



Principles of Liquidity Risk Management

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Principles of Liquidity Risk Management¹

Executive Summary

In late 2005, the Institute of International Finance (IIF) established a Special Committee on Liquidity Risk. The Special Committee, chaired by Ahmass Fakahany, Vice Chairman and Chief Administrative Officer of Merrill Lynch, with Chris Grigg, Chief Executive, UK Business Banking of Barclays as vice chairman, includes representatives of about 40 of the largest global financial institutions. The objective of the Special Committee was to develop a perspective and Recommendations on liquidity risk measurement, monitoring, management, and governance at financial institutions. The focus is timely, as the liquidity characteristics of international markets have been undergoing significant changes at a time when the industry and the regulatory community have been giving relatively greater attention to other issues. The Special Committee is broadly encouraged by the growing sophistication of firms' approaches to liquidity risk management and does not see any imminent cause for special concern. Nevertheless, increased globalization of firms and the financial system, the increasingly concentrated number of firms that provide market volume and liquidity, the increased reliance on secured funding, and the lack of harmonization of global liquidity standards suggested that a closer look was needed.

This report focuses on funding liquidity risk, exploring appropriate practices and making a number of Recommendations for the private sector on three broad topics: governance and organizational structure for managing liquidity; an analytical framework for measuring, monitoring, and controlling liquidity; and stress testing and contingency planning. The intent of the report is to raise expectations for liquidity risk management. The fundamental premise is that firms should deliver, and supervisory and regulatory approaches should recognize, risk-management frameworks that are tailored to each firm's business model and market position. To this end, the report also includes some Considerations for the Official Sector that the Special Committee hopes will be useful in assessment of policy positions and in evaluation of firms' positions and practices.

It is important to underscore that the deliberations of the Special Committee demonstrated repeatedly that firms' needs and strategies can, for legitimate business reasons, vary considerably, so that the Recommendations proposed must be understood as describing a range of good practices, not a prescriptive list of necessarily "best" detailed practices. Moreover, all Recommendations and commentary apply on a *"comply or explain"* basis, and controlled firms may have good reasons to take quite different approaches.

A brief overview of Emerging Liquidity Issues in a Changing International Environment offers a review of market developments behind the analysis. While it can be argued that the markets have become more resilient with recent innovation and increasing interconnectedness, it cannot be known with certainty whether new vulnerabilities have been created or old ones displaced in ways that will need to be dealt with in the event of a liquidity crunch. This appreciation of what we may not know or fully understand is why attention to good practices is timely and why the industry on the whole has made substantial investments in liquidity risk management.

Both effective governance and organizational structure for managing liquidity are critical given that liquidity issues come up in various ways for firms with different mixes of business, funding structures, market characteristics, and risk appetites. Because no formulaic approach will yield appropriate or prudential results across the board, internal governance and controls are the keys to reducing liquidity risk for a firm. Similarly critical is public disclosure of information about each firm's liquidity risk management practices.

The analytical framework for measuring, monitoring, and controlling liquidity risk in each firm receives considerable attention, reflecting the priority that firms need to give to developing appropriate measurement and monitoring tools. Current risk-management techniques provide firms with clearer views, better-understood internal strategies, and better control overall.

¹Related regulatory papers consulted include "Sound Practices for Managing Liquidity in Banking Operations," Basel Committee on Banking Supervision, February 2000; "Sound Practices for the Management of Liquidity Risk at Securities Firms," Report of the Technical Committee of the International Organization of Securities Commissions, May 2002; and "The Management of Liquidity Risk in Financial Groups," The Joint Forum, Basel Committee on Banking Supervision, May 2006. They are referenced where appropriate.

Such techniques, however, require careful review of assumptions and experience to provide strong underpinnings for the sound judgment that each firm must apply to assessing its needs and risks in both businessas-usual and stressed conditions in order to establish appropriate metrics and limits within its strategy. The Special Committee believes that no simple, predetermined metrics or quantitative measures with prescribed assumptions would work to provide either adequate liquidity safeguards or truly useful disclosures. Imposing such simple measures across institutions might have some immediate appeal but is unlikely to give truly comparable results across institutions. In fact the lack of comparability may render the information yielded by such measures at best not useful and at worst potentially deceptive.

Each firm's liquidity management must include substantial attention to stress testing and contingency planning. While methodological work is constantly improving sensitivity analyses and scenario testing, management judgment remains critical and the question becomes, essentially, how to structure the process to make sure that modern and well-founded techniques are used to support but not to supplant good judgment. Part of that analysis needs to be focused on clearly understanding the role of central bank facilities and the limits on these facilities.

The short but significant list of Considerations for the Official Sector reflects the concerns of the industry about the increasing disconnect in globalized markets between firms that conduct a substantial amount of their business across borders, often largely managed on a group-wide basis, and historical patterns of local regulation. While it is essential to recognize the benefits of liquidity risk regulations, both for the public at large and firms in the financial industry, and certain jurisdictional constraints faced by the official sector, failing to adapt regulatory and supervisory structures to more integrated and responsive markets may increase the chance of firm-specific or systemic crossborder problems, and reduce the efficiency of liquidity risk management for firms.

As in other areas of regulation, it is essential that home and host supervisors of international groups coordinate their supervision of groups' integrated liquidity risk management structures. Although complete convergence of regulations may not be feasible, regulators should seek to harmonize regulations in order to facilitate sound internal risk-management systems. Liquidity regulations should be based on qualitative approaches designed to foster sound enterprise risk management, not prescriptive, quantitative requirements. As part of any review of the regulatory and supervisory approach, the problem of trapped pools of liquidity must be addressed in order to enable groups to manage firm-wide liquidity more efficiently and to avoid unnecessary potential problems. To this end, central banks and settlement systems should expand and harmonize the range of collateral that they accept. Finally, central banks should consider providing greater and more uniform clarity on their role as lenders of last resort and, where they are not already doing so, participate more actively in firm- and system-wide contingency planning. Although this raises moral hazard issues that need to be managed, the trade-off between the ability to plan for a crisis against time-bound "constructive ambiguity" needs to be reexamined.

Given their significance in recent market developments, the report highlights two additional emerging issues: the increased reliance on secured funding as an incremental source of liquidity and the need to consider how complex financial instruments can affect a firm's liquidity. Secured financing is now fundamental to the liquidity profiles of international financial institutions. Recommendations are thus aimed at firms' developing a deep understanding and robust planning for issues of access to secured funding, and refining their risk-management and risk-mitigation practices. Central banks' policies have a critical effect on firms' access to secured funding, and this fact is a central facet of contingency planning. Similarly, the complex financial instruments that have emerged recently have significantly affected the market, and while many of these ways have been beneficial, Recommendations still are needed as to the prudent monitoring and effective mitigation of the liquidity risks arising from such instruments.

It is the IIF's hope and intent to generate a constructive dialogue on risk-management issues, using this report as a point of departure.

Preface

In late 2005, the IIF established a Special Committee on Liquidity Risk. The Special Committee is chaired by Ahmass Fakahany, Vice Chairman and Chief Administrative Officer of Merrill Lynch, and Chris Grigg, Chief Executive of Barclays UK Business Banking, is the vice chairman. It includes representatives from about 40 of the largest global financial institutions.² The objective of the Special Committee was to develop a perspective and Recommendations on liquidity risk measurement, monitoring, management, and governance at financial institutions. This focus is timely, as it has been noted for some time that while a vast body of regulatory and academic literature exists about credit, market, insurance, and operational risks, relatively less attention has been given to liquidity risk. Moreover, a proper distinction between the various types of liquidity risk and corresponding risk measurement models and outputs is not always made. Concerns have also been expressed that the lack of harmonization of liquidity requirements and practices at the international level has resulted in suboptimal prudential and competitive conditions. To address these concerns and to perform a review of industry practices, the IIF established a Special Committee on Liquidity Risk.

In the course of preparing its Recommendations, the Special Committee also considered the integration of liquidity risk with other existing risk-management processes, namely, market, credit, and operational risk management. In addition, it addressed the relationship between liquidity risk and capital adequacy requirements, including the obligation to take liquidity into consideration for the purposes of Pillar 2 of Basel II, Supervisory Review Process.

There has been growing private sector and regulatory concern in this area. The Counterparty Risk Management Policy Group II in its report states, "The evaporation of market liquidity is probably the second most important variable in determining whether and at what speed financial disturbances become financial shocks with potentially systemic traits."³ The Special Committee considered not only institutional liquidity, but also the resilience of the financial system to shocks. While there have been significant advances in risk-management practices at financial institutions and a strengthening of market infrastructure in recent years, structural changes in markets, including growing product complexity and the entry of new participants, as well as the important role of large and complex global institutions, highlight the need for continual reassessment and improvements. Lessons from past market liquidity crises can be studied with an eye toward steps that can be taken to prevent future crises and improve response preparedness. The Special Committee deliberated as to whether gaps exist in processes for timely international information sharing among authorities at times of crisis.

A detailed but relatively informal questionnaire was developed and distributed among IIF members. The responses formed the basis of this report and provided a point of departure upon which a working group of experts built its analysis.⁴

Recommendations for the Private Sector; Public-Sector Considerations. The report proposes Recommendations that include objectives and specific and actionable items. These Recommendations would apply under an umbrella "comply or explain" ethic, whereby industry participants who do not adopt, or develop plans to meet, these Recommendations should be expected to explain why they consider a particular Recommendation inapplicable or inappropriate or why they have failed to comply with a Recommendation if it is applicable.

A number of Recommendations in this report originate from the principles set out in the February 2000 Basel Committee on Banking Supervision (BCBS) paper, "Sound Practices for Managing Liquidity in Banking Operations." The principles represent a sound foundation to build on and from which to reflect on the increase in the complexity of the financial industry and its products since their adoption in 2000.

In addition to the Recommendations for the private sector, this report includes a short but significant list of Considerations for the Official Sector that reflect the concerns of the industry about the increased disconnect in globalized financial markets between firms

²See the list of participants attached.

³"Toward Greater Financial Stability: A Private Sector Perspective," The Report of the Counterparty Risk Management Policy Group II, July 27, 2005.

⁴Responses to the questionnaire were provided on an anonymized basis with distinctions being made only between commercial and investment banks and domicile.

that conduct a substantial amount of their business across borders, often largely managed on a group-wide basis, and historical patterns of local regulation. While it is essential to recognize the benefits of liquidity risk regulations, both for the public at large and firms in the financial industry,⁵ and certain jurisdictional constraints faced by the official sector, failing to adapt regulatory and supervisory structures to more integrated and responsive markets may increase the chance of firm-specific or systemic cross-border problems.

Scope of the Inquiry. The report begins with a section on "Emerging Liquidity Issues in a Changing International Environment" that offers a brief review of market developments and other environmental factors. This section sets the stage for the analysis in the balance of the report. The report also includes Analytical Discussions on "Reliance on Secured-Financing Sources" and "The Impact of Complex Financial Instruments upon Liquidity-Management Policies and Practices."

It should be noted that the members of the Special Committee were drawn from internationally active banks, including large and medium-sized, or regional, banks, but not from small, local, or primarily domestic banks. We acknowledge the report's focus and also note that there are liquidity issues with respect to smaller, noninternationally active banks that need to be addressed separately. Furthermore, the report addresses liquidity issues as confronted by commercial and investment banks, not other sectors of the financial industry such as the insurance industry or hedge funds. This narrower scope does not suggest that firms with insurance as well as commercial or investment bank platforms should manage liquidity in their insurance platforms completely separately from the other platforms or that liquidity-management principles for the insurance platform should necessarily differ materially. This report recommends a central liquidity-management oversight function for firms with multiple platforms and legal entities, irrespective of whether firms have chosen a decentralized or centralized liquiditymanagement structure, so that such potential issues as contagion risk can be identified and addressed early. Other Recommendations in this report may also apply to firms with no commercial and investment bank

platforms, but their perspective has likely not been completely covered.

The report highlights the differences between cash management and long-term structural balance-sheet management. It focuses on both the short-term need to survive the initial period of a crisis as well as structural long-term liquidity management. In the context of the report, liquidity-management issues include businessas-usual and anticipating stressed conditions.

The report does not, however, address the intraday liquidity issues that have recently attracted the attention of the world's central banks, for example, those concerns addressed by the Board of Governors of the Federal Reserve System in its consultation paper "Intraday Liquidity Management and Payment System Risk Policy," June 15, 2006.⁶

The scope of the report is not so wide as to address business continuity issues. The link between a pure liquidity crisis and a business continuity problem is shown within the report, but the main focus is on managing a liquidity crisis regardless of its origin.

Focus on Funding Liquidity Risk. The report distinguishes between the risk to funding the firm, which is referred to as "funding liquidity risk," and the risk that a particular on- or off-balance sheet market or product is illiquid, which is referred to as "market liquidity risk." As noted in the May 2006 Joint Forum document entitled "The Management of Liquidity Risk in Financial Groups," 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." The same document describes market liquidity risk as "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." The close link between these two risks is recognized both by the industry and the Joint Forum, including the fact that common events may trigger both. This report primarily addresses funding liquidity risk.

⁵Firms draw some comfort in knowing that their counterparts have to meet sound minimum regulatory standards, provide disclosure of their practices, and are subject to regulatory oversight.

⁶In order to avoid duplication of work we have also referenced within the report studies by other parties.

Range of Practices. The responses to the questionnaire reflected a range of practices. To some degree, these differences reflect firms' assessments of suitable approaches to unmitigated liquidity risk tolerance, and some firms believe that it is important to strike a balance between an appropriate level of funding liquidity risk and mitigation costs. Fundamentally, firms need to define and manage their own risk appetites within basic prudential limits that take into consideration their current and prospective financial conditions.⁷ Banks may with perfect reason conclude as a matter of business strategy that total risk elimination would be too costly and then manage their liquidity risks accordingly.

In addition to differences deriving from varying risk appetites and risk profiles, many legitimate differences result from firms' histories, cultural traditions, legal structures, markets in which they operate, complexity, or management philosophies. This report encourages embracing these differences across firms, which depend on diverse business models, such as those resulting from centralization or decentralization of management.

The intent of this report is to encourage an overall raising of expectations while not imposing a rigid template on a rapidly changing industry. We recognize that firms must manage their own risks and needs and develop tailored models and approaches within an acceptable range. It should also be kept in mind that the theoretical best may be the enemy of the practical good and that firms need to be prudent and thoughtful given their particular needs. What might have been bright lines in the past may now be best addressed on a "comply or explain" basis.

The report also encourages firms to increase transparency and to provide additional information in their financial statements to increase understanding of such differences. This would help supervisors and regulators to understand that the differences between the entities justify the range of practices. Furthermore, it would help supervisors and regulators understand the differences, identify the outliers, and make informed decisions, as opposed to requiring conformity.

The Special Committee hopes this report contributes to the understanding of liquidity risk and its management and that the proposed Recommendations contribute to better management and supervision of liquidity risk.

General Notes:

The term "firm" is used in this report as a generic term and may refer to the group, the parent firm, or an independent subsidiary. Whenever pertinent, specific references are made to these entities or others, such as "branches."

References in this report to the "board of directors" of a firm should be read with reference to the context of each firm. In some countries, this term may refer to the most senior level of management, in which case "supervisory board" corresponds to what other countries refer to as "board of directors."

In addition, references to the "board of directors" should always be understood to include a committee, properly constituted under the firm's charter and applicable law, to which relevant authority has been delegated by the full board.

Where local law permits and it is customary to do so, and if appropriate internal authority exists, the Special Committee believes it is acceptable for senior management to approve policies or take other actions that may, in other firms, be reserved to the board or a committee of the board.

Emerging Liquidity Issues in a Changing International Environment

This study addresses liquidity questions at a time of extraordinary change. Recent economic conditions have been benign, yet the implications of rapidly changing markets and technologies, cross-border financial system consolidation, growing interdependencies of markets, new market infrastructures and participants, regulatory and accounting change, and even improvements in the sophistication of liquidity risk management, merit thoughtful attention by both the private and the public sectors.⁸ As is often noted, developments that generally strengthen liquidity in the system may shift risks or create new risks in ways that are not yet fully understood.

To some degree, the greatest liquidity risk to global financial stability may be the pace of change and the need to understand what is new, modified, or interacting differently. The private sector perspective proposed here has been developed with an eye toward these developments, but also with an appreciation of what remains to be well understood.

Background and Context

This section offers a brief review of environmental factors to set the contextual stage for the analysis in the balance of the report.

Economic Context. The fundamental background fact to this report is that the past few years have been a time of benign markets, resulting in compressed risk premia, when there has been pressure on investors and asset managers to press the "search for yield" into potentially riskier territory. At the same time, there has been concern among economists that a sudden unwinding of global imbalances could result in a weakening of the U.S. dollar (USD), and, with higher U.S. interest rates, that could lead to reduced global liquidity. In the recent past there have been indications that concerns about global growth and inflation and the ability of industrial countries to manage monetary policy effectively in an uncertain environment will lead to higher volatility in financial markets and a new risk aversion among investors. In reaction to these events, there were withdrawals of liquidity from the global financial system by investors as the appeal of carry strategies declined and economic fundamentals came into question in highyield markets. Thus, at the global investor level, some tightening of liquidity occurred in emerging markets, and the period of May–June 2006 exhibited increasing volatility compared to previous low levels.

The one thing that is certain is that the recent benign markets are unlikely consistently to characterize future periods. Indeed, the USD has exhibited signs of weakness since the latter part of November 2006 as investors' concerns have risen over the willingness of countries with large current account surpluses to continue to accumulate substantial USD assets. Hence the need to take a fresh look at liquidity issues, taking into account market changes over the past decade, particularly during the low-volatility period.

Globalization Context. The increasing consolidation and centralization of financial groups with the growing integration of financial markets means that firms will increasingly have dispersed, multilateral obligations, commitments, and assets that they will need to subject to coherent risk management. Globalization of the financial system collides with the policies and procedures of traditional home and host supervisors and local supervision of international payment and settlement systems. This divergence from traditional jurisdiction-circumscribed regulatory, monetary, and political management constitutes a profound policy challenge for public and private sectors alike.

Technological Context. The acceleration of communications and the vastly increased power of firms to collect and analyze data are well known. These changes underpin much of the present discussion, but also are worth mentioning independently.

Similarly, market developments, such as the continuous linked settlement system (CLS) and greater reliance on real-time gross settlement (RTGS) of payments, have very substantially reduced settlement risk in important segments of payments and foreign exchange, albeit at a price of perhaps moving liquidity stress points to other

⁸The May 2006 Joint Forum paper has been important in catalyzing discussion, but other public-sector agencies, including the IMF, European Central Bank, European Commission, Federal Reserve Bank of New York, and many others have addressed aspects of the issues raised here.

parts of the system. Securities settlement systems have also reduced their internal risks, at a cost of increasing collateral requirements.

The Bank of England's introduction of fundamental reforms in the sterling money market⁹ to reduce potential liquidity bottlenecks, the U.S. Federal Reserve's continuing long-term process of close study of and improvement to the functioning of the USD intraday markets, and the introduction of the euro and the European Central Bank's development of margin lending in a large Eurozone all change the picture from what it was a few years ago and reflect policy attention to multinational liquidity issues.

Finally, Internet banking is developing rapidly, even (or especially) for small retail customers. While Internet banking changes delivery channels, it may also affect the nature and behavior of products, as discussed below. These changes allow corporate and retail customers to more easily compare product offerings and economics and make rational decisions.

Issues Arising from Changes in Banking Fundamentals

The following observations are broad generalizations that apply unevenly across firms and countries but reflect fundamental developments.

Securitization.¹⁰ While market developments over many years have led banks to be more dependent on secured finance, regulatory developments, including Basel II, have been significant in spurring further development of asset-backed (including covered-bond) channels. Securitization has a long and deep history in certain products and markets, but the pace of development appears to be accelerating. These are positive trends for market liquidity and for the reduction in funding liquidity risk, as are recent advancements in secured-funding markets. However, there are risks involved in these trends, which have been noted by both the private and public sectors. This report provides a general discussion of this topic as well as a series of Recommendations.

Derivatives/Structured Transactions. The development of credit derivatives has given banks greater freedom to manage their balance-sheet constraints and risks. Moreover, credit derivatives have enabled banks to take a more market-driven view of credit in general. Like securitization transactions, credit derivatives allow the shift of longer-term risk to other market players who seek to hold and manage it because of their desired risk profiles. In addition, the new risk markets allow a greater degree of market-based pricing of credit, although post-transaction marking to market remains highly problematic for many areas of lending.

There is also a significant argument to be made that more liquid bond markets, securitization, and credit derivatives are reducing the traditional pro-cyclicality of bank lending by creating more market transparency, which allows both earlier identification of credit issues for specific debtors and the market as a whole and more diversification of the investors in the market. This yields better market pricing and more flexible responses to cycle dynamics.¹¹

Credit derivatives markets have faced certain infrastructure issues, which are now being resolved, albeit at a substantial cost in Information Technology (IT) investment and personnel.¹² More basically, these markets have developed rapidly against the background of what could have been a systemically serious issue born of the Long-Term Capital Market incident of 1998, which required concerted private-public sector efforts to resolve a serious liquidity problem. Since then, the markets have weathered such substantial storms as the downgrading of General Motors' and Ford's debt in 2005 and the Amaranth failure of 2006 relatively smoothly, in part because the developing depth and diversification of investors provided market flexibility.

⁹"Reform of the Bank of England's Operations in the Sterling Money Markets: A paper on the new framework by the Bank of England," April 2005. ¹⁰See the Analytical Discussion 1: Reliance on Secured-Financing Sources.

¹¹See "The Influence of Credit Derivative and Structured Credit Markets on Financial Stability," Global Financial Stability Report, IMF, April 2006. The alleged procyclicality of Basel II would also be somewhat mitigated by this effect.

¹²As is well known, back-office and market-practice questions about confirmation and novation of credit-derivative transactions caused considerable concern over the past year; however, a concerted effort by the private sector, with helpful catalysis by the Federal Reserve Bank of New York, the Financial Services Authority, and other publicsector authorities, has substantially reduced the problems. Back-office, technological, and market-discipline approaches have all contributed to reducing the problem.

Much of that market capacity has been provided by hedge funds. Substantial concerns about the potential behavior of these funds in a market crisis have been expressed by some central banks. What is the true impact of hedge funds or similar actors, particularly nonregulated ones, on the markets? Can they be counted on to continue to participate, or will they "rush for the exits"? Other official observers, although cautious about the limitations of current knowledge, have been more sanguine about the role of hedge funds noting, for example, that managers of these funds quickly entered the market to seize perceived opportunities at the time of the 2005 downgrades.

Insurance companies and pension funds have longer liability horizons and avoid the classic bank mismatch problem. They are better placed in some respects to acquire and hold risk transferred by banks via securitization transactions or credit derivatives. Such institutions sometimes face legal-investment or capital constraints that may limit their ability to participate in the new markets, and, a few years ago, their understanding of credit derivatives and other new instruments was sometimes questioned. If there was an issue with the sophistication of such investors, it is now much reduced, at least for the major firms. In addition, the interpretation of ratings of nontraditional instruments, such as collateralized debt obligations (CDOs), is now better understood than even a short time ago.¹³

However, questions still arise about the willingness of such investors to participate in markets in stressful times, especially when one-way markets occur, even if some have argued in parallel that high-quality asset-based securitization (ABS) could represent a better refuge than high-quality corporate bonds in times of crisis because the specifics of the underlying exposure are more transparent. In addition, as the market develops, there are more bespoke, illiquid products and more products with longer time horizons, which are more difficult to price. The willingness of investors to take on these risks has not been tested outside of relatively calm conditions. There is a chance that markets that appear to be developing well from a strategic viewpoint may suddenly lack depth at critical points in time.

The more equity-like tranches of both securitization and credit derivative transactions, which have often been retained by originating institutions, also may create exposures that could weaken an institution in a time of stress; new opportunities to off-load such exposures have developed but could dry up in such times. Market developments, improved internal economic capital analysis, and the more risk-sensitive regulatory approach of Basel II should reduce such risks, although prudence suggests that they will be least liquid (or most expensive to dispose of) in difficult markets.

Many observers have found grounds for optimism in the fact that some investors, such as hedge funds, have been willing to take on more risk, even in moments of market uncertainty. Still, it is notable that a substantial part of the liquidity resilience of these new markets (and of their ability to shift risk away from banks to other sources of capital) depends on the opportunistic behavior of a relatively new, unregulated class of institutions whose strength is its readiness to change form and pursue new strategies opportunistically.¹⁴ Liquidity also depends to some extent on insurance companies and pension funds that, for many good reasons, approach the markets with caution.

The financial system ultimately cannot reduce actual economic risk, but can only transfer it to parties with different time horizons and risk appetites and dilute it by diversification. A good deal of firms' examination of liquidity issues against the foregoing market developments has to do with hedging against the behavior of institutions that have generally done a good job of providing risk intermediation in the new markets.

Thus, there is much to be encouraged about in recent developments, but experience is limited, and it cannot be said with certainty how the markets will perform in severely adverse circumstances.

Concentration Questions. A further issue is the relative concentration of the dealer side of the market (and at a more macro level, the consolidation of the international top tier of firms into large, complex institutions). A few large firms provide a large part of the volume and liquidity in certain markets. The prospect of

¹³The question has been whether investors fully understood the differing risks and default behavior of instruments, such as CDOs, as opposed to traditional bonds. While some investors may still be uncritically reliant on ratings on their face, there is less excuse for this now that a great deal has been written on the subject. Moreover, the rating agencies are considering new approaches, such as "stability scores" that provide more tailored ways of assessing transactions.

¹⁴This report does not focus on counterparty risk, which has been amply treated elsewhere, but of course, counterparty risk must be part of any institution's prudent analysis

of its participation in the market.

a significant player disappearing from the market has been a source of concern, although efforts at modeling what would happen have suggested that the market is large enough and mature enough to deal with such an eventuality. Originators and dealers in securitization markets are less concentrated, at least in the most frequently traded instruments. Nonetheless, participants in, for example, home-currency mortgage securitization markets, can be relatively few, although it would be the potential desire of a smaller or less-involved player to offload assets in a crisis that would be the likely issue rather than the capacity of major dealers.

A broader question is the interconnectedness of market participants, especially the largest institutions that participate in many markets across multiple products, currencies, settlement systems, and jurisdictions. The world's large and complex financial institutions are deeply and increasingly interconnected, which raises liquidity issues because they provide so much of the market volume that they – and their clients – rely on.

*Collateral Issues.*¹⁵ Participants in the financial system today are much more reliant on secured finance than in the past.¹⁶ This is part of the overall shift away from customary banking toward market-based finance, but large commercial banks in general are significantly dependent on their ability to marshal collateral for repurchase agreements (repos) and other secured-financing vehicles. In this they are like investment banks in that they use wholesale funding sources in largely professional markets. The degree of this reliance on the markets (in addition to wholesale markets for certificates of deposit (CDs) and commercial deposits), rather than on retail deposits, varies from firm to firm, but the fact is well established, especially for the large, cross-border institutions.

Outright disposals of assets are less vulnerable to firmspecific issues but, of course, raise potentially severe business issues if selling into down markets occasions substantial losses. In addition, asset sales, particularly outside of trading and available-for-sale books, can have deleterious tax consequences.

Traditional secured-lending and repo markets depend on the ready availability and acceptability of collateral. Greater reliance on secured finance requires a focus on the hierarchy of liquidity characteristics of different types of collateral. Good collateral (with quality obligors, subject to market-appropriate haircuts) is the best assurance of liquidity and the best assurance of avoiding moral hazard or inappropriate reliance on lenders of last resort. Yet regulatory requirements, jurisdiction-specific central bank expectations, and clearance-system limitations combine to create a disconnect between collateral sources that remain to a substantial extent compartmentalized on traditionally defined bases and by the globally driven needs of many firms. In addition, collateral has a cost, and unnecessarily burdensome requirements not only impose costs on firms but also act as a brake on the efficiency of the financial system as a whole.

Much could be said about the technicalities of collateral questions; however, the basic problems are simple. How can a global market find ways to leverage available collateral and remove artificial roadblocks so as to use that collateral to avoid liquidity problems for participants in any local or sectoral market?

To some extent, the problem is a technical one of transferability; however, technical problems should be relatively easy to overcome since much collateral is held in Central Securities Depository (CSD) or International Central Securities Depository (ICSD) systems, from which it could be made available to any pledgee (including central banks) on short notice. Direct transfers are not yet seamless, but they are continuing to be nudged in at ever greater ease and speed. Legal questions have been reduced compared to 20 years ago, although there remain legal doubts and efforts such as the proposed Hague Convention have become bogged down. Thus, the market does need to push to do more to address the problems of international usage of collateral, but the most fundamental problems are elsewhere.

"Interoperability" of collateral is more of an issue than transferability. Progress has been made in this area, but more needs to be done to ensure the clear, undisputed availability of government obligations and other highquality collateral from national system to national system. The restrictions that result in "trapped pools of

¹⁵Please refer to the collateral-marshalling ideas in the document "Managing Payment Liquidity in Global Markets: Risk Issues and Solutions," Report by the Cross-border Collateral Pool Task Force, The Payments Risk Committee, March 2003. ¹⁶See the Analytical Discussion 1: Reliance on Secured-Financing Sources.

collateral" need to be lifted. Even if the aggregate of collateral anachronistically locked up in national cantonments is, as some contend, greater than the amount that would be maintained by firms if they were free to use global pools of collateral, the net power of readily transferable, widely accepted collateral across global markets to protect against liquidity crises and contagion would quite likely be greater.¹⁷

Although it is not the purpose of this report to address intraday mechanics, the shift toward real-time gross settlement of payments moves the burden away from credit toward liquidity risk. Central banks typically make intraday secured credit available for liquidity purposes. And central banks should have an incentive to accept as wide a collateral range as possible to reduce collateral costs and prevent settlement delays or blockages. But restricted eligible collateral remains a problem for firms, especially those that must manage obligations in a number of payment and settlement systems.

A situation could arise in which a house is highly liquid overall but could still face a difficult situation in one system because of restrictions and transfer problems. This risk is compounded by the fact that collateral may become more difficult to move in a crisis, which could exacerbate risks or create unnecessary liquidity blockages. Obstacles to effective access to collateral, based on outdated market models, may deepen a crisis rather than alleviate it. This potential problem is on top of the day-to-day fact that firms must finance and warehouse liquidity (i.e., cash and collateral positions) on the balance sheet on a basis that is suboptimal from a global perspective.

Behavior of Liabilities. Behavior of demand and unrestricted savings deposits, and of retail instruments such as short-term certificates of deposit, remains highly predictable and easily modeled under most circumstances. The effects of deposit guarantees and the inertia of consumer behavior are well known. This is hardly surprising given that banks have literally hundreds of years of experience with the most basic types

of liabilities and, in many countries, experience suggests highly consistent behavior since the beginning of industrialization. Yet this should not stop firms from continually challenging their assumptions, especially in marketplaces in which change is material and occurring rapidly, as even modest changes to erosion factors could have a notable impact on liquidity.

How is this experience affected by technological change and the large intergenerational wealth transfer currently underway? Where firms are becoming increasingly reliant on on-line deposits, are past assumptions about the stickiness of consumer funds still holding? Are customers with only an on-line relationship, who can more easily move funds electronically, significantly more prone to changing firms to obtain better rates or to react to negative news about their current firm? What are the practical obstacles to closing out on-line relationships that may restrain transfers? Firms that focus on on-line business are cognizant of these issues and approach them conservatively. But how conservative to be about such assumptions remains somewhat speculative and varies by the market. Even outside of the "e-banking" sphere, well-informed consumers may prefer not to deal with a bank whose reputation is questioned, simply to avoid the frictions of recovering funds if a failure occurs, even if their funds are fully covered by deposit insurance.18

Beyond these simple but basic questions, big-picture questions can also affect these issues. Changes in international capital flows and in global liquidity affect each other and may in turn be affected by political motivations, especially where global imbalances are concerned. Such macro effects may then affect the behavior of professional investors and their willingness to deploy liquidity and accept risk.

Concluding Remarks

There is an argument that market innovations may tend to smooth out cyclicality and provide liquidity. On the other hand, the argument is also made that the overall effects of recent innovations in instruments

¹⁷This is a separate point from the equally important point that well-managed firms that are diversified across multiple markets should generally be stronger for the diversification.

¹⁸Quite apart from the question of "stickiness," when a bank's name comes into question, the volatility of consumer funds may be increased by on-line competition both among banks and with highly liquid money market funds, or, where permissible, by third-party brokering of insured deposits.

and diversification of participants in markets may be a shift to less-frequent but higher-impact crises.¹⁹ The concern would be that all of these innovations are effective so long as participants can see opportunities in difficulties, which has been the case recently; however, it is not clear how these new market factors would perform in a crisis that appears extraordinarily difficult to participants. Furthermore, many of these market innovations have existed only during periods of relative calm in the markets. Difficulty with a few key players could have a profound impact on the functioning of these markets. The point of this section is not to be alarmist. Quite the contrary. There are substantial indications that the resilience of markets that are wider, deeper, and more diverse on the investor side, and vastly larger than ever before, has increased, thanks to technology, financial innovation, and interconnectedness, and that this resilience outweighs the vulnerabilities created by the same factors. But we cannot know for sure. That is the reason for the industry's reflections in this report, the reason for very substantial investments in risk management and stress testing, and the reason for the Recommendations for greater transparency and incremental collaborative mechanisms between the public and private sector in contingency planning.

Recommendations on Industry Practice for Liquidity Risk

The previous section provides the context from which the IIF Special Committee on Liquidity Risk concluded that it would be time well served to examine international liquidity issues. New instruments, newly global competition, reliance on secured-funding alternatives, and the rapidly increasing sophistication of risk management require a new perspective on liquidity questions.

This is very much a private sector discussion, and it is intended to be useful to private sector executive management and liquidity-management departments in evaluating their risk-management efforts for liquidity. The report is intended to suggest food for thought rather than categorical prescriptions. It outlines reasonable practices on many aspects of liquidity management, but one of the conclusions of the Special Committee is that firms vary considerably in their needs, their management styles, and their risk appetites. There is little scope for single-answer solutions and considerable need for flexibility within prudentially reasonable parameters, given that decisions about how to manage liquidity often reflect basic business strategy over which the firm must retain control in an increasingly competitive and globalized market.

The report's Recommendations, therefore, should be considered just that: directional suggestions of issues that good risk managers should think about, not formulae or prescriptions for what they should do. Within the scope of the principles suggested here, there is a considerable range of reasonable responses. Moreover, it should always be understood that a firm may, on the basis of its business mix and strategy, decide that a Recommendation is better disregarded than followed, even within the usual range of flexibility. Therefore, to the extent that the market or a supervisor might question any firm's response to any Recommendation, the "comply or explain" principle always applies: the firm should be able to provide a good explanation of its strategic or tactical choices, on the one hand, and, on the other, the market or the supervisor should accept a firm's well-grounded rationale for the way it chooses to proceed.20

The following Recommendations refer to liquidity management under both normal circumstances and stressed conditions.

A. Governance and Organizational Structure for Managing Liquidity:

Liquidity Risk Definition

Recommendation 1: Firms should define the different forms of liquidity risk to which they are exposed (including relevant subsets within each form defined); identify where they fit in their enterprise risk universe; and communicate these definitions across their groups so that a common understanding is applied when identifying and evaluating liquidity risk related to existing businesses, business reviews, new businesses, products or initiatives, and acquisitions and alliances.

Recommendation 2: Firms should distinguish between funding liquidity risk and market liquidity risk in their enterprise risk universe. Within funding liquidity risk, firms should address their practices related to the management of the following (on a time continuum for the first two subsets):

- Structural liquidity risk (over one year longterm, or strategic gap, ratios and funding mix; cash capital; survival horizon),
- Tactical liquidity risk (similar concepts as longterm but for shorter terms; operational, cash flow), intraday (cash and collateral management), and
- Contingency liquidity risk (stress testing, i.e., sensitivity analysis and scenario testing, special liquidity asset pools, contingency plans, ratios, and earmarked liquidity asset pools).

Discussion:

Firms generally make a clear distinction between funding liquidity risk and market liquidity risk.²¹ In defining these risks, firms can be influenced by regulatory definitions. Market liquidity risk is usually considered a form of market risk.

²⁰The Special Committee recognizes that the level of flexibility available to each firm for choosing not to comply may vary by Recommendation.

²¹For definitions, differences, and links between these two forms of liquidity risk, see the Preface to this document.

In defining funding liquidity and/or market liquidity risk, firms make reference to how issues with the management of this risk may affect financial performance and to wanted and unwanted outcomes of liquidity management. Issues typically considered include:

- Risk to earnings and capital of a significant impairment in the ability to meet on a timely basis any financial on- or off-balance sheet obligations as they fall due;
- Material, sudden, and unexpected increases in funding costs and liquid asset price discounts/ collateral margins;
- The inability to achieve an optimal and cost-efficient liability structure;
- The inability to monetize assets due to loss in market access or insufficient market depth;
- The inability to conduct business as a result of reduced secured- or unsecured-funding capacity and/or liquid assets or as a result of a lack of these; and
- The need to meet requirements in normal and stressed conditions.

In general, regulators are more interested in short-term and intraday liquidity-management practices under stressed conditions, whereas rating agencies are more interested in structural liquidity under stressed conditions. Because funding liquidity risk can manifest itself in a number of different ways with varying degrees of complexity, different firms use various metrics to define and measure this risk.

Roles and Responsibilities, Integrated Risk Management, and Limit Setting

Recommendation 3: Firms should have an agreedupon strategy for the day-to-day management of funding liquidity risk that takes into consideration their business models and legal structures (e.g., mix of foreign branches versus foreign operating subsidiaries), complexity (the breadth and diversity of markets/ products, geographies, and legal entities), key lines of business, home and host regulatory requirements and environments, marketplaces, and risk materiality in the context of the firm-wide risk-management strategy and appetite. The rationale for this strategy should be explained, and the strategy should be communicated throughout the organization.

Recommendation 4: A firm's board of directors (or a committee thereof under delegated authority) should approve the strategy and significant policies related to the management of funding liquidity risk under both normal and stressed conditions and review and approve these policies annually. Board-approved documents should identify key funding liquidity limits and approval levels, as well as those authorities delegated to senior management committees or those executives accountable for approving detailed strategies, goals, procedures, limits, and exceptions. The board should also ensure that senior management takes necessary steps to appropriately manage, measure, monitor, and control funding liquidity risk in an integrated fashion with other closely associated risks to facilitate enterprise-wide risk-management solutions. The board should be informed regularly of the funding liquidity position of the firm (metrics, indicators, and outlooks), and immediately notified if there are any material changes in the firm's current or prospective funding liquidity positions.

Recommendation 5: Firms should have a management structure in place to effectively execute their funding liquidity strategies. Roles and responsibilities of various board and senior management committees in the funding liquidity-management structure, as well as those of different functional and business units, should be documented, and these roles and responsibilities should demonstrate appropriate segregation of duties between the execution, design, and oversight and monitoring roles within the firm. This structure should include the ongoing involvement of members of senior management, who must ensure that funding liquidity is effectively managed on a regular and timely basis and that appropriate policies and procedures are established to limit and control material sources of funding liquidity risk.

Recommendation 6: Firms should have adequate information systems for measuring, monitoring, controlling, and internally reporting their funding liquidity risk positions. Management should be able to prepare these reports in times of firm-specific and systemic business contingencies.

Discussion:

Board and senior management committees are involved in reviewing funding liquidity-management strategies and performing risk oversight on a regular basis. Consistently with common practice, significant policies (such as the liquidity framework, funding liquidity strategy, and contingency plan) need to be reviewed and approved annually by the board (or a committee thereof). The boards of some firms delegate authority to approve various policies, limits, and related exceptions for specified entities and items to management committees or functions. In such instances, authority is clearly highlighted in board-approved policies. While the board of directors of a few firms may review the funding liquidity position of the firm as often as once a month, we believe that quarterly reviews are acceptable practice.

Key management committees and functions involved in funding liquidity management include the Asset Liability Committee (ALCO), Risk Committee, Finance Committee, Treasury, Risk Management, Finance, and Trading. Some ALCOs meet weekly, although monthly is the norm. Many firms have separate ALCOs for subsidiaries, business divisions, and countries, in which group functions participate. Subsidiaries consider both regulatory and group requirements in managing their funding liquidity and related governance processes. Some subsidiaries have separate internal frameworks and policies that the parent firm reviews to provide advice and counsel. The strength of links between subsidiary and group ALCOs (and between treasury functions) varies, reflecting firms' preferences for centralized versus decentralized structures.

There are almost an equal number of firms in which the boards approve the most senior limits and those in which senior management committees or group executives do so, typically on an annual basis. Either board or senior management limit approval is considered acceptable, provided that key limits are included in board-approved documents. Based on materiality, within board-approved guidelines it is viewed as satisfactory for more detailed strategies, limits, and procedures to require approval only by senior management committees or an executive in the function responsible for liquidity management. In some firms, limits are set by Risk Management while the goals, strategies, and procedures are set by Treasury.

The day-to-day transactional implementation of these strategies typically occurs in either the function with overall responsibility for funding liquidity management, in the Capital Markets/Trading division of the firm, or in both, in which case each group has distinct responsibilities (e.g., term funding and capital issuance in Treasury, collateral/liquid asset trading in the trading division, and short-term unsecured funding and securitization in either one). These transactional groups manage financing and rollover risk. Funding relationships with liquidity providers are managed by the Treasury function, the sales force of the trading division, and/or by creditor relations groups (dealers). There are a number of acceptable variations, especially for decentralized firms.

Typically, the main function with firm-wide responsibility for funding liquidity management is independent of the financing, lending, and trading functions. Independent oversight, reporting, and monitoring are provided by Risk and/or the function with primary responsibility for funding liquidity management (e.g., Treasury and Finance). Some firms separate the function responsible for compliance and limit monitoring from the one that performs firm-wide analyses and reports. In other firms, these responsibilities may be located in different functions for different subsets of funding liquidity risk. Irrespective, most firms emphasize the need for proper segregation of functions in the funding liquidity-management process, especially between execution and the other roles (design, monitoring, and oversight of policy, strategy, and limits). If some execution is conducted by the function that plays the latter roles, the execution and the governance processes are overseen by senior management committees.

Other noted related practices include:

- Funding liquidity reports reviewed as often as intraday or daily (based on type, materiality, and volatility of the metric) by businesses, and functions with direct responsibility for funding liquidity management; and
- Increased reporting frequency and level of detail from board to senior management to businesses and functions with direct responsibility for funding liquidity management.

Recommendation 7: Firms should ensure that funding and liquidity risk management practices are incorporated within a firm-wide, integrated risk-management framework that also includes market, credit, operational, and other appropriate risks.

Discussion:

The degree to (and manner in) which funding liquidity risk is integrated with credit, market, and operational risk varies greatly between firms. Integration can take the following forms: full/partial integration of funding liquidity risk control with market or group risk control; funding liquidity risk management function reporting to Risk Management; Treasurer and Chief Risk Officer (CRO) being key members of senior management committees with oversight of funding liquidity; market liquidity risk being considered in value at risk (VAR) measurement (with as output P&L Effects — as defined in the discussion below — that could be combined with other risk models measuring P&L Effects) and funding liquidity risk measures (with a potential cash outflow output that could be combined with inflows and outflows for other on- or off-balance sheet items); integration between funding liquidity and structural interest rate risk; coordination between the heads of different risks at the functional level, informally or through committees, to review all risk aspects of new business proposals; participation of other risk managers in liquidity crisis teams; integrated risk reporting for senior management and board committees; and integration of market, credit, and operational risk considerations in liquidity stress testing assumptions.

In discussing risk measurements applied to liquidity issues it is important to distinguish models and analytical approaches, such as VAR, that are focused on assessing potential effects on profitability, in other words *potential losses* ("P&L Effects"), from liquidity risk models and measures that aim at assessing *cash flows*. Processes aimed at delivering estimated P&L Effects as outputs (applied to credit, market, and operational risk) are quite different in their means and ends from processes aimed at delivering estimated cash flows as outputs (applied to liquidity risk). Estimated changes in P&L Effects help manage businesses and product lines and can be taken through to show ultimate effects on capital, whereas cash-flow estimates have as their purpose assessing needs and risks of funding liquidity. Management responses to estimated P&L Effects and estimated cash flows are quite distinct as well. Of course, VAR-type statistical techniques are often applicable in analyses ancillary to liquidity risk analysis, such as estimating the marked-to-market value of marketable assets, including the likely volatility of market values within relevant time frames (e.g., one day, one week, or one month). See also the discussion of Recommendation 15.

Recommendation 8: Having identified the liquidity risks and specific vulnerabilities that each firm is subject to, firms should describe in their policies and strategies their overall tolerance for unmitigated funding liquidity risk, the factors that may affect choices of strategies and limits, the desirable (or, alternatively, unwanted) outcomes and key objectives of funding liquidity-management strategies, and the key drivers and stakeholders influencing risk appetite, policies, and strategies. Firms should implement a framework of limits, targets, or triggers to ensure that they operate within these specified tolerances. Potential cash outflow and the ability to generate liquidity should be the basis of calculation of liquidity risk tolerance and feed into limit setting.

Discussion:

Firms stress the need for sound and prudent approaches to funding liquidity management. This is reflected in their risk profiles, assumptions, and risk measurement techniques. Firms want to convey to stakeholders their strong funding liquidity profile, their preparedness and ability to withstand stressful/unexpected events, their management expertise and responsiveness to changing internal and market conditions, and the very low likelihood that the firm's funding liquidity position could negatively impact their reputation, earnings, capital base, financial strength, credit ratings, client business, and strategic objectives.

Other firms define their risk appetites in terms of always meeting regulatory and internal requirements, not having to rely on unsecured (versus secured) funding for a set period of time, and being able to survive a defined firm-specific crisis.

Some firms strike a balance between an appropriate level of funding liquidity risk and mitigation costs, as total risk elimination is considered too expensive. Other firms have a much lower risk appetite and, for example, avoid using short-term wholesale funding to fund illiquid assets and have no unmitigated funding liquidity risk. Within reasonable and acceptable boundaries that reflect various business models, conditions, capabilities, and capacities (e.g., funding capacities), and provided that this Recommendation is adhered to, there is no right or wrong choice on the level of funding liquidity risk that a firm may decide to take.

Stakeholders and drivers influencing strategies and policies include regulators, central banks, external auditors, rating agencies (and credit ratings), best practices, business/economic/market environment, operating plans, business models, a firm's overall risk appetite, other risk-management frameworks within the firm, market share targets, unsecured- and secured-funding access at various stress levels, and competitive benchmarking.

Centralization versus Decentralization of Liquidity-Management Practices

Recommendation 9: Given the premise that there is no right or wrong choice between a centralized or decentralized liquidity-management structure (or a mix thereof), the Recommendations put forward in the previous section should be applied to each applicable subsidiary for which detailed strategies and significant policies for principal operating subsidiaries of the group are in place either to meet regulatory requirements or to accommodate a preferred decentralized structure. Where a decentralized structure leads to key funding liquidity metrics being different or not consolidated at the group level, processes should be in place to ensure that the group's board and senior management are made aware of material developments in key subsidiaries. Irrespective of management structure, a group Treasury or Risk function should be responsible for central oversight of these subsidiaries. The group's strategy and policy documents should describe the structure for managing enterprise-wide funding liquidity risk and for overseeing operating subsidiaries and foreign branches.

Discussion:

Based on their own sets of circumstances, "centralization" may mean different things to different firms. For example:

- Centralization of the responsibility for groupwide governance, policy and oversight processes;
- Centralization of the booking of all flows through one or a few parts of the firm; and/or
- Centralization of roles and responsibilities within one business unit for executing funding liquidity-management strategies across multiple legal entities and jurisdictions.

Some firms emphasize the importance of decentralized management at each principal subsidiary, whereas others emphasize the importance of centralized management across the group, sometimes with the caveat that decentralization is tolerated for less material currencies if warranted by local regulation. Driving factors include applicable jurisdictions, an organization's structure (predominance of branches versus subsidiaries), business lines, fungibility of currencies within and between legal entities and markets, system capabilities, regulatory and tax constraints, and management culture. The degree to which regulations affect this choice differs among firms. The level of sophistication of some regulators, not necessarily just the magnitude and type of operations in that country, can also be a driver.

Generally, firms appear to prefer centralization even as they recognize that hurdles exist that make it difficult to achieve fully. Some firms are centralized by types of activity (e.g., term funding, unsecured borrowing); others are focused along legal entities or lines of business. The importance of a centralized oversight function is recognized under both approaches.

Under a centralized structure, firms need to be particularly diligent in ensuring that all local regulatory requirements are met and that due process is followed before funding lines are arranged between group entities (head office, branches, and subsidiaries). Under a decentralized structure, firms should ensure that there is strong centralized oversight as well as efficient processes and suitable coordination of the firm's access to unsecured-funding markets under various names.

The specific market characteristics and risks of nonglobal and emerging-market currencies need to be taken into account. Where there are no reliable foreign exchange (FX) markets for such currencies, they must be managed from an essentially local-market perspective, with funding managed through the local market (subject, of course, to firm-wide policies and riskmanagement oversight, and regardless of the physical location of the managers). Where well developed FX markets exist, a more global approach to management of the currency can be taken, including use of swaps, though careful assessment must be made of the risk that the ability to swap into the currency might be eroded, perhaps rapidly, under stressed conditions. See the further discussion at Recommendation 18.

Intragroup Liquidity Transfers

Recommendation 10: Firms should have policies, limits, and processes in place to control the flow of funds (related to intraday, tactical, structural, or stressed liquidity) between branches, between branches and subsidiaries, and between subsidiaries that consider regulatory, legal, accounting, credit, and tax restrictions as well as the strategies and goals of their funding liquidity-management framework.

Discussion:

In their governance of intragroup liquidity transfers, firms focus on a variety of different funding restrictions, including upstream funding restrictions, downstream restrictions, and internal restrictions, that force each legal entity to attain funding sufficiency independently. Additionally, a number of firms monitor senior debt funding, capital funding, and double leverage separately. In the case of some firms, credit lines to subsidiaries have to be approved by regulators.

Where applicable, functional responsibility for approving credit lines primarily rests with Risk with, in certain cases, the involvement of Treasury. In some instances, firms treat the requests for credit lines from subsidiaries in the same manner as third-party requests, with a dedicated team handling the approval process and pricing on an arms-length basis for statutory reporting.

Recommendation 11: Senior management within firms should ensure that the right incentives, policies, and procedures are in place to elicit appropriate behavior within each business that incurs liquidity costs (e.g., collateral, term funding), in order to consider and manage such costs effectively. Where applied, transfer pricing should be closely aligned with the liquidity of the underlying asset or structural nature of the underlying liability.

Discussion:

Businesses that cause a firm to incur liquidity costs should effectively consider and manage these costs through mechanisms such as limits and transfer pricing. Where applied, liquidity costs need to be charged to those businesses that consume liquidity. Proper alignment of the liquidity risk profile of an asset or liability and the associated pricing creates a feedback mechanism, as the change in funding cost becomes an important part of product pricing decisions. This aligns the cost of funding with performance measurements, ensures that the appropriate incentives are in place for the efficient management of liquidity in a businessas-usual situation, and provides a mechanism to alter this pricing based on market conditions in a liquidity event. This dynamic then becomes part of an overall liquidity risk management process.

Additionally, the costs of funding should be made transparent within a firm, which will not only improve the quality of liquidity management, but also will promote the efficient use of liquidity as a scarce resource within the firm.

Internal Controls

Recommendation 12: Firms should have effective systems of internal control over their liquidity risk management processes, including regular independent reviews and evaluations of the effectiveness of these systems. Firms should ensure that the frequency and scope of these reviews are consistent with, and supported by, their internal risk assessments.

Discussion:

Consistent with the Basel Principles that call for independent review of liquidity risk management by both internal parties and supervisors, nearly all firms are subject to some form of regular internal review, most often in the form of an annual review performed by internal audit. In addition, most firms undergo a review by external audit. The internal reviews are generally based on adherence to policies, processes, and limits.

Public Disclosure

Recommendation 13: Firms should ensure that there is appropriate disclosure of qualitative and quantitative information about each firm's liquidity position and liquidity risk management practices. Mandating quantitative disclosure would not be meaningful or comparable across firms given that firms' liquidity practices vary significantly, as do their internal and external environments.

Discussion:

Firms provide varying degrees of liquidity information to market participants. Information provided to creditors, investors, and other counterparties principally references firms' public disclosures and annual reports. Regulators and credit rating agencies are extended a much wider range of information but typically receive this information only on an as-requested basis. The decision regarding what to disclose is driven by legal and regulatory requirements and the attempt to strike a balance between providing useful disclosure and confusing external constituents as well as by the desire to provide transparency and to respond to investor and rating agency demands.

Although most firms provide liquidity information in their quarterly and annual reports, the level of detail varies significantly, given that firms' liquidity-management practices differ considerably and that disclosure practices differ across businesses and jurisdictions. Firms' disclosures generally indicate that they manage liquidity with the goal of ensuring that they have sufficient funds available to meet known and anticipated cash funding requirements. Disclosures tend to focus on qualitative descriptions of funding and liquidity plans but provide little quantitative detail to support these plans. In regard to the development of liquidity plans, disclosures generally contain a variety of liquidity risk measures, including business and liquidity needs, regulatory requirements, rating agency criteria, taxes, prevailing interest rates, and other market conditions. Most firms' disclosures also indicate the types of liquid instruments that their liquidity pools or reserves are primarily invested in.

Firms' disclosures also contain information on their liquidity risk measurement, management, and monitoring techniques, which generally include utilizing liquidity limits, a range of liquidity ratios, market triggers, periodic stress tests of temporary and longterm stress scenarios, cash flow projections, analysis of liquid assets, term liquidity gaps and mismatches, and cash capital measurements. Although most firms' analyses utilize various liquidity ratios, the actual ratios are generally not disclosed. Instead, firms provide components of the balance of their liquidity sources or disclose the minimum result they strive to maintain.

Most firms include information on their contingency funding strategies and the risks that their contingency liquidity planning frameworks take into account (i.e., general market disruptions, adverse economic developments, etc.). While most firms disclose that they undergo some type of stress testing to ensure they can meet funding requirements in even the most unfavorable conditions, for the most part, they do not disclose the types of stress tests performed. Of those firms that do disclose such information, examples include oneor two-notch rating downgrades, withdrawals of customer deposits, deterioration in asset liquidity, and limited to no access to unsecured funding.

Given the range of practices, there is some room for improvement in qualitative public disclosures. In many cases, discussions about liquidity structure and governance could be expanded to better describe liquiditymonitoring practices and the timeframes and groups in which these practices take place. Firms should provide detail on key metrics used in their analyses and on the types of stress tests they perform. In addition, firms should describe the general nature of contingency funding plans and the internal governance involved in overseeing these plans and in setting and monitoring limits. Owing to the number of very real constraints faced by firms, relatively little quantitative data are disclosed. Disclosure practices are not only guided by each firm's philosophy about disclosure, but also by key legal and compliance considerations, which impact firms' ability to provide quantitative liquidity risk measures, particularly if such information is not based on accounting concepts. Among other things, firms are obliged to take into account restrictions on disclosure of potentially price-sensitive information.

B. Analytical Framework for Measuring, Monitoring, and Controlling Liquidity Risk:

Forecasting, Measuring, and Monitoring Funding Requirements

Measurement and Monitoring Tools

Recommendation 14: Firms should establish well reasoned, robust, and documented methodologies to measure and monitor funding liquidity risk. Firms should forecast future cash flows of assets, liabilities, and, if material, off-balance sheet items over appropriate timeframes. Where appropriate, they also should consider employing liquidity ratios as well as measures for monitoring concentration and diversification.

Recommendation 15: Firms should ensure that methodologies for forecasting the future cash flows of assets, liabilities, and off-balance sheet items are regularly validated to confirm that they continue to be appropriate and to identify the main assumptions and/or parameters to which net funding requirements are sensitive.

Discussion:

To measure and monitor their liquidity risks, firms use various measurement techniques, time frames, and levels of granularity.²² The firms' primary funding liquidity risk measurement models quantify cash flows not potential P&L Effects.²³

Most firms use a "cash flow mismatch/liquidity gap" metric,²⁴ produced at least weekly for horizons extending from a few days to a few months and at least annually for longer horizons ranging from a few months to many years. Short-term forecasts are produced as often as daily, while long-term forecasts can be produced as often as weekly, although monthly or quarterly is typical. Balance-sheet ratios are frequently used for firm-specific and industry analysis. Common practices include:

- Analyzing gap breakdowns by products, organizational units, or business areas, with limits on the gaps;
- Forecasting liquidity needs in various stress scenarios; and
- Updating daily the volatility of metrics with the values observed last day.

Real-time monitoring of liquidity positions is primarily used for intraday cash and collateral management, especially by investment banks or at the level of the Treasury department.

Estimation of Funding Capacity

Recommendation 16: Firms should establish wellreasoned, robust, and documented methodologies to manage different components of their funding strategies, including diversification of liabilities by types of depositors, investors, products, marketplaces, and currencies; relationship with investors; and financing and selling of assets. These components should be regularly reviewed to determine whether they continue to be adequate and to identify the main assumptions and/or parameters to which the net funding is sensitive. Firms should measure and/or estimate their secured- and unsecured-funding capacity (at the aggregate and in meaningful subsets) to better understand their current and prospective funding liquidity risk under varying conditions.

Discussion:

In normal conditions, most firms manage funding risk by using different sources of funding, which helps prevent an adverse development in their funding positions.

Most firms' base case estimates of their funding capacity in normal conditions are derived from past

²²"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." "The Management of Liquidity Risk in Financial Groups," The Joint Forum, Basel Committee on Banking Supervision, May 2006.

²³As explained in the discussion of Recommendation 7, measures of potential cash flows must be distinguished from measures of P&L Effects. The outputs of "Liquidity at Risk" models that generate cash-flow estimates cannot be combined with the outputs of other "at risk" models (e.g. VAR for market risk) that measure P&L Effects. Because the terminology is not necessarily uniform, there may be models referred to as "Liquidity at Risk" models that generate P&L Effects, but these focus on market-liquidity risks (of liquid assets) and not funding-liquidity risk, which is assessed by cash-flow measures. Of course, estimating the marked-to-market value of marketable assets is relevant to, but needs to be distinguished from, estimating cash flows for funding-liquidity purposes.

²⁴The May 2006 Joint Forum paper also indicates that the banking and insurance sectors prefer the cash flow analysis of the liquidity of assets.

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observations of their different sources of secured and unsecured funding. Haircuts are also derived from past observations. When necessary, such estimates are complemented by the judgments of those in charge of maintaining the different funding sources as well as by third-party dealers familiar with a firm's name in the wholesale markets. The factors taken into consideration when estimating funding capacity may vary materially between firms depending on the types of markets and jurisdictions in which a firm operates.

Within their funding sources, some firms distinguish between what they estimate to be "reliable," or core funding, capacity and the "surplus" portion of this capacity, which they view as excess buffer. The surplus capacity above the reliable portion is then analyzed and measured, taking into account lenders' appetite for a firm's name, its unused credit lines, and the unutilized documented program size for each of the firm's programs.

Reliability is in some instances determined from the results of stress testing analyses and scenarios in which some funding sources are assumed to at least partially disappear. For instance, in the case of wholesale funding capacity, most firms assume that their unsecured capacity would disappear or be significantly reduced. The extent of this assumption varies based on both the level of severity of the scenario being considered and the current credit rating of a firm. Similarly, some firms are cautious in assuming that committed liquidity lines would be made available to them in the event of firm-specific liquidity events.

Reliability can also be determined by undertaking a thorough analysis of different sources of funding, classified by counterparty, market liquidity, creditor survey, and product, including pledgeable assets and unencumbered liquid assets.

Practices for estimating and managing funding capacity include:

- A dedicated desk responsible for strengthening the relationships with main funding providers and central bank discount windows;
- Estimates of unfulfilled appetite/surplus capacity for the group's name;
- Haircuts calculated for each scenario based on stressed market conditions that take into consid-

eration market liquidity as well as name-specific concerns; and

• Identification of funding strategies under each scenario.

Asset and Funding Diversification Practices

Recommendation 17: Firms should have asset and funding diversification strategies commensurate with the nature of their businesses, the environment in which they operate, and the types of products and markets in which they are active. These strategies should be adjusted as changes occur in the internal or external environment.

Discussion:

Most firms monitor depositor concentration.

Diversification of funding sources is usually accomplished by having:

- A reliable and diversified retail and commercial deposit franchise;
- Maturity dates that are spread out through targets or limits on predefined periods;
- Varied funding programs, including an internal infrastructure built and maintained to support these programs (e.g., securitization);
- Assorted funding products, such as commercial paper (CP), CDs, prospectus-based debt programs, and securitization;
- Different types of wholesale investors, e.g., central banks, pension funds, money market funds, and money managers;
- Diversification of depositors;
- Investors in different geographies, countries, regions; and
- Multiple currencies in which to issue.

Liquid assets could be diversified by using the following attributes:

- Pledgeable assets (depending on central banks and industry criteria);
- Repoable assets; and
- Securitizable assets (retail consumer loans, retail mortgage loans, corporate loans, etc.) with cash structures or with synthetic structures (credit default swap).

Alternatively, firms could have notional limits by type of liquid asset, issuer type, issuer name, credit rating, and other meaningful criteria, and/or longer liquidation timeframes/larger haircuts as inventory in a specific product grows.

Liquidity Position by Currency, Cross-Border, and Legal Entity

Recommendation 18: Firms should have in place a system to measure, monitor, and control their liquidity positions for all material legal entities, jurisdictions, foreign branches, and subsidiaries in the significant major currencies in which they are active. In addition to assessing aggregate foreign currency liquidity risk commitments, firms should also undertake separate analysis of their strategies for each material currency individually, outlining as appropriate how strategies for established currencies with liquid markets and diverse funding alternatives may be different from those for non-global or emerging market currencies. Firms should identify the extent to which fungibility among pools of currencies²⁵ (e.g., USD, EUR, JPY, GBP, and CHF), legal entities, and jurisdictions can be relied on, and this should be reviewed regularly. Firms should assess, monitor, and, where appropriate, limit acceptable mismatches between foreign and domestic currency in light of various internal and external factors.

Discussion:

The metrics used by most firms generally take into account the ability to shift liquidity surplus from one currency to another and across jurisdictions and legal entities. Firms usually quantify their liquidity exposure by currency and use various criteria, such as convertibility, swap market depth, and the ability to lend funds between group entities in the normal course of business without triggering any internal or external concerns, to determine fungibility. Some firms consider pools of fungible currencies, whereas other firms consider major currencies, such as USD, EUR and GBP, on a consolidated basis to determine their shortterm liquidity position.

Most firms apply adjustments to currency exposures to take into account the liquidity of the FX markets and the settlement conventions of spot FX trades when necessary. Convertibility risk appears not to be a major issue for most firms, as this risk is often taken into account through stress testing and contingency planning and/or in the limits.

Liquidity Position by Maturities

Recommendation 19: Firms should choose the specific time horizons over which they measure, monitor, and control their funding exposures based on the nature of the exposure. At minimum, short-term horizons should include a period from the next few days to the next few months; long-term horizons should at least go out to one year. Measurement should be performed using, as appropriate, contractual or effective maturity dates as well as known and forecasted flows (e.g., taking into account assumptions with respect to changes in loans, assets, core deposits, etc.).

Retention Rates on Nonmaturing Assets and Liabilities and on Assets and Liabilities with Contractual Maturities

Recommendation 20: Firms should use a robust qualitative and quantitative analytical framework that considers all relevant internal and external factors before assigning liquidity values to nonmaturing assets and liabilities. The same process should be followed for other categories of assets and liabilities for which contractual maturity dates may not be good indicators of liquidity value.

Recommendation 21: Firms should understand the characteristics of their funding instruments and evaluate the effective cash flows under business-as-usual and stressed conditions. At minimum, retention rates for nonmaturing liabilities should be viewed differently for retail and commercial deposit liabilities. Firms should analyze retention rates for nonmaturing liabilities by domicile, investor type, product, currency, and scenario.

Discussion:

Most institutions consider a portion of their nonmaturing liabilities, such as demand deposits and capital, as core in their liquidity positions. In the case of demand deposits and other types of nonmaturing deposits, statistical analyses usually enable a firm to distinguish between a volatile part, considered shortterm funding, and a stable part, considered middle- to long-term funding.

The scheduling through time of the stable part of these deposits takes into account decay factors that reflect the assumptions and models used by an institution to analyze its data. The use of different assumptions may reflect different levels of risk aversion.

Decay factors may depend on the type of clients²⁶ (retail, large corporates, small and medium corporates) and type of funding instruments (interest bearing deposits, noninterest bearing deposits, insured deposits).

Some institutions assign decay factors to nonmaturing assets and liabilities by using only qualitative judgment without reference to quantitative models. Some may also apply judgment to the results of their statistical analyses by adjusting core values as circumstances warrant.

Recommendation 22: In countries where there is depositor insurance, this insurance should, subject to appropriate judgmental analysis, be considered when modeling depositor behavior. In general, deposits covered by insurance may be considered to be more "sticky" in a crisis than other deposits. When applying this concept in practice, consideration should be given to whether there are any indications that recent developments may require prudent adjustment of historical patterns.

Discussion:

Firms appear to be divided as to whether depositor insurance should be a consideration in modeling depositor behavior. In certain country-specific events, deposit insurance can be viewed as a competitive disadvantage to certain banks in that it limits a flight to quality. In addition, in certain countries deposit insurance either is offered only to domestic institutions or may have different terms for foreign and domestic institutions. These facts need to be taken into consideration when determining the behavior of depositors in a liquidity event and the resultant impact of this behavior.²⁷ Please refer to *Behavior of Liabilities* in the section on "Emerging Liquidity Issues in a Changing International Environment."

Sources of Contingent Liquidity Demand and Related Triggers

Recommendation 23: Firms should ensure that liquidity risk measures take into account the potential liquidity consequences of undrawn commitments and triggering events. A distinction should be made between different types of commitment (e.g., revocable and irrevocable, conditional and nonconditional, purpose of facility, and types of customers and their respective credit ratings). Liquidity risk consequences should be modeled by applying drawdown probabilities under various stress scenarios.

Discussion:

For most firms, unutilized commercial loan commitments and commercial paper back-up lines are key sources of contingent liquidity demand. Other key sources depend on the nature of the institution.

Potential triggers for draws include economic cycles, systemic crises, credit rating downgrades (with different degrees of severity expressed in terms of numbers of notches lost), country crises, specific market disruptions (e.g., CP market disruption, credit crunch), and International Swaps and Derivatives Association, Inc. (ISDA) collateral agreements. Practices include:

- Triggers estimated with different degrees of severity, and
- Estimated impact of triggering events in scenario analysis.

²⁶The May 2006 Joint Forum paper indicates that banks should "assign the timing of cash flows for each type of asset and liability by assessing the probability of the behavior of those cash flows under the scenario being examined." Investor type will be an important determinant of behavior.
²⁷In analyzing depositor behavior, the May 2006 Joint Forum paper suggests that in some countries retail and small depositors may rely on public-sector safety nets to shield them from loss.

Cash Flow of Financial Derivatives

Recommendation 24: If material, firms should consider cash flows related to financial derivatives (net flows, where supported by legal frameworks, that occur at the repricing or maturity date of contracts, as well as those covering exchange of margin or collateral during the life of these contracts) and interest rate flows in their liquidity risk analyses.

Discussion:

Most firms consider cash flows of financial derivatives in their liquidity risk analyses, although material expected cash flows appear to be monitored more than potential cash flows related to uncertain outcomes. Most firms do not include interest cash flows associated with on-balance sheet instruments when measuring liquidity demand and supply. There are a number of practical challenges in forecasting derivative flows related to uncertain outcomes (i.e., options), and each firm needs to make an informed judgment as to the materiality of these challenges. To that effect, it is not the gross amount of derivative or interest rate cash flows originating from each contract of a particular business/activity that should drive the determination of materiality; rather, it should be the net amount of all contracts within each period being measured that should be the driver for firms to determine whether more resources should be dedicated to their measurement in light of the relative materiality of these interest and/or derivative cash flows vis-à-vis typical total net flows that firms experience for these periods.

Measuring and Monitoring Asset Liquidity

Recommendation 25: Firms that rely on securedfunding sources to a significant extent should have robust processes in place to evaluate asset liquidity under a variety of business-as-usual and stressed conditions. It should be recognized that liquidity values of similar assets may vary across firms depending on the nature of their business and their respective market capabilities.

Discussion:

It is standard practice for securities firms and large banks with capital market platforms to assess the ability of a firm to convert its unsecured funding to a secured basis. The loan ("collateral") value of its unencumbered portfolios is reviewed daily. Haircuts on these securities need to be reviewed regularly with the funding desks, and consideration must be given to any concentration of positions and risk effects that would affect the prudent level of haircuts in a crisis. This process should be consistently applied to trading and banking books. The treatment should differentiate between use of assets as collateral for borrowing and for generation of cash by sales of such assets, and also take into consideration the business strategy for the assets in question, the potential P&L impact of any disposition, and whether management would be willing to absorb potential losses, taking into account tax effects. In determining the appropriate haircut for sale purposes, the business environment in which the firm operates and potential stressed volatility of markets need to be considered over the determined liquidation horizon. Haircuts for repo purposes should be based on an evaluation of the markets' ability to absorb the level of positions, at proposed haircut levels. This evaluation should be performed on securities held for clearance and for other regulatory or legal purposes to determine whether they are encumbered or otherwise unavailable for liquidity purposes.

Liquidity value needs to be given to other asset classes in which liquidity has been demonstrated through an active and ongoing sales or securitization program. Central bank/government repo facilities should only be used if they have been tested and would be available in a name-specific event.

- Firms could base haircuts on prior experience, best-practice assumptions, liquidation scenarios, regulatory requirements, practices adopted in market or credit risk, or market liquidity models. A comparison of various models would provide a range of results from which firms could select an appropriate model.
- Securities need to be grouped by their liquidity value. High values, for example, would apply to eligible central bank holdings. Other criteria to be included in considering liquidity values and categorization are rating/credit quality, market price availability, maturity, type of security, reason for holding (trading, investment, hedge), access to secured funding for the security, issuer

type/country, currency, size of position (e.g., relative to issue size, daily traded volume), and time to settlement. Liquidity categories can be grouped into high, medium, and low liquidity or by the likelihood that the action will be taken.

Most firms use haircuts or volatility analyses to determine the liquidity value of assets. In general, firms evaluate the value and timing of their actions based on the scenario that is being addressed.

Recommendation 26: Firms should ensure that asset liquidity is assessed based on a demonstrated ability to obtain liquidity, and firms should only take credit for active and ongoing programs for sale, securitization, or secured borrowings. Consideration should be given to adjusting haircuts if the state of markets (stressed) during the specified scenario warrants it.

Recommendation 27: Firms with significant reliance on asset liquidity should evaluate haircuts and the timing of cash flows from these sources. In determining the amount of available liquidity and the liquidation horizon, the evaluation should include a determination of whether the asset is encumbered as well as an assessment of market haircuts, market capacity constraints, access to central bank facilities, concentrations in collateral, potential name-specific concerns, and the operational ability to complete the transaction. In particular:

- Encumbered assets should be excluded from incremental liquidity value;
- Haircuts should be evaluated in business-asusual as well as in stressed conditions;
- The capacity of the markets for a particular asset class should be evaluated; and
- Operational capability to facilitate the transaction should be in place and tested.

Discussion:

When metrics are based on the market values of assets and liabilities, market price movements are mechanically taken into consideration. Some firms take market price movements into account in their normal course of business and stress/scenario analyses, for example, by using haircuts. Other firms consider the impact of market price movements on their liquidity positions to be limited because they are already included in other market risk metrics. Hence, these firms believe that liquidity risk metrics do not have to take these movements into account.

If large liquidity demands were to occur, a decision would need to be made as to holdings that could be shed with the least detriment to business relationships and to perceptions about a firm's soundness while taking into account business economics (profit and loss). Firms that are active in secured-lending markets could use assets to generate liquidity through repos rather than through outright sales, should markets permit.

Most firms rely to some extent on the ability to generate liquidity from securities positions in normal course and emergency conditions; others reduce cash holdings or interbank deposits.

Sources of liquidity generally are weighted based on their degrees of liquidity. When analyzing the liquidity value of a portfolio, time to liquidity must be considered (i.e., how long it takes to move the firm's assets to the right place at the right time so that the firm can generate liquidity in time to cover its needs).

Liquidity Risk Metrics and Limits

Recommendation 28: Firms should use metrics that are relevant to the nature of the business they undertake. Firms that engage in a broad range of activities would be expected to use a similarly broad range of liquidity metrics.

Recommendation 29: For each selected metric, firms should decide whether they will impose a prescriptive limit or a preferred target/range or just monitor the metric for historical trends. Not all metrics need to be assigned limits, and firms could make different choices for the same metric, bearing in mind their respective internal and external environments.

Discussion:

No simple, convenient and predetermined metric or quantitative measure with prescribed assumptions would work to provide either adequate liquidity safeguards or truly useful management information. Although the idea of imposing simple metrics across institutions may have some immediate appeal, differences in institutions are likely to make the results not truly comparable, even if superficially similar. In fact, lack of comparability may render the information at best not useful and at worst potentially deceptive.

The diversity of activities undertaken by firms, as well as their size, complexity, demonstrated capabilities, and financial conditions, effectively means that the liquidity risks arising in each firm may be different in nature or magnitude. Therefore, a list of prescriptive metrics and/or limits would be neither appropriate nor sufficient to address the source and nature of the liquidity risk that may occur in each firm. The metrics that a firm uses need to be relevant to the key liquidity risk vulnerabilities that it has identified. A firm that uses a small number of specific metrics designed to cater to identified vulnerabilities will be more effective in its liquidity risk management endeavors than a firm that produces a longer but less tailored set of metrics and limits.

A robust liquidity-management framework should identify the potential sources of liquidity risk arising from such activities and establish a range of metrics. Refer to *Appendix 1* for a list of possible sources of liquidity risk vulnerabilities and metrics. **Recommendation 30:** Firms should ensure that liquidity risk limits are only set on a consolidated basis when it is practicable to do so given the regulatory, legal, accounting, credit, tax, and internal constraints on the effective movement of liquidity. Firms' risk tolerance should be evaluated at the individual entity level unless there is an unrestricted ability to transfer funds between entities and across borders. If such an unrestricted ability does exist, then consolidated limits that encompass these entities and geographic areas may be appropriate.

Discussion:

In times of financial distress certain regulatory and internal constraints have been relaxed (as was the case, for example, in the 9/11 crisis) depending on the source and nature of the distress. However, it is also conceivable that certain regulatory requirements could become more severe. Firms need to manage their liquidity based on thorough assessments of the likelihood of central bank actions or statutory requirements. For example, if particular assets are not eligible as collateral with the central banks, the working assumption should be that such assets will remain ineligible during a liquidity event.

C. Stress Testing and Contingency Planning:

Stress Testing (Sensitivity and Scenario Analysis)²⁸

Recommendation 31: Firms should analyze liquidity using a variety of firm-specific and market-related scenarios and/or sensitivity analyses, or a combination of the above. Stress testing may be appropriate at a group level, by geographic region, and at a subsidiary level. The rationale behind the choice of time horizons over which a crisis is to be measured and the severity levels of crises considered should be appropriately documented.

Discussion:

Most firms employ scenario analysis as part of their liquidity risk measurement. Examples of market stress scenarios include a general regional crisis, such as an emerging markets crisis or country crisis; the failure of a clearing and settlement system; a systemic shock, such as 9/11, that leads to an inability to fund/reduced access to wholesale money markets; or a major disruption in financial markets. Firm-specific scenarios usually test the impact of downgrading (1-4 notches); reputation risk driving deposit withdrawals; a shock to the clearing/settlement system (internal system outage); the default of a major counterparty or funding source, market player, or obligor; differing levels of ability to borrow in unsecured and secured markets; and loss of CP rating (could also be a market-specific CP crisis). Per the Joint Forum paper, two-thirds of firms simulate firm-specific and market events separately.

Many firms run several scenarios that cover a range of crisis durations and levels of severity. Some firms may test the same scenario at different points in the crisis event and may include the point in time when business returns to normal.

Most commercial banks use relatively short time horizons. Since these firms tend to be more reliant on short-term, unsecured funding, surviving a disruption in this funding source is emphasized. On the other hand, since the funding profile of broker-dealers tends to be longer-term with an emphasis on long-term debt and capital, most investment banks use a longer benchmark assumption, with many using one year. Short-term funding sources for investment banks tend to be supported with unencumbered securities that can be sold or repoed. Thus, these institutions ensure that short-term, unsecured obligations can be funded with secured sources. This is a standard benchmark in the industry that is accepted by rating agencies and regulators.

Firms may elect to consider types of events that can lead to liquidity risk in order to identify liquidity exposure. For example, it could be useful to integrate market risk metrics to provide a measure for asset liquidity. Another consideration is the practice of reducing credit exposure for derivative transactions through adding downgrade triggers or provisions to deliver funding or collateral should predefined events occur.

Recommendation 32: Firms should ensure that stress tests are used to measure the behavior of all sources of cash inflows and outflows that could potentially be material to the firm under various sets of assumptions. To the extent that these tests indicate an unwanted shortage of funding over the time horizon over which they are conducted, consideration should be given, in light of the probability of the scenario, to modifying underlying normal course of business limits to address this shortfall.

Discussion:

The level and timing of cash inflows and outflows may differ quite sharply between scenarios and from one firm to another depending on each firm's historical experience. The level and timing may also reflect reputation, market presence, current credit rating, or other factors. Judgment will play a large role if recent historical experience is not available.

Each scenario contains assumptions about behavior under stress, and the run-off profile of each balancesheet and nonbalance-sheet item is considered. The assumed behavior can be objective and/or subjective in nature. For those that are subjective in nature, firms can elect to use a more or less conservative approach.

²⁸Stress testing is a risk-management technique used to evaluate the potential effects on an institution's financial condition of a specific event and/or movement in a set of financial variables. The traditional focus of stress testing relates to exceptional but plausible events. Sensitivity analyses are generally less complex to carry out since they assess the impact on an institution's financial condition of a move in one particular risk factor, the source of the shock not being identified, whereas scenario tests tend to consider the impact of simultaneous moves in a number of risk factors, the stress events being well defined.

Based on the type and severity of the stress test contemplated, potential sources of inflows could include raising incremental core customer deposits, using unused unsecured and secured wholesale funding capacity, selling unencumbered liquid assets, increasing securitization of assets for which programs already exist, drawing on committed lines, borrowing from central banks, calling client loans where legally possible, making illiquid asset sales, and maximizing internal funding between the firm's various legal entities. Many scenarios could involve a firm's still being able to borrow from the market, even unsecured funds, possibly at reduced levels, shorter maturities, increased cost, or some combination of such effects.

Potential sources of outflows could include loss of core deposits, inability to rollover wholesale deposits, increased collateral requirements from payment/settlement systems and derivatives transactions, normal course of business loan drawdowns, committed liquidity line drawdowns, higher haircuts for securities finance transactions and asset sales, increased cash or collateral postings as a result of a downgrade, and loss of deposit with credit rating triggers.

In performing stress tests, firms need to take into account both the level of severity of a crisis and their position (on a standalone basis and relative to their peers) at the onset of the crisis before they decide how to measure exposures and react to the results of these tests. In the case of potentially less disruptive stress scenarios, such as a ratings downgrade, firms need to review several stages of the crisis; this allows them to test assumptions about changes in assets and liabilities over time.

Recommendation 33: The appropriate starting point for stress testing assumptions for firms should be a business-as-usual approach with clients. This approach assumes that the entity will continue to operate as a going concern and that the franchise has significant value. Different scenarios should be used to evaluate how various events may impact the firm, including the point at which growth plans may need to be curtailed if the severity of the crisis warrants such an action. This should then be used to plan the evolution of the balance sheet in a crisis.

Discussion:

Most firms employ a business-as-usual approach to the balance sheet while stress testing. This assumes that the balance sheet is "evergreen," with assets rolled over at maturity. However, a significant minority of firms attempt to forecast changes in the balance sheet, with some assuming there would be reductions based on the severity of the scenario and others assuming growth in line with their business forecasts.

Recommendation 34: Firms should ensure that the results of key stress tests are periodically communicated to senior management and, as appropriate, to the board. Firms should have an understanding of the worst-case scenarios that may trigger implementation of contingency plans. The assumptions and parameters underlying these tests and resulting cash flows, including funding capacity assumptions, should be regularly reviewed and challenged.

Discussion:

The results of key stress tests provide management with a range of liquidity gaps that could open up; this could be the starting point for designing a contingency plan or survival strategy. Potential liquidity gaps identified in these tests, and the firm's capacity to generate liquidity, can provide the cornerstones for a liquidity limit framework, after taking into account the firm's appetite for liquidity risk. The discussion with senior management will generally include: the extent to which stress-test assumptions can be considered realistic; the complexity and precision of the models and the need to assess models critically (precision and complexity not being guarantees of accurate outputs); and an estimate of the probability of occurrence of each stress situation. Senior management will not and should not respond to stress tests mechanistically, but must make appropriate strategic decisions based on sound business judgment, taking the tests but also many other considerations into account.

Contingency Planning - Governance

Recommendation 35: Firms should have contingency plans in place that address potential early warning sig-

nals of a crisis, the strategy and tactics used in normal course of business to prevent escalation of liquidity concerns, and the possible strategies for dealing with different levels of severity and types of liquidity events that cause liquidity shortfalls. The breadth and depth of these strategies should incorporate recovery objectives that reflect the role each firm plays in the operation of the financial system (e.g., provision of collateral to payment/settlement systems) such that these strategies enable a firm to continue to play its role, even in times of major operational disruptions. Firms should make efforts to assess the effectiveness of their contingency plans.

Discussion:

Some firms define stages of a crisis and define appropriate measures to mitigate a crisis. Generally, firms distinguish among orderly market conditions, a liquidity squeeze during which unsecured funding may be partially inaccessible and steps are taken to strengthen liquidity, and a severe liquidity squeeze or shock, including a firm-specific crisis when unsecured funding is not accessible and access to secured funding may also be limited.

At this last stage a liquidity crisis committee could convene to take appropriate measures. Such measures would be based on expected liquidity positions, estimates of how cash might be generated through the market, and projected outflows from deposit run-offs or reduced wholesale funding. Firms can, and generally do, identify early warning signals of a liquidity crisis (both firm-specific and market-wide) and the operating procedures to be activated in the event of progressive deterioration.

Market participants should explicitly consider and plan for major operational disruptions, developing recovery objectives that reflect the risk they represent to the operation of the financial systems in which they participate. Those who provide more critical services need to target higher standards.

Firms may consider limiting the provision of committed funding lines as the crisis escalates, and they may need to carefully consider the value of purchasing access to committed lines of funding. Firms manage their various funding needs and maintain diverse funding sources that can help avoid disruption or, alternatively, can be used during a funding disruption. One option is to hold excess liquidity in a portfolio of high-quality assets in local currency and, as appropriate, foreign currencies that can either be sold in the market or used in repos to generate additional liquidity.

Consistent with this Recommendation is that firms should assess the effectiveness of their contingency plans. Contingency tests, as an example, are used by some firms to ensure the effectiveness of contingency plans when stress situations are simulated. If these tests do not meet predefined minimum threshold standards, firms generally take action. Regular contingency tests could be conducted to ensure that key exposures are understood and that contingency procedures are known and understood in areas critical during a liquidity crisis. The scope of contingency tests can span from testing the availability of crisis contacts to discussing the policies and procedures to be followed during a liquidity crisis to simulating a crisis, with the focus placed on managing a liquidity crisis rather than on business continuity or operational payment or settlement issues.

Recommendation 36: Firms should ensure that contingency plans are proportionate to the size and complexity of the firm and involve input from senior management. Contingency plans should be reviewed as business or market circumstances change.

Discussion:

The level of organization involved in a contingency plan may differ depending on business activities, whether liquidity is managed centrally or not, and whether liquidity pressures are managed locally in the first place. Reporting as a group, reporting for material subsidiaries, or reporting on a regional basis could all be appropriate.

Contingency plans need to involve Treasury, Risk, and business areas, and could include IT, operations/settlements/payments, communication, and Finance units, among others. Often a member of Treasury or Risk is assigned the role of contingency coordinator to ensure that working groups understand their tasks and that decisions and actions are logged and communicated as appropriate.

Recommendation 37: Firms should ensure that contingency planning includes establishing policies and procedures and clear divisions of roles and responsibilities for liquidity events so as to avoid confusion or lack of clarity of roles during a crisis. This should include strategies and procedures for timely, clear, consistent, and uninterrupted internal and external communication flows to ensure timely decisions, to avoid undue escalation of issues, and to provide adequate assurance to market participants, employees, clients, creditors, regulators, and shareholders. This would include the designation of leadership roles in a liquidity crisis and may include the designation of a formal crisis team that would be a contact point for senior management. The planning process should include the designation of back-ups for key functions and the assurance that key systems and processes have been considered in the firm's business continuity planning.

Discussion:

Most firms have a liquidity crisis team in place that is chaired by the Treasurer or CFO. Alternatively, an effective ALCO or another similar forum with representation from senior management, Treasury, Finance, Risk Management, representatives responsible for asset-liability management (ALM), members of the funding desks, and significant businesses could serve such a function. In many firms, this function also reviews various scenarios as part of the normal ALM monitoring process. The frequency of team meetings differs from firm to firm, reflecting the fact that in many cases such teams meet on a regular basis to review stress scenarios in business-as-usual conditions. An agenda for a crisis team would generally include a liquidity crisis scenario simulation, market reports, liquidity monitoring and analysis, and liquidity strategy. The team should also ensure that the plan is adequately tested on a regular basis.

Many firms also have coordination between their liquidity crisis teams and business continuity management.

Recommendation 38: Firms should outline in their liquidity policies the benchmark periods that require evaluation for whether liquidity needs can be met. Selection of these benchmark periods should be based on a number of qualitative factors.

Discussion:

The quality of a firm's underlying assumptions and the robustness of its funding and liquidity risk management process should be prime considerations in the determination of a benchmark period. Other determining factors should include the type of entity and whether the firm has access to the central bank/lender of last resort. Firms that have access to nonwholesale sources of funding that tend to be more stable may have shorter benchmark periods (subject to the analysis suggested at Recommendation 22). Firms may also choose to have multiple benchmark periods.²⁹

Asset Reduction and Financing Strategy

Recommendation 39: Firms should have in place an asset reduction plan and financing strategy for both firm-specific and market-related liquidity events.

Recommendation 40: Back-up plans may involve invoking unused credit facilities granted to a firm; however, firms should not rely excessively on such lines as counterparties could elect not to honor their obligations to provide funding if a firm is in trouble.

Discussion:

Firms consider the loss of access to funding sources under certain scenarios such that one source may be completely eliminated. Secured funding and asset liquidation should be available against higher haircuts (or

²⁹The May 2006 Joint Forum paper indicates that the first few days in any liquidity crisis are crucial to maintaining stability and that the appropriate time frame will depend on the nature of the bank's business. In the context of collecting data related to the bank's liquidity, the paper goes on to suggest the benchmark period is highly dependent on the bank's reliance on short-term money markets. Banks that are reliant on short-term funding should concentrate primarily on managing their liquidity in the very short term (out to five days) whereas banks less dependent on short-term money markets might manage their net funding requirements over a slightly longer period, perhaps one to three months ahead. However, the paper also suggests that institutions should collect data and monitor their liquidity positions in more distant periods.

premiums), although access to secured funding might be limited during a market crisis or if a firm does not have a demonstrated market presence in a liquid product category in business-as-usual conditions. During a disruption asset liquidation would be possible for high-grade paper (in particular, eligible central bank assets), but again, higher haircuts would be applied based on liquidity quality.

Cushion of Liquid Assets

Recommendation 41: Firms should develop methodologies and policies to determine the level of specifically earmarked liquid assets that they should maintain at all times to meet immediate liquidity needs when faced with adverse conditions. These policies should also include criteria for asset composition.

Discussion:

Firms maintain a cushion of eligible central bank or highly liquid assets to generate liquidity through repos, through asset sales, or through central bank pledges. The calculation of such a cushion can be based on stress simulation, a requirement to cover short-term liabilities (wholesale funding), or historical analysis. Firms need to introduce a minimum level for such a cushion of liquid assets. They also should consider whether different haircuts should be used for different/stressed scenarios and factor this into their stress testing. A stressed scenario is generally expected to lead to increased collateral demands in response to reduced access to unsecured funding.

Central Bank Facilities

Recommendation 42: Firms should ensure that assumptions regarding potential funding from central banks are evaluated taking into account the level of severity and type of crisis. Firms should differentiate between different types of central bank facilities (e.g., "standing" facilities and "emergency" facilities).

Discussion:

In considering the use of central bank facilities, some central banks differentiate between standing facilities and emergency lending (often referred to as lender of last resort facilities). The former might be set at preagreed levels and often may be granted under a "no questions asked" basis; the latter may be available only to market participants deemed significant for the financial stability of a currency. In some cases, lender of last resort facilities, or emergency funding, are truly meant to be a last resort and as such, the firm may have to comply with conditions that change the business model significantly if it wishes to obtain funding. During general market crises, access to central bank funding could be expected to be generally more forthcoming against high-quality collateral for standing facilities. During a name-specific event, using central bank funding could send out negative signals to the market, and central bank eligibility criteria could be stricter.

Recommendation 43: Firms can include standing central bank facilities that are granted on a "no questions asked" basis in their contingency plans. The inclusion of such funding should be consistent with the timing of the availability of the respective collateral at the central bank.

Discussion:

In Europe some central banks provide lending facilities to market participants. Under these standing facilities, participants can raise liquidity on demand, usually against high-quality collateral already pledged to the central bank, sometimes at a market rate and sometimes at a penalty rate. Some examples include the European Central Bank, the Bank of England (standing facilities), and the Swiss National Bank (Liquidity Shortage Financing Facility).

In 2006 the Bank of Japan removed the maximum number of times a month that banks may go to the discount window. In fact, banks with high-quality collateral are encouraged to use it to increase the liquidity in the market during times of tightness, particularly when market rates rise above the central bank lending rate.

In all of these cases, approaching the central bank for economic reasons is deemed prudent and takes place on a "no questions asked" basis whereby firms are not asked to explain what circumstances led to the liquidity shortage.

In the United States, discount window facilities should not be considered available in a name-specific event, as this could signal to the markets that the firm is in dire straits and could exacerbate the crisis. The Federal Reserve publishes statistics related to the use of the discount window by district. Although the name of the borrower is not disclosed, if there were concerns about a particular institution there would be speculation about its borrowing that could lead to reputation issues. However, if the scenario is such that access to unsecured funding is assumed to be lost, then using these facilities as a last resort is an acceptable alternative.

The Web site of the Bank of Canada details the Bank's policies and procedures as a lender of last resort, which includes both standing and emergency facilities. One document outlines the policies governing the Bank's lending activities, including the terms and conditions of its two lender of last resort programs and the eligibility criteria that a financial institution must meet to receive a loan.³⁰ Another document provides an overview of the Bank of Canada's lender of last resort role, discusses the policy framework that guides the lender of last resort function, and addresses the potential provision of liquidity to major clearing and settlement systems.³¹

Most firms currently consider the impact of standing and emergency lending facilities in their stress scenarios. A limited number of these firms plan to rely on and use these facilities only in limited circumstances (i.e., severe stress events or to cover liquidity needs in honoring credit facilities to other financial intuitions). In a general market crisis, market participants assume access to central bank funding is possible against high-grade collateral.

The availability of central bank funding depends on the circumstances at the time of the crisis: Are markets operating normally, or is there a firm-specific, contained (product, region), or market-wide disruption? Availability of central bank funding (and conditions to be met for funding to be forthcoming) needs to be assessed prior to making assumptions for stress testing purposes. Some firms eliminate this source of funding as it could send out negative signals to the market if used.

Recommendation 44: Emergency lending facilities (lender of last resort facilities) should be considered in firms' stress testing. When implementing firms' "what-if" scenarios, the potential use of these facilities should be dimensioned under each scenario. However, in terms of dimensioning risk (and establishing liquidity risk limits), emergency facilities should only be considered available in extreme events subject to conditions under which the facility can be used legally and under conditions that would not exacerbate a liquidity event for the institution.

Discussion:

Access to emergency lending facilities under the designated scenario should be confirmed in order to establish that local rules and regulations allow for such borrowing and that the prerequisite operational aspects have been demonstrated. Assumptions generally should be conservative.

³⁰Please refer to www.bankofcanada.ca/en/financial/llr.html.

 ${\rm ^{31}Please\ refer\ to\ www.bankofcanada.ca/en/review/winter04-05/daniel.html \#box2.}$

Considerations for the Official Sector

The following Considerations are targeted at publicsector authorities as well as at firms. In these cases, it is hoped that the suggestions will help inform a constructive public policy discussion that will both make the system stronger and reduce regulatory rigidities or uneconomic cross-border obstacles to good liquidity management. New technologies, new instruments, and new risk-management capabilities have created more integrated and responsive markets that cannot be contained in old regulatory forms that may actually increase, rather than decrease, the chance of international systemic problems.

Roles of Supervisors

A: Home and host supervisors should work together to conduct an independent evaluation of a firm's integrated liquidity positions as well as strategies, policies, procedures, and practices related to the management of global liquidity. Supervisors should ensure that the firm has an effective system in place to measure, monitor, and control liquidity risk and has an appropriate liquidity contingency plan on a consolidated basis and, where required by regulation or deemed appropriate by the board of directors, for each legal entity. As needed, supervisors should leverage the firm's internal risk reporting to obtain sufficient and timely information to evaluate the firm's level of liquidity risk.

Discussion:

Consistent with the Basel Core Principles, firms are generally subject to regular reviews on a consolidated basis by a firm's home supervisor and on a legal entity basis by each host or legal entity regulator. The criteria for these overlapping reviews, however, are not formalized or consistent, with some regulators focusing on qualitative assessments while other reviews are more quantitative in nature. Similarly, supervisory guidance and regulation are a mix of qualitative and quantitative requirements. Quantitative information reported to supervisors varies, but tends to include gap reports, liquidity position, and liquidity ratios.

While it is recognized that supervisors have certain legal constraints, home country supervisors need to consider taking a more holistic rather than comparative approach to assessing the adequacy of a firm's global liquidity risk management. That is, supervisors need to focus on the overall effectiveness of each firm's process, rather than expecting the risk-management framework at each firm to have similar components. Often, such differences as legal structure, complexity, risk-management approach, centralized versus decentralized management, key lines of business, and risk materiality justify differences in firms' management structures and strategies (i.e., risk measurement and mitigation).

To enable such reviews, firms need to assist supervisors to understand where and why differences in practices across sectors and/or jurisdictions are acceptable and lead to more efficient and effective risk-management solutions that are tailored to a firm's individual circumstances.

Liquidity Risk Regulation

B: Regulators should seek to harmonize, or at least to promote greater consistency of, liquidity concerns, definitions, and standards among regulators so that firms are better prepared to address regulatory considerations when constructing liquidity risk management policies and practices for firm-wide implementation across multiple legal entities and jurisdictions.

C: Liquidity regulations should be based on qualitative (Pillar 2) risk-management guidance, not specific quantitative (Pillar 1) requirements. Host regulators should put more uniform reliance on home regulators and regulation to ensure adequacy of enterprise-wide management of liquidity. More effective global management of liquidity by large firms should reduce systemic liquidity risk, even if at times this may mean that the national interests of individual regulators are not maximized.

Discussion:

For most firms regulatory requirements directly related to liquidity and other prudential requirements are key considerations in their global liquidity risk management frameworks. In fact, the need to meet legal entity requirements is one of the main drivers of the design of such frameworks. Quantitative legal entity requirements, however, may impinge on the ability to manage liquidity on a group-wide basis, especially where

host country currencies are very liquid currencies and when the firm has a preference for a centralized liquidity-management structure, by creating liquidity pools maintained at subsidiaries that are restricted from lending to the holding company or sister subsidiary. This trapped liquidity could severely exacerbate the group-wide liquidity situation should a crisis arise. In addition, different regulatory requirements in various jurisdictions force firms to provide a number of different reports that are not based on internal models, duplicating work and approval processes and creating distortions between internal and regulatory liquidity reports. This inconsistent regulatory framework and these restrictions on transferring liquidity between entities in a group limit the ability of groups to manage firm-wide liquidity efficiently and have led many groups to monitor and manage liquidity on a legal entity basis.

Regulators need to give further consideration to the benefits of taking a more qualitative, consolidated (rather than national) view when overseeing funding liquidity management of firms' subsidiaries and branches in their jurisdictions. To this end, host and legal entity regulators need to rely less on rules that might trap liquidity and rely more on internal policy frameworks and models reviewed by home regulators and on information sharing and cooperation with home regulators. This will lead to more effective and efficient global management of funding liquidity risks and reduce systemic liquidity risk. Regulators are rightly concerned that financial difficulties encountered in one entity could adversely impact the financial stability of the entire group, or even the markets in which they operate. Therefore, close monitoring of the relationships between regulated entities and all other entities is of utmost importance. The regulatory requirement to maintain separate pools of liquidity, however, need not lead to the conclusion that a firm can consistently distance itself from a troubled affiliate, since large firms would suffer quite serious damage to both their reputations and their liquidity positions should a material subsidiary become troubled.

The May 2006 Joint Forum paper made similar observations, noting that regulations impede the movement of liquidity and could force firms to hold liquid assets in a number of jurisdictions and currencies. The paper also stated that most firms believe that firm-specific liquidity problems are most likely to spread through reputational contagion that, by definition, cannot be prevented by the presence of trapped liquidity in a subsidiary in which problems did not originate. Instead, such trapped liquidity may have the unintended consequence of exacerbating the problem by limiting access to these assets.

It is important that the issues of depositor and creditor protection and those of liquidity not be confused. The more mobile and fungible liquidity is across locations and currencies, the less likely it is for liquidity risks to crystallize and eventually become a question of solvency. Ensuring consumer/creditor protection would be better addressed by implementing harmonized bankruptcy laws across various jurisdictions and allowing for a free flow of liquidity from locations where excess liquidity exists. Should regulators relax some of the restrictions on the free movement of funds between affiliates (e.g., large exposure regulation), the liquidity situation would be less vulnerable to liquidity crises, as firms could more freely move liquidity around when and as needed instead of having to keep certain pools of local liquidity merely to comply with local regulations. Fast access to liquidity is key to a liquidity crisis not developing into a solvency crisis that could affect the stability of the rest of the financial system.

Role of Central Banks

D: Central banks should seek to expand and harmonize eligibility of central bank collateral, enabling firms to maintain a common collateral pool.

Discussion:

Central banks, payment and settlement systems, and public exchanges should harmonize and expand the types of acceptable collateral (especially for crises for which the financial industry is not the root cause) as well as take steps to permit cross-border collateralization. Such a move would allow firms to manage liquidity risk more effectively and more efficiently, in part by enabling firms to maintain a common collateral pool. Central banks in particular need to consider including less-liquid, but high-quality, assets as eligible collateral for their RTGS payment systems and normal course of business liquidity facilities. **E:** Central banks should provide greater clarity on their roles as lenders of last resort in both firm-specific and market-related crises.

F: The official sector, including central banks, should be willing to actively participate in a firm's contingency planning, including periodic testing of lender of last resort facilities.

Discussion:

Central banks should be more transparent about the process to be followed during extraordinary events, for example, the types of additional collateral that could be pledged, haircuts that could be applied, limits by asset type (if any), and the delivery form of such assets. This would include the questions that would be asked related to the borrowing and whether the borrowing would be public information.

As the IIF Special Committee on Effective Regulation notes in its *Proposal for a Strategic Dialogue on Effective Regulation*, there is a fear that greater transparency on the part of central banks would lead to moral hazard. It is the Special Committee's belief, however, that the benefits of increased clarity on how central banks would respond to different types of crises outweigh this risk. In times of crisis involving multiple jurisdictions and regulators, there will always be challenges in the coordination of information collection, sharing, and decision making. To the extent possible, the more protocol that is established prior to such an event, the better prepared both firms and supervisors will be to address a crisis.

Publishing the criteria about how a central bank would determine which firms would qualify for advances against "special" collateral is not the only way to increase transparency. Central banks could provide a collateral list and the circumstances under which such collateral would be accepted and could advise firms of the procedures for collateralizing advances so that banks could be better prepared. Central banks also need to provide the ability for business-as-usual testing of these facilities so that operational details are arranged in advance. For their part, firms are responsible for acknowledging and managing the moral hazard risk as well as for maintaining adequate liquidity to respond to firm-specific liquidity shocks. If they do not, the public sector would have regulatory and legislative means available to bring to order firms that do not meet minimum risk-management standards (following the incremental clarity provided by central banks). As a principle, central banks should be more willing to intervene to support the market and its participants and be more lenient as to the type of collateral they are willing to accept, if the crisis originates outside the financial industry.

Interaction of Liquidity Risk and Capital Adequacy

G: Regulatory and economic capital should not be directly tied to funding liquidity risk. The Basel II requirement to take liquidity into consideration for purposes of Pillar 2 (Supervisory Review Process) should be met through a regulatory assessment of firms' liquidity positions and risk-management practices that considers each firm's various liquidity risk metrics and levels of acceptable risk tolerance in light of its internal and external environment and circumstances.

Discussion:

The Special Committee recognizes that there is some intellectual appeal to trying to attribute capital to all risks, including funding liquidity risk. However, the use of a simple, standardized measure of liquidity risk to derive capital requirements would be unlikely to yield a result that would be truly risk based. Developing and implementing a capital requirement for liquidity risk would be not only costly and complex, but also would result in little additional capital. As noted throughout this report, the most effective understanding of liquidity risk is developed through an evaluation of firms' liquidity positions and risk-management practices. Therefore, metrics should be tailored to market- and firm-specific characteristics.

Funding liquidity risk is mainly a second-order risk. That is, material liquidity risk issues typically arise as a result of problems with the management of other risks. Although liquidity risk could accelerate the downfall of a firm, particularly if it initially had a high level of unmitigated liquidity risk, it will almost never be the root cause of a bank-specific crisis. Assigning capital to cover funding liquidity risk would be adding to capital already allocated to other first-order risks, including credit, market, business, and operational risks. There would inevitably be a duplication of capital requirements if this were mandated.

There are more efficient and effective ways to offset liquidity risk than using capital (e.g., increase core deposits, securitization, term funding, and pools of liquid assets) if liquidity risk reduction is required.

Even if regulators or firms were to try to implement a capital framework, there are a number of more detailed conceptual challenges to developing a robust and meaningful methodology. One question that would need to be addressed is how to incorporate in the capital measure the impact of important off-balance sheet liquidity risk mitigants, such as different levels of unused funding capacity between different firms, existence of deposit insurance programs, and differences among various jurisdictions. Another question is how to choose business environment assumptions for measuring liquidity risk and, therefore, capital requirements and corresponding confidence intervals, when firms are not operating in a uniform environment and the risk of liquidity shocks to various firms may vary greatly. These challenges may lead to a significant divergence between institutions in their adopted measurements, diluting the comparability of the outcomes and undermining the objectivity of the framework itself.

Challenges also exist in applying to liquidity risk the concept of unexpected loss, which is the basis for most economic and regulatory capital measures. If unexpected loss were to be determined by looking at structural liquidity gaps and the incremental cost that firms could pay to close these gaps, how should this be interpreted in markets in which the capacity to close these gaps in term funding markets does not exist? In cases in which the capacity exists to mitigate the risk fully but firms choose not to, would the spread a firm could pay to close this gap be a reasonable proxy for what the firm would have to pay in short-term markets in times of crisis? In other words, would the short-term premium the firm has to pay in a crisis be as large as the long-term premium the firm would have had to pay at the onset, especially in the case of lower-rated firms for which long-term spreads can be very wide and can vary materially between firms with the same rating?

In addition to the modeling challenges outlined above, there is also a public policy aspect. Before considering any capital charges for liquidity risk, and in light of the important "maturity transformation" role financial firms play in the economies of all countries, regulators would need to assess and understand the impact these charges could have on financial firms, on their business franchises, and on other participants in capital markets. Failure to do so could result in unintended consequences, such as diminishing financial firms' maturity transformation role (especially in markets in which gaps cannot be fully closed) or imposing a higher entry barrier for new competitors, who would have to pay more to close these gaps if they are not well rated.

Given the practical, conceptual, and policy challenges, we believe that the industry's resources would be better spent improving capital measures related to other, more material risks and on strengthening liquidity risk management. Pursuing a costly solution to an immaterial problem is inconsistent with risk-based regulation.

Analytical Discussion 1

Reliance on Secured-Financing Sources

Background

As a general principle, liquidity derived from assets, as opposed to incremental liabilities, is the most reliable source of funding in a liquidity event. Thus, a significant aspect of the liquidity risk management process of a financial institution involves the assessment of its ability to access secured-financing sources. The most significant forms of secured-funding sources relate to securities portfolios (Trading and Available for Sale) and loans for which there are active markets for their securitization (mortgages, credit cards, and others). The principles delineated in this report are equally applicable to asset sales and to secured funding.

As noted above, the most reliable form of funding in a liquidity event is derived from assets as opposed to raising unsecured incremental liabilities. As financial markets evolve, a significant trend impacting the liquidity of financial institutions relates to the increased availability of secured-financing sources. During 2006, in the U.S. alone, issuance of asset-backed securities exceeded \$809 billion.³² Individual firms rely on billions of dollars of secured funding on a daily basis to finance their securities portfolios and to facilitate customer transactions.

The markets for secured financing fall into several categories:

- Securities financing arrangements, such as repurchase/reverse repurchase agreements and stock borrow/stock loan;
- Asset-backed commercial paper (ABCP);
- Securitization of loans, such as
 - ° Credit Cards,
 - ° Mortgages, and
 - ° Autos; and
- Covered bonds.

The primary purpose of some of these transactions in business-as-usual environments may or may not

be to provide funding to the institution. For example, securitization offers the opportunity to correct a substantial part of the classic banker's mismatch between short-term deposits and other obligations and longterm assets by converting those assets into more readily tradable form, getting them off the balance sheet, and allowing banks to diversify risk and concentrate on originating and managing credit rather than solely on warehousing risk. Conversely, capital relief and reduction of credit risk are often primary considerations for securitizing assets.

The Special Committee on Liquidity Risk noted that there is a general assumption among financial institutions that incremental liquidity can be generated from unencumbered qualifying assets and that there is a significant, increasing trend in their reliance on this funding source. This mirrors market developments in the secondary market for various asset classes and is a positive trend for the financial community. However, along with assessing the liquidity value of the assets of a particular firm, this raises more general market-related questions about the availability of this funding source in stressed market conditions. In particular, the concerns relate to the availability of this funding source in a general market event or in a systemic event impacting more than one financial institution relying on the same liquidity sources. A fundamental question is whether a firm that appears to be sliding into trouble would be able to have access to this market on reasonable terms, and if so, to what extent? Even if able to offer high-quality collateral, a firm might find that the market is increasingly closed to it because counterparties (and triparty repo providers) may simply not want to face the potential difficulties of dealing with a failing firm, even if they are confident under the applicable legal regime that the collateral is fully secure and available to them. The regulatory community shares these concerns. The May 2006 Joint Forum paper notes this trend, and further discussions with regulators indicated particular concern about assumptions that central banks would provide a "backstop" in a market disruption.

Securitization gives tremendous flexibility to firms and to the markets, but securitization (including covered-bond) transactions require expert personnel and substantial infrastructure. There are highly technical

questions regarding how to value securitized assets, including what liquidity haircuts to apply to even the most widely understood assets, such as mortgages. Moreover, the market standing required for doing such deals successfully cannot be overlooked. It is highly unlikely that a firm that is not in the business could use such transactions to unload assets if it began to encounter liquidity or other financial difficulties. In addition, although markets for many securitized assets are broad and deep and regularly absorb large issuances, market capacity cannot be assumed, and if several firms attempted to dispose of large amounts of assets at the same time, especially under conditions of broader market stress, that capacity could be challenged. In short, securitization is strong strategically but may not be available tactically in times of stress.

These concerns can be partially alleviated by strong policies and procedures at individual firms. The regulatory community needs to provide additional support by providing clarity about its role, allowing broader eligibility of collateral, and facilitating cross-border collateralization.

Recommendation: While there is a need to continue to look for ways to address the potential risk of liquidity drying up in secured-finance and liquid-asset markets, the Special Committee believes that:

A1. The main focus should be to take steps, through collaborative mechanisms between the industry and the official sector, to reduce the probabilities that such events will occur, and if they do occur, to reduce their impact. The qualitative and quantitative measurement of this risk in liquidity stress tests conducted by various firms remain speculative and arbitrary and would in the extreme produce results that senior management would consider impractical to remedy. Rather, firms should continue to refine their risk-management practices and focus on risk mitigation.

Recommendations – Financial Institutions

A2. Firms that rely on secured-funding sources to a significant extent should have a robust process in place to evaluate asset liquidity under a variety of business-as-usual and stressed conditions. Please see Recommendation 25. Firms with significant reliance on asset liquidity should eval-

uate the haircuts and timing of the cash flows from these sources.

- A3. In determining the amount of available liquidity and the liquidation horizon, the evaluation should include a determination of whether the asset is encumbered as well as an assessment of market haircuts, market capacity constraints, access to central bank facilities, concentrations in collateral, potential name-specific concerns, and the operational ability to complete the transaction. Please see Recommendation 27.
 - Encumbered assets should be excluded from incremental liquidity value;
 - Haircuts should be evaluated in business-asusual as well as in stressed conditions;
 - The capacity of the markets for a particular asset class should be evaluated; and
 - Operational capability to facilitate the transaction should be in place and tested.
- A4. Liquidity value should only be given to those asset classes for which their liquidity has been demonstrated through active and ongoing sales, secured funding, or securitization programs. Please see Recommendation 26.
- A5. In determining the available liquidity from these sources, the depth of the markets should be evaluated in business-as-usual and stressed conditions. Capacity can be evaluated by asset class/security type through discussions with customers regarding their available credit facilities, capacity, and pricing. Please see Recommendation 25.
- A6. Business strategy should be considered in evaluating the liquidity of an asset class. For example, if a liquid asset is held as a hedge of another asset or derivative transaction as part of an overall business strategy, consideration should be given to the impact on that business strategy, even assuming such assets could, in light of existing business or regulatory requirements or obligations, be sold or pledged. Please see Recommendation 27.
- A7. To the extent practicable, firms should test their ability to access lender of last resort facilities.

This test should be coordinated with the central bank. Please see Recommendation 25.

Discussion:

It is standard practice of securities firms and many large commercial banks to assess the ability of a firm to convert its unsecured funding to a secured basis. The loan ("collateral") value of its unencumbered portfolios is generally assessed on a daily basis. Haircuts on these securities are reviewed on a regular basis with the funding desks and consideration is given to the concentration of positions, the level of haircuts in a crisis, and the operational capability to complete the transaction. Acceptable practice for a bank's trading and banking books should be consistent with the process above.

If liquidity problems occur, a decision would need to be made as to which holdings can be shed that are least detrimental to business relationships and to perceptions about the firm's soundness, taking into account business economics (profit and loss). Firms that are active in secured-lending markets could use assets to generate liquidity through repos rather than through outright sales, should markets permit.

Some central banks offer limited overnight funding against high-quality collateral (usually pledged in advance) on a "no questions asked" basis.

The evaluation of the liquidity value should differentiate between use of assets as collateral for borrowing and for generation of cash by sales of such assets, and also take into consideration the business strategy for the assets in question, the potential P&L impact of any disposition, and whether management would be willing to absorb potential losses, taking into account tax effects. In determining a haircut for sale purposes, stressed volatility of markets should be considered over the projected liquidation horizon. Haircuts for repo purposes should be based on an evaluation of the market's ability to absorb the level of positions, at proposed haircut levels. An evaluation should be performed of securities held for clearance and for other regulatory or legal purposes to determine whether they are encumbered or otherwise unavailable for liquidity.

Liquidity value should only be given to asset classes for which liquidity has been demonstrated through an active and ongoing sales or securitization program. The availability of central bank/government repo facilities should be used only if they have been tested and would be available in a name-specific event. Consideration should be given to whether use of these facilities would exacerbate a crisis.

Firms could base haircuts on prior experience, bestpractice assumptions, liquidation scenarios, regulatory requirements, practices adopted in Market or Credit Risk, or market liquidity models. A comparison of various models would provide a range of results from which firms could select an appropriate model.

Securities should be grouped according to their liquidity value. High values, for example, would apply to eligible central bank holdings. Other criteria to be considered when assessing liquidity values and categorization are rating/credit quality, frequency of markto-market, market price availability, maturity, type of security, reason for holding (trading, investment, hedge), access to secured funding for the security, issuer type/country, currency, size of position (e.g., relative to issue size, daily traded volume), and time to settlement. Liquidity categories can be grouped into high, medium, and low liquidity or by the likelihood that the action will be taken.

Most firms use haircuts or a volatility analysis to determine the liquidity value of assets. In general, firms evaluate the value and timing of their actions based on the scenario that is being addressed.

Considerations for the Official Sector

- A8. Central banks should seek to expand and harmonize eligibility of central bank collateral, enabling firms to maintain a common collateral pool. Please see Consideration D for the Official Sector.
- A9. Central banks should provide greater clarity on the role of the central bank as lender of last resort in both firm-specific and market-related crises. Please see Consideration E for the Official Sector.

A10. The official sector, including central banks, should be willing to participate actively in firms' contingency planning, including periodic testing of lender of last resort facilities. Please see Consideration F for the Official Sector.

Discussion:

Central banks, payment and settlement systems, and public exchanges should harmonize and expand the types of acceptable collateral (especially for crises for which the financial industry is not the root cause) as well as take steps to permit cross-border collateralization. Such a move would allow firms to manage liquidity risk more effectively and more efficiently, in part by enabling firms to maintain a common collateral pool. Central banks in particular need to consider including less-liquid, but high-quality, assets as eligible collateral for their RTGS payment systems and normal course of business liquidity facilities.

Central banks should be more transparent about the process to be followed during extraordinary events, for example, the types of additional collateral that could be pledged, haircuts that could be applied, limits by asset type (if any), and the delivery form of such assets. This would include the questions that would be asked related to the borrowing and whether the borrowing would be public information.

As the IIF Special Committee on Effective Regulation notes in its *Proposal for a Strategic Dialogue on Effective Regulation*, there is a fear that greater transparency on the part of central banks would lead to moral hazard. It is the Special Committee's belief, however, that the benefits of increased clarity on how central banks would respond to different types of crises outweigh this risk. In times of crisis involving multiple jurisdictions and regulators, there will always be challenges in the coordination of information collection, sharing, and decision making. To the extent possible, the more protocol that is established prior to such an event, the better prepared both firms and supervisors will be to address a crisis.

Publishing the criteria about how a central bank would determine which firms would qualify for advances against "special" collateral is not the only way to increase transparency. Central banks could provide a collateral list and the circumstances under which such collateral would be accepted and could advise firms of the procedures for collateralizing advances so that banks could be better prepared. Central banks also need to provide the ability for business-as-usual testing of these facilities so that operational details are arranged in advance. For their part, firms are responsible for acknowledging and managing the moral hazard risk as well as for maintaining adequate liquidity to respond to firm-specific liquidity shocks. If they do not, the public sector would have regulatory and legislative means available to bring to order firms that do not meet minimum risk-management standards (following the incremental clarity provided by central banks). As a principle, central banks should be more willing to intervene to support the market and its participants and be more lenient as to the type of collateral they are willing to accept, if the crisis originates outside of the financial industry.

Analytical Discussion 2

The Impact of Complex Financial Instruments upon Liquidity-Management Policies and Practices

Introduction

The growth in the use of Complex Financial Instruments (CFIs) over the past decade requires us to consider the extent to which developments in the manufacturing, warehousing, and distributing of such products can affect the liquidity of a firm and should affect its related policies and practices. At first glance this may not seem to be an obvious question. After all, derivatives have historically been off-balance sheet and unfunded commitments. When we think of funding liquidity risk our thought process rarely begins with the derivatives arena.

So why should we consider this question? Firstly, little has been written to date on this specific subject. There are good reasons for this. The subject is not simple, and few market practitioners are experts in both the fields of derivatives and balance-sheet/liquidity management.

Secondly, derivatives have flourished in an environment in which regulatory prescription and industry practices are not very consistent and in which opacity governs the way in which some prices are determined and some transactions are reflected in financial statements. The fact that different firms may measure and attribute different economic values to "liquidity" for these transactions may create pricing discrepancies that are not warranted.

The third (and perhaps most specific) reason that we should consider this question requires an acknowledgment that many firms may not have yet fully transitioned their liquidity policies and practices from being primarily concerned with core commercial lending activity out of the commercial banking areas into giving derivatives areas the attention they deserve. Aspects of financing (typically, secured lending) are increasingly being structured as derivative financing trades under an ISDA contract. The drivers behind this change are several; however, perhaps the most important is the difference in the way in which income is recognized. The margin on a secured loan in the commercial bank is accrued over the life of the contract. The margin on a derivative financing trade can often be present valued and recognized into income immediately upon completion of the transaction. Some firms may regard this as an incentive to develop their derivatives' financing activity. Some firms may not have fully recognized the impact this will have over time on their own balance sheets.

This report attempts to illustrate the ways in which CFIs can affect a firm's liquidity. The report does not attempt to quantify the scale of the risk or vulnerability created. What it does aim to do is provide participants with an insight into how liquidity vulnerabilities may arise and what drivers are behind activities that create such vulnerabilities; finally, it suggests how to best monitor and mitigate the liquidity risks arising. Reviewing the vulnerabilities and ways to mitigate the risks is considered a higher-return activity than scaling the exposure. Because of the differences between firms owing to the differences in jurisdictions, markets, businesses, and structures, there is no simple set of metrics that can be used to gauge the aggregate size of this exposure.

The process by which this report has been produced began with the formation of a Task Force operating under the auspices of the IIF Special Committee on Liquidity Risk.

The Task Force developed an analysis, based on the experiences of each member's respective firm, of the ways in which CFIs could impact the liquidity of a firm. This analysis was distilled into this summary report.

Our analysis revealed that the liquidity impact of CFIs can be categorized under four headings:

1) Documentation Risk

The challenge of ensuring that all the critical terms of structured transactions are adequately captured and made visible to those responsible for maintaining an entity's liquidity is substantial. CFI transactions are often bespoke transactions governed by bespoke documentation. Certainty in respect to the contractual terms of the transactions and the legal enforceability of the contracts are key aspects of ensuring liquidity in the markets and the predictability of cash flows. Firms that are active in this area need to satisfy themselves that all material liquidity risks, in addition to the credit, counterparty, and market risks embedded in such documentation, are both understood and visible.

2) Liquidity of Assets

A common presumption is that highly rated assets are inherently liquid (either from the perspective of a firm's ability to refinance using the secured markets or in terms of a firm's ability to sell the assets in the market). This presumption needs to be confirmed. In times of distress there may be an inverse correlation between the complexity of an asset and its true liquidity.

3) The Total Return Swap (TRS)

The Total Return Swap is a critical mechanism within the broader structured-asset market. The TRS is used by some firms to take advantage of the differential in funding costs that exists between firms. Firms with a low cost of funds can finance assets on-balance sheet and transfer the economics of these assets via a TRS to a firm with a higher cost of funds. The differential in funding costs is shared between the firms and may in some cases be recognized into income immediately upon completion of the transaction

As the use of the TRS as a financing tool has grown, so too have instances of the use of mismatches in the term structure of the TRS warehouse books in which some firms seek to benefit from the term structure of financing costs by providing long-term financing via a TRS hedged with a TRS of a shorter duration. Firms may therefore be exposed to the risk that the "hedge" TRS does not roll over at its maturity. This creates an open market risk and liquidity position, which is directly relevant to a firm's liquidity if consideration is given to hedging the open position with the purchase on-balance sheet of the reference assets.

4) Conduit Financing

It is an increasingly common practice for firms to finance assets (both client and proprietary) via conduits. Conduits may be used to finance assets that arise from the provision of CFIs to a firm's clients. The conduits issue ABCP for which repayment is supported by a backstop liquidity facility. The provision of these facilities constitutes contingent liquidity risk. This risk arises in the event of disruption in the ABCP markets, an issue with funded assets, or an issue with the provider of the liquidity line. In effect, if the ABCP markets are not able to fund the conduit, the obligation to fund the assets passes to the provider of the backstop liquidity facility. While the risk of draw on liquidity lines is a low probability event, firms should consider what their obligation would be under such circumstances and ensure that they are properly mitigating this risk.

Analysis of the likelihood of drawdown based on history may lead to a false level of comfort. Firms need to acknowledge that "black swans"³³ may exist and ensure that the quantum of facilities extended makes sense in the context of their overall liquidity planning, including both legal and practical obligations. Analysis of the liquidity of the assets pledged to the conduit, alternative funding arrangements available for these assets, and protections provided by the nature of the underlying customer relationship are important considerations in determining the extent of the liquidity risk.

In the pages that follow we provide further detail on how best to monitor and mitigate the risks described under the headings above.

Descriptions and Recommendations

1) Documentation Risk

Overview of Vulnerabilities:

The increasingly unique and bespoke nature of structured transactions and derivative trading documentation has resulted in a variety of contractual arrangements that could expose a firm to a variety of vulnerabilities, including:

- Contingent liquidity risks, and
- Misstatement in liquidity profile, i.e., lack of clarity regarding the pay-off profile of a structured investment product, any embedded derivative features, and event triggers that could result in a misstatement of the liquidity characteristics of such products.

³³A black swan is a large-impact, hard-to-predict, and rare event beyond the realm of normal expectations.

Insufficient management information on the nature of such contractual arrangements may mean that these issues and their liquidity impact may not be visible to a firm and, consequently, may not be adequately included in liquidity planning and contingency plans.

How the vulnerabilities may occur:

Such vulnerabilities may occur through a variety of common arrangements, several of which are detailed below:

1. Credit Rating Downgrade Language

Certain clients may be required, through internal board policies or legal charters, to ensure that all transactions/trading activities are executed with the most highly rated institutions. As a consequence, such clients may require that Credit Rating Downgrade Language be included in bilateral counterparty documentation. The consequences of a credit downgrade can vary:

- Under trading documentation, such as ISDA, a common consequence of breaching a credit rating trigger includes the termination of the transactions by the nonaffected party or, if a Credit Support Annex (or equivalent) has been executed, requirement of the delivery of collateral in a specified amount and quality by the affected party to the nonaffected party.
- Under bespoke liquidity arrangements the entity being downgraded may be required to collateralize its commitment within a specified period (i.e., placing cash on a specified escrow account within 30 days). In certain transactions, particularly some conduit liquidity facilities, the amounts that may be required to be placed as collateral can be significant.

The occurrence of a credit rating downgrade event represents a liquidity risk for a firm, a contingent liquidity risk that Treasury will have to recognize and manage. Lack of management information on the issue may mean that the issue and its impact (and the timing thereof) may not be visible to Treasury and thus not included in liquidity plans and stress tests.

Mismatches may also exist between treatment of counterparties' collateral support agreements, putting some risk on the firm to provide collateral to the counterparty while the client covers its exposure via a general deed of pledge on its assets.

2. Call Features Embedded in Structured Investment Products

Structured investment products are common derivative products through which predominantly retail and high net worth individuals are provided with structured investment exposure to a range of asset classes in a variety of forms.

The pay-off features of such products can vary considerably. Some structured products, while issued with, for example, a ten-year term, have embedded features allowing the issuer to call the product from customers on a regular basis, i.e., every three months, if certain market-based triggers are breached. A product area may treat and book these transactions as ten-year term deposits, whereas from a liquidity-management perspective the call feature necessitates that these types of products should be treated as three-month rolling deposits. A lack of clarity regarding the pay-off profile of a structured investment product, and specifically any embedded derivative features, could result in a misstatement of the liquidity characteristics of such products.

Recommendation B1: The function within a firm that is responsible for liquidity risk should receive regular management information or have access to information on the nature and profile of all material arrangements that expose the firm to a contingent liquidity risk. Any material negative liquidity implications related to these arrangements should be captured in the firm's liquidity measures.

Recommendation B2: All transactions that expose a firm to a material-contingent liquidity risk should be subject to pre-approved business limits or be reportable and subject to pre-approval and, where appropriate, conditions of sanction by Treasury management.

Recommendation B3: The function within a firm that is responsible for liquidity risk should be actively engaged in the evaluation of new product offerings to ensure that liquidity issues are adequately addressed and appropriate actions taken to report and mitigate such risks as appropriate. **Recommendation B4:** The function within a firm that is responsible for liquidity risk should have a detailed understanding of the nature of the structured investment product business undertaken and the way in which such products are booked and reported in liquidity reporting frameworks.

2) Liquidity of Assets

Overview of Vulnerabilities:

By financing a trading desk on an overnight basis, rather than based on the expected liquidity profile of its underlying assets or asset packages, a firm could be exposed to a potentially unrecognized liquidity mismatch.

Liquidity issues could be further exacerbated when the assets are held as a hedge to a derivative transaction and profit is booked on the derivative transaction upfront. In such circumstances, the liquidation of the asset position may trigger the booking of a loss in the relevant trading book.

How the vulnerabilities may occur:

The vulnerabilities may occur through a variety of transactions; two common derivative transactions in which such vulnerabilities may arise include:

1. Total Return Swaps

A trading desk will often provide a client with synthetic exposure to an asset via a term TRS and then hedge the client transaction by buying the underlying asset and holding it on-balance sheet using finance provided by Treasury. On the basis that the transaction is originated and booked by a trading desk and the asset may be highly rated, Treasury may assume that the underlying asset is liquid and readily tradable and, consequently, fund the underlying asset on a short-term (typically overnight) basis. This may be appropriate where a deep and liquid cash and derivative market exists for these assets, allowing the trading desk to easily substitute its hedge by selling the underlying reference assets (e.g., government securities) and entering into a derivative hedge (e.g., an interest rate swap) with a market counterparty.

However, TRS transactions increasingly reference complex and unique underlying assets (e.g., CDOs, hedge funds, funds of hedge funds), and while some of these assets may be highly rated there is not, at present, a deep and liquid cash and derivative market for them. In reality, the ability of the trading desk to:

- a) Quickly and easily sell the cash hedge may be low, and oftentimes the desk will be unwilling to sell due to the creation of an open risk position and doubts as to whether the asset hedge can be reacquired at a later date. Some assets are unique and bought by buy-to-hold investors; consequently, secondary liquidity can be sparse.
- b) Quickly sell the cash hedge and substitute it with a derivative alternative may be doubtful; in reality such a transaction would often take months to arrange.
- 2. Negative Basis Transactions

A proprietary desk may seek to realize a "riskless" profit by capturing differentials in the pricing of a credit between the cash and derivative market. Typically, a transaction involves:

- a) The purchase of a credit asset, funded via Treasury; and
- b) The hedging of the associated credit risk through the purchase of credit default swap (CDS) protection.

Assets purchased will typically be held on-balance sheet and funded via Treasury.

While the credit asset may be liquidated in a short period of time, this is not the correct liquidity benchmark for anything other than a stressed liquidity situation. By buying a concomitant CDS hedge the trading desk has created a "negative basis" package. If the asset element of the package were to be liquidated in isolation, the trading desk would be left with the CDS position, which would be difficult to unwind and would, in the meantime, expose the trading desk to a potentially unwelcome synthetic short position in the underlying credit.

For liquidity risk management purposes, the liquidity of the "negative basis" package should be analyzed. There are three alternative ways in which the package could be funded:

- a) A back-to-back TRS with a third party, whereby the trading desk would sell the asset and provide the purchaser with credit protection.
- b) Novation of the package in which the trading desk sells the assets to a third party and transfers its CDS.
- c) Repo or secured funding of the underlying asset so that the position is maintained but the underlying asset is repoed into the market to raise funding.

In reality, the repo market for some of these assets may lack depth while the back-to-back TRS or Novation could take several months to arrange.

Recommendation B5: The function within the firm that is responsible for liquidity risk should have a detailed understanding of the asset profile of each trading desk, including access to information on the estimated period of time to liquidate, substitute via derivative, or repo the assets held on such books.

Recommendation B6: As part of the new business approval process for material transactions involving highly structured assets as underlyings, trading desks should clarify how they aim to fund these positions, what the potential alternatives for liquidating these positions are, and the expected timescales to achieve such exits.

Recommendation B7: Firms should consider whether a policy ought to be established requiring that assets and asset packages be funded for a tenor equivalent to their expected liquidity profile and/or limits placed on ensuing funding gaps, or alternatively, whether processes should be implemented to recognize these gaps in firm-wide liquidity reports and allocate, where applicable, related term funding costs that may be incurred.

Recommendation B8: As stated in Recommendation 11 of the main report, where applied, transfer pricing should be closely aligned with the liquidity of the underlying asset or structural nature of the underlying

liability. Liquidity costs should be charged to those businesses that consume liquidity.

3) Use of Total Return Swaps to Fund Directly from the Market

Overview of Vulnerabilities:

Total Return Swaps can be regarded as off-balance sheet funding arrangements. Unless Treasury ensures that appropriate controls are in place over such transactions, a structuring desk by using a TRS may:

- Utilize the capacity of an entity to raise funding in the market; and
- Create and run funding mismatches, exposing a firm to tactical and structural liquidity risk.

How the vulnerabilities may occur:

A common derivative transaction is for a trading or structured product desk to provide a client with synthetic exposure to an asset via a TRS. The trading desk can hedge this exposure by either:

- a) Buying the asset and holding it on-balance sheet (using finance provided by Treasury); or
- b) Entering into a hedge TRS with a market counterparty.

The hedge TRS can be regarded as an off-balance sheet funding arrangement. If a trading desk uses a TRS in this way to raise funding in the market without Treasury's and/or the main funding desk's awareness that this is taking place, it is:

- Utilizing the firm's capacity to access the wholesale markets, potentially and perhaps unknowingly restricting the firm's ability to access liquidity when it may really need it.
- Possibly sending an inconsistent message to the market regarding the price and form in which a firm raises debt if pricing levels are not coordinated.

If the client TRS and the hedge TRS are not contractually identical, the trading desk is running a funding mismatch. While running interest rate mismatches is normal in the course of trading desk or Treasury business, running a funding mismatch is generally not. For example, if a trading desk provides a five-year TRS to a client and hedges it via a six-month TRS from the market, in the event that the hedge TRS cannot be rolled over at maturity, the firm may be exposed to a tactical and structural liquidity risk ("roll risk").

Without proper recognition of the liquidity risk in this example, the financial performance of the structuring desk may be overstated. This issue can be further compounded when this benefit is not accrued but instead is taken upfront as a structuring fee.

Recommendation B9: A firm's policies on the management of funding and liquidity risk should incorporate funding gaps arising from the usage of derivative products within trading areas.

Recommendation B10: The function within a firm that is responsible for liquidity risk should understand how structured transactions are booked in legacy and risk systems and how they roll up in the balance sheet to ensure that adjustments to automated liquidity risk measurement processes are made where necessary.

Recommendation B11: Regular management information should be produced or made available as required for Treasury that details the on- and off-balance sheet funding profile of each trading desk, including any roll risk.

4) Contingent Liquidity Risk Arising from Conduits

Overview of Vulnerabilities:

A standby liquidity facility extended to a conduit vehicle represents a contingent liquidity risk in that on the occurrence of specified events a firm may be required to provide funding, potentially immediately, to a conduit. From a liquidity-management perspective such a facility represents a number of challenges:

- The timing and size of drawdowns may involve the interaction of a number of factors that are difficult in aggregate to assess and often are beyond a firm's control;
- Management reporting of such contingent liquidity risk (i.e., scale, sensitivities, and characteristics), if not well developed, would fur-

ther impede the ability of a firm to effectively manage the associated liquidity risks; and

• Contingent liquidity risks, if material and not included within internal and regulatory liquidity reporting requirements, would lead to a potential misunderstanding of a firm's true liquidity risk. Consequently, the firm may not be maintaining sufficient liquidity to deal with conduit based contingent liquidity events.

How the vulnerabilities may occur:

To facilitate client transactions, structured product areas often seek to use conduit vehicles. Such vehicles will typically be arm's-length, special-purpose enterprises that acquire assets funded via the issuance of ABCP to third parties.

The spectrum of assets held by the conduit can vary considerably, dependent on its strategy, but could include mortgages, car loans, and customer receivables, as well as liquid securities such as ABS. While the assets will typically be highly rated by a recognized credit rating agency, their liquidity profile can vary considerably from intraday (e.g., central bank repo eligible securities) to several years (e.g., an amortising customer asset that can not be transferred or sold).

The ABCP issued by the conduit will typically have a maturity of one to six months, whereas the asset liquidity profile may be significantly longer. As a consequence the conduit is exposed to a liquidity mismatch. To mitigate this risk and facilitate the short-term credit ratings necessary for the successful distribution of the ABCP to third parties, a highly rated bank provides a liquidity facility to the conduit in the form of a standby liquidity facility.

The occurrence of any of three possible events would typically cause the drawdown by a conduit of its liquidity facility:

- 1. A general disruption in the CP market that shuts off the conduit's access to ABCP fund-ing;
- 2. A conduit or administrator disruption that eliminates ABCP market access (e.g., a ratings downgrade to A-2/P-2 or below of the liquidity provider); or

3. An issue with a specific transaction that leads the conduit administrator to fund the transaction outside the conduit.

The materiality of the vulnerabilities to which a firm is exposed will depend on a number of factors:

- 1. The nature of the specified event that has occurred and the duration over which it occurs;
- 2. The quantum of aggregate liquidity facilities that a firm has extended that relate to the specified events;
- 3. The other funding options the seller has to fund these assets in light of the expensive costs that normally apply to drawing these lines; and
- 4. The nature of the inherent liquidity mismatches being run by the conduits to which ABCP liquidity facilities have been extended, as well as whether the conduit will readily liquidate assets on the occurrence of a specified event.
 - A liquid conduit, being one that invests in highly liquid securities that the conduit can sell or repo within the maturity distribution of outstanding ABCP, exposes the firm to a low duration of the contingent liquidity risk.
 - An illiquid conduit, being one that invests in highly illiquid/structured assets that cannot be sold within the maturity distribution of the CP, exposes the firm to a potentially significant duration of the contingent liquidity risk.

One of the challenges faced when dealing with this topic is that while the probability that liquidity lines will get drawn is minimal, and there is plenty of evidence to support this view, the potential impact that these draws could have on a firm's liquidity could be very material. Therefore the risk has to be proactively understood, managed, and controlled.

Recommendation B12: The function within the firm that is responsible for liquidity risk should have a detailed understanding of the contingent liquidity risk to which it is exposed by extending backstop liquidity facilities to conduits, as well as the events that may trigger the drawdown of these liquidity facilities.

Recommendation B13: The potential liquidity consequences of the conduit business should be integrated into the overall liquidity planning of a firm. These plans should take into account contingent liquidity demands from various businesses.

Recommendation B14: A firm should mitigate the contingent liquidity risks arising from the provision of such backstop liquidity facilities by establishing an appropriate strategy, policy, limit framework and other mitigants as appropriate for this activity that take into consideration the types of assets being securitized and their degrees of liquidity. Such a framework could include, for example, limits on the size and nature of ABCP facilities offered, limits on the amount of CP maturing during any one time period (overnight, one week, two weeks, one month, etc.), or holding a risk-adjusted pool of earmarked liquid assets to mitigate against short-term disruptions.

Recommendation B15: Any material transactions that incorporate ABCP-based liquidity facilities should be subject to Treasury approval or prior business limit approval.

Appendix 1

Possible Sources of Liquidity Vulnerabilities and Potential Metrics

The concept of "liquidity" is complex, and any suggestion that a single metric will adequately reflect the true liquidity risk of a firm is misguided. A range of metrics is therefore required. The range of metrics needs to be customized to meet the needs of the firm.³⁴

As the business mix of each firm differs and does not fall into simple categories, we refrain from classifying the metrics. The firm should ensure that its choice of metrics reflects the business mix and is appropriate for the liquidity vulnerabilities that exist within the firm. The following possible sources of liquidity vulnerabilities and potential liquidity metrics have been identified as good examples of what firms may want to consider in their liquidity risk analyses. Where these vulnerabilities are applicable and material, firms may choose to implement these or other similar metrics, bearing in mind the context of their own vulnerabilities. This list is neither exhaustive nor intended to be a prescriptive list of metrics that each firm should use. Some metrics may be used to address multiple vulnerabilities. Some firms will naturally focus on the vulnerabilities most relevant to their liquidity profiles. These vulnerabilities are focused on liquidity outcomes, not necessarily such root causes as significant credit losses or reputational issues. We have grouped them in the following categories, recognizing that different firms could group them differently and that some vulnerabilities and metrics are more meaningful than others.

Liability-Related

Possible Sources of Liquidity Vulnerabilities	Potential Metrics
Accelerated withdrawal of relationship-based and	Stress testing under various scenarios
transactional deposits from banks or dealers	Cash capital
	Core deposits to loans
Lack of competitive deposit strategy	Deposit profile - by customer type, amount bands,
and products	product type, currency
	Ability of liquid assets to cover liquidity gaps
More rapid loan than deposit growth	(reference to benchmark period discussion)
	Risk-adjusted models measuring potential exposure
	Market triggers – to monitor transition from business-
	as-usual to stressed conditions
	Core deposit haircuts
Loss of access to unsecured wholesale funding or ex-	Liquidity stress tests that assume no access to unse-
treme increase in cost	cured wholesale funding
	Ability of liquid assets to cover liquidity gaps
Material dependence on wholesale short- and long-	(reference to benchmark period discussion)
term unsecured funding, including from higher-rated	Business-as-usual funding gaps
counterparties	Maximum unsecured <u>unused</u> funding capacity over
Failure of major provider of unsecured funds	previous periods as a proportion of expected funding
	requirements
Concentration of wholesale funding sources	Maximum unsecured <u>used</u> funding capacity over secu-
	rities available for collateralization

Reduction in the availability of money market lines	Unused unsecured funding capacity broken down by
available to the firm	products, currencies, geographies, etc.
	Risk-adjusted models measuring potential exposure
Reduction in ability to raise term money	Diversity of funding programs
	Market triggers to monitor transition from business-
	as-usual to stressed conditions, wholesale unsecured
	funding, and less short-term placements, as compared
	with third party liabilities
	Loan to deposit and loan to core deposit ratios
	Cash capital
	Survivability horizon
	Comparative funding costs
	Cash flow and term mismatches
	Survey of dealer and counterparts to estimate unused
	unsecured funding capacity
	Credit available to firm by counterparties for unsecured
	funding
	Proportion of funding from higher-rated counterpar-
	ties to total unsecured funding
	Concentration analysis of liquidity providers
	Debt profile by product, market, investor, currency,
	and maturity
	Comparative debt spreads
	Stress tests
Reliance on credit dependent sources of secured fund-	Proportion of credit sensitive funding lines to total
ing, correspondingly, availability of committed irrevo-	funding
cable secured-funding lines	List of securities categorized by degree of liquidity of
	secured-funding market
Restricted access to secured-funding markets	Total and unused secured funding capacity
	Liquidity stress testing for dependence on secured
	funding
	List of commercial and central bank secured lines
Reliance on synthetic funding from better-rated coun-	Review of concentrations of funding
terparties	Proportion of funding from higher-rated counterpar-
	ties to total unsecured funding
Technology risk related to funding	Stress testing
	Quantum of funding which is reliant upon the stability
	of the technology supporting e-channels
Ratings downgrade	Stress testing
	Cash capital
	Sensitivity of funding and collateral needs to ratings
	changes broken down by number of notches

Possible Sources of Liquidity Vulnerabilities	Potential Metrics
Insufficient availability of collateral	Maximum collateral usage for each payment system
	and settlement system
Disruption in payment/settlement systems	Forecasting models
	Stress testing
Increased collateral requirements due to market risk	Impact of ratings changes on collateral requirements
losses, ratings triggers, or asymmetric documentation	Exclusion in cash flow analysis
	Pledging limits
	Special emergency asset pool
Inadequacy of a firm's infrastructure to conduct securi-	Securitizable amounts by period, currency, and asset
tization transactions	class (can be incorporated into scenario analysis/stress
	testing)
Reduced liquidity of outright market for securities	Stress scenarios of wider haircuts
	List of liquid asset holdings by categories, credit rat-
	ings, and liquidity value
Too large a trading position relative to market volume,	Size of position compared to open interest and average
open interest, and number of market makers	daily volume; considered as part of stress tests
Failure of specialist liquidity providers in niche secu-	Scale of exposure to any given liquidity provider
rity markets	
Unwillingness of counterparties to take settlement risk	List of pledgeable collateral by appropriate categories
on collateral transfers across time zones	Metrics scaled to the entity level, where "entity" is de-
	fined by the fungibility of liquidity
Spurious diversification; while portfolios might be di-	List of asset categories across strategies
versified strategies may be correlated across counter-	
parties (like in the case of long-term capital manage-	
ment)	
Lack of demonstrable liquidity due to bespoke nature	Cash capital
of transaction	Customer loans to customer liabilities and core liabili-
	ties
	Stress testing

Generic On- or Off-Balance Sheet

Possible Sources of Liquidity Vulnerabilities	Potential Metrics
Increased drawdown of committed facilities or other	Total committed but undrawn facilities broken down
contingent funding uses	by credit rating of borrower, with different drawdown
	percentages assumed by ratings
	Risk-adjusted models measuring potential exposure
	Scenario analysis based on ratings migration and vari-
	ance in line utilization by rating
	Market triggers to monitor transition from business-
	as-usual to stressed conditions

Funding transactions structured as derivatives, possibly resulting in contingent funding risks not being identi- fied, measured, or managed effectively	List of deals with contingent funding by period Risk-adjusted models measuring potential exposure
Structure of group – multiple balance sheets, tax, and regulatory restrictions; ability to transfer liquidity across entities, geographies, currencies efficiently Change in regulatory or tax rules	Metrics scaled to the entity level, where "entity" is de- fined by the fungibility of liquidity – amount of liquid- ity that can be transferred must be considered in other metrics
Currency mismatch between assets and liabilities	Quantify acceptable reliance upon FX swap market or cross-currency for access to funding in specific curren- cies Cross-currency funding measures and limits
Concentration and diversification risks of strategy, product, industry, currency, counterparty, funding sources	Concentration and diversification analysis and/or lim- its
Reduced internal capital generation	Cash capital Survivability horizon

Appendix 2

Recommendations on Industry Practice for Liquidity Risk

For purpose of convenience Appendix 2 restates the Recommendations contained in the main body of the report.

A. Governance and Organizational Structure for Managing Liquidity:

Liquidity Risk Definition

Recommendation 1: Firms should define the different forms of liquidity risk to which they are exposed (including relevant subsets within each form defined); identify where they fit in their enterprise risk universe; and communicate these definitions across their groups so that a common understanding is applied when identifying and evaluating liquidity risk related to existing businesses, business reviews, new businesses, products or initiatives, and acquisitions and alliances.

Recommendation 2: Firms should distinguish between funding liquidity risk and market liquidity risk in their enterprise risk universe. Within funding liquidity risk, firms should address their practices related to the management of the following (on a time continuum for the first two subsets):

- Structural (over one year long-term, or strategic gap, ratios and funding mix; cash capital; survival horizon),
- Tactical (similar concepts as long-term but for shorter terms; operational, cash flow), intraday (cash and collateral management), and
- Contingency (stress testing, i.e., sensitivity analysis and scenario testing, special liquidity asset pools, contingency plans, ratios, and earmarked liquidity asset pools).

Roles and Responsibilities, Integrated Risk Management, and Limit Setting

Recommendation 3: Firms should have an agreedupon strategy for the day-to-day management of funding liquidity risk that takes into consideration their business models and legal structures (e.g., mix of foreign branches versus foreign operating subsidiaries), complexity (the breadth and diversity of markets/ products, geographies, and legal entities), key lines of business, home and host regulatory requirements and environments, marketplaces, and risk materiality in the context of the firm-wide risk-management strategy and appetite. The rationale for this strategy should be explained, and the strategy should be communicated throughout the organization.

Recommendation 4: A firm's board of directors (or a committee thereof under delegated authority) should approve the strategy and significant policies related to the management of funding liquidity risk under both normal and stressed conditions and review and approve these policies annually. Board-approved documents should identify key funding liquidity limits and approval levels, as well as those authorities delegated to senior management committees or those executives accountable for approving detailed strategies, goals, procedures, limits, and exceptions. The board should also ensure that senior management takes necessary steps to appropriately manage, measure, monitor, and control funding liquidity risk in an integrated fashion with other closely associated risks to facilitate enterprise-wide risk-management solutions. The board should be informed regularly of the funding liquidity position of the firm (metrics, indicators, and outlooks), and immediately notified if there are any material changes in the firm's current or prospective funding liquidity positions.

Recommendation 5: Firms should have a management structure in place to effectively execute their funding liquidity strategies. Roles and responsibilities of various board and senior management committees in the funding liquidity-management structure, as well as those of different functional and business units. should be documented, and these roles and responsibilities should demonstrate appropriate segregation of duties between the execution, design, and oversight and monitoring roles within the firm. This structure should include the ongoing involvement of members of senior management, who must ensure that funding liquidity is effectively managed on a regular and timely basis and that appropriate policies and procedures are established to limit and control material sources of funding liquidity risk.

Recommendation 6: Firms should have adequate information systems for measuring, monitoring, controlling, and internally reporting their funding liquidity risk positions. Management should be able to prepare these reports in times of firm-specific and systemic business contingencies.

Recommendation 7: Firms should ensure that funding and liquidity risk management practices are incorporated within a firm-wide, integrated risk-management framework that also includes market, credit, operational, and other appropriate risks.

Recommendation 8: Having identified the liquidity risks and specific vulnerabilities that each firm is subject to, firms should describe in their policies and strategies their overall tolerance for unmitigated funding liquidity risk, the factors that may affect choices of strategies and limits, the desirable (or alternatively, unwanted) outcomes and key objectives of funding liquidity-management strategies, and the key drivers and stakeholders influencing risk appetite, policies, and strategies. Firms should implement a framework of limits, targets, or triggers to ensure that they operate within these specified tolerances. Potential cash outflow and the ability to generate liquidity should be the basis of calculation of liquidity risk tolerance and feed into limit setting.

Centralization versus Decentralization of Liquidity-Management Practices

Recommendation 9: Given the premise that there is no right or wrong choice between a centralized or decentralized liquidity-management structure (or a mix thereof), the Recommendations put forward in the previous section should be applied to each applicable subsidiary for which detailed strategies and significant policies for principal operating subsidiaries of the group are in place either to meet regulatory requirements or to accommodate a preferred decentralized structure. Where a decentralized structure leads to key funding liquidity metrics being different or not consolidated at the group level, processes should be in place to ensure that the group's board and senior management are made aware of material developments in key subsidiaries. Irrespective of management structure, a group Treasury or Risk function should be responsible for central oversight of these subsidiaries. The group's strategy and policy documents should describe the structure for managing enterprise-wide funding liquidity risk and for overseeing operating subsidiaries and foreign branches.

Intragroup Liquidity Transfers

Recommendation 10: Firms should have policies, limits, and processes in place to control the flow of funds (related to intraday, tactical, structural, or stressed liquidity) between branches, between branches and subsidiaries, and between subsidiaries that consider regulatory, legal, accounting, credit, and tax restrictions as well as the strategies and goals of their funding liquidity-management framework.

Recommendation 11: Senior management within firms should ensure that the right incentives, policies, and procedures are in place to elicit appropriate behavior within each business that incurs liquidity costs (e.g., collateral, term funding), in order to consider and manage such costs effectively. Where applied, transfer pricing should be closely aligned with the liquidity of the underlying asset or structural nature of the underlying liability.

Internal Controls

Recommendation 12: Firms should have effective systems of internal control over their liquidity risk management processes, including regular independent reviews and evaluations of the effectiveness of these systems. Firms should ensure that the frequency and scope of these reviews are consistent with, and supported by, their internal risk assessments.

Public Disclosure

Recommendation 13: Firms should ensure that there is appropriate disclosure of qualitative and quantitative information about each firm's liquidity position and liquidity risk management practices. Mandating quantitative disclosure would not be meaningful or comparable across firms given that firms' liquidity practices vary significantly, as do their internal and external environments.

B. Analytical Framework for Measuring, Monitoring, and Controlling Liquidity Risk:

Forecasting, Measuring, and Monitoring Funding Requirements

Measurement and Monitoring Tools

Recommendation 14: Firms should establish wellreasoned, robust, and documented methodologies to measure and monitor funding liquidity risk. Firms should forecast future cash flows of assets, liabilities, and, if material, off-balance sheet items over appropriate timeframes. Where appropriate, they also should consider employing liquidity ratios as well as measures for monitoring concentration and diversification.

Recommendation 15: Firms should ensure that methodologies for forecasting the future cash flows of assets, liabilities, and off-balance sheet items are regularly validated to confirm that they continue to be appropriate and to identify the main assumptions and/or parameters to which net funding requirements are sensitive.

Estimation of Funding Capacity

Recommendation 16: Firms should establish wellreasoned, robust, and documented methodologies to manage different components of their funding strategies, including diversification of liabilities by types of depositors, investors, products, marketplaces, and currencies; relationship with investors; and financing and selling of assets. These components should be regularly reviewed to determine whether they continue to be adequate and to identify the main assumptions and/or parameters to which the net funding is sensitive. Firms should measure and/or estimate their secured- and unsecured-funding capacity (at the aggregate and in meaningful subsets) to better understand their current and prospective funding liquidity risk under varying conditions.

Asset and Funding Diversification Practices

Recommendation 17: Firms should have asset and funding diversification strategies commensurate with the nature of their businesses, the environment in which they operate, and the types of products and

markets in which they are active. These strategies should be adjusted as changes occur in the internal or external environment.

Liquidity Position by Currency, Cross-Border, and Legal Entity

Recommendation 18: Firms should have in place a system to measure, monitor, and control their liquidity positions for all material legal entities, jurisdictions, foreign branches, and subsidiaries in the significant major currencies in which they are active. In addition to assessing aggregate foreign currency liquidity risk commitments, firms should also undertake separate analysis of their strategies for each material currency individually, outlining as appropriate how strategies for established currencies with liquid markets and diverse funding alternatives may be different from those for non-global or emerging market currencies. Firms should identify the extent to which fungibility among pools of currencies³⁵ (e.g., USD, EUR, JPY, GBP, and CHF), legal entities, and jurisdictions can be relied on, and this should be reviewed regularly. Firms should assess, monitor, and, where appropriate, limit acceptable mismatches between foreign and domestic currency in light of various internal and external factors.

Liquidity Position by Maturities

Recommendation 19: Firms should choose the specific time horizons over which they measure, monitor, and control their funding exposures based on the nature of the exposure. At minimum, short-term horizons should include a period from the next few days to the next few months; long-term horizons should at least go out to one year. Measurement should be performed using, as appropriate, contractual or effective maturity dates as well as known and forecasted flows (e.g., taking into account assumptions with respect to changes in loans, assets, core deposits, etc.).

Retention Rates on Nonmaturing Assets and Liabilities and on Assets and Liabilities with Contractual Maturities

Recommendation 20: Firms should use a robust qualitative and quantitative analytical framework that considers all relevant internal and external factors before assigning liquidity values to nonmaturing assets

and liabilities. The same process should be followed for other categories of assets and liabilities for which contractual maturity dates may not be good indicators of liquidity value.

Recommendation 21: Firms should understand the characteristics of their funding instruments and evaluate the effective cash flows under business-as-usual and stressed conditions. At minimum, retention rates for nonmaturing liabilities should be viewed differently for retail and commercial deposit liabilities. Firms should analyze retention rates for nonmaturing liabilities by domicile, investor type, product, currency, and scenario.

Recommendation 22: In countries where there is depositor insurance, this insurance should, subject to appropriate judgmental analysis, be considered when modeling depositor behavior. In general, deposits covered by insurance may be considered to be more "sticky" in a crisis than other deposits. When applying this concept in practice, consideration should be given to whether there are any indications that recent developments may require prudent adjustment of historical patterns.

Sources of Contingent Liquidity Demand and Related Triggers

Recommendation 23: Firms should ensure that liquidity risk measures take into account the potential liquidity consequences of undrawn commitments and triggering events. A distinction should be made between different types of commitment (e.g., revocable and irrevocable, conditional and nonconditional, purpose of facility, and types of customers and their respective credit ratings). Liquidity risk consequences should be modeled by applying drawdown probabilities under various stress scenarios.

Cash Flow of Financial Derivatives

Recommendation 24: If material, firms should consider cash flows related to financial derivatives (net flows, where supported by legal frameworks, that occur at the repricing or maturity date of contracts, as well as those covering exchange of margin or collateral during the life of these contracts) and interest rate flows in their liquidity risk analyses.

Measuring and Monitoring Asset Liquidity

Recommendation 25: Firms that rely on securedfunding sources to a significant extent should have robust processes in place to evaluate asset liquidity under a variety of business-as-usual and stressed conditions. It should be recognized that liquidity values of similar assets may vary across firms depending on the nature of their business and their respective market capabilities.

Recommendation 26: Firms should ensure that asset liquidity is assessed based on a demonstrated ability to obtain liquidity, and firms should only take credit for active and ongoing programs for sale, securitization, or secured borrowings. Consideration should be given to adjusting haircuts if the state of markets (stressed) during the specified scenario warrants it.

Recommendation 27: Firms with significant reliance on asset liquidity should evaluate haircuts and the timing of cash flows from these sources. In determining the amount of available liquidity and the liquidation horizon, the evaluation should include a determination of whether the asset is encumbered as well as an assessment of market haircuts, market capacity constraints, access to central bank facilities, concentrations in collateral, potential name-specific concerns, and the operational ability to complete the transaction. In particular:

- Encumbered assets should be excluded from incremental liquidity value;
- Haircuts should be evaluated in business-asusual as well as in stressed conditions;
- The capacity of the markets for a particular asset class should be evaluated; and
- Operational capability to facilitate the transaction should be in place and tested.

Liquidity Risk Metrics and Limits

Recommendation 28: Firms should use metrics that are relevant to the nature of the business they undertake. Firms that engage in a broad range of activities would be expected to use a similarly broad range of liquidity metrics.

Recommendation 29: For each selected metric, firms should decide whether they will impose a prescriptive

limit or a preferred target/range or just monitor the metric for historical trends. Not all metrics need to be assigned limits, and firms could make different choices for the same metric, bearing in mind their respective internal and external environments.

Recommendation 30: Firms should ensure that liquidity risk limits are only set on a consolidated basis when it is practicable to do so given the regulatory, legal, accounting, credit, tax, and internal constraints on the effective movement of liquidity. Firms' risk tolerance should be evaluated at the individual entity level unless there is an unrestricted ability to transfer funds between entities and across borders. If such an unrestricted ability does exist, then consolidated limits that encompass these entities and geographic areas may be appropriate.

C. Stress Testing and Contingency Planning:

Stress Testing (Sensitivity and Scenario Analysis)³⁶

Recommendation 31: Firms should analyze liquidity using a variety of firm-specific and market-related scenarios and/or sensitivity analyses, or a combination of the two. Stress testing may be appropriate at a group level, by geographic region, and at a subsidiary level. The rationale behind the choice of time horizons over which a crisis is to be measured and the severity levels of crises considered should be appropriately documented.

Recommendation 32: Firms should ensure that stress tests are used to measure the behavior of all sources of cash inflows and outflows that could potentially be material to the firm under various sets of assumptions. To the extent that these tests indicate an unwanted shortage of funding over the time horizon over which they are conducted, consideration should be given, in light of the probability of the scenario, to modifying underlying normal course of business limits to address this shortfall.

Recommendation 33: The appropriate starting point for stress testing assumptions for firms should be a business-as-usual approach with clients. This approach

assumes that the entity will continue to operate as a going concern and that the franchise has significant value. Different scenarios should be used to evaluate how various events may impact the firm, including the point at which growth plans may need to be curtailed if the severity of the crisis warrants such an action. This should then be used to plan the evolution of the balance sheet in a crisis.

Recommendation 34: Firms should ensure that the results of key stress tests are periodically communicated to senior management and, as appropriate, to the board. Firms should have an understanding of the worst-case scenarios that may trigger implementation of contingency plans. The assumptions and parameters underlying these tests and resulting cash flows, including funding capacity assumptions, should be regularly reviewed and challenged.

Contingency Planning - Governance

Recommendation 35: Firms should have contingency plans in place that address potential early warning signals of a crisis, the strategy and tactics used in normal course of business to prevent escalation of liquidity concerns, and the possible strategies for dealing with different levels of severity and types of liquidity events that cause liquidity shortfalls. The breadth and depth of these strategies should incorporate recovery objectives that reflect the role each firm plays in the operation of the financial system (e.g., provision of collateral to payment/settlement systems) such that these strategies enable a firm to continue to play its role, even in times of major operational disruptions. Firms should make efforts to assess the effectiveness of their contingency plans.

Recommendation 36: Firms should ensure that contingency plans are proportionate to the size and complexity of the firm and involve input from senior management. Contingency plans should be reviewed as business or market circumstances change.

Recommendation 37: Firms should ensure that contingency planning includes establishing policies and procedures and clear divisions of roles and responsibil-

³⁶Stress testing is a risk-management technique used to evaluate the potential effects on an institution's financial condition of a specific event and/or movement in a set of financial variables. The traditional focus of stress testing relates to exceptional but plausible events. Sensitivity analyses are generally less complex to carry out since they assess the impact on an institution's financial condition of a move in one particular risk factor, the source of the shock not being identified, whereas scenario tests tend to consider the impact of simultaneous moves in a number of risk factors, the stress events being well defined.

ities for liquidity events so as to avoid confusion or lack of clarity of roles during a crisis. This should include strategies and procedures for timely, clear, consistent, and uninterrupted internal and external communication flows to ensure timely decisions, to avoid undue escalation of issues, and to provide adequate assurance to market participants, employees, clients, creditors, regulators, and shareholders. This would include the designation of leadership roles in a liquidity crisis and may include the designation of a formal crisis team that would be a contact point for senior management. The planning process should include the designation of back-ups for key functions and the assurance that key systems and processes have been considered in the firm's business continuity planning.

Recommendation 38: Firms should outline in their liquidity policies the benchmark periods that require evaluation for whether liquidity needs can be met. Selection of these benchmark periods should be based on a number of qualitative factors.

Asset Reduction and Financing Strategy

Recommendation 39: Firms should have in place an asset reduction plan and financing strategy for both firm-specific and market-related liquidity events.

Recommendation 40: Back-up plans may involve invoking unused credit facilities granted to a firm; however, firms should not rely excessively on such lines as counterparties could elect not to honor their obligations to provide funding if a firm is in trouble.

Cushion of Liquid Assets

Recommendation 41: Firms should develop methodologies and policies to determine the level of specifically earmarked liquid assets that they should maintain at all times to meet immediate liquidity needs when faced with adverse conditions. These policies should also include criteria for asset composition.

Central Bank Facilities

Recommendation 42: Firms should ensure that assumptions regarding potential funding from central banks are evaluated taking into account the level of severity and type of crisis. Firms should differentiate between different types of central bank facilities (e.g., "standing" facilities and "emergency" facilities).

Recommendation 43: Firms can include standing central bank facilities that are granted on a "no questions asked" basis in their contingency plans. The inclusion of such funding should be consistent with the timing of the availability of the respective collateral at the central bank.

Recommendation 44: Emergency lending facilities (lender of last resort facilities) should be considered in firms' stress testing. When implementing firms' "what-if" scenarios, the potential use of these facilities should be dimensioned under each scenario. However, in terms of dimensioning risk (and establishing liquidity risk limits), emergency facilities should only be considered available in extreme events subject to conditions under which the facility can be used legally and under conditions that would not exacerbate a liquidity event for the institution.

Additional Recommendations regarding Reliance on Secured-Financing Sources and the Impact of Complex Financial Instruments upon Liquidity-Management Policies and Practices are set out in Analytical Discussions 1 and 2.

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