

THE JOINT FORUM

BASEL COMMITTEE ON BANKING SUPERVISION
INTERNATIONAL ORGANIZATION OF SECURITIES COMMISSIONS
INTERNATIONAL ASSOCIATION OF INSURANCE SUPERVISORS

The management of liquidity risk in financial groups

May 2006

Contents

I.	Introduction.....	1
II.	Key observations.....	1
III.	Liquidity risk management.....	3
	(i) Centralisation vs decentralisation	3
	(ii) Metrics used for liquidity risk management	4
	(iii) Cross-border issues	4
	(iv) Cross-currency issues.....	5
	(v) Cross-affiliate issues	5
IV.	Regulatory impact	6
V.	Sources of liquidity strain	6
	(i) Event-driven sources	6
	(ii) Transaction- and product-driven sources.....	7
	(iii) Market trends	8
VI.	Stress testing.....	8
	(i) Liquidity stress testing at the group and subsidiary levels	8
	(ii) Stress testing scenarios	9
VII.	Contingency funding plans	13
	(i) General features	13
	(ii) General assumptions underlying CFPs.....	13
	(iii) Mechanisms for cross-border transfers.....	15
	(iv) Responses to the potentiality of breakdowns in mechanisms.....	16
	Annex: Members of the Working Group on Risk Assessment and Capital.....	17

The management of liquidity risk in financial groups

I. Introduction

This paper presents the results of a review by the Joint Forum's Working Group on Risk Assessment and Capital (the Working Group) of funding liquidity risk management practices¹ at conglomerates engaged in banking, securities, and insurance activities. The review focussed on 40 large, complex financial groups with operations spanning national borders, financial sectors, and currencies. The majority of the financial institutions represented in the review were involved in at least two of the banking, securities, or insurance sectors.² All observations are based on information and opinions provided by the firms through written responses to a survey, interviews, and presentations to the Working Group.

The review was designed to address five key questions:

- how large, complex banking, securities and insurance groups manage liquidity risks across jurisdictions, sectors, and subsidiary units, particularly in times of stress;
- the impact of regulatory and supervisory approaches on liquidity risk management practices and structures;
- the nature of the products and activities that give rise to significant demands for liquidity;
- assumptions that firms make regarding available sources of liquidity; and
- the scale of liquidity shocks that firms are prepared to address.

The purpose of this paper is to provide summary feedback to the firms that participated in the review, firms' supervisors, and other interested parties. This paper does not aim to identify best practices and/or to make recommendations for firms or supervisors in any of the three sectors. Any further work on the management and supervision of liquidity risk is left to the consideration of the parent committees (ie Basel Committee on Banking Supervision, International Organization of Securities Commissions, and International Association of Insurance Supervisors).

II. Key observations

The Working Group reviewed the extent to which financial groups integrate liquidity risk management across sectors. Firms in each of the three sectors monitor and manage liquidity risk primarily through the use of risk limits, monitoring systems, and scenario analyses that are incorporated into contingency funding plans (CFPs). However, given differences in

¹ Funding liquidity risk is the risk that the firm will not be able to efficiently meet both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the firm. It differs from the market liquidity risk, which is the risk that a firm cannot easily offset or eliminate a position without significantly affecting the market price because of inadequate market depth or market disruption. However, in many cases, the same factors may trigger both types of liquidity risk.

² When categorised by their most prominent sector, groups include 23 firms primarily in banking, five primarily in securities, and 12 primarily in insurance. Fourteen of them have significant activity in all three sectors.

business lines³ and funding mix, liquidity risk management is mostly separated in financial groups that contain firms operating in multiple sectors. With few exceptions, liquidity risk management is not well integrated in groups conducting an insurance business as well as banking and/or securities businesses. Groups generally have integrated to some extent liquidity risk management across the banking and securities business lines, although the degree of integration varies considerably among firms.

The Working Group also studied differences in liquidity risk management practices within individual sectors. Factors that appear to have a significant influence on a firm's approach to liquidity risk management include: scope of international operations, level of complexity of activities undertaken in different jurisdictions in which the group is present, types of foreign currency exposure, supervisory requirements, legal environment and restrictions, commercial market environment, and national markets. The Working Group found a greater range of practice within the banking sector than within the securities and insurance sectors in areas such as liquidity risk measures and limits, types of scenarios, time considerations, and underlying assumptions.

Some of the surveyed firms indicate that regulations may have an impact on the design of their structures for managing liquidity risk. Some regulatory restrictions impede the movement of liquidity across jurisdictions; for example, regulatory restrictions may give rise to the need to maintain liquid assets in separate jurisdictions and currencies, rather than in a single pool.

Products and activities that give rise to liquidity risk include derivatives, other off-balance sheet instruments, and on-balance sheet contracts with embedded optionality. Additionally, certain market trends serve to increase the amount of liquidity risk to which firms are exposed. These include changes in funding sources and greater customer awareness of product options.

Firms' assumptions regarding available sources of liquidity in a stress situation are reflected in their CFPs. Most importantly, where allowed, firms nearly universally expect to raise funds through secured borrowing during times of stress. Firms take into account the possibility that they will face operational risk in the short-term secured funding market or in clearing and other market mechanisms during a liquidity stress event. However, an implicit, and in some cases explicit, assumption that the official sector would address any operational risk that causes widespread disruption across multiple markets is embedded in certain firms' scenario analyses.

In the area of stress testing, the Working Group reviewed the extent to which tests incorporate both firm-specific and market-wide shocks and the level and depth of stress tests. Most firms test liquidity using firm-specific shocks, generally the impact of a rating agency downgrade. Scenarios that combine a firm-specific stress event with a time of general market stress are utilised by all of the surveyed securities and insurance firms. In the banking sector, about one-third of surveyed banks test the impact of a firm-specific event within an unsettled market environment, while approximately two-thirds simulate firm-specific and market events separately. The outcomes of stress tests across firms should be

³ The term "business line" refers to the traditional business activities and balance sheets in each sector. Banking institutions fund long-term, illiquid instruments (eg loans) with short-term non-contractual funding sources (eg deposits). Securities firms' balance sheets are made up primarily of highly liquid securities (trading assets) that are funded through secured transactions such as repurchase agreements and stock loans. Insurance companies, especially life insurance companies, take on long-term liabilities that are invested in assets with an emphasis on matched funding.

interpreted carefully in light of differences in the nature of stress tests across and within the three sectors. With a few exceptions, liquidity stress testing is also conducted at the subsidiary level when it is conducted at the group level.

III. Liquidity risk management

(i) Centralisation vs decentralisation

The Working Group found that a key defining characteristic of financial groups' liquidity risk management is the degree of centralisation of the management function.⁴ The Working Group studied the degree of centralisation among groups and differences attributable to the type of firm dominating the group.

Financial groups have adopted a variety of structures for managing liquidity risk that range from highly centralised to highly decentralised. The degree of centralisation may be viewed on a continuum, with a minimum level involving the development of general group-wide policies and procedures and the submission to group-level management of regular reports on each business unit's performance and risk profile. A higher level of central control would be for a group-wide risk management unit to manage risk throughout the organisation, either on its own or in conjunction with managers of the operating units. At the tightest level of central control, the centre manages functions on behalf of the operating units.

A group's business model is an important factor in its decision regarding the degree of centralisation of liquidity risk management. Groups also balance considerations of efficiency, minimisation of funding costs, diversification of funding, management knowledge and responsibility, and the feasibility of moving funds and collateral. Groups report that regulation has only a limited impact on the degree of centralisation of liquidity risk management structures.

Firms with a more centralised approach to liquidity risk management cited the benefits of a common language and methodology throughout the organisation, the ability to add central management resources and expertise to local expertise, and the ability to open centrally managed cash and collateral resources to affected subsidiaries. However, firms generally hold adequate liquid reserves at the local or subsidiary level to mitigate the risk that these arrangements may be complicated when funds and collateral are in different currencies or are not easily transferable between group entities.

Groups that are dominated by securities firms tend to take a highly centralised approach, moving funds to wherever in the organisation they are needed in times of stress. At the opposite end of the spectrum, groups conducting primarily an insurance business tend to grant a large measure of autonomy to individual operating units, even when under stress. Banking groups tend to expect local units to handle a crisis initially, but to provide increasing funding and management assistance as the crisis escalates, up to a certain limit.

⁴ When referring to centralised or decentralised approaches to funding liquidity management, there are at least two aspects to be considered: (1) the level(s) at which management policies and procedures, tools, metrics and/or limits are designed and applied within a group; and (2) the extent to which liquidity may or may not flow to certain parts of the group. This paper refers to the second aspect, unless otherwise noted.

(ii) Metrics used for liquidity risk management

Most financial firms use a variety of metrics to monitor the level of liquidity risk to which they are exposed. The basic approaches may be categorised into three types: the liquid assets approach, the cash flow approach, and a mixture of the two.

- Under the liquid assets approach, the firm maintains liquid instruments on its balance sheet that can be drawn upon when needed. As a variation on this approach, the firm may maintain a pool of unencumbered assets (usually government securities) that can be used to obtain secured funding through repurchase agreements and other secured facilities. (The relevant metrics in this approach are ratios.)
- Under the cash flow matching approach, the firm attempts to match cash outflows against contractual cash inflows across a variety of near-term maturity buckets.
- The mixed approach combines elements of the cash flow matching approach and the liquid assets approach. The firm attempts to match cash outflows in each time bucket against a combination of contractual cash inflows plus inflows that can be generated through the sale of assets, repurchase agreement or other secured borrowing. Assets that are most liquid are typically counted in the earliest time buckets, while less liquid assets are counted in later time buckets.

Because, as stated above, most firms use several metrics, there will be some overlap in the approaches taken by firms in the three sectors. Nonetheless, the Working Group's survey revealed notable sectoral leanings. The liquid assets approach is the most commonly used approach in the securities sector for both normal and stress environments. It is used to a lesser extent in the banking and insurance sectors. These two sectors place more emphasis on the cash flow matching approach. When gaps in maturity buckets are unfavourable, banks and insurance companies would utilise the mixed approach to help ensure that they will be able to meet their obligations to provide cash to counterparties.

(iii) Cross-border issues

A key issue in group liquidity risk management is the extent to which individual business units domiciled in jurisdictions other than that of the parent are expected or have the ability to handle liquidity pressures with their own resources. In this regard, a number of groups differentiate between jurisdictions with hard, convertible currencies and those with non-convertible currencies. Approaches to cross-border liquidity risk management range from a group's expectation that non-domestic units stand alone and independently access funding liquidity in a stress situation to a central provider of funding liquidity across the group, up to a certain limit. The latter approach is consistent with the more centralised liquidity risk management model generally found in securities groups. An in-between approach is most common in the banking sector, with a variety of shadings as to how quickly and to what extent the central liquidity provider enters into the picture. In the insurance sector, there is the expectation that the individual units will stand alone, although there is some access to the parent as a lender-of-last resort in severe stress scenarios.

Firms note that cross-border liquidity risk management is subject to the requirements of maintaining cash and collateral in both domestic and foreign currencies, which involves a trade-off between maintaining readily available liquid assets for contingent funding needs in various entities within the group versus the costs of maintaining such assets.

Financial groups' three main alternative approaches to addressing cross-border issues include holding liquid assets (i) in a single entity concentrated in one location, (ii) in a single entity in a number of locations, and (iii) in a number of subsidiaries in various locations.

Approximately 30 percent of the surveyed firms operating primarily in the banking or securities sectors take an approach that entails centrally managed pools of liquid assets in an entity widely diversified by location, time zone, currency or central bank access. (No insurer-led group is known to have this approach.)

(iv) Cross-currency issues

Major financial groups noted the presence of cross-currency/cross-time-zone liquidity risk, that is, the risk that arises when a firm relies on a cash inflow or asset in one currency to meet an obligation in another currency, often in another time zone. However, currency risk appears not to be limited to groups with international activity; some firms noted that they face significant cross-currency liquidity risk because they raise large amounts in foreign currencies and swap them into the currencies needed by their business, both for cost-of-funding and diversification reasons.

Most firms assume continuous convertibility of the major currencies, even in their stress scenarios. Some firms nonetheless monitor the extent of cross-currency liquidity risk at group level by calculating group liquidity risk for each currency material to their business or by monitoring imminent currency borrowing needs across the group. Liquidity risk management of soft currencies (ie currencies incurring material foreign exchange risk) can involve either a prohibition of asset/liability mismatches or the exclusion of mismatched assets and cash inflows from the calculation of the group's liquidity risk profile. Securities firms address currency risk by maintaining parent-level liquidity reserves overseas, as well as by maintaining excess liquidity in foreign subsidiaries.

(v) Cross-affiliate issues

A key issue for the Working Group was the extent to which the parent or subsidiary units of a group would provide liquidity to affiliates under stress and the implications of cross-affiliate transfers of funds and collateral across national borders, sectors, and currencies.

Liquidity support from parents is not common in the insurance sector, given generally strict regulatory restrictions on funds transfers from one insurance subsidiary to another. Parent support is more common in the banking and securities sectors, where parent firms often serve as a source of strength and ensure that there are resources at both the parent and subsidiary levels to address liquidity events as they arise. This is consistent with the tendency towards the centralisation of liquidity risk management in these sectors, as greater centralisation generally contributes to a structure in which affiliates are expected to provide liquidity support to one another.

Most groups opined that reputational contagion (ie when market counterparties assume that a problem at one affiliate implies a solvency problem for the group as a whole) is the most likely mechanism by which a liquidity problem in one affiliate would spread to other parts of the group, especially if the group follows a centralised approach to liquidity risk management. To mitigate contagion, surveyed firms stressed the importance of communication with counterparties, credit rating agencies, and other stakeholders. In addition to a highly effective communication function, group-wide CFPs, liquidity pools, and multiple sources of funding were identified as mechanisms that may mitigate reputational contagion. In addition, some firms with decentralised liquidity management opined that such a decentralised approach

could mitigate reputational contagion to some extent, as long as the approach is well-communicated and understood by the market ex ante.

Groups also noted that liquidity pressures can spread through various cross-affiliate funding channels. An entity that provides regular funding to affiliates may be unable to continue providing the normal funding on which its affiliates rely when it faces its own liquidity strain or one affiliate is in need of extraordinary funding. Groups often establish internal limits on liquidity risk at the group level. Stress testing is viewed as a useful tool in determining group limits. Many firms also have limits at subsidiary levels to reduce the subsidiary's reliance on funding from the parent in order to reduce the likelihood of contagion from stresses felt elsewhere in the organisation. Internal limits are sometimes set for each currency used by the firm. The limits may be stricter where ready conversion between currencies is uncertain, particularly in stress situations.

IV. Regulatory impact

The Working Group asked firms to indicate what consequences, intended or unintended, regulatory standards have for liquidity risk management. A number of groups comprised primarily of banking or insurance firms stated that regulatory constraints limit their ability to centralise liquidity risk management and their options for dealing with crisis situations. The firms made several suggestions for regulatory change, the most prominent being recommendations for relaxation of the limits on providing funding to affiliates, especially when the affiliate is under stress. Several firms advocated harmonisation of national regulations, the acceptance of internal models in lieu of quantitative regulatory requirements in jurisdictions that impose those rules, and the adoption of the "home regulator concept".

Securities groups generally did not indicate that regulatory requirements significantly interfere with the way that they are organised for liquidity management purposes. Securities firms generally do not view capital requirements, which apply to their broker-dealer subsidiaries, as impacting their liquidity risk management because internal decisions result in capital levels maintained in regulated subsidiaries that exceed supervisory requirements. Some securities firms did note, however, that regulators of financial institutions often impose restrictions on inter-affiliate loans and that cross-border liquidity transfers are sometimes discouraged by the resulting tax consequences.

V. Sources of liquidity strain

Liquidity risk arises from many sources, including a financial firm's business decision to provide liquidity to the markets, potential damage to a firm's reputation, specific products and activities, and potential changes in the macroeconomic environment.

(i) Event-driven sources

Ratings downgrades or other negative news leading to a loss of market confidence in a firm were cited as the most significant firm-specific sources of liquidity risk across the sectors. For securities firms, a downgrade or other loss of market confidence would impact the firms' ability to refinance current unsecured debt obligations, which are their primary sources of funding for activities that cannot be self-financed. For insurers, such a triggering event would typically cause many policyholders to consider surrendering their policies provided that the

contractual and economic conditions are fulfilled. In addition, many reinsurance contracts include a ratings-downgrade trigger under which collateral is required when the rating of the counterparty falls below investment grade. For banking organisations, a downgrade can result in reduced market access to unsecured borrowings (eg commercial paper) from institutional investors, a reduction or cancellation of inter-bank credit lines, or a reduction of deposits. Downgrades or other material, negative, firm-specific news or rumours can also increase liquidity demands through margin calls, requirements to post additional collateral, the need to provide credit enhancements or backup lines for securitisations, and the need to fund assets no longer capable of being sold or transferred via securitisation.

Funding liquidity risk also arises from systemic events, such as Long Term Capital Management's near-collapse following the 1998 Russian bond default, or external events and catastrophes resulting in large claims on insurers. Financial groups find that preparing for systemic events presents challenges because scenario analysis requires in-depth and detailed determinations of appropriate assumptions regarding different sources of systemic risk, the speed and timing of the event, its impact across the various firms within the group, and the behaviour of counterparties – information that is not easily derived from historical data.

(ii) Transaction- and product-driven sources

The survey indicated that the primary transaction- and product-driven sources of liquidity risk involve derivatives, other off-balance sheet instruments, and on-balance sheet insurance contracts with embedded optionality. The most significant sources of transaction-driven liquidity risk at securities firms, and among the more significant sources at banking firms, are over-the-counter (OTC) derivative transactions and stock-borrowing transactions, where sharp and unanticipated market movements or events, such as an unanticipated bankruptcy, default, or ratings downgrade, could cause demand for additional collateral from counterparties.⁵

Similar pressures on firms' (especially banks' and securities firms') liquidity positions can arise from collateral calls from exchanges in connection with foreign exchange and securities transactions, margin and collateral agreements in the OTC derivative market or repo market, liability mismatches arising from settlement systems requiring effective hedging or increased collateralisation, and short positions in financial options with cash delivery. Firms reported that the liquidity risks from these sources have been increasing over recent years. Margin requirements for collateralised transactions are becoming more common because the rating agencies require high collateralisation levels and ratings-downgrade triggers to support their highest credit ratings. Higher trading volumes, information-efficient markets, and ratings-linked behaviour of market participants have contributed to funding liquidity pressures for some firms.

Off-balance sheet exposures also contribute to liquidity risk at banking firms during times of stress. Key off-balance sheet products that can give rise to sudden material demands for liquidity at banking firms include committed lending facilities to customers, committed backstop facilities to commercial paper conduits, and committed back-up lines to special purpose vehicles.

⁵ In a stock borrow transaction, the firm borrows securities and provides cash as collateral in an amount equal to the value of the securities borrowed. If the market value of the securities increases, the firm will be called upon to provide additional cash collateral or return some of the borrowed securities.

Insurance contracts offering policyholders the right, at regular intervals, to surrender a contract on guaranteed terms give rise to liquidity risk. Another commonly mentioned product was linked funds, where investors are entitled to demand redemptions; funds holding illiquid assets such as real estate are especially problematic. Other products mentioned by a few firms include swaps, futures, and put options sold by the firm that might need collateralisation, and reinsurance or other contracts containing rating triggers.

(iii) Market trends

In addition to specific products and activities, firms noted certain market trends that may increase liquidity risk. Banking firms noted that a movement to more volatile funding sources, such as wholesale funds, brokered certificates of deposit, and internet banking, and depositors' ability to switch funds among accounts by electronic means, have complicated liquidity risk management. Insurance firms noted that they are selling a larger volume of savings-based products as opposed to protection products and there is also greater awareness by customers of the options available to them in various insurance products. Growth in insurers' institutional business has increased the proportion of the customer base that is operating with large volumes of assets that can be switched to new firms or products with relative ease.

VI. Stress testing

Almost all financial firms in the Working Group's survey conduct some form of stress testing of liquidity risk to prepare the firm to cope with strain, to assess opportunities for business development, or to help determine the best way to fund new activities and asset growth.

(i) Liquidity stress testing at the group and subsidiary levels

There is a strong relationship between a firm's proclivity toward central management of liquidity risk and its conduct of liquidity stress testing on a group-wide basis. If the liquidity management is centralised, group-wide stress testing generally is performed.

A key observation from the survey is that most conglomerate groups with significant operations in all three financial sectors stress test their insurance business separately from their banking and securities businesses.

With a few exceptions, liquidity stress testing is also conducted at the subsidiary level or by geographical regions when it is conducted at the group level. This is especially relevant when the nature of what constitutes a stress scenario may differ substantially from one jurisdiction to another. Those firms that do not conduct stress testing at the subsidiary level perceive essentially all liquidity risk to reside in the main corporate unit, and this risk is analysed by a group-level test. The results of stress testing conducted at the subsidiary level generally are reviewed at the group level, regardless of the level of centralisation. However, the subsidiaries may have considerable autonomy to devise scenarios that are specific to them, particularly if they are expected to stand alone in a crisis without parent support. This expectation is especially widespread in the insurance sector.

Most firms that stress test at the group and subsidiary level believe that they are able to better consider contagion effects across the firm and to assess potential movements of available liquidity to wherever it is needed in the group. These firms believe that this can

result in pro-active cross-border, cross-currency, and even cross-sector transfers of funds and collateral in order to obtain a balanced liquidity risk profile across the subsidiary units during periods when there is no crisis.

Firms that do not stress test at the group level appear to rely on their subsidiaries to handle localised liquidity events both on a day-to-day manner and for contingency purposes. Firms note that an advantage to stress tests being conducted at the local or subsidiary level is reliance on local management who are most familiar with the local markets and customers to manage liquidity events. In the cases where concerns about currency convertibility are at issue, groups generally require that a local subsidiary or affiliate manage day-to-day and contingency liquidity separately from the group.

Conversely, certain firms take the view that the lack of group-wide stress testing may expose firms to intra-group contagion of liquidity risk since the firm will not have a mechanism to plan for reputational risk events that can spread throughout the group. Moreover, these firms state that a failure to stress test at the group level may not take into sufficient consideration important group effects, limits on the accessibility of any parent support, and the operational and timing constraints that impede funds movements across national borders and currencies. Moreover, the absence of group-wide stress testing may limit the firm's internal transparency of information which facilitates decision making and the ability to direct liquidity resources to resolve a crisis.

(ii) Stress testing scenarios

Stress testing scenarios at firms include both firm-specific and market scenarios. Many firms create a firm-specific scenario that reflects a two- or three-notch downgrading in their creditworthiness rating by an external rating agency. The key factor determining the severity of the stress tests is not the number of notches that the firm is downgraded, but the consequences for the balance sheet and cash flows that result from the downgrading.

Market stress scenarios may involve either changes in the macro-economic environment or disruptions in the markets or both. Changes in interest rate levels, stock prices and inflation rates are macro-economic factors that affect the provision of and demand for funds.

About one-third of surveyed banks test the impact of a firm-specific event within an unsettled market environment, while approximately two-thirds simulate firm-specific and market events separately. In the securities sector most scenarios involve a firm-specific event occurring during a time of market stress. Insurance firms also tend to simulate both stresses together, although just under half also simulate one or the other source (or both) separately. As noted previously, the outcomes of stress tests across firms should be interpreted carefully in light of differences in the nature of stress tests across and within the three sectors.

Banking sector

In the banking sector, a primary liquidity risk is deposit run-offs in a firm-specific event. The assumptions that banks utilise are based on a combination of firm-specific historical data, industry data from prior stress events, and/or best guess estimates. When using firm-specific historical data, some banks add an extra cushion to the assumed outflows to factor in their perception that data largely based on stable historical periods may not adequately proxy depositor behaviour during a future stress event. The severity of deposit outflows in a bank's stress scenario depends upon factors including the strength of the bank's relationships with its customers, the proportion of deposits that is protected by deposit insurance, the composition of its balance sheet, and the duration of the crisis.

The percentage of retail deposits that exit the bank in a crisis scenario is typically postulated to be in the single digits, with a few banks assuming outflows could be in the low double digits. In some jurisdictions this reflects an assumption that retail depositors would be comforted by deposit insurance and so would not withdraw their deposits. For corporate, bank and government deposits, which tend to be uninsured, typical worst-case scenarios reflect outflows of between 20 percent and 50 percent, typically over a one-month time span. Outflows are at least sometimes assumed to be 100 percent for certain deposit types that are dependent on the bank's credit rating. At least some banks make finer breakdowns according to the type of client and the relationship between the client and the bank, for example, distinctions between domestic and foreign depositors or per geographical regions. Banks generally assume that time deposits will not be withdrawn until maturity and at maturity, some percentage will be renewed.

Banks also commonly assume that they will roll over loans as they mature in order to protect their franchise.⁶ They assume that the repo and securitisation markets remain open, that certain assets remain liquid, and that the currencies of the developed countries remain convertible. Nonetheless, most banks recognise that assets may entail haircuts (depending on the scenario); and some assume that even secured funding would not be available, except from the central bank. Many also recognise that intra-group cash flows might be disrupted.

In addition, banks also conduct stress tests for sudden, unexpected demands for liquidity that may arise from products or services that require them to provide funding based on a triggering event. For instance, a credit downgrade of the firm may prompt the firm's counterparties to request additional collateral for derivatives transactions. Other common triggers include the need to fund liquidity backup arrangements and credit enhancements for securitisations.

More than half of banks stress test hypothetical crises lasting one month or less; one quarter test crises lasting two or three months; and the remainder test crises lasting six months or more. A few banks test a range of different durations.

Securities sector

The primary liquidity risks noted by securities firms were: (1) the inability to continue to obtain unsecured long-term debt to support the illiquid portions of their balance sheets; and (2) demands for additional collateral to continue to finance liquid assets. Securities firms mitigate these risks by holding pools of unencumbered highly liquid assets (government securities) that can be used in a crisis to replace unsecured funding and meet other cash needs (such as calls for additional collateral). The assumption is that the firms will not be able to access unsecured funding markets at all or on favourable terms for a period of time and, consequently, will need to rely on the government securities in their liquidity pools to raise funds to meet cash needs (primarily maturing debt obligations) for a period of time.

Therefore, the primary stress tests are: (1) the amount of cash needed to survive a 12-month period during which no unsecured long-term debt can be issued; and (2) the amount of long-term debt and shareholder equity (cash capital) needed to fund 100 percent of illiquid assets and stress haircuts on liquid assets. The result of the first test is used to size the firms'

⁶ In later stages of a real crisis, banks may well not renew maturing loans in order to apply repayments to obligations. However, for purposes of stress testing, they conservatively assume that they will not use this funding source.

liquidity pools. The cash capital test quantifies the buffer of liquidity that can be used to continue the secured financing of liquid assets in a stress (market or firm-specific) event.

Securities firms tend to simulate crises lasting one year, while assuming that the most crucial period will be the first two weeks.

Insurance sector

Insurance firms noted that their primary source of liquidity risk is product-driven, in particular in the case of professional policyholders. Assumptions regarding the severity of liquidity demands vary between jurisdictions and markets depending on the firms' market and product features as well as the nature of the insurance business (life or non-life).

The insurers noted that they conduct liquidity stress testing as part of their solvency or asset/liability stress testing. Asset/liability testing involves modelling asset and liability cash flows under normal, stress, and catastrophic scenarios and is designed to ensure, among other things, that the company's assets exceed its liabilities, that liquid assets will be available to meet the cash flow requirements of policyholder obligations as they fall due, that the average life of a block of liabilities is maintained within a specified range of the average life of the underlying assets, and that the impact of a change in interest rates will be within tolerance limits.

As an example, stress scenarios for a life insurer might include prices and yields in the debt securities market changing adversely to the insurer for an extended period⁷, during which (i) mortality rates remain stable or increase above the norm, and/or (ii) the rate of policy lapses changing unfavourably. In these scenarios, the insurer is assumed to be unable to raise sufficient cash to meet its policy obligations without incurring significant losses. Typical assumptions underlying these scenarios include:

- A shift in the yield on debt securities either up or down by 200-300 basis points over a multi-year period, eg 5 years, or a shift obtained from a value-at-risk (VaR) measure, for instance, a tail VaR at a 99 percent confidence level.
- An increase in defaults on debt issues and a decline in income from real estate investments.
- Variations in policy lapse rates by 20-50 percent above or below the norm, depending on which direction would have an adverse impact on a particular policy type. Some insurers make assumptions more or less severe than a 20-50 percent variation and tie the assumed lapse rate to the product type (eg wholesale or retail). In some markets, the potential for variation in lapse rates is limited because contracts make it disadvantageous to the policyholder to surrender a policy before stated expiration.
- An increase in mortality by 15 percent generally over a five-year period. These scenarios include the possibility of a catastrophic loss from terror attacks and epidemics.

⁷ Insurers believe that short-term market fluctuations have a minimal impact on their liquidity because well-managed firms maintain sufficient reserves in cash or near-cash instruments to ride out temporary periods of market stress.

- With respect to variable or separate account products with guarantees, a sudden drop in the stock market comparable to the 1987 market break, eg 20 to 35 percent over a short timeframe.

It is important to note that these scenarios involve the unfavourable change persisting for an extended period. Short-term market fluctuations would have minimal impact on a life insurer's liquidity situation because well-managed firms maintain sufficient reserves in cash or near-cash instruments to ride out temporary periods of market stress.

Other scenarios are closely tied to technical risk, with less relationship to market risk. For example, new business may grow faster than planned, leading to increased cash outlays for policy acquisition expenses and higher reserving and capital requirements. Still other scenarios involve expenses increasing faster than expected, forcing the firm to draw down its stock of cash and other liquid assets.

Another element in insurers' stress testing in some jurisdictions is to assume that reinsurance fails when the primary insurer is facing a large claim or group of claims. This particular test may be undertaken from a credit, as well as liquidity, perspective. Usually, insurance undertakings' exposures on risks arising from reinsurance contracts are reflected in the overall credit risk assessment.

Insurers may also assume that following a firm-specific stress event, no new business will be written and thus cash inflows from new premia totally cease. Simultaneously, higher lapse rates will be experienced, reducing inflows of premia on previously contracted business. The reduction in premium income would force the firms to utilise their assets to meet policy claims, with potentially significant alterations in the maturity structure of remaining assets and implications for cash flows in later time buckets.

Some insurance supervisory agencies specify a particular scenario that insurance companies in their jurisdictions must stress test. In addition, some insurance companies have adopted internally the liquidity stress tests conducted by the rating agencies (eg Standard and Poor's⁸). These tests apply various factors to the values of assets to reflect their market liquidity and other factors to the various types of liabilities to reflect the risk of unexpected payment demands emerging. The factors vary according to the scenario and time horizon (generally from one month to one year).

As a consequence of the nature of insurance business, the relevant timeframes for liquidity crisis tend to be longer than in the other sectors. Approximately half of surveyed insurance firms simulate stress scenarios lasting for one year or less; a fourth, stress scenarios lasting three years or more; and the final fourth, various stress scenarios lasting from one month to three years.

⁸ Standard and Poor's has been using a liquidity model for insurance companies in North America since the early 1990s. Moody's introduced its own model in 2003. Both rating agencies think that liquidity considerations are becoming an increasingly important factor influencing the overall rating of life insurance companies in Canada and the United States. (The rating agencies do not apply liquidity models to European insurance companies because they view European insurance products to be less likely to have significant liquidity risk.)

VII. Contingency funding plans

Nearly all of the surveyed firms reported having a CFP at some level in the organisation or being in the process of developing a plan. Nonetheless, only a few firms with significant business in all three sectors reported having a CFP that covers the whole group, although all firms exercise oversight at the holding company level. Nearly all groups conducting both banking and securities activities have a global, cross-sector CFP. CFPs generally provide for subsidiaries to look to their parent for funding in those organisations where liquidity pressures are managed centrally, and also in many cases where the liquidity pressures are to be managed locally in the first instance.

(i) General features

CFPs generally document the sources of liquidity available to the firm, prioritising the sources from which funds are to be accessed or raised. Notably, CFPs are generally linked to stress testing scenarios. In cases where a firm has more than one stress test, it is not uncommon to see variations tailored to each scenario to highlight the proposed actions for accessing liquidity in the scenario. CFPs also specify the responsibilities of various officers and staff of the firm when it undergoes strain. They generally include provisions for making contact with important counterparties, supervisory authorities, credit rating agencies, and the media.

(ii) General assumptions underlying CFPs

Firms' CFPs incorporate a range of assumptions regarding the sources of additional funding in a crisis. These may be grouped in four categories: secured borrowing, unsecured borrowing, sale of assets, and other. In the event of a market-wide or systemic crisis – one extending beyond just a few institutions or transfer systems – most firms in each sector expect that central banks and other national authorities will step in to help resolve the situation.

Secured borrowing

Almost all surveyed firms expect to borrow funds secured by collateral in times of stress. The borrowing would be obtained through repurchase agreements arranged either with private sector counterparties or, in the case of eligible counterparties, with central banks. For banks, the proclivity to go to the private markets versus the central bank varies according to the bank and the scenario. In a market-wide stress scenario, banking firms generally expect to turn to their central banks as they assume that all banks would be affected.

With respect to private sector borrowing, some firms assume that the haircuts on secured loans would become larger when the firm is under stress, and they take this factor into account in assessing how much they can borrow against a stated amount of collateral. Assumptions about how much the haircuts widen vary from firm to firm and usually depend on the type of collateral.

It is not clear whether firms' CFPs take account of limitations on the capacity of the private markets to deal with an affected firm. If a firm's demand for cash is large enough and compressed into a very short time span, the markets may become unsettled. While firms generally secure their borrowings with the most liquid government securities to maximise market access, their CFPs often do not consider the time factor (ie how quickly the cash must be raised).

The Working Group investigated the potential use of tri-party repurchase agreements⁹ in stress situations. Because a tri-party custodian has expertise in collateral management that the cash lender may not have, a tri-party repo structure gives cash borrowers access to a wider range of cash lenders and may allow for a wider range of collateral than bilaterally arranged repos. Firms indicated that borrowings under tri-party repurchase arrangements are implicitly (if not explicitly) included in their plans to obtain secured funding in a contingency situation. These firms note that potential users must pre-arrange the agent account, links, investor relationships, collateral schedules, and other elements of the facility. Unless they do so, they would not be able to avail themselves of this mechanism when a crisis strikes. Even then, the terms have to be agreed bilaterally with the counterparty, as the custodian is responsible only for determining the type of collateralisation. A further risk is present in that a custodian bank may have extended an unadvised, non-collateralised line of credit to facilitate the transactions. Unless it is secured, this line can be withdrawn in a crisis.

Unsecured borrowing

Most firms assume that unsecured borrowing would not be available to them in stress situations, particularly at the group level. Even committed lines of credit might not be counted upon because the funds provider could prefer to face the legal consequences of failing to honour a commitment than the credit risk inherent in a weakened borrower. Nonetheless, a few firms include unsecured borrowing in their CFPs for certain less stressful scenarios. Such borrowing would be obtained on the inter-bank market within limits previously established under ongoing programs for the issuance of commercial paper and through other sources of normal funding.

Asset sales

Nearly all firms expect to sell assets if necessary. Those firms that have trading portfolios would reduce their size. Insurance companies expect to sell out of their holdings of government securities. Some firms indicate that asset sales would be appropriate only in the event of a firm-specific crisis, not in general market stress. Firms acknowledge that they may have to accept markdowns on the assets to be sold, particularly the less liquid ones. Other firms indicate that asset sales would be considered only when an extended liquidity squeeze is expected or occurs.

Securitisation constitutes one important type of asset sales. An estimated three-fourths of banks and an estimated one-third of securities and insurance firms expect to securitise loans and other receivables. However, securitisation is more a means of raising funds strategically than specifically in stress events. Indeed, firms acknowledge that they need to be regular players in the securitisation market in normal times in order to be able to use this mechanism when under stress. For this reason, some firms engage in securitisation in normal times to be able to do so in case of liquidity stress. Firms also seek to use this mechanism early in a pending crisis and inconspicuously so as not to give the markets an indication that they might be facing liquidity strains.

⁹ A tri-party repo is an arrangement in which a trusted custodian safekeeps the repo collateral on behalf of both counterparties. The custodian ensures the simultaneous exchange of funds and collateral at both the initiation and the termination of the repo. The costs associated with the delivery of securities are eliminated, yet the lender of funds has comfort that the borrower does not have possession of the collateral.

Other

With respect to other funding sources, insurance companies may look to payments from reinsurers, although some insurers (partly depending on the jurisdiction) assume that such payment will not be forthcoming in a stress scenario.¹⁰ Other insurers may seek to accelerate collections of premia from agents. In some jurisdictions, there is a reliance on policy terms that enable the insurance firm to adjust the amount of any surrender value in line with the realisable value of assets and to make payments at a time of its choosing (where required, subject to regulatory approval).

(iii) Mechanisms for cross-border transfers

Firms expect to undertake cross-border transfers of funds and collateral when a crisis emerges. In order to make transfers, market participants typically need to access both the securities and payments infrastructure for the relevant instrument and currency. Thus they interact with national systems, as well as with trans-national systems like Euroclear and Clearstream. While the national systems work well when used by local banks to meet local needs, for foreign transactions it becomes more complex, as firms must have access to the foreign system, a means of moving the funds or instruments, sufficient time for the movement, and experience in dealing with the foreign system. Firms note that legislation on clearing and settlement systems is not harmonised, and developing common procedures to handle transactions requires a big investment.

Some firms connect to the clearing and settlement mechanisms through correspondents (ie nostro agents). The decision as to whether to utilise a nostro agent involves considerations of simplicity of operations, cost, the siting of sufficient and suitable collateral in the right place, knowledge of the local markets, the degree of central control that the group wishes to exercise, and the availability of uncommitted and uncollateralised credit lines from the agent. Balancing these considerations, the major players choose to self-clear in the currencies that they consider to be strategic to their operations and to use correspondent service providers for the remainder. In particular, the firms use correspondents for the non-convertible currencies and do not expect to make cross-border transactions in these currencies during a crisis.

Where market participants choose to settle foreign securities directly, they may establish membership in the local settlement system through a local subsidiary or branch. A second option is for the firm to connect to the local settlement system through remote access. A third method is to take advantage of links that various central securities depositories (CSDs) have established among themselves. Firms' reliance on CSDs, in turn, presumes that the necessary systems will be open and able to make timely movement of funds and collateral in a timely manner.

Another issue involves timing. Payments and securities transfers can be effected only within the schedules set by the systems involved. While much progress has been made to synchronise the schedules of various systems operating within a jurisdiction, the issue of making transfers across time zones has not yet been fully resolved. Thus transfers between the Asian, European, and North American time zones still represent something of a

¹⁰ For instance, in some contracts, when an insured event occurs and obligations under reinsurance contracts are clear and undisputable, reinsurers make payments to the primary insurer within few days after the filing of claim.

challenge, particularly if the transfers have to be made at short notice, as might happen during a contingency.

(iv) Responses to the potentiality of breakdowns in mechanisms

Some firms incorporate in their CFPs steps to take in the event that clearing and settlement systems are not operating normally. A majority of the surveyed securities firms have developed, or are in the process of developing, CFPs predicated on the assumption that the repo market is inoperative. For example, some of them maintain cross-jurisdictional secured facilities for use when intra-jurisdictional secured funding sources experience operational difficulties. Some banks have thought about how to resolve the problem without turning to the central bank. For example, a bank might seek to protect itself from the failure of a settlement system by distributing collateral across separate systems (eg Euroclear and Clearstream) and by making rapid adjustments should a breakdown materialise. Other banks have not made special provisions for a breakdown in securities systems. If such a breakdown were to occur, these banks typically would plan to borrow from their central banks, perhaps using pre-pledged collateral and a variety of transfer mechanisms between central banks.

Annex

Members of the Working Group on Risk Assessment and Capital

**Co Chairmen: Paul Sharma, UK Financial Services Authority
Lance Auer, Federal Reserve Bank of New York**

Belgium	Mr Jurgen Janssens	Commission Bancaire, Financière et des assurances
Canada	Mr Daniel Mayost	Office of the Superintendent of Financial Institutions
France	Mr Philippe Faure	Commission Bancaire
Germany	Mr Daniel Mestek Mr Axel Oster Mr Michael Porth	Bundesanstalt für Finanzdienstleistungsaufsicht
Italy	Ms Laura Pinzani	Banca d'Italia
Japan	Mr Naoyuki Suzuki	The Bank of Japan
Netherlands	Mr Klaas Knot	De Nederlandsche Bank NV
Spain	Ms Marta Estavillo Mr José Manuel Portero	Banco de España Comisión Nacional del Mercado de Valores
Switzerland	Mr Christopher McHale Mr Robert Bichsel	Eidgenoessische Bankenkommision Swiss National Bank
United Kingdom	Mr Vincent Baritsch Mr William Hewitson Mr Jeremy Richardson Ms Sarah Parkinson Mr Mark Chertkow	Financial Services Authority Bank of England
United States	Ms Mary Frances Monroe Ms Jodie Goff Mr William Tiernay Mr Keith Ligon Ms Mayra Gonzalez Ms Elise Liebers Mr Richard Mead Ms Teresa Rutledge Mr James Ray Diggs Mr George Lavdas Mr Randall Roy	Board of Governors of the Federal Reserve System Federal Deposit Insurance Corporation Federal Reserve Bank of New York Office of the Comptroller of the Currency Securities and Exchange Commission
EU Commission	Mr Tobias Mackie	
FSF	Ms Kristel Grace Poh	
IMF	Mr Todd Groome	
Secretariat	Mr Laurent Le Mouël	Joint Forum Secretariat
Observer	Ms Luchia Christova	Secretariat of the Committee on Payment and Settlement Systems