Improving the Resilience of Core Funding Markets

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Financial markets and financial institutions are the core of the financial system. They channel savings to investment and allocate risk to those willing and able to bear it. The recent crisis revealed that *both* markets and institutions are more stable when core funding markets operate continuously, especially in times of financial stress. Core funding markets provide essential funding liquidity to financial institutions and market-makers, the key providers of liquidity to the financial system. Funding liquidity is therefore central to the efficient and stable functioning of the financial system, benefiting not only those who depend directly on core markets, but also the economy as a whole (Carney 2008).

In promoting the safety and efficiency of our financial system, and as the ultimate provider of Canadian-dollar liquidity to the financial system, the Bank of Canada has an interest in seeing that the core markets function continuously, even in times of stress. This article describes the importance of core funding markets to financial system liquidity and identifies the characteristics that are key to making these markets work effectively. Also outlined is the range of policies that are essential to supporting the resilience of core funding markets, as well as some initiatives under way in Canada and globally that are aimed at improving market infrastructure.

Enhancing the ability of core funding markets to operate under stress involves improving the infrastructure that supports these markets. As an important first step, the Bank of Canada is working closely with industry leaders (the Investment Industry Association of Canada, or IIAC) on an initiative to develop a more effective central counterparty framework for repo transactions in Canada, with the objective of making the repo markets more efficient in good times and less vulnerable in times of stress. Improving the resilience of core funding markets also involves providing liquidity support to these markets in extraordinary times, and structuring that support in such a way that it does not distort the efficiency of markets in normal times.

Core Funding Markets Provide Essential Liquidity

A modern financial system includes many types of markets that expand the opportunities for allocating risk and matching savers with borrowers, thus adding to the efficiency of the economy (Bauer 2004). A number of these markets are systemically important in that real economic activity would be significantly disrupted if they ceased to function effectively. As well, a subset of these systemically important markets—core funding markets—is necessary to the process of generating liquidity within the financial system, and thus these markets are at the centre of the financial system.

Key intermediaries use core funding markets for two main purposes. First, temporary mismatches between revenue inflows and outflows are funded in these markets to maintain the funding liquidity of financial institutions. Second, core funding markets allow market-makers to efficiently finance long positions and cover short positions associated with market-making activity. This is necessary to facilitate transactions in other markets and, hence, the market liquidity that drives asset prices closer to their fundamental values.

Core funding markets can become an important channel for contagion in times of stress (Brunnermeier 2009), as was demonstrated vividly in the recent crisis (Gorton and Metrick 2009). When the costs and risks of using these

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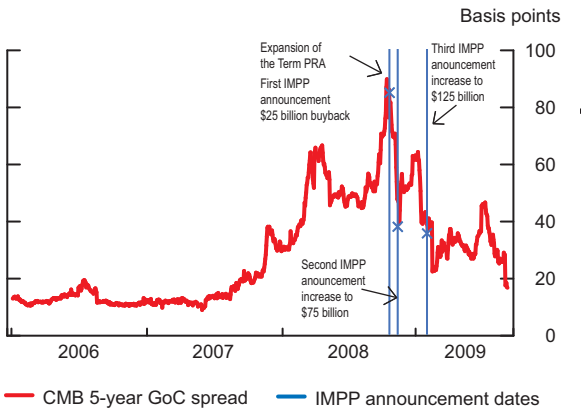
markets rise as the result of an adverse shock, as happened with the dramatic rise in uncertainty about counterparty risk and the reduction in balance-sheet capacity following the Lehman Brothers' bankruptcy in September 2008, key intermediaries may hoard liquid assets and substantially curtail—or even temporarily stop—their market-making activities. The overall capacity of core funding markets to generate liquidity for the financial system would be reduced if enough intermediaries were to simultaneously react this way. Moreover, this decrease in funding liquidity could come at a time when the financial system needs an *increase* in liquidity to buffer the shock. As a result, a vicious circle, or "liquidity spiral," can be set off (Brunnermeier and Pedersen 2009). If the shock and reaction are sufficiently severe, funding markets can effectively shut down, creating a generalized liquidity crisis.

The behaviour of spreads on Canada Mortgage Bonds (CMBs) during the recent period of market turmoil suggests that this contagion channel was at work. CMBs are explicitly guaranteed by the Government of Canada (GoC) and, thus, changes in the spreads of CMBs (above the yields on bonds issued directly by the GoC) reflect a lack of market liquidity, not changes in the risk of default. Following the collapse of Lehman Brothers in September 2008, CMB spreads rose markedly from relatively low and stable levels **(Chart 1)**. As is well known, spreads across fixed-income markets also widened sharply over this period. The rise in corporate bond spreads, or other non-government securities, also reflected expectations of a deteriorating economic environment and the associated increase in defaults. The same cannot be said of the rise in CMB spreads.

It is therefore likely that a rising system-wide liquidity premium explains the common increase in all fixed-income spreads relative to more-liquid GoC securities. Funding markets for securities other than GoC securities were severely disrupted following the collapse of Lehman Brothers, as were the funding markets for financial institutions, as evidenced by the large spike in the Canadian Dealer Offered Rate-overnight index swap (CDOR-OIS) spread **(Chart 2)**. The impact of the Bank's Term Purchase and Resale Agreement (PRA) Facility[1] and the federal government's Insured Mortgage Purchase Program (IMPP), introduced in October 2008, also suggests that illiquidity was a key factor in rising spreads.[2] For example, by December 2008 just prior to the second IMPP announcement, CMB spreads had dropped by around 33 basis points, while all other spreads had increased as the crisis intensified (including spreads on high-quality provincial bonds). By January 2009, CMB spreads had fallen further, while all other spreads were either flat or higher. With the generalized improvement in market conditions that took hold in March 2009, all spreads tightened considerably.

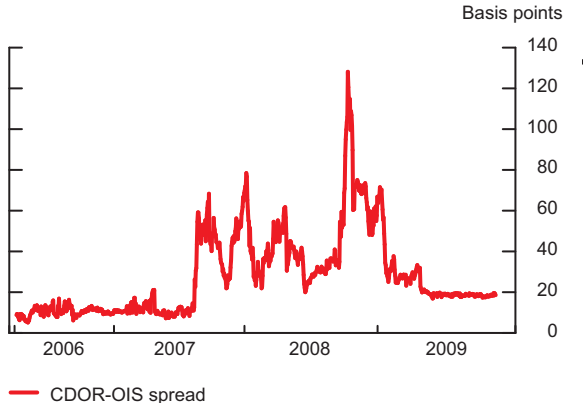
Chart 1: The increase in the spread on CMBs illustrates the rising liquidity premium during the crisis



Source: Bloomberg

Last observation: 1 September 2009

Chart 2: The sharp rise and fall in the 3-month CDOR-OIS spread highlights the pressures in funding markets for financial institutions



Source: Bloomberg

Last observation: 16 November 2009

Core Funding Markets Connect Major Players in the Financial System

As discussed above, core funding markets are at the centre of the financial system's process for generating liquidity. These markets are critically important: if any one of them disappeared, there would be no substitute for its function,

1 In particular, the Bank increased the frequency for term PRA operations to weekly (from the biweekly schedule followed earlier), expanded the list of eligible counterparties to include LVTS participants in addition to primary dealers, and added a 3-month maturity (see Zorn, Wilkins, and Engert 2009 for details). Given that CMBs are eligible securities in this program, the term PRA reduced funding costs of CMBs.

2 Under the IMPP, the government purchased, through the Canada Mortgage and Housing Corporation, large amounts of insured residential mortgage pools from eligible financial institutions. This freed up capital, thereby relaxing the aggregate borrowing constraint on financial intermediaries and reducing compensation for risk across all asset classes. Clearly, the IMPP did not affect the liquidity premium of all fixed-income assets similarly, but it is likely that corporate spreads would have continued their increase had the IMPP not been introduced.

and the system's generation of liquidity would be significantly disrupted. Moreover, these markets represent a potential source of contagion for the financial system because they facilitate vital links between systemically important financial intermediaries and market-makers and support the functioning of other core markets. This creates critical interdependencies at the centre of the financial system.

A core funding market has three characteristics:

(i) It is an important source of funding for the institutions, market-makers, and governments at the centre of the financial system.

(ii) There is no immediate substitute for this funding source, so that aggregate funding to the financial system is reduced if this source is diminished.

(iii) If a core market ceases to function, there is likely to be important contagion between major institutions and markets, which can spread into a broader array of institutions and markets.

The structures of financial systems vary between countries and over time. Consequently, what constitutes a core funding market can also vary between countries and over time. **Table 1** identifies core funding markets in Canada at the present time and describes these markets in terms of the characteristics identified above. The sovereign debt market is at the core of the financial system in Canada, as is the case in many jurisdictions. Aside from providing funds to the federal government, which is the ultimate guarantor of the financial system, this market provides the benchmark curve for pricing—directly or indirectly—all other financial transactions. Important disruptions in primary and

Table 1: Defining characteristics of core funding markets

Core funding markets		Important source of funding	Substitutes	Contagion
Government of Canada	Treasury bills, bonds	Provides funds for the Government of Canada, which is the ultimate guarantor to the system	None	Benchmark curve for pricing of most other financial transactions; facilitates secured funding
Repo	Government of Canada bonds, provincial bonds, CMBs	Important economic function because they finance major activities of financial institutions (FIs) such as: (1) financing long positions; (2) financing transactions motivated by low funding costs relative to other investments; (3) covering short positions/borrowing of securities	No real substitutes other than going to the deposit base (for banks) or being forced to sell to obtain liquidity; the latter can lead to contagion in the face of an aggregate liquidity shock.	All major FIs and a wide range of institutions are active. Supports important cash markets (i.e., Government of Canada, provincial bonds, and CMBs)
Securities lending		Small size, but important for financing activities such as: (1) borrowing to cover a short position (i.e., settlement coverage, directional shorting, market-making, and arbitrage trading); (2) borrowing as a part of a financial transaction motivated by the desire to lend cash; (3) borrowing to transfer ownership temporarily to the advantage of both lender and borrower (e.g., arbitrage of dividend reinvestment plans); (4) upgrading collateral to obtain liquidity	No real substitutes	All major FIs are active, as well as many large institutional investors (e.g., pension funds and mutual funds). Facilitates the well-functioning of the repo market and also of important cash markets
Unsecured private money markets	Bankers' acceptances (BAs)	Provide a source of short-term funding for banks and their corporate clients; perform a role similar to that of the unsecured interbank market, which is very small in Canada	FIs issuing BAs would be forced into the securitized money market or longer-term debt	All major FIs are active, as well as many large institutional investors (e.g., mutual funds, pension funds). This is an important segment of the Canadian money market and supports pricing in the market for commercial paper and asset-backed commercial paper.
Foreign exchange	Spot and swap	Important source of funding for large domestic financial institutions and corporations with foreign currency liabilities, and for foreign institutions with Canadian-dollar liabilities.	No real substitutes, other than asset sales or direct funding in local markets	All FIs, market-makers, and large corporations rely on these markets.

secondary markets for government bonds (particularly "on the run" bonds) would result in severe disruptions in other markets, including core private funding markets.

Repo markets are also clearly core, since they are used extensively by banks and market-makers to finance their inventories of securities. Repo markets can be used to fund positions in an associated cash market, as well as to fund temporary shortfalls in revenue. This implies that a repo market, although small, is core if it is essential to the liquidity of a systemically important cash market. The securities lending market is core because it facilitates the well-functioning of the repo market and also of important cash markets for various securities, including government bonds. The market for BAs is core because it is used by banks and their clients as short-term liquidity pools.[3] The foreign exchange markets are core to funding for large domestic financial institutions with foreign currency obligations, and for foreign institutions with Canadian-dollar liabilities.[4] Without the ability to convert foreign funds to Canadian dollars, or vice versa (either through the swap market or in the spot market), domestic entities with foreign currency liabilities or foreign entities with liabilities in domestic currency would be forced to fund in local markets, even at times when these markets were under stress.

Core Funding Markets Need Support to Operate Effectively When Under Stress

For funding markets to function well, they need market liquidity so that market participants are able to trade on short notice at predictable prices. Generally, market liquidity requires that key intermediaries, including financial institutions and market-makers, are ready to transact on both sides of the market in significant volumes. A number of underlying problems can undermine the liquidity of funding markets and, hence, their resilience.[5] The first challenge is incomplete or asymmetric information about the quality of securities and counterparties (Hellwig 2008). This uncertainty makes it difficult for market participants to assess the risks they face: market risk, counterparty risk, and credit risk. The second potential problem is a weak market infrastructure that magnifies risk when placed under stress and encourages herding behaviour or limits the ability of market participants to take on more risk in response to large shocks. The final problem is related to regulatory and market practices that, through the "paradox of thrift," undermine the resilience of core funding markets in times of stress (Carney 2009; Persaud 2009).

Keeping core funding markets continuously open requires that these problems be addressed through policies and infrastructure that support the private generation of liquidity and provide central bank support when required. Both of these elements are needed to support core funding markets, although the frequency of central bank intervention is reduced by a set of policies and an infrastructure that greatly reduce the risk that idiosyncratic shocks would trigger contagion that could disrupt system-wide liquidity.

Policies and infrastructure to support private generation of liquidity

Given the problems that can disrupt core funding markets in times of financial system stress, the resilience of these markets can be strengthened in at least three areas:

(i) policies that support the creation of more transparent, standardized, and well-designed financial instruments;

(ii) sound clearing and settlement processes with risk-reducing elements, such as central clearing counterparties, where appropriate; and

(iii) a solid framework governing the behaviour of market participants.

Policies that support the creation of more transparent, standardized, and well-designed financial instruments help markets to remain liquid, which, in turn, supports the resilience of core funding markets. These policies help to build focus, cohesion, and critical mass in the market (Swann 2000). Product standardization decreases informational asymmetry and uncertainty by reducing diversity in the characteristics of a product, making it less costly to acquire information about that product and to assess its quality. Ultimately, a central bank could contribute to the standardization of the securities traded in core funding markets by taking as collateral for its lending facilities only those products that conform to a certain standard.[6]

Market resilience is also supported by sound clearing and settlement processes, as well as central counterparties, where appropriate. The Bank of Canada engages in active discussions organized by industry associations (e.g., IIAC, Canadian Foreign Exchange Committee) and international bodies (e.g., Financial Stability Board, Committee on the Global Financial System) that encourage the identification, development, and implementation of best practices in a timely and consistent fashion. As noted, the Bank of Canada is working closely with the IIAC to develop an effective central counterparty framework for Canadian-

3 The commercial paper markets (both secured and unsecured), while important for financial system efficiency, are not considered to be core funding markets at the present time in Canada. The unsecured commercial paper market is too small, and to a large extent, can be replaced by BAs. The asset-backed commercial paper (ABCP) market, while larger, is also not considered to be core because it too can be replaced by BAs (and other types of bank borrowing). Some derivatives markets, such as interest rate swaps, are important because they are relied upon to manage risk in the face of financial shocks, but they are not considered core to funding.

4 Institutions also fund foreign currency obligations in local markets.

5 These factors are not unique to funding markets, but can apply to markets in general.

6 The Bank of Canada implemented strict transparency requirements for ABCP accepted as collateral in its lending facilities.

dollar repo markets to make these markets more efficient in good times and less vulnerable in difficult times.[7] This initiative is important because Canadian-dollar repo markets are central to the private liquidity-generation process, and they experienced a period of significant illiquidity in the autumn of 2008, as counterparty concerns grew following the failure of large financial institutions in foreign markets. At the same time, the practice of hoarding liquidity for precautionary purposes also increased, owing to the extreme uncertainty that prevailed. While several factors were at play, inefficient balance-sheet netting likely exacerbated the problem, since the cost of using repo markets for funding was particularly elevated as balance sheets became more of a constraint. In this regard, the identification of the solution to this problem and the establishment of a plan to implement new infrastructure constitutes important progress.

Finally, a solid framework governing the activities and conduct of market participants is also essential. As highlighted in the G-20 declarations, this would include appropriate regulation and accounting standards and credible credit-rating agencies. Another key factor for continuously functioning core funding markets is the way in which liquidity is monitored and regulated. Regulation governing reporting and accounting standards can ensure that all entities have access to a minimum and consistent body of information. Credit-rating agencies can provide independent in-depth analysis and opinions that expand the information available for outside analysis.

Central bank policies to support continuously functioning core funding markets

Enhancing the private generation of liquidity for core funding markets reduces, but does not eliminate, the likelihood that the financial system will become illiquid in a crisis. It is still possible that an aggregate shock to the central elements of the financial system, a shock that requires all financial intermediaries to rebalance risk in a similar way, will generate a demand for liquidity that is greater than the capacity of the financial system to generate it. In such circumstances, the central bank can provide liquidity to the financial system to help it cope with the shock. The central bank may want to provide liquidity to institutions or to markets, depending on the nature of the shock. Such central bank intervention supports financial stability and enhances the effectiveness of monetary policy.

A central bank can use three types of tools to support core funding markets (Cecchetti and Disyatat 2009):

(i) *Lending or borrowing in the open market.* Repos and securities lending can be used to affect the distribution of liquidity in the financial system when the private creation of liquidity breaks down in the face of an aggregate liquidity shock. This approach gives funding support to the key market participants so that they will continue to provide liquidity to the core markets and the broader financial system. These tools were the backbone of the response of many central banks to the current crisis, including the Bank of Canada (see Zorn, Wilkins, and Engert 2009).[8]

(ii) *Direct lending to financial institutions.* This approach can be used when a single institution is facing a liquidity shock but is still assessed as being solvent. By lending funding support to a single institution, contagion to other key market participants can be avoided. This support often takes the form of a standing facility (e.g., the U.S. Federal Reserve's discount window or the Bank of Canada's Standing Liquidity Facility) but can also be provided via Emergency Lending Assistance (ELA) that is accompanied by a regulatory response similar to that followed by the Office of the Superintendent of Financial Institutions (OSFI), which includes early and staged intervention (see Bank of Canada 2004).

(iii) *Outright purchases and sales*. This approach can be used when the central bank wants to directly influence the amount of aggregate liquidity in the financial system (monetary policy)[9] or to add liquidity directly to a particular market to kick-start the endogenous liquidity-generation process (financial system policy). For example, the Bank has a policy that governs intervention in foreign exchange markets in the event of a severe lack of liquidity in that market.[10] This approach can be implemented in different ways to support the market-makers (e.g., by buying existing inventory from them to make room for new inventory) or to step in for the market-makers (e.g., by acting as a counterparty to other market participants). This approach has not been used by the Bank of Canada in the recent crisis.

The implementation of these tools raises issues of moral hazard, which can distort incentives in markets and institutions to manage risk and allocate capital efficiently. The Bank will continue to review its policies for providing liquidity to core funding markets using one, or a combination, of these extraordinary facilities in a principled way to mitigate this problem.

7 The Bank is also active in work at the international level to improve the infrastructure for over-the-counter (OTC) derivatives.

8 The Bank's main tool in this regard is term PRAs. The Bank also has a securities-lending program to support liquidity of Government of Canada securities markets.

9 In its April *Monetary Policy Report*, the Bank outlined a framework for conducting quantitative or credit easing for monetary policy purposes, if required.

10 For details on the Bank's policy governing intervention in the foreign exchange market, see <http://www.bankofcanada.ca/en/backgrounders/bg-e2.html>.

Conclusion

The liquidity of core markets is central to the stable and efficient functioning of the financial system. The recent crisis has made it clear that, on their own, financial markets cannot be counted on to generate the right amount of funding and market liquidity in all circumstances. The Bank's role as liquidity provider of last resort is to ensure that markets do a better job at generating liquidity in times of stress. The Bank will continue to work on this issue by promoting policies that support the private generation of liquidity, such as policies to create transparent, standardized, and well-designed financial instruments, and putting in place an infrastructure that prevents contagion. The Bank is currently working with industry leaders on the infrastructure in the repo market and will continue its efforts to identify opportunities for improvements in other core markets. It is also ready to provide central bank support, when appropriate, and is reviewing its framework for liquidity provision with a view to refining its policy.[11]

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11 See Engert, Selody, and Wilkins (2008) for the current principles underlying the Bank of Canada's provision of liquidity.