

Liquidity Risk at Banks: Trends and Lessons Learned from the Recent Turmoil

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The market turmoil that began in late 2007 underscored the importance of liquidity to the functioning of financial markets and the banking sector. Prior to the turmoil, asset markets were buoyant, and low-cost funding was readily available. The reversal in market conditions illustrated how quickly liquidity can evaporate, and that illiquidity can last for an extended period (Basel Committee 2008b). Banking systems around the world came under severe stress, necessitating central bank actions to support both the functioning of money markets and, in some cases, individual institutions.

Bank supervisors regularly review the liquidity positions and liquidity-risk-management practices of banks and provide banks with liquidity guidelines. The recent turmoil revealed certain weaknesses in these practices that are now being addressed by supervisors globally.

Central banks—as the ultimate source of liquidity—are taking an enhanced interest in liquidity risk. The recent events have highlighted the central bank as “key stakeholder” in this area. Both the Financial Stability Forum (FSF 2008) report and the September 2008 Basel Committee report on liquidity risk recommend that central banks take a more active role in the area of liquidity risk—including reviewing the liquidity contingency plans of banks.

BANKS AND LIQUIDITY RISK

It has been said that “liquidity is easier to recognize than define” (Crockett 2008) and that it can be an elusive concept. In its barest essentials, however, liquidity is about having access to cash when you need it. A specific definition of “liquidity” pertaining to banks is that it represents the capacity of a bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses (Basel Committee 2008a).

The fundamental role of banks typically involves the transformation of liquid deposit liabilities into illiquid assets such as loans; this makes banks inherently vulnerable to liquidity risk.

Liquidity-risk management seeks to ensure a bank’s ability to continue to perform this fundamental role. While some outflows are known with certainty, risk arises from the need to meet uncertain cash flow obligations, which depend on external events and on the behaviour of other agents.

The liquidity situation of an individual bank is ultimately a function of confidence: the confidence of counterparties and depositors in the institution and its perceived solvency or capital adequacy. A liquidity shortfall at a single institution can have system-wide repercussions, since a withdrawal of confidence in one institution can spread to others that are perceived to be exposed to it or to similar problems.¹

The distinction is frequently made between funding liquidity risk and market liquidity risk (IIF 2007). “Funding liquidity risk” is the risk that the firm will not be able to efficiently meet both expected and unexpected current and future cash flows and collateral needs without impairing the daily operations or the financial condition of the firm. “Market liquidity risk” is the risk that a firm cannot easily offset or eliminate a position without significantly affecting the market price of the security, because of inadequate market depth or market disruption. The focus of this article is on funding liquidity risk.

What is unique about liquidity risk?

Prominent economist Charles Goodhart has noted that, “Liquidity and solvency are the heavenly twins of banking, frequently indistinguishable. An illiquid bank can rapidly become insolvent, and an insolvent bank illiquid” (Goodhart 2008). Even though strong capital positions reduce the likelihood of liquidity pressure, apparently solvent banks can experience liquidity problems. Although problems with funding liquidity at banks can arise at any time, they will be most severe in an

1. It is important to note that significant progress in risk-proofing systemically important clearing and settlement systems in Canada, such as the LVTS, CDSX, and CLS Bank, has virtually eliminated the risk that default by one institution would spread to others as a result of transactions conducted through these systems.

environment of heightened market-liquidity risk, as witnessed during the latest turmoil. The close link between these two risks has been noted, including the fact that the same events may trigger both (Matz and Neu 2007).

Liquidity risk is sometimes thought of as a “consequential risk” or second-order risk because it normally would not come about without a sharp rise in one or more of the other major financial risks (Matz and Neu 2007). Unlike the other major financial risks, liquidity risk can arise on both sides of the balance sheet.² It can be triggered by exogenous or endogenous events. The trigger event might be, for example, a firm-specific operational-risk problem or damage to the bank’s reputation (endogenous), or a market-wide liquidity problem (exogenous). Trigger events tend to undermine confidence in an institution very quickly. This, in turn, leads to a rapid erosion in its liquidity position, for example, from a rapid loss of wholesale deposits.³ Liquidity risk can, in turn, interact with market risk and credit risk in complex and unanticipated ways.

Managing liquidity risk

Banks hold liquid assets as a buffer against liquidity pressures. Liquid assets comprise those types of assets that are generally expected to hold their value over time, that have low transactions costs, and that can therefore be quickly transformed into cash, when needed, at low cost. These assets must be “unencumbered,” that is, not pledged to other entities or tied to specific financial transactions.

To access cash in the very short run, banks have three basic options: they can sell or redeem unencumbered liquid assets, they can borrow (either from private sources or from the central bank) on a secured or unsecured basis, or they can access new cash generated from operations. To deal with a long-term liquidity need, banks endeavour to sell less-liquid assets and access more permanent funding through the capital markets.

What is a sufficient amount of bank liquidity? This is a difficult question that depends on a variety of factors. Clearly, there is an opportunity cost to holding liquid assets because they offer a very low return, reflecting their low risk and the high demand for collateral in the market. Indeed, there is an adage in the banking world—“a lack of liquidity can kill a bank quickly, whereas too much liquidity can kill a bank slowly.” Normally, banks hold sufficient liquid assets to stand up to all potential cash demands resulting from high-probability, low-severity events, and to some, but not all, low-probability, high-severity

events. The decision about which events a bank will defend itself against depends on strategic choices, such as the bank’s tolerance for risk and its business model.⁴

IMPACT OF RECENT FINANCIAL DEVELOPMENTS ON LIQUIDITY RISK

Prior to the credit crisis, it was generally believed that liquidity risk—arguably the most basic of banking risks—was well understood. However, it was perhaps not fully appreciated that financial innovation and global market developments in recent years had altered certain facets of liquidity risk in important ways (Basel Committee 2008a). The consequences of some of these developments became strikingly apparent during the recent turmoil.

Reliance on capital markets

First, the funding of major banks has shifted towards a greater reliance on wholesale funding (wholesale deposits, repurchase agreements, and other money market instruments) from institutional and corporate investors (both financial and non-financial)—a typically more volatile source of funding than traditional retail deposits. Chart 1 presents the long-term trend in reliance on wholesale funding for the major Canadian banks as a group. Total wholesale funding as a share of total funding is currently at levels that had been previously seen in the 1980s, but the composition has shifted from bank to non-bank deposits. The sharp rise in reliance on wholesale funding that began in the 1990s reflected slow growth in retail deposits as individual investors shifted their assets into mutual funds. This trend suggests that banks may be assuming more funding risk. It should also be noted that about half of wholesale funding is done in foreign currencies, which tends to pose more risk than funding in domestic currency. On the other hand, the fact that the share of this funding coming from other banks is declining tends to dampen the potential for systemic risk.

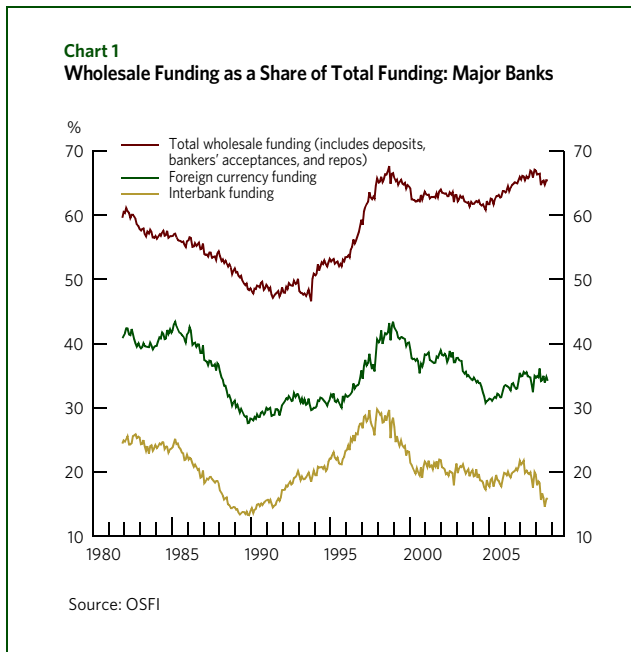
At times of severe market stress, sophisticated wholesale investors tend to exhibit heightened risk aversion. This was made very apparent by the severe funding problems experienced in 2008 by major U.S. investment banks that lacked a stable retail deposit base. At such times, investors can demand higher compensation for risk and greater discounts to collateral assets with uncertain cash flows, require banks to roll over liabilities at considerably shorter maturities, or refuse to extend financing. In these cases, refinancing sources must be found quickly to replace the loss of funding.⁵

2. The broad categories of financial risk that banks are subject to include credit and counterparty risk, market risk, operational and legal risk, and liquidity risk. See Aaron, Armstrong, and Zelmer (2007) for an overview of these risks and their management at the major Canadian banks.

3. The severe difficulties and eventual demise of the U.K. bank, Northern Rock, in 2007 (and some other cases globally), underlined how a precipitous loss of confidence in an institution’s funding strategy can bring liquidity risk to the forefront. Thus, at times, liquidity risk can become a “first-order” risk.

4. These strategies are usually established by the Board of Directors and are executed by management and various delegated committees.

5. Of course, investors must put their funds somewhere during such periods. They may acquire risk-free assets such as treasury bills, being content to earn a lower return until the crisis subsides.



Securitization

Many banks had come to rely increasingly on securitization as a source of fee income and as a way to reduce capital and liquidity requirements. However, during the recent turmoil, liquidity pressures arose as some of these banks were forced to postpone some planned securitizations and faced a buildup of warehoused assets that had to be financed. Some forms of securitization (i.e., ABCP conduits) gave rise to contingent liquidity risk, i.e., the need to provide liquidity under backstop arrangements, at a time when the sponsoring bank was already under stress.

Canadian banks had tended to rely relatively less on securitization as a funding source than, for example, their U.S. counterparts. In addition, the government-sponsored Canada Mortgage Bond (CMB) Program for securitizing residential mortgages has functioned very well through the turmoil.

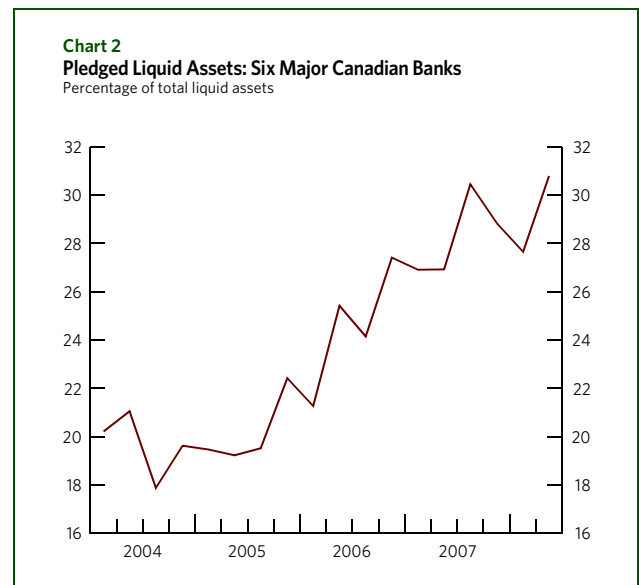
Some Canadian banks, however, provided support to some of their own bank-sponsored ABCP that could not be successfully refinanced. Some experienced liquidity pressures from difficulties with other off-balance-sheet entities such as third-party ABCP, structured investment vehicles, and other structures that they occasionally chose to support for reputational reasons.⁶

6. On balance, these developments proved manageable for Canadian banks. This was because the Canadian banks were in sound financial condition before the crisis and were able to fund themselves successfully in a range of capital markets. See the June 2008 FSR (pp. 21 and 23) for more detail on these developments.

Rising demand for collateral

A third recent trend has been expanded demand for high-quality collateral. This trend is due partly to an increase in the use of collateral for pledging purposes to mitigate risk (Aaron, Armstrong, and Zelmer 2007) and partly to the changing nature of transactions between financial firms, including the increased use of repos and derivatives in the wholesale funding markets. Rising demands from real-time payment and settlement systems have also notably increased intraday demand for collateral.

Chart 2 shows that, for the major banks, pledged liquid assets as a share of total liquid assets have risen considerably in recent years.



While the use of collateral mitigates counterparty credit risk, it can aggravate funding liquidity risk because counterparties have to provide additional collateral at short notice if conditions change. The more widely collateralization is used, the more significant this risk becomes, especially as market price movements in hedged portfolios result in changes in the size of counterparty credit exposures. During the recent turmoil, shortages of high-quality collateral emerged, prompting special operations by some central banks.⁷

Cross-border flows and global liquidity management

Another financial innovation that can complicate the management of liquidity risk is the extent of cross-border flows. Large global financial institutions are increasingly seeking to manage

7. Having access to high-quality collateral did not always guarantee that troubled institutions could maintain access to wholesale funding, as evidenced by the case of Bear Stearns.

their intraday and overnight liquidity demands (including collateral) in a centralized manner across currencies and across borders.

Such banks must, consequently, factor into their plans the conditions in overseas markets, as well as the time it takes to complete the transfer of funds or collateral across jurisdictions. A bank needs to take into account the risks of sudden changes in exchange rates and liquidity conditions in foreign markets, which can sharply widen liquidity mismatches and reduce the effectiveness of foreign exchange hedges (Basel Committee 2008b).⁸

The global experience has shown that liquidity may not be fully transferable across borders, particularly in times of market stress, and that pockets of liquidity can potentially be “trapped.” For example, during the recent turmoil, the normal ability of banks to swap currencies sometimes dried up during times of stress. The management and supervision of cross-border liquidity will continue to be a focus of current and future reviews of liquidity-risk management.

THE BASEL COMMITTEE'S NEW LIQUIDITY STANDARDS

In September 2008, the Basel Committee published its “Principles for Sound Liquidity Risk Management and Supervision.” This report is a major update of a 2000 report that was already under way prior to the crisis, but was refocused to highlight the lessons of recent events. It is expected to have an important impact on supervisory practice in the area of liquidity risk. The report sets out 17 fundamental principles for the management and supervision of liquidity risk. Here, we note some of the highlights.

The first principle of liquidity-risk management (LRM) delineates a balance of responsibilities between banks and supervisors. The bank is responsible for LRM and should have a risk-management framework that ensures the availability of a stock of liquid assets sufficient to survive a stress environment.⁹

Product pricing

As the crisis unfolded, it became apparent, in many cases, that banks had not been properly pricing in the costs of liquidity risk pertaining to certain products and business strategies.

8. The March 2008 Senior Supervisors Group Report on global risk-management practices found that, during the turmoil, some financial institutions had trouble identifying their global liquidity position, and others had overly optimistic assumptions about the availability of foreign exchange swap markets.
9. Bank boards are responsible for establishing the firm-wide risk tolerance; they delegate to senior management the powers to establish an infrastructure necessary to maintain that risk tolerance. Supervisors are responsible for assessing that framework and should intervene in a timely fashion to address observed deficiencies.

The Committee recommends that banks incorporate liquidity costs, benefits, and risks in the pricing, performance measurement, and approval process for all significant business activities (both on and off the balance sheet).

Measuring off-balance-sheet exposures

Many banks had apparently underestimated the liquidity risk they had assumed pertaining to related off-balance-sheet entities. The Basel Committee recommends that a bank should identify, measure, monitor, and control potential cash flows relating to off-balance-sheet commitments and other contingent liabilities. This should include an analysis of potential non-contractual exposures that arose because of reputation concerns.

Intraday liquidity

The document introduces a principle on the management of intraday liquidity risk. A bank should actively manage its intraday liquidity positions and risks to meet payment and settlement obligations on a timely basis under both normal and stressed conditions and thus contribute to the smooth functioning of payment and settlement systems.

Stress testing

During the turmoil, many banks failed to consider the possibility of a market-wide stress event, such as the inability to fund in either unsecured or secured markets. Stress tests and contingency funding plans (CFPs) were designed under an assumption that a liquidity crisis would be relatively short-lived. Furthermore, there was a weak connection between stress-test results and the shaping of banks' CFPs. The Committee recommends the use of market-wide scenarios covering longer time horizons in stress tests, as well as the explicit linkage of stress-test results to CFPs.

Disclosure

The Basel Committee also recommends improved disclosure, both quantitative and qualitative, of a bank's liquidity-risk profile and management framework.

THE ROLE OF CENTRAL BANKS

By definition, the central bank is the ultimate provider of liquidity. Central banks provide liquidity in various contexts to promote the stability and efficient functioning of the financial system (Chapman and Martin 2007).

Indeed, central banks played a key role following the events of August 2007 in facilitating the overall level of and distribution of liquidity in the system. During normal times, central banks tend to focus on the aggregate level of liquidity provided to

banks and, to a much lesser extent, the distribution of liquidity. During stressed times, central banks give greater emphasis to alleviating problems with the distribution of liquidity in the system through measures intended to be temporary.

For banks, access to central bank liquidity is a key component of their toolkit for liquidity-risk management. But, again, this access is normally seen as a source of temporary last-resort financing—particularly during times of stress—not as a source of permanent funding.

The recent events have underlined the need for central banks to have more flexibility—with respect to the permitted terms and eligible asset classes—for their facilities for providing liquidity to banks and markets during periods of stress. As an initial step, the Bank of Canada Act has been revised to permit the Bank to accept a wider range of collateral in its purchase and resale (PRA) operations, if circumstances should so warrant.¹⁰ This wider range has been used in the term PRA operations this autumn.

Central bank operations are no substitute for sound liquidity-risk management at banks. As pointed out by the Committee on the Global Financial System (CGFS): “The expectation that central banks will act to attenuate market malfunctioning may create moral hazard by weakening market participants’ incentives to manage liquidity prudently. Central banks should carefully weigh the benefits of actions to re-establish liquidity against their potential costs and, where necessary, introduce or support safeguards against the distortion of incentives.” (CGFS 2008).¹¹

The FSF recommendation that central banks share their contingency plans for liquidity, not only with their supervisors but with relevant central banks, is one way of mitigating these moral hazard concerns. In that context, the Bank of Canada and the Office of the Superintendent of Financial Institutions have initiated an intensified program of collaboration in terms of collecting and sharing information on the liquidity-risk practices of banks and on developments in market risk.

10. It is important to note that the large Canadian banks also have extensive foreign currency operations. While they have access to Bank of Canada standing liquidity facilities and PRA operations to obtain Canadian currency, they are expected to make arrangements to meet their liquidity needs in all other currencies relevant to their business. For example, banks with an important requirement for U.S.-dollar liquidity are expected to have arrangements in place with the Federal Reserve’s Discount Window. However, given the market turmoil, the Bank of Canada and the U.S. Federal Reserve have agreed on a US\$30 billion swap facility (reciprocal currency agreement) with the Federal Reserve to be accessed, should the need arise, to provide U.S.-dollar liquidity in Canada (Bank of Canada 2008).

11. See Engert, Selody, and Wilkins (2008) for background as to how the Bank of Canada provides liquidity to financial institutions and a framework for intervention during times of market turmoil.

CONCLUSION

Prior to the events of August 2007, liquidity risk—arguably the most fundamental of all banking risks—may not have been getting the attention it deserved in some quarters. That is clearly no longer the case. Banks and supervisors are carrying out an in-depth review of their liquidity practices and procedures to ensure that they reflect the realities of today’s complex banking organizations and markets. Central banks are reviewing their role in the provision of liquidity during such difficult times, and ensuring that they have all the tools they might need during such circumstances.

REFERENCES

- Aaron, M., J. Armstrong, and M. Zelmer. 2007. “An Overview of Risk Management at Canadian Banks.” *Bank of Canada Financial System Review* (June): 39–48.
- Bank of Canada. 2008. “Bank of Canada Announces Swap Facility with U.S. Federal Reserve as Part of Coordinated Central Bank Actions.” Notice, 18 September.
- Basel Committee on Banking Supervision. 2008a. “Liquidity Risk: Management and Supervisory Challenges.” Bank for International Settlements (February).
- _____. 2008b. “Principles for Sound Liquidity Risk Management and Supervision.” Bank for International Settlements (September).
- Chapman, J. and A. Martin. 2007. “The Provision of Central Bank Liquidity under Asymmetric Information.” *Bank of Canada Financial System Review* (December): 83–86.
- Committee on the Global Financial System (CGFS). 2008. “Central Bank Operations in Response to the Financial Turmoil.” CGFS Papers No. 31 (July).
- Crockett, A. 2008. “Market Liquidity and Financial Stability.” *Banque de France Financial Stability Review—Special Issue on Liquidity*. No. 11 (February): 13–17.
- Daniel, F., W. Engert, and D. Maclean. 2004–2005. “The Bank of Canada as Lender of Last Resort.” *Bank of Canada Review* (Winter): 3–16.
- Engert, W., J. Selody, and C. Wilkins. 2008. “Financial Market Turmoil and Central Bank Intervention.” *Bank of Canada Financial System Review* (June): 71–78.
- Engert, W., T. Gravelle, and D. Howard. 2008. “The Implementation of Monetary Policy in Canada.” Bank of Canada Discussion Paper No. 2008-9 (July).

REFERENCES (CONT'D)

Financial Stability Forum (FSF). 2008. "Report on Enhancing Market and Institutional Resilience ." (April).

Goodhart, C. 2008. "Liquidity Risk Management." Banque de France *Financial Stability Review*—Special Issue on Liquidity. No. 11 (February): 39-44.

Institute of International Finance (IIF). 2007. "Principles of Liquidity Risk Management." (March).

Matz, L. and P. Neu (eds). 2007. *Liquidity Risk Measurement and Management: A Practitioner's Guide to Global Best Practices*. Singapore: John Wiley & Sons (Asia).

Moody's Investors Service. 2002. "Bank Liquidity: Canadian Bank Case Study." Special Comment (December). ■