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Financial System Review

December 2010

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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 resilience 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 collaborating with various domestic and international policy-making bodies to develop policy. 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 resilience 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 efforts of the Bank, and other domestic and international regulatory authorities, to mitigate those risks. The focus of this report, therefore, is on providing an assessment of the downside risks rather than on the most likely future path for the financial system. 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, Tiff Macklem, John Murray, Timothy Lane, Jean Boivin and Agathe Côté.

The material in this document is based on information available to 3 December 2010 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 *Review* presents the collective judgment of the Bank of Canada's Governing Council on the main risks and vulnerabilities bearing on the stability of the Canadian financial system. The objective is to raise awareness about these risks and to examine the required policy response.

Introduction

Although the global financial system continues to recover gradually from the unprecedented dislocations experienced in recent years, significant downside risks remain. Market concerns over acute fiscal strains in some euro-area countries have intensified sharply in recent weeks. With the global economic recovery projected to be more modest than previously expected, the process of repairing the international financial system is likely to be protracted, and achieving a sustainable fiscal position will pose a significant challenge for several countries. Moreover, global current account imbalances, which narrowed during the recession, have been widening again with the recovery, creating heightened tensions in currency markets and increasing the risk of a disorderly adjustment. With weaker growth and ongoing deleveraging, interest rates in major advanced economies will likely remain at low levels for a considerable period, potentially creating additional sources of vulnerability in the financial system over time. In light of these fragilities, there remains an elevated risk that global financial stability could be undermined by an adverse feedback loop between weak economic activity, fiscal strains and the financial system.

Although the global financial system continues to recover gradually from the unprecedented dislocations experienced in recent years, significant downside risks remain.

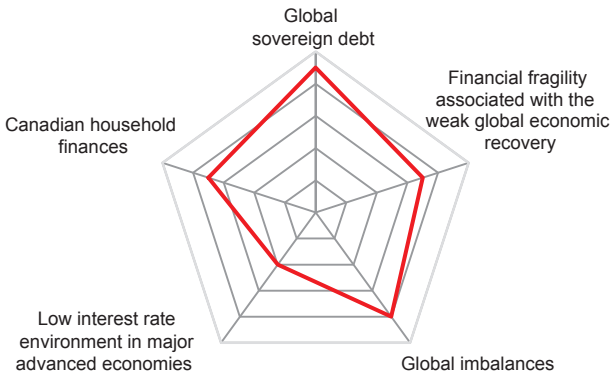
Despite the challenging international macrofinancial environment, the Canadian financial system remains relatively strong, with domestic financial markets functioning well and the capital and liquidity positions of Canada's major banks showing further improvement in recent months. The aggregate financial position of the Canadian non-financial corporate sector is excellent, with considerably lower leverage than in most other advanced economies. The rising indebtedness of Canada's household sector, however, continues to be a source of concern. While the rate of growth of household debt has moderated in recent months, it continues to exceed that of income, deepening the vulnerability of the household sector.

Despite the challenging international macrofinancial environment, the Canadian financial system remains relatively strong.

Risks are elevated and have increased over the past six months.

The Governing Council judges that, even though Canada's financial system is currently on a sound footing, risks are elevated and have increased over the past six months. Four major interconnected sources of risk emanate from the external macrofinancial environment: (i) sovereign debt concerns in several countries; (ii) financial fragility associated with the weak global economic recovery; (iii) global imbalances; and (iv) the potential for excessive risk-taking behaviour arising from a prolonged period of exceptionally low interest rates in major advanced economies. The main domestic source of risk arises from the increasingly stretched financial position of Canadian households, which leaves them more vulnerable to adverse events **(Figure 1)**.

Figure 1: Risk assessment: December 2010



Note: Each rung indicates a perceived risk level: the farther away from the centre, the more elevated the perceived risk.

In characterizing these risks, the Bank has modified the categories used in the past four issues of the *Financial System Review*. In particular, the access of Canadian banks to funding markets and the adequacy of their liquidity and capital positions are no longer judged to constitute significant vulnerabilities—although, if other identified risks materialize, there would likely be an adverse impact on banks' liquidity and capital. Another change in our categorization of risks pertains to the treatment of sovereign risk: given the developments of the past six months, fiscal strains are now identified as a separate source of risk rather than as a factor underlying other risks.[1]

KEY RISKS

Global sovereign debt

Acute fiscal strains in peripheral Europe and weaknesses in the European financial system could reinforce each other and have adverse effects on other countries, including Canada, through several interconnected channels.

The financial strains currently affecting parts of the euro area have provided a stark reminder of the close interlinkages between sovereign risk and the financial sector. Underlying this situation is a combination of short-term refinancing problems, concerns about debt sustainability, and longer-term issues of growth and competitiveness in the affected countries. Their fiscal imbalances are, to varying degrees, a result of pre-existing fiscal weaknesses, the fiscal effects of the recession and the costs of supporting

1 For example, sovereign risk was presented in the June 2010 FSR as an important consideration underlying three other risks: the global outlook, global imbalances, and funding and liquidity.

financial institutions. A key concern is that the acute fiscal strains in peripheral Europe and weaknesses in the European financial system could reinforce each other and have adverse effects on other countries, including Canada, through several interconnected channels.

First, debt problems in peripheral euro-area countries could have important cross-border spillover effects, with banks in other European countries potentially experiencing significant losses, both on direct holdings of peripheral debt and on their domestic loan portfolios as economic conditions deteriorate. These effects would be transmitted to other countries with important economic and financial links to Europe.

Second, concerns over the quality of sovereign debt in countries with severe fiscal strains could lead to heightened perceptions of counterparty risk, even for banks that have only indirect exposure to this debt through their interconnections with other institutions. Global bank funding markets could be severely disrupted as institutions become less willing to extend funding to each other.

Third, these problems could escalate into a generalized retrenchment from risk in the global financial system, with effects on the prices of a wide range of risky assets, including equities, currencies and commodities. In credit markets, such generalized risk aversion could result in increased spreads and reduced access for financial institutions and other private sector borrowers. From Canada's perspective, this third channel of financial transmission would likely be the most important.

In addition to these financial spillovers, market concerns over sovereign debt could force countries to implement fiscal consolidation more rapidly, resulting in slower global economic growth.

While public debt challenges are the most acute in peripheral Europe, many advanced economies have fiscal positions that are not sustainable in the long run. The swift propagation of market stress to financial institutions and other countries has demonstrated the important role of market confidence in the transmission of sovereign risk. At present, dislocations in markets are mainly affecting weaker institutions, and sovereign spreads have increased primarily for those governments that are the most vulnerable. Nonetheless, there is a material risk that fiscal strains could be transmitted to others through a generalized loss of confidence.

Canada's fiscal position is stronger than that of most other advanced economies. Moreover, the domestic financial sector has limited direct exposures to the sovereign debt of peripheral euro-area countries. Nevertheless, as noted earlier, there are a number of potential channels through which the Canadian financial system could be adversely affected by sovereign debt problems elsewhere. Overall, the Bank judges that the risk to the Canadian financial system from global sovereign debt is high and has risen since June.

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Financial fragility associated with the weak global economic recovery

The pace of the economic recovery in Canada and other advanced countries is projected to be more subdued.

As noted in the October issue of the Bank's *Monetary Policy Report*, the global economic recovery is entering a new phase. With the temporary factors that supported growth in advanced economies in 2010—such as pent-up demand and the inventory cycle—having largely run their course, and with fiscal stimulus projected to shift to fiscal consolidation, the pace of the economic recovery in Canada and other advanced countries is projected to be more subdued than was expected last June.

Although banks around the world have made substantial progress in repairing their balance sheets, they remain unusually strained.

Although banks around the world have made substantial progress in repairing their balance sheets, they remain unusually strained. Some of their principal challenges stem from the current macroeconomic environment. In particular, the outlook for banks in Europe and the United States is clouded by continued weakness in the labour and real estate markets. Both residential and commercial property markets are affected by high refinancing risk, owing to elevated loan-to-value ratios.[2] As discussed in the preceding section, public debt levels also represent a significant vulnerability. Furthermore, the global banking sector faces significant refinancing risk, given the large stock of debt maturing over the next two years. While, to some extent, low interest rates and steep yield curves help financial institutions fund their maturing debt relatively cheaply, investor confidence remains volatile. Risk premiums could increase significantly in reaction to concerns over the weaker macroeconomic environment, and the unusual vulnerability of the global financial system could be prolonged.

The relatively strong position of the Canadian financial sector suggests that its ability to withstand a shock is greater than that of most other jurisdictions. Nonetheless, the potential for domestic markets and institutions to be adversely affected by international conditions is elevated.

Risks arising from the financial fragility associated with a weak global economic recovery have increased since June and are elevated.

Overall, the Bank judges that risks arising from the financial fragility associated with a weak global economic recovery have increased since June and are elevated. A more modest global economic recovery could further delay the improvement in the international financial sector and the pace of structural adjustments.

Global imbalances

Global current account imbalances have widened again in recent quarters.

Although global current account imbalances narrowed considerably during the recession, they have widened again in recent quarters. Such large imbalances cannot persist indefinitely; the more they grow, the greater the magnitude of the future adjustment required to resolve them. In the event of a disorderly resolution—characterized by a sharp adjustment in exchange rates and risk premiums for a wide range of assets—there could be major stresses on financial institutions, particularly those with imperfectly hedged cross-border exposures and funding strategies. Investors with exposures to cross-border carry trades could also experience losses arising from sharp fluctuations in exchange rates.

2 In the United States, there is also a high rate of default on restructured mortgages as well as a potentially large pent-up supply of properties resulting from delinquent mortgages.

Resolving global imbalances requires that the United States and other deficit countries boost domestic saving in a timely and sustained manner. At the same time, surplus economies—particularly the emerging economies of Asia—need to undertake structural reforms to bolster internal sources of growth in order to reduce their reliance on external demand. A transition towards more flexibility in exchange rates is an essential part of the solution, since it would facilitate a durable and orderly narrowing of current external disequilibria and provide greater resilience to future shocks.

Leaders of the G-20 countries have committed to implement policies consistent with these objectives. Most recently, at the Seoul Summit in November, they agreed to strengthen multilateral co-operation to promote external sustainability. In particular, they committed to enhance the G-20 Mutual Assessment Process through the development of guidelines for the timely identification of persistently large external imbalances, and also agreed to assess the nature of such imbalances, as well as the root causes of the factors impeding adjustment.

While these commitments are welcome, the adjustments necessary to resolve global imbalances have not yet been implemented. For example, the rise in the private sector savings rate in the United States has been more than offset by the growing fiscal deficit. Moreover, while Chinese authorities announced in June 2010 that they would introduce greater flexibility in the exchange rate—allowing the renminbi to appreciate—it has, in fact, depreciated in real effective terms since then.

The necessary adjustments to resolve global imbalances have not yet been implemented.

Capital inflows towards emerging-market economies have rebounded since the middle of 2009, putting upward pressure on the currency of recipient economies and raising concerns about their potential to contribute to excessive credit growth and asset-price bubbles in local markets. In particular, net inflows to equity and bond funds that invest in emerging markets have picked up in recent months. A number of countries have intervened in foreign exchange markets to counter upward pressure on their currencies, and some have tightened controls on capital inflows. It is estimated that countries whose currencies account for roughly half of the U.S. real effective exchange rate have taken measures to resist real exchange rate appreciation in the past year. Since June, there have been significant geopolitical tensions over external imbalances, focused to a large extent on possible spillover effects from exchange rate and monetary policies. The risk of real and financial protectionism has increased. Thwarting adjustment will only exacerbate the buildup of imbalances, ultimately requiring a larger adjustment and increasing the risk of a disorderly resolution.

Thwarting adjustment will only exacerbate the buildup of imbalances, ultimately requiring a larger adjustment and increasing the risk of a disorderly resolution.

Overall, the Bank judges that the risk of market turmoil resulting from global imbalances is high and has risen since June. Heightened tensions in currency markets and related risks associated with global imbalances could result in a more protracted and difficult global recovery, causing further stress in the financial system.

The risk of market turmoil resulting from global imbalances is high and has risen since June.

Low interest rate environment in major advanced economies

A long period of very low interest rates may be associated with excessive credit creation and undue risk-taking as investors seek higher returns.

Interest rates are at extraordinarily low levels in the major advanced economies, and markets are pricing in the likelihood that this will continue for an extended period. While stimulative monetary policy is needed to support the global economic recovery, experience suggests that a long period of very low interest rates may be associated with excessive credit creation and undue risk-taking as investors seek higher returns, leading to the underpricing of risk and unsustainable increases in asset prices. The record issuance of high-yield debt securities in the United States, the rebound of capital flows into emerging-market economies and the popularity of commodity exchange-traded funds in recent quarters all suggest that global investors have indeed been seeking to enhance their returns by increasing investment in riskier assets.

Institutional investors with liabilities having a duration exceeding that of their assets, such as life insurance companies and defined-benefit pension plans, are particularly affected by a sustained period of low interest rates. In this environment, the combination of upward pressure on the actuarial value of contractual liabilities and reduced yields on assets is likely to put pressure on the balance sheets of these entities, and potentially encourage risk-taking behaviour as these institutions strive to achieve the minimum returns they have guaranteed to policyholders and beneficiaries.

Given the low cost of rolling over and extending weak and impaired credits, expectations of a sustained period of very low interest rates may also reduce incentives for financial institutions to repair their balance sheets in a timely manner. In particular, there are concerns that extraordinarily low interest rates may allow banks to exercise forbearance by revising repayment terms for borrowers in difficulty. Banks with weak capital positions may have incentives to follow such a practice, since writing off impaired loans erodes capital.

The influence of sustained low interest rates in major advanced economies on risk-taking behaviour is a powerful dynamic that bears watching. The risk of this environment jeopardizing financial stability in Canada in the near term is moderate.

The influence of sustained low interest rates in major advanced economies on risk-taking behaviour is a powerful dynamic that bears watching. While the Bank judges that the risk of this environment jeopardizing financial stability in Canada in the near term is moderate, careful monitoring of risk-taking is essential so that any resulting buildup of financial imbalances can be identified early.

Canadian household finances

The proportion of households with stretched financial positions that leave them vulnerable to an adverse shock has grown significantly in recent years.

In Canada, household credit has continued to expand rapidly during the recession and the early stages of the recovery. While this expansion—in contrast with the experience in previous downturns and in other advanced economies—is in part a testament to the resilience of Canada's financial system, it is also an important source of risk. The proportion of households with stretched financial positions that leave them vulnerable to an adverse shock has grown significantly in recent years, as the growth rate of debt has outpaced that of disposable income. The risk is that a shock to economic conditions could be transmitted to the broader financial system through a deterioration in the credit quality of loans to households. This would prompt a tightening of credit conditions

that could trigger a mutually reinforcing deterioration of real activity and financial stability.

Developments since the June FSR suggest that the vulnerability of the Canadian household sector has increased. In some regions, lower house prices weigh on personal wealth levels. Moreover, while there are signs of moderation in the pace of debt accumulation by households, their credit continues to grow faster than income. Without a significant change in behaviour, the proportion of households that would be susceptible to serious financial stress from an adverse shock will continue to grow.

While there are signs of moderation in the pace of debt accumulation by households, their credit continues to grow faster than income.

The probability of an adverse labour market shock materializing is judged to have edged higher in recent months, owing to the downward revision in the October *Monetary Policy Report* to the outlook for the global and Canadian economies. The Bank has conducted a partial stress-testing simulation to estimate the impact on household balance sheets of a hypothetical labour market shock that would increase the unemployment rate by 3 percentage points. The results suggest that the associated rise in financial stress among households would double the proportion of loans that are in arrears three months or more. Owing to the declining affordability of housing and the increasingly stretched financial positions of households, the probability of a negative shock to property prices has risen as well.

The Bank judges that, overall, the risk of a system-wide disturbance arising from financial stress in the household sector is elevated and has edged higher since June. This vulnerability is unlikely to decline quickly, given projections of subdued growth in income.

The risk of a system-wide disturbance arising from financial stress in the household sector is elevated and has edged higher since June.

POLICY ACTIONS AND ASSESSMENT

The Governing Council judges that the probability of an adverse shock that could compromise the stability of the Canadian financial system remains significant even though the domestic financial sector is currently on a solid footing. The overall level of risk has increased since June. Concerns arise from the combination of fiscal strains in many advanced economies, the continued fragility of the international financial sector associated with a slow and uneven global recovery, global imbalances, and the rising vulnerability of Canadian households to adverse shocks. The behaviour of market participants in the current environment of low interest rates in the major advanced economies is an emerging source of vulnerability. A sustained search for higher returns without appropriate attention to the associated risks might lay the foundation for a further buildup of financial imbalances.

It is essential that all governments continue to take steps to stabilize and ultimately reduce public debt ratios. Commitments from G-20 leaders recognize the need for both medium-term fiscal sustainability and carefully chosen timelines for implementation so as not to impede the recovery. Most governments have already announced plans for consolidation. To reinforce credibility, they need to take concrete measures consistent with these pre-announced plans. Within Europe, international financial support, provided in particular through the European Financial Stability Facility and the International Monetary Fund (IMF), will enable

It is essential that all governments continue to take steps to stabilize and ultimately reduce public debt ratios.

countries with acute sovereign debt challenges to undertake fiscal consolidation in an orderly manner and in a suitable time frame. Consideration should be given to enhancing these programs if necessary.

Progress is needed at the international level to address outstanding problems stemming from the crisis.

To put global financial stability on a firmer footing, progress is needed at the international level to address outstanding problems stemming from the crisis and fully restore confidence in the banking sector. For example, according to estimates from the International Monetary Fund, about one-quarter of the required writedowns and loss provisions on impaired assets have yet to be realized. There is also a significant concentration of bank debt maturing over the next 24 months, suggesting that near-term bank funding pressures in global markets will remain high. Continued focus is required to address weaknesses, and consideration should be given to targeted capital enhancements where necessary.

Firm implementation of the G-20 commitments to co-operate in resolving global imbalances is essential.

Firm implementation of the G-20 commitments to co-operate in promoting an orderly, timely and sustained resolution of global imbalances is essential. Market-oriented exchange rates that reflect underlying economic fundamentals are needed to facilitate this adjustment and strengthen the resilience of economies to shocks. Surplus economies also need to undertake reforms to bolster self-sustaining domestic sources of growth—thereby reducing their reliance on external demand—while deficit countries need to boost national savings. While many surplus countries may prefer a slower pace of reform for near-term domestic reasons, greater flexibility is required to sustain their own economic recoveries, as well as a more stable international macrofinancial environment, of which they are an important, and growing, part.

The substantial strengthening of global capital and liquidity standards endorsed by G-20 leaders represents an important milestone towards a more resilient banking system.

To safeguard financial stability over the medium term, the regulatory reform agenda established by G-20 leaders must be implemented within an appropriate time frame. The recent agreements reached by the Group of Governors and Heads of Supervision to strengthen international capital requirements for banks and to introduce new global standards for bank liquidity are a significant development in this regard. This substantial strengthening of global capital and liquidity standards was endorsed by G-20 leaders at the Seoul Summit and represents an important milestone towards a more resilient banking system. The enhanced standards will be phased in over time so that banks can support the economic recovery while moving towards the higher requirements. The benefits will therefore build over time. An important immediate benefit of the agreement is that it alleviated some of the uncertainty around the future regulatory regime. Uncertainty will be reduced further as authorities continue their efforts to finalize other components of the global reform agenda. The agreed reforms to make the banking system more resilient are outlined in **Box 1**.

Reducing the likelihood and consequences of future periods of turmoil also requires a policy response that gives appropriate emphasis to managing systemic risks over the cycle and across institutions, complemented by structural measures to contain the propagation of risk across the system. Actions to establish a more resilient financial market infrastructure are particularly important in this regard. This issue of the FSR includes four reports exploring

policy initiatives that are consistent with these objectives. They examine countercyclical capital buffers, the infrastructure for over-the-counter derivatives markets, the use of central counterparties, as well as contingent capital and bail-in debt securities.

In Canada, the deteriorating financial position of the household sector also requires vigilance. Important measures were announced by the Government of Canada in February 2010 to strengthen underwriting practices for government-backed insured mortgages. These measures included a reduction in the maximum loan-to-value ratio of refinanced mortgages, a higher minimum down payment on properties not occupied by the owner, as well as a more stringent qualifying test that requires all borrowers to meet the standards for a 5-year fixed-rate mortgage, even if they are applying for a mortgage with a variable rate and/or a lesser term. These measures are now starting to have an impact. When taking on debt, households bear ultimate responsibility for ensuring that they will be able to service that debt in the future. It is also essential that financial institutions actively monitor the risk surrounding households' ability to service their debt over time, taking into account the macroeconomic outlook. Authorities are co-operating closely and will continue to monitor the financial situation of the household sector.

Important measures taken by the Government of Canada to strengthen underwriting practices for government-backed insured mortgages are now starting to have an impact.

Box 1

Global Reforms: Making the Banking Sector More Resilient

In response to a G-20 commitment, the Governors and Heads of Supervision (GHOS), the governing body of the Basel Committee on Banking Supervision (BCBS), agreed in July and September 2010 to several measures for strengthening capital and liquidity regulation.[1] This agreement, endorsed by G-20 leaders in November at the Seoul Summit, is expected to bolster the resilience of the international financial sector and to produce considerable net benefits for the global economy.

In summary, capital reforms will raise the quality, consistency and transparency of the capital base, as well as increasing the minimum level of common equity that banks will be required to hold. Reforms incorporate a capital conservation buffer above the minimum requirement that can be used to absorb losses during periods of stress. An important novel element of the new capital framework is the introduction of a discretionary countercyclical capital buffer. Requiring banks to build a capital buffer above the regulatory minimum in periods of excessive credit growth, and allowing them to draw down this buffer when the cycle turns, will mitigate the tendency of bank capital regulation to amplify movements in lending conditions and the real economy.

Taken together, these reforms to capital requirements will bring an important reduction in system-wide risk. In addition to raising the quality of the capital base, the BCBS has improved the risk coverage of the regulatory framework to better capture some significant risks. In particular, the rules governing capital requirements for trading-book exposures, complex securitizations, and exposures to off-balance-sheet vehicles have been substantially strengthened. An additional element in the regulatory capital framework is a leverage ratio that will serve as a backstop to the risk-based capital requirement. A regulatory leverage limit is already in place in Canada, and evidence suggests that it played a role in limiting the buildup of imbalances in the domestic banking sector in the period leading up to the crisis.

The BCBS has also agreed to new global liquidity standards that will make banks more resilient to short-term disruptions in access to funding and will address longer-term structural mismatches of liquidity on their balance sheets. These standards include a measure to ensure that banks have enough liquid assets to cover their commitments over a 30-day period following a liquidity shock (the liquidity-coverage ratio). This ratio will be

(continued)

1 The measures are outlined in <http://www.bis.org/press/p100726.htm> and <http://www.bis.org/press/p100912.htm>.

Box 1 (continued)

Global Reforms: Making the Banking Sector More Resilient

underpinned by another that focuses on the longer-term structure of bank funding, with the goal of ensuring adequate stable funding for long-term assets (the net stable funding ratio (NSFR)).

The timeline for implementing the capital reforms was designed to ensure that the banking sector can meet the higher capital standards through earnings retention and reasonable levels of capital raising, while still supporting lending to the economy. The standards will be phased in beginning in January 2013. The agreement calls for implementation of the reforms to be completed by 2019. National authorities have the discretion to impose shorter transition periods where appropriate. Given limited experience with liquidity standards in complex financial systems, the BCBS is taking a carefully considered approach to the design and implementation of these standards. After an observation period beginning in 2011, during which time the ratios will be monitored, the liquidity-coverage ratio will be formally introduced on 1 January 2015. The revised net stable funding ratio will move to a minimum standard by 1 January 2018. In Canada, reforms pertaining to the adequacy of both capital and liquidity will be overseen by the Office of the Superintendent of Financial Institutions.

In August 2010, the Financial Stability Board and the BCBS published assessments of the potential macroeconomic costs and benefits of enhanced capital and liquidity requirements for the banking sector.[2] At the same time, the Bank of Canada published a summary of the costs and benefits for the Canadian economy.[3] The results for Canada, which are broadly in line with the international results, suggest that increases in the required level of capital and liquidity in the banking sector will have substantial macroeconomic benefits: for example, the incidence of financial crises would be lower and their severity reduced. The economy would also benefit from smoother economic cycles and a lower risk that resources are misallocated. Given the scale of potential losses in the event of a crisis, the potential economic benefits of stronger capital and liquidity standards are clearly significant. These benefits are offset to only a limited extent by wider lending spreads as banks pass on to their customers some of the higher costs of carrying more capital and liquid assets. On the conservative assumption that these costs are fully passed on, a representative 2-percentage-point increase in capital requirements, in conjunction with the new liquidity standards, would widen lending spreads by approximately 42 basis points. On balance, the benefits of stronger capital and liquidity requirements are judged to be substantial on a net present-value basis, amounting to roughly 13 per cent of GDP, or $200 billion in the Canadian context.

2 For more information, see the interim report of the Macroeconomic Assessment Group at <http://www.bis.org/publ/othp10.htm> and the report on the long-term impact of enhanced standards at <http://www.bis.org/publ/bcbs173.htm>.

3 The Bank's assessment of the impact of enhanced global standards on the Canadian economy is available at <http://www.bankofcanada.ca/en/publication/strengthening.html>.

The Macrofinancial Environment

This section of the *Review* provides an assessment of macrofinancial conditions to support the evaluation of the key risks and vulnerabilities for Canadian financial stability outlined in the preceding section. It begins by exploring the global economic context before focusing on trends and issues in international and Canadian financial markets and institutions, as well as the financial position of Canadian households and businesses.

GLOBAL ECONOMY

As outlined in the Bank's October *Monetary Policy Report*, the global economic recovery is entering a new phase, with a weaker growth profile that reflects the broad forces of household and bank deleveraging, as well as the fiscal consolidation taking place in several advanced economies. The recovery is projected to remain uneven across regions, with demand continuing to grow at an unusually modest pace in advanced economies relative to emerging-market economies. After narrowing during the crisis, global imbalances have begun to grow again in recent quarters, with both the U.S. current account deficit and the Chinese trade surplus increasing.

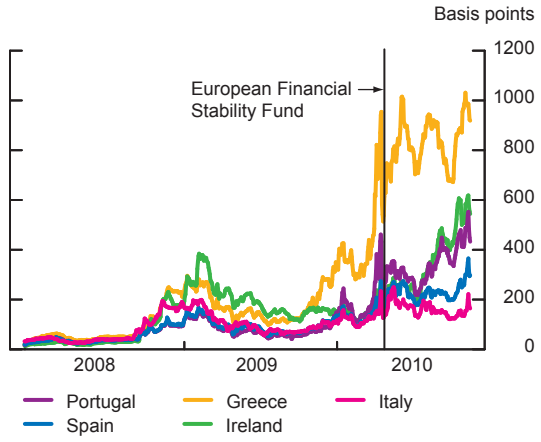
In the context of the weaker macroeconomic outlook, the fiscal situation in a number of advanced countries remains a significant source of vulnerability as a result of high debt levels and, in some cases, substantial concentrations of maturing debt to be refinanced, weak growth and dislocations in financial markets. Financial market indicators of sovereign credit risk have increased in recent weeks, particularly for some peripheral European countries **(Chart 1)**.

Private capital flows to emerging-market economies rebounded in recent quarters, largely because of their stronger economic prospects and resulting higher returns on financial assets, compared with advanced economies. These inflows have caused emerging-market currency indexes to appreciate **(Chart 2)**. In response, authorities in a number of countries have taken measures to limit capital inflows and/or have substantially increased foreign exchange intervention. Since foreign exchange reserves are composed primarily of debt issued by governments in the advanced economies, the accumulation of reserves by emerging-market economies has to some extent reinforced interest rate differentials, putting further upward pressure on their currencies.

Most commodity prices have risen significantly since June. While this is partly the result of strong demand from emerging-market economies, anecdotal evidence suggests that heightened

Chart 1: Indicators of sovereign risk have increased for some peripheral European countries in recent weeks

Spreads on 5-year sovereign credit default swaps

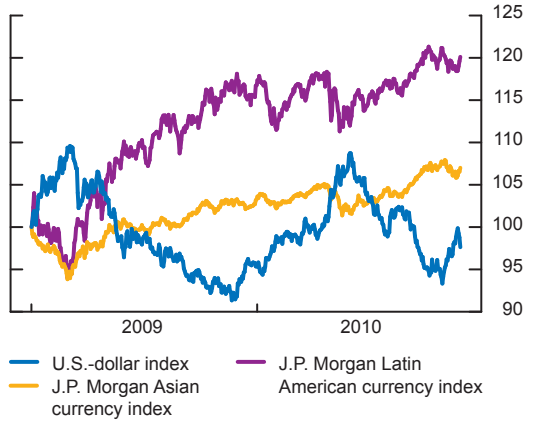


Source: Markit

Last observation: 3 December 2010

Chart 2: The currencies of several EMEs have appreciated in recent months

Indexes (January 2009 = 100)



Source: Bloomberg

Last observation: 3 December 2010

demand from investors seeking greater returns in an environment of low interest rates and high liquidity is also playing a role. For example, investors have been turning to commodity-linked exchange-traded funds. In cases where the portfolios underlying these funds are composed of the physical commodities themselves, investor demand has contributed directly to higher prices in commodity markets; in other cases, the influence operates more indirectly, via the futures markets.

Financial markets

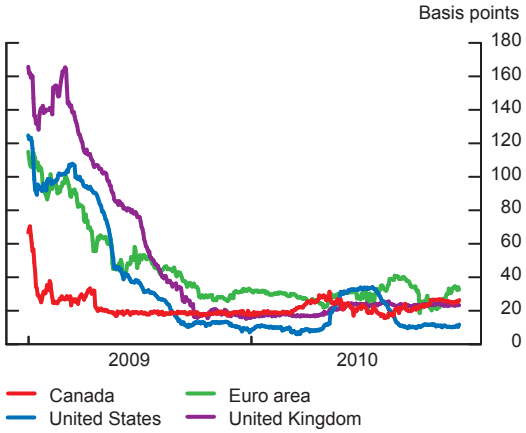
There have been two broad themes in financial markets since the June FSR. First, since yields on long-term government bonds remain at very low levels in the major advanced economies—and particularly as the recovery in these countries is projected to be more modest—there has been mounting evidence that investors are turning increasingly to riskier assets in search of higher returns. A second theme has been the recurring stresses associated with the state of the banking sectors and fiscal situations of several European countries. After a period of relative calm over the summer, there has been a resurgence of tensions in euro-area financial markets in recent weeks, with government bond yields rising sharply in several countries.

Money markets

As the focus on fiscal strains in Ireland and some southern European countries intensified in early November, pressures in short-term bank funding markets in the euro area have re-emerged, particularly for funding in U.S. dollars. In contrast with the broad-based dislocations in euro-area funding markets experienced last spring, financing conditions have thus far been constrained mainly for financial institutions with weaker fundamentals. Bank funding markets in other jurisdictions are generally functioning well **(Chart 3)**.

Chart 3: Outside the euro area, short-term bank funding markets are functioning well

Spreads between 3-month interbank offered rates[a] and overnight index swaps



a. For the United States and the United Kingdom, LIBOR; for the Euro area, EURIBOR; and for Canada, CDOR

Source: Bloomberg Last observation: 3 December 2010

Canadian short-term funding markets were largely unaffected by last spring's turmoil in global funding markets and have continued to function well in the most recent episode of market turbulence, with the spread between the Canadian Dealer Offered Rate (CDOR) and the rate for 90-day overnight index swaps (OIS) essentially unchanged. Moreover, anecdotal evidence suggests that investor demand for money market instruments remains strong.

Nevertheless, both Canadian and international funding markets remain susceptible to the re-emergence of widespread tensions under certain adverse scenarios, given the challenges faced by the global banking sector and the continued fragility of some institutions abroad.

Corporate debt markets

Corporate debt markets around the world continue to be supported by strong investor demand for fixed-income instruments, including from less-traditional sources (such as equity investors, households and leveraged funds). This has contributed to improved liquidity in secondary markets, as evidenced by a tightening in corporate spreads and an increase in trading volumes.

The current environment has supported elevated corporate bond issuance across the credit spectrum **(Chart 4)**. In particular, issuance of U.S.-dollar high-yield debt has reached a historic high. The search for yield has also supported increased issuance of securities with longer maturities, especially in the most recent period.[1] Owing partly to the relative strength of Canada's banking, corporate and government sectors, demand by foreign investors for Canadian debt securities remains robust.[2] A number of Canadian issuers, including some banks and provincial governments, have taken advantage of this strong international demand for Canadian debt products by accessing markets outside Canada.

Not surprisingly, given the strength of demand, credit spreads have tightened further in Canada and in other key developed markets, although they generally remain above historical averages **(Chart 5)**.[3] Assuming a 40 per cent recovery rate, the current spreads on North American indexes for corporate credit default swaps (CDS) imply a default rate for the next five years of 1.50 per cent per year for investment-grade issuers and 5.25 per cent per year for high-yield issuers. Based on historical data, these implied default rates, although well below the peaks reached in previous recessions, are higher than the average realized default rates.[4] Overall, this suggests that current pricing in corporate bond markets is consistent with expectations of a modest economic recovery in industrialized economies.

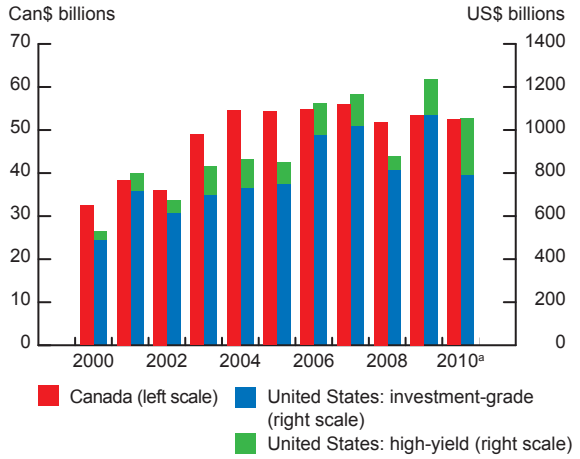
Equity markets

Global equity markets have rallied since the setback experienced in the spring **(Chart 6)**. Consistent with the uneven pattern of global demand, equity indexes in emerging-market economies have risen more than those in advanced economies. Equity prices generally remain below their 2007 levels—in some cases substantially so.

While past economic cycles were characterized by a rapid increase in the ratio of equity prices to realized earnings following the end of a recession, this is currently not the case.[5] This difference can be explained by the lower drop in overall corporate earnings in the recent recession compared with previous economic downturns in Canada and the United States. In addition, expectations of a more modest recovery compared with past cycles may weigh on the prospects for the future appreciation of prices. Although corporate earnings increased markedly over the past year and, according to private sector consensus forecasts,

Chart 4: Strong investor demand has supported corporate debt issuance, particularly of high-yield securities

Gross issuance

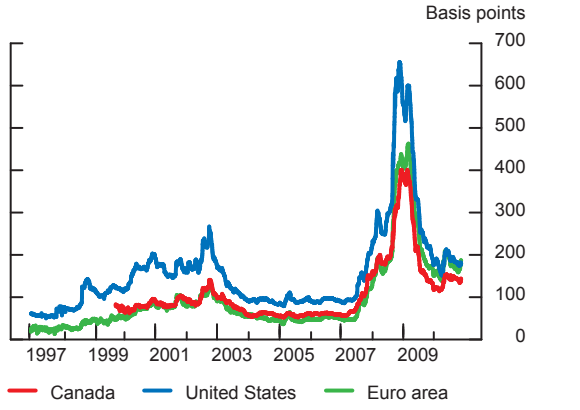


a. Year-to-date values

Sources: Bank of Canada and Bloomberg

Last observation: October 2010 for Canadian data; November 2010 for U.S. data

Chart 5: Spreads on investment-grade corporate bonds remain above historical averages

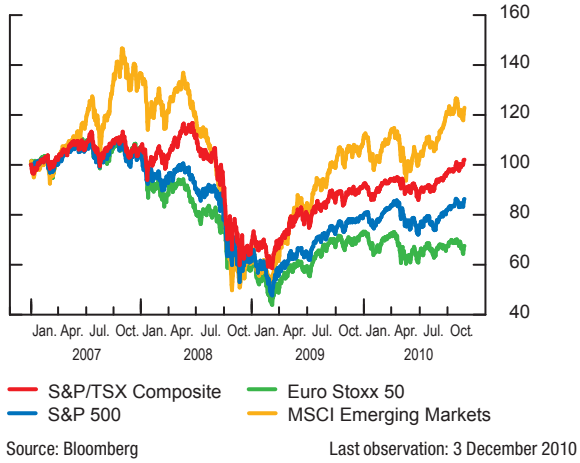


Source: Bank of America Merrill Lynch

Last observation: 3 December 2010

Chart 6: After experiencing a setback last spring, global equity markets have resumed their recovery

Equity indexes (January 2007 = 100)



Source: Bloomberg

Last observation: 3 December 2010

1 For instance, 45 per cent of total corporate debt issued in the Canadian market in the third quarter had a maturity of 5 to 10 years, and 9 per cent a maturity of 30 years or more, compared with averages of 32 per cent and 3 per cent, respectively, since 1999.

2 Statistics Canada data show that, in the 12-month period ending in September 2010, non-resident investors purchased $105 billion in bonds in Canadian markets, compared with $43 billion over the same period in 2009.

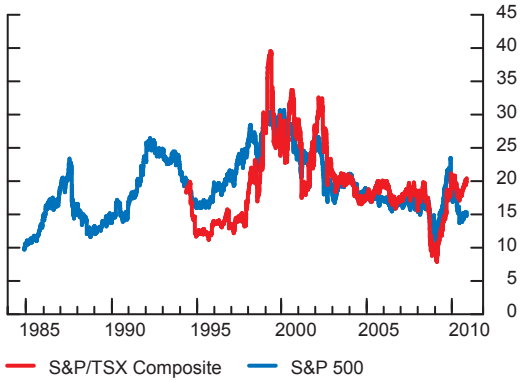
3 While corporate spreads in Canada and the euro area are above their levels from the early 2000s, U.S. spreads are somewhat lower, particularly for high-yield investors.

4 Default rates for high-yield issuers have peaked at about 12 per cent during every recession since 1990, and the average default rate since the 1980s has been 4.5 per cent. Moody's reports that, for the period from 1989 to 2009, the average cumulative default rate over a five-year window was 0.9 per cent for Canadian investment-grade issuers and 1 per cent for U.S. investment-grade issuers.

5 Because of data limitations, comparisons with past economic cycles are possible for the United States only.

Chart 7: Equity valuations reflect expectations of a modest recovery in advanced economies

Ratio of equity prices to 1-year realized earnings

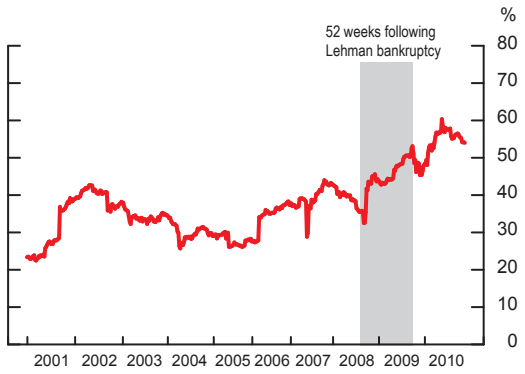


Source: Bloomberg

Last observation: 3 December 2010

Chart 8: Co-movements in asset prices reflect ample liquidity and volatile perceptions of the global macroeconomic outlook

Contribution of the first common factor to the variation in asset returns estimated through principal-component analysis (52-week rolling window)[a]



a. See footnotes 6 and 7 for information on the methodology used.

Sources: Bloomberg and Bank of Canada calculations

Last observation: 28 October 2010

are expected to grow faster than historical norms in 2010 and 2011, price-earnings ratios in some advanced economies generally remain below their recent historical averages **(Chart 7)**. This suggests that markets may be reassessing the attainability of these projected elevated earnings in light of the significant downward revisions to expectations for economic growth.

The Canadian equity market has experienced a stronger recovery than those in most other advanced economies: the S&P/TSX Composite Index is currently close to the peak reached at the beginning of 2007, and the forward price-earnings ratio is in line with its historical average. This evidence is consistent with the comparatively better performance of the Canadian economy, the stronger position of Canadian banks and the increase in commodity prices resulting from the recent robust performance of emerging-market economies.

Prospective concerns

Considering the historical level of corporate bond spreads and equity price-earnings ratios, the current valuation of equity and fixed-income markets appears to reflect expectations of a modest recovery and low interest rates in the major advanced economies. However, unlike other episodes when government bond yields fell, prices in most risky asset classes have appreciated, resulting in an increase in the correlation in price movements across a broad range of financial assets. There may thus be greater potential for a shock affecting one risky asset class to spread to other risky asset classes, generating increased volatility across markets.

An analysis of the factors driving the weekly rates of return on a wide range of assets suggests that, since the bankruptcy of Lehman Brothers in September 2008, a higher proportion of the overall variation in weekly asset returns can be explained by a common factor **(Chart 8)**.[6, 7] Anecdotal evidence suggests that this common factor could be related to ample liquidity in the global financial system and volatile market perceptions of the international macroeconomic outlook. Exceptionally low yields on government bonds are also likely playing a role as investors seek to raise returns by increasing their exposure to a broad range of higher-yielding assets. As noted, although the valuation of risky assets is currently not out of line with the historical norm, in a sustained low-return environment there could be a buildup of financial vulnerabilities resulting from excessive risk-taking. Yet, in contrast with the low-yield environment of 2005–07, current valuations seem to be more reflective of the economic situation than a by-product of excessive leverage.

6 The principal-component analysis used here is a statistical methodology that describes co-movements between variables in terms of a small number of uncorrelated common factors. If all the data under consideration were perfectly correlated, the first common factor would explain all of the variation in the data; conversely, if all the data were uncorrelated, the first factor would explain none of the variation.

7 The assets used in this analysis are: the S&P 500 Index; the S&P/TSX Composite Index; the Euro Stoxx 50 Index; the MSCI Emerging Markets Index; the MSCI Asia Pacific Index; the U.S.-dollar index; the exchange rate of the Canadian dollar, the Australian dollar and the euro against the U.S. dollar; oil prices; the CRB Index; U.S. 10-year government bond yields; Canadian 10-year government yields; German 10-year government yields; spreads on 10-year Portuguese bonds; spreads on 10-year Greek sovereign bonds; the Merrill Lynch global corporate bond spread; the Merrill Lynch Canadian investment-grade spread; the Merrill Lynch U.S. investment-grade spread; and the Merrill Lynch U.S. high-yield spread.

Financial Institutions

Global banking sector

Since last June, global banks have continued to repair their balance sheets and to bolster liquid assets and capital buffers. The pace of improvement has been slow, however, and significant vulnerabilities remain. Global banks will face a number of challenges in the period ahead, including upcoming refinancing needs, continued dislocations in property markets, slow economic growth and persistently high unemployment.

Profitability and capital adequacy

The global banking sector as a whole continues to earn profits **(Chart 9)**, but the primary driver of profitability has changed. Whereas in 2009 profits were fuelled largely by elevated trading revenues, this year, they have largely reflected declining loan losses.

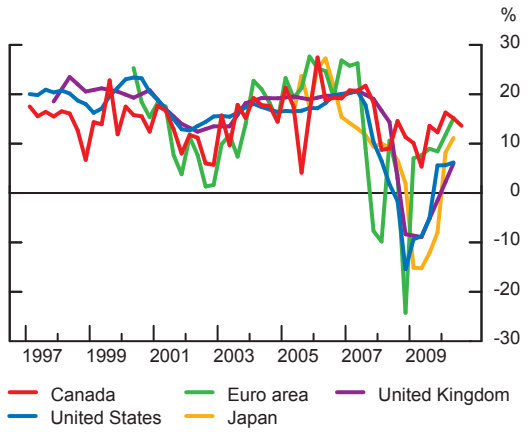
Banks continue to increase both the size and quality of their capital **(Chart 10)**, aided by improvements in retained earnings. Should the recent profitability gains not be sustained, further improvements to capital positions could be more challenging. Even though loan losses have declined, they continue to be elevated by historical standards **(Chart 11)**. Overall, the global banking system remains strained, and credit quality could deteriorate further in an extended period of modest economic growth. While banks around the world have made significant progress towards recognizing losses on impaired assets, the IMF estimates that restoring the soundness of the global banking system requires additional writedowns and loan provisions of approximately US$550 billion (about 25 per cent of the total required).[8]

The challenges are most acute in Europe. While the status of individual banks varies across jurisdictions, the European banking sector as a whole has been weakened by the legacy of the financial crisis. In particular, exposures to property markets and the household sector represent a significant challenge in Ireland and Spain, and the combination of projections of modest growth and significant fiscal strains is adding to the vulnerability of banks across Europe. There are also concerns about the state of smaller, regional lending institutions in many countries. Since these institutions, as a group, account for a sizable share of the banking sector in several countries, losses could affect the stability of the overall domestic banking sector. Weaker banks pose a threat to financial stability across Europe, given the high degree of interconnectedness in the region.

Exposures to both residential and commercial real estate markets also remain a source of vulnerability in the United States. Higher vacancy rates for commercial properties are leading to increased loan defaults, although loss rates are lower than those estimated in the baseline scenario from the April 2009 stress test conducted by U.S. authorities as part of the Supervisory Capital Assessment Program. These losses also reduce revenues from commercial mortgage-backed securities. Hence, weak real estate markets are

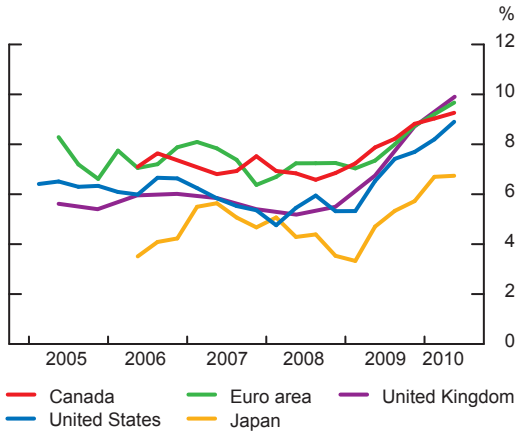
8 See the October 2010 issue of the IMF's *Global Financial Stability Report*.

Chart 9: The profitability of banks around the world is returning to historical norms
Return on equity



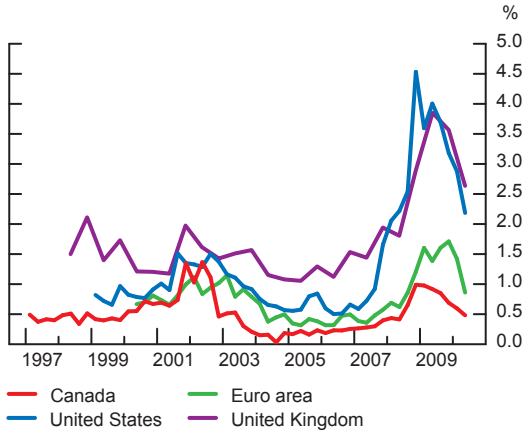
Source: Bloomberg — Last observation: 2010Q2

Chart 10: Capital ratios are rising around the world
Average ratio of common equity to risk-weighted assets



Source: Bloomberg — Last observation: 2010Q2

Chart 11: Loan losses are trending downward
Provisions for loan losses as a percentage of total loans (annualized)



Note: U.S. data exclude Goldman Sachs, Bank of America Merrill Lynch and Morgan Stanley.
Source: Bloomberg — Last observation: 2010Q2

putting stress on both loan and trading books. Slow wage growth and persistent unemployment will delay the recovery in the housing market and hamper the ability of vulnerable households to service their debts, potentially leading to further loan delinquencies or defaults. The volume of restructured loans for residential real estate has risen, which is a welcome indication that banks are addressing remaining vulnerabilities. However, recent moratoriums on foreclosures, resulting from concerns about irregularities in the foreclosure process, could slow the resolution of these problems.[9]

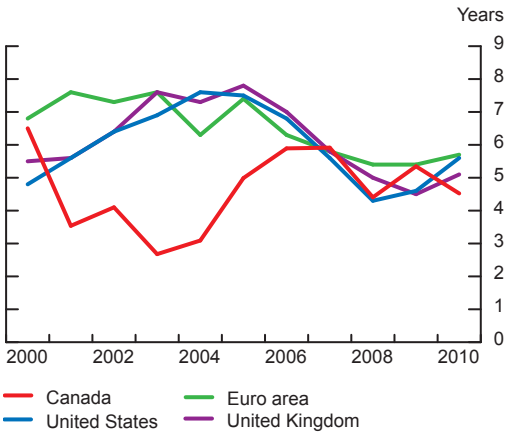
In emerging-market economies, there are concerns that fiscal stimulus and capital inflows have led to unsustainable increases in bank loans. Since last June, authorities have been intervening to ease pressures in credit and asset markets. For example, authorities in Hong Kong, Singapore and China have increased minimum down payments and reduced maximum loan-to-value ratios, especially on loans for second homes. In the event of a disorderly or abrupt unwinding of financial imbalances, non-performing loans could rise materially.

Funding

International banks continue to increase liquid assets and search for stable, longer-term funding, but progress has been slow. Many institutions still rely on wholesale funding, and the average maturity of new issuances has declined since the beginning of the crisis **(Chart 12)**. Some small banks that have traditionally relied on retail deposits to finance their operations are facing stronger competition, given that the banking sector as a whole is seeking to improve the stability of its liquidity position by reducing its reliance on wholesale sources of funds.

Chart 12: The average maturity of new debt issuance has declined since the beginning of the crisis

Weighted average maturity, Moody's-rated bank debt



Source: Moody's

Last observation: October 2010

The global banking sector faces significant refinancing challenges in the coming years. Elevated stocks of bank debt are set for refinancing before the end of 2012—at a time when many governments also have sizable financing needs—and government-guaranteed debt will also need to be replaced.

Heightened market focus on sovereign risk in peripheral Europe has jeopardized the ability of banks from these countries to access funding markets, and their use of the European Central Bank's liquidity facilities has risen. In recent weeks, funding conditions have deteriorated across Europe, although stronger institutions are still able to obtain funds at cost-effective terms.

Canadian banking sector

The capital positions of Canada's major banks have strengthened further since June. While their profitability has declined slightly in recent quarters, it remains reasonably strong by historical standards and is above that of banks in other jurisdictions. Canadian banks also continue to enjoy ready access to domestic and global capital markets for funding.

9 There is also a risk that U.S. banks will be required to repurchase a significant amount of the impaired subprime mortgages that they securitized before the crisis. Some large institutional investors and government-sponsored enterprises are seeking to return such assets to the originating bank on the basis of alleged misrepresentation in the securitization process.

Profitability and capital adequacy

Risk-weighted capital ratios have improved further since June **(Chart 13)**, in line with trends in other jurisdictions. As was the case prior to the financial crisis, Tier 1 ratios in Canada are higher than those in most other banking systems. The profitability of Canadian banks also remains relatively strong, with an average return-on-equity ratio of 13.6 per cent in the third quarter of 2010. This return is down slightly from earlier in the year, but significantly above the cyclical trough reached in the second quarter of 2009. Profitability has been underpinned by a rebound in profits from the banks' core retail and commercial lending businesses, driven primarily by a decrease in loan losses. Total loan losses have receded markedly since peaking at an annualized rate of about 1 per cent of loans in the second quarter of 2009, and were about 0.5 per cent in the third quarter of 2010. Even at the peak, loan-loss rates during the most recent recession were lower than those seen in previous recessions. While most indicators of credit quality point to an improvement in asset quality in Canadian loan portfolios, some banks have significant portfolios of U.S. residential and commercial real estate loans. As discussed in the section on the global banking sector, the quality of these loans remains a significant source of vulnerability. Even though Canadian banks have few direct exposures to the most vulnerable banking sectors in the euro area **(Table 1)**, significant stress in the European banking sector could, nonetheless, affect them in the event of generalized pressure in funding markets or spillover to the largest European banks.

Since major Canadian banks have large exposures to the household sector **(Chart 14)**, loan portfolios could be adversely affected by the state of Canadian household finances or by a real estate shock. Although a significant portion of bank exposures to the household sector is in the form of mortgages that are insured against default, banks could incur losses on other loans to households, such as uninsured mortgages and unsecured household credit. In light of the high level of indebtedness of Canadian households, some caution in banks' lending to households is warranted.

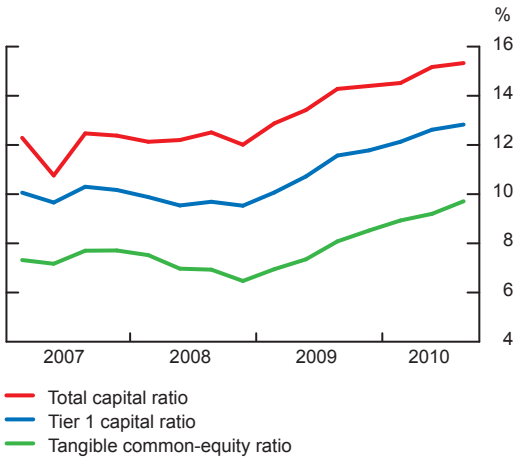
Table 1: Foreign exposures of Canadian banks, as of 30 June 2010

	Gross exposures (Can$ billions)	As a percentage of total assets (%)
United States	463.2	15.2
United Kingdom	75.9	2.5
France	20.2	0.7
Germany	15.0	0.5
Greece	0.4	0.01
Ireland	6.2	0.2
Italy	2.0	0.07
Portugal	0.4	0.01
Spain	3.1	0.1
Other countries	272.6	8.9
Total	859.0	28.1

Sources: Bank for International Settlements and Bank of Canada calculations

Chart 13: Capital ratios at Canadian banks continue to improve

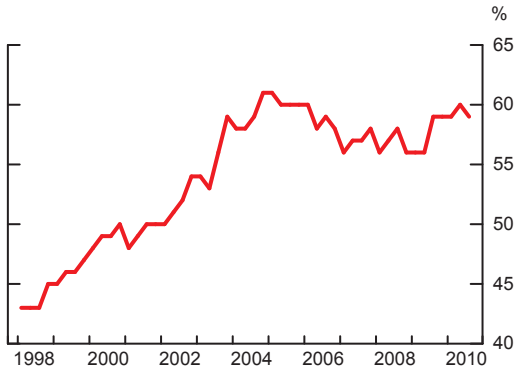
Risk-weighted capital ratios of major Canadian banks



Source: Regulatory filings — Last observation: 2010Q3

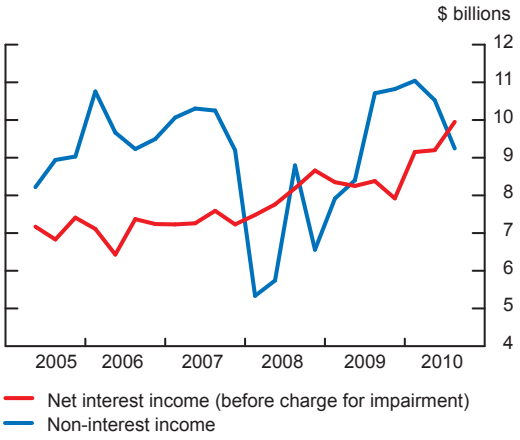
Chart 14: Household credit accounts for a large share of the loan portfolios of Canadian banks

Household loans as a percentage of total loans, major Canadian banks



Source: Regulatory filings — Last observation: 2010Q3

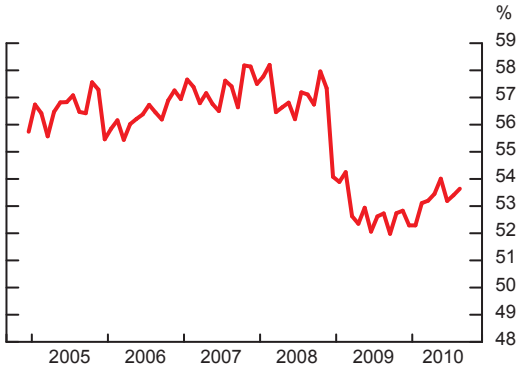
Chart 15: The non-interest income of major Canadian banks has declined in recent quarters



Source: Regulatory filings Last observation: 2010Q3

Chart 16: Reliance on wholesale funding has declined relative to pre-crisis levels, but remains substantial

Wholesale funding as a percentage of the total funding of major Canadian banks[a]

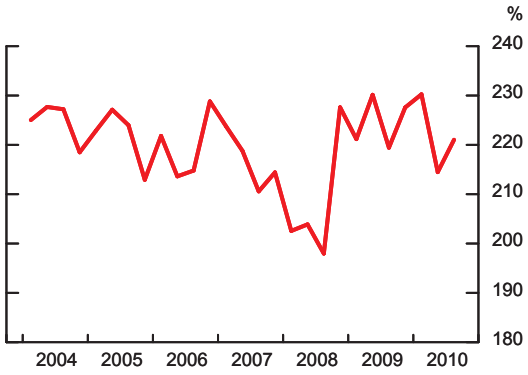


a. Wholesale funding includes non-retail deposits, repurchase agreements, bankers' acceptances and subordinated debt.

Source: Regulatory filings Last observation: September 2010

Chart 17: The capital positions of Canadian life insurers are well above the regulatory minimum

Minimum continuing capital and surplus requirements ratio (MCCSR) for major Canadian life insurers



Note: The regulatory target and minimum for the MCCSR ratio are 150 per cent and 120 per cent, respectively.

Source: Regulatory filings Last observation: 2010Q3

Partially offsetting the improvement in revenues from lending activity, non-interest income, notably from trading activities, has declined in recent quarters **(Chart 15)**. Activities in capital markets were exceptionally profitable in 2009, and recent developments reflect a return to a level of profits that is closer to the historical norm.

In recent months, some Canadian banks have acquired troubled U.S. banks, with a number of these transactions assisted by U.S. authorities.[10] As well, some Canadian banks are continuing to expand into global capital markets and wealth-management business lines. The ability of Canadian banks to take advantage of growth opportunities in the wake of the crisis is a reflection of their soundness and profitability. However, as with any acquisition, banks need to ensure that the risks surrounding these new business lines are well understood, and that growth does not outpace the capabilities of their risk-management processes.

Funding

Given the strong capitalization of Canadian banks, global financial strains would likely affect the Canadian banking system mainly through the funding channel. As the crisis illustrated, banks that rely heavily on wholesale funding sources can quickly run into difficulty when markets are under stress. The global liquidity standards proposed by the Basel Committee on Banking Supervision, once implemented, will enhance the resilience of banks' funding positions. Generally, the standards will require banks to hold higher amounts of liquid assets, and will favour longer-term over short-term funding, and retail funding over wholesale funding.

Major Canadian banks currently hold more liquid assets than before the crisis. They have also shifted their funding away from wholesale markets, which tend to be a less-stable source of funds than retail deposits, particularly in times of stress **(Chart 16)**. As in other jurisdictions, Canadian banks have a significant amount of wholesale debt coming due in the near term. Banks are actively planning for these maturities by taking advantage of market conditions to issue term debt, and by diversifying their investor base—for example, by issuing covered bonds in global markets.

Life insurance sector

During the crisis, life insurers suffered large losses arising from reserve increases on their variable-annuity and segregated-fund guarantees, and their financial position has recovered more slowly than that of deposit-taking institutions. While the capital positions of Canadian life insurers remain in excess of both the minimum and the target level imposed by the Office of the Superintendent of Financial Institutions **(Chart 17)**, and they have been able to access financial markets to raise capital, there are some important risks facing these institutions. For example, market risk remains a key challenge for insurers given the volatility of global equity markets and the uncertain macroeconomic outlook. Low interest rates

10 In an assisted transaction, the Federal Deposit Insurance Corporation typically has a loss-sharing agreement with the acquirer, limiting the potential credit losses on the loans of troubled banks. In an unassisted transaction, the acquiring bank bears all future losses on the loans. However, the loans are written down upon acquisition, such that only unexpected losses will lead to credit losses for the acquiring bank.

Box 2

Regulatory Initiatives Affecting the Canadian Life Insurance Industry

As part of the aftermath of the crisis, the regulatory landscape for the global financial sector is undergoing significant changes. The life insurance industry will be affected in coming years by important regulatory initiatives, such as the changes to accounting standards being proposed by the International Accounting Standards Board (IASB) and enhanced capital rules.

Like other Canadian firms, insurers will move to International Financial Reporting Standards (IFRS) in 2011. The IASB, the organization responsible for developing IFRS, proposed a revision to accounting standards applying to insurance contracts (IFRS 4), with a target implementation date of 2013. This revision is intended to improve the transparency of assumptions pertaining to the valuation of insurance contracts and the international comparability of insurers' financial positions.

The IASB proposal included using a risk-free rate to calculate the present value of insurers' contractual liabilities. The proposed change would have made the valuation of their net worth sensitive to changes in credit spreads and thus would have increased the volatility and procyclicality of their earnings. This serves to illustrate the important interactions that can arise between accounting standards and financial stability. The Chair of the IASB is on record as saying that the Board will work with stakeholders to reassess the options for determining the discount rate.

Another important development pertaining to the regulatory landscape for Canadian life insurers is the ongoing review of capital standards by the Office of the Superintendent of Financial Institutions (OSFI). OSFI has released a draft advisory regarding the appropriate level of capital to be held against segregated-fund guarantees. In determining capital requirements for segregated funds that have guarantees tied to the performance of the stock market or bond markets, companies make assumptions about how these markets will perform in the long run, based on historical experience and on their own judgment. Proposed changes are intended to better capture the risks associated with foreign equity holdings and fixed-income investments in calculating capital. The provisions of the draft advisory, if adopted, would apply to new business starting in 2011. OSFI has also indicated that it is reviewing its approach to segregated funds in general.

also represent a challenge. Since the duration of life insurers' liabilities is typically longer than that of their assets, they tend to earn less than the guaranteed rates of return embedded in their liabilities when interest rates fall. In recent quarters, the earnings of insurers have been reduced by revaluations of their liabilities in line with lower rates. The longer interest rates remain exceptionally low, the more likely it is that the value of these liabilities will need to be increased further. There is also a risk that some business lines may become unprofitable unless fundamental changes in product design or pricing are implemented.

As in the banking sector, the regulatory environment for the life and health insurance sector is undergoing substantial change, which may affect insurers' business models. Some of these changes are outlined in **Box 2**.

Non-financial sector

Household sector

The growth in total household credit has moderated in recent months, falling from the 8.0 per cent annualized rate in the first half of 2010 to 5.6 per cent for the four-month period from July to October **(Table 2)**. Personal lines of credit have continued to support growth in consumer credit, although to a lesser extent than in recent years.

Table 2: Household credit — annualized growth rates (%)

	Distribution	2000–2007	2008	2009	2010H1	July to October 2010[a]
Residential mortgage credit[b]	68.4	8.7	10.2	6.6	8.8	6.0[e]
Consumer credit[b]	31.5	9.8	7.9	9.2	6.3	4.9[e]
Personal lines of credit[c]	14.8	17.0	16.0	16.8	8.5	7.8[e]
Other consumer credit[d]	16.7	5.5	0.3	1.0	3.5	2.5[e]
Total household credit[b]	100	9.1	9.4	7.4	8.0	5.6[e]

Note: Unless otherwise specified, this table includes average quarterly growth rates.
a. 4-month annualized growth rate for July to October 2010
b. These values are adjusted for seasonal factors.
c. For chartered banks only. Approximately 65 per cent of personal lines of credit are secured by home equity.
d. Other consumer credit includes credit card loans, auto loans, non-bank personal lines of credit and other personal loans.
e. These values contain estimates for some components.
Source: Bank of Canada

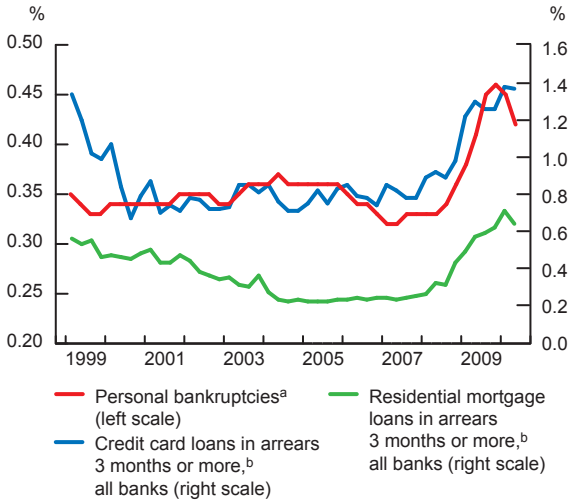
A number of factors can help to explain the dynamics in household borrowing since the start of the year. Some of the moderation may reflect the reaction of households to interest rates and their expectations of future income growth. The increase in the overnight rate from 0.25 per cent to 1.0 per cent between June and September has had a direct effect on consumer variable-rate loans, and the increase in these rates may have contributed to the slower growth of household borrowing. Since the June FSR, some of the moderation may also have been a consequence of credit demand that was pulled forward to the first half of the year because of temporary factors. In particular, the introduction of the harmonized sales tax in Ontario and British Columbia in July 2010 may have prompted households to move some of their larger purchases, including durable goods and housing, into the first half of the year. This would help to explain the robust growth of mortgage credit in the first half of the year.

Statistics Canada's measure of the household sector's aggregate debt-service ratio (DSR) edged down in the second quarter of 2010, and remains well below its historical average, owing to low borrowing rates. Nonetheless, there is evidence of stress in the household sector, since mortgage and credit card loans in arrears were well above pre-crisis levels in the second quarter **(Chart 18)**.

Microdata obtained from an Ipsos Reid survey suggest that the proportion of households with elevated levels of indebtedness has risen. In particular, the proportion of the indebted population that has a DSR greater than or equal to 40 per cent and the share of debt owed by these households have increased noticeably **(Chart 19)**.[11]

Recent data indicate that the net worth of the Canadian household sector edged lower in the second quarter **(Chart 20)**. While

Chart 18: Household loans in arrears remain well above pre-crisis levels



a. As a percentage of the population aged 20 and over
b. As a percentage of total balances outstanding
Sources: Statistics Canada, Office of the Superintendent of Bankruptcy and regulatory filings

Last observation: 2010Q2

11 Consistent with industry standards, a DSR of 40 per cent is the threshold above which a household is considered more likely to have difficulty making loan payments.

the value of liabilities rose, total household assets were broadly unchanged, since losses on financial assets were offset by gains on real estate assets.

Prospective concerns

The financial position of households as measured by the debt-to-disposable income ratio is likely to deteriorate further in coming quarters. As discussed in the Bank's October *Monetary Policy Report*, a number of factors are expected to restrain the growth of labour income in Canada, including the withdrawal of fiscal stimulus, announced wage restraints by various governments and a slow recovery in average hours worked. Thus, even if households continue to borrow at a more moderate pace than in 2009 and the first half of this year, it is likely that the debt-to-disposable income ratio will continue to trend upwards over the near term. An increase in this ratio would, all else being equal, put upward pressure on the debt-service burdens of households.

Canadian house prices have continued to rise significantly relative to income **(Chart 21)**, and housing affordability (measured by mortgage payments as a share of income) has declined in recent quarters **(Chart 22)**. Nevertheless, the current low level of mortgage interest rates continues to have a significant effect on affordability. Affordability would be lower if interest rates were closer to longer-run norms (as shown by the measure calculated with a 4 per cent floor for real mortgage rates). Recent indicators show that house prices in Canada have started to come down in some markets, and there is a risk that they will continue to decline over the near term, which would adversely affect household balance sheets. Property price gains are unlikely to provide the same support to household wealth in the future as they have in recent years.

Stress testing the household sector

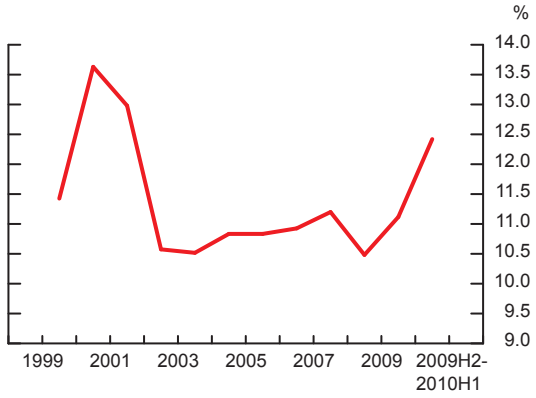
The Bank has conducted a stress test to assess the potential impact of an adverse labour market shock on the financial situation of Canadian households, which represents a key risk for the household sector.[12] Specifically, we examined the effect of a hypothetical sharp increase in the unemployment rate on the financial position of households and the banking sector. This simulation is done in two steps. First, using household microdata and a set of baseline assumptions, we simulate the evolution of the distribution of the household DSR until the fourth quarter of 2012. Second, given this distribution, we estimate the impact of a hypothetical 3-percentage-point increase in the unemployment rate at the end of our simulation period on the proportion of household loans in arrears for three months or more.

The estimation of the DSR for each household is conditional on assumptions for the future growth path of household debt, income and interest rates. These estimates are then used to assess how the share of highly vulnerable indebted households (i.e., those with a DSR greater than or equal to 40 per cent) and the proportion of the total debt they owe evolve over the simulation period. For the

12 This simulation was conducted with microdata from Ipsos Reid's *Canadian Financial Monitor*. The methodology is outlined in the report "The Bank of Canada's Analytic Framework for Assessing the Vulnerability of the Household Sector," in the June 2010 FSR.

Chart 19: The share of debt owed by vulnerable households has increased noticeably

Share of household debt owed by those with a debt-service ratio greater than or equal to 40 per cent

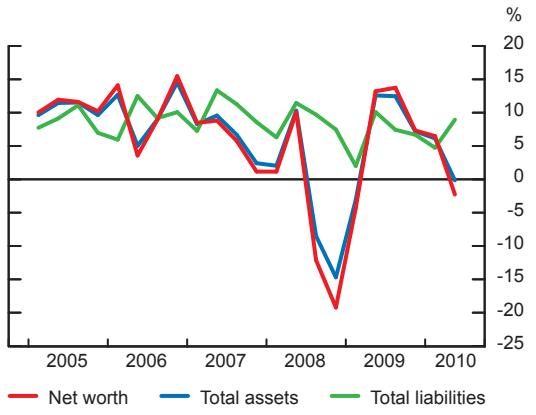


Sources: Ipsos Reid and Bank of Canada calculations

Last observation: 2009H2–2010H1

Chart 20: The net worth of Canadian households edged lower in the second quarter

Annualized quarter-over-quarter growth rate

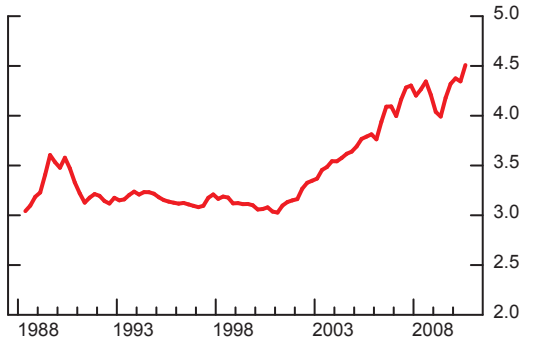


Source: Statistics Canada

Last observation: 2010Q2

Chart 21: Canadian house prices have risen relative to income

Ratio of house prices to disposable income[a]

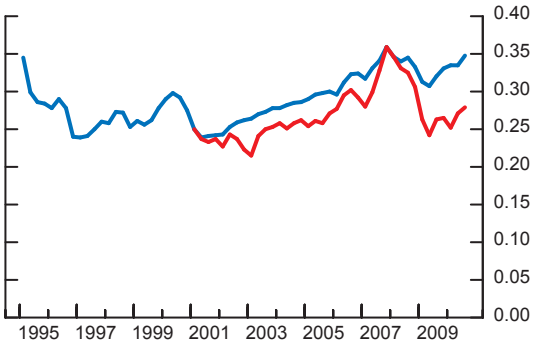


a. The Teranet house price index is used from 1999 onward. House prices consistent with that index were estimated by the Bank of Canada for the earlier period.

Sources: Statistics Canada, Teranet-National Bank and Bank of Canada calculations

Last observation: 2010Q3

Chart 22: The affordability of housing has declined in recent quarters



a. This measure estimates the size of mortgage payments for a representative household given prevailing interest rates and house prices, and then scales this value by personal disposable income in order to measure affordability.
b. To illustrate affordability if interest rates were closer to historical norms, the average real mortgage rate since 1995 (4 per cent) is used to set a floor for the real interest rate; if the observed value is below 4 per cent in a period, the floor is used in the calculation.
Source: Bank of Canada calculations Last observation: 2010Q3

exercise, household debt is assumed to grow at a pace broadly consistent with the recent trend and—given the current labour market dynamics described earlier—faster than income growth **(Table 3)**. The differential between the growth rates of debt and income implies that the aggregate debt-to-income ratio for Canadian households continues to rise over the simulation period, reaching 158 per cent by the fourth quarter of 2012. The interest rate profile used for the simulation is consistent with market expectations as of mid-November.[13]

Table 3: Assumptions for simulation of the debt-service ratio

Period	Market expectations of 1-week rate (%)	Effective cost of debt (%)	Annualized growth rate of household income (%)	Annualized growth rate of household credit (%)
2010Q3	1.00	5.3	3.5	6.5
2010Q4	1.00	5.3		
2011Q1	1.16	5.2		
2011Q2	1.46	5.3		
2011Q3	1.73	5.5		
2011Q4	1.74	5.5		
2012Q1	1.90	5.5		
2012Q2	2.05	5.6		
2012Q3	2.21	5.7		
2012Q4	2.17	5.6		

Note: The effective interest rate of households is a weighted average of interest rates on various mortgages and consumer loans.

Step two involves the introduction of a negative labour market shock in the fourth quarter of 2012. We then estimate the ability of households to service their debts over a period of unemployment.[14] In aggregate, the unemployment rate is assumed to rise to 11 per cent and the average duration of unemployment is assumed to increase to 25 weeks.[15] The magnitude of the shocks to the unemployment rate and the duration of unemployment are calibrated to replicate those experienced in Canada during the recession of the early 1990s. The impact of the shock on the domestic banking system is calculated in terms of the change in the proportion of household loans that are in arrears for three months or more.

Given the assumed scenario, the proportion of indebted households with a DSR of 40 per cent or more—an indicator of the overall vulnerability of the household sector—would rise to 7.8 per

13 The term premium for mortgage rates (i.e., the slope of the yield curve) is assumed to stay near current levels, while the risk premiums (i.e., the difference between mortgage rates and the respective yield on Government of Canada bonds) are assumed to fall gradually from current levels towards their historical averages over the simulation.

14 Funds available to the unemployed households for servicing their debt and covering basic living expenses are equal to income from employment insurance (where applicable) plus the value of their holdings of liquid assets (these include balances in chequing and savings accounts, term deposits, guaranteed investment certificates and a proportion of their mutual fund holdings). A household is assumed to be in arrears when funds from these sources are not sufficient to make loan payments for a period of at least three months.

15 For comparison, the unemployment rate was 8 per cent and the average duration was 19.6 weeks in the third quarter of 2010.

cent in the fourth quarter of 2012, compared with an average of 6.1 per cent over the past 10 years **(Table 4)**. The proportion of the total household debt owed by these households would increase to 14.7 per cent by the end of the simulation period. Finally, the unemployment shock increases the rate of loan arrears for domestic financial institutions, from 0.6 per cent in the third quarter of 2010 to 1.4 per cent.

Table 4: Impact of a 3-percentage-point increase in the unemployment rate

	Proportion of indebted households with DSR ≥ 40%	Proportion of debt owed by households with DSR ≥ 40%	Proportion of household loans in arrears three months or more (%)
2009H2-2010H1 (observed)	6.5	12.4	0.6
2012Q4	7.8	14.7	1.4

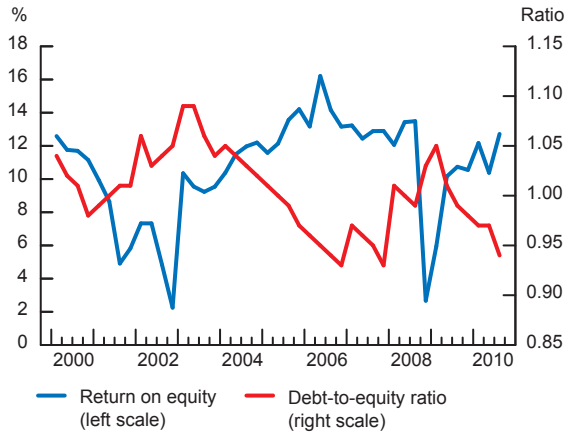
Source: Bank of Canada simulations

Since a number of simplifying assumptions were necessary to conduct the simulation, these results are purely illustrative. This partial simulation exercise does not attempt to capture any of the additional repercussions of an economic downturn severe enough to engender such a labour market shock, including any change in interest rates following the rise in unemployment. There are reasons why the model results may overstate the rise in the arrears rate.[16] Nevertheless, the results highlight the need for banks to carefully consider the aggregate risk of the entire portfolio of household exposures. The results also underline the need for households to assess their ability to service their debt over the entire maturity of the loan.

Corporate sector

New information received since June indicates that the aggregate financial position of the Canadian non-financial corporate sector remains robust despite the recent slowdown in economic growth. The corporate sector appears well placed to withstand the financial consequences of adverse shocks. Corporate leverage declined in the third quarter of 2010, reaching the lowest ratio observed since the end of the financial crisis **(Chart 23)**. Canadian corporate leverage, measured at market value, remains significantly below that of the United States, the United Kingdom and the euro area. Moreover, liquidity in the Canadian non-financial corporate sector—as measured by the ratio of short-term assets (less inventories) to short-term liabilities—remains elevated **(Chart 24)**. Profitability also increased in the third quarter.

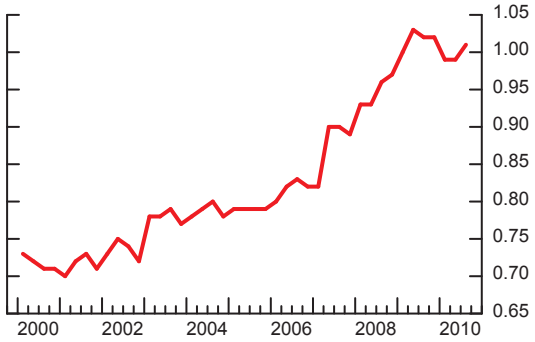
Chart 23: Canadian corporate leverage continued to edge lower in the third quarter



Source: Statistics Canada — Last observation: 2010Q3

Chart 24: Liquidity remains elevated in the corporate sector

Quick ratio[a]



a. The quick ratio is defined as short-term assets (less inventories) over short-term liabilities.

Source: Statistics Canada — Last observation: 2010Q3

16 The model does not account for the possibility that households may use pre-approved limits on personal lines of credit and credit cards to meet their financial needs during a period of unemployment. While accumulating more debt would increase the vulnerability of these households to future shocks, it may nonetheless prevent them from becoming insolvent. Second, our model does not allow households to avoid insolvency by selling less-liquid assets.

Reports

Reports examine, in greater depth, selected issues of relevance to the financial system.

Introduction

The global financial crisis of 2007–09 revealed the need for wide-ranging reforms in financial sector regulation. In particular, the crisis has shown that safeguarding the solvency of individual financial institutions, while essential, is not sufficient to prevent systemic crises. The recent crisis highlighted the potential for interlinkages and homogeneous behaviour across the financial system to contribute to the buildup of financial imbalances and to amplify and transmit shocks. It is therefore necessary to take these system-wide factors explicitly into account in designing and implementing policies for the financial system.

The lessons of the crisis are being applied in the far-reaching and multi-faceted reform agenda endorsed by leaders of the G-20 countries. These reforms aim to increase the resilience of the global financial system, making financial crises both less frequent and less severe.

Some key objectives of this agenda are to strengthen prudential standards for financial firms, to enhance the ability of financial market infrastructures to withstand shocks and to establish a credible regime for resolution. The reports in this section of the *Financial System Review* examine selected aspects of this agenda and ongoing efforts to implement it in Canada.

Sound Prudential Standards For Financial Institutions

A critical objective has been the design of stronger prudential standards for financial institutions to enhance both the quality and quantity of the capital and liquid assets that they are required to hold in order to increase their ability to withstand shocks. To this end, much work has been done over the past two years through the Basel Committee on Banking Supervision (BCBS) to strengthen the international framework for banking regulation. The set of rules recently agreed upon by the BCBS will make the entire financial system more robust by increasing the capital available to absorb losses.[1]

The countercyclical capital buffer proposed by the BCBS is an important and novel addition to the new capital framework. This buffer, which requires that capital be built up in favourable financial conditions but allows it to be drawn down to absorb losses under conditions of stress, introduces a system-wide overlay to the traditional microprudential orientation of bank capital rules. This provides an instrument through which policy-makers can respond to the buildup of system-wide imbalances. In **The Countercyclical Bank Capital Buffer: Insights for Canada**, authors David Xiao Chen and Ian Christensen outline the key features of this new instrument and discuss the type of information that could be used by authorities to inform the operation of the countercyclical buffer. To illustrate, the authors consider what a small set of indicators might have signalled about excessive credit growth in Canada and the United States in the period surrounding the recent crisis.

1 See BCBS (2010a,b) for more details.

Financial Market Infrastructure

Sound prudential standards materially decrease, but do not eliminate, the probability of a default by a financial system participant. As a result, in times of stress, standards alone are not sufficient to prevent markets from disruptions caused by concerns about the financial condition of important participants. Hence, designing the financial market infrastructure to foster the resilience of markets and minimize the contagion resulting from concerns about counterparty risk is also a key element of the reform agenda.

Market infrastructure played a critical role in the recent financial crisis. In some cases, it had a positive effect, dampening the impact of failures and allowing the financial system to continue to function. This was the case, for example, with the large-value payment systems in major jurisdictions, and with the CLS Bank, the globally connected settlement system for foreign exchange transactions. That these systems continued to function well was essential to supporting markets and financial institutions throughout the crisis.

In other areas, however, market infrastructure either did not function well, or was non-existent. Deficiencies in the infrastructure for over-the-counter (OTC) derivatives markets, in particular, have been exposed by the crisis. The lack of central clearing and settlement led, in some instances, to a tangled web of opaque interconnections that worsened the prevailing uncertainty about the financial health of participants, resulting in further stress and contagion. In some cases, the authorities found themselves with little alternative but to rescue certain insolvent financial institutions, the failure of which would have led to the collapse of key markets. This also complicated the winding down of transactions involving those firms that were allowed to fail. A set of reforms have therefore focused on improving the infrastructure for OTC derivatives in particular and on promoting wider use of central counterparties in general. In the report, **Strengthening the Infrastructure of Over-the-Counter Derivatives Markets**, Carolyn Wilkins and Elizabeth Woodman discuss the importance of the OTC derivatives markets and the reforms under way to enhance their resilience.

Central counterparties (CCPs) have many potential benefits, but to realize these benefits fully, they must be properly designed and monitored. In **Central Counterparties and Systemic Risk**, Nikil Chande, Nicholas Labelle and Eric Tuer argue that the current review of standards for such infrastructures must focus not only on ways to decrease the likelihood of CCPs failing, but (similar to the discussion around other financial institutions) also on establishing sound standards for containing the risks to which CCPs are exposed and preventing their behaviour from exacerbating stresses in the financial system more widely. Three such system-wide issues are discussed: the procyclicality of margins; the default process; and resolution mechanisms for failed central counterparties.

A Credible Resolution Regime

While effective supervision and regulation mitigate excessive risk-taking and establish adequate buffers, thus making it less likely that a financial institution will become non-viable, the authorities cannot—and should not—eliminate the possibility of failure. A credible resolution regime is needed to limit the effects of one institution's failure on the rest of the financial system and to provide appropriate incentives to manage risk ex ante. The latter requires ensuring, to the greatest extent possible, that those individuals in a financial institution who benefit from its risky activities (managers, owners and creditors) bear the cost in the event of the institution's failure. Without an appropriate resolution regime, public support for the financial system would generate moral hazard—i.e., financial institutions would act less prudently in the future and take on more risk because they believe they will not have to bear the full cost of their actions.

Resolution is particularly challenging in the case of large and complex financial institutions performing critical functions that, if interrupted abruptly, could greatly disrupt other financial institutions and markets, thereby propagating and potentially amplifying a shock. If the resolution framework is to dampen the impact of such an institution's failure on the rest of the financial system and the economy, it must:

- allow for the continuation of essential services in the banking and financial systems;
- be able to be implemented quickly; and
- minimize the cost of the default (and therefore the effect on the financial system) by, for example, maximizing the liquidation value of the firm.

One important element of the resolution framework proposed to address this issue is living wills. These plans, developed by financial institutions in co-operation with supervisory authorities, are intended to contain much of the information needed for a quick and effective resolution. While such detailed documents take time to develop and need to be kept current, they are a useful form of contingency planning that can help to facilitate a smooth resolution process. As a result, they will help to make the resolution of systemically important financial institutions a credible undertaking.

Living wills, however, are just one tool in a suite of instruments that are needed for a comprehensive and credible resolution toolkit. The report, **Contingent Capital and Bail-In Debt: Tools for Bank Resolution**, by Chris D'Souza, Toni Gravelle, Walter Engert and Liane Orsi, describes two other tools that have the potential to reinforce the ability of policy-makers to deal with the challenges to be faced in the resolution of a systemically important financial institution. By ensuring that shareholders and creditors bear losses before others, bail-ins and contingent capital provide a strong incentive for such institutions to monitor risk-taking

behaviour ex ante. The tools, which can be deployed quickly, increase the likelihood that the firm will continue operations, thereby decreasing the impact on the rest of the financial system. As well, they reduce the cost of the default for survivors—and, not inconsequentially, for taxpayers—by ensuring that losses are first borne by shareholders and creditors.

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_____. 2010b. "Group of Governors and Heads of Supervision Announces Higher Global Minimum Capital Standards." Press Release, 12 September. Available at <http://www.bis.org/press/p100912.htm>.

The Countercyclical Bank Capital Buffer: Insights for Canada

David Xiao Chen and Ian Christensen

Introduction

A lesson learned from the global financial crisis is that regulatory capital requirements can be an important source of procyclicality that can amplify the credit cycle through periods of both boom and bust. For example, in the good times prior to the recent crisis, when risks were assessed to be low, capital requirements were also low, which fuelled the easing of lending conditions and the expansion of credit. In the downturn, however, the measured riskiness of bank assets rose, forcing up the required level of capital at a time when increasing capital levels was costly and difficult because of losses. In these cases, capital regulation contributed to the pressures on banks to reduce the size of their balance sheets, with important negative consequences for the supply of credit and for economic activity.

Reducing the procyclicality of bank lending can help to sustain economic growth during periods of stress. One way to achieve this is to establish a countercyclical capital buffer that can raise the required level of bank capital in boom times and allow it to be drawn down when the cycle turns (Arjani 2009). On 16 July 2010, the Basel Committee on Banking Supervision (BCBS) released a proposal for such a buffer (BCBS 2010a). The BCBS proposal sets out the objective and general decision-making framework for setting the buffer, as well as a numerical guide that could serve as an initial source of information when such decisions are made. Then, on 12 September, the Group of Governors and Heads of Supervision (GHOS), the oversight body for the BCBS, confirmed the countercyclical capital buffer as part of the package of reforms to global capital standards.[1] The countercyclical buffer, as well as a capital conservation buffer, will be phased in beginning on 1 January 2016 and will become fully effective on 1 January 2019.

In this report, we describe the main features of the framework for the countercyclical capital buffer proposed by the BCBS. Some flexibility remains as to how the buffer will be implemented in each jurisdiction. This is followed by some examples of the kind of information that could be used to help inform the application of the buffer by Canadian authorities.

Highlights of the BCBS Proposal

The aim of the countercyclical capital buffer is "to ensure that the banking sector in aggregate has the capital on hand to help maintain the flow of credit in the economy without its solvency being questioned, when the broader financial system experiences stress after a period of excess credit growth" (BCBS 2010a). This means that, in boom times, a buffer of regulatory capital would be built up, and in a bust, the requirement would be suspended in order to ease regulatory constraints on the flow of credit in the economy. Additionally, the buffer may help to mitigate the buildup of system-wide risk during a boom, and, hence, reduce the likelihood of a bust.

The countercyclical capital buffer is linked to, and shares many features with, the new capital conservation buffer, the goal of which is also to promote "the build-up of adequate buffers above the minimum that can be drawn down in periods of stress" (BIS 2009). The capital conservation buffer is intended to prevent international banks from making dividend payouts, share buybacks and other capital disbursements in periods of expansion when systemic risks may be mounting. Actions such as these reduced the resilience of individual banks and the banking system as a whole in many jurisdictions before the crisis took hold. The capital conservation buffer establishes a range for common equity

1 See the 12 September 2010 press release from the BCBS, "Group of Governors and Heads of Supervision Announces Higher Global Minimum Capital Standards" (BCBS 2010b).

above the regulatory minimum requirement: when capital levels fall below the top of the range, banks are subject to constraints on the distribution of earnings. These constraints become more severe as capital levels approach the minimum requirement (the bottom of the capital conservation buffer), thereby encouraging banks and their supervisors to take prompt corrective action to address underlying problems before the minimum capital requirement is breached. The constraints imposed near the top of the range will be minimal, so the conservation buffer should not be seen as merely a new minimum requirement.

Under normal conditions, the countercyclical capital buffer requirement would be set to zero, and only the conservation buffer would be in place. When the countercyclical capital buffer is in effect, it will extend the range of the capital conservation buffer. Upon a full release of the countercyclical buffer by the authorities, it would return to zero. In their September statement, the GHOS announced that the countercyclical buffer will require banks to hold additional common equity or other fully-loss-absorbing capital in amounts ranging from 0 per cent to 2.5 per cent of the risk-weighted assets. The capital conservation buffer will be 2.5 per cent of risk-weighted assets, and this requirement will be met with common equity after deductions.

Under the BCBS proposal, the authorities would activate the countercyclical capital buffer in periods when they judge that aggregate credit growth is excessive, and associated with an increase in system-wide risk.[2] As well, decisions on this additional capital requirement (the buffer add-on) would be announced up to 12 months in advance, in order to give banks time to meet the requirements before they take effect.[3] Reductions in the buffer would take place immediately, however, to reduce the risk that regulatory capital requirements might constrain the supply of credit. The consequences of a bank's capital falling below the level set by the countercyclical capital buffer will be the same as for the capital conservation buffer (i.e., constraints on distributions of earnings).

Authorities in each jurisdiction will be responsible for setting the buffer add-on that applies to credit exposures in their jurisdiction. A bank with purely domestic credit exposures will be subject to the full amount of the add-on determined by the national authorities. Internationally active banks will calculate a buffer add-on for each jurisdiction in which they have credit exposures, using the respective buffers in effect in each host jurisdiction **(Box 1)**. National authorities will be required to inform authorities in other jurisdictions promptly of any change in the domestic countercyclical buffer. Supervisors will be responsible for ensuring that the banks domiciled in their jurisdictions calculate their buffer requirements correctly on a consolidated basis, according to the geographic location of their exposures. Authorities will not be able to impose a lower buffer on a domestic bank for a given foreign exposure than the buffer set by the supervisor in that jurisdiction (a form of reciprocity).

Information requirements for buffer-setting decisions

The BCBS proposal also includes a methodology to calculate an internationally consistent reference guide to aid in setting the countercyclical buffer. This guide would be part of the information set used by each jurisdiction when making decisions related to the buffers. It is important to emphasize, however, that authorities would set the size of the buffer on the basis of their judgment, using a wide range of information on macrofinancial conditions, rather than on the basis of a simple fixed quantitative rule.

The information used in setting the countercyclical capital buffer would need to capture upswings and downswings in the financial cycle. Periods during which system-wide risks are mounting would be associated with the buildup phase of the buffer, and periods of sharp contraction—when risks begin to materialize—would correspond to the release phase of the buffer. It is unlikely, however, that a single measure would reliably capture both the buildup phase and the release phase, since the former requires sound leading-indicator properties and the latter must be a reliable contemporaneous indicator (Drehmann et al. 2010). As well, a good variable to proxy for the buildup phase should vary considerably from its long-run trend during boom times, but this effectively rules out measures such as non-performing loans (which are bounded at zero) and may limit the information content of credit spreads. In contrast, the latter variables may be very informative about the timing of the release phase.

In this regard, indicators may be more informative in combination than individually. For example, Borio and Drehmann (2009) show that measures of aggregate credit growth and real estate prices *jointly* contain more predictive information about future financial crises than when either is considered in isolation. If multiple indicators signal the emergence of excessive credit growth and growing system-wide risks, authorities can be more certain about turning on the buffer, or they may be willing to adjust its setting more forcefully. The decisions on setting the buffer

2 The additional capital requirements imposed under Pillar 2 of the Basel Capital Accord may need to adapt to the presence of the countercyclical capital framework, since it would not be appropriate for authorities to require additional capital to be held for financial system-wide issues if this is already required by the countercyclical buffer when the latter is above zero. However, as Pillar 2 may capture risks that are not related to system-wide issues (e.g., concentration risk), capital meeting the countercyclical buffer should not be permitted to be used to meet these non-system-wide elements of any Pillar 2 requirement.

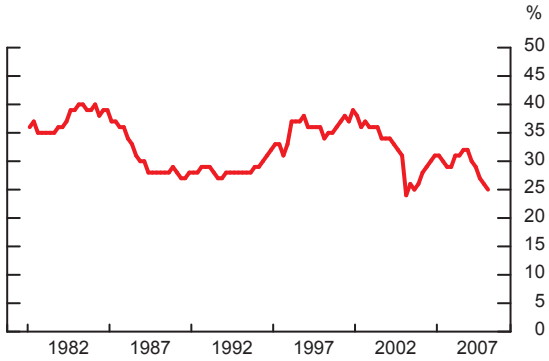
3 This advance announcement will reduce the extent to which banks may feel obliged to hold extra capital to protect themselves against the uncertainty that the buffer may be activated, since it gives them time to increase capital after the announcement and therefore more choice in how they achieve higher capital levels. While a 12-month pre-announcement may seem lengthy, one should not underestimate the signalling component of buffer decisions and associated commentary on macrofinancial conditions, which is likely to affect bank behaviour at the time buffer decisions are announced, not when they take effect.

Box 1

The Buffer Add-On from the Perspective of the Major Canadian Banks

Canada's six largest banks are all internationally active. **Chart 1-A** plots the average share of foreign claims in their total assets since 1982. The chart shows that the majority of the exposures are domestic, peaking at 75 per cent of total assets in the most recent data. Foreign exposures have been important over this period and show considerable variation, ranging from 23 to 40 per cent of total assets. To implement the countercyclical capital buffer, it is therefore essential for authorities to have *timely* information on the geographical distribution of the banks' assets.

Chart 1-A: Since 1982, foreign claims of the six major banks have ranged between 23 and 40 per cent of assets



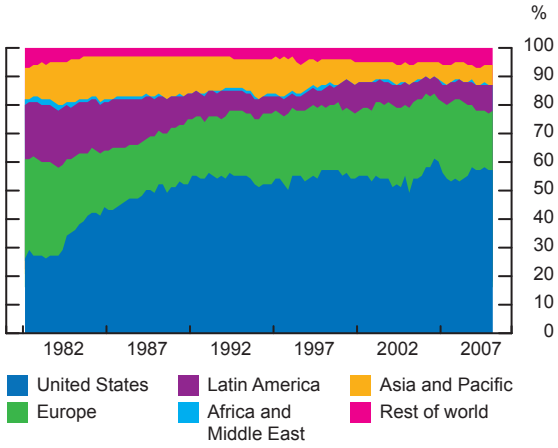
Source: Office of the Superintendent of Financial Institutions Last observation: 2010Q1

Internationally active banks must hold buffers for a foreign jurisdiction if they have private sector exposures in that jurisdiction that attract a capital charge for credit risk and if the authorities in that jurisdiction have activated the buffer. A bank's total countercyclical capital requirement will thus be a weighted average of the buffers applied in the jurisdictions to which it has exposures. The weighting applied to these buffers will be the share of the bank's charge for credit-risk exposures in one jurisdiction in the total credit-risk charge for exposures across all jurisdictions. The total amount of capital held for a bank's countercyclical buffer may include capital held against domestic and foreign exposures (e.g., exposure1) multiplied by the buffer set by the authorities in each jurisdiction (e.g., buffer1):

Buffer = (exposure1 x buffer1 + exposure2 x buffer2 + ... + exposureN x bufferN).

To illustrate which foreign jurisdictions will be most important for the buffer calculation, **Chart 1-B** shows the breakdown of the foreign exposures of the six major

Chart 1-B: The United States and Europe account for the majority of foreign claims of the six major banks



Source: Office of the Superintendent of Financial Institutions Last observation: 2010Q1

banks as a group, measured on the basis of ultimate risk.[1] Not surprisingly, foreign claims on U.S. counterparties represent the largest percentage, followed by claims on European counterparties. The main development since 1982 is an increase in the share of claims on U.S. counterparties, which was mostly complete by the mid-1990s. If historical patterns continue, these plots suggest that, after the domestic buffer, developments in the U.S. buffer and, to a lesser extent, the buffers for European countries should have the strongest influence on the overall buffers that the six major banks would be required to hold. However, exposures in other regions may be important for individual banks (e.g., Latin and South America in the case of Scotiabank).

1 Calculating foreign claims on the basis of ultimate risk allocates claims to the country where such risk lies; i.e., the country in which the guarantor of the financial claim resides or in which the head office of a legally dependent branch incurring the exposure is located. In contrast, foreign claims are measured on an immediate-borrower basis, which captures the location where the borrower resides. **Charts 1-A** and **1-B** show the total nominal exposures (not risk-weighted exposures) that will be necessary for the calculation of bank-specific countercyclical capital buffers.

add-on will therefore need to take into account a broad array of information.

A useful indicator for setting the buffer must be available on at least a quarterly basis (or even more frequently) and provide information about the presence of excessive credit growth in *real* time. It is often argued that the buildup of imbalances is a cumulative process, and, thus, that data in the form of gaps from long-run trends are the most informative. In this case, the determination of the trend is an important issue. Ideally, authorities would be able to rely on measures of the gap that are available frequently and not subject to large revisions. It will therefore be important to better understand how innovations in the financial sector and regulatory change are likely to influence long-run trends in the data.

The deviation of the private sector credit-to-GDP ratio from its trend (also known as a credit gap) was put forward in the BCBS proposal as a common, internationally available starting reference point or "guide" to help authorities make and explain decisions on buffers. An advantage of a credit-to-GDP ratio that incorporates measures of credit from institutions and markets is that it is less prone to strategic manipulation by the individual institutions to which the buffer would be applied. Another advantage is that the credit-to-GDP ratio is influenced by the behaviour of the banking sector as a group. This credit gap, which also accounts for the fact that aggregate credit demand and supply grow with the size of the economy, has historically shown success as a leading indicator of banking crises in various countries.[4] However, this indicator is unlikely to adequately pinpoint the appropriate timing for the release of the countercyclical buffer, since it tends to rise as a crisis worsens, reflecting in part the decline in GDP (the denominator of the ratio) and the fact that the demand for credit can rise at the start of a crisis. Determining the appropriate timing of the release of the countercyclical buffer is critical to prevent capital regulation from further reducing the supply of credit to the economy.

The BCBS proposal and Drehmann et al. (2010) highlight some additional information that might be useful for decisions on when to activate and release the buffer. This information includes indicators of banking sector performance (earnings, losses or asset quality); the cost and availability of credit (funding spreads and credit conditions surveys); the prices of broad classes of assets (real estate and equity prices); and other measures of the amount of financial intermediation (apart from the credit-to-GDP ratio).

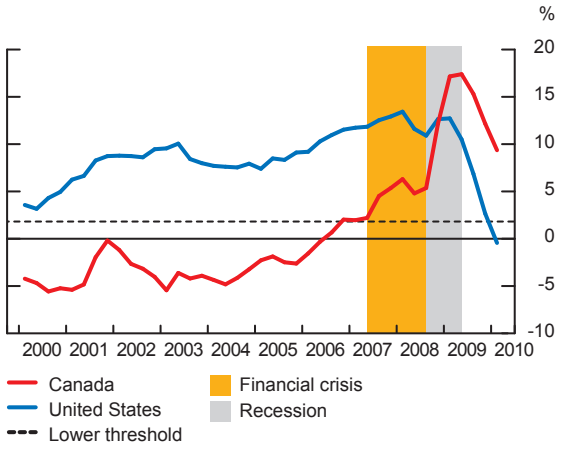
Illustration: The Recent Crisis

To illustrate, we now consider what a small set of indicators, including the credit-to-GDP gap, might have signalled to authorities in Canada and the United States in the period before and during the crisis and recession. These indicators were chosen for illustration purposes, and this discussion is not a comprehensive examination of all the available information that might be considered.

Chart 1 shows the gap in the credit-to-GDP ratio for Canada and the United States. This indicator is a rough measure of the aggregate leverage of the financial system (relative to trend) as it captures aggregate debt levels over a measure of aggregate income. Aggregate private sector credit for Canada is constructed from data series published by the Bank of Canada and includes all credit extended to households and non-financial firms. It captures lending by institutions (banks and private non-bank lenders) and debt raised in financial markets (bankers' acceptances, commercial paper and corporate bonds). The credit-to-GDP ratio is detrended, using the procedure suggested in the BCBS proposal.[5] The yellow area of the chart indicates the first part of the crisis, starting in 2007Q3, and the grey area indicates the Canadian recession, which began in 2008Q4.

Consistent with earlier empirical work by Borio and Lowe (2002), the BCBS proposal and Drehmann et al. (2010) have shown that the larger the credit-to-GDP gap, the more informative it is with respect to future crises. As a result, the methodology for the reference guide described in the BCBS proposal includes a notional threshold that is broadly consistent with cross-country evidence and is intended to

Chart 1: Canada and the United States showed marked differences in the credit-to-GDP gap



Sources: U.S. Federal Reserve, Flow of Funds, U.S. Bureau of Economic Analysis, Bank of Canada and Statistics Canada
Last observation: 2010Q1

4 One of the criteria used to assess the forecast performance of an indicator is the noise-to-signal ratio. This measure accounts for the frequency with which an indicator gives false-positive signals (i.e., signals a crisis when one does not happen) and false-negative signals (signals no crisis when one happens). Drehmann et al. (2010) show that the credit-to-GDP ratio achieves the lowest noise-to-signal ratio (performs the best) among a range of indicators considered.

5 The proposal suggests calculating the trend using the Hodrick-Prescott filter. We use data from 1969 to 2010.

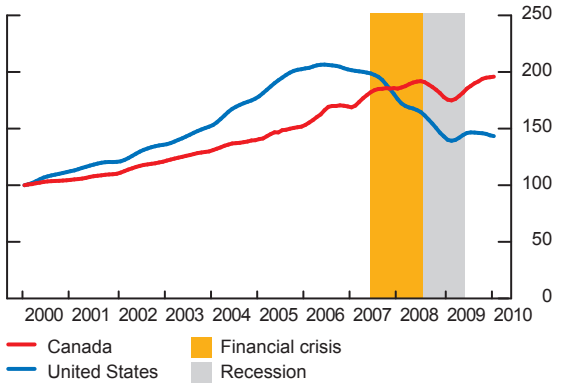
signal when the credit gap might be reaching a level that warrants attention. The proposal suggests a threshold of 2 per cent for the credit-to-GDP gap, which is plotted as a dashed horizontal line in **Chart 1**.

Two other indicators that contain information that might be useful to the decisions on buffer activation and release are also considered: house prices **(Chart 2)** and spreads on corporate bond yields relative to government bond yields **(Chart 3)**.[6] Rapid and sustained changes in asset prices, particularly the prices of residential or commercial property, may signal growing imbalances in these markets. Because many commercial banks have large mortgage loan portfolios, a bust in the housing market may have a simultaneous large negative impact on bank balance sheets. An index of corporate BBB-rated bond yields relative to government bond yields is an indicator of credit quality for the broad economy, as well as the cost of financing and the risk appetite of investors. Very low spreads may be present in a boom, followed by sharp rises in a bust. An indicator of credit spreads in the banking sector, such as an index of credit default swaps (CDS) for banks, could also be informative, but these are not actively traded for Canadian obligors.

In Canada, the credit-to-GDP gap **(Chart 1)** was not positive until the latter part of 2006, just before the crisis began, and did not exceed the threshold value proposed by the BCBS (dashed line) until just before the crisis. This indicator suggests that the rise in credit was generally in line with the increase in economic activity, rather than a sign of excessive credit growth.[7] In part, this reflects the fact that Canada did not have the same easing in lending standards that characterized subprime-mortgage lending in the United States. Although Canadian house **(Chart 2)** and equity prices were climbing steadily over this period, and corporate bond yield spreads were historically low **(Chart 3)** in the three years before the crisis, the credit-to-GDP ratio suggests that these developments were not fuelled by higher leverage in the private sector as a whole, and thus were less likely to suggest the buildup of system-wide risk.

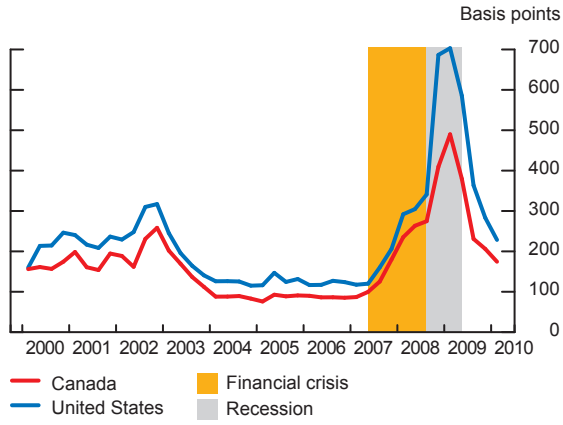
It should be kept in mind that the lack of a signal from the credit-to-GDP ratio before the crisis is consistent with the fact that the crisis originated outside Canada. It is unlikely that any domestic indicator will be a good leading indicator if the source of the banking stress is a spillover from a foreign shock. This is the role of the buffer add-ons for international exposures **(Box 1)**. Therefore, one should consider whether there were advance signals to increase the buffer for exposures to foreign jurisdictions.

Chart 2: House prices were rising before the crisis
Indexes (January 2000=100)



Sources: Standard & Poor's and Teranet/National Bank — Last observation: 2010Q1

Chart 3: Yield spreads on corporate bonds rose sharply as the crisis developed



Source: Merrill Lynch — Last observation: 2010Q1

The case of the United States is illustrative. In contrast to the Canadian experience, a U.S. credit-to-GDP buffer guide and other supplementary indicators would have sent the same signals of excessive credit growth and rising systemic risk. Hence, this evidence suggests that rising house and equity prices were being fuelled, in part, by rising financial leverage in the U.S. economy. The U.S. credit-to-GDP gap exceeded the BCBS's proposed threshold between 2000 and 2009 **(Chart 1)**. U.S. house prices also rose sharply after 2003, and yield spreads on corporate bonds were at historical lows by 2004. The U.S. example shows the potential for available information to signal the need to build up the countercyclical capital buffer. If the BCBS proposal had been in place at the time, and if U.S. authorities had raised the buffer in response to these signals, Canadian banks would have held a higher buffer of capital against their U.S. exposures prior to 2007.

6 House prices are the nominal price from the repeat-sale house price index from Teranet/National Bank for Canada and Standard & Poor's Case-Shiller Index for the United States. Chart 2 indicates the percentage increase in house prices since January 2000 in each country.

7 Note that the rise in the credit-to-GDP gap in Canada during the crisis and recession is an illustration of the concerns, raised in the BCBS proposal, that this measure can be misleading during a downturn.

Equally important as the timing of the activation is the timing of the release phase, when the countercyclical capital buffer is lowered to allow bank capital to absorb losses, thus mitigating the negative impact of losses on lending. Since the demand for credit tends to rise at the start of a recession, it is not surprising that the U.S. credit-to-GDP ratio was very slow to signal the need to release the buffer. However, as the crisis unfolded, there was a sharp rise in the spreads on corporate bond yields **(Chart 3)** and a rapid decline in house prices in the United States. Both of these indicators provided a signal for the release of the buffer, even as the credit-to-GDP gap continued to rise.

Conclusion

The new Basel III capital rules for banks include a countercyclical capital buffer to mitigate the tendency of bank capital regulation to amplify movements in lending conditions and real economic activity. This buffer will rise during periods of excessive credit growth associated with increasing systemic risk, and thus help to protect banks in the event of an adverse turn in the credit cycle. It will be released when the cycle turns, reducing the pressure on banks to deleverage to meet regulatory capital requirements. An additional benefit will be the reduction in system-wide risk during the boom phase of the cycle.

We have described the main features of the framework for the countercyclical buffer proposed by the BCBS. When this framework is in place, Canadian authorities will regularly assess a range of indicators to evaluate the evolution of system-wide risks in the financial system and form a view on the appropriate setting for the capital buffer. This type of information is regularly analyzed as part of the Bank of Canada's system-wide surveillance activities. The Bank's analysis will complement that from other relevant federal authorities in informing buffer-setting decisions.

A key advantage of the countercyclical capital buffer is that banks are required to carry the additional capital only when systemic risk is building. In addition, the reciprocity provisions in the buffer framework give domestic authorities confidence in knowing that any actions they take will not be undercut by foreign authorities, which will help to promote a level playing field for all banks with exposures in a particular jurisdiction.

Given the importance of judgment in buffer decisions, it is crucial that authorities explain the reasons for their actions to foster accountability and help banks and market participants manage uncertainty about future capital requirements. Thus, as recommended in the BCBS proposal, a key element in the implementation of a countercyclical capital buffer is the development of a communications strategy to achieve these goals. Canadian authorities will be considering the appropriate strategy for the Canadian context.

A countercyclical capital buffer is just one component in a set of system-wide tools. These tools should be designed to address problems at their source. The countercyclical capital buffer is likely to be used when more-targeted measures are unavailable, or unsuccessful, and when there is a need to prepare banks for the turn in the credit cycle. Used appropriately, the countercyclical capital buffer will help to maintain economic growth during periods of financial and economic stress.

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Strengthening the Infrastructure of Over-the-Counter Derivatives Markets

Carolyn Wilkins and Elizabeth Woodman

Introduction

Strengthening the infrastructure of over-the-counter (OTC) derivatives markets is a priority of policy-makers across the G-20 in their efforts to establish a framework for a safer, more resilient global financial system. While activity in OTC derivatives markets was not the immediate cause of the financial crisis,[1] certain features of these markets helped to amplify the crisis because of the size and interconnectedness of the major participants, the concentration and magnitude of bilateral counterparty credit exposures, and a lack of transparency regarding these exposures (Duffie 2010). The crisis demonstrated how rapidly concerns about the solvency of a large counterparty could spread across the network of participants and destabilize markets. Uncertainty regarding exposures to credit derivatives contributed significantly to the heightened concerns about counterparty risk that led to the failure (or near failure) of Bear Stearns, Lehman Brothers and American International Group (AIG) (Acharya and Richardson 2009; Brunnermeier 2009). The opacity of OTC derivatives markets also meant that regulators lacked the necessary information to respond to and resolve the events of the crisis.

Policy-makers around the world are championing reforms to OTC derivatives markets that will reduce bilateral counterparty credit risk, increase transparency, and "provide firewalls to help prevent the knock-on effects of an institution's failure and allow shocks to be absorbed more easily" (IMF 2010). The leaders of the G-20 member countries have committed to an ambitious overhaul of OTC derivatives markets that aims, by the end of 2012, to increase the standardization and central clearing of OTC derivatives contracts; move trading onto exchanges or electronic trading platforms, where appropriate; report all trades to trade repositories; and impose higher capital requirements for non-centrally-cleared contracts.

This report discusses how these reforms, by strengthening the infrastructure of OTC derivatives markets, can improve the resilience of financial markets and, hence, the safety of the financial system. It begins with a brief discussion of OTC derivatives markets, both globally and within Canada. The remainder of the report addresses what the reforms are intended to achieve, the progress made to date on implementing the reforms internationally and within Canada, and the main challenges for implementation.[2]

OTC Derivatives Markets

Since the mid-1990s, OTC derivatives markets have experienced considerable growth on a global basis, both insize and in the number and complexity of products. At the end of 2009, the notional amount outstanding in OTC derivatives, globally, was US$615 trillion.[3] Interest rate derivatives account for the largest share of the market (83 per cent), followed by foreign exchange (FX), credit, equities and commodities **(Chart 1)**.[4] A substantial share of the trading, globally, is conducted by a small number of dealers located in large financial centres, mainly in London and New York. Preliminary data from the 2010 Bank for International Settlements (BIS) triennial survey suggest

1 The events of the financial crisis of 2007–09 are discussed in Acharya and Richardson (2009).

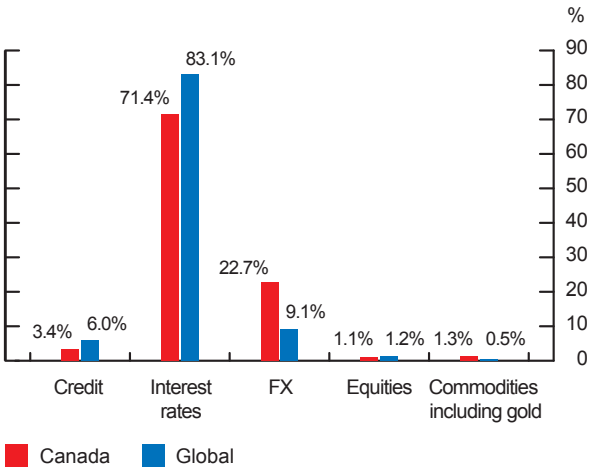
2 A working group of the Financial Stability Board (FSB 2010) was mandated to make recommendations on the implementation of the G-20 objectives. The group examined how the objectives can be achieved consistently across jurisdictions while promoting greater use of OTC derivatives in standardized form.

3 The notional amount outstanding is the value of outstanding contracts, which is used as the basis for determining payments on derivatives contracts. It is a useful measure for assessing market size and structure but should not be considered a measure of the riskiness of the positions. Definitions used by the Bank for International Settlements can be found in BIS (2007b).

4 A more detailed breakdown is provided in OTC DWG (2010).

Chart 1: Most OTC derivatives are in two asset classes: interest rates and foreign exchange

Share of gross notional amount outstanding, by asset class, end-2009



Sources: Bank for International Settlements and Canadian Market Infrastructure Committee (see OTC DWG 2010). Both sources include amounts that have not been allocated across asset classes. The percentages are based on totals adjusted to remove "unallocated" amounts.

that the United Kingdom and the United States, together, account for about two-thirds of the total turnover[5] in interest rate derivatives and 50 per cent of the turnover in FX derivatives.[6]

Similar to several other G-20 countries, Canada represents a small share of the OTC derivatives market (less than 2 per cent of the notional amount outstanding or US$10.1 billion).[7] Reflecting the global nature of the market, Canada's six largest financial institutions book nearly 40 per cent of their transactions (by notional value) outside of Canada, and those booked domestically often have a foreign counterparty on the other side of the trade. Overall, 80 per cent of transactions are booked in a foreign jurisdiction on at least one side of the transaction.[8] Relative to the global market, FX contracts are more widely used in Canada (23 per cent versus 9 per cent globally), partly reflecting the importance of FX swaps to the core funding of Canadian financial institutions (CFEC 2010; Terajima, Vikstedt, and Witmer 2010). As in the global market, the largest asset classes for OTC derivatives, by notional amount, are interest rates and FX **(Chart 1)**.

Need for Reform

OTC derivatives can provide a substantial benefit to economic efficiency by enabling the effective management of business and operational risks. As the financial crisis revealed, however, certain features of OTC derivatives markets are in need of fundamental reform in order to make the financial system safer and more resilient to stress.

Trading of OTC derivatives is decentralized, and transparency is limited. Counterparties negotiate trades directly with each other over the phone or electronically, resulting in a market structure that is organized around an informal network of bilateral relationships. Market participants are exposed to counterparty credit risk (counterparty risk), which is the risk that a counterparty will default prior to the maturity of the derivatives contract and will not make the agreed-upon current and future payments. This risk is concentrated in a small group[9] of large, complex financial institutions that act as contract counterparties to each other and to other market participants.

Over the past 10 years, the industry has made considerable progress in improving the management of counterparty risk—for example, through the bilateral netting and posting of collateral on net exposures.[10] However, because risks are managed bilaterally, the risk that each trade imposes on the financial system is not taken into account in the setting of collateral and margin requirements (Acharya and Richardson 2009). Because the market is opaque to participants and regulators, it is possible for some participants to build up a large exposure that has not been sufficiently capitalized to mitigate the risk involved. Thus, market resilience can be adversely affected by inadequately managed counterparty risk, the opacity of the market, and post-trade infrastructure that has, at times, failed to keep pace with the rapid creation of new products and the rise in trading volumes.[11]

Events such as those leading to the rescue of the U.S. insurance firm, AIG, are a case in point.[12] AIG, through its subsidiary, AIG Financial Products, was able to sell protection on credit default swaps (CDS), linked to U.S. subprime mortgages, with a notional value of over US$500 billion.[13] AIG's AAA rating meant that it was not required to post

5 Turnover is a rough proxy for market liquidity, defined by the BIS as the absolute gross value of all deals concluded during the month, in notional value, divided by the number of trading days in that month.

6 Preliminary survey results can be found in BIS (2010b).

7 Data for the six largest Canadian banks as of December 2009. See OTC DWG (2010).

8 The entity booking a trade in a foreign jurisdiction could be either a Canadian dealer's foreign subsidiary or a foreign counterparty.

9 Singh and Aitken (2009) report that, prior to the crisis, 90 per cent of the activity in OTC derivatives was handled by 10 large, globally active dealers.

10 The industry, through the International Swap Dealers Association (ISDA), has created master agreements that allow for cross-product bilateral netting between two counterparties to reduce payment and close-out amounts (the latter refers to the amount that would be referenced in the event of bankruptcy). The increased use of collateral has been supported by the development of Credit Support Annexes to these agreements. Progress has also been made to eliminate redundant contracts outstanding (see IMF 2010).

11 See BIS (2007a) and Ledrut and Upper (2007).

12 The details of the AIG episode are complex and difficult to describe fully in this report. For a detailed account, see Sjostrom (2009).

13 In return for a premium, a CDS contract provides insurance to the buyer against various credit events affecting an underlying bond or company. If a credit event (e.g., bankruptcy) is triggered, the seller of the protection must compensate the buyer of the CDS according to the terms of the contract.

collateral on its derivatives contracts. The firm was therefore able to accumulate an excessively large uncollateralized position. Furthermore, in contrast to the practices of most dealers, AIG did not hedge its positions using an offsetting exposure. As the financial crisis unfolded and the U.S. subprime-mortgage market deteriorated, large losses were incurred in the securities for which AIG had sold protection, requiring the firm to provide compensation. A subsequent downgrade in AIG's AAA credit rating triggered massive collateral calls on its OTC derivatives contracts that the firm was unable to meet. The potential knock-on effects of an AIG bankruptcy prompted the U.S. Federal Reserve to take action to prevent AIG's failure. While they may not have prevented AIG's difficulties, it is likely that the reforms proposed by the G-20 (e.g., increased transparency and appropriate incentives for managing the risks of OTC derivatives transactions) could have discouraged AIG from building up such large uncollateralized exposures.

G-20 Reform Initiatives

The weaknesses in market infrastructure that were exposed during the crisis motivated the G-20 leaders to commit to an ambitious overhaul of the infrastructure of OTC derivatives markets, stating that:

> All standardized OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end-2012 at the latest; OTC derivative contracts should be reported to trade repositories. Non-centrally cleared contracts should be subject to higher capital requirements.[14]

In some jurisdictions, efforts to implement these reforms are well advanced. The Japanese parliament has approved legislation requiring central clearing of OTC derivatives and trade reporting by 2012, and, in the United States, the recently enacted Wall Street Reform and Consumer Protection Act contains provisions regulating market participants and markets, including mandatory central clearing, exchange trading, real-time price transparency and higher capital charges for bespoke derivatives. Draft regulation for the mandatory clearing of OTC derivatives and reporting to trade repositories was introduced in Europe in September and is expected to be finalized in mid-2011. As well, there are plans to address trading venues in an amendment to the Markets in Financial Instruments Directive (MiFID) by mid-2011 at the latest. The progress made to date in Canada is outlined in **Box 1**. In the remainder of this report, we discuss the objectives of the reforms and the main challenges for implementation.

Standardization

The push for greater standardization of OTC derivatives is at the heart of the proposed reforms, because standardization is a necessary condition for central clearing and trading on an electronic trading platform or exchange. Other benefits of increased standardization include reduced operational risk, greater comparability of contracts (which reduces information asymmetry and improves valuation and risk management), facilitation of reporting and information sharing for regulatory purposes, and enhanced reliability of information (FSB 2010; CESR 2010).

Three aspects of standardization must be addressed to support the G-20 initiatives: product, legal and process standardization. Product standardization applies to the economic terms of the OTC derivatives contract—for example, contract size and maturity, collateral, delivery date, and delivery location. While there is considerable room to improve product standardization for the purposes of central clearing, some products are likely already sufficiently standardized to support exchange trading (e.g., benchmark credit default swap indexes). That said, there will continue to be a role for customized OTC derivatives contracts that provide important economic benefits to end users (FSB 2010).

Standardization of legal documentation and terms reduces the complexity of contracts, provides greater legal certainty and allows counterparties to focus on the negotiation of economic terms. Although further work is needed in this area, the industry, through ISDA, has made considerable progress in legal standardization across all asset classes. Significant accomplishments include those previously mentioned aimed at improving the management of bilateral counterparty risk, standard definitions for all asset classes and standard agreements that facilitate trade confirmations.

Process standardization is aimed at reducing operational risk by automating the various aspects of the different trading and post-trade processes. In exchange trading, post-trade steps are typically handled seamlessly within the exchange. In today's OTC derivatives markets, there can be many different systems involved in various aspects of post-trade processing (including manual processes) leading to operational inefficiency and risks. This has been a concern of regulators for some time, and much progress has been made in addressing this issue, including the reduction of confirmation backlogs for credit derivatives.[15]

For standardized OTC derivatives to be eligible for central clearing, authorities must also consider factors such as the depth and liquidity of the market in which the product is

14 These commitments, made at the Pittsburgh Summit in September 2009 (Group of 20 2009), were reconfirmed at the Toronto Summit in June 2010, at which time they were modified to address margin requirements for CCPs that take account of procyclicality, place somewhat greater emphasis on standardization and transparency, and stress the need for internationally consistent standards and implementation.

15 Since 2005, prudential supervisors of the largest global dealers have been actively working with the industry (the largest global dealers, ISDA, and, more recently, with buy-side participants) to address these issues. See <http://www.newyorkfed.org/newsevents/news/markets/2010/100301_letter.pdf>.

Box 1

Progress in Reforming Canadian Markets for OTC Derivatives

Canada has been working on both the international and domestic fronts towards the reform of OTC derivatives markets. Internationally, Canada has taken an active role in many areas of reform, including work with the Basel Committee on Banking Supervision (BCBS) on the capital framework to be applied to OTC derivatives transactions; standards for the safety and soundness of financial market infrastructure, including CCPs, now under review by the Committee on Payment and Settlement Systems (CPSS) and the International Organization of Securities Commissions (IOSCO); as well as the policy framework developed by the Financial Stability Board (FSB 2010). Domestically, an inter-agency working group (OTC DWG), chaired by the Bank of Canada, is developing policy options for Canada and has issued a discussion paper with preliminary recommendations for reform (see OTC DWG 2010).

The OTC DWG is composed of members from the Bank of Canada, the Federal Department of Finance, the Office of the Superintendent of Financial Institutions (OSFI), the Ontario Securities Commission (OSC), the Autorité des marchés financiers (AMF), and the Alberta Securities Commission (ASC). In order to develop a sound regulatory framework for OTC derivatives, securities regulators must have the appropriate legislative authority. The Canadian Securities Administrators (CSA), a national coordinating body for the provincial securities regulators, issued a consultation document in November containing high-level proposals regarding the regulation of OTC derivatives (CSA 2010). The report states that "clear jurisdictional authority in each province, as well as specific rule-making powers, need to be set out in provincial securities and derivatives legislation" (p. 56). Consistent with this, Ontario's draft Bill 135 (released in November) contains proposed amendments to the Ontario Securities Act that would establish a regulatory framework for trading in derivatives. The proposed Canadian Securities Act, released by the Government of Canada in May 2010, establishes a broad framework for the regulation of OTC derivatives under the Canadian Securities Regulatory Authority.

The official sector in Canada is working closely with stakeholders in OTC derivatives markets, including dealers, buy-side participants and service providers, both domestically and internationally. The Canadian Market Infrastructure Committee (CMIC) was formed to examine, from an industry perspective, the various issues related to the implementation of the G-20 commitments for OTC derivatives and to make recommendations to public authorities. Given the industry's crucial role in the implementation of these reforms, this is a very welcome development. The CMIC and OTC DWG are currently assessing how Canadian market participants might access central clearing for OTC derivatives, focusing on three options: (i) expanded global CCP offerings to include a broader range of Canadian-dollar products; (ii) the establishment of a stand-alone Canadian CCP with linkages to regional or global CCP(s); and (iii) the establishment of a Canadian CCP that would be an affiliate of an established global CCP. The official sector has also engaged the CMIC on other aspects of reform, including the standardization of OTC derivatives products, trade repositories and increased transparency in OTC derivatives markets.

traded and the availability and reliability of pricing (FSB 2010). This information is necessary to ensure that a CCP can effectively manage a contract's risks. To implement the G-20 commitments, authorities will need to work with market participants to determine which products are suitable for central clearing. It is necessary to set ambitious targets to discourage the industry from using customized contracts in order to avoid clearing and also to monitor the progress made in meeting the G-20 commitments.

Benefits and Challenges of Central Counterparty Clearing

Implementation of the G-20 commitments related to central clearing will require international coordination to ensure non-discriminatory access for all G-20 members and to ensure that the reforms achieve the intended objectives of enhancing the safety and resilience of the global financial system. As discussed in Chande, Labelle, and Tuer in this *Review*, the increased use of CCPs can reduce systemic risk through a number of channels. Aside from reducing the counterparty risk assumed by major market participants

and the uncertainty regarding market-wide counterparty risk exposures, increased use of central counterparties would reduce the propagation of financial stress across the network of major market participants.[16] A CCP with proper risk-mitigation mechanisms would, in conjunction with other reforms, help ensure that the failure of an individual institution would not jeopardize systemic integrity and market confidence.

That said, CCPs that clear OTC derivatives transactions can pose a number of additional challenges for risk management compared with CCPs that clear cash-based securities and, to some extent, exchange-traded derivatives.[17] First, unlike cash-based securities that settle in one or two days, OTC derivatives often have long contract maturities over which the CCP must manage the associated risks. Second, it can be more challenging to calculate the margin required to cover risks given that some OTC derivatives markets lack liquidity and reliable consensus pricing and that the contracts may have non-linear payoffs. Finally, CCPs that clear OTC derivatives are relatively new or non-existent for some asset classes and most products, while CCPs for cash products have a longer history. As a result, in many cases, best practices for risk management, third-party clearing and oversight have yet to be developed and are largely untested for OTC derivative CCPs.[18] The CPSS-IOSCO review of standards for financial market infrastructure will set the bar for the risk management of this important infrastructure.

The global nature of OTC derivatives markets and the economics of clearing pose additional challenges for ensuring relatively low-cost and broad access to CCP services, within an appropriate risk-control framework. This is because only a relatively small number of financial institutions may be large enough to have direct access to central clearing services, with smaller financial institutions and buy-side participants being required to clear indirectly through these large institutions. These challenges are particularly important for smaller jurisdictions, such as Canada and Australia, that are located outside of the main financial centres in which most OTC derivatives contracts are booked.

Access to central clearing for Canadian financial institutions and buy-side participants could, in principle, be achieved either through participation in global CCPs or through the development of a domestically domiciled CCP (either a Canadian CCP or an affiliate of a global CCP) that establishes links to a global CCP (see **Box 1**). Given the global nature of OTC derivatives activity in most asset classes, a stand-alone Canadian-domiciled CCP (i.e., a Canadian-domiciled CCP that was not linked to a global CCP) would not likely be viable.[19]

In assessing these options, it is important to consider several factors that are relevant for risk reduction and efficiency. These include the degree to which exposures would be reduced through netting, the mechanism available for Canadian authorities to ensure that CCPs clearing Canadian products and serving Canadian financial institutions are properly overseen and risk-proofed, and the safe and cost-effective design of links between CCPs, should links be required. It is also essential to consider how the clearing of Canadian products by CCPs would be prioritized now and in the future under different access options in order to foster resilient markets and healthy innovation. These options must also be assessed in terms of their implications as to whether Canadian OTC derivatives dealers are able to retain their ability to compete in the global marketplace. Finally, it will be important to consider how CCPs clearing Canadian products could obtain effective access to extraordinary Canadian-dollar liquidity from the Bank of Canada.

Increasing Transparency in OTC Derivatives Markets

As discussed earlier, the lack of transparency in OTC derivatives markets made it difficult for regulators and market participants to recognize the buildup of risks prior to the crisis and to respond to and resolve the events of the crisis. Transparency can be improved through the establishment of trade repositories (TRs), which are a new form of market infrastructure. TRs are centralized, electronic registries of transaction records for all OTC derivatives contracts that provide a consistent, credible source of data on OTC derivatives.[20]

The advantage of TRs is that they can provide regulators with a complete picture of the exposures of large market participants by requiring that all trades be reported, including non-centrally-cleared trades. At present, there are three TRs in operation: Warehouse Trust, a TR for credit default swaps operated by DTCC-Derivserv; Tri-Optima's TR for interest rate derivatives; and DTCC's TR for equity derivatives. A TR can provide regulatory authorities with the timely and reliable information required to: (i) assess risks on the books of market participants, particularly systemically important financial institutions; (ii) identify and monitor the buildup of concentration risks; (iii) support the enforcement of regulations for market conduct; and (iv) address risky market practices. A TR can also increase transparency to the market through public reporting of data such as aggregated live positions, transaction activity, aggregate settlement data, and (delayed) transaction-level pricing. The benefits provided by a TR are, however, contingent on the TR being able to access information on the overall market, as would be the case if one global TR were to be developed for each asset class. At the same time, this

16 See Brunnermeier (2009); Duffie, Li, and Lubke (2010); and Caballero and Simsek (2009).

17 See Glass (2009) and Ledrut and Upper (2007).

18 This is reflected in the work under way internationally to revise and develop new standards for financial market infrastructures such as CCPs (FSB 2010).

19 An exception to this are equity-based derivatives, which are mainly traded locally.

20 See BIS CPSS-IOSCO (2010a) and FSB (2010).

poses various challenges for cross-border oversight of the TR, should coverage of, or access to, relevant transactions in offshore TRs be inadequate.

Moving OTC trading to exchanges is one way of increasing market transparency for those OTC derivatives that are sufficiently standardized and liquid. Trading on exchanges increases both pre-trade and post-trade transparency to market participants, because, on an exchange, participants have access to firm quotes and real-time information on trade prices.[21] This type of price transparency has the potential to improve market efficiency, as well as levelling the playing field for market participants, thus offering greater protection to unsophisticated or uninformed market participants. Electronic trading platforms[22] can also increase transparency for trades in OTC derivatives, typically by offering limited pre-trade transparency and indicative quotes (for example, to a smaller group of market participants than would be the case with a regulated exchange).

Any regime for improved price transparency imposed on OTC derivatives markets would have to be designed to minimize its potential negative impact on liquidity, since some forms of price transparency could impair dealers' market-making ability, thus withdrawing liquidity from the market.[23] A potential reduction in aggregate hedging capacity is also possible if market-making activity is shifted away from customized OTC contracts in favour of standardized exchange contracts.[24] The appropriate trading venue and level of transparency are thus dependent on a number of factors, including the depth of liquidity, and should be carefully considered before imposing rules. To assist local authorities in this effort, the IOSCO Task Force on OTC Derivatives Regulation is evaluating the benefits and the challenges of implementing measures aimed at increasing exchange and electronic trading and assessing the appropriateness of drafting international standards.

Conclusion

The reform of OTC derivatives markets is a major initiative of G-20 countries, designed to increase the resilience of the global financial system by reducing bilateral counterparty credit risk, reducing operational and legal risks, and increasing transparency to both financial market participants and regulators. Reform is well under way in many jurisdictions, including the United States, Japan and Europe. Canada has been working on both the international and domestic fronts towards the reform of OTC derivatives markets. The official sector in Canada, including the Bank of Canada, Finance Canada, OSFI, the OSC, the AMF and the ASC, is working in a coordinated manner with stakeholders in OTC derivatives markets, including dealers, buy-side participants and service providers, both domestically and internationally. The scope of the reforms is broad and will profoundly change the architecture of OTC derivatives markets. Achieving the implementation deadline (the end of 2012) is ambitious and will require a concerted effort on the part of the official sector and the industry. Finally, ongoing monitoring will be required to ensure that this important infrastructure is developed in a manner that contributes to the safety and resilience of the global financial system.

21 Pre-trade transparency refers to publishing quotes and orders for transactions, while post-trade transparency is reporting on the details of completed trades (FSB 2010).

22 See FSB (2010) for a discussion of the features of exchanges and electronic trading platforms.

23 See, for example, Financial Services Authority and HM Treasury (2009).

24 The price at which dealers offer customized contracts is likely to be higher if they find it more difficult to reduce the risk related to these contracts as volumes move to more standardized OTC or exchange-traded contracts.

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Central Counterparties and Systemic Risk

Nikil Chande, Nicholas Labelle and Eric Tuer

Introduction

Financial market infrastructures played an important role in the financial crisis of 2007–09. In some cases, they were a stabilizing force, allowing transactions to continue to settle even when uncertainty about the credit exposures of participating institutions reached its peak.[1] For instance, Canadian payment and settlement systems functioned well during the crisis, and even in countries most directly impacted by the crisis, domestic large-value payment systems continued to operate smoothly.[2] In addition, despite record volumes in foreign exchange (FX) markets, CLS Bank continued to effectively manage settlement risk in FX markets during the financial crisis and the period that followed.[3]

In other cases, weaknesses in financial market infrastructures led to heightened uncertainty, resulting in disruptions to markets and increased systemic risk.[4] For example, deficiencies in the infrastructure for over-the-counter (OTC) derivatives markets may have exacerbated the crisis (Wilkins and Woodman 2010; Duffie, Li, and Lubke 2010).[5] And in the repo market, uncertainty about the valuation of collateral and the network of bilateral exposures among financial institutions led to heightened aversion to counterparty risk, causing many participants to withdraw from trading (BIS 2010b). The resulting illiquidity in repo markets was a major factor that led to the near-collapse of Bear Stearns and its subsequent purchase by J.P. Morgan Chase in March 2008 (Fleming, Hrung, and Keane 2010).

To address some of the problems experienced during the crisis, policy-makers have promoted greater use of a particular type of financial market infrastructure known as a "central counterparty" (CCP)—a financial entity that takes a buyer or seller position in every trade through the "novation" process. The benefits traditionally associated with CCPs include reduced counterparty credit risk, enhanced netting efficiencies, and reduced potential for the transmission of stresses through the financial system.

Given these benefits, leaders at the G-20 Pittsburgh Summit in September 2009 agreed that "[a]ll standardized OTC derivative contracts should be [. . .] cleared through central counterparties by end–2012 at the latest" (Group of 20 2009).[6] This commitment was reaffirmed at the Toronto Summit in June 2010 (Group of 20 2010). More generally, "[a] number of ongoing policy initiatives are examining the use of CCPs or other centralised clearing infrastructure mechanisms as a potential solution addressing issues of market infrastructure resiliency, market opacity, orderly collateral liquidations, and the management of counterparty credit risk" (CGFS 2010, 20). One of these policy initiatives in Canada is the development of a CCP for the Canadian repo market by the Canadian Derivatives Clearing Corporation (CDCC) **(Box 1)**.[7]

1 See, for example, Bank of England (2009, 5); ECB (2009, 29); and IMF (2010, 4).

2 The smooth functioning of large-value payment systems highlights the success of coordinated efforts on the part of central banks over the past two decades to minimize credit risk in these systems.

3 Settlement risk refers to "the risk that settlement in a funds or securities transfer system will not take place as expected" (CPSS-IOSCO 2004, 66). Although the elimination of settlement risk by CLS Bank helped FX markets to operate without disruption, some FX markets (forwards and swaps in particular) experienced periods of illiquidity during the second half of 2008 (CLS Group 2009, 12).

4 Systemic risk is broadly defined as the probability that the financial system is unable to support economic activity (M. Carney 2010).

5 Banque de France (2010) also provides some interesting views on issues pertaining to OTC derivatives and financial stability.

6 Leaders at the G-20 Pittsburgh Summit also agreed that "all standardized OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate" (Group of 20 2009).

7 See Bank of Canada (2009b).

Box 1

The Canadian Derivatives Clearing Corporation: Becoming a CCP for the Canadian Repo Market

The Bank of Canada has identified the repurchase agreement (repo) market as a core funding market for financial institutions (Fontaine, Selody, and Wilkins 2009).[1] At the height of the financial crisis in September–October 2008, the repo market experienced periods of illiquidity as institutions became increasingly concerned about counterparty credit risk and balance sheets became constrained.

To ensure that this core funding market remains continuously open, the Investment Industry Association of Canada, with the support of the Bank of Canada, issued a request for proposal for the development of CCP services for repos. In December 2009, the Canadian Derivatives Clearing Corporation (CDCC) was selected to provide these services. The CDCC currently operates Canada's main CCP for exchange-traded financial derivatives and is now working with its stakeholders to develop a CCP repo service in a phased-in approach commencing in 2011. Given the important role that the CDCC's new services will play in supporting the repo market, the Bank plans to formally oversee the system once the new services commence operations. To oversee a clearing and settlement system, the Governor of the Bank of Canada must designate it under the Payment Clearing and Settlement Act, and the Minister of Finance must agree that the designation is in the public interest.[2]

1 See also M. Carney (2008) for a discussion of continuous markets.

2 For more background on the Bank of Canada's role in the oversight of clearing and settlement systems and the designation process, see Engert and Maclean (2006).

A well-designed CCP will enhance the resilience of the financial system. In order to deliver the maximum benefits, CCPs need to have strong risk controls and should be subject to rigorous oversight. In this regard, the Committee on Payment and Settlement Systems (CPSS) and the International Organization of Securities Commissions (IOSCO) are reviewing their standards pertaining to the safety and soundness of financial market infrastructures, including CCPs.[8] As they implement these standards through their oversight activities, authorities such as the Bank of Canada need to take a system-wide perspective and ensure that the risk controls and operating practices of CCPs are compatible with well-functioning financial markets. In this report, we discuss three critical elements that should be addressed by authorities in a coordinated manner going forward: the procyclicality of CCP margin requirements; CCP default-management practices; and capital requirements and resolution mechanisms for CCPs.

Benefits and Challenges of CCPs

To provide some context, we begin by describing the three main benefits traditionally associated with CCPs.

First, a CCP can facilitate the management of credit risk for its clearing members. Through novation **(Box 2)**, the credit risk of the original transacting parties is transferred to the CCP. This does not imply that credit risk is eliminated; rather, it is managed by the CCP and redistributed according to a predefined set of rules as to who incurs losses if a clearing member defaults (Ripatti 2004). A well-managed CCP can prevent excessive concerns about counterparty credit risk from affecting markets in times of crisis. It can also reduce the informational costs and asymmetries associated with managing credit risk, since each participant can rely on the CCP, which has a clearer overall view of the interconnections and exposures in the system (Bliss and Steigerwald 2006). The enhanced transparency of markets arising from the introduction of a CCP can also facilitate the monitoring and mitigation of systemic risk by regulators.

A second important benefit offered by CCPs is the enhanced efficiency of netting.[9] A clearing member may have offsetting contracts; i.e., buyer and seller positions on the same product. After novation to the CCP, the offsetting contracts are netted against each other, thereby minimizing the outstanding contracts and the exposures arising from these contracts in the form of payment or securities obligations. In addition, the payment and securities obligations associated with these reduced outstanding contracts can be netted. By netting contracts, as well as payment and securities obligations, the CCP simultaneously reduces the counterparty and liquidity risks faced by each individual clearing member. This multilateral netting can result in collateral savings to the members, since they are required to pledge against a smaller net exposure. It may also provide participants with balance-sheet relief. Allowing participants to simultaneously offset liabilities and assets associated with these contracts enables them to manage their balance sheets more efficiently. In times of stress, this may alleviate the pressure for disruptive deleveraging, as witnessed in some markets during the financial crisis.

8 For more background on the standards review, see BIS (2010a).

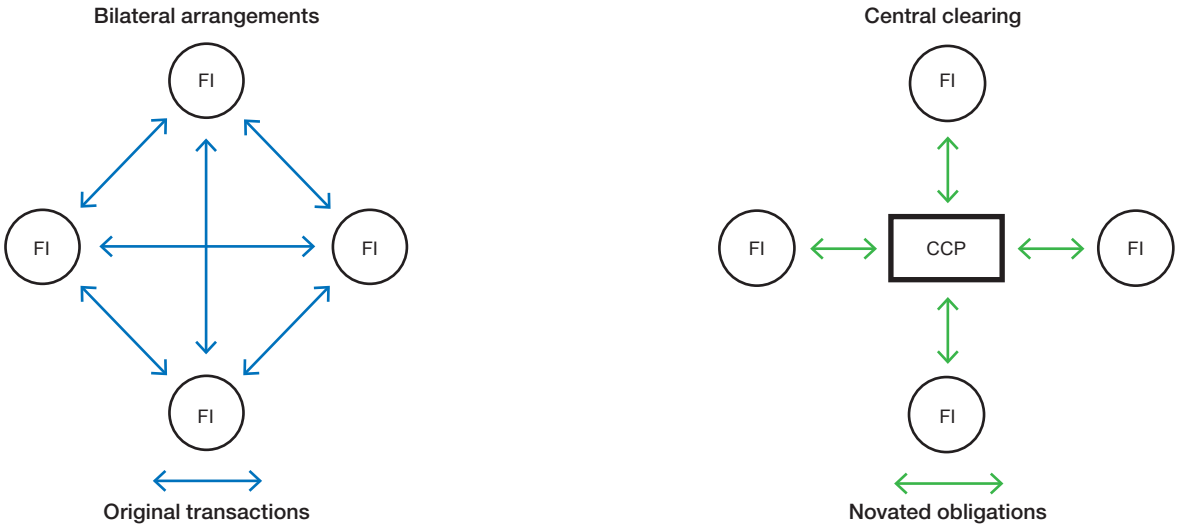
9 Moving from bilateral settlement arrangements to CCPs may not improve netting in all cases—for example, if there is too much fragmentation of clearing activity across separate CCPs (Duffie and Zhu 2010).

Box 2

The Novation Process

A CCP is a financial market infrastructure that interposes itself between two parties in a trade. Through a process known as "novation," the original transaction is cancelled and replaced by two equivalent transactions: one between the seller and the CCP, and the other between the buyer and the CCP. Once the transaction is novated to the CCP, the associated obligations are no longer between the financial institutions that originally contracted, but rather with the CCP. This is the fundamental distinction between central clearing through a CCP and decentralized clearing through bilateral settlement arrangements (Bliss and Steigerwald 2006).

Figure 1



Third, in the event that a clearing member defaults, if the CCP has a robust default-management mechanism, there is a reduced likelihood of contagion spreading to the other members and to broader markets. If the resources pledged to a CCP by the defaulting member are insufficient, residual losses are shared among the survivors in accordance with pre-arranged loss-sharing agreements, which helps to reduce uncertainty in times of stress. By distributing losses across the entire membership, the impact on any individual institution is reduced, mitigating the potential for contagion (Bliss and Papathanassiou 2006).

To maximize these benefits, CCPs must be well managed and have robust risk-management mechanisms and effective oversight. This is because, by definition, a CCP concentrates into one entity the risks that are decentralized in bilateral settlement.[10] For example, as the counterparty to all clearing members, credit risk is concentrated within the CCP and, as a result, it may incur losses if a clearing member were to default. Valuation risk is also concentrated within the CCP, which calculates counterparty credit exposure using market prices and a pricing model. Moreover, a CCP faces liquidity risk since, in the event of a default, it must continue to fulfill its obligations to non-defaulting members in a timely manner. In addition, operational risk is particularly relevant for a CCP because system deficiencies, human errors or disruptions from external events can have wide-ranging impacts. A CCP also faces settlement banker risk if a commercial bank that provides the CCP with an account for cash settlement is no longer willing or able to provide it with those services.[11] Given the concentration of these risks within the CCP, it must be designed to effectively mitigate their impact.

Overall, CCPs have tremendous potential to reduce systemic risk and reinforce financial stability by addressing the deficiencies associated with existing bilateral settlement arrangements.

10 See CPSS-IOSCO (2004, 8) for a summary of the risks that CCPs must manage.

11 To mitigate this banker risk, CCPs often maintain settlement accounts with central banks rather than with commercial banks.

PROTECTING THE FINANCIAL SYSTEM

As CCPs take on a more prominent role, it is crucial that they be properly protected by rigorous risk controls and effective oversight. Significant work has already been done to establish high standards for strong risk-management practices by CCPs. Through the CPSS and IOSCO, central banks and securities regulators have published the CPSS-IOSCO Recommendations for Central Counterparties (CPSS-IOSCO 2004), which articulate 15 international standards that CCPs should comply with to properly address the major risks they face. Areas covered by these recommendations include legal risk, participation requirements, counterparty credit risk, default procedures and operational risk, as well as CCP governance and transparency. In addition, the CPSS and IOSCO have issued guidance on the application of the Recommendations for Central Counterparties for CCPs that clear OTC derivatives (CPSS-IOSCO 2010).

Given the regulatory push to strengthen financial market infrastructures, the CPSS and IOSCO are currently enhancing their standards, including those pertaining to CCPs. The revised standards will likely put even more emphasis on the need for sufficient financial resources (including capital and liquidity) to handle one, or even two, large defaults. Ensuring that individual CCPs are properly risk-proofed and are subject to robust oversight is clearly important for reducing systemic risk.

For CCPs to accomplish the goals set out by policy-makers, authorities must think beyond risk-proofing individual CCPs and ensure that risk controls and operating practices are consistent with the promotion of a well-functioning financial system.

In this section, three key issues for the protection of the financial system will be discussed: (i) the procyclicality of margins; (ii) managing the default of a member; and (iii) capital requirements and resolution mechanisms for CCPs.

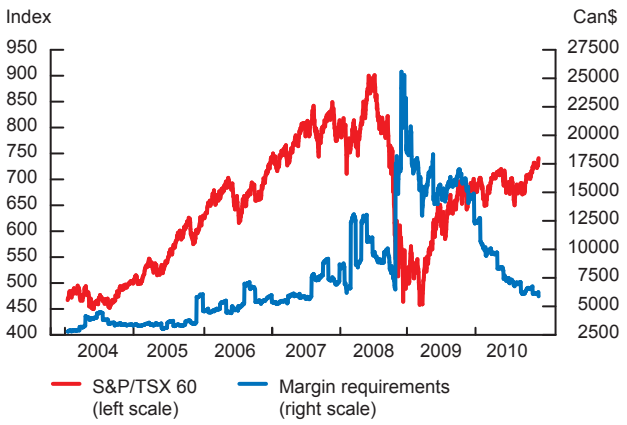
Procyclicality of margins

Procyclicality refers to the feedback loops between the financial system and the real economy, which can amplify the business cycle and exacerbate financial instability.[12] For example, in times of market stress, collateral requirements and haircuts can increase dramatically, owing to the volatility or illiquidity of the underlying assets.[13] Leaders at the June 2010 Toronto G-20 Summit agreed to seek ways to reduce the procyclicality of haircuts and margining practices for securities financing and OTC derivatives transactions (Group of 20 2010).

CCPs can help address procyclicality arising from bilateral arrangements in several ways (Cecchetti, Gyntelberg, and Hollanders 2009; CGFS 2010). For instance, by mitigating concerns about counterparty credit risk during periods of stress, CCPs can encourage trading in markets that might otherwise become illiquid. As well, since collateral is required from every clearing member, the potential increase in collateral requirements in a stress event would be smaller than if no collateral had been initially collected, which has often been the case in bilateral settlement arrangements.[14] And because the netting efficiencies associated with CCPs reduce clearing members' outstanding contracts, the increase in collateral requirements following sudden market volatility affects fewer outstanding contracts.

Although CCPs can help to decrease procyclicality, they still face certain challenges. Their risk management relies heavily on the calculation and collection of margins to cover the exposures they face with clearing-member contracts that have been novated.[15] These calculations are typically based on historical price observations covering a relatively short period. As a result, collateral requirements imposed on clearing members can increase abruptly in times of sudden market volatility.

Chart 1: Margin requirements can be procyclical
Margin requirements associated with the SXF (S&P/TSX 60 Index Futures)



Sources: Bloomberg and Canadian Derivatives Clearing Corporation
Last observation: 5 November 2010

As **Chart 1** shows, margin requirements charged by the CDCC for the SXF, a futures contract on the S&P/TSX 60 Index traded on the Montréal Exchange, can be procyclical. For instance, large increases in margin requirements took

12 Procyclicality in the financial system is discussed in a number of reports in Bank of Canada (2009a).

13 The large collateral calls seen in bilateral settlement arrangements can be destabilizing. JPMorgan's collateral call on Merrill Lynch might have motivated its sale to Bank of America on 14 September 2008 (J. Carney 2008). JPMorgan also demanded $8.6 billion in collateral from Lehman Brothers over the four days leading up to its bankruptcy on 15 September 2008, including $5 billion on the last day (Stempel 2010).

14 For example, in OTC derivatives markets, a large part of the counterparty risk is undercollateralized (Singh 2010).

15 Margins cover the maximum movement in the value of a contract over a given confidence interval and liquidation period. The clearing fund is a secondary pool of collateral to be used if the defaulter's margin is insufficient, and is typically calculated using stress scenarios.

Box 3

Clearing-Member Default in a CCP

A default refers to a breach of any requirement imposed by the CCP, and can include non-payment of cash obligations, non-delivery of securities or a failure to satisfy collateral requirements. Non-payment and non-delivery are the most critical, since the CCP owes the corresponding cash payments and/or securities to other clearing members. If additional collateral requirements were not met following sudden market volatility, the CCP would still be able to meet its obligations to its clearing members, but it would be exposed to uncovered credit risk (as measured by its risk model). This would result in losses for the CCP and/or survivors following non-payment or non-delivery only if the defaulter had not pledged sufficient collateral.

In the event of a member's default, the CCP can transfer or hedge the defaulter's contracts. This can take some time, especially in stressed markets, and can require significant human and technical resources. As a last resort, a CCP can use its discretion to close out contracts, which could lead to losses for surviving clearing members that might have to replace them amid stressed markets.

place as the S&P/TSX 60 Index was falling dramatically during the financial crisis. Of particular note, the margin requirements in dollar amounts increased by 149.7 per cent on 10 October 2008 relative to the previous day.

By requesting higher levels of collateral in times of increased volatility, CCPs can put pressure on already fragile market participants, potentially destabilizing them. While a CCP needs to be able to properly protect itself against risk, it must also consider the procyclical effects of its actions on the functioning of markets.

To address the procyclicality of margin practices in secured lending and derivatives transactions, the Committee on the Global Financial System (CGFS) has recommended that authorities and CCPs consider the implications of imposing through-the-cycle (TTC) margins and haircuts (CGFS 2010). A TTC approach can help to prevent an accumulation of excessive leverage in good times and disruptive deleveraging in bad times.

There are various potential approaches to TTC margins, but there is no extensive literature on the subject nor consensus as to which approach may be most appropriate. One option may be to use a margin floor, which is a minimum level of margin intervals (expressed in per cent) that each clearing member must maintain. A margin floor can help to prevent a buildup of excessive leverage during the expansionary phase of the financial cycle, because, even as volatility falls, members must continue to pledge the minimum level of collateral. The trade-off is a higher cost of collateral during periods of low volatility, but smaller increases in required collateral in times of stress. Another option may be for CCPs, in consultation with authorities, to expand the list of acceptable collateral in stressful times, albeit with conservative haircuts. In crisis periods, clearing members may have plenty of lower-quality collateral to pledge with no alternative uses. Allowing members to pledge lower-quality collateral would be less disruptive than rapidly liquidating derivatives contracts or acquiring additional high-quality collateral on short notice amid stressed markets.

In summary, as CCPs take on an expanding role in the financial system, they need to develop margining practices that are less procyclical. Doing so requires that CCPs and authorities re-evaluate the structure of the existing risk-management frameworks.

Default-management practices

With regulators promoting greater use of CCPs and potentially mandating CCP clearing for certain financial products, CCPs have to be ready to manage clearing-member defaults in order to protect themselves, non-defaulting clearing members and the broader financial system. Since the default-management process is dynamic and uncertain, CCPs typically retain significant discretion **(Box 3)**.

In a default, the CCP, its members and the financial system will face considerable challenges. Moreover, because the defaulter's affiliates may be suspended in other CCPs (as occurred when Lehman Brothers Holdings Inc. filed for bankruptcy), a number of large CCPs may be attempting to transfer, hedge or close contracts simultaneously. The introduction of linkages between CCPs across different jurisdictions, which global customers are likely to demand, will further complicate the default-management process.[16]

Given the complexity associated with the default-management process, it is difficult to accurately predict the amount of financial resources that a CCP will need in order to properly manage such an event, especially in times of stress. This is due, in part, to the limited number of bidders that may be willing to acquire large portfolios and are capable of doing so. For instance, in September 2008, the division acting as CCP for the CME Group (CME Clearing)

16 Areas of concern include the sharing of risk-management responsibilities, accounting reconciliation and the resolution of cross-jurisdictional legal claims that may arise upon default.

chose not to liquidate the proprietary derivatives contracts of Lehman Brothers Inc. in the open market.[17] Instead, the CME conducted two auctions on 14 and 17 September 2008, with potential bidders selected by CME on the basis of their capital and risk-management expertise, as well as their potential concentration in the market (Valukas 2010, 1846). In the first auction, five out of the six firms submitted bids, but "all of the bids involved substantial losses" to Lehman Brothers Inc. in the form of collateral transfers (Valukas 2010, 1846). Following the second auction, three out of the five bidding firms acquired the contracts of Lehman Brothers Inc. (Valukas 2010, 1851). And in this particular case, the CME had placed Lehman Brothers Inc. on liquidation-only status due to "general financial insecurity reasons related to [Lehman Brothers Holdings Inc.'s] bankruptcy filing" (Valukas 2010, 1848). In other words, CME did not actually have to deal with unmet payment, security delivery or margin obligations on the part of Lehman Brothers Inc., which would have been even more challenging for CME to manage.

Having sufficient collateral to cover potential losses is one challenge, but having access to sufficient cash and securities to meet payment and delivery obligations on time is another. To manage this liquidity risk, CCPs accept high-quality liquid collateral, monitor haircuts and concentration limits, and maintain liquidity lines with financial institutions and central banks.[18] By imposing standards for acceptable collateral and using concentration limits, CCPs can liquidate collateral while minimizing losses and market impacts. However, selling collateral sometimes entails settlement delays.[19] Liquidity lines, which generally have to be collateralized by the CCP, can cover the gap between the CCP's obligations at any point in time and the amount of collateral it can turn into cash. These lines also allow CCPs to meet their cash obligations in a timely manner, without having to sell collateral so quickly that markets are affected through disorderly sales. Because liquidity support can lessen the impact of a default on the financial system, it is crucial that CCPs have robust liquidity lines in place.

As already noted, the events surrounding a default are dynamic and uncertain, and for that reason CCPs typically retain significant discretion in their rules. For instance, CCPs are not normally tied to specific timelines to meet their cash and securities obligations following a default. This level of discretion provides a CCP with the flexibility to protect itself and its surviving members, and to minimize market impact when it manages the defaulter's contracts, liquidates collateral or obtains securities. However, in using this discretion, a CCP could adversely affect financial stability if it attempts to minimize losses through indiscriminate sales of assets or by hastily transferring, hedging or closing out the defaulter's contracts. Thus, as CCPs gain importance, they will need to develop certain principles, in consultation with stakeholders, to guide the use of this discretion in order to promote transparency and strike the right balance between safeguarding the interests of the CCP and its non-defaulting members and promoting financial stability.

In summary, to reduce systemic risk through greater use of CCPs, authorities need to be sure that the default-management practices that CCPs have in place are suited to the challenges they face.

Capital requirements and resolution mechanisms

The proposal to reduce the interconnectedness of the financial system through CCPs entails creating entities that concentrate risks. Although CCPs rarely fail, history shows that it does happen.[20] Thus, clear frameworks should be designed that address CCPs' management of capital and provide mechanisms for their orderly resolution should they become non-viable.

The important work of developing standards for capital management is just beginning. These standards should include minimum capital requirements for CCPs as a preventive measure, but also as a buffer in the event of default or as a protection against risks unrelated to default. Requirements pertaining to the safety of a CCP's capital assets should be developed as well. Moreover, authorities should consider requiring a CCP to expose some of its own capital before survivors' capital in the event of a default. This practice, which is already followed by many CCPs, reinforces their incentives to implement strong risk-management practices. Finally, any capital-management plan should take into account the role played by capital in protecting CCPs from residual credit risk.

To minimize potential disruption from a failure or near-failure, CCPs and regulators should prepare ex ante resolution mechanisms that include:

- credible ex ante plans for raising additional capital should the level fall below minimums;
- early-intervention tools that would allow authorities to take over CCPs in difficulty; and
- exit or transition plans that minimize systemic disruptions.

17 Lehman Brothers Inc. was an affiliate of Lehman Brothers Holdings Inc.

18 Central bank liquidity support is generally a last-resort measure, drawn on in the event of systemic pressure when private sector support is unavailable or insufficient. CCPs constituted as banks have access to central bank facilities, although this is not necessarily the case for non-bank CCPs.

19 In Canada, Government of Canada treasury bills settle the same day in CDSX, but other Government of Canada bonds can take up to three days to settle; consequently, a CCP would not receive the cash in time to meet its obligations on the day of default.

20 Three examples of CCP failures are: Caisse de Liquidation, Paris (1974); Kuala Lumpur Commodity Clearing House (1983); and Hong Kong Futures Guarantee Corporation (1987). (See Ripatti 2004, Appendix 1.) Failures in risk management, as well as financial bubbles and crashes, were involved in all three cases.

Conclusion

CCPs can reduce systemic risk and reinforce financial stability. To ensure their success, they must be properly risk-proofed and must be subject to effective oversight. To this end, international standards pertaining to the safety and soundness of financial market infrastructures, such as CCPs, are being enhanced. Authorities must also recognize that, as CCPs take on a more prominent role, they need to operate in a way that promotes the integrity of the financial system as a whole. Issues of particular importance that should be addressed by authorities in a coordinated manner include the procyclicality of CCP margin requirements, default-management practices and resolution mechanisms.

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Contingent Capital and Bail-In Debt: Tools for Bank Resolution

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Introduction

In the recent global financial crisis, many banks failed, or were in danger of doing so. Internationally, the public policy responses to failing banks differed substantially, depending on the size and complexity of the banks in question. Small, less complex banks were allowed to fail, and their failures were usually managed in accordance with existing procedures for liquidation and winding up. These failures resulted in shareholders being totally wiped out, and the imposition of losses on debt holders and uninsured depositors, based on established rules for creditor-claim seniority and the resources available from the disposition of the failed banks.

In the case of failing large banks, the response typically involved public sector equity investment, together with substantial liquidity support and credit guarantees.[1] As a result, common shareholders of these major international banks generally suffered losses but were not wiped out, and preferred shareholders and creditors were protected. In addition, the managements of these banks, in most cases, stayed in place. Estimates of the amount of public sector capital injections used to directly bail out major banks are well in excess of US$1 trillion; including guarantees and insurance provided by major governments during the recent crisis adds another US$8.5 trillion (Alessandri and Haldane 2009).

These experiences showed that policy-makers around the world were unwilling or unable to allow major financial institutions to fail, particularly in a stressed financial environment. Public sector authorities were worried about exacerbating financial stress, and wished to avoid the adverse consequences that could result from the failure of a large, complex financial institution. Authorities in many countries were concerned that they would not be able to resolve such institutions without causing a disruption in essential financial services and generating significant costs to the real economy. An implication of bailouts, however, is the creation of incentives that promote risk-taking behaviour by the private sector—in other words, moral hazard. Over time, such behaviour leads to a greater likelihood of bank failures, instability and future crises, with serious fiscal and social costs.

As a result, policy-makers have been reviewing their financial regulatory arrangements to develop more effective ways to respond to the risks posed by large, interconnected institutions. A wide range of approaches have been under discussion, including capital surcharges, systemic risk levies and funds, more effective supervision, contingent capital and bail-in debt, improved legal powers to restructure a failing bank, and living wills.

This report considers two related approaches to improving the resolution of failing banks: contingent capital and bail-in debt. Various types of contingent capital and bail-in debt mechanisms have been discussed in the academic literature and the press, and have been debated in policy circles. This report focuses on the types of contingent instrument that have been the subject of proposals by the Office of the Superintendent of Financial Institutions (OSFI) (Dickson 2010a,b) and, more recently, by the Basel Committee on Banking Supervision (BCBS) (2010), and that have been a focus of banking reform policy discussions more generally.

* The authors thank Paul Melaschenko, formerly of the Office of the Superintendent of Financial Institutions (OSFI) and now with the Bank for International Settlements, for his important contributions to the work underpinning this report.

1 In Canada, the federal government and the Bank of Canada offered various forms of funding liquidity to Canadian financial institutions to mitigate the spread of liquidity problems, but there were no bank failures or bailouts. (See Zorn, Wilkins, and Engert 2009 for a discussion of these Bank of Canada liquidity actions.)

What Are Contingent Capital and Bail-In Debt?

Contingent capital is a subordinated security, such as a preferred share or subordinated debenture, that converts to common equity under certain conditions. Such contingent capital instruments are contractual mechanisms; that is, the arrangements governing conversion would be set out in the contractual terms of the financial instrument purchased by the investor. As a result, investors in these instruments would accept the prospect of conversion under certain conditions, and therefore would require compensation for bearing this risk, depending on their expectations of conversion. With bail-in debt, this contractual mechanism is extended beyond the regulatory capital base to senior debt securities of the issuing bank. The trigger event that leads to conversion, as well as its timing, is a central feature of contingent capital and bail-in debt, and is considered next.[2]

Gone-concern and going-concern contingent instruments

Contingent capital is typically differentiated as either *gone-concern* or *going-concern*. Gone-concern contingent capital converts to common equity when the financial condition of a bank is judged by its supervisor to have deteriorated to the point where it is no longer viable. Given this timing, gone-concern contingent capital would contribute to a resolution framework. In contrast, going-concern contingent capital converts to common equity earlier, well before non-viability, for even modest erosions of capital. Further, conversion would be triggered by a breach of a given threshold, such as a capital ratio, or when the bank's stock price falls below a predetermined level, or when the aggregate value of the banking sector, as measured by a stock index, falls below a trigger value.[3] (For example, see Flannery 2005, 2009; McDonald 2010; and Sundaresan and Wang 2010.)

Figures 1 and **2** provide a stylized perspective on the two types of contingent capital. As the bank's condition moves from the green area towards the red, supervisory concerns increase. If the threshold that triggers conversion of going-concern contingent capital is breached, the contingent capital security would automatically convert to common equity relatively early in the process, as illustrated in **Figure 1**. In the situation illustrated in **Figure 2**, however, the supervisor relies on other early-intervention tools to deal with a troubled bank (possibly including a directive to raise capital in the market), until the bank reaches the point of non-viability, which could then trigger conversion of debt to equity to help resolve the failing institution.

Regulatory context matters

When considering contingent capital and bail-in debt, it is important to take account of the overall regulatory framework, particularly the incentives and powers of the supervisor and resolution authority to intervene in a timely manner when dealing with a troubled bank. As illustrated in **Figures 1** and **2**, going-concern contingent capital would

Figure 1: Going-concern contingent capital and bail-in debt

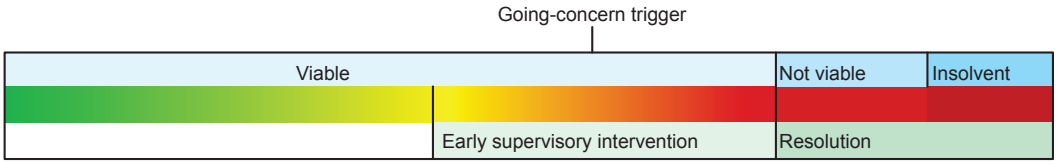
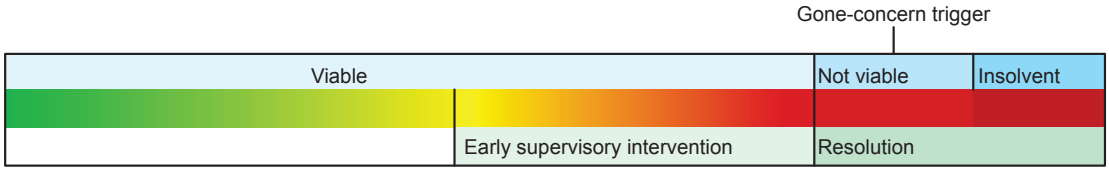


Figure 2: Gone-concern contingent capital and bail-in debt



2 Another approach would be to simply write down the face value of specified debt securities following a trigger event (instead of converting debt to equity), which would have the effect of transferring wealth to the common shareholders of the troubled bank. This report does not discuss such an approach. As well, some commentators have proposed that, instead of relying on a contractual mechanism to effect conversion, public sector authorities should have the statutory power to write down or convert bank debt outside of the usual court-supervised restructuring and liquidation process. This report does not consider such proposals either.

3 This means that the metric used to trigger conversion for a going-concern instrument (such as a capital ratio) needs to be a sufficient and reliable measure of firm value, for example. (In this regard, note that many banks that failed or experienced severe difficulties in the recent crisis had regulatory capital measures that met or exceeded regulatory requirements.)

provide for conversion relatively early in the troubles of a bank, following the breach of a specific metric. Arguably, going-concern contingent capital is focused on dealing with forbearance—a tendency of some supervisors to accommodate troubled institutions and to refrain from intervening with corrective measures (in the yellow-orange zone of **Figures 1** and **2**). This could occur because the supervisor lacks adequate incentives (the "will to act") or the powers (the "ability to act") to intervene effectively as the financial condition of the bank deteriorates. Put differently, going-concern contingent capital aims to reproduce elements of early intervention by emphasizing a rule that provides for the automatic recapitalization of the institution in the form of conversion of debt and capital instruments to common equity when a specific metric is breached, thereby reducing the scope for the exercise of supervisory forbearance.[4]

The Canadian regulatory framework has tried to address the supervisory will and ability to act by providing OSFI with particular incentives that condition its judgments, as well as adequate powers to act on them. The framework gives OSFI a clear mandate focused on the protection of depositors, policyholders and creditors. Together with operational autonomy and wide-ranging powers, this framework orients OSFI towards risk aversion and early intervention with regard to troubled banks.[5] As well, the Canadian financial safety net has been designed to encourage working relationships between OSFI and other federal agencies that have a strong interest in the ongoing quality of supervision, including the Bank of Canada, as lender of last resort, and the Canada Deposit Insurance Corporation (CDIC), the deposit insurer. (CDIC's mandate also includes the resolution of failed CDIC-member institutions in a manner that minimizes loss.) This interaction among federal safety-net agencies further supports supervisory incentives for early and effective intervention. For example, the *Guide to Intervention for Federally Regulated Deposit-Taking Institutions* (OSFI 2008) sets out a structured process for early intervention that is jointly followed by OSFI and CDIC.[6] In addition, the major federal agencies with an interest in supervisory issues (OSFI, CDIC, the Bank of Canada, the Department of Finance and the Financial Consumer Agency of Canada) meet regularly under the chairmanship of the Superintendent of Financial Institutions to exchange information relevant to the supervision of regulated institutions. This forum, the Financial Institutions Supervisory Committee, also provides for the coordination of strategies when dealing with troubled institutions. Further, the heads of the federal safety-net agencies are also members of CDIC's Board of Directors.

In sum, OSFI operates within a safety-net framework designed to support both the will and the ability to act with regard to troubled institutions. This suggests that gone-concern contingent instruments, which focus on resolution, may provide relatively larger net benefits in the Canadian context than going-concern contingent capital.[7] The rest of this report addresses the role of gone-concern contingent capital instruments.

Objectives of gone-concern contingent instruments

Gone-concern contingent capital and bail-in debt share two related objectives:

(i) to support the resolution of a failing bank by providing sources of capital when the institution cannot recapitalize through private markets; and

(ii) to ensure that equity holders and other providers of regulatory capital, as well as major creditors of banks, face risk of loss, even if the troubled bank is not closed and liquidated.

Such instruments could improve the incentives affecting private behaviour by exposing holders of common equity to a risk of significant dilution, and by widening the pool of market participants with credible "skin in the game." Accordingly, market discipline could be improved and moral hazard reduced. As a result, such contingent instruments would reduce the likelihood of a government bailout of a large, complex institution and, in the event of such a bailout, would reduce the cost to taxpayers.

How Would Gone-Concern Contingent Instruments Help Resolution?

The Basel Committee's recent proposal on gone-concern contingent capital requires that all newly issued regulatory capital instruments that are not common equity include, in their contractual terms, a mechanism that creates common equity at the point of non-viability. Accordingly, these securities would be converted to common equity under two conditions:

(i) when an institution is judged by its regulator to have reached the point of non-viability;[8] or

4 Depending on the trigger, however, such an approach could transfer the operation of forbearance to the manipulation of the trigger variable (such as a capital ratio) if the supervisor's objectives and incentives are not well specified.

5 Dickson (2010c) discusses the importance of such institutional design for effective regulation and supervision. For a discussion of the evolution of the Canadian financial safety net, see Engert (2005).

6 OSFI's governing statute also recognizes that financial institutions need to compete and take reasonable risks. The legislation notes as well that the boards of directors and management of financial institutions are responsible for the management of risks, and that financial institutions can fail.

7 Nevertheless, going-concern contingent capital might also provide useful incentives for investors to monitor bank risk-taking behaviour, and could contribute as an early corrective measure.

8 If this trigger was not exercised and the bank failed, no conversion would take place, and there would be no impact on the established priority of the claims of shareholders and creditors.

(ii) when the public sector provides capital or equivalent support to restore the failing bank, without which the bank would not be viable.

However, such gone-concern contingent capital might not by itself generate sufficient capital to effectively support the restoration of viability for a failing bank. Accordingly, bail-in debt, with the same conversion triggers, could increase the amount of private sector capital available at the point of non-viability. Distinct from contingent capital, however, these arrangements could be structured so that only a portion of the senior debt would convert to common equity at the point of non-viability, in recognition of its creditor-claim seniority relative to subordinated debt and equity instruments. This partial write-off, or haircut, would mean that most of the senior debt instrument would remain unchanged, even if conversion was triggered.

There is some debate about the scope of the liabilities that should be subject to such bail-in conversion, but a focus on senior, unsecured debt instruments would be relatively straightforward.[9] This particular scope of application would leave secured creditors, insurable depositors, short-term securities holders and a bank's counterparties unaffected by bail-in provisions.

Conceptually, conversion of contingent instruments could occur on a "par-to-market value" basis. For example, at conversion, holders of a contingent security could receive, in exchange for the security, common shares with a total value equal to the par value of the contingent instrument. For example, assuming a par value of $100 for a preferred share subject to conversion, and a market value of $2 for common equity at the time of conversion, the investor would receive 50 common shares. (The conversion terms for more senior contingent instruments could provide more beneficial arrangements.)

With the conversion of contingent instruments to common equity, the original equity would be heavily diluted, and converted preferred stock and subordinated debt would be subject to loss as common equity. Converted bail-in senior debt would also be exposed to loss as common equity. This process also implies that the value of the bank's liabilities would decline. The bank would therefore be recapitalized, with somewhat less leverage. Such restructuring could help to attract new private investment and liquidity for the bank, thus supporting resolution and the restoration of viability. (New private investment could be in the form of subordinated debt or preferred shares with warrants to provide scope for new investors to capture the potential upside.)

Together, contingent capital and bail-in senior debt should be seen as one of several tools that authorities could use to help resolve a failing bank. Others include taking control, the replacement of management, CDIC-assisted transactions, the establishment of a bridge bank and winding-up powers. These other tools could be applied in combination with the conversion of contingent instruments, which could involve losses for a wider range of uninsured creditors and counterparties.

How much contingent capital and bail-in senior debt?

The amount of contingent capital and bail-in debt issued by an institution would be an important factor in their effectiveness as possible resolution tools. The Basel Committee has proposed that all newly issued regulatory capital instruments that are not common equity must be gone-concern contingent capital. More generally, an objective could be that banks should have sufficient contingent capital and bail-in debt to be able to achieve recapitalization according to prudential requirements. This implies a predetermined minimum for the bank's funding in the form of contingent capital and bail-in debt.

Conceptually, the regulator could set the capital requirement for a bank based on the prudential risks posed by its business activities, as in the current Basel capital framework. Levels of contingent capital and bail-in senior debt could then be set to protect against insolvency and government bail-outs if, for any reason, the prudential capital requirement turned out to be inadequate. Put differently, in addition to the standard prudential capital requirements, the sum of common equity plus contingent capital and bail-in senior debt could be subject to an overall minimum requirement, chosen to provide for the restoration of prudential capital requirements. In practice, the choice of instruments (common equity, contingent capital and bail-in debt) could be left to banks and market participants, which, given their various constraints, would optimize to find the most efficient funding and capital structure. Following the establishment of such a requirement, the capital and funding structures of banks would correspondingly evolve over time.

Costs

As discussed above, the conversion of contingent capital and bail-in senior debt would take place at the point of non-viability, which is typically a low-probability event. Thus, it seems reasonable to expect that these instruments should generally be priced close to their underlying host instrument, plus an incremental cost reflecting the elimination of an expectation that government will bail out the failing bank (an implicit guarantee). To the extent that implicit government support had been expected—and if the prospect of conversion embedded in contingent capital and bail-in senior debt was seen to be credible—investors would demand a corresponding premium to compensate for their increased risk, depending on the financial health of the issuing bank. (The latter would influence the expected

9 It could be technically or legally difficult to extend bail-in provisions beyond this class of liabilities. Doing so could have adverse implications regarding the management of risk and liquidity, particularly under unfavourable circumstances.

probability of conversion.) Any increase in costs might also be offset by the value investors ascribe to the conversion feature. That is, investors could view the potential gains embedded in the conversion mechanism as attractive, compared with a liquidation scenario where the recoveries to capital providers have historically amounted to cents on the dollar, or nothing. The impact on funding may not be limited only to contingent instruments, since the cost of bank common equity might increase as well, given that contingent instruments imply a risk of dilution of ownership under some conditions.

In addition to possibly affecting the cost of capital in this way, such contingent instruments could affect investor behaviour and market dynamics as a failing bank deteriorated to a level where conversion was generally believed to be likely; that is, when non-viability was expected. In that case, a bank's equity price would be under considerable downward pressure in anticipation of the substantial dilution associated with the prospective conversion of contingent instruments to common equity. Such a downward ("death") spiral would, however, be expected for the stock price of any firm approaching insolvency (appropriately, since common equity should lose value in such cases), and the prospect of conversion could exacerbate this dynamic. It seems likely that the market's behaviour in this context would be conditioned by the specific terms of conversion.[10]

Some commentators have suggested that, to the extent that contingent capital and bail-in debt are held by other financial institutions, these institutions would face greater risks, and that holdings of contingent instruments could exacerbate contagion under some conditions. However, this prospect already exists, owing to inter-institution holdings of financial institution securities: if an issuer was liquidated or restructured, investors could become residual claim holders. The argument that contingent capital and bail-in debt expose holders of bank securities to greater risks than the status quo implies that current inter-institution holdings of securities are protected by implicit guarantees. Of course, the use of contingent capital and bail-in debt aims to minimize the value of such guarantees, which necessarily exposes the holders of such securities to risk of loss. This, in turn, would create incentives that could usefully reduce interlinkages, or improve their management. Fundamentally, however, risks related to inter-institution holdings of securities already exist.

Finally, there is uncertainty about the extent of investor appetite for contingent capital and bail-in debt. For example, the traditional mandates of institutional fixed-income investors might inhibit them from investing in instruments that convert to common equity (even though, in liquidation or traditional bankruptcy reorganization, investors would often receive a variable residual claim). In such cases, however, these investors could sell their positions in the market or hold the equity resulting from conversion in a trust arrangement for subsequent disposition.[11] Institutional investor mandates for fixed-income securities would also likely evolve over time to include these contingent instruments as these investors seek to retain their exposure to global financial institutions and develop a greater understanding of the instruments' risk and return characteristics. More generally, as is usually the case following the introduction of a new security, there would be a period during which market participants would learn about the characteristics of the instrument and how to value it, with corresponding pricing adjustments. This would also be associated with increasing market acceptance and greater liquidity for the securities.

Non-Viability and Supervisory Discretion

As noted above, one of the triggers for the conversion of gone-concern contingent capital and bail-in senior debt would depend on the supervisor's judgment of non-viability. In Canada, however, no new supervisory discretion would arise from the existence of such a trigger condition in the contractual terms of securities, since the Superintendent of Financial Institutions already has considerable discretion to respond to failing banks. For example, the Superintendent can take control of a bank if the regulatory capital of the institution has, in the Superintendent's opinion, reached a level or is eroding in a manner that may detrimentally affect depositors and creditors, or if the institution has failed to comply with an order of the Superintendent to increase its capital (Bank Act, s. 648(1)). Furthermore, the Superintendent can ask the Attorney General to apply for an order to wind up the bank on the sole ground that control of the bank or its assets has been taken (Bank Act, s. 651; Winding-Up and Restructuring Act, s.10.1). In addition, the trigger for establishing a bridge bank rests on the opinion of the Superintendent that the bank has ceased, or is about to cease, to be viable (CDIC Act, s. 39.1).

Thus, financial institutions and market participants already operate in a regulatory regime that provides OSFI with considerable discretion with regard to taking control, liquidation and the initiation of resolution proceedings, including bridge banks. The gone-concern contingent capital and

10 It would appear to be relatively straightforward to include features in the conversion terms that would limit the decline in the price of the common stock, such as a predetermined minimum stock price to be used for conversion. As noted, death spirals and associated market behaviour (such as short selling of the common stock) might be expected when a bank is approaching insolvency even if it had not issued convertible instruments—unless it had the benefit of an implicit government guarantee, which would arrest such a spiral. Note also that there are innovative conversion proposals that might provide ways to mitigate the risk of a death spiral (e.g., Pennacchi, Vermaelen, and Wolff 2010).

11 A trust could be established to hold the shares on behalf of new shareholders who are ineligible to hold them because of legal impediments or other constraints (similar to provisions applicable to ineligible persons in the terms of Canadian Tier 1 innovative instruments). The trustee could either effect the sale of the shares on behalf of the ineligible persons or would hold the shares until the legal impediments or other constraints were removed and the ineligible shareholder could hold the shares directly.

bail-in debt proposals being debated would operate under these same conditions.

Conclusion

Several issues concerning contingent capital and bail-in senior debt require further analysis, including the precise form of any prudential rules to bring these mechanisms into effect; the amount of such contingent instruments to require; and the determination of the period over which such requirements would become binding. Other issues include how these mechanisms would relate to other tools in the regulators' resolution toolkit; their incentive effects on market participants, including when conversion seems likely; and the implications for investors holding instruments that are not subject to conversion.

These issues should be addressed as policy-makers around the world continue to debate the set of tools to be included in an effective framework for bank resolution. The framework should recognize the possibility that financial firms can fail, and that they need to be resolved efficiently, in a way that minimizes disruption to the wider economy and reduces the risk of moral hazard. Relying on higher prudential requirements for common equity is undoubtedly part of the solution, as was recently proposed by the Basel Committee. In addition, contingent capital and bail-in debt could improve the capacity of the private sector to contribute to the resolution of failing banks while reducing risks to the public sector and improving the incentives that condition market behaviour.

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Abbreviations

Readers wishing to access a more comprehensive list of financial and economic terms are directed to the Bank of Canada's online glossaries at <http://www.bankofcanada.ca/en/glossary/index.html>. Additional information on Canada's payment clearing and settlements systems is available at <http://www.bankofcanada.ca/en/financial/payments.html>.

AIG: American International Group

AMF: Autorité des marchés financiers

ASC: Alberta Securities Commission

BCBS: Basel Commission on Banking Supervision

BIS: Bank for International Settlements

CCP: Central counterparty

CDCC: Canadian Derivatives Clearing Corporation

CDIC: Canada Deposit Insurance Corporation

CDOR: Canadian Dealer Offered Rate

CDS: Credit-default swap

CESR: Committee of European Securities Regulators

CGFS: Committee on the Global Financial System

CLS Bank: Continuously Linked Settlement Bank

CMIC: Canadian Market Infrastructure Committee

CPSS: Committee on Payment and Settlement Systems

CSA: Canadian Securities Administrators

DTCC: Depository Trust & Clearing Corporation

ECB: European Central Bank

FSB: Financial Stability Board

FX: Foreign exchange

G-20: Group of 20 Countries

GHOS: Group of Governors and Heads of Supervision

IMF: International Monetary Fund

IOSCO: International Organization of Securities Commissions

ISDA: International Swap Dealers Association

MiFID: Markets in Financial Instruments Directive

OIS: Overnight index swap

OSA: Ontario Securities Act

OSC: Ontario Securities Commission

OSFI: Office of the Superintendent of Financial Institutions

OTC derivatives: Over–the-counter derivatives

OTC DWG: Over–the-Counter Derivatives Working Group

S&P: Standard & Poor's

TR: trade repositories

TSX: Toronto Stock Exchange

TTC: Through–the-cycle