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BANQUE DU CANADA

Financial System Review

December 2008

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Preface

The financial system makes an important contribution to the welfare of all Canadians, since the ability of households and firms to hold and transfer financial assets with confidence is one of the fundamental building blocks of our economy. A stable financial system contributes to broader economic growth and rising living standards. In this context, financial stability is defined as the resiliency of the financial system to unanticipated adverse shocks, thereby enabling the continued smooth functioning of the financial intermediation process.

As part of its commitment to promoting the economic and financial welfare of Canada, the Bank of Canada actively fosters a stable and efficient financial system. The Bank promotes this objective by providing central banking services, including various liquidity and lender-of-last-resort facilities; overseeing key domestic clearing and settlement systems; conducting and publishing analyses and research; and by providing advice to various domestic and international policy-making bodies. The Bank's contribution complements the efforts of other federal and provincial agencies, each of which brings unique expertise to this challenging area in the context of its own mandate.

The *Financial System Review* (FSR) is one avenue through which the Bank of Canada seeks to contribute to the longer-term resiliency of the Canadian financial system. It brings together the Bank's ongoing work in monitoring developments in the system with a view to identifying potential risks to its overall soundness, as well as highlighting the Bank's efforts to mitigate those risks. The FSR also summarizes recent work by Bank of Canada staff on specific financial sector policies and on aspects of the financial system's structure and functioning. More generally, the FSR aims to promote informed public discussion on all aspects of the financial system.

The Risk Assessment section is a product of the Governing Council of the Bank of Canada: Mark Carney, Paul Jenkins, Sheryl Kennedy, Pierre Duguay, David Longworth, and John Murray. ■

The material in this document is based on information available to 20 November 2008 unless otherwise indicated.

The phrase "major banks" in Canada refers to the six largest Canadian commercial banks by asset size: the Bank of Montreal, CIBC, National Bank, RBC Financial Group, Scotiabank, and TD Bank Financial Group.

Risk Assessment

This section of the FSR presents the collective judgment of the Bank of Canada's Governing Council on the key risks and vulnerabilities arising from both international and domestic sources bearing on the stability of the Canadian financial system. The objective is to raise awareness of these risks and describe actions taken to address them.

Introduction

The turmoil in global financial markets entered a new phase in September, moving to a more acute and broad-based loss of confidence in the context of a series of failures and near-failures of large financial institutions in the United States and Europe. Wholesale funding markets came to a standstill in many countries, with bank funding markets essentially ceasing to function at terms longer than overnight. Corporate bond spreads widened to all-time highs in October, equity markets experienced sharp declines, and foreign exchange volatility increased sharply. Finance ministers and central bank governors of the G-7 nations responded to these developments on 10 October with a Plan of Action to stabilize the global financial system (outlined on p. 14). This was reinforced and broadened at the G-20 summit in November. Following the announcement of these initiatives, the strains in short-term funding markets have started to ease, but it will take time for confidence to be fully restored and for markets to be fully functional again.

The Canadian financial system has proven to be relatively resilient throughout the crisis, but it has not been immune to spillover effects. The housing and mortgage market excesses seen in the United States and in several European countries do not have a counterpart in Canada. More generally, Canadian financial institutions have been sheltered from the worst of the problems, largely because of their lower leverage,[1] lower exposure to asset-backed products, and more conservative lending practices. Nonetheless, strains in Canadian wholesale funding markets have been significant in recent months, and this has impeded the normal functioning of the financial system.

The Canadian financial system has proven to be relatively resilient throughout the crisis, but it has not been immune to spillover effects.

The most likely outcome is for a gradual improvement in global financial markets and credit conditions in Canada as the various extraordinary measures aimed at resolving the crisis take hold. This underlies the base-case projection for economic growth and inflation outlined in the October 2008 *Monetary Policy Report*. But uncertainties remain around the timing of the likely return to more normal financing conditions, and there is a significant risk of

1. Capital requirements for Canadian institutions (set by OSFI under the Basel II framework) are generally more stringent than those in other countries. In addition, unlike those of many other countries, the Canadian regulatory system continues to require that banks keep their unweighted asset/capital ratio below 20 (banks may apply to have this limit raised to 23). Box 3 on p. 24 compares the leverage of Canadian banks with that of their international counterparts.

mutually reinforcing weakness in the financial sector and in the real economy. Against this background, the purpose of this assessment is not to focus on the most likely outcome, but to identify and examine the main sources of risk to the Canadian financial system and to highlight the policy actions taken to mitigate those risks.

Five key sources of risk to the strength and stability of the Canadian financial system are explored. The first concerns market liquidity and the funding of financial institutions; the second, the closely related issue of capital adequacy. The global financial crisis is increasing the pressures on Canadian financial institutions in these areas, which could lead them to further curtail the availability of credit and thus aggravate the adverse feedback loop between the financial system and the real economy. The third risk arises from the indebtedness of the Canadian household sector, which represents a potential channel of contagion through which an external shock could affect the wider Canadian financial system. Such a shock could take the form of a sharper, or more prolonged, downturn in the global economy than currently expected, which is the fourth risk. Finally, we consider the issue of global financial imbalances and their potentially destabilizing effect should they be unwound in a disorderly fashion.

Potential Risks

Funding and liquidity

A key risk is that a delay in the return of confidence and more normal financing conditions will aggravate the adverse feedback loop between the financial system and the real economy.

While the deterioration of conditions in the wholesale funding market in Canada has generally been less severe than elsewhere, the impact has still been substantial.[2] The current reluctance of lenders to enter the market seems to reflect uncertainty over their own future funding needs and risk exposure to assets already on their balance sheets, rather than counterparty concerns. In late September, funding availability in the Canadian markets dried up beyond the shortest maturities, prompting an expansion of the Bank of Canada's liquidity arrangements. This liquidity support has helped Canadian financial institutions roll over their existing money market obligations. Together with reduced concern about counterparty risks around the world, given major government initiatives, this has sharply lowered yield spreads in the money market and has encouraged some extension of maturities. Nonetheless, market lending activity is proving slow to return—especially in the bond market. As well, the financial system more broadly remains under stress, with institutions cutting back on their central roles as intermediaries and market-makers. A continuation of this situation would exacerbate the illiquidity and volatility of financial markets and prevent a restoration of confidence within the financial system. The risk is that such a delay in the return of confidence and more normal financing conditions will aggravate the adverse feedback loop between the financial system and the real economy.

Capital adequacy

In Canada, the capital ratios of the major banks have remained fairly stable throughout the crisis and well in excess of regulatory requirements. Losses and writedowns related to the credit market dislocations have been small compared with those of major U.S. and European banks. The more traditional business model pursued by Canadian banks, where a greater proportion of

2. For a more complete discussion, see p. 10 and "Liquidity Risk at Banks: Trends and Lessons Learned from the Recent Turmoil" on p. 47.

loans remain on the balance sheet of the originator, has encouraged higher-quality underwriting practices, reduced the need to reintermediate loans into the banking system, and lowered the sensitivity of bank capital to fluctuations in the market price of assets.

The relative strength of Canadian banks means that they do not currently face the same pressures to deleverage as their international counterparts. But their loan portfolios are still exposed to the traditional stresses emanating from weaker domestic and global economic conditions. A deep, or prolonged, downturn in the economy could entail new challenges for Canadian banks in the form of higher credit losses, with potentially significant negative impacts on their capital ratios. The worsened financial market conditions accompanying such a stressful outcome would compound these balance sheet pressures by making it more costly to raise capital. The risk is that market forces could compel banks to restore their capital ratios, leading them to curb balance sheet growth more aggressively. This could result in a significant tightening of lending conditions for both households and businesses that would exacerbate weakness in the economy and difficulties for financial institutions.

Market forces could compel banks to restore their capital ratios, leading them to curb balance sheet growth more aggressively.

Household balance sheets

Although the overall financial situation of the Canadian household sector still appears reasonably healthy, indicators of financial stress, such as arrears on loans and bankruptcies, have picked up modestly, albeit from historically low levels. Household balance sheets are coming under pressure from weak equity markets and softening house prices at a time when the debt-to-income ratio is at a record high. Higher debt levels mean that households are potentially more sensitive to adverse shocks to wealth and income. Since the household sector represents the largest exposure in the loan portfolios of Canadian banks, an increase in losses on household lending would have an immediate adverse impact on bank profitability.

With the economy expected to slow, conditions are already in place for an increase in default rates among highly leveraged households over the coming year. The risk is that the increase in default rates on household borrowing could prove more substantial if a more severe economic downturn (with significant increases in unemployment and weaker incomes) materialized. Moreover, while household access to credit has not tightened significantly since the onset of the financial crisis, this could change if the crisis persists. Significantly elevated credit risk in the household sector is unlikely to materialize independently of an external shock to incomes, such as would be generated by a deeper recession in the United States than currently expected and its spillover effects on Canada. Bank of Canada simulations indicate that such an outcome could cause the proportion of "vulnerable" households (those with a debt-service ratio above 40 per cent) to rise significantly from the current level of 3 per cent (see p. 21), reducing the ability of households to meet their financial obligations. This would lead to substantial losses for the major Canadian banks. These losses would be largely mitigated, however, by the fact that mortgages with less than 20 per cent down payment at origination must be insured. Nonetheless, household indebtedness could act as a channel of contagion for an external shock and could affect the wider Canadian financial system through higher loan losses, while also causing a tightening of credit conditions.

Household indebtedness could act as a channel of contagion for an external shock and could affect the wider Canadian financial system through higher loan losses.

While the increased indebtedness of the household sector represents a source of vulnerability to the Canadian financial system that should be closely monitored, the magnitude of this risk should not be overstated. Lending practices in Canada have been much more conservative than in the United States and some European countries, and the resulting imbalances far less acute. The subprime-mortgage market in Canada accounts for less than 5 per cent of the residential mortgage market, compared with 14 per cent in the United States, and it is characterized by more stringent lending standards than those that have been applied in the United States. Although there have been a number of innovations in the Canadian mortgage market in recent years, products remain more conventional than in the United States and lack many of the features that have contributed to the sharp rise in delinquencies seen there.[3] Moreover, the impact on the balance sheets of financial institutions of a downturn in the Canadian housing market would also be substantially mitigated by mortgage insurance and by the fact that most of the securitized mortgage market consists of National Housing Act Mortgage-Backed Securities (NHA MBS), a large portion of which are sold into the Canada Mortgage Bonds Program, which carries a formal government guarantee.

Global economic downturn

With the process of deleveraging far from complete, there is the possibility that the global economy could enter a prolonged downturn as constraints on the supply of credit persist.

Downside risks to the global economy have risen significantly in recent months, as spillover effects from the financial turmoil have intensified. Credit conditions have tightened, not only in the United States but also in other industrialized nations, threatening to aggravate the adverse feedback loop between the real economy and financial markets. Western European economies, many of which are in recession, face many of the same risks to their housing and corporate sectors as the United States. The outlook for many emerging-market economies (EMEs) has also deteriorated as they have been increasingly drawn into the crisis, and the downside risk to the resumption of rapid growth is significant. Central and Eastern Europe are looking particularly vulnerable, given their high dependence on foreign capital flows. While the extraordinary policy measures adopted by U.S., European, and Asian authorities should help to stabilize financial markets, there is a risk that they may not stimulate sufficient lending activity to support the economic growth rates envisaged in the base-case outlook for their economies. With the process of deleveraging far from complete, there is the possibility that the global economy could enter a prolonged downturn as constraints on the supply of credit persist.

Given the strong economic and financial linkages between Canada and the United States, the risk is that there could be a deeper, or more persistent, recession than currently expected south of the border, which would have a substantial impact, both direct and indirect, on Canadian businesses, households, and financial institutions. If this risk were to materialize, the credit quality of banks' corporate loan portfolios would deteriorate, and household loan portfolios would also come under pressure as incomes and employment weakened. Banks would likely experience further writedowns and a sharp increase in loan-loss provisions that would erode their capital base. An update of the Financial Sector Assessment Program (FSAP) stress-test exercise presented in the June 2008 issue of the FSR (p. 58) indicated that the level of capital at the major Canadian banks was sufficient, in aggregate, to absorb the losses associated with such an outcome, but that actions taken by

3. The Government of Canada tightened standards for government-guaranteed mortgages on 15 October 2008 to further strengthen the housing market: <http://www.fin.gc.ca/news08/08-051e.html>.

banks to continue to meet regulatory requirements would exacerbate pressures on the Canadian economy and on the financial system.

Global imbalances and currency volatility

Global financial and trade imbalances have increased markedly in recent years. During the credit boom, global economic growth became increasingly dependent on an over-indebted U.S. household sector and on banking industry profits linked to increasing levels of risk and high leverage. With the United States not saving enough to finance domestic investment, its current account deficit increased to record levels. The counterpart to the foreign inflows of capital that financed this deficit can be found among the large current account surpluses of several Asian economies.

Such large international imbalances cannot persist indefinitely. The appreciation of the U.S. dollar since July 2008 could impede the gradual adjustment process of the past few years, increasing the risk of a disorderly resolution of these imbalances at some point in the future. An abrupt and sizable decline in the value of the U.S. dollar would give rise to sharp movements in asset prices, additional volatility in financial markets, and a renewed rise in risk premiums across a broad range of financial assets. That would entail further writedowns and trading losses for Canadian financial institutions, and global sources of market funding could dry up once again.

An abrupt and sizable decline in the value of the U.S. dollar would give rise to sharp movements in asset prices, additional volatility in financial markets, and a renewed rise in risk premiums.

Some EMEs, particularly those in Central and Eastern Europe, are also vulnerable to shifts in investor sentiment. The potential for sharp reversals in capital flows to EMEs threatens to compound the ongoing volatility in global financial markets, with spillover effects for the global economy. While Canadian financial institutions have limited direct exposures to EMEs, the Canadian financial system could still be adversely affected through these indirect channels of contagion.

Policy Actions and Assessment

In response to the severity of global financial developments and the risks (described above) that these developments pose to the Canadian financial system, the Bank of Canada has developed and implemented a range of extraordinary facilities within its sphere of responsibilities. It has also added its voice to the call for other initiatives, both domestic and international, to strengthen the resilience of the global financial system. These policies and initiatives are discussed below.

Since the financial crisis originated outside of Canada, the Bank of Canada and domestic regulatory authorities have been working closely with their international counterparts to ease the current strains in financial markets and to ensure that the domestic and international financial systems are more resilient to future shocks.

Immediate actions have been focused on restoring confidence and re-establishing the normal functioning of the financial system. Canada remains committed to the G-7 Plan of Action, which entails a number of initiatives to restore the flow of credit.[4] Domestically, the Bank of Canada has responded aggressively by expanding its provision of liquidity through an increase in term purchase and resale agreements, by widening eligible collateral, by

Immediate actions have been focused on restoring confidence and re-establishing the normal functioning of the financial system.

4. These initiatives are outlined on p. 14, and international actions to date are summarized in Table 1.

extending the range of counterparties, and by introducing new lending facilities. Other initiatives to improve banks' access to funding have also been announced. The Government of Canada has created the Canadian Lenders Assurance Facility (CLAF) to provide insurance on the wholesale term borrowing of federally regulated (and some provincially regulated) deposit-taking institutions and thus ensure that they are not put at a competitive disadvantage, given similar actions announced by other countries. In addition, the government has implemented a program to purchase up to $75 billion of insured mortgages, thereby increasing the access of Canadian institutions to longer-term funding.

The Bank of Canada and Canadian regulatory authorities remain committed to ongoing domestic and international work to ensure the longer-term resiliency of the financial system.

At the same time, the Bank of Canada and Canadian regulatory authorities remain committed to ongoing domestic and international work to ensure the longer-term resiliency of the financial system. Rapid implementation of the measures proposed by the Financial Stability Forum (FSF)[5] will help in this regard. In Canada, most of the FSF recommendations have either been completed or are in the process of being implemented. Supervisory oversight of banks' liquidity arrangements is being strengthened, and enhanced stress-testing procedures are being implemented for risk-management and capital-planning purposes. The Canadian banking system was the first to report its results in accordance with FSF recommendations on improved disclosure around subprime and other troubled assets. Further improvements by some Canadian banks would be desirable to align disclosure standards, particularly regarding valuation techniques, more closely with the best practices of leading foreign banks. On the issue of transparency of structured products, progress in implementing the FSF recommendations has been slow to materialize, and there is a role for provincial securities commissions to advance this initiative.

The Bank of Canada has formal responsibility for the oversight of clearing and settlement systems in Canada. This infrastructure has continued to function very well throughout the turmoil, despite increased volumes and activity in each of the designated systems. However, usage of CLS Bank by Canadian institutions to virtually eliminate their foreign exchange settlement risk has not been as great as that of their international counterparts, and its wider use is strongly encouraged (see Box 1 on p. 11).

In the current environment, there is also a risk that a shock to the global financial system, such as a major corporate default, could be amplified by the way in which the over-the-counter (OTC) derivatives market operates. The related uncertainty can compound frictions when markets are unsettled. Private sector initiatives are being developed in the United States and Europe to establish a central clearing counterparty (CCP) to mitigate these concerns. By standing between parties to a trade, such a system would reduce counterparty risks and confirmation backlogs by enforcing more stringent financial and operational standards and more robust risk management. The Bank of Canada strongly welcomes these international initiatives to process and clear OTC derivatives. The Bank also encourages domestic efforts to explore other potential uses of clearing houses and exchanges to mitigate risks.

More generally, the financial crisis has added urgency to the need to rethink elements of the regulatory regime. Work is under way in Canada and internationally to identify the forces that contribute to procyclicality in the financial

5. The FSF recommendations can be found at <http://www.fsforum.org/publications/r_0804.pdf>.

system and to develop possible options for mitigating them (see Box 2 on p. 15 for proposals related to capital requirements).

In summary, the global financial system is experiencing its most severe crisis since the 1930s. While Canadian financial institutions remain well capitalized, the severe strains in financial markets are hindering their ability to perform their normal intermediation and market-making roles. Nevertheless, with the policy actions that have been taken to provide liquidity and funding support, financial institutions should increasingly be expected to have the capacity to re-enter markets. Against this backdrop, the Bank of Canada and domestic regulatory authorities continue to monitor developments closely and to develop contingency plans so that they are prepared to respond to any potential further stresses and help restore the normal functioning of the financial system. ■

With the policy actions that have been taken to provide liquidity and funding support, financial institutions should increasingly be expected to have the capacity to re-enter markets.

The Macrofinancial Environment

This section of the FSR assesses how financial and macroeconomic developments over the past six months have affected financial stability. It begins with an analysis of trends and issues in financial markets before focusing on the balance sheets of Canadian businesses and households. The section concludes with a discussion of the implications for Canadian financial institutions.

Financial Markets

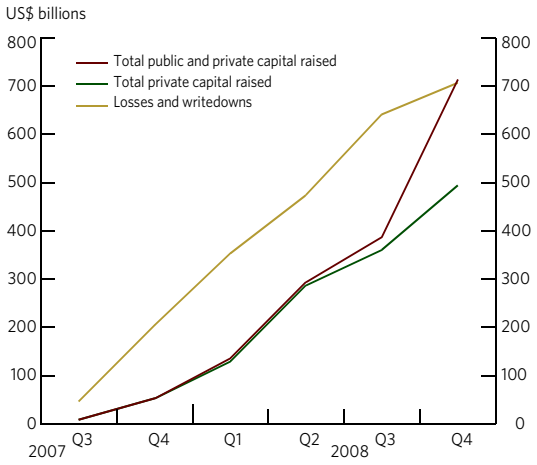
Conditions in global financial markets have deteriorated substantially since the publication of the June *Financial System Review* (FSR), prompting a series of aggressive actions by authorities around the world. The combination of an accelerated deleveraging process and a series of failures or near-failures of several large financial institutions in the United States, the United Kingdom, and some European countries, as well as deteriorating economic fundamentals, have resulted in falling asset prices and extremely difficult financial conditions. The bankruptcy of the large U.S. investment bank Lehman Brothers in mid-September intensified these financial strains because it raised questions about losses and capital adequacy at other institutions and about who was inside or outside the "safety net." This event also led to the freezing of some financial assets during the settlement process.

Since the June FSR, financial institutions around the world have continued to announce losses and writedowns. As of 20 November, the total losses and writedowns reported by banks and brokers exceeded US$700 billion, with about 95 per cent of those losses and writedowns reported by financial institutions in the United States, the United Kingdom, and Europe.[1] In comparison, the major Canadian banks have reported approximately $12 billion in total losses and writedowns up to the third quarter. Recently, the gap between the cumulative amount of writedowns reported globally and the aggregate amount of new capital raised, which stood at over US$250 billion based on estimates at the end of the third quarter of 2008, has been closed, largely as a result of government injections of public capital to systemically important financial institutions (Chart 1).

In mid-September, heightened concerns over counterparty risk sharply curtailed liquidity in a number of markets worldwide. The freezing up of short- and longer-term funding markets that ensued seriously impaired the ability of financial and non-financial borrowers to obtain market-based financing. This took place at a time when the availability of bank credit was also being

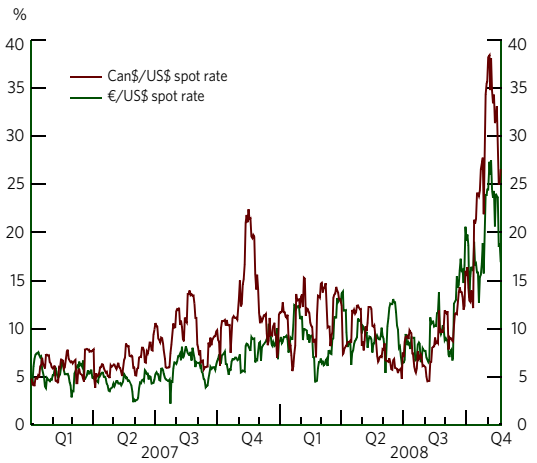
1. The latest estimate from the International Monetary Fund (as of October 2008) is that financial sector writedowns on U.S. loans could total US$1.4 trillion, up from the previous estimate of US$945 billion in April 2008.

Chart 1
Cumulative Losses, Writedowns, and Capital Raised at Banks and Brokers



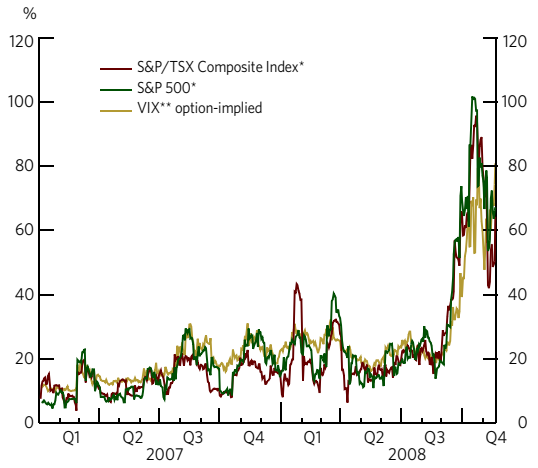
Note: Data for 2008Q4 are current as of 20 November.
Source: Bloomberg

Chart 2
Foreign Exchange Market Volatility*



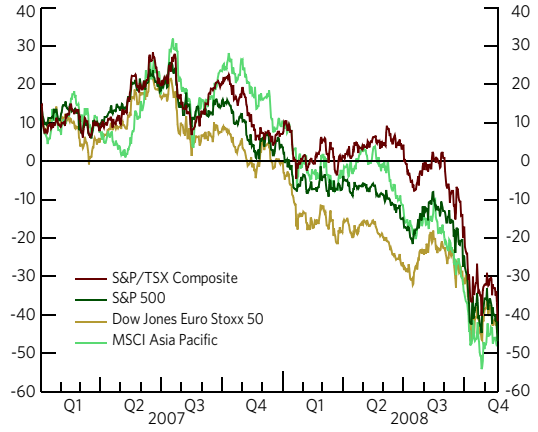
* Volatility is measured by the 10-day historical volatility.
Sources: Bloomberg and Bank of Canada calculations

Chart 3
Equity Market Volatility



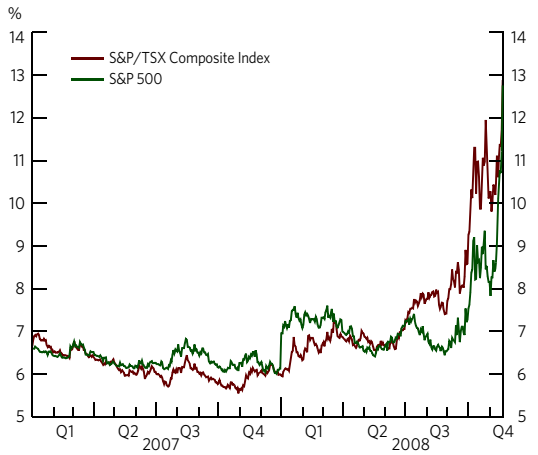
* The S&P 500 Index and the S&P/TSX Composite Index are based on 10-day historical volatility.
** The VIX is a measure of the implied volatility obtained from option contracts on the S&P 500 Index.
Source: Bloomberg

Chart 4
Equity Market Performance
Year-over-year percentage change



Source: Bloomberg

Chart 5
Forward Earnings Yield



Note: Forward earnings yields for the S&P/TSX and S&P 500 are equivalent to the inverse of the forward price-earnings ratio of the index.
Sources: Bloomberg and Bank of Canada calculations

increasingly restricted as banks attempted to reduce their own leverage. While Canadian financial institutions remain in considerably better shape than their international peers (see "Financial Institutions" on p. 22), strains in Canadian funding markets nonetheless rose significantly.

Combined with growing concerns over the risk of a global recession, which were partly stoked by evidence that economic growth in emerging-market economies—particularly China—was slowing more than previously thought, these events contributed to pronounced declines in the value of a broad range of financial assets and sharp increases in volatility across all asset classes (Charts 2 and 3). In particular, equity market indexes in most advanced and developing economies suffered significant losses as the continued pressure to reduce leverage added to declines stemming from a worsening economic outlook. Most major equity markets are down between 40 per cent and 50 per cent year-to-date, with the financial sub-indexes experiencing even sharper falls (Chart 4). Some emerging-market indexes have fallen by as much as 70 per cent from their peaks. The sharp declines in asset values are exacerbating the cycle of balance sheet destruction for banks, corporations, and households, and have substantially raised the cost of equity for corporations (Chart 5), further constraining their ability to raise capital.

In light of these developments, central banks and governments undertook unprecedented actions to stabilize the global financial system. These initiatives have included the provision of large amounts of liquidity, and agreement on a Plan of Action by G-7 countries, subsequently reinforced by the G-20 leaders, which led to specific policy responses in the major economies (see "Policy response" on p. 12 for details). As a result of these actions, tensions in credit markets have eased somewhat. Short-term credit spreads have narrowed from their record highs, although they remain at elevated levels, and activity in the money markets and corporate debt markets is slowly resuming. Nonetheless, issuance remains low by historical standards.

Financial market conditions remain fragile and the level of financial stress elevated. The process of deleveraging and recapitalization across global financial intermediaries will take time. Market liquidity is likely to remain lower, and volatility higher, than average for some time. Combined with continued efforts by financial and some non-financial firms to strengthen their balance sheets, the recent policy actions should contribute to a gradual return to more normal market conditions.

Money markets

Credit spreads in global short-term funding markets spiked to unprecedented levels in early October as lenders became increasingly concerned about their counterparties' ability to repay, and the interbank and wholesale borrowing markets in many countries essentially ceased to operate for terms longer than overnight. The spread between 3-month unsecured loans in various currencies and a measure of the expected overnight interest rate over the same period reached levels that were significantly wider than at any other time since the start of the crisis in the summer of 2007 (Chart 6).

Compounding this problem was the reintermediation of corporate lending by banks, as liquidity in the commercial paper market also suddenly dried up. Following the Lehman Brothers bankruptcy, prime money market funds that held commercial paper issued by Lehman were forced to write off the value of those holdings. This resulted in the net asset value of one U.S. fund's unit falling

BOX 1

FOREIGN EXCHANGE SETTLEMENT RISK: IMPLICATIONS FOR CANADA

Foreign exchange settlement risk (FXSR) is a form of counterparty risk. It is the risk that a participant in the foreign exchange market will lose up to the full principal amount of the transaction if it pays out the sold currency but its counterparty fails to deliver the purchased currency. The failure of Lehman Brothers heightened concerns by its counterparties regarding the settlement of foreign exchange transactions involving Lehman. An issue that surfaced during this episode is the need to ensure that FXSR is well managed. CLS Bank is an international payments system for settling foreign exchange transactions. By providing simultaneous settlement of both transaction legs (payment-versus-payment, PVP), CLS Bank is designed to virtually eliminate the credit-risk component of FXSR. To the extent that use of CLS Bank removed credit risk in foreign exchange settlement, it was a stabilizing factor during this period of heightened uncertainty.

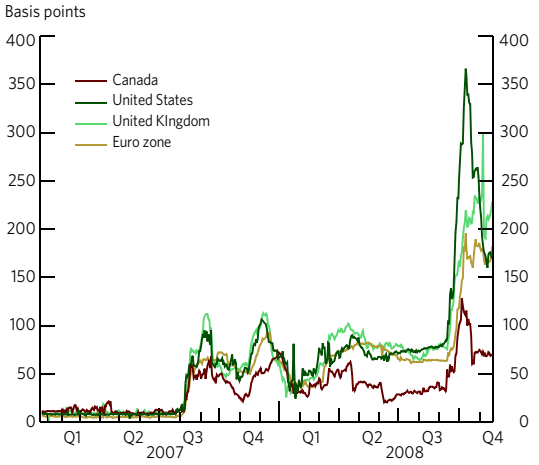
In 2006, the Bank of Canada, in conjunction with several other central banks, organized and conducted a survey of major Canadian banks regarding their use of various FX settlement methods and their management strategies for FXSR.[1] The survey found that Canadian banks are using a comprehensive framework to manage FXSR and that management of this risk has improved over the past decade compared with the previous CPSS survey in 1998.[2] Use of CLS Bank by Canadian banks lags that of their global counterparts, however, and there is room for improvement with respect to the measurement of foreign exchange exposures at certain Canadian banks.

The Lehman Brothers episode raises questions about the FXSR management practices of Canadian banks, since a large portion of their foreign exchange transactions are settled outside of CLS Bank, partly because CLS Bank does not currently allow for the settlement of same-day US$/Can$ trades.[3] Indeed, one major bank does not use CLS, and another settles only a small portion of its foreign exchange transactions through CLS Bank. Greater use of CLS Bank might have helped to alleviate some of their uncertainty in the wake of the failure of Lehman Brothers. The Bank of Canada encourages Canadian banks to consider using CLS Bank for managing their FXSR, while bearing in mind that they still have to manage other risks associated with foreign exchange transactions that are not addressed by CLS Bank.[4] In considering use of CLS Bank, it is important not to underestimate the benefit of reducing FXSR. In particular, Annex 3 of the Basel II framework sets out capital charges for non-PVP transactions.

The Bank of Canada and the Office of the Superintendent of Financial Institutions will continue to work on approaches to manage FXSR and to supervise the banks in this area, as part of a forthcoming initiative by the Basel Committee on Banking Supervision to update international guidance related to the management of this risk.

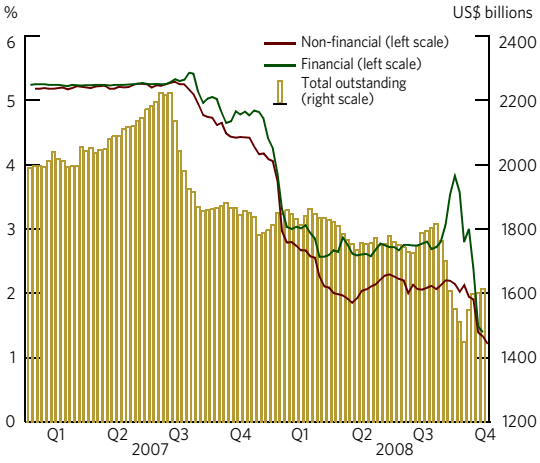
1. The survey was administered by member central banks of the BIS Committee on Payment and Settlement Systems (CPSS) Sub-Group on FXSR. The report, published in May 2008, is available at <http://www.bis.org/publ/cpss83.htm>.
2. At the time of the survey (April 2006), three Canadian banks participated in CLS Bank. Two others started using CLS Bank after the survey was completed. Survey results specific to Canadian banks were reported in the December 2007 FSR.
3. These are trades that are executed, confirmed, settled, and reconciled all within the same business day.
4. For example, CLS Bank does not mitigate replacement risk, which occurs when trades are rescinded before the settlement date. Furthermore, CLS Bank has the potential to accentuate liquidity funding risk because its settlement process requires funding to be completed within very short time frames.

Chart 6
Spreads between 3-Month LIBOR and Overnight Index Swaps*



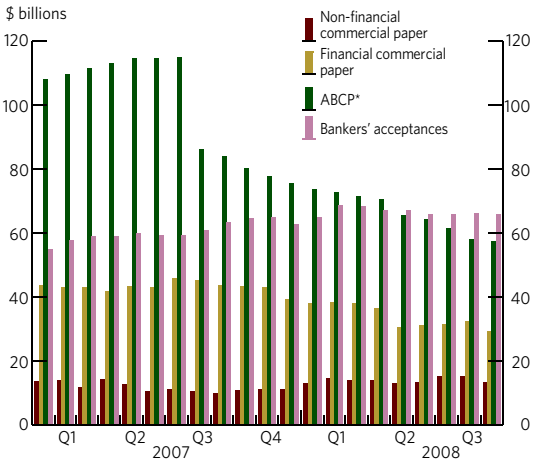
* U.S. and U.K. LIBOR, EU EURIBOR, and Canada CDOR
Source: Bloomberg

Chart 7
U.S. Commercial Paper: Yields and Total Outstanding



Source: U.S. Federal Reserve

Chart 8
Canadian Money Market: Outstanding Issues



* Beginning August 2007, excludes approximately $33.7 billion outstanding related to affected trusts under the Montreal Proposal. Prior to August 2007, the series included both bank- and non-bank-sponsored ABCP.
Sources: Bank of Canada and DBRS

below the critical par one-dollar level ("breaking the buck"), an extremely rare event not seen since the 1970s. Fears of losses at other U.S. money market funds led to a substantial increase in redemptions by investors, which, in turn, forced the sale of assets in illiquid markets and led to a reduction in the funds' ability and appetite to hold commercial paper. The demand for private sector debt instruments fell, both in the United States and elsewhere (including in Canada), the yield differential over short-term U.S. government Treasury bills rose significantly (further exacerbated by a general "flight to quality"), terms to maturity for commercial paper shortened, issuers became unable to refinance upcoming maturities, and the amount of commercial paper outstanding declined (Chart 7).

In Canada, indicative commercial paper rates jumped as high as 300 basis points above the yield on government treasury bills (and about 125 basis points above the overnight index swap rate), a reflection of both funding pressures and a flight to quality. In some cases, bank-sponsored asset-backed commercial paper (ABCP) was sold at levels considerably higher. With the commercial paper market becoming very costly and difficult to access, even for high-quality borrowers, the use of existing lines of credit increased, with some companies reportedly drawing down funds as a precautionary measure, putting further pressure on bank balance sheets. Reflecting the difficulty in accessing capital markets, the amount of Canadian-dollar unsecured commercial paper issued by financial and non-financial corporations declined by nearly $7.5 billion in September and October.[2] The amount of bank-sponsored ABCP outstanding has also continued to shrink, having fallen by a cumulative $28 billion since the onset of the crisis; this is roughly equivalent to one-third of the amount that was outstanding at the end of August 2007 (Chart 8).

The credit crisis has also had a material impact on liquidity in the Canadian and global repo markets; markets whose importance as a secured funding vehicle has grown significantly in recent years. As banks, securities dealers, and other financial market participants have faced pressure to deleverage, the amount of risk capital they have been able or willing to commit to market-making and trading activities has shrunk. In addition, recent events have highlighted the challenges of selling, in thin and very volatile markets, illiquid collateral used to secure borrowings in the event of a counterparty default. The resulting loss of liquidity in the repo market is undermining the ability of all players to fund positions in anything but the most liquid marketable securities (e.g., Government of Canada securities). This will have implications for new issue activity.

Policy response to ease strains in markets

In the face of persistent severe pressures in funding markets more broadly, central banks and governments around the world undertook unprecedented actions—both collectively and individually—to stabilize the global financial system. These included a substantial increase in the provision of overnight and term liquidity in local currency and in U.S. dollars, the purchase of troubled assets directly from banks, the guarantee of customer deposits and wholesale bank borrowings, and direct capital injections of public funds into

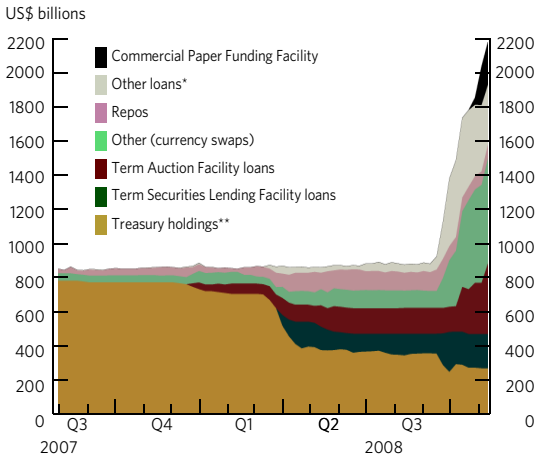
2. The total amount of Canadian-dollar unsecured commercial paper outstanding fell by 35 per cent between August 2007 and the end of October 2008, to about $36 billion. The decline is largely attributable to reduced issuance by federal Crown corporations following the policy decision to consolidate their borrowings with those of the Government of Canada and foreign financial issuers. The outstanding amount of commercial paper from foreign financial issuers also fell sharply in recent months: from over $3 billion in May 2008 to less than $700 million in October. Source: DBRS.

TABLE 1

Initiatives to Stabilize the Financial System

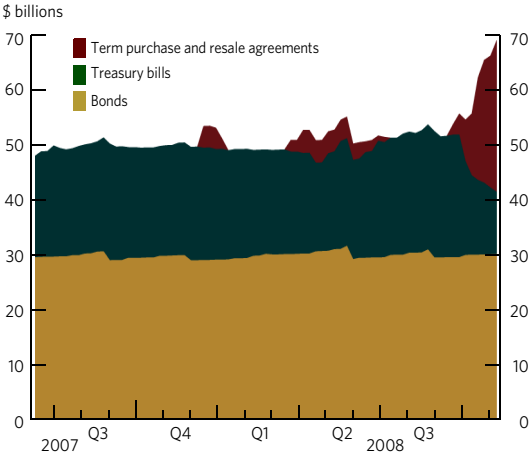
	Canada	United States	United Kingdom	Euro zone
Liquidity injection *Provision of term funding by central banks*	• Increased size of term PRAs to over $30 billion, and increased frequency to weekly • Introduced new facilities: (i) a money market term PRA that can be accessed by eligible money market participants on an indirect basis; and (ii) a Term Loan Facility (TLF) for LVTS participants, with non-mortgage loan portfolios used as collateral	• Increased size of U.S.-dollar Term Auctions Facility to US$900 billion, and increased frequency to weekly • Increased U.S.-dollar swap agreements with 14 central banks, in some cases to unlimited amounts • Introduced new temporary facilities to support short-term debt markets	• Increased size of weekly injections • Created discount window facility against wide range of collateral • Long-term repo open market operations against broader range of collateral to be introduced • U.S.-dollar swap agreement with Federal Reserve (unlimited amount)	• Enhanced provision of longer-term refinancing (previously announced operations rolled over) • U.S.-dollar swap agreement with Federal Reserve (unlimited amount)
Collateral changes *Broadening the list of assets eligible as collateral for central banks' lending operations*	• Broadened list of securities eligible for term PRAs and accepted ABCP from affiliated dealers on a temporary basis • Accepted general assignment of non-mortgage loan portfolio at standing liquidity facility and TLF on a temporary basis	• Further broadened the range of acceptable collateral to term-lending facilities	• Broadened the range of acceptable collateral for long-term repo operations (term repo)	• Extended eligible collateral for both credit operations and longer-term refinancing operations
Deposit insurance *Increase in the amount of customer deposits insured by the government*	• No change: the Canada Deposit Insurance Corporation (CDIC) insures savings up to $100,000.	• The Federal Deposit Insurance Corporation (FDIC) increased deposit insurance from US$100,000 to US$250,000 per depositor through to 31 December 2009.	• The Financial Services Compensation Scheme increased coverage from £35,000 to £50,000 for each customer (joint accounts thus guaranteed up to £100,000).	• The EU has agreed on an increase in the minimum deposit guarantee to €50,000 with permission to member states to offer higher guarantees up to €100,000.
Guarantees of bank liabilities *Introduction of government guarantee on interbank lending, bank debt, and/or other bank liabilities*	• The Canadian Lenders Assurance Facility, available to federally regulated deposit-taking institutions (and provincially regulated institutions when an agreement is reached with the provincial government) insures new issues of certain senior unsecured wholesale debt up to 3 years to a maximum of 125% of wholesale debt or 20% of deposits. A fee of 110 bps, plus 25 bps or 50 bps based on credit rating, applies.	• FDIC's Temporary Liquidity Guarantee Program guarantees new senior debt of: (i) FDIC-insured depository institutions; (ii) bank holding companies; (iii) financial holding companies; and (iv) some savings and loan holding companies. Guarantees up to 125% of debt outstanding as of 30 September 2008 that matures before 30 June 2009. A fee of 75 bps plus 10 bps applies.	• The 2008 Guarantee Scheme guarantees certificates of deposit, commercial paper, and senior unsecured bonds and notes for any U.K. incorporated bank or building society for no longer than 3 years. A fee of 50 bps plus 100% of median 5-year CDS spread applies.	• Numerous European countries, including Germany, Greece, Ireland, the Netherlands, Spain, and Sweden, announced bank debt guarantees. Fees vary across countries. • France will not guarantee bank debt directly but set up a company to lend to banks for up to 5 years (a guarantee was provided to Dexia jointly with Belgium and Luxembourg).
Capital injection *Injection of public funds into the capital of banks or other major financial intermediaries*	• No capital injections announced	• Capital Purchase Program within TARP. Allows financial institutions to apply for non-voting, preferred share investment by Treasury: 5% cumulative dividend for 5 years, 9% thereafter.	• £25 billion to £50 billion recapitalization scheme to provide Tier 1 capital in the form of equity and preference shares at institution's request. All U.K. banks and building societies eligible.	• Many European countries, including Austria, France, Germany, Greece, the Netherlands, Sweden, and Switzerland announced plans to inject capital into financial institutions.
Asset purchases *Purchase of various assets from financial institutions, including impaired assets*	• The federal government will purchase, via auctions, up to $75 billion in insured mortgage pools through the Canada Mortgage and Housing Corporation.	• Mortgage-backed securities and whole loan purchase programs (initially part of TARP) • Commercial Paper Funding Facility to provide liquidity to issuers and finance purchase of unsecured and asset-backed commercial paper • Federal Reserve to buy up to US$200 billion ABS (auto, student, credit card, or small business loans) through the Term Asset-Backed Securities Loan Facility (TALF), up to US$100 billion in GSE obligations, and up to US$500 billion in MBS backed by GSEs.	• The £200 billion Special Liquidity Scheme allows banks to swap temporarily illiquid assets of sufficiently high quality for treasury bills (Gilts).	• Spain created a fund to buy high-quality bank assets on a voluntary basis, at market prices. • Switzerland will purchase US$60 billion in assets from UBS AG.

Chart 9
Federal Reserve Assets
Weekly average reported Wednesdays, starting 25 July 2007



* Other loans include other liquidity programs (e.g., Primary Credit Facility)
** Treasury holdings exclude TSLF loans
Source: Federal Reserve Board of Governors

Chart 10
Bank of Canada Assets
Wednesday values, starting 6 June 2007



Source: Bank of Canada

the banking system (Table 1). As part of these efforts, swap agreements between the Federal Reserve and 14 central banks were established or increased,[3] in some cases to unlimited amounts of U.S. dollars, and various central banks further broadened the range of securities eligible as collateral for lending operations. These actions have had a significant impact on the size and composition of central banks' balance sheets. The proportion of total assets consisting of traditional government securities has fallen, and the overall size of balance sheets has increased, particularly in the case of the Federal Reserve (Charts 9 and 10).

In response to the dislocations in the U.S. commercial paper market more specifically, the U.S. government has also announced that it will guarantee holdings of money market mutual funds.[4] Moreover, the Federal Reserve has introduced a number of new temporary facilities to restore liquidity and to support short-term debt markets.[5]

On 10 October, G-7 finance ministers and central bank governors announced a Plan of Action to stabilize financial markets and restore the flow of credit to support global economic growth. As part of this plan, G-7 countries agreed to

- take decisive action and use all available tools to support systemically important financial institutions and prevent their failure;
- take all necessary steps to unfreeze credit and money markets and ensure that banks and other financial institutions have broad access to liquidity and funding;
- ensure that banks and other major financial intermediaries can raise capital from public as well as private sources in amounts sufficient to re-establish confidence and permit them to continue lending to households and businesses;
- ensure that the respective national deposit insurance and guarantee programs are robust and consistent so that retail depositors will continue to have confidence in the safety of their deposits; and
- take action to restart the secondary markets for mortgages and other securitized assets where appropriate.

Following a summit held on 15 November, the G-20 leaders announced their intention to reinforce these initiatives with close co-operation to restore economic growth, avoid negative spillovers, and support emerging-market economies and developing nations. A work plan was agreed upon to strengthen transparency and accountability, enhance sound regulation, promote integrity in financial markets, and reinforce international co-operation.

These actions were intended to stabilize the financial system and restore investor confidence in financial institutions. They were also aimed at allowing

3. On 29 September, the Bank of Canada and the Federal Reserve agreed to expand their swap facility (reciprocal currency arrangement) to US$30 billion. This facility would be accessed, should the need arise, to provide U.S.-dollar liquidity in Canada. If drawn on by the Bank of Canada, the swap would provide liquidity facilities for use by financial institutions in Canada. This swap facility expires on 30 April 2009.
4. The U.S. Treasury will use up to $50 billion from the Exchange Stabilization Fund—a fund created during the Great Depression—to provide this guarantee.
5. These facilities are the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF), the Commercial Paper Funding Facility (CPFF), and the Money Market Investor Funding Facility (MMIFF).

BOX 2

RECENT PROPOSALS FOR PROCYCLICAL MINIMUM CAPITAL REQUIREMENTS

Under Pillar 1 of the Basel II regulatory framework, a bank's minimum capital requirements are related to the amount of credit risk in its asset portfolio.[1] Since risk varies with the business cycle, there are concerns that the current system may tend to amplify cyclical fluctuations in economic and financial conditions. In this box, we describe these concerns and examine some proposals for addressing the problem.

During the upswing of the cycle, the favourable economic situation and low default rates lead to lower estimates of credit risk and, therefore, to lower capital requirements under the Basel II standards. This capital relief allows banks to supply additional loans or to purchase other assets at a stage of the cycle when lending conditions may already be easy and asset prices may be rising at a strong pace. This reduction in capital requirements can thus increase the risk that excessive growth in credit and asset prices will cause financial imbalances to emerge.

The current minimum capital framework may also exacerbate problems during the downturn of the business cycle. As economic conditions deteriorate, increases in credit risk cause minimum capital requirements to rise. Since it can be difficult to raise capital during periods of market stress, banks may need to restrict loan growth or liquidate other assets to satisfy minimum capital ratios. From the viewpoint of an individual bank, these actions may be a reasonable response. However, if many financial institutions are subject to the same pressures, the increase in capital requirements would force a widespread restriction of loan growth and exert downward pressure on asset prices, further eroding bank capital in the process. These developments would worsen the downturn in economic activity and increase the risks to financial system stability.

These concerns have motivated proposals that argue that systemic risks can be mitigated if macroeconomic conditions are taken into account in the design of capital regulations.[2] Under these proposals, banks would be required to build up a capital buffer during the boom part of the cycle—thereby strengthening their balance sheets and reducing the risk that financial imbalances will develop from excessive easing of financial conditions. During a downturn, banks would be allowed to draw down these buffers, which would alleviate the need to liquidate assets or restrict loan growth at a time when credit conditions and asset prices are already under stress. Thus, minimum capital requirements would move procyclically—the reverse of what happens under the current Basel II framework—and would help moderate cyclical fluctuations in the economy. This strategy could be implemented by linking capital requirements to movements in macroeconomic indicators of the state of the credit cycle, such as loan growth and asset prices.

Proper assessment of the effectiveness of these proposals will require careful examination of a number of practical issues.[3] A fundamental question is how much procyclicality in capital requirements would be necessary to maximize the improvement in financial stability.[4] To achieve this outcome, the links between macroeconomic indicators and systemic risk would need to be better identified. If the responsiveness of capital requirements to macroeconomic conditions is too weak, the policy objective of reducing systemic risks would not be fully realized. Conversely, if the capital framework constrains lending behaviour excessively, there would be adverse effects on the efficiency of the financial system. Another question is whether there should be a rules-based approach linking capital requirements in a predetermined way to observable variables such as loan or asset growth, or whether discretion should be used to adjust the minimum capital ratios. In a system with discretion, it would be necessary to define the appropriate roles for the prudential regulator and for other agencies (such as the central bank) that have a broader macroeconomic perspective. Finally, consideration should be given to whether the proposed change would have unintended consequences—such as providing incentives to divert activity to less-regulated parts of the financial system—and how these risks might be mitigated.

1. See M. Illing and G. Paulin, "The New Basel Capital Accord and the Cyclical Behaviour of Bank Capital" (Working Paper No. 2004-30, Bank of Canada, 2004).

2. For example, see C. Borio, "Towards a Macroprudential Framework for Financial Supervision and Regulation?" (Working Paper No. 128, Bank for International Settlements, 2003) and C. Goodhart and A. Persaud, "How to Avoid the Next Crash," *Financial Times*, 30 January 2008.

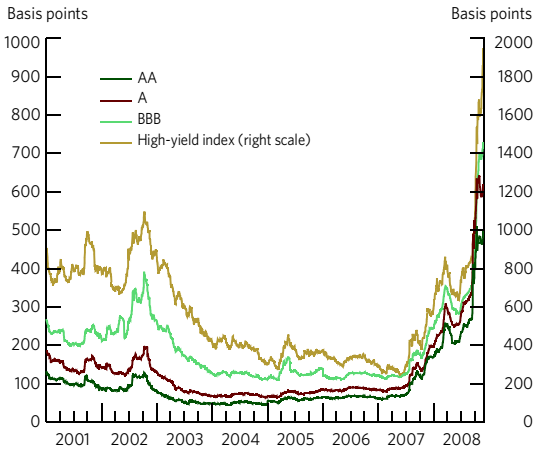
3. Regulatory capital standards are not the only factor that can amplify cyclical fluctuations in the financial system. Other factors include accounting standards and compensation arrangements at financial institutions. See Financial Stability Forum, *Report of the Financial Stability Forum on Enhancing Market and Institutional Resilience: Follow-up on Implementation* (10 October 2008) for a summary of the broad range of potential initiatives currently being studied by international organizations.

4. The need for procyclical movements in regulatory capital requirements would be mitigated to the extent that market forces give the desired movements in the capital buffer (i.e., by inducing a sufficient buildup of capital above regulatory requirements during the boom phase, and allowing the buffer to fall during the downswing). Note, however, that market forces are exerting pressure for increases in capital during the current downswing.

banks time to raise private capital and resume their lending activities, thereby limiting the negative impact of dislocations in credit markets on the real economy.

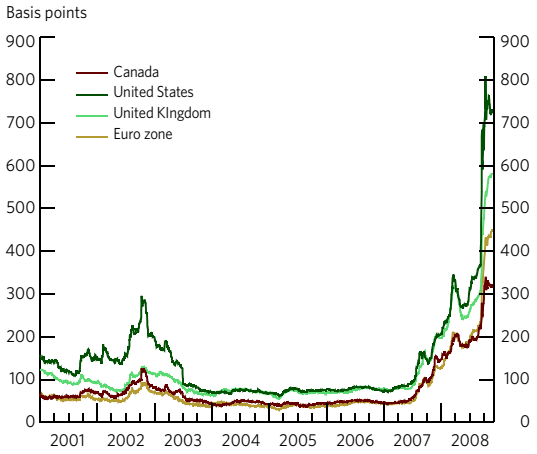
Evidence to date suggests that these measures have had some success in containing the concerns over the stability of the financial system, and have started to alleviate the funding pressures on financial institutions. Nonetheless, credit spreads are expected to remain wider than they were prior to the onset of the market turmoil, and a global recession is now likely.

Chart 11
Yield Spreads on U.S. Corporate Bonds



Sources: Bloomberg and Merrill Lynch

Chart 12
Yield Spreads Facing Investment-Grade Financial Issuers: Corporate Bonds over Government Securities



Sources: Bloomberg and Merrill Lynch

Canadian response

The Bank of Canada responded to the very challenging funding conditions in a number of ways.

First, the Bank reintroduced term purchase and resale agreements (PRAs) in September and increased the amount outstanding to over $30 billion. It also increased the frequency of these operations to weekly and extended their term to as long as 91 days. Second, the Bank broadened the range of eligible securities to include commercial paper, some asset-backed commercial paper (including, on a temporary basis, its use by affiliated dealers), corporate bonds, and U.S. Treasuries,[6] and expanded its list of counterparties to include direct participants in the Large Value Transfer System (LVTS) in addition to primary dealers. Third, the Bank began to accept an assignment of non-mortgage loan portfolios as eligible collateral for LVTS and standing liquidity facility purposes. Finally, to enhance the functioning of money markets, the Bank offered a new term PRA money market facility[7] and, on 12 November, introduced a new Term Loan Facility (TLF) to provide exceptional liquidity to the Canadian financial system.[8] Overall, the amount of liquidity injected by the Bank of Canada totalled about $37 billion as of the end of November.

In addition to the actions taken by the Bank of Canada, the Government of Canada took steps to maintain the availability of longer-term credit in Canada by purchasing, via auctions, up to $75 billion in insured mortgage pools through the Canada Mortgage and Housing Corporation (CMHC). The first three operations were conducted successfully in October and November for a cumulative amount of $19 billion. The government also created a temporary Canadian Lenders Assurance Facility (CLAF) to insure new issues of certain senior unsecured marketable wholesale debt instruments of federally regulated (and some provincially regulated where an agreement with the provincial government exists) deposit-taking institutions. The insurance is available on instruments with a term to maturity of at least 3 months, denominated in Canadian dollars, U.S. dollars, euros, sterling, and yen, and applies to the principal and interest payments for up to three years. The CLAF initiative was undertaken to ensure that Canadian financial institutions were not put at a competitive disadvantage, given similar actions announced by other countries (see Table 1).

6. These changes were made possible by amendments to the Bank of Canada Act in July 2008 that gave the Bank greater flexibility in the provision of liquidity to the financial system in reaction to exceptional circumstances.

7. Under this new facility, other eligible money market participants can, indirectly, via primary dealers, pledge bankers' acceptances, promissory notes, commercial paper, and some eligible ABCP.

8. The TLF will be transacted through a single-price auction process with direct participants in the Large Value Transfer System (LVTS) who have completed the necessary legal arrangements. Eligible collateral will be non-mortgage loans as accepted on a temporary basis for LVTS and standing liquidity facility purposes.

Corporate debt markets

Longer-term credit markets have also deteriorated since the publication of the June FSR, as perceived default risk rose and the dysfunction in short-term funding markets spread to longer-term debt markets. With the cost of financing trading positions higher and more uncertain, the liquidity premium demanded by agents also increased. This, in turn, contributed to the widening of credit spreads relative to government securities beyond what would be expected solely from the increase in default risk and expected losses.

Yield spreads on corporate bonds around the globe rose to all-time highs in both the secondary bond and credit default swap markets, with the increase being particularly significant for high-yield and lower-rated issuers, reflecting an increasing degree of credit tiering (Chart 11). While spreads on higher-risk issues rose the most, all corporate borrowers were affected as primary debt markets became non-receptive to issuance from even higher-quality names. In the United States, for example, September and October were the two months with the lowest amount of corporate bond issuance so far in 2008; the amount issued during those two months was 68 per cent lower than in 2007 and 58 per cent below the 5-year average for the same two-month period.[9] Any bond issuance that was completed came at significant price concessions, in some cases with yields being set as high as 100 basis points above indicative secondary-market levels. Some foreign debt issues by emerging-market sovereigns were postponed because of the precarious market conditions.

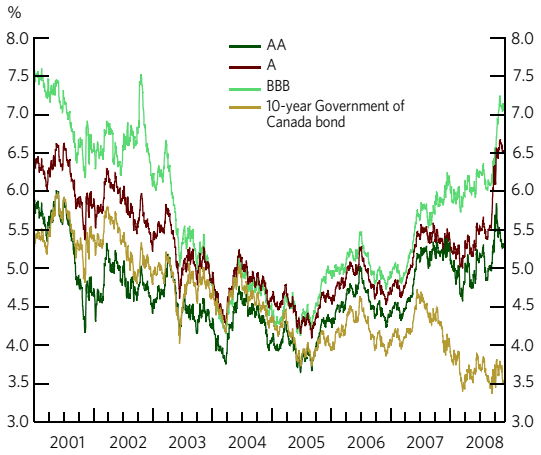
Financial issuers were particularly affected, and witnessed their cost of issuing long-term debt rise precipitously. Spreads on financial sub-indexes increased even more rapidly than the spreads on the broader corporate bond indexes (Chart 12). While the corporate debt market has since reopened to issuance to a limited degree, credit spreads remain high, and some segments of the credit markets, including residential and commercial mortgage-backed securities, remain closed.

In Canada, as elsewhere, the effective long-term borrowing costs for corporations increased, despite the decline in government yields (Chart 13). Corporate debt issuance has decreased in recent months, particularly for non-financial issuers, and fell sharply at the peak of the market turmoil. Total bond issuance by non-financial Canadian corporations fell to only about $8 billion in September and October combined, compared with an average monthly issuance of nearly $16 billion during the first eight months of 2008 (Chart 14).[10]

Also, a larger proportion of issuance than usual came from financial issuers (Chart 15), with banks accounting for 60 per cent of the total amount of corporate bonds issued in Canada during the third quarter of 2008, compared with an average of just over 40 per cent from 2000 to the second quarter of 2008.[11] Canadian banks also tapped foreign markets to raise funds, at least until the markets essentially closed in September. This included launching covered bonds in the European market. As in the U.S. debt market, bonds issued during the period of turmoil came at significant concessions to secondary-market levels.

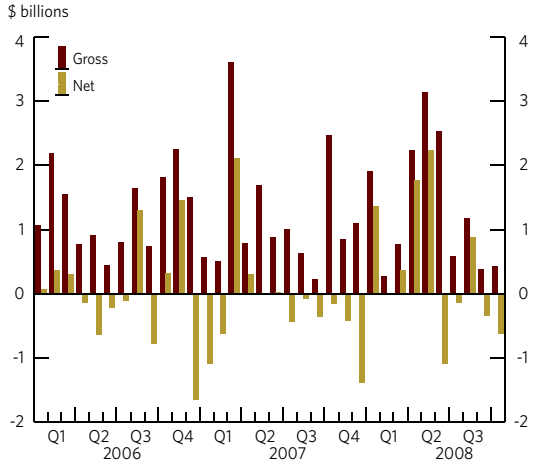
9. Source: Bloomberg. As of 31 October, the amount of corporate bonds issued in the United States (year-to-date) was 29 per cent below the amount issued by that date in 2007, and is the lowest year-to-date amount of issuance over this period since 2005.
10. Source: Bank of Canada
11. Source: BMO Capital Markets

Chart 13
Yields on Canadian Corporate Bonds and 10-Year Government of Canada Bond



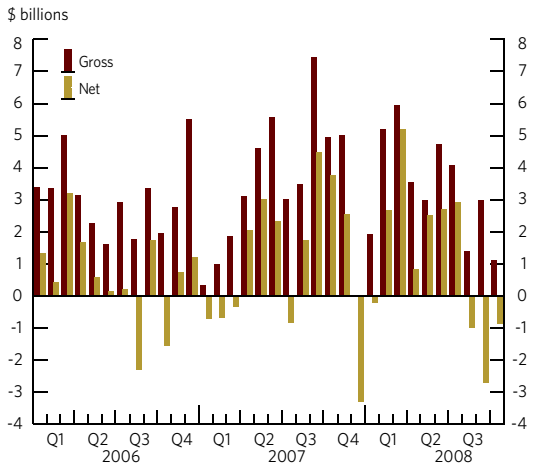
Sources: Bloomberg and Merrill Lynch

Chart 14
Canadian Non-Financial Corporate Bond Issuance in Canada



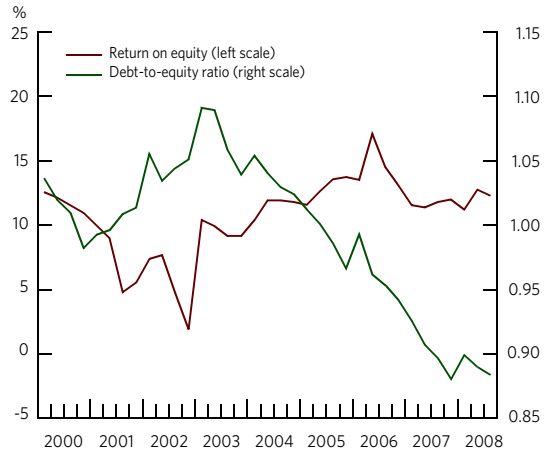
Source: Bank of Canada

Chart 15
Canadian Financial Bond Issuance in Canada



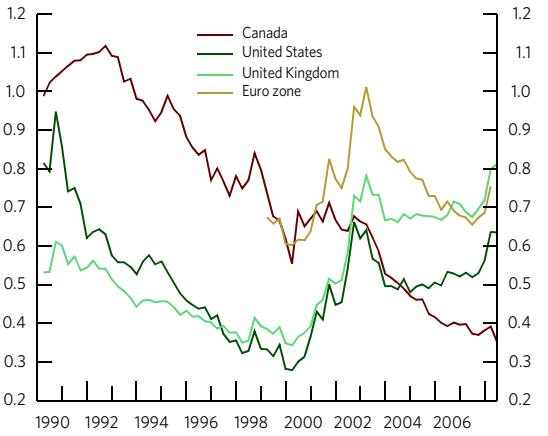
Source: Bank of Canada

Chart 16
Financial Position of the Canadian Non-Financial Corporate Sector



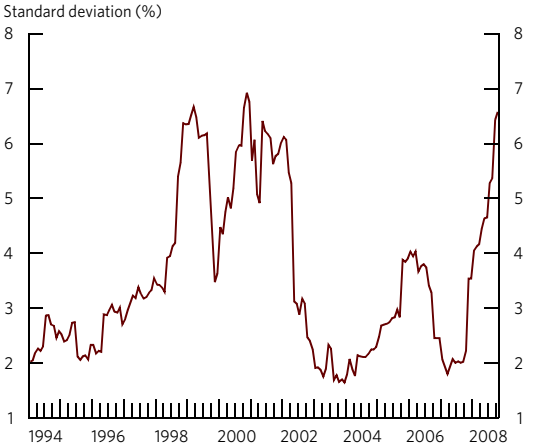
Sources: Statistics Canada (Quarterly Financial Statistics for Enterprises)

Chart 17
Non-Financial Corporate Sector: Debt-to-Equity Ratio*



* For international comparability, data for Canada are measured at market value rather than book value .
Sources: Statistics Canada, U.S. Federal Reserve, U.K. National Statistics, ECB

Chart 18
Volatility of Return on Canadian Corporate Portfolio



Source: Bank of Canada calculations based on data from Thomson Financial Datastream and the *Globe and Mail* (prior to January 2005); Moodys KMV (January 2005 to date)

More recently, however, bank issuance has stalled. The difficulty in accessing market-based funding would be of particular concern if it were to persist, given the large amount of upcoming debt maturities of Canadian banks next year.

Balance Sheets of the Non-Financial Sector

Credit growth

Table 2 shows that credit growth in Canada—residential, consumer, and business—has generally been sustained throughout the crisis. Although credit obtained through privately sponsored securitization markets has contracted sharply since the start of the turmoil,[12] banks have generally continued to lend at a healthy pace. This has been facilitated by their ability, throughout the crisis, to convert residential mortgages into NHA MBS used to support the issuance of Canada Mortgage Bonds. Although bank lending to businesses slowed in the third quarter of 2008, this coincided with some improvement in access to non-securitized sources of market funding for businesses prior to mid-September. More recent data for October show renewed robust growth in bank lending to businesses against the background of difficult market conditions.

TABLE 2
Credit—Annualized Quarterly Growth

	10-year average†	Pre-crisis trend*	2007H2	2008H1	2008Q3
Residential	**8.2**	**10.8**	**13.2**	**12.9**	**9.4**
Securitized (non-NHA MBS)**	18.5	21.5	5.3	-11.2	-6.1
NHA MBS	*27.5*	*20.5*	*36.6*	*42.4*	*23.3*
Bank	7.6	9.2	12.2	5.1	12.4
Consumer	**9.8**	**9.8**	**11.2**	**9.6**	**10.1**
Securitized	18.6	15.7	4.9	-10.2	-1.0
Bank	11.3	9.0	14.1	14.7	14.8
Business	**5.3**	**6.5**	**8.1**	**5.0**	**5.2**
Securitized	15.5	19.8	10.1	-14.6	-10.6
Bank	4.5	13.2	21.3	12.4	1.4
Market***	6.1	3.7	4.0	2.6	6.6

* Average of the annualized quarterly growth rates for the four previous quarters
** Q3 securitization numbers are estimates.
*** Bonds and debentures, equities and warrants, and trust units. Includes both domestic and foreign issues.
† 1998Q3 to 2008Q3
Source: Bank of Canada

Corporate sector

Partly owing to the income gains from the earlier surge in Canada's terms of trade, the financial position of the aggregate non-financial corporate sector remained strong in the second and third quarters of 2008. The rate of return on equity was a little higher, on average, than in the first quarter, and the ratio of debt to equity edged down (Chart 16). At the same time, Canadian non-financial corporate leverage, measured by the debt-to-equity ratio, stands well below that of the United States, the United Kingdom, and the euro area,

12. For more background, see the Highlighted Issue on p. 24 of the June 2008 FSR.

continuing a downward trend begun in the early 1990s (Chart 17).[13] With the marked decline in commodity prices since mid-year and with the U.S. economy entering a recession, profitability will likely drop markedly in the last quarter of 2008. The most important downside risk to the financial situation in this sector would come from significantly weaker-than-expected U.S. economic growth.

Canadian businesses are also feeling pressure from the financial turmoil. Firms have been affected directly, for example, by the difficulty in obtaining financing, but also indirectly by the impact of the turmoil on their customers. In addition, non-financial corporations have, in general, seen returns on their market-valued assets reach the highest level of volatility in nearly eight years (Chart 18). This signal of increased default risk has been driven by broad-based equity volatility, particularly for the oil and gas industry.

Firms that sponsor defined-benefit (DB) pension plans are facing additional pressures. The funding condition of DB plans in Canada has deteriorated sharply in recent months as a consequence of the severe sell-off in equity markets. Chart 19 presents the trend in Mercer's Pension Health Index, which incorporates indexes of the assets, liabilities, and funding positions (assets less liabilities) of a representative DB plan in Canada. Note that assets have recently been falling, whereas liabilities have continued to rise. Firms are required to make special contributions to eliminate deficits over a time period specified by the pension regulators. These contributions adversely affect the earnings and cash flow of the sponsoring corporation.[14]

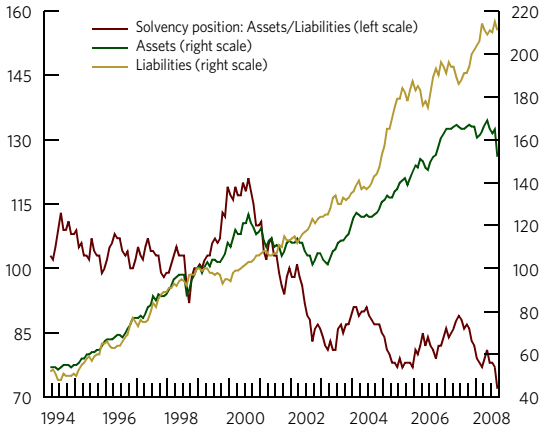
Industry

Canada's auto manufacturing industry had a substantial loss in the first three quarters of 2008 (Chart 20), and the financial situation of the overall North American auto sector has likely worsened since then, as sales of U.S. motor vehicles fell to an extremely low level in October. With the risk of continued losses through the end of 2009, financing for most North American auto manufacturers (including many Canadian parts companies) is becoming increasingly difficult, and there is growing concern over next year's liquidity positions for many firms.

Canada's forest products industry had a small overall loss in the first three quarters of 2008, chiefly the result of the ongoing deterioration in the U.S. housing market and further substantial increases in the costs of materials and energy. The near-term financial outlook continues to be bleak.

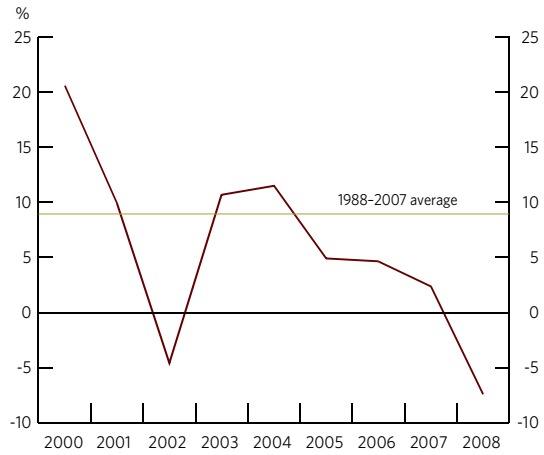
Profitability in most other Canadian manufacturing industries picked up somewhat in the second and third quarters of this year, mainly owing to a modest decline in the Canadian dollar. With the weakening of U.S. consumer spending becoming increasingly evident, however, the financial position of a broader range of Canadian manufacturers is likely to come under severe

Chart 19
Mercer Pension Health Index
31 December 1998=100



Source: Mercer Human Resource Consulting

Chart 20
Return on Equity: Automotive Manufacturing



Note: Figure for 2008 is an average of the first three quarters.
Source: Statistics Canada

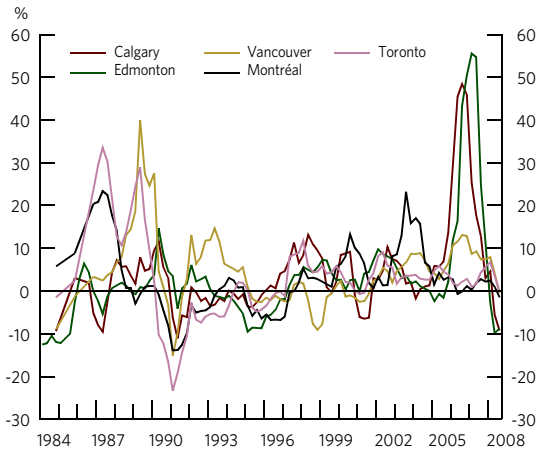
Chart 21
Real Prices for Housing in Canada*
Year-over-year growth rate

* Deflated by CPI
Sources: Royal LePage, Statistics Canada, and Bank of Canada calculations

13. For further information on international trends in leverage in the non-financial corporate sector and their implications for the real economy, see D. Côté and C. Graham, "Corporate Balance Sheets in Developed Economies: Implications for Investment" (Working Paper No. 2007-24, Bank of Canada 2007).

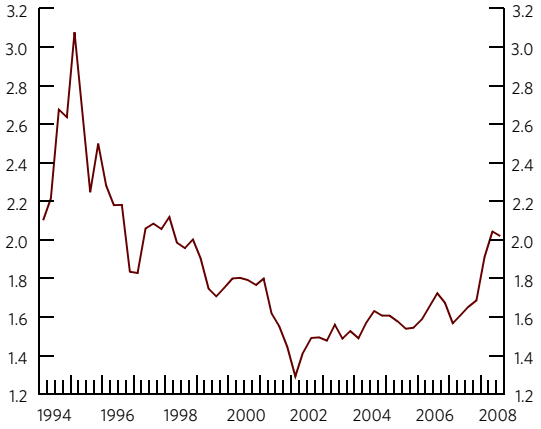
14. Some relief is expected to come from a recent government measure—announced in November—which will allow federal plans to extend their solvency funding payment schedule from 5 to 10 years in respect of solvency deficiencies as at 31 December 2008, subject to certain conditions.

Chart 22
Real Prices for Existing Houses by City*
Year-over-year growth rate



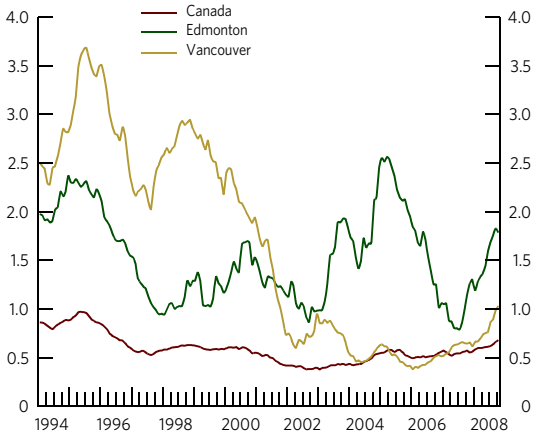
* Deflated by CPI
Sources: Royal LePage, Statistics Canada, and Bank of Canada calculations

Chart 23
Ratio of New Listings to Sales of Existing Homes



Source: CMHC and MLS

Chart 24
Recently Completed Unoccupied Dwellings
Percentage of population



Sources: Statistics Canada and Bank of Canada calculations

downward pressure (although the recent further drop in the Canadian dollar will provide a partial offset, if sustained).[15]

Although many manufacturing companies are likely to face significant additional pressures, their problems are unlikely to have a major adverse impact on the Canadian financial system, since the exposure of Canadian banks to this sector remains limited.

House prices

Prices of new and existing homes have been declining in real terms since the middle of 2008 (Chart 21). This decrease reflects a combination of higher housing supply and lower demand for housing exacerbated by deteriorating consumer confidence and a slowing economy. The downturn has been relatively widespread across the country (Chart 22), although more pronounced in previously overheated local markets, notably in Alberta.

Abundant housing supply—with rising listings in the resale market and a rising number of unoccupied new homes—combined with lower demand, suggests that house prices will continue to weaken (Charts 23 and 24). Tighter restrictions on insured mortgages will restrain demand somewhat in the short run but will strengthen market resilience over time. [16]

As detailed in the October 2008 *Monetary Policy Report,* the Bank is now expecting a modest decline in house prices in most regions of the country over the coming year; steeper decreases are anticipated in markets that previously experienced the largest run-up in prices, and which now exhibit signs of imbalance between demand and supply (e.g., Western Canada, particularly Alberta). If the risk of a prolonged global downturn materializes, then there will be a stronger moderation in house prices, which could lead to a more significant increase in default rates on mortgages.

Canadian household sector

The June FSR noted that the financial position of the Canadian household sector remained sound. Developments since then suggest some deterioration, but the overall situation remains relatively positive.

Household credit has continued to increase at a strong pace recently (11 per cent year-over-year in September 2008).[17] With the more moderate growth in disposable income, the debt-to-income ratio rose further in the second quarter of 2008 to 137 per cent. Still, household debt remains lower as a share of disposable income than is the case in the United States and the United Kingdom (Chart 25). Reflecting lower effective borrowing rates for households, the debt-service ratio (DSR) has edged lower from 8.0 per cent in the fourth quarter of 2007 to 7.5 per cent in the second quarter of 2008. This is below the historical average of 9.2 per cent, suggesting that, at the

15. It is also being reported that, since the onset of the latest episode of severe financial turmoil, U.S. customers are increasingly delaying payments on shipments from Canadian manufacturers (as well as cancelling orders). However, the federal government recently approved a request by Export Development Canada to raise its lending capacity in order to assist exporters with liquidity problems.

16. In July, the federal government announced a set of restrictions related to the mortgage insurance market (implemented in mid-October) aimed at protecting and strengthening the Canadian housing market. The measures include elimination of the zero down payment and the 40-year-amortization period options.

17. This strong increase is somewhat surprising, given the moderation of activity in the housing market and the reported decline in consumer confidence over the recent past.

aggregate level, households can comfortably manage their financial obligations (Chart 26).

The debt-to-asset ratio rose to 17.8 per cent in the first half of 2008, its highest level since 1991 (Chart 27). After increasing strongly over the preceding five years, household real net worth has remained roughly unchanged since the onset of the turmoil in financial markets and has likely declined in the second half of this year, following the sharp drops in global equity markets, together with declining Canadian house prices. In the near term, asset values are unlikely to provide much support to the financial situation of Canadian households.

Indicators of household financial stress also suggest some slight deterioration in the financial position of households in the first half of 2008 (Chart 28). After having been stable at historically low levels for the past three and a half years, the proportion of mortgages in arrears rose to 0.26 per cent in the second quarter of 2008 but remains below the average level since 1997 of 0.38 per cent. Personal bankruptcies are also slightly higher than they were in 2007, although they remain well below the peak reached in the late 1990s.

Overall, despite a modest deterioration, the financial position of the Canadian household sector remains relatively positive. On the other hand, rising debt levels mean that more Canadian households are becoming vulnerable to negative economic shocks at a time when the economy is expected to slow, raising the risk that the incidence of financial stress among households may increase. This bears close monitoring, given the deteriorating economic outlook.

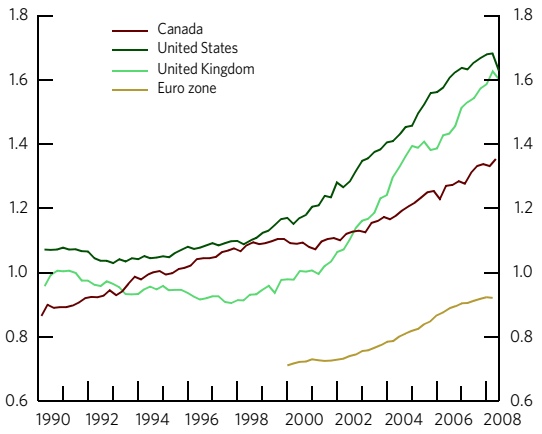
An update of stress testing the household sector

The intensification of the turmoil in financial markets since the June FSR has increased the risk of significant spillover effects to the global economy, with knock-on effects for Canada. The Bank has updated its simulations of the distribution of the household DSR to assess the extent to which these potential adverse developments could affect household balance sheets and the Canadian financial system. These simulations follow the same method used for those reported in the December 2007 FSR.[18] Using household-level data, this involves estimating the implications for the distribution of the DSR, of a hypothetical scenario for debt, income, and interest rates.

The stress scenario used for this exercise is based on the materialization of the "global economic downturn" risk outlined on p. 4. It assumes a prolonged recession in the United States, which contributes to slower growth of household income in Canada and a moderation in housing activity. It is assumed that household nominal income decreases by 2 per cent per annum, on average, over the period 2008Q3 to 2009Q4. Growth in total consumer and mortgage debt is assumed to moderate to 6 per cent per annum. Against the background of slower income growth, the increase in debt levels implies a rise in the aggregate debt-to-income ratio and the DSR. It is assumed that policy interest rates and household borrowing spreads are fixed at their mid-November levels and remain unchanged over the simulation horizon.

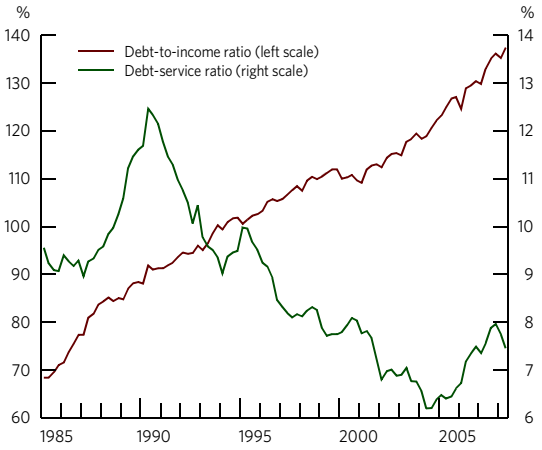
18. For more details on the data and the methodology, see the December 2007 issue of the FSR, pp. 27–28 and S. Dey, R. Djoudad, and Y. Terajima, "A Tool for Assessing Financial Vulnerabilities in the Household Sector," *Bank of Canada Review* (Ottawa: Bank of Canada, Summer 2008): 45–54.

Chart 25
Household Debt as a Share of Personal Disposable Income



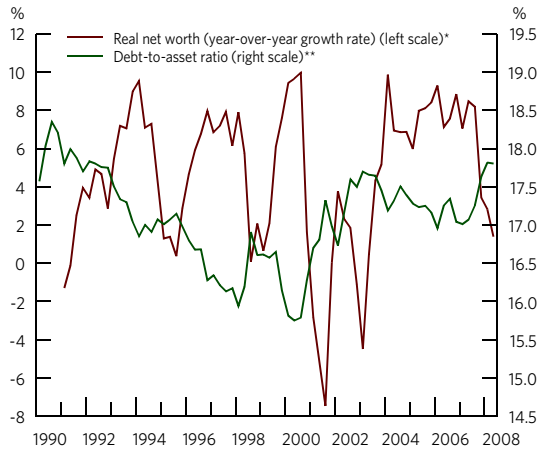
Sources: Statistics Canada, U.S. Federal Reserve, U.K. National Statistics, ECB

Chart 26
Household Sector: Indebtedness Indicators



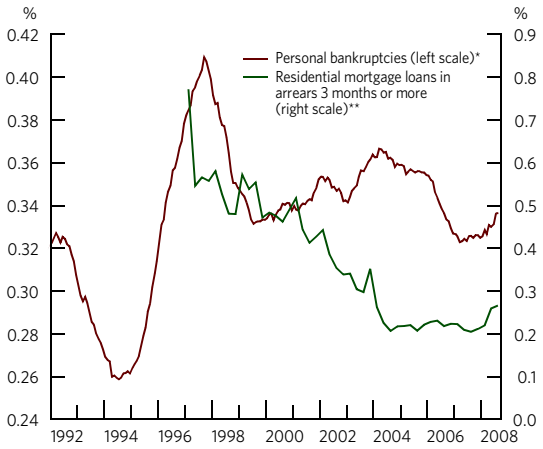
Sources: Statistics Canada, Ipsos Reid, and Bank of Canada calculations

Chart 27
Household Wealth and Assets



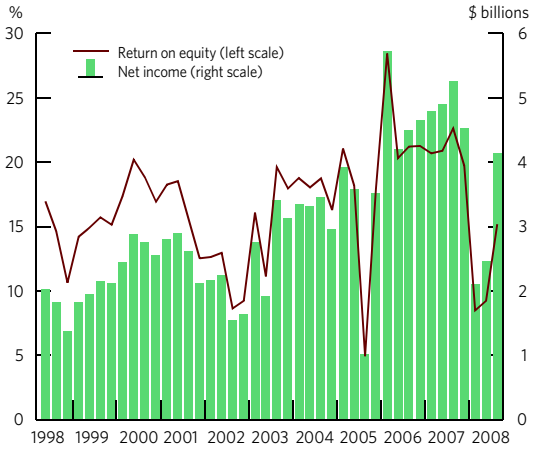
* Deflated by total CPI (1992=100)
** At market value
Source: Statistics Canada

Chart 28
Household Sector: Financial Stress Indicators



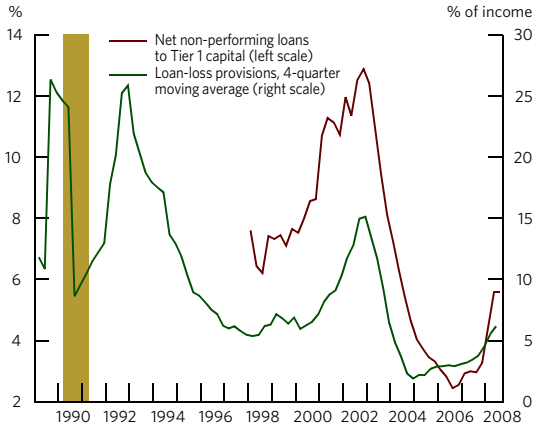
* As a percentage of population aged 20 and over
** As a percentage of total residential mortgage loans outstanding
Sources: Statistics Canada and OSFI

Chart 29
Profits of Major Banks



Sources: Banks' quarterly financial statements (data to 2008Q3)

Chart 30
Asset Quality



Note: Gold bar indicates a period of recession
Sources: OSFI and Canadian Bankers Association

TABLE 3

Impact of a Prolonged Economic Slowdown on Vulnerable Households

Time period	Proportion of households with DSR>40%*	Share of total debt owed by households with DSR>40%
1999–2007 average	3.30%	6.3%
2001**	4.04%	7.8%
2007H2–2008H1	3.00%	6.1%
	Stress-test results	
2009Q4	6.20%	12.9%

* As a percentage of total households with debt
** Data for 2001 provide a useful reference because the share of debt held by vulnerable households was at its maximum during the sample period (1999–2007) in that year.
Source: Ipsos Reid Canada and Bank of Canada simulations

Table 3 shows the impact of a protracted economic slowdown on the distribution of "vulnerable" households (those with a DSR above 40 per cent). The proportion of vulnerable households is estimated to rise from the current level of roughly 3 per cent to 6 per cent by the fourth quarter of 2009, while the proportion of debt carried by these households would also double from 6 per cent to almost 13 per cent over the same period. This is double the 1999–2007 historical average.

Should this scenario materialize, the banking sector would suffer significant losses from the rising vulnerability in the household sector. For example, assuming that 50 per cent of households with a DSR above 40 per cent go into default, and that loss-given-default is 100 per cent on consumer loans,[19] the associated losses for the Canadian banking sector would be close to 1 per cent of their total assets. The average Tier 1 ratio would fall from 9.7 per cent to approximately 8.8 per cent. This remains well above the OSFI benchmark of 7 per cent.

Financial Institutions

During the recent period of extreme global financial stress, the relative strength of the Canadian financial system has been apparent. Major Canadian financial institutions remain well capitalized and profitable, but global events have nonetheless raised some challenges.

Banks

Profits and return on equity for the major Canadian banks have been on an improving track since the apparent trough in the first quarter of 2008, when writedowns seem to have peaked (Chart 29). Since the start of the turmoil, the major banks have reported cumulative capital market writedowns of almost $12 billion on a pre-tax basis. For the fourth quarter, five banks have pre-announced additional writedowns totalling around $2 billion.

As discussed, the volatility in the value of the securities portfolios of financial institutions has continued (through the requirements of fair value accounting) to adversely affect their earnings.[20] Recently, changes were announced

19. Only consumer loans were considered in the losses, since most defaulting mortgages would be insured.

20. For background on fair value accounting, see the report on p. 35 .

by the Canadian Accounting Standards Board (AcSB), which mirror recent changes in International Accounting Standards (IAS). These modifications permit financial institutions, in some cases, to reclassify assets from the "held for trading" account to the banking book. This change is expected to reduce future volatility in the earnings of some banks. Several banks have since reclassified assets under these guidelines.

Prospects for bank core earnings over the near term are clouded by a slowing global economy and a turbulent capital markets environment. Lending margins have been adversely affected by rising funding costs. In addition, banks are facing increasing headwinds from rising loan-loss provisions, both in Canada and the United States (Chart 30). Provisions still remain well below their historical peak. However, in a deteriorating economic environment with potential further weakening in the labour and housing markets, the financial condition of households could become a concern (see "Canadian household sector" on page 20). The largest sectoral loan exposure of Canadian banks is to the household sector which, on a global consolidated basis, accounts for about 30 per cent of total bank assets (Chart 31). Still, this risk is mitigated to the extent that mortgages with an initial loan-to-value ratio greater than 80 per cent need to carry mortgage insurance. In fact, about 46 per cent of Canadian residential mortgages are insured, since banks also often purchase insurance on other mortgages to facilitate their future securitization.

Canadian banks also have significant exposure to corporate loans. However, this has declined on a relative basis in recent years. Chart 32 shows the trend in Canadian bank global loan exposures to some of the most cyclical sectors: construction and real estate, natural resources, manufacturing, and telecommunications. This exposure is on a declining trend and, in aggregate, accounts for less than 8 per cent of bank assets.[21]

Nevertheless, it is important to note that overall corporate exposure has remained relatively constant in recent years, since the share of corporate bonds and equities has increased (Chart 33). Corporate securities tend to be held largely in the trading book, where they are subject to immediate writedowns when there has been a deterioration in fair value. Corporate loans are held mainly on the balance sheet at amortized cost, where they are subject to loan-loss reserves when there is a deterioration in credit quality.

In terms of other risk exposure, balance sheet claims by Canadian banks vis-à-vis U.S. borrowers constitute about 15 per cent of total bank assets. (See Box 3 in the June FSR for more details on the composition of these exposures.) Thus, the banks will likely feel the adverse effects of any further deterioration in the U.S. economy.

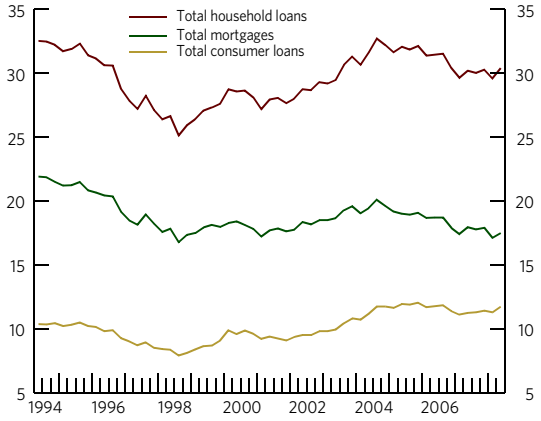
An assessment of overall default risk derived from market data, the distance to default for major Canadian banks, suggests a deterioration in their perceived credit quality since the June 2008 FSR (Chart 34). Driven by continued volatility in bank share prices, this measure has, in fact, reached its lowest point on record.[22]

In the current environment, the capital adequacy of banks has received considerable attention. Because the writedowns of the Canadian banks have

21. Note that this does not include any additional exposure through undrawn lines of credit.

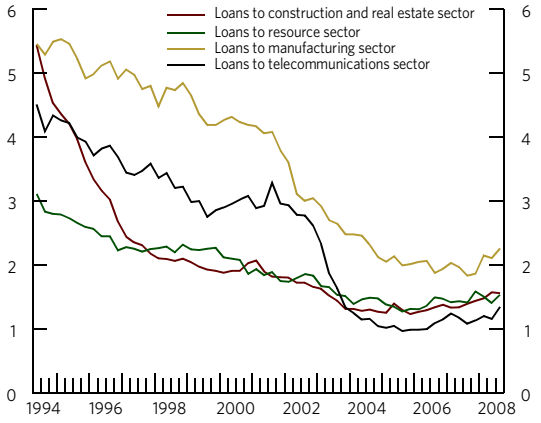
22. Data are available since December 1982.

Chart 31
Exposure of Major Banks to Household Sector
Percentage of total assets



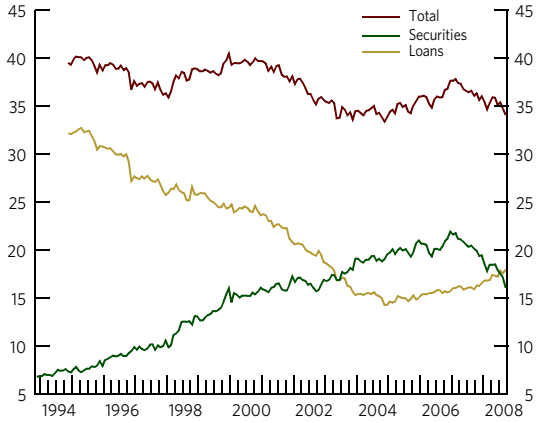
Source: OSFI

Chart 32
Exposure of Major Banks to Cyclical Sectors
Percentage of total assets



Source: OSFI

Chart 33
Major Bank Corporate Exposure
Percentage of total assets



Source: OSFI

BOX 3

CANADIAN BANK LEVERAGE: AN INTERNATIONAL COMPARISON

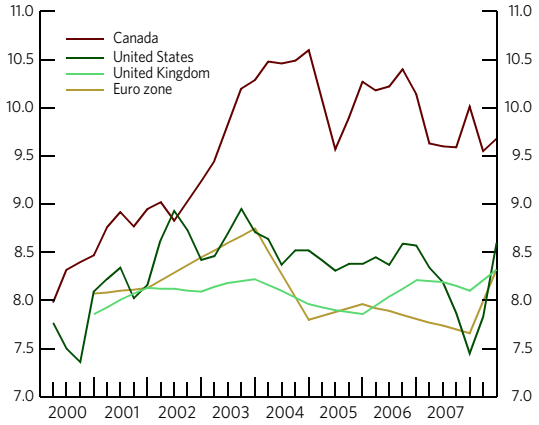
Capital-adequacy ratios, a common regulatory metric under the Basel accords, provide some insight into bank leverage, since capital is shown as a share of risk-weighted assets. According to such measures, Canada's major banks have been quite well capitalized in recent years, relative to their counterparts in the United Kingdom and the euro zone, and to commercial banks in the United States (Chart A). However, to avoid any distortions that may be introduced by assumptions regarding the risk-weighting of assets, it is also important to monitor capital adequacy in non-risk-weighted terms.

Indeed, OSFI requires that non-risk-weighted regulatory bank leverage cannot exceed an asset-to-capital multiple of 20 (although some large banks may be given permission to reach a limit of 23).[1] Similar rules are in place for U.S. commercial banks.[2]

As such, Canada's major banks remain less leveraged than their international counterparts, with the exception of U.S. commercial banks (Chart B).[3] At the same time, it is important to recognize that in the case of foreign banks, these leverage measures do not account for off-balance-sheet items, which could significantly increase the leverage of many banks.[4]

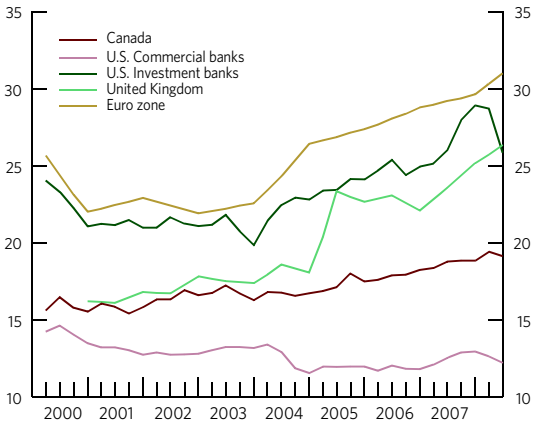
With comparatively low leverage, Canada's banking system thus entered the current market crisis in a stronger financial position than did many of their U.S. and European counterparts. Not surprisingly, the relatively low leverage of Canada's major banks has also translated into comparatively low leverage in other sectors of the Canadian economy (see Charts 17 and 25).

Chart A
Tier 1 Capital-Adequacy Ratio
Tier 1 capital as a percentage of risk-weighted assets



Sources: Bloomberg and bank financial statements

Chart B
Banking Sector Leverage
Assets as a multiple of capital



Sources: Bloomberg and bank financial statements

1. Canada's regulatory leverage is the ratio of assets (including some off-balance-sheet items) to an adjusted measure of Tier 1 and Tier 2 capital.
2. Specifically, U.S. commercial banks are considered "well capitalized" if Tier 1 capital represents at least 5 per cent of non-risk-weighted assets (equivalent to an asset-to-capital multiple of 20) and "adequately capitalized" if Tier 1 capital is at least 4 per cent of non-risk-weighted capital (i.e., an asset-to-capital multiple of 25).
3. Based on data for seven major banks from the euro zone, six major U.K. banks, five large U.S. investment banks, plus ten large national and regional U.S. commercial banks.
4. Available data suggest that off-balance-sheet securitized assets of Canadian banks represent a comparatively small share of total on-balance-sheet assets, relative to those of U.S. commercial banks.

been relatively moderate and because Canadian banks started from a strong capital base, most banks have not needed to raise capital. Furthermore, the major banks have been able to absorb additional writedowns and provisions and still maintain strong Tier 1 capital ratios. Chart 35 shows that the regulatory capital ratios of major banks have been sustained well above OSFI benchmarks since the beginning of the credit crisis in late 2007. Furthermore, the discussion in Box 3 highlights the fact that Canadian banks are well capitalized by international standards and remain less leveraged than many of their international counterparts.

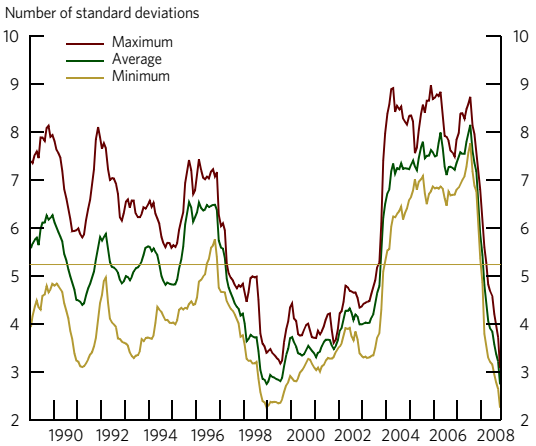
Managing liquidity risk has also taken on central importance for banks (see the article on p. 47). Since the start of the turmoil, liquidity problems for Canadian banks have been aggravated by the generally poor functioning of global interbank lending markets. Furthermore, there have been times, such as in the fourth quarter of 2008, when Canadian banks have not had access to the full range of capital markets normally available for funding purposes.

However, through this difficult period, Canadian banks have closely managed their liquidity positions in both Canadian dollars and in foreign currencies. They have worked to maintain or extend the term of their wholesale funding and have made extensive use of Bank of Canada term PRA facilities. At longer maturities, the banks have continued to participate in the Canada Mortgage Bond Program. In addition, the federal program announced in October, whereby the government would purchase up to $75 billion in National Housing Act Mortgage-Backed Securities (NHA MBS) through Canada Mortgage and Housing Corporation, has been a very helpful source of cost-effective liquidity funding for banks. The Canadian Lenders Assurance Facility, which, for a fee, provides optional government insurance for a temporary period on the wholesale term borrowing of eligible deposit-taking institutions, has provided an additional backstop through this period.

Conclusion

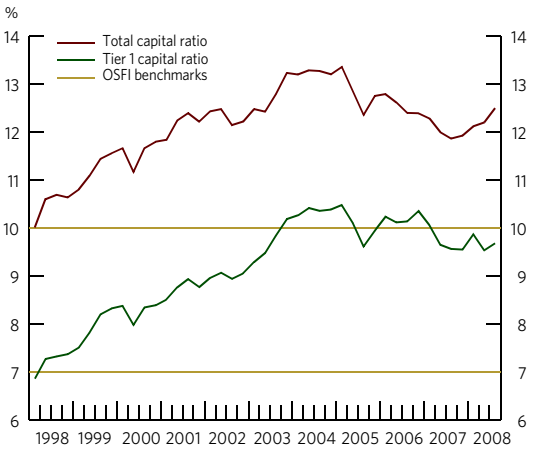
In spite of the relative strength of their capital adequacy and profitability, the recent period has not been an easy one for major Canadian banks, particularly in terms of funding and liquidity. This is evidenced by their extensive use of Bank of Canada liquidity facilities on an ongoing basis. The fact that many financial markets have not been functioning properly for an extended period, along with weakening prospects for many of their business lines and the generally deteriorating credit environment, suggests that the near term will be a challenging period for Canadian banks.

Chart 34
Distance to Default for Major Banks



Note: Horizontal line is the average distance to default from December 1982 to present.
Source: Bank of Canada calculations based on data from OSFI and Thomson Financial Datastream

Chart 35
Total and Tier 1 BIS Capital Ratios of Major Banks



Note: Data reflect Basel II framework beginning in 2008Q1 (data to 2008Q3).
Source: OSFI

Life and health insurance companies

The major Canadian life and health insurance companies, which had largely avoided exposures to toxic subprime-mortgage securities early in the crisis, have more recently reported fairly significant exposures in their corporate fixed-income portfolios to some of the problem and failed large financial institutions in the United States. These have led to writedowns that have adversely affected earnings in the second half of 2008.

Furthermore, weak and volatile equity markets continue to put pressure on the profitability of these companies. While their direct holdings of equities are relatively small (at about 6 per cent of total assets), they have significant

exposure to equity markets through their segregated-fund guarantees.[23] Companies frequently hedge these exposures, but in some cases the sharp fall in equity prices required them to book capital reserves (which reduce earnings) against these guarantees. Many of these products carry long terms to maturity (exceeding five years), implying that there is time for equity markets to recover before losses materialize. This has been recognized by OSFI, which recently issued new guidelines for segregated funds that lower the capital charge with respect to guarantees applicable to longer-term payment obligations.[24]

While the level of disclosure at life and health insurance companies has improved in recent years, it is generally not as detailed as that of banks, and recent events have underlined the need for further enhancements. For example, it would be desirable for life and health insurance companies to provide more information about the consolidated capital position of the enterprise as a whole, not just at the unconsolidated operating company level. ■

23. A segregated fund is an investment product held within an insurance contract; the contract typically offers certain protection features or guarantees. The term "segregated" refers to the fact that the investment assets are separated from the general assets of the insurance company. Almost three-quarters of the assets in these funds are linked to equity markets.

24. These can be found at <http://www.osfi-bsif.gc.ca/osfi/index_e.aspx?ArticleID=2639>.

Reports

Reports address specific issues of relevance to the financial system (whether institutions, markets, or clearing and settlement systems) in greater depth.

Introduction

In the report, *Credit, Asset Prices, and Financial Stress in Canada*, authors Miroslav Misina, Pierre St-Amant, and Greg Tkacz describe work done at the Bank of Canada on conceptualizing and measuring financial stress, and their recent work that examined the performance of various measures of credit and asset prices as early-warning indicators of financial system vulnerability, both historically and in the latest episode.

The expanded use of fair value accounting for financial instruments has come under increased scrutiny during the financial market turbulence. In their report, *Fair Value Accounting and Financial Stability*, Éric Chouinard and Peter Youngman describe accounting standards for financial instruments. The authors critically examine the application of fair value accounting during the turmoil, as well as the interplay between accounting standards and cyclical fluctuations in the economy.

A period of strong economic growth has boosted capital inflows to emerging-market economies and has fostered the emergence of sovereign wealth funds, which have the potential to significantly affect the landscape of international markets. In the report, *The Impact of Sovereign Wealth Funds on the International Financial System*, Tamara Gomes outlines the potential benefits and risks associated with investments from these financial market participants. The author concludes that, while the risk of destabilizing behaviour does exist, sovereign wealth funds will likely act to stabilize the international financial system by facilitating the efficient allocation of capital and even providing support in times of market distress. ■

Credit, Asset Prices, and Financial Stress in Canada

Miroslav Misina, Pierre St-Amant, and Greg Tkacz

Despite the apparent uniqueness of each financial cycle—from the conditions that lead to boom times, to triggers that result in the reversals—historical narratives (e.g., Kindleberger and Aliber 2005) suggest that most cycles display common features: boom times are typically associated with periods of credit expansion and persistent increases in asset prices, often followed by rapid reversals.

These commonalities, confirmed by recent empirical work (e.g., Borio and Lowe 2002; Kaminsky and Reinhart 1999), suggest that developments in the credit and asset markets of individual countries may provide an early-warning indicator of vulnerability in the financial system that would be useful in assessing the current situation and in discussions of possible policy actions. To arrive at a useful set of predictors for a particular country, however, the information content of different types and measures of credit (business credit, household credit) and asset prices (stock prices, bond prices, real estate) must be assessed for that country.

Assessing the usefulness of credit and asset prices as early-warning indicators in Canada is problematic, given the scarcity of events that would qualify as financial crises. Bordo et al. (2001) find that Canada has not experienced any "twin crises" (banking and currency crises) since the beginning of their sample in 1883. The absence of financial crises does not mean that Canada's financial system has not, or cannot, come under stress. Financial stress, even if it is not accompanied by the widespread failures of financial institutions usually associated with financial crises, can disrupt the financial system, which may have implications for real economic activity.

Although it seems plausible to postulate that expansions in credit and asset prices may be associated with increased financial stress, the empirical work that examines this link has been hindered by vagueness that is, to some extent, inevitable, in the definition of financial stress, and the consequent difficulties in quantifying it.

In this report, we describe the work done at the Bank of Canada on conceptualizing and measuring stress in the Canadian financial system (Illing and Liu 2003, 2006), and the work on the performance of various measures of credit and asset prices as early-warning indicators of financial system vulnerability, both historically and in the latest episode (Misina and Tkacz 2008).

Measuring Financial Stress Using the Financial Stress Index

Financial stress can be characterized as a situation in which large parts of the financial sector face the prospect of large financial losses. These situations are usually accompanied by an increased degree of perceived risk (a widening of the distribution of probable losses) and uncertainty (decreased confidence in the shape of that distribution).

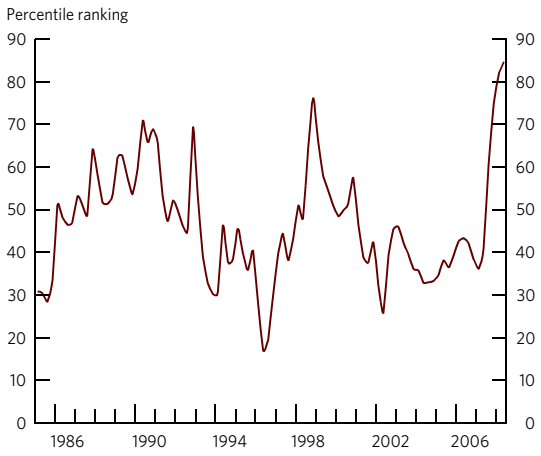
To capture these features of financial stress, Illing and Liu (2003, 2006) constructed a weighted average of various indicators of expected loss, risk, and uncertainty in the financial sector. The resulting financial stress index (FSI) is a continuous, broad-based measure that includes the following indicators from equity, bond, and foreign exchange markets, as well as indicators of banking sector performance:

- the spread between the yields on bonds issued by Canadian financial institutions and on government bonds of comparable duration
- the spread between yields on Canadian non-financial corporate bonds and government bonds
- the inverted term spread (i.e., the 90-day treasury bill rate minus the yield on 10-year government bonds)
- a beta variable derived from the total return index for Canadian financial institutions
- volatility of the trade-weighted Canadian dollar
- stock market volatility (TSX)

- the difference between Canadian and U.S. government short-term borrowing rates
- the average bid/ask spread on Canadian treasury bills
- the spread between rates on Canadian commercial paper and treasury bills of comparable duration

In constructing the FSI, Illing and Liu considered several weighting options and settled on weights that reflect relative shares of credit for particular sectors in the economy. The resulting index was most effective in correctly signalling events that are widely associated with high financial stress (e.g., the U.S. stock market crash in October 1987, the peso crisis in 1994, the LTCM crisis in 1998). The index is shown in Chart 1.

Chart 1
Financial Stress Index



Illing and Liu emphasize that the FSI provides a timely snapshot of *contemporaneous* stress in the Canadian financial system, and is not a leading indicator. That feature of the index is particularly evident in the recent episode. While the index performed very well in capturing the increased financial stress that started in August 2007, it did not foreshadow the problems.

The fact that the FSI has correctly indicated increased stress in the most recent period is encouraging,[1] but being a contemporaneous measure, it is of limited use as an early-warning indicator of possible problems.

Credit, Asset Prices, and Financial Stress

In a recent paper, Misina and Tkacz (2008) combine the insights offered by Borio and Lowe's work with the work on the FSI and ask to what extent various measures of credit and asset prices can help identify vulnerability in the financial system ahead of the episodes of stress.

It is important to emphasize that the objective of this exercise is not to forecast idiosyncratic events that cause reversals (an impossible task using any econometric model), but rather to assess whether, historically, there has been a relationship between the various measures of movements in credit and asset prices at time *t* and the FSI *k* periods ahead. The working hypothesis is that movements in credit and asset prices are indicators of the health of the system and its ability to withstand various types of shocks. Since the impact of a shock depends not only on the state of the system, but also on the magnitude of the shock, one would expect that, everything else being the same, excessive growth of credit and persistent increases in asset prices reduce the ability of the system to withstand shocks.

To test their hypothesis, the authors consider a broad range of measures of credit and asset prices, as well as various domestic and international variables:

- credit measures: the growth rates of total household credit, total business credit, and total credit/GDP
- asset prices (growth rates): stock prices (TSX), commercial real estate (nominal and real price indexes), residential real estate (new and existing house price indexes), average house price to personal disposable income; Canadian-dollar price of gold (Gold C$)
- macroeconomic variables: investment/GDP, the growth rate of money (M1++ and M2++), inflation (total CPI and core CPI)
- foreign variables: price of crude oil, asset-price indexes (United States, Australia, Japan), global GDP, U.S. bank credit, U.S. federal funds rate

Starting from this broad range of variables, the authors identify the most promising models by comparing the forecasting power of a wide range of specifications with that of a simple benchmark model in which the current FSI is a linear function of its own lagged value (*k*-quarters).[2]

1. The FSI was designed to ensure that it captured historical episodes of financial stress; the latest episode is a real-time test case.

2. Given the multitude of horizons (from one quarter to three years ahead) and variables under consideration, this alone requires the assessment of several thousand models.

Chart 2
Actual and Predicted FSI Using the Best Threshold Model
1-year forecasting horizon

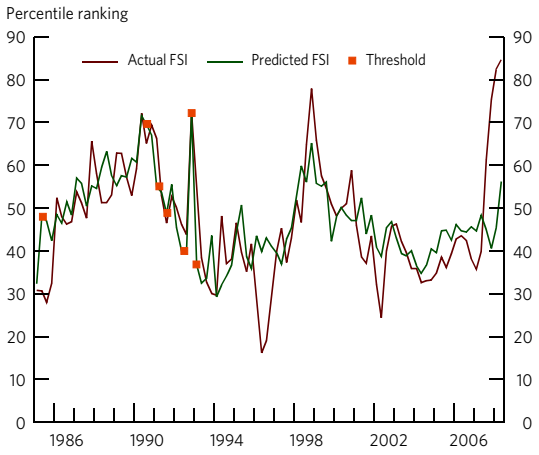
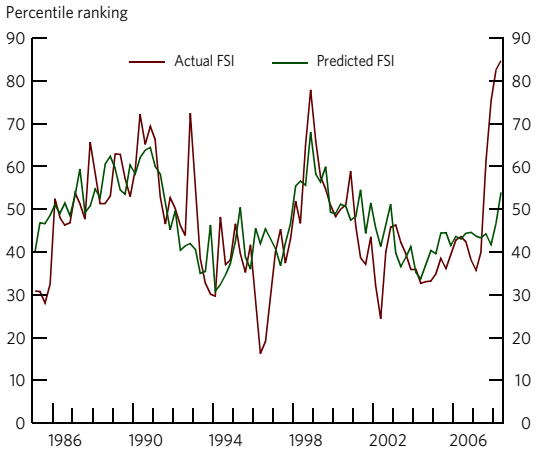


Chart 3
Actual and Predicted FSI Using the Best Linear Model
1-year forecasting horizon



In performing this exercise, both linear and threshold specifications are considered. If one believes that unusually large movements in asset prices, credit, monetary expansion, etc. may lead to changes in underlying relationships (because of "irrational exuberance," for example), then the relationship between some of the explanatory variables and the FSI may be non-linear. Misina and Tkacz approximate non-linear relationships by allowing for threshold effects between the explanatory variables and the FSI, such that the parameters of the models are allowed to differ when the explanatory variables lie above or below their threshold values. The methodology employed allows for the possibility of threshold effects in each of the 24 explanatory variables, as well as the possibility that the variable triggering a regime change differs from the variables that are the best predictors of financial stress within a regime.[3]

The best models are selected using the data that span the period 1984 to 2006. The forecasting exercise is performed over the period 1996 to 2006.

The findings can be summarized as follows:

- Within a linear framework, the credit growth of domestic business is the best predictor of the FSI at all horizons.
- Various domestic asset prices tend to be better predictors of the FSI when non-linearities are allowed for, suggesting that extreme movements in asset prices have a disproportionate impact on financial stress.
- At the one- and two-year horizons, domestic business credit and real estate prices emerge as important predictors of financial stress. This confirms the general findings of Borio and Lowe regarding the importance of considering credit and asset prices jointly rather than in isolation.
- Various measures of real estate prices are identified as the key threshold variables in the best threshold models (1- to 3-year horizon). The authors do not find a significant threshold effect in any measure of credit.
- With the exception of the federal funds rate at short horizons (two quarters), inclusion of international variables does not usually lead to improved forecasting performance relative to the benchmark model.

The forecasting performance of the best threshold models is significantly better than that of the best linear models, suggesting that non-linearities play an important role in capturing episodes of financial stress, a finding very much in line with the observations of Misina and Tessier (2007, 2008) on the importance of non-linearities in capturing the extreme movements associated with stress.

Chart 2 shows the actual FSI and the value predicted four quarters ahead by Misina and Tkacz's preferred threshold model, in which the threshold variable is the ratio of the average house price to per capita personal disposable income, and the explanatory variable is, in addition to that variable, domestic business credit.[4] In general, the model performs reasonably well in tracking the trend and turning points of the FSI. The

3. By contrast, Borio and Lowe pre-specify both the threshold variables (credit and asset prices). In addition, their thresholds are exogenously given, whereas in Misina and Tkacz, they are estimated endogenously.

4. The threshold marks on Chart 2 indicate the periods in which the threshold variable crossed the endogenously estimated threshold value.

best linear model (Chart 3) fails to capture some of the more extreme movements in the FSI over this period.[5]

Credit and Asset Prices in the Recent Episode of Financial Stress

In August 2007, the FSI increased sharply, pointing to considerable stress in the Canadian financial system. Indeed, in the recent episode, the FSI reached its historical high, indicating that this is the most stressful episode since 1985.

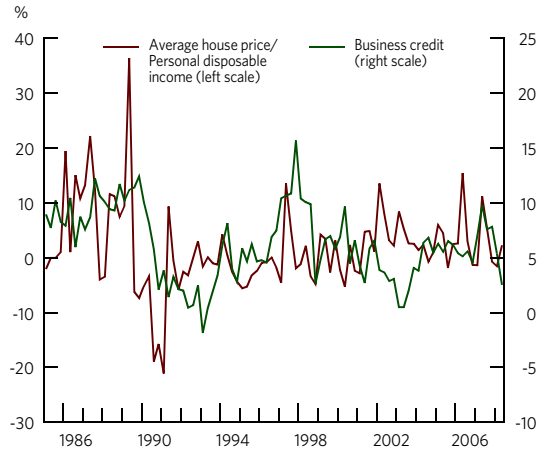
The results in Chart 2 indicate that, although the best forecasting model does generate an increase in the FSI, the magnitude of that increase underestimates the increase in the FSI by a large margin. This is not surprising, given that the increase in stress captured by the FSI was triggered largely by exogenous events (collapse of the U.S. subprime-mortgage market), but analysis of the behaviour of the explanatory variables can provide additional insights.

A look at the two key explanatory variables retained in the best threshold specification (Chart 4) reveals that, while both variables peaked in the second quarter of 2007, neither was close to its historical high. This may be an important contributing factor to the relatively good health of the Canadian financial system and its resilience to date.[6] Of course, the impact of a shock on the system is also a function of the magnitude of the shock, and the peak in the FSI, despite the good health of the system, indicates that this is a large shock by historical standards.

Summary and Further Work

The work described in this report indicates that a broad-based measure of financial stress, such as the FSI, can be a useful indicator of contemporaneous financial stress. Furthermore, the empirical evidence on the role of credit and asset prices in Canada in episodes of financial stress is consistent with historical narratives and the studies that examined this issue internationally.

Chart 4
Explanatory Variables
Annualized quarterly growth rate



The most promising model specifications can be included in the toolkit of early-warning indicators for the Canadian financial system, but the methodologies used to construct the FSI and to forecast it are general and are well suited to any country that exhibits the same characteristics as Canada (very few or no financial crises). A comparative exercise could provide insights into possible commonalities across countries, as well as differences.[7]

It is important to note that our analysis captures only the first-round effects of financial stress. Significant increases in financial stress may result in second-round effects, and may induce regime changes in the real economy.[8] Li and St-Amant (2008) explore this idea in a Canadian context by estimating a threshold in the FSI above which the economy behaves differently. They find that high financial stress regimes tend to be associated with weaker output, higher interest rates, and higher inflation.[9] These findings imply that taking account of the second-round effects is important and should be considered in any exercise that seeks to assess the longer-run consequences of financial stress.

5. The root-mean-squared error (our measure of forecasting performance) for the best non-linear specification is 0.54, which is significantly lower than that for the linear model (0.78). A root-mean-squared error of 1 indicates no improvement relative to the benchmark.

6. Some caution is necessary in drawing conclusions based on real-time data, owing to data revisions. Credit aggregates are periodically revised to include new instruments, but the revised data are not available in real-time exercises. This issue may be of particular importance when dealing with episodes such as the recent one, characterized by strong financial innovation and an emergence of alternative sources and instruments of financing. Some of these are not included in the data. For instance, venture capital and private equity financing (two sources of financing that were very vigorous in the period preceding the 2007 turmoil) are not included in the data. Lending by hedge funds and some asset-backed securities (e.g., commodity-linked notes) are captured either partially or not at all. A recent work by Keshishbanoosy et al. (2008) examines the nature and extent of the revisions in Canadian credit aggregates, and finds that they tend to be revised up in the quarters and years following their first release.

7. In a step in this direction, IMF (2008) introduces FSIs for several countries. Unfortunately, the choice of subcomponents and the method of aggregation deviate from Illing and Liu's recommendations, making direct comparisons difficult.

8. Some papers, e.g., Azariadis and Smith (1998), present theoretical arguments for this. Balke (2000) and Atanasova (2003) present empirical evidence, based on U.S. and U.K. data, respectively, that different degrees of tightness in credit conditions can cause regime changes.

9. For example, the authors find that there is a moderate negative correlation between the FSI today and real GDP growth two years ahead, as well as a moderate positive correlation between today's GDP and the FSI two years ahead. These results suggest the presence of two-way links between financial stress and the economy, but more work is needed to assess their significance.

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Fair Value Accounting and Financial Stability

Éric Chouinard and Peter Youngman

Over the past decade, accounting standards for the valuation of financial instruments have evolved to better reflect the economic reality facing publicly accountable companies. An important change is the measurement of an increasing array of financial assets and liabilities at "fair value," i.e., at the price that knowledgeable and willing parties would pay in an arm's-length transaction at the date of the financial statement.

In principle, this allows for financial statements that are more relevant and more easily comparable across entities. However, since markets are prone to bouts of excessive optimism and pessimism, the use of fair value accounting can affect the economy and the financial system in unintended ways—for example, by reinforcing the peaks and troughs of the economic cycle. While the valuation of financial instruments according to their market value remains an accounting technique that is superior to the alternatives (e.g., historical cost), there is room for improvement in the way changes in value are measured and presented when there are challenges in assessing an instrument's fundamental value.

This report examines some of the implications of fair value accounting for financial stability.

The Rationale for Fair Value Accounting

Accounting information plays a fundamental role in the efficient functioning of a market economy. Financial statements facilitate the allocation of capital throughout the economy by conveying information that helps creditors and investors assess an entity's future profitability. A sustained flow of timely and relevant information also underpins the stability of markets by enhancing transparency about an entity's activities, thereby promoting market discipline.

Of course, if financial statements are to provide an appropriate guide for decision making, it is imperative that they portray the economic reality of an entity's financial position and performance as accurately as possible. Traditional accounting valuation techniques measuring financial instruments at historical cost mask changes in the fundamental economic value of financial instruments.[1] This can make it difficult for users of financial statements to adequately analyze an entity's economic situation, and investors would be expected to demand increased risk premiums as remuneration for this uncertainty.

Historical cost accounting also reduces the comparability of financial statements across entities. For example, suppose that two firms are both holding a certain financial asset. Under historical cost accounting, the accounting value of this asset could be different on the balance sheets of the two firms if they acquired it at different times.

Historical cost accounting can, nonetheless, be appropriate. It is still used in certain situations—for example, for instruments with a fixed maturity that are intended to be held until maturity.

Box 1 describes accounting standards for financial instruments in greater detail.

Fair Value Accounting: Application Issues in Inactive Markets

Fair value is defined as a price agreed upon by a knowledgeable, willing buyer and a knowledgeable, willing seller in an arm's-length transaction. Underlying the concept of fair value is a presumption that an entity is a going concern without any intention or need to liquidate, to materially curtail the scale of its operations, or to undertake a transaction on adverse terms in the context of a distressed sale.

Fair value can be measured in a number of ways. U.S. Generally Accepted Accounting Principles (GAAP) established a

1. Under historical cost accounting, revaluations to align the accounting value of an asset or liability with its market price occur only in certain situations. For example, it occurs when an instrument is part of the trading book of a financial intermediary, or when the holding entity can demonstrate that its value has been altered permanently.

BOX 1

OVERVIEW OF ACCOUNTING STANDARDS FOR FINANCIAL INSTRUMENTS

This box provides an overview of Canadian standards for measuring the value of financial instruments and for disclosing it in financial statements. Canadian standards are broadly similar to those in effect in other jurisdictions, most notably the United States and the approximately 110 countries that have adopted International Financial Reporting Standards (IFRS), a set of global standards developed by the International Accounting Standards Board that Canada will adopt in 2011.

The Canadian Institute of Chartered Accountants (CICA) has adopted a "mixed attributes" model, in which certain instruments are measured at fair value and others at historical cost.[1] The treatment of a financial asset or liability largely depends on how the firm intends to close out its position. If a financial instrument has a fixed maturity, and the firm can demonstrate that it has both the ability and the intention to hold the instrument until it matures, the instrument can appear in financial statements at historical cost, adjusted for payments that have been made or received and amortization of any discount or premiums. However, instruments that the entity actively buys and sells for the purpose of making a profit, or that otherwise cannot be classified as instruments to be held to maturity (e.g., equity investments, because they do not have a fixed maturity date), need to be measured at fair value. An entity also has the option to designate any instrument for measurement at fair value when doing so results in more relevant accounting information. This would be pertinent, for example, when fair value measurement would eliminate or significantly reduce an accounting mismatch that would otherwise arise from measuring assets or liabilities or recognizing the gains and losses on them on a different basis. Entities can also designate an instrument for fair value measurement when its performance is evaluated on a fair value basis in internal financial reports.

Gains and losses resulting from a change in the valuation of financial instruments measured at fair value need to be recognized in the income statement, even though they are not yet realized. Net income will be affected only in the case of financial instruments held for trading, or designated as held for trading under the fair value option. Revaluation gains or losses resulting from available-for-sale instruments are reported outside of net income, in a category labelled "other comprehensive income."

In terms of disclosure, firms need to provide in their financial statements any information that would enable users to evaluate the significance of financial instruments for the entity's financial position and performance, as well as the extent of risks arising from them. Disclosure standards follow a principles-based approach that allows for judgment in determining the level of detail to be disclosed about a particular instrument.[2] That is, firms are encouraged to strike a balance between overburdening financial statements with excessive detail and obscuring significant information with insufficient disclosure. Items that are considered pertinent according to guidance provided by accounting bodies include information about the terms of the financial instruments themselves, and how fair value has been determined. Firms are encouraged to convey information about the reliability of their valuation, so that users of financial statements are better equipped to assess the quality of the reported information.

1. See CICA Handbook, Section 3855 (Financial Instruments—Recognition and Measurement). The equivalent standard in the United States can be found in Sections 157 and 159 of the Statement of Financial Accounting Standards, and, for IFRS countries, in International Accounting Standard 39.
2. The level of detail that is required differs from one jurisdiction to another. For example, U.S. standards are more prescriptive than those in Canada or in IFRS countries.

hierarchy indicating the relative reliability of these measures. Canadian GAAP and International Financial Reporting Standards (IFRS) contain similar concepts.

When a financial instrument is traded on an active market, fair value is a quote from that market—the bid price for an asset held and the offer price for a liability. The Canadian Institute of Chartered Accountants (CICA) considers a financial instrument to be traded in an active market when quoted prices that reflect recent and regularly occurring transactions are readily and regularly available from an intermediary such as an exchange, a dealer/broker, an industry group, a pricing service, or a regulatory agency. Quotes from active markets are labelled "level 1" in the U.S. GAAP hierarchy.

In the absence of reliable and observable quotes from an active market, fair value is measured with a valuation technique. Accountants are directed to employ the valuation technique that makes maximum use of inputs observed in markets, and to rely as little as possible on inputs estimated by the entity. Valuation techniques using recent arm's-length market transactions between knowledgeable, willing parties for instruments that are similar in substance to the one for which they need to establish a value are labelled "level 2."

If such information is not available, fair value can be estimated with a valuation model that reflects how market participants would reasonably be expected to price the instrument. Examples of such models are discounted cash-flow analysis or option-pricing models. Whichever valuation technique is used, it needs to incorporate all the factors that market participants would consider in setting a price, and the model inputs need to objectively represent market expectations of the risk-return factors inherent in pricing the instrument. Valuation techniques based on models using observable inputs are part of the "level 2" category, while those relying heavily on unobservable inputs are labelled "level 3."

It goes without saying that the absence of reliable estimates for the value of a given financial instrument raises significant concerns with respect to the reliability of the financial statements. Fair value can, in fact, lead to informational distortions—and, hence, to suboptimal economic decisions—if the models or observable prices used for measurement are inadequate.

Measurement concerns are particularly important during periods of market stress. There are also measurement concerns in the case of complex instruments that are infrequently traded and for which there is no established valuation technique with a proven track record. Whenever models are used in lieu of observable prices, there is potential for management to introduce bias into the valuation process through judgment.

For investors and other stakeholders to have confidence in the valuation technique used, firms need to demonstrate the credibility of their valuations by disclosing information about their valuation processes and controls.

A review of the financial statements of Canadian banks for fiscal year 2007 revealed that between 27 per cent and 46 per cent of financial assets (Table 1), and between 10 per cent and 36 per cent of financial liabilities (Table 2) were carried at fair value. Differences in the overall use of fair value are related to differences in the scale of activities in capital markets, as well as the use of the fair value option.

Most financial instruments carried at fair value were measured with observable prices (level 1) or with a valuation model using observable inputs (level 2). Instruments measured with models using unobservable inputs (level 3) accounted for a relatively small portion of holdings, but notes to financial statements suggest that losses on these instruments were responsible for a large share of the overall write-downs stemming from declines in market values that were reported by financial institutions.

Tables 1 and 2 indicate that there is considerable variability across Canadian banks in the observability of valuation inputs. Banks that had a higher proportion of instruments valued with non-market observable inputs likely had larger positions in securities and derivatives linked to subprime residential mortgages.

While fair value disclosures improved following the recommendations of the Financial Stability Forum (FSF 2008), there is still room for improvement. Not all quarterly reports of Canadian financial institutions contain the information shown in Tables 1 and 2, and this prevents users of those financial statements from monitoring the use of fair value on an ongoing basis. Certain institutions do not even provide this information in their annual statements. Users of financial statements would also benefit from a more detailed description of the valuation inputs used in each category.

Accounting standard-setters in Canada and in countries that follow IFRS recently proposed improvements to disclosure about financial instruments by requiring that this information be set out in tabular format in annual statements, using the same three-level hierarchy as in the United States. According to this proposal, not only would movements between levels of the fair value hierarchy need to be identified, but the reasoning behind them would also have to be indicated. Moreover, changes in the amount of level 3 instruments will need to be explained.

TABLE 1

Financial Assets Carried at Fair Value for Major Canadian Banks

	BMO	BNS	CIBC	NBC	RBC	TD
Percentage of assets carried at FV	35	27	32	39	46	36
Of which: (%)						
Level 1	65	73	64	n/a	53	34
Level 2	30	27	30	n/a	47	66
Level 3	5	1	6	n/a	<1	1

Source: Estimated from 2007 annual reports

TABLE 2

Financial Liabilities Carried at Fair Value for Major Canadian Banks

	BMO	BNS	CIBC	NBC	RBC	TD
Percentage of liabilities carried at FV	17	10	13	19	36	28
Of which: (%)						
Level 1	n/a	39	35	n/a	20	12
Level 2	n/a	59	55	n/a	80	87
Level 3	n/a	1	11	n/a	<1	1

Source: Estimated from 2007 annual reports

Market Turbulence of 2007–08

Recent events in financial markets revealed some weaknesses and inconsistencies in the application of fair value accounting at financial institutions. As the liquidity of many markets became impaired, there was some uncertainty as to how to adjust valuation techniques. A BIS survey of accounting practices at financial institutions revealed that, in some cases, banks reverted to historical cost to value certain products (Basel Committee 2008). In other cases, they used trading prices for similar instruments or generic credit spreads based on a product's assigned credit rating. Some banks assumed that primary market prices were a good indicator of conditions in secondary markets. Finally, banks also increased their use of models, but the BIS survey found evidence that they took differing views on the reliability of certain inputs.[2]

2. A commonly cited example of the difficulties firms face is the valuation of complex securities linked to subprime residential mortgages. Some banks reportedly adjusted their valuation models to produce valuations in line with the quoted prices on Markit ABX HE indexes. The concern with this practice is that the instruments being valued may not be strictly comparable to the ABX index, and also that the observed price of the ABX index may represent sales in a distressed market.

Policy-makers and industry participants concur, based on their assessment of the recent period of market turmoil, that the way fair value accounting is applied in times of crisis needs to be reassessed (FSF 2008; IIF 2008). Some industry participants are proposing that fair value accounting be discontinued during a crisis. This seems undesirable both because historical cost accounting suffers from more serious shortcomings, and because it would increase investors' skepticism towards financial statements. The Financial Stability Forum and other policy-makers are instead calling on accounting standard-setters to strengthen guidance for applying fair value accounting standards when measurement is challenging (FSF 2008).

In response to the FSF, The International Accounting Standards Board (IASB) formed an advisory panel made up of experts from the financial industry, accounting standard-setters, as well as prudential and securities markets regulators to enhance its guidance on valuing financial instruments when markets are no longer active. The panel, which issued a report in October (IASB 2008), offered guidance on measurement and disclosure issues. The Financial Accounting Standards Board and the Securities and Exchange Commission also gave guidance.

These organizations noted that entities sometimes place undue emphasis on the distinction between active and inactive markets when measuring fair value. They contend that even when markets are inactive, transaction prices often provide the best evidence of fair value. Distress sales and involuntary liquidations are rare, and evidence is needed before determining that a transaction has taken place at a price that is not consistent with fair value. Models may be adjusted to reflect changing market conditions, but only if doing so can better capture fair value. Adjustments that drive measurement away from fair value, for example, for conservatism, are not appropriate.

In terms of disclosure, the guidance calls for more frequent and more detailed disclosure about fair values, including valuation techniques. When non-observable inputs are used, entities should discuss how the alternative inputs would have affected valuation.

Accounting standard-setters have amended IFRS and Canadian GAAP to harmonize them with U.S. GAAP regarding the ability to reclassify financial assets. These changes allow, in rare circumstances, an entity to reclassify non-derivative financial instruments out of the categories for which fair value assessment is required if the entity has the ability and the intention to hold them for the foreseeable future. Since valuation adjustments recognized prior to the reclassification cannot be undone, the accounting value of the instrument at the time the reclassification is conducted will be its new historical cost. The risk that these changes make financial statements less transparent and less relevant for their users is mitigated by enhanced disclosure requirements for entities that reclassify instruments. These include disclosures regarding the circumstances that led to the reclassification and a discussion of the exceptional nature of these circumstances.

Procyclicality in the Financial System: The Role of Fair Value Accounting

Financial agents naturally tend to behave cyclically, taking more risks when economic activity is trending upwards and opting for safety in an economic downturn. When a process reinforces fluctuations in markets and the economy, it is said to be procyclical.

Market participants, regulatory agencies, and central banks are concerned about the procyclicality of fair value accounting. Their main concern is that fair value accounting may create a "feedback loop," whereby declines in asset values reduce regulatory capital, triggering asset sales and declines in lending which, in turn, trigger further declines in asset values. This loop operates in reverse when asset prices are rising, further accentuating booms in credit and asset prices.[3]

3. Recent work by Adrian and Shin (2008) explores this mechanism.

The procyclical nature of fair value accounting is not a concern in normal circumstances, when changes in accounting data simply reflect underlying economic volatility. It can, however, be a concern for financial stability when accounting valuation does not reflect underlying fundamentals. To the extent that asset values reflect overly optimistic or pessimistic estimates of discounted future cash flows at different points in the economic cycle, there is the potential for these price swings to translate into excessive fluctuations in the financial system and in the real economy.

During the recent credit crisis, increased doubts about the valuation of complex products and structured vehicles brought markets in certain asset classes to a virtual halt, with transactions taking place at a discount. These depressed market conditions led to substantial writedowns at financial firms, which responded by tightening credit and liquidating assets, reinforcing the market downturn and, in turn, leading to further writedowns. Fair value accounting, or the way it has been applied, may have been exaggerating losses incurred by those financial firms, thereby exacerbating market unease, stress, and dislocation (IIF 2008).

Recent work by the IMF (2008) highlights the procyclical impact of fair value accounting on the capital ratios of banks, and identifies measures that could mitigate it. The authors demonstrate procyclicality by simulating bank balance sheets over the business cycle under different accounting regimes. When they introduce a liquidity shortage to the model, the procyclicality is amplified when financial instruments are measured at fair value. Potential measures to mitigate procyclicality include expanding the set of liabilities that are marked-to-market and limiting the impact of changes in fair value on the balance sheet via a smoothing mechanism or a circuit breaker.

Applying fair value accounting to liabilities can also offset fair value losses (gains) on the asset side with gains (losses) from changes in an entity's own creditworthiness. However, the practice also gives rise to some counterintuitive outcomes in financial statements (Box 2).

By definition, dampening the impact of changes in fair value on the balance sheet will result in reduced procyclicality of capital. However, if fair value estimates are reliable and relevant for investors, any smoothing technique will obscure valuable information. Thus, the IMF suggests further strengthening of accounting standards to ensure that fair value estimates are as reliable and relevant as possible.

Since the unintended consequences of fair value accounting described here are reinforced by certain practices and policies that tie economic decisions to accounting data, they could be mitigated by not using fair value estimates in a mechanistic fashion. Users of financial statements need to take into account the uncertainty surrounding valuation estimates

BOX 2

TREATMENT OF LIABILITIES

Financial liabilities are subject to the same accounting rules as assets. Liabilities held for trading, such as securities sold short and derivatives with negative replacement value, must be carried at fair value, with gains and losses recognized in net income. Other liabilities would be designated as held to maturity, unless they are designated as held-for-trading under the fair value option. The fair value of liabilities is dependent on many market factors, including the entity's own credit risk. Accounting standards require entities to take into account their own creditworthiness in fair value estimates of liabilities. This means that a financial institution whose creditworthiness has worsened would recognize an income gain as a result of the decline in the market value of its obligations. In the most dramatic case, an insolvent entity might appear solvent as a result of marking to market its own credit risk.

Some observers have questioned whether a decline in the market value of liabilities represents a true change in the entity's financial situation. Indeed, prudential regulators and many market participants remove such gains and losses when assessing an entity's financial position (Basel Committee 2006). However, other observers suggest that applying fair value to liabilities could provide a natural offset to gains and losses from changes in the fair value of assets, thus reducing the volatility of reported earnings and capital (see the main text for details).

During the recent turmoil, many financial institutions reported gains from declines in their own creditworthiness. However, these gains were small compared with the writedowns reported on mortgage-related assets and other assets affected by the market turmoil.

disclosed in the statements. Good disclosure practices can provide users of financial statements with an understanding of the assumptions underlying these estimates, as well as the uncertainty surrounding them. Such information could be just as important for decision-makers as the financial statements themselves. Caution in interpreting fair values is equally important during cyclical upturns as during downturns.

Concluding Remarks

Fair value accounting has the potential to amplify economic cycles, both on the upside and on the downside. Recent events have illustrated that, when markets are temporarily illiquid or when a temporary decline in risk tolerance leads investors to avoid risky assets, regardless of their intrinsic quality, fair value accounting can cause financial statements to paint a picture that does not represent the underlying economic fundamentals of a firm. While the application of fair value accounting needs to be clarified for situations where it is difficult to obtain reliable estimates of market value, it remains a superior method than the alternatives.

The procyclical nature of fair value accounting is more of a consequence of how accounting data influence economic decisions than of how financial statements are prepared. Fair values on financial statements are estimates of prevailing market conditions at one point in time. Recognizing this, policy-makers and market participants alike need the skills to interpret fair value and related disclosures, to assess the uncertainty surrounding these estimates, and to adjust their decision-making frameworks in a transparent fashion.

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The Impact of Sovereign Wealth Funds on the International Financial System

Tamara Gomes [1]

Many emerging-market economies (EMEs) and commodity-exporting nations have recently experienced sustained capital inflows and an accumulation of substantial amounts of foreign exchange reserves. The management of these foreign reserves has increased the importance of a particular set of financial actors: sovereign wealth funds (SWFs). While SWFs have existed in one form or another since the 1950s, their recent rise to prominence has led to increased public scrutiny and debate. Much of this attention is due to the establishment of SWFs by major economies such as China and Russia, which has raised concerns about the role of state actors in global financial markets. In formulating policies for SWFs, the G-7 and G-20 have called on multilateral institutions such as the IMF and the OECD to identify best practices and codes of conduct, while reviewing legislation concerning state-financed cross-border investment.

This report focuses on the potentially stabilizing and destabilizing effects of SWFs on the international financial system. While challenges exist, we conclude that, on balance, SWFs will likely act to stabilize the international financial system. SWFs are long-term investors that can supply liquidity and reduce market volatility.

Stylized Facts on SWFs

Definition, sources, and objectives

There is not, as yet, a commonly accepted definition of sovereign wealth funds. Efforts to incorporate the varying sources, purposes, and management structure into one standard definition often render it unwieldy and vague. Fundamentally, SWFs are large pools of capital owned by sovereign governments. Other definitions stress that these funds are invested in a broad portfolio of risky assets, including equities. A key defining characteristic is that these foreign reserves are managed independently from official reserves. Kimmitt (2008) defines SWFs as "government investment vehicles funded by foreign exchange assets and managed separately from official reserves."[2, 3]

SWFs differ based on the source of their funds and their ultimate policy objectives. Generally, all SWFs are financed by current account surpluses arising from two principal sources: (i) revenues generated by net commodity exports (typically oil); and (ii) revenues generated by a merchandise trade surplus. The largest SWFs are usually designed with one or more policy objectives in mind, including the stabilization of government revenue to smooth planned expenditures; the accumulation of a portion of windfall revenues to benefit future generations; and higher returns on foreign exchange holdings. SWFs can also be used for several ancillary objectives, such as debt repayment, funding for development projects, and exchange rate intervention. Table 1 presents an overview of several major SWFs, including the Alberta Heritage Savings Trust Fund.

Relative size and projected growth rates

In 2007, there were approximately 40 SWFs, 20 of which have been established since 2000 (McCormick 2008). Assets under management of SWFs stood at an estimated US$2 trillion to US$3 trillion, which represented 2.5 per cent of global assets (Jen and Miles 2007).

1. For more detailed analysis, see Gomes (2008).

2. For the remainder of this report, Kimmitt's definition is used.

3. It is important to note that the CPP Investment Board and the Caisse de dépôt et placement du Québec are not included in the definition of SWFs used here because of characteristics that set them apart from SWFs as described above (e.g., they do not manage government money or, as with the Caisse, manage both public and private money). For details on the CPP Investment Board, see CPP Investment Board (2007). However, since the Alberta Heritage Savings Trust Fund is derived from revenues associated with government royalties on oil and natural gas, it is included in the definition used here.

TABLE 1

Overview of Major Sovereign Wealth Funds

SWF: Country and date of establishment	Official name	Size US$ billions (% GDP)	Official reserves US$ billions (% GDP)	Truman score[a]
United Arab Emirates (1976)	Abu Dhabi Investment Authority	875 (324%)	60 (22%)	0.50
Singapore (1981)	Government of Singapore Investment Corporation	330 (171%)	177 (92%)	2.25
Norway (1990)	Government Pension Fund—Global	369 (77%)	50 (10%)	23.00
Kuwait (1953)	Kuwait Investment Authority	264 (165%)	14 (9%)	12.00
China (2007)	China Investment Corporation (CIC)	200 (5%)	1,684 (40%)	-
Russia (2004)	Stabilization Fund of the Russian Federation	192[b] (11%)	555 (31%)	9.50
Singapore (1974)	Temasek Holdings	130 (67%)	177 (92%)	13.50
Qatar (2005)	Qatar Investment Authority	50 (43%)	13 (11%)	2.00
Korea (2005)	Korea Investment Corporation	30 (3%)	258 (27%)	9.00
Canada (1976)	Alberta Heritage Savings Trust Fund	16	-	19.50

a. Truman (2007) compiles a "scoreboard" of major SWFs, ranking them on transparency, governance, accountability, and other measures. The score is based on 25 yes/no questions. A score for the CIC is not available at this time.

b. The Stabilization Fund was split into two separate funds in February 2008: the Reserve Fund and the National Prosperity Fund. This figure represents the sum of both funds.

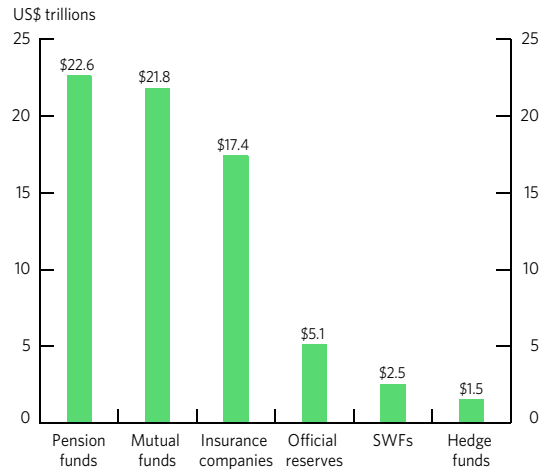
Note: The figures cited here represent the most recently available data; sizes are approximate when not disclosed by authorities. GDP data are IMF estimates for 2008. Reserves data are for 2008Q2, except for China, which is 2008Q1.

Sources: Truman (2007), IMF International Financial Statistics, Ministry of Finance of the Russian Federation, Sovereign Wealth Fund Institute

Chart 1 shows that, while large in size, the assets under management of SWFs are still relatively modest compared with pension funds and mutual funds; they are, however, concentrated in the hands of a few players.

Despite incurring paper losses because of the financial crisis, the assets of SWFs are projected to grow markedly over the next decade or so. Jen and Andreopoulos (2008) estimate that SWFs could grow to as much as US$9.7 trillion by 2015 and will exceed the world's total holdings of official reserves in 2014. Kern (2007) estimates that, over the next decade, the asset allocations of SWF portfolios could lead to a gross capital inflow of over US$3 trillion into global equity markets and US$4.5 trillion into global debt markets.

Chart 1
Relative Sizes of SWFs (2007)



Stabilizing Effects of SWFs

SWFs can prove to be a stabilizing force in several ways. At the country level, they have allowed states to manage capital inflows, while addressing long-run structural issues, thus providing a basis for sustained economic growth in certain EMEs. At the international level, by virtue of their size and long-term investment strategies, SWFs can be liquidity providers and contrarian investors that support global markets in times of financial stress. These aspects are examined below.

Managing capital inflows

SWFs can aid in the macroeconomic management of large current account surpluses. By transferring excess revenues into investment funds, states can alleviate inflationary pressures arising from capital inflows that place upward pressure on nominal exchange rates, thus reducing demand for exports and slowing growth. By investing capital inflows offshore, SWF states can maintain a stable exchange rate in the face of large shocks. However, offshoring capital inflows may become unsustainable or suboptimal, especially when perpetuated indefinitely.

Addressing longer-horizon structural issues

Investing excess revenues strategically can provide SWF states with a means to address structural weaknesses in their economies. Savings funds facilitate intergenerational transfers, allowing future generations to benefit from current favourable economic conditions. Additionally, investing abroad allows SWF states to import knowledge and technical expertise to develop local industries and domestic infrastructure and provide a basis for sustained growth. As such, strategic investment can help SWF states reduce both macroeconomic and financial vulnerabilities that may lead to instability in the future.

Investor profile: Large-scale, long-term investors

One commonly cited advantage of SWFs is that, given their large scale and long investment horizons, they are able to inject liquidity into global capital markets, thereby supplying capital to those who require it. SWFs have an explicit mandate of long-term investment and, thus, can withstand short-term fluctuations, allowing them to act as contrarian investors, investing in times of market distress. This function was clearly exhibited in 2007, when SWFs invested more than $85 billion in financial institutions in developed economies, helping them to recapitalize after incurring substantial losses associated with the U.S. subprime-mortgage market. Moreover, since SWFs are not subject to specific capital requirements, they are less likely to liquidate rapidly when markets deteriorate, thus potentially contributing to financial stability.

Because traditional reserve managers seek to preserve the value of their holdings, reserve assets are typically safe, liquid investments offering low returns. SWFs, however, have a different objective: they aim to earn higher returns on their holdings by diversifying across currencies and asset classes. Most notably, this implies a high allocation towards equities. Depending on the size of the SWF (especially relative to official reserves), this can represent a significant shift and increase in investment earnings.

To secure higher returns, SWFs are effectively accepting a higher level of risk. By diversifying their foreign exchange earnings, SWFs aim to spread the risk in their portfolios across a variety of assets and currencies. Moreover, since SWFs represent an additional source of revenue for governments, this reduces their reliance on any one macroeconomic output (such as oil) at the margin.

Potential Risks to International Financial Stability

While SWFs may provide benefits to the international financial system, they may also present several potential risks.

Triggering "herding" behaviour

With SWFs, large sums of capital are concentrated in the hands of a limited number of major players that have a relatively high tolerance for risk, compared with traditional foreign exchange reserve managers, such as monetary authorities. In the absence of SWFs, these surpluses would be distributed among domestic citizens, who can be assumed to be distributed along a continuum of risk preferences.

The presence of such large players can induce herding behaviour that could lead to a negative outcome, thus reducing market efficiency. The size of the impact depends on the information content of the move and the signal being sent to the smaller traders (Corsetti et al. 2004).

While the possibility of SWFs inducing "herding" behaviour does exist, the risk that they would deliberately seek to destabilize or manipulate markets is minimal. SWFs are typically committed to diversifying their portfolios, rather than investing in one specific asset class.

Lack of transparency, non-economic objectives, and financial protectionism

As Truman (2007) shows, SWFs run the gamut from full, open disclosure and high standards of governance (e.g., Alberta and Norway) to providing little to no information (e.g., the Gulf SWFs), which could raise short-term volatility in markets. In particular, transparency regarding investment objectives is

strikingly absent from many of the major SWFs. This has raised concerns in many policy-making circles that SWFs will be motivated by non-commercial objectives, and thus attempt to invest in sensitive industries that may compromise national and economic security.

Investing for strategic reasons could lead to price distortion if SWFs are willing to pay prices above market value for specific assets, thus undermining market efficiency. Another consideration is the response of states receiving SWF investments. While not a risk inherent to SWFs, some observers are concerned about a protectionist backlash against SWFs that would restrict cross-border investment and slow economic growth. The reaction of Western economies to SWF investment may lead to the adoption of barriers, preventing the free movement of capital. This policy response would not only affect SWFs but might also ensnare other institutional investors, such as national pension funds.

Virtually all countries already have legislation in place that protects national and economic security; additional measures may impede the efficient allocation and free flow of capital, undermining the advances made thus far in liberalizing capital flows.

Conclusion

On balance, SWFs should contribute to stability in the international financial system by facilitating the efficient functioning of international financial markets. Although the risk of politically motivated actions does exist, and non-economic behaviour is always possible, global investment is a repeated game, and SWF states are vulnerable to retaliatory tactics, even if such behaviour leads to suboptimal outcomes.

The OECD and the IMF have encouraged both SWF states and recipient states to engage in open dialogue. The IMF in particular has provided a secretariat for the International Working Group of Sovereign Wealth Funds that have recently agreed on a voluntary set of guiding principles and practices for SWFs. The adoption of best practices and greater transparency regarding investment strategies and risk management would facilitate the efficient allocation of excess savings and encourage the flow of capital to where it is most needed, as well as alleviating any concerns about the non-commercial motivations. Ultimately, the prudent management of SWFs is in the best interests of SWF states. This is an opportunity for developing nations to acquire the financial and human capital required for institutional development and productivity gains, thus promoting domestic and global growth while contributing to the stability of financial markets.

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Policy and Infrastructure Developments

The financial system and all of its various components (institutions, markets, and clearing and settlement systems) are supported by a set of arrangements, including government policies, that influence its structure and facilitate its operation. Taken together, these arrangements form the financial system's infrastructure. Experience has demonstrated that a key determinant of a robust financial system is the extent to which it is underpinned by a solid, well-developed infrastructure. This section of the FSR highlights work in this area, including that related to relevant policy developments.

Introduction

The article, *Liquidity Risk at Banks: Trends and Lessons Learned from the Recent Turmoil,* by Jim Armstrong and Gregory Caldwell, underlines the importance to banks of managing risks to funding liquidity, in the context of the recent turmoil. It points out the unique features of liquidity risk vis-à-vis other major banking risks such as credit risk and market risk. The article reviews some of the major developments in the financial system that altered the nature of liquidity risk leading up to the crisis. It then summarizes some of the lessons learned and the regulatory response as concentrated in the new principles for sound management and supervision of liquidity risk proposed by the Basel Committee. The changing role of central banks in this area is also discussed. ■

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

Jim Armstrong (Bank of Canada) and Gregory Caldwell (Office of the Superintendent of Financial Institutions)

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]

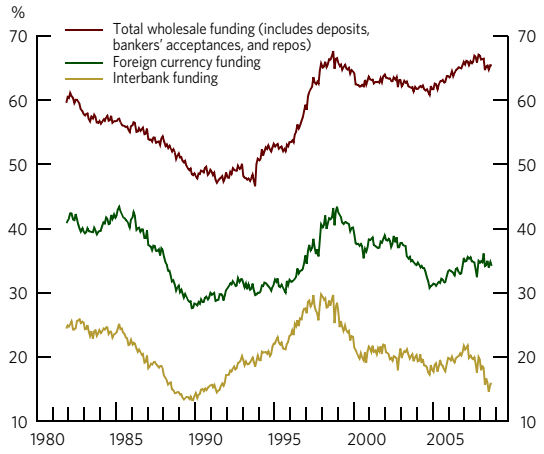
2. The broad categories of financial risk that banks are subject to include credit and counterparty risk, market risk, operational and legal risk, and liquidity risk. See Aaron, Armstrong, and Zelmer (2007) for an overview of these risks and their management at the major Canadian banks.

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.

Chart 1
Wholesale Funding as a Share of Total Funding: Major Banks



Source: OSFI

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]

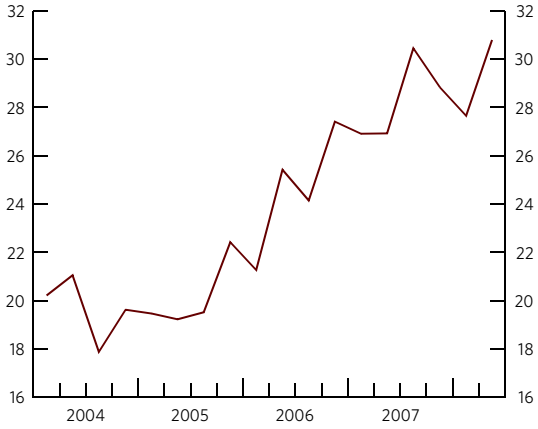
6. On balance, these developments proved manageable for Canadian banks. This was because the Canadian banks were in sound financial condition before the crisis and were able to fund themselves successfully in a range of capital markets. See the June 2008 FSR (pp. 21 and 23) for more detail on these developments.

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.

Chart 2
Pledged Liquid Assets: Six Major Canadian Banks
Percentage of total liquid assets



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 Superintendant 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.

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Research Summaries

Bank of Canada staff undertake research designed to improve overall knowledge and understanding of the Canadian and international financial systems. This work is often pursued from a broad, system-wide perspective that emphasizes linkages across the different parts of the financial system (institutions, markets, and clearing and settlement systems), linkages between the Canadian financial system and the rest of the economy, and linkages to the international environment, including the international financial system. This section summarizes some of the Bank's recent work.

Introduction

In *A Model of Housing Boom and Bust in a Small Open Economy*, Hajime Tomura considers the relationship between expectations-driven boom and bust cycles in house prices and financial market conditions using a model of a small open economy that experiences temporary high income growth of uncertain duration. The model suggests that household expectations of strong future house prices during the high-growth period and the subsequent correction in those expectations at the end of the period can generate a boom and bust cycle in house prices. The model indicates that the supply of credit from international financial markets plays an important role in boom and bust cycles by meeting the strong demand for credit during the boom period. Higher loan-to-value ratios for mortgages amplify the cycles by fuelling mortgage growth during the boom period, which results in more liquidation of housing collateral to service larger mortgage repayments when house prices drop.

Recent events in financial markets have underlined the importance of analyzing the link between the financial health of banks and real economic activity. The second article, *The Role of Bank Capital in the Propagation of Shocks*, by Césaire Meh and Kevin Moran, summarizes their construction of a dynamic general-equilibrium model in which the balance sheets of banks affect the propagation of shocks. The model is used to conduct quantitative experiments on the economy's response to technology and monetary policy shocks, as well as to disturbances originating within the banking sector. The authors find that well-capitalized banks increase an economy's ability to absorb shocks and, in doing so, affect the conduct of monetary policy. The model is also used to shed light on the ongoing debate over the regulation of bank capital.

The final article, *Good Policies or Good Fortune: What Drove the Compression in Emerging-Market Spreads?*, by Philipp Maier and Garima Vasishtha, examines the factors influencing the movements in the yield spreads on emerging-market bonds from 1998 to 2007 for a set of 20 countries. The authors use factor analysis to study the extent to which emerging-market bond spreads are driven by global factors, as opposed to country-specific macroeconomic fundamentals. Using data on different U.S. asset classes, they identify a common factor linked to global financial conditions. They use this factor in a panel-estimation framework to assess its importance, relative to improved macroeconomic fundamentals, in explaining the fall in spreads. They find that the common factor is not responsible for the reduced spreads. Instead, strong macroeconomic fundamentals, including lower inflation and lower debt, enabled emerging markets to attract financing at favourable rates. ■

A Model of Housing Boom and Bust in a Small Open Economy

Hajime Tomura

The recent financial turmoil in the United States has clearly demonstrated that an unexpected decline in house prices following a strong housing boom can destabilize the financial system, causing negative spillovers to the rest of the economy. Given the potentially significant impact of fluctuating house prices on the financial system, it is important for central banks to enhance their understanding of boom and bust cycles in the housing market.

This article summarizes Tomura (2008), which considers a possible relationship between boom and bust cycles in house prices and household expectations of income growth, using a small-open-economy model for the Canadian economy. The model highlights the development of household expectations during a period of high household income growth when households are uncertain about the period's duration. During the high-growth period, uncertainty prompts households to expect that their income growth will continue to be high in the next period with some probability. When the high-growth period ends, however, households correct their expectations. Since house prices reflect household expectations, a boom and bust cycle in house prices emerges. The amplitude of the cycle is found to be dependent on financial market conditions.

Zeira (1999) analyzes a similar scenario for stock market boom and bust cycles, using a partial-equilibrium model with an exogenous real interest rate. Tomura (2008) considers a macroeconomic model incorporating house prices and an endogenous domestic real interest rate, and analyzes the role of financial markets in housing-market dynamics. The model highlights an improvement in the terms of trade as the source of high household income growth, based on Canada's experience in the past decade.

The Model

In the model, the domestic economy (Canada) trades with the rest of the world. The relative price of exports to imports (i.e., the terms of trade) is determined in world markets and is not influenced by the volume of trade that flows in and out of the domestic economy. This assumption reflects the real-world situation, in which the prices of Canadian exports and imports are largely determined by demand and supply in world markets. The model also assumes that the terms of trade improve for an unknown period of time, moving towards a higher but unknown level that will persist in the long run. This assumption is based on the steady improvement in Canada's terms of trade since 2000 and the observation that Canada's terms of trade have occasionally experienced permanent shifts since 1970. The model introduces uncertainty regarding the duration of the transition period, since it is difficult for households to predict exactly when the terms of trade will stabilize at their new long-run level.

An improvement in the terms of trade raises the trading value of the domestic economy's output, and the resulting rise in purchasing power for imported goods increases real household income. Hence, when the terms of trade improve towards a new long-run level, the growth of household income is temporarily accelerated.

In the domestic economy, firms produce goods by employing labour and capital, which are, respectively, supplied and owned by households. The products of domestic firms can be sold domestically or exported abroad. There are two types of households in the economy: homebuyers who finance their housing investments through mortgages, and those who make mortgage loans to the homebuyers. When homebuyers take mortgage loans, they make down payments to satisfy the loan-to-value ratio required by lenders. Homebuyers and lenders can be thought of as young and old households, respectively.

Households can lend and borrow in international financial markets at a given world real interest rate.[1] Thus, international

1. The model simplifies the analysis by abstracting from the role of financial intermediaries in financial markets.

financial markets absorb excess credit supply and demand in the domestic financial market. Households incur a cost to transact in international financial markets. This cost represents various "frictions" that hamper smooth international financial transactions, such as country-specific interest premiums, the cost of complying with financial regulations, and transactions costs across borders.

Main Results

There are two main results. First, in a period of high household income growth driven by improved terms of trade, households expect the high income growth to continue in the next period with some probability, since they do not know exactly when the period of high income growth will end. Current real house prices rise on these expectations, since households anticipate that demand for housing will rise with income. When the period of high income growth ends, however, households correct their expectations, and real house prices drop abruptly.

The second result concerns the role of financial markets in the formation of boom and bust cycles. During the period of high household income growth, the expected high future income lessens the need for households to save to support future consumption. If the cost of access to international financial markets is high, then the shortage in the supply of domestic credit raises the domestic real interest rate so strongly that it offsets the effect of expected high future house prices on current house prices, as illustrated by a simplified house-price equation:

$$\text{Current real house price} = \text{Imputed rent} + \frac{\text{Expected future real house price}}{1 + \text{Real interest rate}}.$$

This equation implies that if the real interest rate moves in concert with expected future house prices, then current house prices become insensitive to expected future house prices. In this case, real house prices rise during the period of high household income growth, since income growth increases housing demand and thus imputed rent, but the correction of household expectations at the end of the high-growth period does not cause a fall in real house prices.

On the other hand, if the cost of access to international financial markets is low, then capital inflows from international financial markets offset the shortage in domestic credit supply. Fluctuations in the domestic real interest rate are consequently attenuated, and current real house prices become sensitive to expected future real house prices. At the same time, the stabilized real interest rate lets household mortgages grow strongly during the housing boom. Mortgage growth becomes even stronger when the loan-to-value ratio in the residential mortgage market is high, since higher loan-to-value ratios allow borrowers to increase their loans when house prices rise. The strong mortgage growth fuels the housing boom while, at the same time, the financial position of households becomes more fragile as leverage increases. This development exacerbates the housing bust, since more housing collateral must be liquidated to service larger mortgage repayments when house prices drop.

With realistic parameter values, the model does not fully explain the typical magnitude of housing-market boom and bust cycles. Thus, the mechanism described above is complementary to other possible contributors to boom and bust cycles in the housing market.

Conclusions

Using a macroeconomic model of a small open economy, the author analyzes a possible linkage between household expectations and housing-market dynamics when the duration of a period of high household income growth is uncertain. The model suggests that financial market conditions that determine the financing cost of mortgage loans and, hence, mortgage growth, play an important role in the linkage. The policy implication of the model is that monitoring joint developments in the real interest rate and in household expectations during housing booms is important in assessing the risk of future housing-market crashes caused by corrections in household expectations.

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The Role of Bank Capital in the Propagation of Shocks

Césaire Meh (Bank of Canada) and Kevin Moran (Université Laval)

The balance sheets of banks worldwide have recently come under stress, as significant asset writedowns led to sizable reductions in bank capital. This appears to have generated a "credit crunch" in countries (such as the United States) where banks cut back on lending and firms found it harder to obtain external financing. This situation raised concerns that economic activity would be undermined. This has boosted interest in a quantitative model of the business cycle that can be used to analyze the interactions between bank capital, bank lending, economic activity, and monetary policy. Most macroeconomic models do not take into account the financial health of financial intermediaries. Meh and Moran (2008) take an important first step in this direction by developing a dynamic general-equilibrium model in which the link between bank capital and macroeconomic performance is significant. The simple model features an endogenous capital-adequacy ratio instead of an exogenous regulatory requirement, and is used to shed light on the ongoing debate on the regulation of bank capital.

Model and Methodology

In our working paper, we develop a monetary macroeconomic model in which the condition of bank balance sheets has important effects on economic outcomes. The model includes several nominal and real frictions, in the spirit of state-of-the-art monetary models, but departs from those in the literature by accounting for the role of bank capital in the amplification and propagation of shocks.

The optimal financial contracting arrangement builds on the theoretical work of Holmstrom and Tirole (1997). Banks intermediate funds between investors/depositors, who are the ultimate lenders, and firms, who are the ultimate borrowers. A key function of banks is to monitor firms on behalf of investors/depositors. The intermediation process is complicated by two sources of moral hazard (owing to asymmetric information): the first affects the relationship between banks and firms, and arises because firms may not exert an optimal level of effort, since effort is costly and not publicly observable. To mitigate this problem, banks can monitor the behaviour of firms and require that they invest their own funds in the projects.

The second source of moral hazard influences the link between banks and investors and stems from the fact that banks, to which investors delegate the monitoring of firms, may not provide the optimal intensity of monitoring, since monitoring is costly and not publicly observable. In response, investors will provide loanable funds only to banks that are well capitalized. All things being equal, higher bank capital lessens the moral hazard problem between banks and investors and increases the ability of banks to attract loanable funds. In addition, raising new bank capital is costly, and this implies that in the short run, bank capital is determined mainly by earnings. In the model, the overall effects of shocks depend on the relative amount of bank capital and on the net worth of firms.

The mechanism through which bank capital affects the propagation of shocks can be illustrated with the following example. A negative shock to aggregate productivity reduces the profitability of firms, making lending to them less attractive. Banks thus find it harder to attract loanable funds from investors. To compensate, they must finance a larger share of investment projects from their own capital, which increases their capital-adequacy ratio. Since bank capital cannot be quickly adjusted in the short run, bank lending decreases significantly, as does aggregate investment. This sets the stage for second-round effects in subsequent periods, in which lower investment leads to lower bank earnings and net worth, further decreasing the bank's ability to attract loanable funds and provide external financing to support economic activity.

Main Findings

Our main findings can be summarized as follows. First, we show that in economies with well-capitalized banks, the economic downturn following a negative shock to productivity is

muted, and banks are better able to provide funding. This moderates the response in aggregate investment and output. In turn, inflationary pressures resulting from adverse shocks are subdued when banks are well capitalized, reducing the response required from monetary authorities. These results support the long-held view that an economy with a well-capitalized banking sector is more resilient to shocks.

Second, we find that sudden exogenous shortages in bank capital have a prolonged negative impact on the real economy. The source of this deterioration in the balance sheets of banks is unspecified but could arise from severe weakness in a specific sector or foreign market where banks are heavily involved.

Third, the model predicts that banks must satisfy market-determined capital-adequacy ratios. Interestingly, whether or not these capital-adequacy ratios are procyclical depends on the source of the shocks. Specifically, after an erosion of bank capital caused by unexpected loan losses, the capital-adequacy ratio decreases (i.e., is procyclical), suggesting a possible motivation for allowing banks to hold less capital in recessions. During such episodes, banks have a greater incentive to monitor because of the scarcity of bank capital. This lessens the moral hazard problem between banks and investors and is reflected in a decline in the capital-adequacy ratio.

After a negative shock to aggregate productivity, however, these capital ratios increase (i.e., are countercyclical), suggesting the need for tighter banking standards in economic downturns. A negative productivity shock decreases overall returns to lending and intensifies the moral hazard problem. Thus, to provide banks with the right incentives for monitoring, investors will lend funds only to banks with higher capital-adequacy ratios.

Policy Discussion

Our simple model does not provide a direct motivation for regulating capital-adequacy ratios. In this model, the market provides the proper level of discipline. If the regulator is viewed as a representative of investors/depositors, however, our results have some bearing on the ongoing debate about regulating capital-adequacy ratios.

A widespread concern about the new capital-adequacy regulation, known as Basel II, is that it might force banks to restrict their lending when the economy is facing a recession and thus worsen economic downturns. Our model sheds some light on this concern and argues that the desirable cyclicality of capital-adequacy ratios depends on the source of economic fluctuations.

The model suggests that regulated capital-adequacy ratios should decrease if the downturn is driven by an unexpected shock to the banking sector, since the market-determined capital-adequacy ratio falls in response to a shock hitting that sector. Imposing Basel II-type regulation would inhibit this response and thus exacerbate the negative effects of the credit crunch on the whole economy.

On the other hand, our analysis suggests that regulatory capital ratios should increase, following aggregate productivity shocks, in agreement with the spirit of Basel II, since the market-determined capital-adequacy ratio rises when an adverse productivity shock hits the economy. Under this interpretation, the regulatory authority may not need to decrease the capital-adequacy requirement even if the banking sector is experiencing difficulties.

Conclusions

Our work makes two key contributions: (i) a macroeconomic model that takes into account real-financial linkages by explicitly modelling the link between bank capital (the health of the banking sector), real activity, and monetary policy; and (ii) the model contributes to financial stability research by clarifying the ongoing debate about the regulation of capital-adequacy ratios.

More generally, this work points to the economic benefits of well-capitalized banks (high capital-adequacy ratios) and to the need for flexibility in capital-adequacy regulation.

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Good Policies or Good Fortune: What Drove the Compression in Emerging-Market Spreads?

Philipp Maier and Garima Vasishtha

Sovereign spreads for emerging markets have fallen considerably over the past five years. In 2007, the EMBI Global Composite declined to the lowest level ever recorded, and even though emerging-market spreads have risen during the recent financial turmoil, they have remained well below their historical averages. It is important to consider whether this relative stability on the part of emerging markets will be sustained.

Two hypotheses have been advanced to explain the compression in emerging-market spreads. First, since the Asian crisis, many countries have strengthened their macroeconomic policy frameworks and have undertaken structural reforms. Consequently, macroeconomic outcomes in terms of growth and inflation have improved greatly, resulting in a reduction in spreads on emerging-market debt. The second explanation, while acknowledging the improvements in macroeconomic policies and outcomes, notes that risk spreads have fallen globally for virtually all asset classes, not just for emerging-market debt. This could indicate that other factors besides country fundamentals are responsible for the sharp fall in risk premiums. Specifically, it has been argued that high prices for energy and non-energy commodities, and favourable global financial conditions—characterized by low interest rates and low volatility in stock markets in advanced economies, as well as an abundant supply of liquidity—have fuelled the compression of spreads. Hence, it has been argued that the compression in spreads on emerging-market debt is primarily driven by exogenous factors, such as changes in the willingness of international investors to hold risky assets.

Against this backdrop, our study (Maier and Vasishtha 2008) examines the factors influencing movements in the yield spreads on emerging-market debt from 1998 to 2007.[1] This issue is addressed in two stages. First, factor analysis is used to examine the degree to which spreads in different asset classes exhibit similar patterns. Second, we use the common factor (computed from the first stage) in a panel framework to analyze the degree to which the narrowing in spreads is driven by better macroeconomic fundamentals.

Methodology

In a seminal work in the literature on lending behaviour in international markets, Edwards (1984) derives the following relationship for sovereign spreads:

$$\log(s_{i,t}) = \alpha_i + \sum_{k=1}^{K} \beta_k X_{k,i,t} + \varepsilon_{i,t} \qquad (1)$$

where $s_{i,t}$ is the yield spread for country i at time t, α_i is an intercept coefficient, β_k denotes the slope coefficients, X_k denotes K macroeconomic fundamentals, and $\varepsilon_{i,t}$ is an i.i.d. error term.

Our aim is to analyze the effect of global conditions, along with macroeconomic fundamentals, on sovereign spreads. To this end, we use factor analysis, a statistical technique used to detect structure in relationships between variables (Tsay 2005). A simple way to think about a principal factor is that it represents a pattern in the data that is observed in all countries or variables over which the principal factor is estimated. We estimate two principal-factor models:

- The first model uses data on different U.S. bond classes. The factor extracted from these series is labelled the "global factor."[2]

1. Our choice of this time period is driven by the availability of data. The sample comprises Argentina, Brazil, Bulgaria, Chile, China, Colombia, Ecuador, Hungary, Malaysia, Mexico, Morocco, Panama, Peru, the Philippines, Poland, Russia, South Africa, Thailand, Turkey, and Venezuela.

2. To compute the "global factor," we use data on investment-grade bonds, high-yield bonds, and bonds rated AAA, AA, A, and BBB (all bond-equivalent yields to maturity).

- The second model uses spread series from individual countries. The factor we extract from these series is labelled the "emerging-market factor."

Having identified these two principal factors, we use them in a panel setting to examine their relevance in explaining the compression in emerging-market spreads. In the most general form, we estimate the following panel specification:

$$\log(EMBI_{i,t}) = \beta_{0,i} + \sum_j \beta_{j,i} PF_{j,t} + \sum_k \beta_k X_{k,i,t} + \sum_l \beta_l Y_{l,t} + \varepsilon_{i,t} \quad (2)$$

where $EMBI_{i,t}$ denotes the $EMBI$ spreads series for country i, and $PF_{j,t}$ denotes the principal factors (the global factor or the emerging-market factor). $X_{k,i,t}$ denotes k country-specific exogenous variables, $Y_{l,t}$ denotes l global variables, and $\varepsilon_{i,t}$ is a normally distributed error term. The country-specific variables used in the estimations include GDP growth, inflation, the ratios of short- and long-term debt to GDP, exports to GDP, reserves to GDP, and the fiscal balance to GDP, etc. The global variables included are oil prices and growth in global GDP.

Results

Results from the factor analysis show that the global factor and the emerging-market factor are quite different. This indicates that spreads for emerging markets reflect distinct developments, suggesting that improvements in the macroeconomic fundamentals in emerging markets may have played an important role in explaining the compression in spreads.

Panel estimations reveal that changes in emerging-market spreads are positively related to the global factor, but the magnitude of the global factor is too small to account for the large compression in spreads. Similar results are found for the emerging-market factor. Our results suggest that the reduction in inflation, but also higher GDP growth, lower long-term debt-to-GDP ratios, and lower budget deficits, are associated with the reduction in spreads. Lastly, we find that oil prices and global GDP growth are also associated with the reduction in spreads, and so are institutional improvements, such as the adoption of inflation targeting.

Our results support the hypothesis that strong macroeconomic fundamentals were a key factor in enabling emerging markets to attract financing at favourable rates. Similar findings are reported for sovereign credit ratings by Butler and Fauver (2006), and for gross debt issuance by Fostel and Kaminsky (2007), although the latter study finds that favourable global economic conditions have started to play an important role since 2003. Our results highlight the importance of macro fundamentals in determining sovereign spreads, which, in turn, provides an explanation as to why the effect of the recent credit market turmoil on emerging-market spreads has been relatively contained.

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