BANK OF CANADA
BANQUE DU CANADA

Financial System Review

June 2009

www.bankofcanada.ca

Financial System Review

June 2009

Contents

THE MACROFINANCIAL ENVIRONMENT (cont'd)

Preface

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

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

The *Financial System Review* (FSR) is one avenue through which the Bank of Canada seeks to contribute to the longer-term resiliency of the Canadian financial system. It brings together the Bank's ongoing work in monitoring developments in the system with a view to identifying potential risks to its overall soundness, as well as highlighting the 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, Paul Jenkins, Pierre Duguay, David Longworth, John Murray, and Timothy Lane.

The material in this document is based on information available to 25 May 2009 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 key risks and vulnerabilities arising from both international and domestic sources bearing on the stability of the Canadian financial system. The objective is to raise awareness of these risks and describe actions taken to address them.

Introduction

Policy-makers around the world met the intensification of the global financial crisis at the end of 2008 with a forceful response aimed at restoring confidence in the global financial system and promoting the flow of credit. Although some degree of confidence has returned in response to these initiatives, and the functioning of credit markets has clearly improved, the global financial system remains under significant stress. The ongoing dislocations in financial markets are being exacerbated by the unusually synchronized and deep contraction in global economic activity triggered by the financial turmoil. Although substantial monetary and fiscal stimulus is in the pipeline, considerable uncertainty attends the near-term path for the global economy. Stabilization of the financial system is a precondition for economic recovery and will require the rapid, comprehensive implementation of plans to restore the soundness of the world's major banks by removing toxic assets from their balance sheets and returning capital to adequate levels. Further action to reform the global financial system, as agreed upon at the G-20 leaders' summit on 2 April, will be needed to put the recovery on a firmer footing and to prevent a recurrence of the crisis.

Despite the severe impact of the global crisis, the Canadian financial system has continued to perform well compared with those of other countries. Canadian households, businesses, and financial institutions had not built up levels of debt to the extent that made other countries vulnerable. There have been no bank failures in Canada, nor have Canadian banks required any capital from the government. Capital ratios have remained high and have been strengthened by additional capital from private investors. While wholesale funding conditions proved difficult towards the end of 2008, funding spreads have since narrowed markedly, particularly at the short end. The liquidity of bank balance sheets has improved as government and central bank initiatives took effect

The Canadian financial system has continued to perform well compared with those of other countries.

and as bank liquid assets rose in response to the combined effect of strong deposit inflows and some slowdown in credit expansion. This has led to some reduction in Bank of Canada liquidity support at the short end and has lowered demand from banks for term funding through the Government of Canada's program to purchase insured mortgages.

As outlined in the April 2009 *Monetary Policy Report*, the most probable outcome is for a gradual improvement in global financial markets and credit conditions in Canada as the various international policy initiatives gain traction. The purpose of this report is not to focus on the most likely future path for the financial system, but rather to provide an assessment of downside risks that, although they are low-probability events, could generate stress on the Canadian financial system. Policy actions taken to mitigate those risks are accordingly highlighted.

In the December 2008 *Financial System Review* (FSR), five key sources of risk to the stability of the Canadian financial system were identified. Those remain the key risks facing Canada's financial system. The following analysis explores how those risks have evolved in the first half of 2009, with Table 1 summarizing the assessments of the Bank of Canada's Governing Council. Developments in these risks over the past six months largely reflect the competing influences of improved financial market conditions on the one hand, and a deterioration in the economic outlook on the other. With these factors taken into account, the overall level of risk to the Canadian financial system is judged to be broadly unchanged since the December FSR.

The overall level of risk to the Canadian financial system is judged to be broadly unchanged since the December FSR.

Table 1: Changes in the Key Risks to the Canadian Financial System

Risk	Direction over the past six months
1. Funding and liquidity	decreased
2. Capital adequacy	decreased
3. Household balance sheets	increased
4. Global economic downturn	increased
5. Global imbalances and currency volatility	unchanged
Overall risk	**unchanged**

It should be borne in mind that the five identified risks are highly interdependent. For example, a sharper global economic downturn than currently expected (risk 4) would likely have an adverse impact on the balance sheets of Canadian households (risk 3) and businesses. This would increase the loan losses of Canadian banks, which might lead them to curb balance sheet growth to maintain their capital ratios (risk 2). A weaker-than-projected global economic environment would also likely be accompanied by a worsening of financial market conditions, which might exacerbate risks to Canadian banks relating to funding and liquidity (risk 1), while also raising the potential for heightened currency volatility (risk 5).

Key Risks

Funding and liquidity

The crisis of confidence that disrupted global financial markets in late 2008 was less acute in Canada, but still produced severe strains in domestic wholesale funding markets. Heightened uncertainty made counterparties reluctant to extend financing beyond the shortest maturities, resulting in intense funding pressures for Canadian financial institutions. Banks' market-making activities in financial markets were also cut back to conserve balance sheet capacity, further aggravating the volatility in markets. This raised the risk that a delay in the return of confidence and more normal financing conditions would aggravate adverse feedback between the financial system and the real economy.

The Bank of Canada responded to these pressures by expanding its liquidity facilities, and the Government of Canada implemented a program to purchase insured mortgages with the help of the Canada Mortgage and Housing Corporation, thereby increasing the access of Canadian institutions to longer-term financing. Since the December FSR, these policy actions have gained considerable traction, helping to reinforce the improvement in domestic funding conditions as the global financial crisis subsided. This improvement in funding conditions has been reflected in a decline in spreads on bank financing in the money markets, a moderate extension of maturities, and a substantial reduction in the cost of term funding for Canadian banks. In addition, these policy initiatives have allowed banks to substantially increase their holdings of government securities, which has helped to boost their liquidity situation in a capital-efficient way. Over the same period, strong growth in retail deposits and slowing credit growth have helped banks to improve their liquidity positions. Market-making activity in Canadian financial markets has also been recovering.

Policy actions have gained considerable traction, helping to reinforce the improvement in domestic funding conditions as the global financial crisis subsided.

Acting in combination, these developments are judged to have lowered the potential impact on the Canadian financial system of any further adverse shocks to funding and liquidity conditions that could result from a renewed intensification of the turmoil in global markets.

Capital adequacy

Writedowns by Canadian banks have been relatively moderate to date, reflecting their conservative lending practices and low exposure to highly impaired asset-backed products. But Canadian banks, as the principal source of finance in our economy, are evidently still exposed to the risk of a marked deterioration in economic conditions, which would depress earnings and generate losses in their household and corporate loan portfolios. In general, this risk is why banks carry high capital buffers. The macroprudential risk is that their capital buffers may not be allowed to play their intended role in absorbing these losses because of market pressures to maintain inordinately high capital ratios. This could force them to curb balance sheet growth, causing a tightening of credit conditions that would reinforce the negative impact of the economic downturn on the financial system.

Canadian banks are very well capitalized by international standards and significantly less leveraged in absolute terms than many of their international counterparts.

Canadian banks are very well capitalized by international standards and significantly less leveraged in absolute terms than many of

their international counterparts. Nonetheless, reflecting the generalized nature of the financial panic, as the crisis unfolded they appear to have come under pressure from markets to increase their capital ratios, which they have been able to do by tapping private sources. The capital held by Canadian banks, including that raised recently, has been of high quality, with a high proportion of common equity relative to innovative instruments. This adds further strength to their positions (see Box 5 on p. 27).

Markets seem to have increasingly discounted downside tail risks as a result of the aggressive international policy response.

Since the December FSR, markets seem to have increasingly discounted downside tail risks as a result of the aggressive international policy response. This improvement in market sentiment has been reinforced by the release of the results of a stress-testing exercise on the 19 largest U.S. banks. These tests showed that the amounts of additional capital that need to be raised are manageable—indeed, around half of the estimated shortfall has already been filled. The results have contributed to a general improvement of confidence in the global banking sector. To the extent that global levels of uncertainty and risk aversion have been lowered, this should also relieve some of the market pressure on Canadian banks to maintain high capital ratios in the event of a marked deterioration in economic conditions.

Taken together, these developments indicate that the level of this risk has decreased over the period.

Household balance sheets

The vulnerability of Canadian households to adverse shocks to wealth and income has risen in recent years as aggregate debt levels have grown relative to 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. The resulting increase in loan-loss provisions and the reduced credit quality of the remaining loans at Canadian financial institutions could prompt a tightening of credit conditions in the economy, thereby fuelling a mutually reinforcing decline in real activity and financial sector health.

Developments since the December FSR suggest some further weakening in the financial health of the Canadian household sector.

Against the background of a sharper-than-expected downturn in the economy, developments since the December FSR suggest some further weakening in the financial health of the Canadian household sector. Income growth has slowed, and personal wealth levels have been eroded by lower house prices in some regions; credit growth has continued to outpace income growth, contributing to higher debt levels. At the same time, sharp increases in unemployment are raising the incidence of financial stress among households. Non-performing household loans and associated provisioning at Canadian financial institutions are thus increasing, although the deterioration in credit quality is being mitigated to some extent by the decline in effective borrowing rates. The Bank of Canada has conducted a partial simulation exercise to estimate the impact on household balance sheets of a more severe economic downturn than currently envisaged, which would increase the unemployment rate to 10 per cent of the workforce. The results indicate that the associated rise in financial stress among households would lead to a significant increase in losses for financial institutions, even though a large share of mortgage debt is insured (see pp. 21–23).

The potential for substantial credit losses on Canadian household loan portfolios, which could transmit stress to the broader financial system, remains a low-probability risk. Nonetheless, given the onset of the recession, the likelihood of this risk materializing is judged to have increased.

Global economic downturn

The risk of a deep and prolonged global recession, as identified in the December FSR, has now partially materialized.

The risk of a deep and prolonged global recession, as identified in the December FSR, has now partially materialized. The sudden, severe, and synchronized downturn in the world economy at the end of 2008 has been remarkable by historical standards, fuelled by a crisis of confidence that spread the shock far beyond its epicentre in the U.S. banking sector. As aggregate demand in the industrialized nations slumped, the interdependence of economies rapidly transmitted the recession around the globe, with a reduction in the availability of trade finance exacerbating the contraction. While the rate of decline in global output appears to have slowed from the precipitous pace seen at the turn of the year, the depth of the recession and the timing and strength of the subsequent recovery are uncertain. The downside risks remain high, associated with possible delays in the stabilization of the financial system and the resulting intensification of adverse feedback effects. The eventual recovery may also prove more sluggish than expected, reflecting the underlying characteristics of the downturn, namely the deleveraging of private sector balance sheets precipitated by the financial crisis and the need or desire to rebuild depleted savings. The weight of past excesses will take time to dissipate, and there is a risk that some governments may face difficulties in implementing appropriate policy actions to generate a sustainable recovery in a timely manner.

As outlined in the April 2009 *Monetary Policy Report*, our base-case projection for global economic growth has been revised down. But there remains a risk that the downturn will prove to be even more severe, or persistent, than currently envisaged. Canada's close trade and financial linkages with the United States and with the broader global economy make it particularly susceptible to a deterioration in external conditions. If this risk materializes, a growing number of Canadian households and businesses would experience financial difficulties, which would translate into lower earnings and an increase in loan-loss provisions at financial institutions. Writedowns of investments held by those institutions would also likely increase, and income from trading activities could suffer from a renewed intensification of market turmoil.

In light of the weaker baseline projection for the global economy, the impact on the Canadian financial system of a greater-than-expected downturn in the global economy is judged to have increased relative to the December FSR.

Global imbalances and currency volatility

Economic conditions in advanced economies have recently contributed to a reduction in the size of global imbalances, although this improvement appears more cyclical than structural in nature. Notwithstanding the expansion in U.S. government borrowing, the U.S. current account deficit has shrunk as the private sector, particularly consumers, retrenched. Between mid-December and

early March, the U.S. dollar appreciated, driven primarily by flows linked to the deleveraging process and to international funding patterns. More recently, these flows have moderated, however, leading to a reversal of this trend. Over the coming year, underlying pressures from fundamental forces may start to dominate movements in the exchange rate, with persisting current account disparities putting further downward pressure on the U.S. dollar. To the extent that the international policy response to the crisis does not help foster a sustained rotation of demand, away from excess consumption in the United States and towards internally generated sources of demand in the developing countries of Asia, there remains a risk that the eventual adjustment of exchange rates could prove sharp and disorderly.

Rapid shifts in exchange rates and asset prices would affect Canadian businesses and financial institutions.

Such an outcome could exacerbate volatility in financial markets and give rise to a renewed increase in risk premiums across a broad range of financial assets. Rapid shifts in exchange rates and asset prices would affect Canadian businesses and financial institutions, as a result of portfolio dislocations caused by the sharp revaluations of assets and liabilities. An unexpected rise in the value of the Canadian dollar would adversely affect Canadian exporters and increase stress on businesses, households, and financial institutions. These pressures would be further exacerbated if the sharp movements in exchange rates gave rise to an increase in trade protectionism and/or policy measures that impede global capital flows.

Such dramatic reversals in cross-border capital flows are already affecting some emerging-market economies (EMEs), particularly those in Central and Eastern Europe. The global deleveraging process is driving many large financial institutions to retreat to their home markets, a trend exacerbated by the design of some rescue packages that encourage increased domestic lending at the expense of foreign lending. This is creating difficulties for EMEs that are highly reliant on cross-border flows of credit. While Canadian financial institutions have limited direct exposures to EMEs, instability in these economies could exacerbate the dislocations in the broader financial system, thereby indirectly transmitting the strains to Canada.

On balance, it is judged that the risk to the Canadian financial system from the crystallization of this risk has remained broadly unchanged.

Policy Actions and Assessment

The financial crisis has been met with unprecedented actions from authorities around the world aimed at calming fears and reducing uncertainty, with a view to restoring the flow of credit. The determination of world leaders to continue to do all that is necessary to repair confidence and support global economic growth was underlined in the G-20 leaders' summit communiqué of 2 April.[1] Implementation of the principles set out in this plan will be critical for the restoration of strength and stability to the global financial system.

1 The summit communiqué is summarized in Box 1 on p. 10.

Outside of Canada, the immediate priority is to stabilize the banking systems in countries where there have been failures. There is a broad consensus that this will require the resolution of uncertainty regarding the value of assets on bank balance sheets, with measures to address legacy assets and to recapitalize financial institutions where necessary. In this regard, the ambitious Financial Stabilization Plan unveiled by the U.S. Treasury represents a comprehensive framework for addressing these issues. The release of stress-test results for the 19 largest U.S. banks on 7 May marked the first stage of this plan and a significant step towards improved transparency. But the planned initiatives to deal with legacy loans and securities will also need to be implemented in a timely and effective manner if widespread and substantial improvements to the functioning of the global financial system are to become evident over the coming year.

Domestically, the Bank of Canada has continued to provide significant liquidity to the financial system through its expanded lending facilities. Since the December FSR, the Bank announced that a portion of the existing stock of 1- and 3-month regular term purchase and resale agreements (PRAs) would be rolled over into 6- and 12-month terms, and it introduced a new Term PRA Facility for private sector instruments to include a broader range of instruments and counterparties. A number of new initiatives to support the functioning of the financial system have also been announced by the Government of Canada under the Extraordinary Financing Framework as part of its Economic Action Plan. These include an expansion of its program to buy insured mortgages, raising the maximum amount of purchases under the scheme from $75 billion to $125 billion, and thereby increasing banks' access to longer-term funding. The Canadian Life Insurers Assurance Facility (CLIAF) has also been introduced to provide insurance on the wholesale term borrowing of federally regulated life insurers.[2] The Canadian Secured Credit Facility (CSCF) was unveiled, with an allocation of up to $12 billion to purchase securities backed by loans and leases on vehicles and equipment to help consumers and businesses access financing for these products.[3] The federal government is also making more credit available to businesses through the Business Credit Availability Program, with Export Development Canada and the Business Development Bank of Canada providing support to viable businesses whose access to financing would otherwise be restricted. As well, the recent federal budget included several proposed changes to improve the capacity of CDIC to respond to troubled financial institutions, including an increase in CDIC's borrowing limit from $6 billion to $15 billion and allowing CDIC the ability to establish a bridge institution as an additional resolution tool.

The Bank of Canada and the Government of Canada have provided significant funding and liquidity support to the financial system.

The Bank of Canada and Canadian regulatory authorities also remain committed to ongoing multilateral work aimed at more fundamental reform of the international financial architecture

The Bank of Canada and Canadian regulatory authorities also remain committed to ongoing multilateral work aimed at more fundamental reform of the international financial architecture.

2 This follows the earlier introduction of the Canadian Lenders Assurance Facility (CLAF), which offers insurance on wholesale term borrowing for federally regulated (and some provincially regulated) deposit-taking institutions. So far, neither the CLAF nor the CLIAF has been used.

3 Over $10 billion has already been allocated in the Large Enterprise Tranche of the scheme.

in accordance with the principles set out in the G-20 summit communiqué. This includes measures to improve transparency, widen the perimeter of regulation, and adopt a macroprudential approach to regulation. A macroprudential perspective would complement the current regulatory framework by focusing not only on the soundness of individual institutions, but also on systemwide risks that arise from the collective behaviour of financial market participants. In particular, this approach would aim to mitigate the procyclical tendencies of the financial system. An overview of various topics relating to this theme is provided in the special section of reports beginning on p. 31. Although substantial progress has been made towards a better understanding of the procyclical aspects of the financial system and designing appropriate policy instruments to counteract these effects, the issues raised are complex, and further analysis is needed to guide the implementation of the macroprudential approach.

The rapid implementation of the principles set out in the G-20 leaders' summit communiqué will be crucial to making further progress in restoring the normal functioning of the financial system.

In summary, the global financial system has started to emerge from its most severe crisis since the 1930s. Canadian financial institutions remain well capitalized, and the improvement in financial conditions has encouraged them to maintain their central roles as intermediaries and to expand their market-making activities. Nonetheless, the deterioration in the economic outlook has raised the potential for damaging feedback to the financial system. Against this background, the rapid implementation of the principles set out in the G-20 leaders' summit communiqué will be crucial to making further progress in restoring the normal functioning of the financial system and supporting the economic recovery.

The Macrofinancial Environment

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

Financial Markets

Conditions in global financial markets have improved since the publication of the December 2008 *Financial System Review* (FSR). Previously intense funding pressures have eased considerably, short-term funding markets are functioning more efficiently, and longer-term credit markets are now open for investment-grade and some high-yield issuers. Capital markets, in general, and equity markets, in particular, have seen strong gains in recent months. These trends serve to illustrate a general decline in risk aversion since early March. The improvement can be attributed, at least partly, to major actions by authorities around the world, and reflects signs that the global economy may be beginning to stabilize. While there is still a long way to go before economic and financial conditions return to normal, markets seem to be pricing out a worst-case scenario. Nonetheless, the improvement remains fragile, and most term securitization markets remain closed.

Uncertainties regarding the solvency of financial institutions are slightly less pronounced than they were in late 2008, partly because of massive capital injections, debt guarantees, and other support provided to banks by authorities around the world, as well as the fact that G-20 leaders again emphasized their commitment not to allow the failure of any systemically important financial institution (Box 1). Nonetheless, markets continue to have concerns regarding the effectiveness and the timeliness of the approach taken by authorities in some major economies to deal with toxic assets. Moreover, the sharper-than-expected deterioration in the economy is increasingly affecting the financial system, as markets focus on the negative impact on financial institutions through their loan exposure to households and corporations, and through their holdings of corporate securities. The deterioration in economic conditions has also spread to emerging-market economies that had initially been relatively unaffected by the financial crisis. This has raised concerns regarding the financial systems of these

Box 1

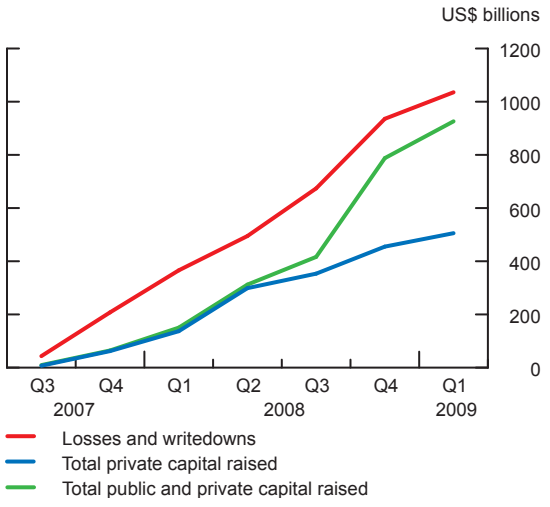
The G-20 Response

On 2 April 2009, the leaders of the G-20 countries committed to take action as needed to: (i) restore confidence, growth, and jobs; (ii) repair the financial system to restore lending; (iii) strengthen financial regulation to rebuild trust; (iv) fund and reform international financial institutions to overcome the current crisis and prevent future crises; (v) promote global trade and investment and reject protectionism; and (vi) build an inclusive, green, and sustainable recovery.

The declaration "Strengthening the Financial System" sets out a number of initiatives intended to support financial stability, including:

- Establish a new Financial Stability Board (FSB)—as a successor to the Financial Stability Forum (FSF)—with a strengthened mandate and expanded to include all G-20 countries, Spain, and the European Commission. The FSB should collaborate with the IMF to provide early warnings of macroeconomic and financial risks and the actions needed to address them;
- Reshape regulatory systems so that authorities are able to identify and take account of macroprudential risks;
- Extend regulation and oversight to all systemically important financial institutions, instruments, and markets;
- Endorse and implement the FSF's new principles on pay and compensation, and support sustainable compensation schemes and the corporate social responsibility of all financial firms;
- Take action, once recovery is assured, to improve the quality, quantity, and international consistency of capital in the banking system. In future, regulation must prevent excessive leverage and require buffers of resources to be built up in good times;
- Extend regulatory oversight and registration to credit-rating agencies to ensure that they meet the IOSCO Code of Conduct Fundamentals, an international code of good practices.

Chart 1: The pace of writedowns at global financial institutions has slowed



Source: Bloomberg Last observation: 2009Q1

countries and the impact on foreign financial institutions that are heavily exposed to these economies.

Cumulative writedowns and losses at financial institutions around the world have increased further—albeit at a reduced pace—since the December FSR, reaching US$1,035 billion in the first quarter of 2009 (Chart 1). Further writedowns and losses are expected as the global economy continues to deteriorate. Estimates of cumulative future writedowns and losses vary across sources, illustrating the high degree of uncertainty over the economic outlook and its impact on financial institutions. While global banks raised additional capital from both private and public sources in the first quarter of 2009 (US$50 billion and US$88 billion, respectively), some will require still more as a shield against the deterioration in economic conditions.

In the second quarter of 2009, the stress-test exercise conducted by U.S. authorities to assess the capital needs of the 19 largest U.S. banks in the event of a sharper-than-expected downturn in the economy indicated that 10 of those banks will need to raise a combined total of US$75 billion of additional capital to provide a sufficient buffer against the higher potential losses associated with the stress scenario. Markets reacted positively to these results, since the amounts of additional capital required appeared manageable. Several banks issued statements shortly after the release of the results detailing how they planned to raise the required capital, and about half of the estimated shortfall has already been filled.

Bank funding markets

Conditions in global short-term funding markets have improved markedly since the December FSR, as illustrated by the sharp decline in spreads between 1- and 3-month LIBOR and overnight index swaps (OIS) rates in major funding markets (Chart 2). This improvement is largely due to the extraordinary liquidity support provided by central banks to the global financial system. The situation in Canadian short-term funding markets remains healthier than in other jurisdictions: the spread between 3-month CDOR and OIS has continued to decline and has stabilized at around 20 basis points since the beginning of May 2009, its lowest value since the financial turmoil began in August 2007 (Chart 2). Moreover, forward CDOR-OIS spreads, which measure the difference between the implied 3-month CDOR and OIS rates at various points in the future, suggest that markets expect further modest improvement over the remainder of the year.[1]

Still, conditions in longer-term bank funding markets remain challenging in a number of jurisdictions because of ongoing concerns over the solvency of global financial institutions. While cumulative bond issuance by financial corporations in the United States since the beginning of 2009 has been robust (US$232 billion; slightly lower than the US$255 billion of issuance over the same period of the previous year), this issuance has been dominated by debt guaranteed by the Federal Deposit Insurance Corporation (FDIC), which accounted for 81 per cent of the total. On the other hand, since the end of April there has been a reversal in the composition of the debt issued by U.S. financial corporations, with an increase in the issuance of non-FDIC-guaranteed debt and a marked decline in the issuance of FDIC-guaranteed debt.

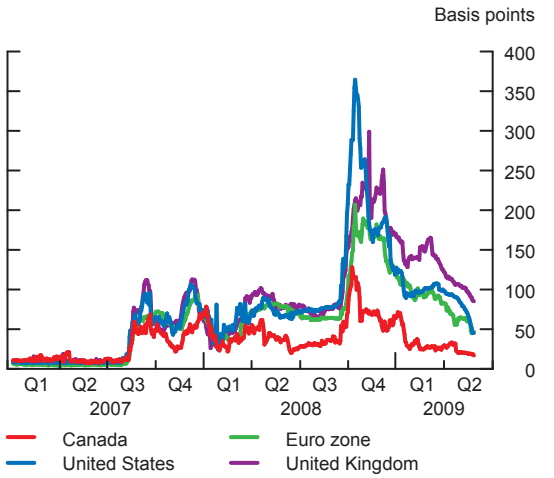
The cost of bank term funding in Canada, which had been less severely affected than in many other jurisdictions (reflecting the strong position of Canadian financial institutions), has fallen markedly since the December FSR as a result of a decrease in both risk-free rates and credit spreads (Chart 3). At the same time, however, new debt issuance by financial corporations in Canada has recently been very limited (Chart 4), owing to the fact that Canadian banks have taken advantage of the Insured Mortgage Purchase Program (IMPP) to secure term funding, while also benefiting from large inflows of retail deposits and slower growth in business credit.

Money markets

Total outstanding issues in the Canadian money market remain below their pre-crisis levels (Chart 5). Nevertheless, there have been signs of improvement in this market since the beginning of 2009: rates have decreased markedly, and demand for longer-term paper has resumed. While the stock of commercial paper (CP) has stabilized, investors in this market remain sensitive to the name and industry sector of the issuer, as is reflected in higher spreads for lower-rated issuers and issuers in cyclical sectors. Despite a further decline in outstanding bank-sponsored asset-backed commercial paper (ABCP) relative to late 2008, the tone in

Chart 2: Conditions in short-term funding markets have improved*

Difference between 3-month interbank offered rates and their respective overnight index swaps

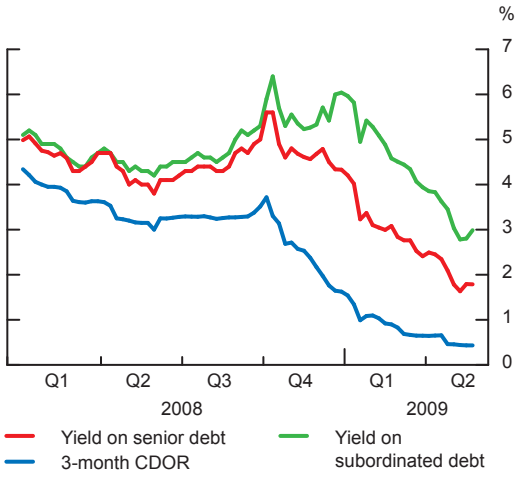


* U.S. and U.K. LIBOR, EU EURIBOR, and Canada CDOR

Source: Bloomberg Last observation: 25 May 2009

Chart 3: The cost of term funding for Canadian banks has declined markedly

5-year debt swapped into 3-month floating-rate debt

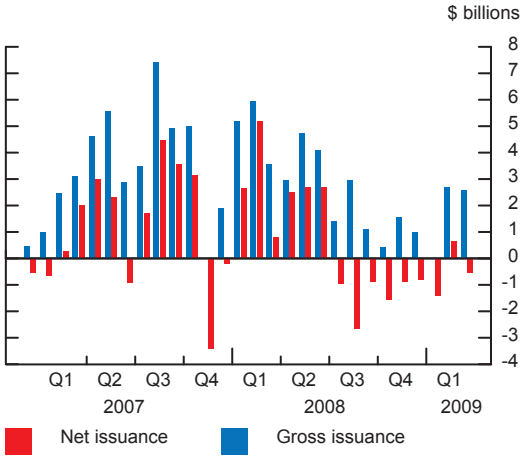


Sources: Bloomberg, Canadian commercial banks, and Bank of Canada calculations

Last observation: 22 May 2009

1 Forward CDOR-OIS spreads are derived from 3-month BAX futures contracts and the OIS curve. Three-month BAX futures contracts are settled using the CDOR setting. It should be noted that forward CDOR-OIS spreads can be affected by other factors that influence implied expectations.

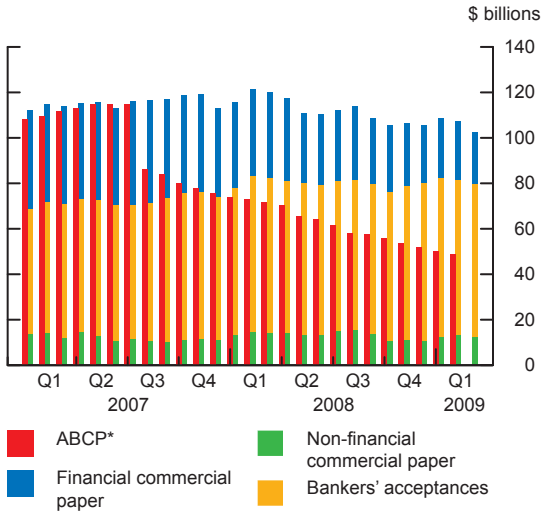
Chart 4: The net debt issuance of Canadian financial corporations remains limited



Source: Bank of Canada

Last observation: April 2009

Chart 5: Outstanding amounts of Canadian money market instruments remain below pre-crisis levels



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

Sources: Bank of Canada and DBRS

Last observation: March 2009; ABCP Feb. 2009

this market has improved markedly: spreads relative to bankers' acceptances (BAs) have declined significantly, and anecdotal evidence suggests that more issuance is taking place at longer terms, reflecting some improvement in confidence as investors seek higher returns. With investor demand greatly reduced compared with pre-crisis levels and sponsors less willing to incur the contingent liquidity commitment associated with ABCP, however, the ABCP market is unlikely to return to its previous size in the near future.

As noted in the December FSR, the financial crisis has had a material impact on liquidity in the Canadian and global repo markets. Market turbulence, along with very low short-term interest rates, led to an increase in settlement fails in repo markets (which occur when securities are not delivered), particularly in the United States. Following persistent and widespread fails in U.S. Treasury securities in late 2008, the U.S. Treasury Market Practices Group (TMPG) endorsed measures—including a financial penalty, implemented on 1 May—to reduce failed deliveries and thus help to restore the efficient functioning of the repo market at low short-term rates.[2] It should be noted, however, that the U.S. repo market experienced a decline in failed deliveries prior to the implementation of the penalty. In Canada, the reduction of the overnight target rate to 25 basis points on the April fixed announcement date has led to reduced activity in the repo market, since very low interest rates offer little incentive to market participants to lend securities. Although anecdotal evidence suggests a decline in repo volumes, in contrast to the United States, there is little evidence of increased settlement fails. On 22 May, the Bank of Canada introduced changes to its securities-lending program in light of the effective lower bound for the Bank of Canada's target rate. The objective of the program remains the same—i.e., to promote the efficient functioning of the Government of Canada securities market by providing a secondary and temporary source of securities to the market—but the standard terms have been revised to enhance the design of the securities-lending program.[3]

Credit markets

Conditions in global corporate debt markets have improved since the December FSR, with the recovery being broad-based across sectors and issuers. Although yield spreads on U.S. corporate bonds remain high, they have declined recently for both higher- and lower-quality investment-grade corporate issuers and even for some high-yield issuers (Chart 6).[4] Combined with lower yields on government bonds, this has led to an overall decline in yield levels on U.S. corporate issues.

2 The "fail" charge is equal to the greater of 3 per cent per annum minus the federal funds target rate (or the lower limit of the target band when the FOMC announces a target band) or zero. The penalty rate would be capped at 3 per cent per annum.

3 These changes include: a decrease in the securities-lending fee, an increase in the bidding limit of participants, and the introduction of a penalty for delivery failures. For details, see <http://www.bankofcanada.ca/en/notices_fmd/2009/notice220509.html>.

4 The decline in corporate spreads is likely due to a decrease in the liquidity premium demanded by agents, since liquidity concerns have eased somewhat, and some of the money previously sitting on the sidelines (e.g., in money market mutual funds) is being reinvested in risky assets. At the same time, however, deterioration in the real economy has led to an increase in credit risk, which contributes to keeping corporate yields above pre-crisis levels.

Issuance of both financial and non-financial corporate debt in the United States has been strong since the December FSR. Cumulative issuance by non-financial corporations since the beginning of 2009 stood at close to US$320 billion, representing an increase of 188 per cent compared with the level of issuance over the same period last year. Access to markets has even improved for high-yield issuers, although the improvement has been essentially for higher-rated issuers in this bracket (mainly BB-rated). This marks a significant shift from the autumn of 2008 when markets were essentially closed to all high-yield issuers.

There have also been tentative signs of improvement for credit products from financial issuers around the world: yield spreads for higher-quality financial issuers declined in April, after having reached historic highs in late March (Chart 7). The still-elevated yield spreads, however, highlight the fact that significant concerns remain regarding the health of financial institutions. These concerns vary across countries, as is reflected in the higher yield spreads on debt issuance by U.S. and U.K. financial institutions compared with their European and Canadian counterparts.

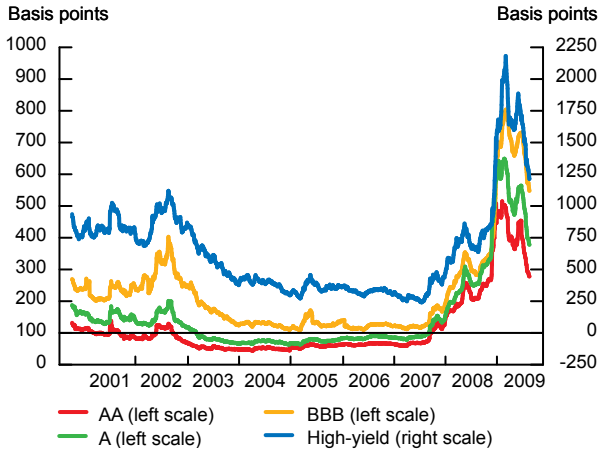
Canadian corporate credit markets

Canadian credit markets have also improved, as evidenced by the recent gradual decline in yield spreads on corporate bonds (Chart 8) and the increased issuance of non-financial corporate bonds (Chart 9). Yield spreads for higher-quality issuers have declined by close to 145 basis points since their peak in early 2009. Although conditions for lower-quality issuers have improved only recently, the compression in spreads has been even more significant. Lower yields on government bonds have also contributed to reduce long-term borrowing costs for corporations.

Conditions in the primary market have improved markedly, with strong issuance by non-financial corporations as they take advantage of low yield levels and the reopening of credit markets. A number of recent issues have been upsized in response to investor demand, and the majority of recent issuance has been sold at smaller concessions relative to the secondary market. Some lower-rated investment-grade issuers have entered the market more recently and have met fairly strong investor demand. Nonetheless, markets remain sensitive to the names and sectors of issuers, and conditions in secondary markets remain more difficult, with limited trading.[5]

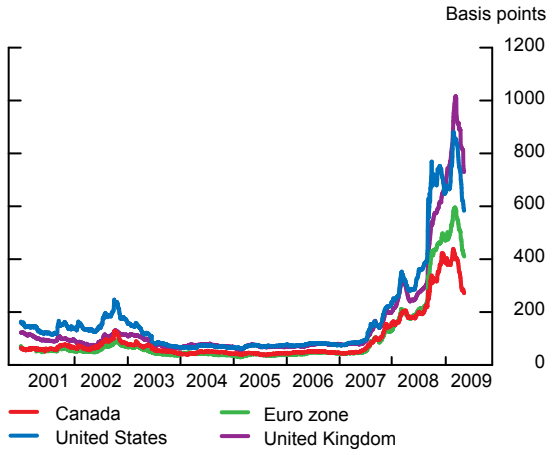
Despite this overall improvement in Canadian credit markets, the term securitization market—excluding National Housing Act Mortgage-Backed Securities (NHA MBS)—remains frozen. The amount of Canadian-dollar asset-backed securities (ABS) outstanding, excluding government-guaranteed mortgage securities, has declined from just over $60 billion in June 2007 to below $50 billion at the end of March 2009, since maturing securities have not been replaced by new issuance.

Chart 6: Yield spreads on U.S. corporate bonds have come down



Sources: Bloomberg and Merrill Lynch Last observation: 25 May 2009

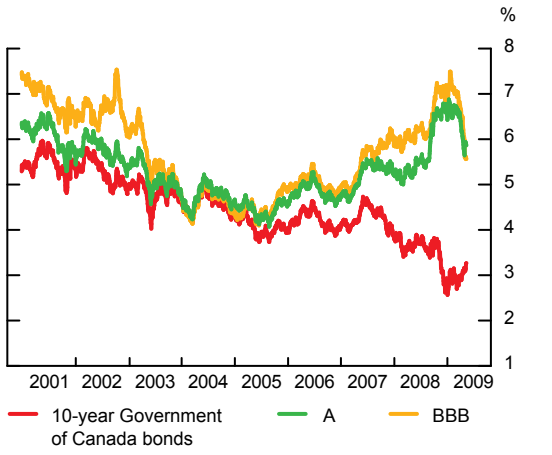
Chart 7: Yield spreads for investment-grade financial issuers are down from historic highs



Sources: Bloomberg and Merrill Lynch Last observation: 25 May 2009

Chart 8: Conditions in Canadian corporate bond markets have also improved . . .

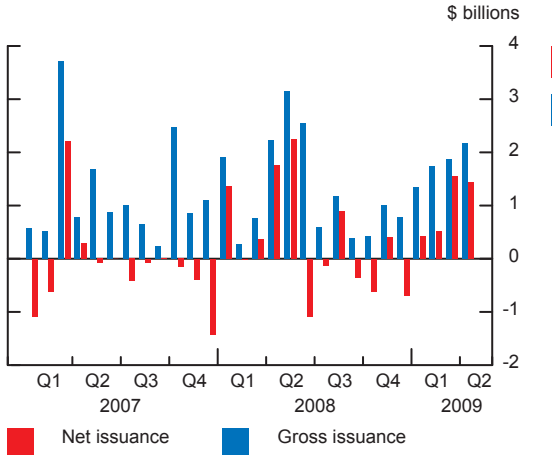
Yields on Canadian corporate and government bonds



Sources: Bloomberg and Merrill Lynch Last observation: 25 May 2009

5 Canadian secondary markets for corporate bonds were not very liquid before the crisis.

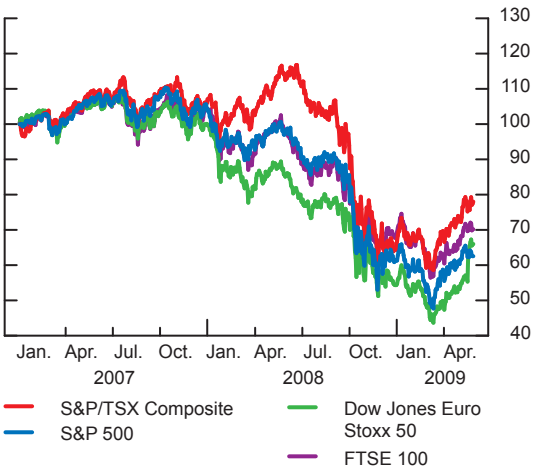
Chart 9: . . . and debt issuance by Canadian non-financial corporations has increased



Source: Bank of Canada — Last observation: April 2009

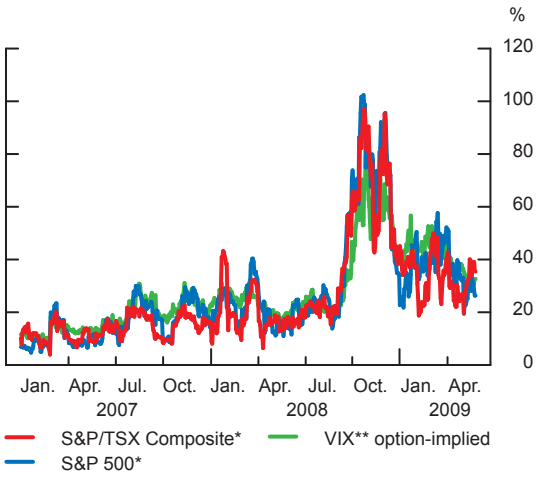
Chart 10: Global equity markets are recovering . . .

January 2007 = 100



Source: Bloomberg — Last observation: 25 May 2009

Chart 11: . . . and volatility has come down



* The S&P 500 index and the S&P/TSX Composite Index are based on 10-day historical volatility.

** The VIX is a measure of the implied volatility obtained from option contracts on the S&P 500 Index.

Source: Bloomberg — Last observation: 25 May 2009

Sovereign markets

Many countries have put in place large fiscal stimulus packages to counteract the deterioration in their economies, thus contributing to increased fiscal deficits that are expected to persist for an extended period. These large deficits have come on top of sizable government rescue plans for the banking system, leading to concerns regarding a relative deterioration in sovereign creditworthiness.

Rising fiscal deficits have also generated concerns regarding the impact that the associated increase in the supply of government securities may have on the future path of interest rates across the yield curve. Although greater supply does appear to have pushed up yields on government securities to a limited extent, they still remain at historically low levels in many countries. This likely reflects a number of countervailing factors, including continued strong demand for risk-free securities, lower expectations for economic growth and inflation (which tend to depress nominal yields), and the reduced supply of private debt instruments. Unconventional monetary policy actions in a number of countries have also acted as an offsetting force, keeping government bond yields low.

Equity markets

Equity markets around the world continued to fall during the winter, reacting to increasing evidence of a significantly greater deterioration in the real economy than expected and to persistent concerns regarding the financial system. Following a sharp sell-off in February and early March that brought most major equity indexes to multi-year lows, there has been a sharp reversal with equity markets experiencing strong gains since mid-March. Major exchanges are up by about 30 per cent from their recent lows, with those in some emerging markets experiencing even stronger rebounds. Nonetheless, equity market indexes remain well below their pre-crisis levels (Chart 10). Although volatility remains elevated, it has declined significantly (Chart 11).

The recent improvement can be attributed to a combination of factors. First, measures taken by authorities around the world have started to restore confidence in financial institutions, as indicated by the comparatively larger gains in financial subindexes. Second, the recent reporting period for corporate earnings, although generally weak in absolute terms, has been characterized by some better-than-expected results, particularly for financial institutions, which has helped to dampen concerns regarding the health of the financial system more generally. Finally, while economic news remains grim, there are signs that the pace of deterioration, particularly in the U.S. economy (notably in the housing sector), may have slowed. The recent improvement in equity markets remains fragile, however, and markets remain vulnerable to shocks.

Emerging-market economies

Emerging-market economies (EMEs) were initially relatively unaffected by the financial crisis, since they had little direct exposure to problem assets. Nonetheless, equity markets in these economies experienced declines of a similar—and in some cases greater—magnitude than those of advanced economies (Chart 12).

The strong feedback effects of the financial crisis on the real economy have caused a sharp contraction in global trade, which has led to a deteriorating economic outlook for EMEs and significant exchange rate fluctuations, particularly for EMEs that are heavily reliant on cross-border flows of credit, such as the economies of Central and Eastern Europe. This deteriorating outlook, together with reduced demand for emerging-market assets, raised concerns regarding the ability of EMEs to meet their financial needs, prompting rating agencies to downgrade the sovereign ratings of a number of EMEs, and causing spreads on credit default swaps (CDS) to widen during the winter. Since March, however, spreads on CDS have generally retreated from their peak levels (Chart 13).

While total net capital flows to EMEs have remained broadly unchanged to date compared with last year, the situation may prove more challenging going forward, since there is a growing home bias to private capital flows. The IMF projects that leveraged foreign investors will continue to reduce their holdings of emerging-market assets, leading to annual portfolio outflows of around 1 per cent of emerging-market GDP over the next few years.[6]

Authorities in a number of EMEs have taken fiscal and/or monetary policy measures to counteract the deteriorating outlook. A few EMEs have sought access to the International Monetary Fund's (IMF) new Flexible Credit Line (FCL),[7] which has been designed to help prevent crises in countries with very strong fundamentals, policies, and track records of policy implementation.[8] The G-20 commitment to increase financial resources to the IMF and other international financial institutions should also help to mitigate the impact of the crisis on EMEs.

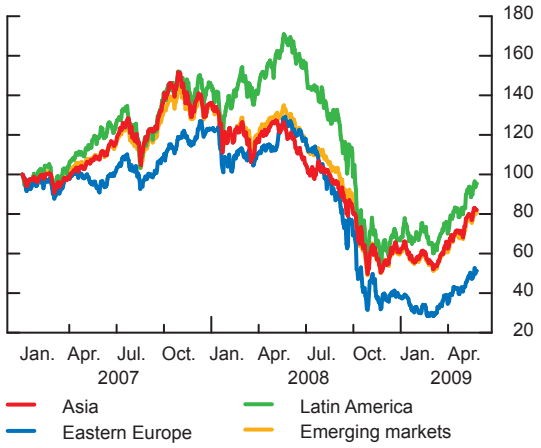
Policy response

Authorities around the world have continued to provide substantial public sector support to financial institutions and markets in response to the ongoing crisis.[9] Since the December FSR, a number of new initiatives aimed at improving the functioning of the financial system have been announced, and large fiscal stimulus packages have been adopted in many countries to counteract the sharp downturns in their economies.

Stabilization of the global financial system will require measures to restore confidence in the solvency of the world's major banks. In this regard, the Financial Stability Plan announced by the U.S. Treasury in February 2009 represents a comprehensive framework to deal with legacy assets and to recapitalize financial institutions

Chart 12: Equity markets in EMEs are also recovering . . .

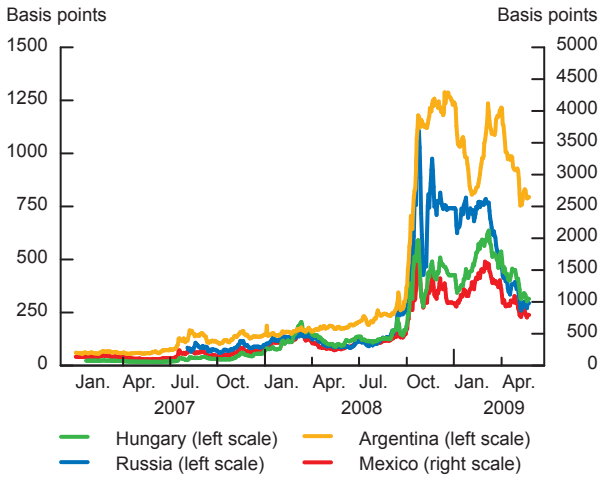
January 2007 = 100



Note: All series titles represent the MSCI Emerging Markets Index for that region.
Source: Bloomberg Last observation: 25 May 2009

Chart 13: . . . but there are concerns about the financial positions of some EMEs

Spreads on sovereign 5-year credit default swaps



Source: Markit Last observation: 25 May 2009

6 International Monetary Fund, *Global Financial Stability Report* (April 2009, 7).

7 The FCL was announced by the IMF in March 2009. It is designed to be primarily a crisis-prevention tool. Access to the FCL is based on a number of criteria and is determined on a case-by-case basis.

8 To date, Mexico, Poland, and Colombia have sought access to the FCL. The IMF has approved a US$47 billion credit line for Mexico, a US$20.58 billion line for Poland, and a US$10.5 billion line for Colombia.

9 See the December 2008 FSR, pp. 12–14, for details of the initiatives announced last year.

where necessary.[10] The successful completion of the first stage of this plan was marked by the release on 7 May of the results of a stress-testing exercise on the 19 largest U.S. banks. The process has helped to reduce uncertainty in markets by determining which banks require additional capital buffers to guard against the potential losses associated with a deeper-than-expected recession. Banks needing to strengthen their positions have access to government capital under the Capital Assistance Program (CAP) to serve as a bridge to receiving private capital, which they must raise by 9 November.

Another central element of the U.S. Treasury's plan is the establishment of a Public-Private Investment Program (PPIP) to deal with the legacy assets on bank balance sheets. The program aims to catalyze private sector investment in these loans and securities by providing access to low-cost, non-recourse funding. With the government potentially providing the vast majority of the financing, private sector participation is nonetheless deemed crucial to promoting price discovery for these complex assets.

While the PPIP represents an ambitious strategy to deal with the problem of legacy assets, there remain a number of challenges to its successful implementation. These include uncertainties relating to bank participation, given the large gap that currently exists between the valuations on bank balance sheets and the price that investors appear willing to pay, as well as the possibility that public funding may be insufficient to deal with the scale of the problem. These challenges will need to be overcome so that the initiatives can be implemented in a timely and effective manner and thereby contribute to the restoration of confidence in the damaged U.S. financial system.

Another key policy development since the December FSR has been the implementation of "quantitative easing" programs by the U.S. Federal Reserve, the Bank of England, and the Bank of Japan to purchase government and/or private sector securities. Although the principal objective of these facilities is the provision of additional monetary stimulus when the policy interest rate reaches the effective lower bound, these programs also benefit the financial system to the extent that they lower yields on government bonds and/or reduce spreads on corporate securities.[11]

Policy response in Canada

The Bank of Canada has continued to provide significant liquidity, as required, to the Canadian financial system. The results of recent auctions of term PRAs (i.e., lower bid-to-cover ratios, lower average yields relative to OIS rates, and a narrowing of the range between high and low yields)[12] indicate a reduction in the need for liquidity support provided by the Bank. Therefore, the Bank has gradually reduced the outstanding amount of term

10 A number of other initiatives have been announced by the U.S. government and the Federal Reserve over the past six months to support household and business credit. These include the Federal Reserve's Term Asset-Backed Securities Loan Facility (TALF) and measures to support the housing market.

11 While the Bank of Canada has not launched such facilities, a framework for the potential provision of additional monetary stimulus at the effective lower bound was set out in the Annex of the April 2009 *Monetary Policy Report* (see <http://www.bankofcanada.ca/en/mpr/pdf/2009/mpr230409.pdf>).

12 For details on the auction results for the various Bank of Canada facilities, see <http://credit.bank-banque-canada.ca/index.php/facilities/liquidityfacilities>.

liquidity provision, from a peak of $41 billion in early December to $25.2 billion as of 25 May.

Notwithstanding this improvement, on 21 April, the Bank announced that it will roll over a portion of its existing stock of 1- and 3-month regular term PRAs into 6- and 12-month terms in order to reinforce its conditional commitment to maintain the overnight rate at ¼ per cent until the end of June 2010. This has had a positive impact on some money markets, e.g., by contributing to a decline in the spread between longer-dated bankers' acceptances and OIS. The offer of longer-term PRAs for monetary policy purposes will likely increase the outstanding amount of term liquidity from the current level.

The Bank of Canada also introduced a new Term PRA Facility for private sector instruments in late February. The objective of this facility (which replaces the Term PRA Facility for Private Sector Money Market Instruments introduced in October 2008) is to support liquidity in markets for private sector instruments. It does so by giving access to central bank liquidity to market participants that are active in the Canadian private sector money and/or bond markets but that are not eligible for regular term PRAs.

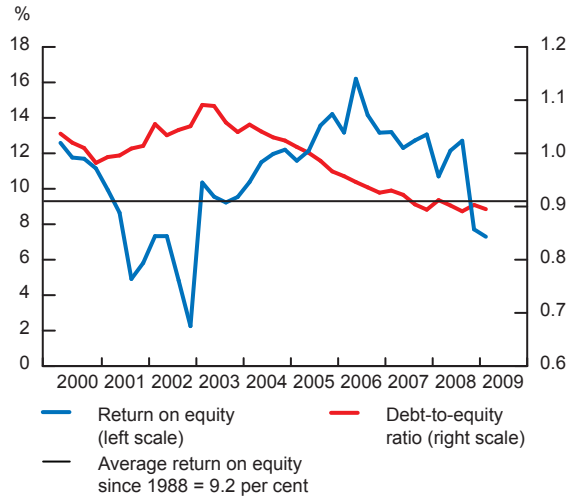
In the Economic Action Plan, introduced on 27 January, the Government of Canada announced the Extraordinary Financing Framework. Under this initiative, the government aims to improve access to financing in Canada through:

- the provision of additional term funding to Canadian banks by increasing the maximum amount of mortgages to be purchased through the IMPP by $50 billion to $125 billion. The most recent auctions have been undersubscribed, suggesting that the needs of banks for term funding have diminished. About $58 billion in mortgages have been purchased since the IMPP was launched.
- the purchase of up to $12 billion in newly securitized term ABS backed by loans and leases on vehicles and equipment under the Canadian Secured Credit Facility (CSCF). Over $10 billion of funding had been allocated to 15 lenders in the vehicle and equipment financing industry as of early May.
- the Canadian Life Insurers Assurance Facility (CLIAF) which, like the Canadian Lenders Assurance Facility (CLAF) for federally regulated (and some provincially regulated) deposit-taking institutions, provides insurance on the wholesale borrowing of federally regulated life insurers. Both the CLAF and the CLIAF initiatives were undertaken to ensure that Canadian institutions are not put at a competitive disadvantage relative to foreign competitors when raising funds in wholesale markets.[13] To date, neither has been used, although the private sector has indicated that having the programs in place is nonetheless important.
- a number of other measures that aim to improve financing to businesses, such as the Business Credit Availability Program.

The federal budget also included several proposed changes to improve the capacity of CDIC to respond to troubled financial institutions, including an increase in CDIC's borrowing limit from $6 billion to $15 billion and allowing CDIC the ability to establish a bridge institution as an additional resolution tool.

13 See Table 1 on p. 13 in the December 2008 FSR.

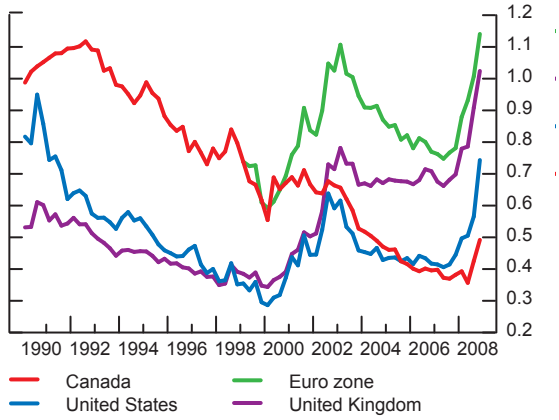
Chart 14: Canadian corporate leverage has remained stable . . .



Source: Statistics Canada *Quarterly Financial Statistics for Enterprises* (at book value)
Last observation: 2009Q1

Chart 15: . . . and stands below that in other countries

Non-financial corporate sector: Debt-to-equity ratio*



* For international comparability, data for Canada are measured at market value rather than at book value.

Sources: Statistics Canada, U.S. Federal Reserve, U.K. National Statistics, ECB
Last observation: 2008Q4

Canadian Non-Financial Sector

Credit growth

As shown in Table 1, overall credit growth in Canada has continued to slow since the December FSR. This slowing has been most evident in the business sector, and is consistent with results from the Bank's *Senior Loan Officer Survey* and *Business Outlook Survey*, which suggest that credit conditions have tightened further and that demand for credit has receded. In contrast, while the growth of household credit has slowed, growth in the consumer credit subcomponent remains surprisingly strong, given the weakness in household spending.

Improved access to capital markets has led to a noticeable increase in new issues of debt and equity by non-financial corporations in the first quarter of 2009 and a shift away from a heavy reliance on bank financing. Growth in non-bank consumer credit has also shown signs of improvement in recent months.

Corporate sector

The financial position of the Canadian non-financial corporate sector remains reasonably solid. Corporate leverage, as measured by the ratio of debt to book-value equity, has been relatively stable since the third quarter of 2007 (Chart 14), after a period of decline that began in the early 1990s. At the same time, Canadian corporate leverage, measured at market value, continued to stand well below that of the United States, the United Kingdom, and the euro area. Although this measure of leverage has risen in

Table 1: Credit—Annualized Growth Rates

	Distribution %	10-year average[a]	Pre-crisis trend[b]	2007H2	2008H2	January to April 2009[c]
Total Household Credit	**100.0**	**8.7**	**10.5**	**12.3**	**8.5**	**7.1**
Residential mortgage credit	**68.6**	**8.3**	**10.8**	**13.3**	**9.0**	**6.4**
NHA MBS program	20.3	32.4	19.9	54.5	97.2	33.4
Other securitized	1.5	4.5	19.5	-7.7	-21.7	-14.0
Chartered bank	32.8	6.4	9.7	8.8	-6.5	-9.5
Non-bank[d]	14.1	3.7	7.1	8.4	4.0	2.1
Consumer credit	**31.4**	**9.7**	**10.0**	**10.2**	**7.5**	**8.7**
Securitized	3.9	15.5	17.1	-3.0	-12.3	-9.7
Chartered bank	22.6	12.1	9.0	15.6	14.5	13.7
Non-bank[d]	4.8	4.8	8.0	4.3	-2.8	1.7
Total Business Credit	**100.0**	**5.3**	**7.0**	**7.6**	**3.9**	**0.7**
Securitized	3.5	12.8	23.4	-6.4	-18.2	-17.4
Chartered bank	26.8	4.8	13.1	21.1	14.6	-9.3
Non-bank[d]	11.6	6.8	4.8	10.5	3.7	2.6
Commercial paper	1.0	-0.1	7.5	3.7	-11.4	12.4
Market[e]	57.1	5.7	4.1	2.4	0.7	5.9

a. Average of the annualized 3-month growth rates for 1999Q1 to 2009Q1
b. Average of the annualized 3-month growth rates for the four previous quarters (2006Q3–2007Q2)
c. Non-bank and securitization data for April 2009 are estimates.
d. Non-bank includes trust and mortgage loan companies, credit unions and caisses populaires, life insurance companies, and non-depository credit intermediaries and other institutions (e.g., auto leasing and sales finance companies).
e. Bonds and debentures, equities and warrants, and trust units. Includes both domestic and foreign issues.

Source: Bank of Canada

recent quarters, its rise has been less pronounced than in those countries (Chart 15).

The profitability of the non-financial corporate sector, measured by the rate of return on book-value equity, edged down further at the beginning of the year, as a result of the contraction in the global economy and the sharp decline in the terms of trade (Chart 14). With the ongoing weakness in the global economy and the subdued outlook for commodity prices, Canadian corporate profits will undoubtedly continue to be under pressure for the remainder of the year (see Box 2 for a discussion of the pressures on firm-sponsored pension plans).

Although business bankruptcies have edged down further since the December FSR, recent data on corporate bond defaults and bond downgrades indicate that corporate default risk has increased.

Industry

While the financial position of the non-financial corporate sector as a whole remains relatively solid, some industries, particularly auto manufacturing and wood and paper products, have experienced further significant financial stress.

The Canadian auto manufacturing industry has been hit by substantial losses since the middle of 2008 (Chart 16). The financial situation of the overall North American auto industry (including many Canadian parts companies) has worsened over the past nine months, and financing has become increasingly difficult. Governments have announced special financing measures for some companies to avoid their insolvency. This financing is conditional on those companies formulating and adhering to stringent restructuring plans.

Despite the depreciation of the Canadian dollar over the past year, profits in Canada's wood and paper products industry have remained in negative territory, largely because of the continued weakness in the U.S. housing market (Chart 17).

Although many manufacturing companies are likely to face significant additional pressures, their problems are unlikely to have a major direct adverse impact on the Canadian financial system, given the marked reduction in the exposure of Canadian banks to these industries since 2002 (see Chart 28).

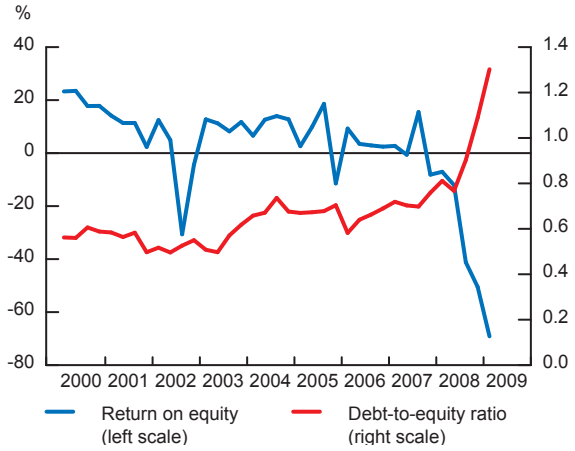
Household sector

Since the December FSR, there has been a further deterioration in the financial position of the Canadian household sector as a result of the continued turmoil in financial markets, the deepening global recession, and worsening labour market conditions. Nonetheless, in aggregate, the financial situation of Canadian households remains reasonably healthy.

Household real net worth continued to decline in the fourth quarter of 2008, falling by 6.7 per cent year-over-year (Chart 18). This drop reflects the combined effect of increased household debt levels, weakening real estate assets, and sharp losses in the value of financial assets caused by equity market declines.

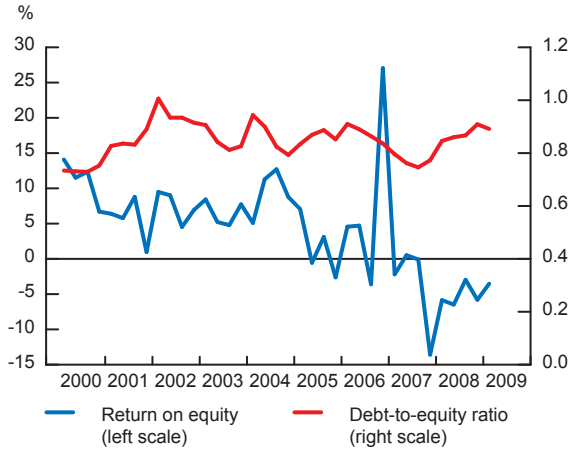
Despite the weakness in the housing market, Canadians continue to hold substantial equity in their homes. Real estate equity as a share of total real estate assets is significantly higher than in

Chart 16: The auto industry has been hit by substantial losses since mid-2008 . . .



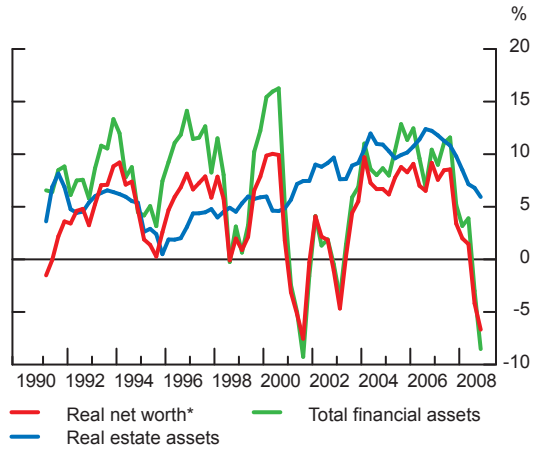
Source: Statistics Canada *Quarterly Financial Statistics for Enterprises* (at book value)
Last observation: 2009Q1

Chart 17: . . . and profits in the wood and paper products industry are also in negative territory



Source: Statistics Canada *Quarterly Financial Statistics for Enterprises* (at book value)
Last observation: 2009Q1

Chart 18: Household net worth has declined
Year-over-year growth rate



* Deflated by total CPI (2002 = 100)
Source: Statistics Canada
Last observation: 2008Q4

Box 2

Funding Status of Pension Plans

Firms that sponsor defined-benefit (DB) pension plans are facing additional stress. The funding condition of DB plans in Canada deteriorated sharply in 2008, before stabilizing in the first quarter of 2009. Chart A presents the trend in Mercer's Pension Health Index, which incorporates indexes of the assets, liabilities, and funding positions (assets less liabilities) of a representative DB plan in Canada. Assets fell in 2008, largely because of the steep decline in Canadian and international equity markets. At the same time, declines in long-term bond yields caused the present value of liabilities to increase.

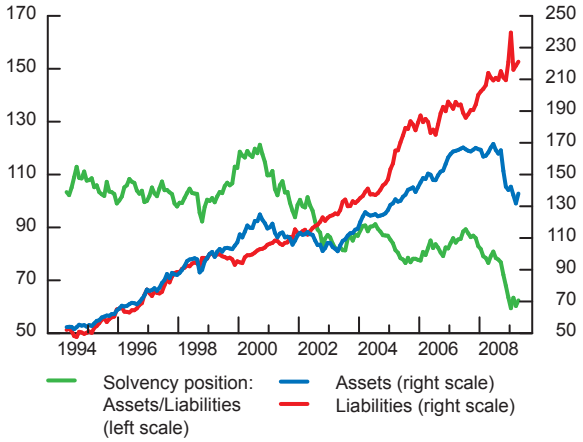
The sensitivity of the funding status of DB plans to the volatility of financial markets points to the need for pension reform in Canada, from the perspective of both plan sponsors and plan members.[1] Private sector plan sponsors are facing large funding shortfalls at a time when profits are cyclically weak and access to credit constrained. In this environment, plan members are concerned about pension obligations being met. To address these issues, reforms should focus on: (i) flexibility to manage risks and (ii) proper incentives.[2]

Reforms (regulatory, accounting, and legal) should also focus on providing sponsors with the flexibility needed to actively maintain a balance between the future income from the pension fund and the payouts associated with promised benefits. Small pension funds should be encouraged to pool with larger funds to better diversify market risk as another way to help make pension funds more resilient to market volatility. The effective use of risk-sharing agreements between sponsors and members would also make pension plans more robust to economic and demographic shocks.

Pension fund surpluses act as a buffer against unanticipated negative shocks to pension assets (or positive shocks to liabilities) at a time when it may not be convenient for the sponsor to make an immediate injection into the pension fund to offset the shock. Reforms should therefore also look at removing disincentives for sponsors to build a surplus and enhancing the benefit that sponsors might obtain from maintaining a surplus.

Chart A: The funding position of DB pension plans has deteriorated sharply

Mercer Pension Health Index, 31 December 1998 = 100



Source: Mercer Human Resource Consulting Last observation: March 2009

1 Reviews of provincial pension systems have been conducted recently in Ontario, Quebec, British Columbia, Alberta, and Nova Scotia. The federal government has launched national consultations on private pensions.

2 For federally regulated pension plans, the period of time over which the deficit must be eliminated was recently extended from 5 years to 10 years for 2008 deficiencies, subject to certain conditions.

the United States (Chart 19), owing to a more subdued downturn in house prices in Canada (Chart 20). Further declines in house prices are expected this year, given the weak economic outlook, growing supply-demand imbalances in the resale market, and the increasing number of unoccupied new homes.

The increase in household debt levels, along with the stagnation of disposable income, has contributed to a further rise in the debt-to-income ratio, which reached a new high in the fourth quarter of 2008 (Chart 21).[14] The increase in debt levels implies that households are becoming more susceptible to adverse shocks, even though Canadian household leverage remains well below that in the United Kingdom and United States. It is against this background of increased vulnerability that the global recession is having a substantial negative effect on employment and incomes in Canada.

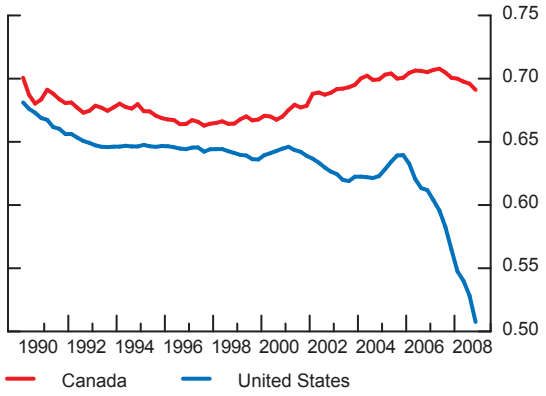
The impact of the global economic downturn is being mitigated to the extent that the lower interest rate environment has kept the aggregate debt-service ratio (DSR) relatively stable over the past year (Chart 22). These lower rates reflect the easing of monetary policy by the Bank of Canada, as well as aggressive actions taken by the federal government to improve conditions in credit markets (Chart 23).[15] Furthermore, microdata from Ipsos Reid indicate that the proportion of vulnerable households (those with a DSR above 40 per cent) remained relatively stable at 2.8 per cent in the second half of 2008, but the share of debt carried by these households decreased markedly to 4.7 per cent, down from 5.9 per cent in the same period a year earlier.

Despite the mitigating effect of lower interest rates, a number of indicators of household financial stress have moved up. The ratio of personal bankruptcies has increased sharply since the third quarter of 2008, which can be attributed largely to the recent substantial decline in employment. Residential mortgage loans in arrears as a percentage of mortgage loans outstanding also rose sharply over this period (Chart 24), as did the ratio of credit cards in arrears. Given the deterioration in the outlook for the economy in general and the labour market in particular, arrears and insolvencies are likely to increase further over the coming year.

Stress testing the household sector

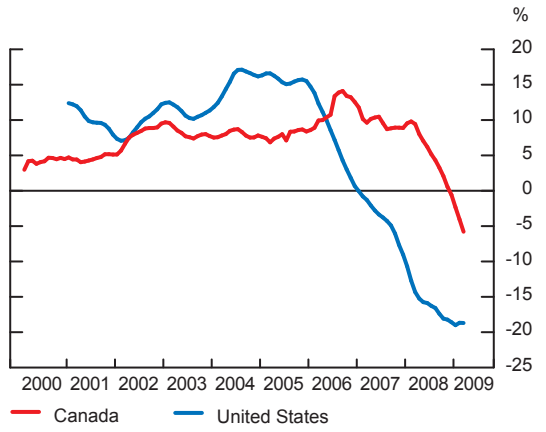
The Bank has conducted a partial stress-testing simulation to assess the potential impact on Canadian household balance sheets of a more severe economic downturn than currently anticipated. This exercise departs from stress-testing simulations of the household sector in previous issues of the FSR[16] by introducing an explicit negative shock to employment.

Chart 19: Equity in Canadian homes remains significantly higher than in the United States . . .
Real estate equity* as a share of real estate assets



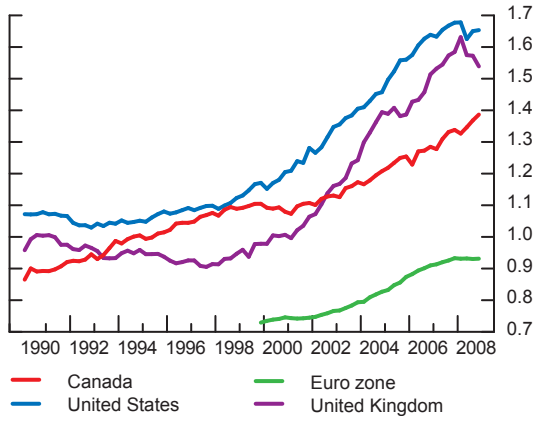
* Real estate equity = real estate assets excluding mortgages
Sources: Statistics Canada, U.S. Federal Reserve (at market value)
Last observation: 2008Q4

Chart 20: . . . since house prices have declined only slightly in Canada
Year-over-year growth rate of house prices



Sources: Teranet-National Bank of Canada and S&P/Case Shiller
Last observation: March 2009

Chart 21: The household debt ratio is still rising in Canada . . .
Household debt as a share of personal disposable income



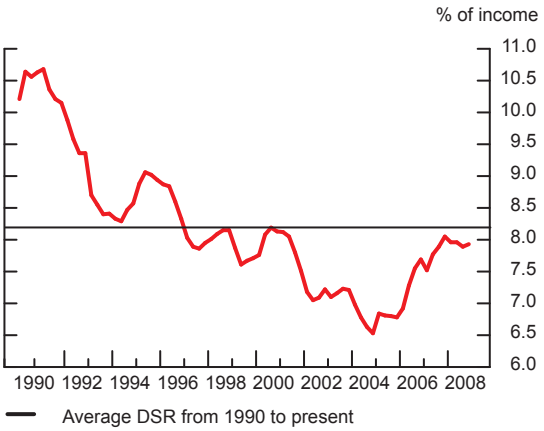
Sources: Statistics Canada, U.S. Federal Reserve, U.K. National Statistics, ECB
Last observation: 2008Q4

14 For purposes of comparison, total U.S. household debt is calculated as being equal to "household debt" plus the debt of the "non-farm non-corporate business sector." This is because the Canadian National Balance Sheet Accounts include "unincorporated business" in their definition of the personal (i.e., household) sector, which the U.S. Federal Reserve Flow of Funds Accounts do not. In both the United States and Canada, "personal disposable income" includes income from both households and unincorporated businesses.

15 See the Bank of Canada's Credit Dashboard at <http://credit.bankofcanada.ca/index.php/financialconditions>.

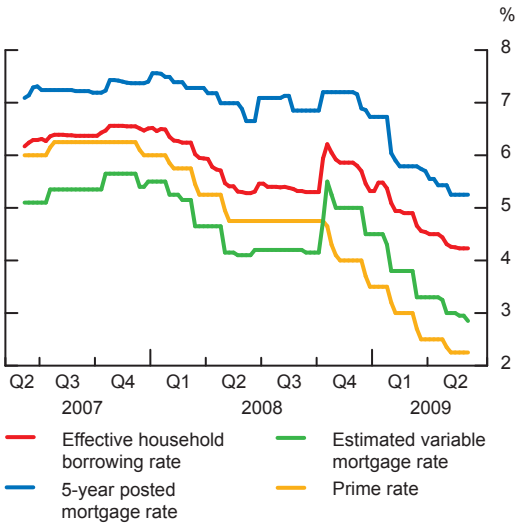
16 For example, the December 2007 and December 2008 issues.

Chart 22: . . . but the debt-service ratio has remained relatively stable over the past year



Note: The DSR includes interest payments only.
Source: Statistics Canada Last observation: 2008Q4

Chart 23: Household borrowing costs have fallen significantly since December



Source: Bank of Canada Last observation: 25 May 2009

This simulation is aimed at assessing the impact of an increase in the unemployment rate on losses in bank portfolios of household loans. Data for 2008 from the Canadian Financial Monitor, a household survey conducted by Ipsos Reid,[17] are used as the starting point for this analysis. Based on a hypothetical outcome for the unemployment rate (relative to the 6.1 per cent level in 2008), a number of households are randomly selected and are assumed to lose their jobs (retirees, students, and other non-labour income households are precluded from this selection). Their ability to service their debt over the period of unemployment is then estimated. Funds available to the unemployed households are recalculated as being equal to income from employment insurance (where applicable)[18] plus the value of their liquid asset holdings (these include balances in chequing and savings accounts, term deposits, and GICs). It is assumed that half of the total funds available to any household would be used for basic expenses and are therefore not available to meet debt-service obligations. Whether a household is able to meet its debt obligations is determined by comparing its available funds with payments on its debt obligations over the period of unemployment.

The longer the period of unemployment, the lower are the resources available to that household to meet its remaining financial obligations and the higher is the probability of it becoming insolvent. The duration of unemployment is not constant across households and through the cycle; for example, between 1997 and 2008, the average duration of unemployment varied from a low of 15 weeks in 2008 to a high of 26 weeks (Statistics Canada, CANSIM Table 282-0047). Two different scenarios for the duration of unemployment are thus considered. In the first, the average duration of unemployment is assumed to be 20 weeks. In the second scenario, the average duration of unemployment is extended to 25 weeks. In both scenarios, the duration of unemployment is randomly distributed between households (following a chi-squared distribution). If a household is unable to fulfill the payment obligations on its debt over more than three consecutive months, the household is considered insolvent, and its outstanding consumer debt is considered a loss to financial institutions.

The hypothetical rate of unemployment chosen is 10 per cent, a significant increase from the average rate of 6.1 per cent in 2008. Debt and interest rates are assumed to remain at their 2008 averages.

The results are shown in Table 2. The first column shows the assumed duration of unemployment. The second column presents the corresponding incidence of unemployment, defined as the ratio of the number of people experiencing unemployment at some point during the year to the number of people in the labour force. The unemployment rate is the product of incidence and duration (divided by 52). The third column shows the increase in the proportion of households defaulting as a share of total households. The fourth column displays the change in total debt held by

17 A brief description of this data set is provided in the December 2006 FSR.

18 Unemployment benefits amount to 55 per cent of average insured earnings up to a maximum payment of $447 per week. Consistent with empirical data, only 43 per cent of the unemployed households are assumed to be entitled to receive unemployment benefits.

Table 2: Marginal Impact of a Prolonged Economic Slowdown on Households (10 per cent unemployment rate)[a]

Unemployment characteristics[b]		Change in the proportion of insolvent households (%)	Change in the proportion of debt held by insolvent households (%)	Banks' resulting losses as a percentage of their RWA[c]
Duration (weeks)	Incidence (%)			
20	26	1.4	5.2	0.9
25	21	2.1	6.0	1.0

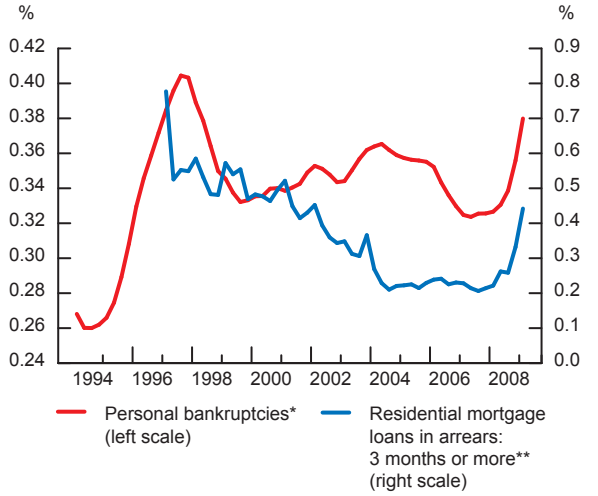
a. Results are presented as variations from the 2008 starting point.
b. In 2008, the average unemployment rate was 6.1 per cent, and duration averaged 15 weeks.
c. RWA: Risk-weighted assets
Source: Bank of Canada simulations

insolvent households as a share of total household debt in 2008. The last column presents the resulting bank losses (assuming that losses-given-default are 100 per cent)[19] as a proportion of the total risk-weighted assets of Canadian banks in 2008.

The results illustrate that the duration of unemployment is an important factor in determining the impact of a shock on a household's balance sheet and on the likelihood of insolvency. An increase in the unemployment rate to 10 per cent associated with a significant increase in the numbers of long-term unemployed would produce one-year losses for banks equivalent to about 1.0 per cent of their risk-weighted assets (or 10 per cent of Tier 1 capital).

It should be noted that these results are purely illustrative, since the simulation necessarily incorporates many simplifying assumptions. First, the unemployment shock is assumed to take effect at the household level, but this may exaggerate the impact on household income to the extent that some households contain more than one earner. Second, some households may be able to liquidate their homes and other tangible assets to avoid insolvency; as well, some of their consumer debt would be secured. Third, the simulation does not account for the possibility that households may accumulate more debt throughout their spell of unemployment. Fourth, the incidence and duration of unemployment may vary between households according to age, the nature of the shock, the gap between actual unemployment benefit and labour income, etc. Importantly, this represents only a partial simulation exercise over a one-year period. It does not attempt to capture any of the losses that would likely materialize in the case of an economic downturn severe enough to push the unemployment rate to such a level, nor does it estimate the potential for additional losses in household loan portfolios beyond the one-year horizon.

Chart 24: Financial stress among Canadian households is rising



* As a percentage of population aged 20 and over
** As a percentage of total residential mortgage loans outstanding
Sources: OSFI, Statistics Canada, Office of the Superintendent of Bankruptcy Canada
Last observation: 2009Q1

19 Only 70 per cent of consumer loans were considered in the losses, since this represents the approximate share of bank credit held as consumer credit, and since most defaulting mortgages would be insured.

Box 3

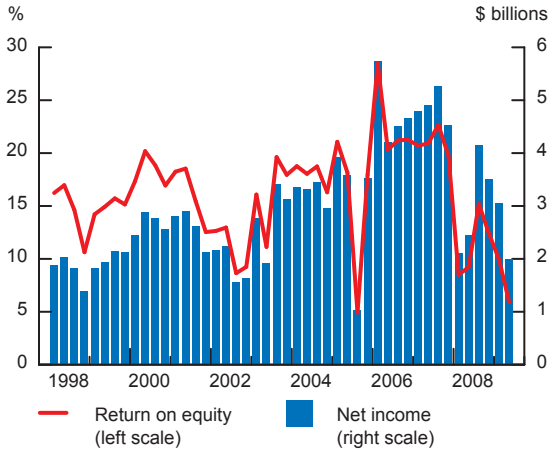
Recent Changes to Rules on Fair-Value Accounting

In April 2009, the U.S. Financial Accounting Standards Board (FASB) announced significant changes to the application of fair-value accounting for financial instruments. On 30 April 2009, the Canadian Accounting Standards Board (AcSB) announced prospective changes to the application of fair-value accounting for financial instruments in Canada. Had there been no change in Canadian accounting standards, it would have been difficult to compare the financial statements of Canadian financial institutions with those of U.S. banks. The changes are to be finalized later this year. The most significant changes proposed involved the recognition of impairments on financial instruments classified as held-to-maturity and the ability to classify debt instruments not quoted in active markets as "loans and receivables." Under the new standard, only credit losses actually incurred on such instruments would be recognized in net income. Prior to the change, any (other than temporary) impairment to the fair value of securities—which includes credit and non-credit related losses—had to be recognized in net income.

In its proposal to converge with international standards regarding the impairment of debt instruments, the AcSB would bring Canadian accounting standards closer to those set by the FASB and to those set by the International Accounting Standards Board (IASB). The IASB did not announce any immediate changes to its standards, but it is currently conducting a fundamental review of accounting for financial instruments.

For Canadian financial institutions, the AcSB changes are expected to reduce the amount of securities write-downs that otherwise would have been recognized in net income.

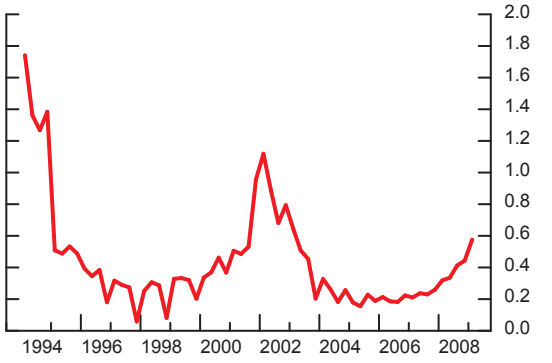
Chart 25: Major banks remain profitable



Sources: Banks' quarterly financial statements
Last observation: 2009Q2

Chart 26: Credit losses are rising

Annualized specific provisions as a percentage of loans



Source: OSFI
Last observation: 2009Q1

Financial Institutions

Banks

The major Canadian banks are in a solid financial position and have improved their liquidity positions since the December FSR. Nonetheless, downside risks remain. In particular, losses on the banks' loan portfolios are expected to increase, although the magnitude of ultimate losses is still uncertain. The strong capital position of the banks, and their ability to raise capital through the growth of retained earnings and from the markets provide a substantial buffer against these headwinds.

Overall, the major banks remain profitable, reporting total net income in the second quarter of 2009 of $2 billion, which represents an annualized return on equity of about 6 per cent (Chart 25). Profits were negatively affected by writedowns in capital markets (Box 3), goodwill impairment, and increases in loan-loss provisions. Trading revenues have generally been strong in 2009. Although net interest margins declined in the first quarter, they remain healthy, despite the move to a very low interest rate environment.

Reflecting the global recession and the related deterioration in the quality of household and business credit, Canadian banks have begun to experience higher loan losses. They increased their general and specific provisions for credit losses in 2009, particularly for loans to U.S. households and businesses (Chart 26). Specific provisions feed directly through to net income and capital. Credit losses are expected to remain elevated through 2009 and 2010.

As part of their core business, banks are exposed to the household sector. Indeed, loans to households currently account for just over 25 per cent of banks' assets (Chart 27). This exposure has declined recently as a result of the government's purchase of insured residential mortgages. Still, indicators of household

Box 4

Exposure of the Canadian Financial System to Commercial Real Estate Loans

Although the recent decline in Canadian house prices has received the most attention from commentators, the commercial real estate market is also coming under pressure. Construction and real estate (C&RE) activity has slowed, loan arrears are rising, and returns on commercial property are declining; indeed, the ICREIM/IPD Canada property indexes[1] for office, industrial, and retail properties have been declining steadily since the end of 2007. Conditions in these sectors may continue to weaken if the recession is prolonged and could be exacerbated by financial market dislocations.

The Canadian commercial real estate market has undergone a number of structural changes since the 1990s recession, and many lenders have considerably reduced their exposures. While insurance companies and pension funds continue to be major players in the non-residential mortgage market, banks have a significant presence in this sector, as well as in the C&RE sectors. Given their systemic importance as providers of redeemable deposits and extenders of credit, Canadian banks are the focus of this discussion.

The loan books of Canadian banks remain exposed to the commercial real estate sector through two main channels: loans to the non-residential construction and real estate sector and mortgage loans for non-residential purposes.[2] Moreover, through their foreign exposures, they are also vulnerable to deteriorating conditions abroad. These issues are examined below.

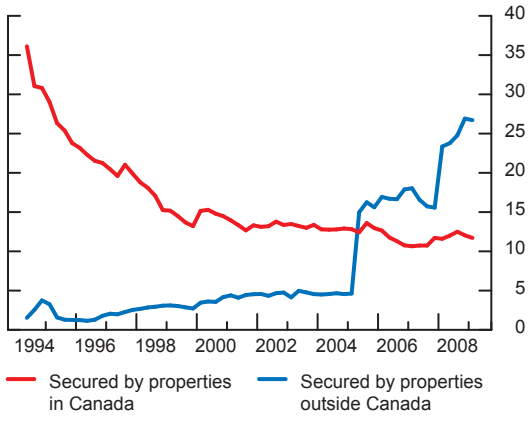
Construction and Real Estate Industries

Following the 1990s recession,[3] banks significantly reduced their exposures to Canadian C&RE firms: in the first quarter of 2009, gross loans to these sectors represented less than 20 per cent of Tier 1 capital, down from almost 60 per cent in the second quarter of 1994. While non-performing loans have been rising since late 2007, they have done so from low levels; non-performing loans were just 2.3 per cent of Tier 1 capital in the first quarter of 2009, compared with over 30 per cent in the second quarter of 1994. Furthermore, since these sectors are expected to continue to deteriorate as a result of the economic downturn, banks have increased provisioning to cushion expected losses. Although difficulties in these sectors are expected to persist, on their own, they are unlikely to have severe systemic implications for Canadian banks. Nevertheless, as property prices and construction activity continue to decline and as lenders restrict credit to risky sectors, arrears—and even defaults—will continue to mount.

Non-Residential Mortgages

As noted earlier, banks are a major provider of non-residential mortgages. But during the 1990s, they also significantly reduced their exposure in this area. In the first quarter of 2009, total non-residential mortgage loans (secured by property in Canada) were less than 12 per cent of Tier 1 capital, compared with 36 per cent in the second quarter of 1994 (Chart A). Moreover, impaired commercial mortgages have fallen significantly since the late 1990s (Chart B). Loan losses at Canadian banks on commercial mortgages can be expected to be relatively muted compared with those in other countries and with losses during the 1990s recession, since the Canadian market is starting from a healthier position, and interest rates are significantly lower than in the 1990s, which should ease debt servicing and refinancing.

Chart A: Canadian banks are more exposed to foreign than to Canadian non-residential mortgages
Percentage of Tier 1 capital



Sources: OSFI and Bank of Canada — Last observation: 2009Q1

(cont'd)

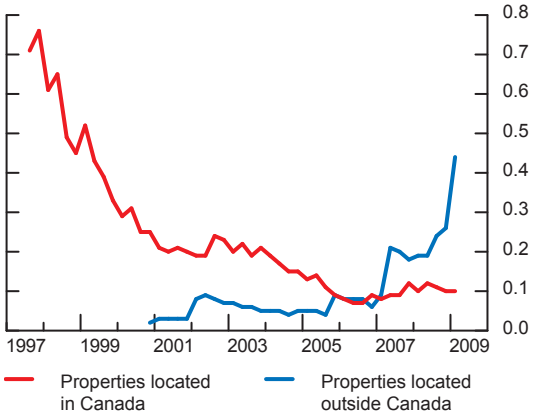
1 The Institute of Canadian Real Estate Investment Managers/Investment Property Databank (ICREIM/IPD) Annual Property Index measures total returns to directly held standing property investments from one open market valuation to the next. For more information, see <http://www.ipd.com>.

2 Banks may also have exposure on their trading books through holdings of securities backed by commercial mortgages. However, since detailed information is unavailable, the focus here is on the loan book.

3 Detailed data on banks' loan exposures are currently available only from 1994. For exposure to commercial mortgages, data on impaired loans are available from 1997.

Box 4 (cont'd)

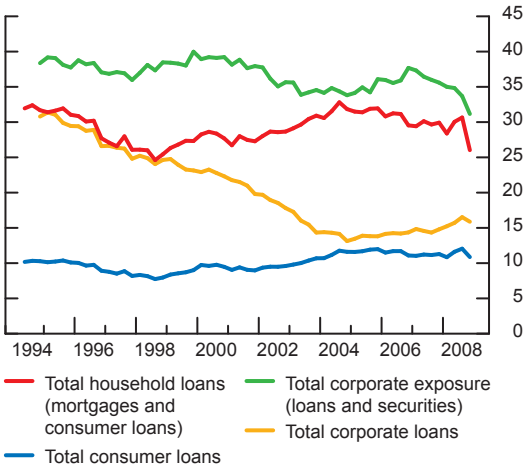
Chart B: Impairment is increasing faster in foreign than in Canadian mortgages
Percentage of Tier 1 capital



Sources: OSFI and Bank of Canada — Last observation: 2009Q1

Nevertheless, Canadian banks are still vulnerable to conditions in other countries. Outstanding non-residential mortgages secured by property *outside* of Canada have increased rapidly since mid-2005, as Canadian banks expanded their presence in the United States, and currently exceed non-residential mortgages secured by property in Canada. Owing to continued dislocations in financial markets, banks are also unable to securitize these mortgages, and therefore these loans must remain on their balance sheets. Chart B shows that impaired loans began to rise in early 2007, just prior to the onset of the crisis, with the increase gathering pace in 2009 as the recession intensified. With the commercial mortgage market in the United States deteriorating more rapidly than that in Canada, developments in foreign markets will likely be the key driver of performance in the commercial real estate portfolios of Canadian banks in the near future.

Chart 27: Banks are equally exposed to the household and business sectors, but corporate lending has fallen
Percentage of total assets



Source: OSFI — Last observation: 2008Q4

financial stress have risen. While the vulnerability of banks to the household sector is largely mitigated by mortgage insurance, consumer loans may be more problematic, as suggested above in the section "Stress testing the household sector." Rising losses on credit cards have been of particular concern to financial markets, and major banks have recently reported higher loss rates on credit card loans. Thus, consumer credit remains a significant source of downside risk.

Banks are exposed to the corporate sector through lending and through holdings of corporate securities. While exposure to corporate loans has been on a downward trend since the early 1990s, banks' holdings of securities increased over the same period (Chart 27). When measured by risk-weighted assets, banks' corporate exposure is larger than their exposure to households.[20] Indicators of corporate credit quality have worsened in most sectors, but especially in the manufacturing, commercial real estate, and resource sectors. Loans to these sectors are non-negligible, at about 5 per cent of banks' assets (Chart 28; see Box 4 for a discussion of exposure to commercial real estate). Given the generalized economic downturn in Canada and the United States, banks are likely to experience higher credit losses across their corporate loan portfolios.

The solid capital position of the banks provides a buffer against rising loan losses. At 10.7 per cent and 13.4 per cent, respectively,

20 Basel II risk-weighted assets are used to determine regulatory capital requirements. The lower risk weighting attributed to household lending is mainly a result of the low risk weight on residential mortgages, owing to mortgage insurance and the fact that mortgage lending is, by definition, secured.

Box 5

The Quality of Bank Capital

The recent financial crisis has focused increased attention on the quantity and quality of the capital that banks hold to absorb unexpected losses on assets.

Capital has typically been analyzed based on definitions in the Basel Capital Accord, which are intended to provide a comprehensive measure of capital, while noting variations in quality. Under the accord, total capital is categorized into three distinct tiers. In general, capital that is permanent and not subject to terms that may hasten liquidation of the bank is considered of higher quality and is classified as Tier 1.[1]

A bank's capital adequacy is most often assessed based on Tier 1 capital as a ratio of risk-weighted assets. However, the flexibility afforded to national regulators in the application of the capital accord (e.g., around the inclusion of intangible assets such as goodwill) has led some analysts and policy-makers to favour a narrower definition of capital: tangible common equity (TCE). Generally calculated by removing preferred shares, goodwill, and intangible assets from shareholders' equity, TCE focuses on core equity, excluding assets likely to have negligible value in the event of liquidation, as well as preferred shares, which may, in practice, be less able to absorb unexpected losses.[2]

As shown in Table A, major Canadian banks have remained well capitalized along with their international peers, based on their Tier 1 capital ratio. Moreover, the ratio of TCE to risk-weighted assets suggests that Canadian banks continue to hold significantly more core equity than their international counterparts.[3] Indeed, recent figures on capital for banks in countries other than Canada may be bolstered by direct government injections, something that has not been necessary for Canadian banks.

Table A: Average Capital Adequacy of Major Peer Banks[a]

Per cent of risk-weighted assets	Region	2007Q2	2009[b]
Tangible common equity	Canada	7.2	7.4
	United States	5.7	4.8
	United Kingdom	6.1	5.2
	Euro area	6.0	6.3
Tier 1 capital	Canada	9.7	10.7
	United States	8.3	10.4
	United Kingdom	8.6	8.6
	Euro area	7.8	8.7

a. Peer groups include 6 major Canadian banks, 8 major U.S. commercial banks, 6 major U.K. banks, and 7 major banks in the euro area.
b. Latest available data: Canada, fiscal 2009Q2; U.S., calendar 2009Q1; U.K. and euro area, calendar 2008Q4.

Overall, major Canadian banks appear better placed to weather the current financial conditions and to absorb unexpected asset losses going forward, given that they hold a larger, higher-quality, core capital base than their international peers.

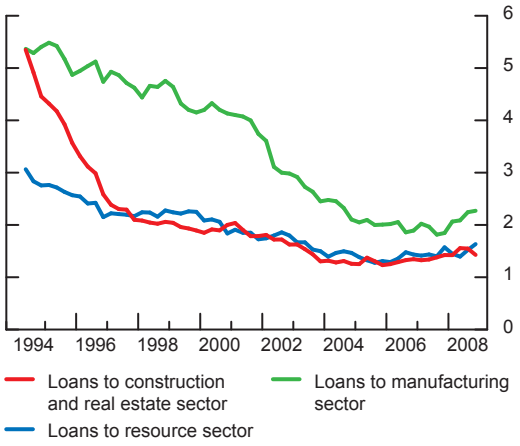
1 Tier 1 capital is closely related to shareholders' equity, containing items such as common shares, retained earnings, and non-cumulative perpetual preferred shares. Tiers 2 and 3 contain supplementary capital of lesser quality, such as subordinated debt and hybrid instruments, that feature contractual terms, which make it more difficult for them to absorb unexpected losses.

2 For example, banks may feel bound to continue paying dividends on non-cumulative preferred shares to avoid reputational issues and/or a dilution in voting rights.

3 U.S. analysts often prefer to measure TCE relative to total unweighted assets. Based on this measure, the capital ratios of Canadian and U.S. peer banks are more closely aligned.

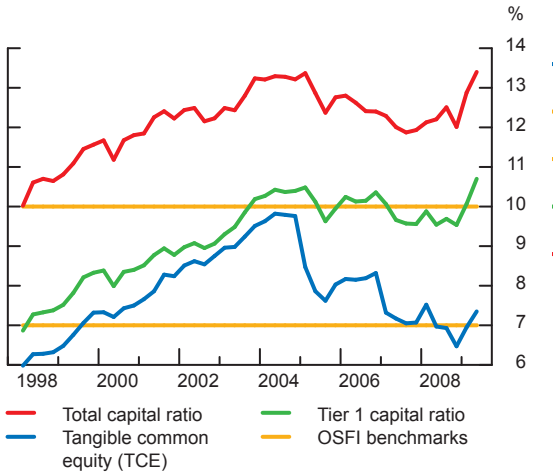
Chart 28: Exposure to cyclical sectors is relatively low

Percentage of total assets



Source: OSFI Last observation: 2008Q4

Chart 29: Capital ratios remain high



Note: Data reflect Basel II framework beginning in 2008Q1.

Source: OSFI Last observation: 2009Q2

Chart 30: Banks have built up their holdings of liquid assets

Liquid assets as a percentage of total assets

Source: OSFI Last observation: 2009Q1

the banks' total and Tier 1 capital ratios are well above OSFI benchmarks (Chart 29) (Box 5). Canadian banks have demonstrated their ability to raise new capital in markets. Since the beginning of 2009, the major banks have raised almost $10 billion in total capital, all of it from private sources. Over half of the capital has been preferred shares, with smaller amounts of hybrid instruments and subordinated debt (banks last issued common equity in December 2008). Since the banks continue to earn profits, they also have the ability to augment their capital positions by growing their retained earnings.

In recent months, banks have improved their liquidity positions. As discussed in the financial markets section, conditions in short-term wholesale funding markets have improved (Chart 2 on p. 11). Banks have seen strong inflows of retail deposits, which are a relatively stable source of funding. They have benefited from the extraordinary liquidity facilities provided by the federal government and the Bank of Canada, which also increased the supply of Government of Canada securities. The combination of easier funding conditions, official liquidity assistance, and slower credit growth has allowed banks to increase their liquidity by holding more cash and government securities (Chart 30). In addition to being liquid, government securities carry little or no capital charges, which helps maintain the banks' capital ratios. These developments suggest that Canadian banks have improved their ability to weather liquidity shocks.

Anecdotal evidence suggests that, following the large capital markets writedowns seen in 2007 and 2008, banks are changing their business strategies to emphasize lending activities over capital markets activities. Net interest income declined from over 70 per cent of total income in the mid-1990s to about 45 per cent of total income in 2005, as the share of income from activities in capital markets rose. If banks do shift their focus back to traditional lending, interest margins would become more important to their profitability. Within their capital markets activities, banks are shifting their focus to simpler instruments. These types of changes in banks' business strategies could have important implications for the future functioning and liquidity of financial markets.

Life and health insurance companies

The overall operating environment for life insurance companies is challenging, owing to weak equity markets, higher corporate credit risk, and a negative earnings environment.[21] This has been reflected in credit-rating downgrades since the beginning of the year.

Canadian life insurers continue to be exposed to equity markets and corporate credits through their investment portfolios and through the guaranteed benefits that they provide on their segregated fund products. The immediate pressure on capital has been mitigated by changes to supervisory guidelines for capital related to segregated fund exposures, as well as by the rebound of equity markets, but the vulnerability remains.

Life insurance companies traditionally account for the largest share of commercial mortgage originations and also hold

21 For simplicity, this section refers to the four largest life insurance companies: Manulife Financial, Sun Life Financial, Great-West Lifeco, and Industrial Alliance.

substantial portfolios of residential mortgages. Their long-standing expertise in these markets has historically led to high-quality portfolios showing low delinquency rates, but a prolonged recession could lead to larger-than-expected losses.

Relatively liquid investment portfolios, however, with high proportions of cash, cash equivalents, and government bonds, give Canadian life companies some financial flexibility to cope with current market conditions. Although lower interest rates have increased the level of actuarial reserves, these long-term liabilities have a limited impact on liquidity positions.

Overall, the industry is vulnerable to persistently low interest rates and deteriorating equity markets. In addition to waning investment income, earnings from wealth-management business lines suffer as investors turn to safer assets. Nevertheless, ratios for minimum continuing capital and surplus requirements (MCCSR) are strong, and the industry has demonstrated its continuing ability to access capital markets in recent months by successfully completing offerings of hybrid capital and subordinated debt.

Reports: Procyclicality in the Financial System

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

Introduction

A defining element of the policy response to the global financial turmoil has been broad agreement on the need to rigorously adopt a macroprudential approach to financial system stability. A macroprudential approach implies that the authorities take a systemic, or systemwide, perspective when considering financial behaviour and the factors affecting it.

Crucially, a macroprudential approach requires consideration of the impact of linkages and feedbacks both across the financial system broadly and with the real economy. One such feedback is that which can lead to procyclical behaviour within the financial system that might reinforce economic upturns and downturns. For instance, during a financial boom, perceived risk tends to be small, and various mechanisms may create financial leverage that reinforces the upturn (e.g., declines in capital, margin, and provisioning requirements). However, when a period of financial distress occurs, perceived risk increases rapidly, reversing this process and potentially reinforcing the downturn.

In the current difficult financial environment, for example, if banks come under pressure to increase capital, this may reinforce the increased reticence to extend credit that typically occurs during a cyclical downturn, thereby exacerbating the economic recession. Financial markets in Canada and elsewhere have, in fact, indicated a strong preference for higher levels of capital, even in instances where regulatory authorities have not generally required banks to increase capital at the current time. Examining how procyclicality could be mitigated is thus important if the financial system is to help absorb rather than amplify adverse shocks.

A substantial international agenda has emerged with respect to implementing a macroprudential approach and, within that, to reducing the potential for procyclical behaviour in the financial system. In particular, G-20 leaders during the London Summit of 2 April 2009 emphasized the need to identify and take account of macroprudential risks and to mitigate procyclicality—work to be undertaken by various international forums over the course of 2009.

Canadian authorities are participating in international efforts to study and, where appropriate, mitigate procyclical behaviour in the financial system. The reports in this special section of the *Financial System Review* each provide an overview of a particular topic relevant to this work. Note that procyclicality may emerge from a variety of sources in the financial system, including the regulatory framework itself and the procedures and conventions adopted in financial markets and transactions.

Procyclicality and Bank Capital examines one of the most active areas of discussion: the possibility that pressures on bank capital may influence the willingness of banks to extend credit and thereby affect the real economy. This might occur if there is a tendency to reduce capital ratios during an upturn, owing to a perceived reduction in risk, but a need to raise them during a downturn, possibly reinforcing the slowing in economic activity. In particular, counter-cyclical capital buffers, which would augment capital during an upturn but allow it to fall when economic and financial conditions deteriorate, may help mitigate the procyclical effects arising from bank capital. Nevertheless, many questions remain regarding the design of such a mechanism.

Loan-loss provisions represent another avenue through which procyclical tendencies may emerge. Loan losses,

and thus provisions, tend to be low during an economic expansion, but both may rise rapidly during an economic contraction. Volatility in loan-loss provisions can affect retained earnings and, consequently, bank capital. *Procyclicality and Provisioning: Conceptual Issues, Approaches, and Empirical Evidence* examines the conceptual issues surrounding loan-loss provisioning and presents evidence on its historical impact on capital. It concludes that provisioning is unlikely a major factor contributing to the procyclicality of capital.

A disturbing aspect of recent financial developments was the extent to which some international financial institutions increased their leverage ratios (defined as total assets to total capital) to very high levels prior to the crisis, consequently raising their vulnerability to the turmoil. Leverage ratios for Canadian banks, which are subject to a ceiling specified by the Canadian regulator (OSFI), were generally lower than those of their peers. *Regulatory Constraints on Leverage: The Canadian Experience* discusses how this may have helped to limit excessive risk taking during the upturn, thus reducing vulnerabilities and procyclical behaviour in the downturn.

Procyclicality and Value at Risk examines the means whereby the extensive use of value-at-risk (VaR) measures may have reinforced procyclicality in the financial system. These techniques make ample use of volatility measures to evaluate risk. Since volatility is generally lower during periods of financial calm than in periods of financial distress, VaR measures based on a short moving window can lead to large jumps in perceived risk and, hence, in required capital (against, for example, banks' trading books) when financial turmoil hits. Several potential avenues for mitigating this effect are discussed, including "through the cycle" approaches to estimating VaR.

Margins, or haircuts, are typically applied in financial transactions to provide a measure of protection—cash, which is less than the value of the asset or collateral put up for purchase, is paid at the time of purchase. These margin rules are also often based on VaR measures and, thus, require lower margins during financial booms, when asset prices are rising and volatility is low, than during periods of financial distress, when asset prices may be falling and volatility is high. As discussed in *Procyclicality and Margin Requirements*, this can have the effect of boosting financial activity further during the boom and impeding market liquidity in periods of financial turmoil. There are different possible approaches to mitigating this source of procyclicality, including making margin rules less dependent on near-term market conditions.

Compensation practices at large financial institutions are widely believed to have been a factor contributing to the financial crisis. By possibly embedding incentives that lead to a focus on short-term financial returns without adequately adjusting for risk, they potentially reinforce behaviour that supports excessive risk taking during good times, exacerbating the development of an asset-price bubble and subsequent financial collapse. *Procyclicality and Compensation* compares the stylized facts regarding the compensation arrangements at major Canadian and U.S. financial institutions.

Procyclicality and Bank Capital

Neville Arjani

In many countries, including Canada, banks are required by regulation to maintain a minimum level of capital in proportion to the riskiness of their assets. This is intended to absorb unexpected losses and ultimately mitigate the risk of insolvency. The Basel Accord, developed in 1988 by the Basel Committee on Banking Supervision (BCBS), was a significant initiative on this front that introduced risk-based regulatory guidelines for the capital treatment of banks' exposures.[1] Fundamental to the Accord is a guideline promoting a minimum capital-adequacy ratio. Based on this guideline, banks should be required to maintain Tier 1 and total capital equal to *at least* 4 per cent and 8 per cent of the value of their total risk-weighted assets, respectively.[2] The Accord has been adopted by domestic regulators in countries around the world, including Canada. For example, the Office of the Superintendent of Financial Institutions (OSFI) has issued guidelines to chartered banks based on the Basel framework, including the requirement that they maintain a minimum Tier 1 capital ratio of 7 per cent and a total capital ratio of 10 per cent.[3]

A revised version of the Accord—known as Basel II—was recently implemented in most major economies and seeks to improve on the original version in several areas.[4] One key improvement is better alignment of the calculation of banks' risk-weighted assets with actual risk. As discussed on page 15 of the December FSR (Bank of Canada 2008), however, this change could generate cyclicality in capital requirements, where higher capital is required in bad times and lower capital in good times.[5] This concerns policymakers, because such cyclicality of capital could lead to procyclicality—that is, it could amplify natural fluctuations in the financial system, and ultimately, undermine financial and economic stability.

This article elaborates on this concern and briefly outlines some features of the Basel II framework that are intended to address it. It goes on to suggest that the addition of an explicit *counter-cyclical* element to the current Basel framework could help to further counteract procyclicality in banks' activities (e.g., lending and market activities) and thus enhance the stability of the financial cycle. In particular, a counter-cyclical mechanism, as defined in this article, would encourage banks to increase their capital base above minimum regulatory requirements during good times—when risk from the perspective of an individual bank is perceived to be low and risk at the system level is likely to be increasing—and allow them to draw down this capital buffer when conditions are weak. The use of counter-cyclical regulatory measures to "lean against the wind" when indications of excesses in the financial system begin to emerge is consistent with a macroprudential view and is gaining attention as authorities look beyond the recent financial turmoil (e.g., Brunnermeier et al. 2009; Goodhart and Persaud 2008). As will be discussed, however, there is still much work ahead in terms of the design of a counter-cyclical regulatory mechanism and also in building an effective policy framework for its implementation.

1 Information on the Basel framework can be found on the Bank for International Settlements (BIS) website at <http://www.bis.org/bcbs>.

2 Tier 1 capital generally refers to equity capital and disclosed reserves (including retained earnings) and is viewed to be of higher *quality* than total capital. The latter includes items such as hybrid debt instruments, including cumulative preferred shares and other "innovative" capital instruments, and also longer-term subordinated debt. Total risk-weighted assets encompass exposure to credit, market, and operational risk.

3 These guidelines can be found on the OSFI website at <http://www.osfi-bsif.gc.ca>.

4 Canada's major banks began reporting under Basel II in the first quarter of 2008.

5 Illing and Paulin (2004) study the potential cyclicality of capital under the Basel II framework with application to the Canadian banking system.

Basel II and Procyclicality

Under Pillar I of Basel II, banks have three options for calculating the credit-risk-weighted value attached to assets held in the banking book: the Standardized approach; the "Foundation" Internal Ratings-Based (FIRB) approach; and the "Advanced" Internal Ratings-Based (AIRB) approach.[6] Under the two IRB approaches, risk inputs for each asset—including the probability of default (PD), exposure-at-default, loss-given-default, and maturity—are taken together and mapped into a risk-weighted value for the asset using formulae developed by the BCBS. In the AIRB approach, all risk inputs are provided by banks, based on their internal estimates. Under the FIRB approach, only the PDs are provided by banks, and all other variables represent values set by the national supervisory authority.[7]

A potential problem arises because estimates of risk generally vary over time based on economic and financial conditions. For example, during a period of sustained economic growth, estimated probabilities of default are likely to fall, prompting lower minimum capital requirements per unit of risk-weighted assets under Basel II. This capital relief presents an opportunity for banks to increase their supply of loans or to purchase other assets at a stage of the cycle when lending conditions tend to be easy and asset prices may be rising rapidly. From the perspective of a single bank, putting this excess capital to work seems rational, given its objective of maximizing the return to its shareholders. When many banks collectively follow the same strategy, however, risk in the broader financial system (hereafter referred to as "macroprudential risk") will increase.[8] That is, the ensuing higher leverage in the banking sector could amplify the severity of a real or financial shock, such that banks' capital may be insufficient to manage the unanticipated loan losses and asset writedowns that accompany the shock if and when it occurs. Rising default risk associated with a subsequent economic downturn will also raise minimum required capital under Basel II, further adding to this strain.

Since it can be difficult for banks to raise new capital in the midst of such conditions, they may be required to restrict loans or liquidate investments to continue to meet minimum regulatory capital requirements and, ultimately, avoid insolvency. Once again, from the perspective of a single bank, this would appear to be a prudent action. However, when all banks are forced to engage in this deleveraging process at the same time, the widespread reduction in loans and the excessive fall in asset prices will further aggravate the downturn. This, in turn, could place even greater strain on the capital positions of banks and, ultimately, undermine economic and financial stability.

Basel II and Efforts to Counteract Procyclicality

The potential of Basel II to induce procyclicality is of key concern to policy-makers, and work is ongoing at the international level to address this. For instance, several measures intended to reduce the cyclical risk sensitivity of minimum capital requirements have already been incorporated into Basel II. These include a requirement for banks using the AIRB approach to measure loss-given-default at levels likely to prevail during an economic downturn;[9] supervisory scope to encourage the use of through-the-cycle estimates of PD instead of point-in-time estimates, which will help to smooth default risk estimates over good and bad times;[10] and a requirement that banks using the IRB approach maintain sound stress-testing procedures in their assessment of capital adequacy, including a stress test for credit risk that considers *at least* the effect of a mild recession.[11]

Moreover, from a macroprudential perspective, there is also growing support for the addition of a *counter-cyclical* "add-on" within Basel II. This is based on the view that the current Basel framework—which focuses on preserving the solvency of individual banks by requiring them to hold capital in accordance with their risk-weighted assets—does not pay sufficient attention to banks' common exposure to systemwide risk factors. With a counter-cyclical mechanism in place, banks would, for instance, be required to enhance their capital base above the minimum Basel requirement during a cyclical upswing. As mentioned earlier, this is when capital requirements under the current Basel framework are expected to be falling, while macroprudential risk is building. In turn, banks should be allowed to draw on this capital buffer to absorb unexpected losses that may arise in a subsequent downturn.

It follows that this proposal has two main objectives as a means of counteracting procyclicality. First, it should help to constrain the buildup of macroprudential risk during good times, thereby reducing the severity of a real or financial shock if and when one occurs. Second, it should strengthen banks' balance sheets and the ability of banks to deal with any shocks that do materialize. This would help

6 Use of AIRB requires supervisory approval. OSFI has approved the use of AIRB by Canada's major banks.

7 For retail exposures, such as personal mortgages and lines of credit, there is no Foundation IRB variant, and banks are required to provide estimated risk inputs based on pools of similar exposures.

8 The article draws from Borio (2003) in distinguishing between the microprudential and macroprudential view. A fundamental distinction between the two is that the former focuses on the prevention of distress at the individual-institution level, while the latter focuses on the prevention of systemwide distress. Moreover, as alluded to above, the macroprudential view recognizes that the collective efforts of individual institutions to improve the health of their balance sheets could result in harmful feedback effects that threaten the stability of the financial system as a whole.

9 See Pillar I of Basel II Framework, paras. 468 to 473. Available at <http://www.bis.org/bcbs>.

10 Ibid., paras. 461 to 463.

11 Ibid., paras. 434 to 437. Pillar I states that the objective of this test is not to consider the outcome under a worst-case scenario. Based on hindsight, a more conservative approach to these tests would have been helpful.

to reduce or eliminate economically harmful deleveraging in the downturn and, ultimately, aid in preserving bank solvency. An example of a counter-cyclical add-on is a rule-based mechanism that links capital requirements to the state of the financial cycle and, therefore, to macroprudential risk. This is discussed in more detail below.

Options for the Design of a Counter-Cyclical Mechanism

The concept of requiring banks to hold more capital in good times and less in bad times is not new (e.g., Borio, Furfine, and Lowe 2001; Borio 2003; Kashyap and Stein 2004). However, the design of a rule-based, counter-cyclical mechanism is still in its early stages, and broad consensus on its formulation has yet to emerge. Many policy issues relating to the implementation of this proposal have also yet to be resolved.

This section lays out a possible design option for a counter-cyclical mechanism. The approach is similar to that taken by Brunnermeier et al. (2009) in that it proposes a macroprudential adjustment to the Pillar I capital-adequacy ratio, using a risk-based multiplier (explained below). The adjustment comes by way of directly including the multiplier in the calculation of the ratio. To illustrate, the equation below is a simplified version of the capital-adequacy ratio under Basel II, where a scaling factor (denoted "*A*") is applied to the denominator, which comprises total risk-weighted assets. It deserves mention that the calculation of total risk-weighted assets under the Basel framework—which encompasses a bank's exposure to credit, market, and operational risk—is left unchanged under this proposal.[12]

$$\text{Minimum capital-adequacy ratio} = \frac{\text{Capital}}{A[\text{Credit RWA} + \text{Market RWA} + \text{Operational RWA}]}$$

In this case, *A* could be linked to one or more indicators of the state of the financial cycle, such as credit growth or asset prices.[13] The scaling factor will rise above unity during good times, as macroprudential risk builds (requiring banks to hold more capital to maintain the same ratio, all else being equal), and fall below unity during periods of decline, as losses are realized and vulnerabilities are gradually reduced.

It follows that a challenge in the design of this rule will be to find a formulaic expression that allows for the buildup of a capital buffer during the growth stage of the cycle, and the subsequent decline of this buffer that can keep pace with unanticipated losses during the downturn. Overcoming this challenge is expected to entail careful judgment on the part of regulators—supported by extensive empirical analysis—regarding both the appropriate level of buffer capital that banks should be required to accumulate going into a downturn, as well as how the level of buffer capital should adjust over the course of the downturn. Regarding the latter, it could be argued that, if the capital buffer is allowed to be depleted prior to all losses being realized by a bank, the risk of a subsequent insolvency may be increased. This is because it may be too difficult for a bank to raise fresh capital at a later time while in the midst of reporting losses. Of course, the optimal timing of buffer withdrawal poses a significant challenge to regulators, given that it is virtually impossible to determine the length and severity of a downturn ex ante.[14] On the other hand, from a macroprudential perspective, a faster reduction in the capital buffer could help to mitigate any adverse systemwide feedback effects, thereby reducing the extent of banks' future losses. The chosen solution for a counter-cyclical mechanism should seek to appropriately balance these microprudential and macroprudential concerns.

Another fundamental design issue relates to the choice of anchor variable(s). For example, in the formulation governing the parameter *A* above, either micro-level variables (i.e., those measured at the individual bank or sector level) or macrofinancial variables could be used. On this point, one might argue that, if the goal of policy-makers is the buildup of a capital buffer in good times that can subsequently be drawn down in bad times—that is, to tie the value of the buffer to the level of macroprudential risk—then macrofinancial variables will serve as a more suitable anchor. For instance, rapid growth in asset prices (e.g., housing, equities) and in private credit are often cited in the literature as conditions preceding financial crises.[15] At the same time, the use of micro-level variables may actually amplify risk at the system level. For example, where individual bank profitability is used as an anchor, poorly managed banks will benefit from relatively lower capital requirements in a cyclical upswing. This, in turn, will allow them to grow their balance sheets further, possibly by taking on ever-greater risk in search of higher returns for shareholders.

One benefit of using micro-level variables as an anchor, such as bank or industry profitability, is that the buildup of a capital buffer will be required when institutions are performing well and are most capable of raising new capital in the market. In contrast, where macrofinancial variables serve as an anchor, a scenario could arise where the

12 The application of a scaling factor against *total* risk-weighted assets should help to mitigate the potential for procyclicality stemming not only from a bank's credit-risk assessment, but also from its assessment of market and operational risk.

13 Misina, St-Amant, and Tkacz (2008) assess the performance of various measures of credit and asset prices as early-warning indicators of financial system vulnerability, both historically and during the recent financial turmoil.

14 Dickson (2009b) notes that a significant challenge associated with the macroprudential calibration of regulatory policy tools, such as capital requirements, stems from difficulties associated with the prediction of cycles.

15 Recent examples of this work include Borio and Drehmann (2009) and Laeven and Valencia (2008).

economy is performing well but the banking sector is not. This could make it difficult for banks to raise capital and could lead to deleveraging.

Whether one chooses micro-based or macrofinancial variables as an anchor, a key objective is to identify variables that are robust over time and, perhaps, across countries (see next section), and for which data are generally accurate and readily available. For illustrative purposes, Box 1 outlines the formulation of a scaling factor similar to *A* above, using aggregate private sector credit growth as an anchor variable.

Selected Policy Issues Related to Implementation

In addition to rule formulation, there are several policy-implementation issues that require greater attention.

Rule-Based or Discretionary Mechanism?

The preceding discussion has focused largely on a rule-based approach. This approach, as opposed to one founded on supervisory discretion, may be preferred because it serves as an effective pre-commitment device, in that supervisors will not be put in the difficult and unpopular position of requesting on an ad hoc basis that banks raise their capital in the middle of an economic boom.[16] On a related note, the consistent application of a rule-based approach will enhance transparency for market participants, potentially making it easier for banks to reduce capital during a downturn without the risk of investors and rating agencies reacting negatively. Where market participants are aware that the buildup and subsequent drawdown of a capital buffer by banks are part of the routine functioning of the Basel framework, they may be less inclined to react in an unfavourable manner.[17]

Pillar I or Pillar II?[18]

Related to the above point, it is not clear whether a rule-based mechanism must be hard-wired into the calculation of the Pillar I minimum capital-adequacy ratio. Instead, one could envision a similar rule-based approach as a tool under the Pillar II supervisory review process, perhaps as a complement to existing guidelines on macro stress testing. A tool that helps to determine the buildup of macroprudential risk in the financial system would be useful to supervisors in assessing the extent to which banks' measurement of risk and their calculation of capital take into account system-level considerations.

A Pillar II solution may be quicker to implement, since it avoids having to revisit the design of Pillar I. It also offers relatively greater flexibility for supervisors to implement the rule as they see fit in their respective jurisdictions. This may prove important, especially where practical differences emerge across jurisdictions. For example, differences might emerge in terms of: precise rule formulation; the degree of procyclicality brought about under Basel II, which will be affected by each country's economic and financial structure; and the choice of anchor variables that best capture the buildup of macroprudential risk in each jurisdiction. On the other hand, a Pillar I solution will likely facilitate greater international consistency in the regulation of capital, which would benefit banks that maintain operations in multiple jurisdictions.

There may be other difficulties associated with implementation in Pillar II. First, without being hard-wired into Pillar I as an "automatic" feature, there is always the possibility that the rule will not be enforced, and this could lead to cross-institutional and/or cross-jurisdictional distortions. Second, even where the rule is appropriately enforced under Pillar II, supervisory intervention may take place with a longer time lag relative to an automatically adjusting Pillar I solution. This means that macroprudential risk could build for some time without the presence of accompanying capital buffers. The flip side of this, of course, is that under Pillar II there may be less chance of regulatory capital requirements reacting to false indications of macroprudential risk, since supervisors will have time to explore and confirm the results of the rule before requiring banks to take action. Finally, it would be more difficult to achieve the benefits of investor transparency and pre-commitment under a Pillar II solution. As mentioned, this could hinder the policy's effectiveness, particularly during a downturn when market participants may be demanding greater capital and thus might not look favourably on a capital reduction.

What Degree of Counter-Cyclicality Is Desirable?

As noted in the December 2008 FSR, another fundamental question is by how much do capital requirements need to be adjusted to counter procyclicality and maximize the improvement in financial stability. A response that is too aggressive will have adverse effects on the efficiency of the financial system, while too lenient a response will leave the system vulnerable to risk. Given the recent introduction of Basel II, a better understanding of the *actual* cyclicality of capital under this framework and its ability to amplify fluctuations in the financial cycle is a crucial first step in determining the formulation of any macroprudential rule

16 For more on this issue, see Dickson (2009a).

17 It could also be argued, however, that a rule-based approach will open up opportunities for gaming and arbitrage, which might not arise under a less transparent discretionary regime.

18 The Basel II framework consists of three Pillars. Pillar I includes guidelines on minimum capital requirements and continues to be based on the concept of a minimum capital-adequacy ratio. Pillar II represents the supervisory review process and is based on a series of guiding principles pointing to the need for supervisory review of banks' assessments of their capital needs, and for appropriate actions to be taken in response to those assessments. Pillar III complements the first two Pillars by encouraging market discipline through the development of a set of disclosure requirements of key information about banks' risk profiles and levels of capitalization.

Box 1

Simple Example of a Multiplier Based on Private Credit Growth

In the simplified minimum capital-adequacy ratio shown on page 35, "*A*" represents a scaling factor to be multiplied by total risk-weighted assets—the sum of credit-, market-, and operational-risk-weighted assets. The objective is to design a formula governing this multiplier such that it will rise above unity as macroprudential risk builds in the system and fall below unity during economic downturns, helping banks to absorb losses and, thus, limiting the potential for harmful deleveraging and/or bank insolvency.

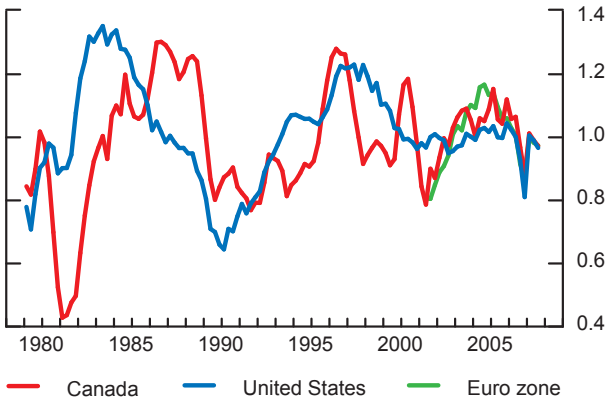
One way of capturing macroprudential risk at a given point in time might be to compare the real growth rate of private credit—comprising household and business credit—with its trend rate. Since credit booms are often cited as preceding financial crises, it seems reasonable to explore this variable as a potential anchor for the multiplier.

In this example, the current growth of private credit is represented by the year-over-year growth rate, while a simple moving average of this rate over the longer term serves as the trend variable. A separate scaling factor, "*B*," is added to the multiplier equation to demonstrate that virtually any magnitude of counter-cyclicality can be achieved with this rule, depending on the preferences of policy-makers. More specifically, the multiplier is calculated as follows:

$$A = 1 + B[(\text{Y/Y growth rate} - \text{moving average of Y/Y growth})/100].$$

Chart A shows the value of this multiplier since 1980—a period spanning a number of cycles—for Canada, the United States, and the euro zone. To generate these series, a 10-year moving average was used in the case of Canada and the United States, while a 3-year moving average was used in the case of the euro zone to accommodate the shorter data set. In all cases, the *B* parameter is arbitrarily chosen to equal 5.[1] The pronounced

Chart A: Multiplier based on growth of private credit



Multiplier for Canada and the United States = 1 + *B*[(Y/Y real credit growth – 10-yr MA)/100]; *B* = 5. Multiplier for the euro zone = 1 + *B*[(Y/Y real credit growth – 3-yr MA)/100]; *B* = 5
Sources: Statistics Canada, U.S. Federal Reserve, European Central Bank, and author's calculations

decrease in the value of the Canadian multiplier in the early 1980s is linked to the significant economic downturn that Canada suffered in 1981–82, which resulted in a considerable decline in private credit growth.

Of course, the increasingly global nature of banks' activities means that they could be exposed to macroprudential risk in more than one jurisdiction. Thus, a macroprudential rule focused on conditions in a single country will not reflect the actual risk exposure of a bank that maintains only a portion of its activities there. One way of overcoming this is to build a revised multiplier (*A**) that accounts for the share of total risk-weighted assets in each of a bank's active jurisdictions. For instance, the revised multiplier could be calculated as a simple weighted average:

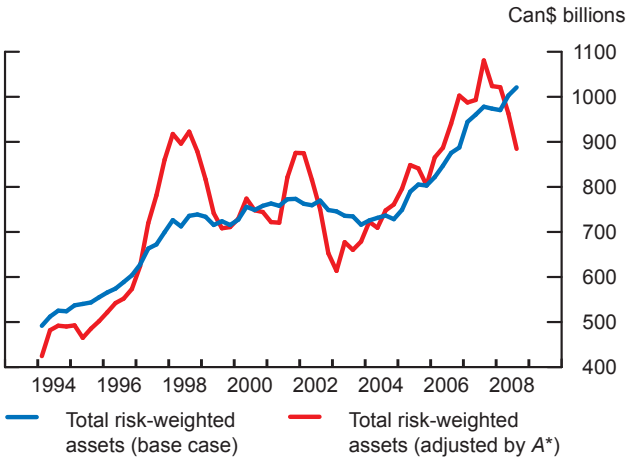
$$A^* = \sum_{i=1}^{N} s_i A_i,$$

where the calculation of *A* is the same as above, and *s* represents the share of a bank's total risk-weighted assets in each active jurisdiction *i* = (1,…,*N*). Chart B shows the product of this revised multiplier and the total risk-weighted assets of major Canadian banks over time. For this example, it is hypothetically assumed that 80 per cent of major Canadian banks' total risk-weighted

(cont'd)

1 Although arbitrarily chosen in this illustration, the value of the counter-cyclical parameter (*B*) requires careful consideration by the regulatory authority. The size of *B* will directly affect the size of the swings in *A* (and thus the level of the required capital buffer) over the cycle. On this point, one option might be to use historical values of *A* in determining the appropriate range of the buffer from peak to trough. In the context of the dual objectives of a supervisor, outlined in Kashyap and Stein (2004), the higher the value of *B*, the greater is the risk that productive investment will be foregone during the growth stage of the cycle, with lower risk of insolvency in the downturn as banks will accumulate a higher capital buffer to absorb losses. Conversely, a very low value for *B* will result in the system being left vulnerable to risk in good times, while the risk of insolvency will be increased in bad times (because of a lower accumulated buffer). In this case, foregone productive investment and institution insolvency are likely outcomes.

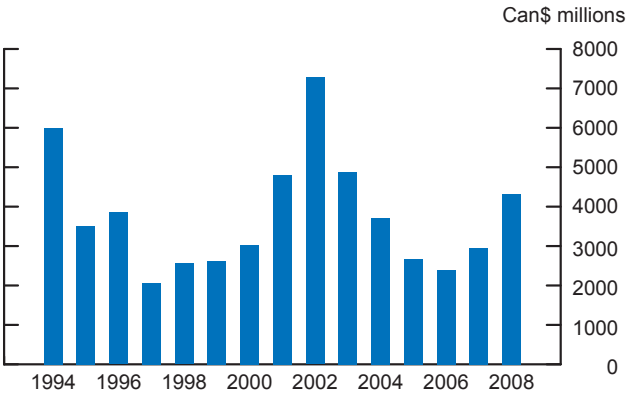
Chart B: Effect of revised multiplier on risk-weighted assets



A^* = 0.80(Cda "A") + 0.20(U.S. "A"); B = 5 in both calculations of A.
Sources: OSFI and Bank of Canada

assets originate in Canada, and 20 per cent originate in the United States. Data for Canadian banks' total risk-weighted assets are available from 1994Q1 and reflect Basel I figures up to 2007Q4. The original (base-case) value of total risk-weighted assets is also shown in Chart B.

Chart C: Annual credit losses of major Canadian banks
(Net of recoveries)



Note: Fiscal year-end for major Canadian banks is the end of October.
Sources: OSFI and Bank of Canada

Chart B shows the impact of the hypothetical multiplier on the denominator of the capital-adequacy ratio. In terms of the above-mentioned objectives of the multiplier, some points are worth noting. Of particular interest is the period between 2004Q2 and 2007Q2 which, in hindsight, exhibited a buildup of macroprudential risk. Chart B indicates that, for the major Canadian banks to achieve the same capital-adequacy ratio (all else being equal) during this period with the multiplier in place, quarterly capital requirements would have been, on average, about 6 per cent higher. If we look further back, the largest discrepancy between base-case and adjusted risk-weighted assets appears during the late 1990s, when Canadian banks continued to report strong earnings with relatively low credit losses (Chart C) during the Asian financial crisis. In particular, between 1997Q2 and 1999Q2, with the multiplier in place, quarterly capital requirements would have been, on average, almost 18 per cent higher to achieve the same capital-adequacy ratio, all else being equal. Finally, Chart B shows that the amount of capital required would have fallen during 2002 and into 2003—a time when the major Canadian banks reported relatively large credit losses at fiscal year-end as a result of the major economic slowdown that began earlier in the decade.

To reiterate, this analysis is not intended as a proposal, but rather as a means of illustrating some fundamental issues in the design of a counter-cyclical, rule-based mechanism as part of the Basel II framework. Of course, much work remains to be done in this area, not only in terms of testing the performance of other potential anchor variables, as well as other functional forms for the rule, but also in addressing the key policy implementation issues raised in this article, not the least of which is the desirable degree of counter-cyclicality.

and the desired degree of counter-cyclicality. To this end, the Bank of Canada encourages the ongoing work of the BCBS to better understand the behaviour of banks' capital levels through the cycle under Basel II. Moreover, in formulating a rule based on a desired level of counter-cyclicality, one must take into account the net effect of all proposals currently being discussed to contend with procyclicality at both the microprudential and macroprudential levels. Some issues to consider in identifying the desirable degree of procyclicality in practice are outlined in Box 1.

International Efforts Going Forward

The issue of procyclicality and bank capital has received a great deal of attention in light of the ongoing global financial turmoil. In response, policy-makers are seeking to address this concern in the near term. As already mentioned, the BCBS continues to monitor the cyclicality of bank capital under Basel II. In November 2008, it published its *Comprehensive Strategy* to address the lessons of the current banking crisis, which includes "building additional shock absorbers into the capital framework that can be drawn upon during periods of stress and dampen procyclicality."[19] The development of a concrete proposal to achieve this goal will be an important area of work in 2009. The efforts of the BCBS were endorsed more recently by both the G-20 and the Financial Stability Forum (FSF).[20] As progress continues, the need for collaboration at the international level will become even more important.

References

Bank of Canada. 2008. *Financial System Review* (December): 15.

Borio, C. 2003. "Towards a Macroprudential Framework for Financial Supervision and Regulation?" Bank for International Settlements Working Paper No. 128.

Borio, C. and M. Drehmann. 2009. "Assessing the Risk of Banking Crises—Revisited." *BIS Quarterly Review* (March): 29–46.

Borio, C., C. Furfine, and P. Lowe. 2001. "Procyclicality of the Financial System and Financial Stability: Issues and Policy Options." In "Marrying the Macro- and Microprudential Dimensions of Financial Stability." BIS Papers No. 1: 1–57.

Brunnermeier, M., A. Crockett, C. Goodhart, A. Persaud, and H. Shin. 2009. "The Fundamental Principles of Financial Regulation." Geneva Reports on the World Economy—Preliminary Conference Draft 11. International Center for Monetary and Banking Studies.

Dickson, J. 2009a. "Capital and Procyclicality in a Turbulent Market." Remarks by Superintendent Julie Dickson, Office of the Superintendent of Financial Institutions Canada (OSFI) to the RBC Capital Markets Canadian Bank CEO Conference, Toronto, Ontario, 8 January.

———. 2009b. "Monitoring the Future: Regulatory Responses and Realistic Expectations." Remarks by Superintendent Julie Dickson, Office of the Superintendent of Financial Institutions Canada (OSFI) to the Asian Banker Summit 2009, Beijing, China, 12 May.

Goodhart, C. and A. Persaud. 2008. "A Party Pooper's Guide to Financial Stability." *The Financial Times*, 4 June.

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

Kashyap, A. and J. Stein. 2004. "Cyclical Implications of the Basel II Capital Standards." Federal Reserve Bank of Chicago *Economic Perspectives* (First Quarter): 18–31.

Laeven, L. and F. Valencia. 2008. "Systemic Banking Crises: A New Database." IMF Working Paper No. 08/224.

Misina, M., P. St-Amant, and G. Tkacz. 2008. "Credit, Asset Prices, and Financial Stress in Canada." Bank of Canada *Financial System Review* (December): 29–33.

19 See the BIS website for the BCBS press release at <http://www.bis.org/bcbs>.

20 See the G-20 Leaders Communiqué, "The Global Plan for Recovery and Reform," and also the "Report of the Financial Stability Forum on Addressing Procyclicality in the Financial System." Both were released in April 2009.

Procyclicality and Provisioning: Conceptual Issues, Approaches, and Empirical Evidence

*Miroslav Misina**

Losses in the loan portfolios of banks tend to follow economic cycles, falling during expansions and rising during downturns. Banks recognize these losses through loan-loss provisioning. Since such charges[1] are a deduction from income, procyclicality of provisions may, all else being equal, lead to an increase in the volatility and procyclicality of bank earnings, retained earnings, and, consequently, bank capital. Reductions in bank capital (or its growth rate) during economic downturns pressure banks to raise additional capital when that may be difficult, and may lead them to sell assets or curtail their lending activities in order to meet regulatory requirements.

Provisioning is only one of the factors that jointly determine the behaviour of bank capital.[2] The contribution of provisioning to the procyclicality of capital depends on the timing of provisions relative to the economic cycle and on the impact of provisioning on capital.

This article examines the conceptual issues underlying the debate on provisioning and procyclicality, describes the approaches currently under discussion at various international forums to address procyclicality arising from the provisioning channel, and presents empirical evidence on the relative impact of provisioning on capital.

Conceptual Issues

The relationship between provisioning and the economic cycle depends on when provisions are made relative to the occurrence of losses. Of the range of views that exist, the following are the two extremes:

- Provisions should be set aside only on the basis of losses actually incurred. This amounts to recognition of a factual state rather than its anticipation. In this case, the timing of losses and provisions coincides.
- For every loan granted, an expected loss can be defined, based on the quality of the borrower's credit (measured by their credit rating, probability of default, credit score, etc.). Provisions should be set aside at the time of loan origination to cover the expected loss between the origination of the loan and its maturity. In this case, provisioning does not depend on any evidence of deterioration in credit quality and is unrelated to the actual occurrence of losses.

While these views are more extreme than actual practice, the difference between them illustrates the differing views on provisioning in the accounting and regulatory-capital models.

From an accounting viewpoint, provisions represent reductions in the carrying amount of a loan, or a group of loans, based on evidence of impairment. Although there are some differences across jurisdictions, the accounting model that underlies this reasoning is based on the notion of *incurred loss*.[3]

In contrast, the regulatory model assumes that provisions will be set aside to cover *expected losses* and that capital is then used to cover unexpected losses. Shortfalls in actual

* I would like to thank Karen Stothers and Richard Gresser (OSFI) for valuable comments and suggestions.

1 Terminology differs across jurisdictions. In the CICA Handbook, the charge is referred to as a "charge for impairment." Internationally, it is more commonly referred to as a "loan-loss provision."

2 Others include the overall performance of a bank as measured by its net income, its dividend policy, tax code, etc.

3 Canadian accounting rules state that "When a loan or portfolio of loans becomes impaired as a result of deterioration in credit quality, the carrying amount of the loan should be reduced. The reduction in the carrying amount should be recognized as a charge in the statement of income in the period in which impairment is identified" (CICA, Sec. 3025). The difference between the evidence of deterioration in credit quality and incurred losses is subtle.

provisions relative to expected losses directly affect capital. The relationship between expected and incurred losses over the business cycle is complex, but, in general, it can be characterized as follows:[4]

- During economic downturns, both expected and incurred losses will increase, but expected losses are likely to increase very early on, whereas actual losses materialize (and are recognized in the form of provisions) at a later time. During downturns, these different dynamics may result in persistent shortfalls and, thus, in reductions in regulatory capital precisely when it may be needed the most.
- During prolonged economic upturns, both expected and incurred losses will tend to be low. It should not be taken for granted, however, that these periods will generate persistent excess provisions over expected losses and, hence, consequent increases in regulatory capital.

The tension between the accounting model and the regulatory model reflects their different purposes: While the objective of the accounting model is to provide an accurate snapshot of the financial situation of an institution at a given moment, the regulatory model is primarily concerned with the soundness of individual institutions and, ultimately, their solvency.

An Overview of Approaches

Given that provisioning is currently subject to the accounting model and that the timing of provisioning based on the concept of incurred loss tends to mimic the timing of economic cycles, the potential for provisioning to reinforce the procyclical elements in the financial system has led to a range of proposals to mitigate this impact. The solutions proposed for dealing with the timing aspects of procyclicality can be grouped into two categories:

- *Solutions within the existing accounting model*. These include using the full fair-value option available within the model or retaining the incurred-cost approach but allowing more scope for expert judgment in its application.
- *Solutions within the regulatory model*. These range from leaving the accounting model intact and working directly on modelling expected losses and their cyclicality, to proposals that the accounting model be abandoned and replaced by some form of "dynamic provisioning."

Solutions within the existing accounting model

One option within the existing accounting model is to replace valuation of loans at amortized cost and provisioning-based loss recognition with the full fair-value option in which changes in value would have a direct impact on financial statements. Aside from the problem of applying the fair-value approach to loans, recent debates among regulators on the role of fair-value accounting in the current crisis suggest that this is not the preferred solution.

The other option is to retain the accounting model based on the incurred loss but make it more flexible. The current system in Canada can be used to illustrate the second option. Canadian provisioning rules exhibit greater flexibility in assessing the deterioration of credit quality than the international standards, while still being consistent with those standards. The key reason for this is that the application of provisioning rules in Canada allows for a greater degree of judgment in assessing the deterioration of credit quality.[5] CICA, Sec. 3025.16 states that "Estimates of the amounts and timing of expected future cash flows from impaired loans reflect management's best judgment, based on reasonable and supportable assumptions, and take into account the range of possible outcomes." The built-in flexibility could, in principle, be used to counter the inherently procyclical nature of provisioning or, at the very least, as a means to achieve robust provisioning at all points in the economic cycle.

While additional flexibility is intended to facilitate a more timely and precise assessment of the extent of impairment in the loans portfolio, it could result in earnings management. One way to guard against that risk is to require greater disclosure.

Solutions within the regulatory model

Solutions within the regulatory model have come to be known generally as "dynamic provisioning." Despite the frequent use of this term, there seems to be some vagueness regarding its meaning. There are two possible interpretations:

(i) Any scheme that, relative to the current provisioning regime, leads to increased provisioning during economic expansions and thus generates "reserves" that can be used to cover credit losses in downturns.

(ii) A provisioning scheme that is based on recognition of the expected losses inherent in a loan at its origination.

The key difference between these two interpretations is that the objective of the first is to relate provisions to indicators of the state of the economy, whereas in the second, provisions are set equal to expected losses. Expected losses are, in turn, a function of the probability of default (PD) and

4 It should be noted that the notion of expected loss within the regulatory model has a range of meanings, from forecasts of losses on non-defaulted assets to estimates of losses on defaulted assets. The discussion in this article does not depend on the precise meaning within that range, nor does it depend on whether one takes a "point-in-time," or "longer-term-average'' view of expected losses, although in the latter case, the dynamics described here would be somewhat muted.

5 This thinking is very much in evidence in OSFI's guidelines on general allowances (C-5).

loss-given-default (LGD). Both PD and LGD may be a function of a broader set of variables, but the issues here are identical to those encountered when considering cyclicality of risk-weighted assets and are not specific to discussions of dynamic provisioning. Consequently, the following discussion will be based on the first interpretation.

One possible solution is to leave the accounting model intact and work directly on modelling expected losses and their cyclicality with respect to the state of the economy. The difference between these losses and accounting provisions can then be converted into either additional provisioning requirements, implemented via a "regulatory provisioning fund," or via additional regulatory capital requirements. The regulator could, for example, ask financial institutions to adjust their estimates of expected losses upwards during economic expansions, on the premise that these losses are typically underestimated during those periods. The increased gap between expected losses and banks' provisions can be used as a basis for requiring additional regulatory provisioning, or additional capital to be held, thus creating buffers in good times.

Aside from being difficult to implement and monitor, this solution fails the "use test" by introducing divergence between models of banks' economic capital and the regulatory capital model. This is contrary to the direction of regulatory changes that started with the Basel Committee's Market Risk Amendment and culminated in Basel II. That is not to say that this path should be left unexamined or that it cannot be modified, but questions involve the whole regulatory framework, rather than modifications within the existing one.

The alternative is to abandon provisioning based on the accounting model and replace it with provisioning based on expected loss. This proposal, however, runs counter to the basic objectives of the accounting model and raises a host of difficult issues regarding the responsibilities of auditors relative to those of banking supervisors.

Empirical Evidence

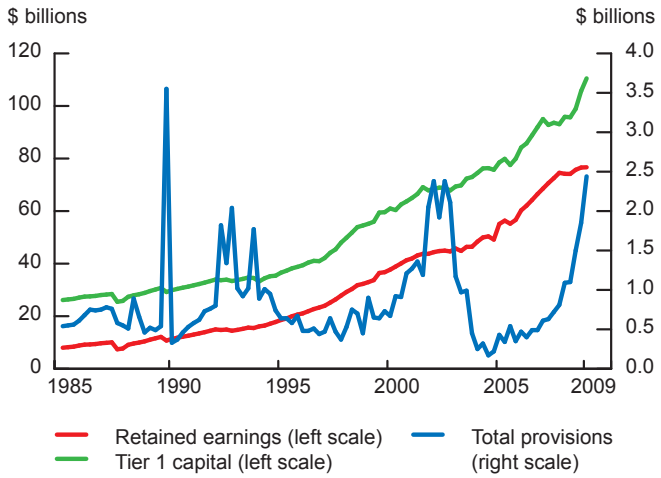
Regardless of what system is put in place, changes in provisions will affect banks' net interest income, their returns on equity, and possibly, their capital. This occurs because provisions are deductions from net interest income. As such, an increase in provisions will, all else being equal, reduce the level of interest income and, thus, a bank's total income. For a fixed ratio of dividend payouts, this will result in lower retained earnings and a reduction in banks' regulatory capital (via its impact on Tier 1).

From a regulatory viewpoint, this may not be a desirable outcome. Increased provisioning during economic expansions may increase the reserve fund to absorb expected losses, while, at the same time, eroding the regulatory capital buffers that banks have to absorb the unexpected losses. Under Basel II, an offsetting mechanism is in place via the stipulation that any excess of provisions over expected losses may be added to Tier 2 capital (subject to an upper limit), while the shortfalls between expected losses and actual provisions are deducted from regulatory capital (50 per cent from Tier 1 and 50 per cent from Tier 2). Although the net effect is difficult to determine precisely, the asymmetric treatment of excesses and shortfalls implies that additional provisioning is likely to affect the composition of regulatory capital, moving it away from high-quality Tier 1 and into Tier 2. Moreover, it is not clear whether the offsetting effects of Basel II would be capital-neutral or would result in a net change (decrease or increase).[6]

The net impact of the offsetting rules is difficult to determine, but one can get an idea of the extent to which provisioning affects capital by examining historical evidence. It should be noted that provisioning will affect capital only to the extent that it affects retained earnings. Chart 1 shows the retained earnings, Tier 1 capital, and total provisions of the major Canadian banks for the period 1985Q1 to 2009Q1.

Chart 1: Trends in provisioning and bank capital

Major Canadian banks



Sources: Bank of Canada and OSFI

Although there is a clear relationship between the stock of retained earnings and Tier 1 capital over this period, the relationship between provisions and retained earnings is less clear. The correlation between changes in retained earnings and provisions is negative,[7] but the overall impact of provisioning on retained earnings and capital is small.

6 These links between regulatory capital and excesses/shortfalls in provisioning point to the need to examine various provisioning and capital requirements jointly rather than in isolation, and to ensure the consistent treatment of expected losses in these proposals.

7 The correlation between quarter-to-quarter changes in retained earnings and provisions is -0.37; the correlation between the year-over-year changes in retained earnings and provisions is -0.31.

This is mainly because of the difference in relative magnitudes: on average, provisions represent less than 2 per cent of Tier 1 capital (about 4 per cent of the stock of retained earnings). Thus, even the sharp increase in provisions in 1989Q4 of about 560 per cent relative to 1989Q3, resulted in a decrease in retained earnings of about 10 per cent and in capital of about 5 per cent.[8]

In contrast, the 1.5 per cent decline in Tier 1 capital in 2002Q4 relative to 2002Q3 was accompanied by an 11 per cent decrease in provisions. It is thus important to keep in mind that the focus of provisioning is on credit risk in the banking book and, as such, does not deal with other types of risk, such as market risk. Recent events show that market-related losses can weaken banks' positions and affect not only their market-related activities, but also their ability and willingness to expand their banking book activities, even when there is little evidence of significant deterioration in the performance of banking book assets.

These findings suggest that provisioning might not be a significant contributing factor to the procyclicality of capital and that if provisioning were to be used to counter the procyclicality of capital, significant increases in provisions would be needed. There are, however, limits to what can be achieved, and these are determined by the income generated by a bank. For example, although magnitudes vary over time, provisions represent around 7 per cent of the net income of Canadian banks. Thus, a doubling in provisions would be expected to have a noticeable impact on net income, while not having a visible impact on capital, nor would it address the changes in capital coming from other sources of risk.

Conclusions

The foregoing discussion implies that, when it comes to the timing of provisioning relative to the economic cycle, either more flexibility within the accounting model or provisioning within the regulatory model might make a difference. In terms of the quantitative impact, our findings suggest that provisioning is likely not a major contributing factor to the procyclicality of capital and that there are limits to what can be accomplished through additional provisioning determined by the net income generated by a bank.

These findings are based on Canadian data and are country specific. A cross-country study to determine whether they hold more broadly would be of great interest. Further study of the issue of flexibility within the accounting standards is also needed. The ongoing work by the Basel Committee's Policy Development Group to review Basel II capital incentives to raise provisions over the expansionary part of the credit cycle and to promote enhanced accounting standards is directly relevant to moving the debate forward and reaching an overall assessment.

8 This change was due to a simultaneous recognition by Canadian banks of impairment in loans to less-developed countries.

Regulatory Constraints on Leverage: The Canadian Experience

*Allan Crawford, Chris Graham, and Étienne Bordeleau**

The Basel capital framework plays an important role in risk management by linking a bank's minimum capital requirements to the riskiness of its asset portfolio. Nevertheless, owing to model and data limitations, these calculations may not fully capture the actual level of risk. For example, as economic conditions improve during the upswing of a cycle, there may be a tendency for risk assessments to be overly optimistic. The opposite tendency may occur during a downturn. As a result, risk-adjusted capital ratios may not fully reflect risk exposures and future vulnerabilities in the financial system. Vulnerabilities can be worsened when changes in risk assessments from optimistic to pessimistic create a need to raise additional capital under stressful conditions.

Internationally, one reaction to these concerns has been to consider ways to improve the methods used to quantify risks. Another strategy is to supplement the information in risk-weighted measures of capital adequacy with other indicators such as an unweighted leverage ratio (defined as an assets-to-capital multiple). Although a simple leverage ratio has its own limitations, it may serve a useful complementary role since it is not distorted by the potential biases in risk-adjusted measures.[1]

As part of Canada's capital-adequacy regime, banks and other federally regulated deposit-taking institutions have been subject to a regulatory ceiling on the unweighted leverage ratio since the early 1980s. This leverage requirement was retained even after implementation of the risk-adjusted measures under Basel I and Basel II. Because measures of risk are imperfect, the Canadian regulator (OSFI) believes that the leverage ratio can function as an objective measure to complement the risk-weighted Basel capital requirements (Dickson 2009). Moreover, a leverage constraint helps to prevent banks from expanding their balance sheets excessively by accumulating assets with low Basel risk weights.[2] These pressures could be greatest during the boom phase of a cycle. Thus, a leverage requirement may be a useful tool for moderating procyclical forces in the financial system.

The imposition of regulatory leverage ceilings has recently been identified by international committees as one of many potential policy options to mitigate procyclicality and strengthen the resiliency of the global financial system. Currently, few countries have formal leverage constraints. In addition to Canada, U.S. commercial banks have been subject to leverage requirements for several decades, and Switzerland recently introduced leverage limits for large banks. In this article, we review lessons from Canada's experience with regulatory leverage constraints over the past 25 years. This includes a discussion of how the limits may have affected the recent evolution of bank leverage and procyclical pressures in the Canadian financial system.

Canadian Regulatory Limits on Leverage

The average leverage ratio of major Canadian banks rose steadily from the early 1960s to 1980, when it peaked at about 40 (Chart 1). Against this backdrop of high and rising leverage, the statutory authority to set a maximum leverage ratio was granted in 1980. From 1982 to 1991, a formal limit of 30 was placed on the assets-to-capital multiple for large banks. However, in practice, the effective leverage constraint was below 30 over this period, as the regulator

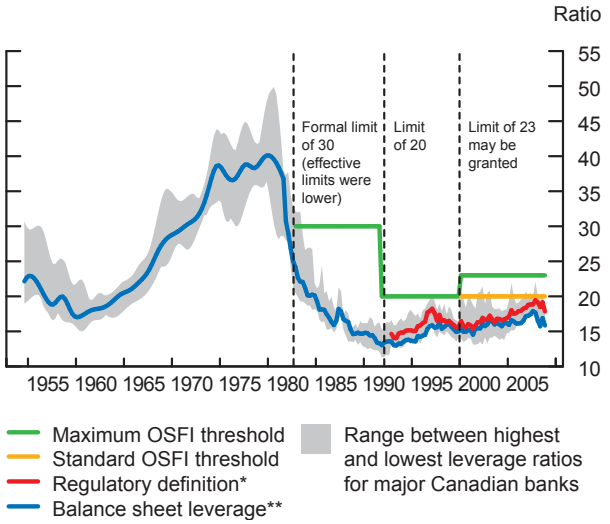
* Jim Armstrong also contributed to this article.

1 As noted by Hildebrand (2008), a leverage ratio "serves as a safety valve against the weaknesses and shortcomings of risk-weighted requirements."

2 Even if the risk weights are appropriate, excessive growth in assets and leverage could increase a bank's reliance on potentially volatile short-term sources of market funding and, therefore, expose it to significantly higher levels of funding-liquidity risk.

used its discretionary power to establish lower actual limits for individual banks. In 1991, a formal upper limit of 20 was imposed, and this ceiling remained in effect until 2000 when it was decided that banks meeting certain conditions could receive an authorized multiple as high as 23.

Chart 1: Leverage history of major Canadian banks



* On-balance-sheet assets plus certain off-balance-sheet items as a ratio of regulatory capital

** On-balance-sheet assets to shareholders' equity plus subordinated debt

Source: OSFI

The regulatory measure of leverage in Canada is the ratio of total balance sheet assets and certain off-balance-sheet items to total regulatory capital (adjusted net Tier 1 and Tier 2 capital).[3] The off-balance-sheet items include all direct contractual exposures to credit risk—including letters of credit and guarantees, transaction-related contingencies, trade-related contingencies, and sale and repurchase agreements. These off-balance-sheet exposures are included at their notional principal amounts.

Various factors are considered when setting the assets-to-capital limit for individual institutions, including operating and management experience, earnings, asset diversification, type of assets, and appetite for risk (OSFI 2007). The standard limit is 20, but a lower level may be set for individual institutions. Based on the above criteria, a newly established bank will usually have a very low limit (as low as 5), and many small banks are subject to limits that have kept their assets-to-capital multiples in the range of 10 to 12.

Since 2000, banks in good standing have been allowed to increase their limit to a multiple as high as 23, if they meet a set of preconditions and provide a satisfactory forward-looking business case. For example, the institution must demonstrate that it does not have undue risk concentrations, and the business case must link the higher limit to lower-risk activities (such as residential mortgages and well-secured repo transactions). Five of the six major banks have had their limits set at 23 for at least part of this period.

Banks try not to operate too close to their limit, particularly if their balance sheet tends to be volatile (as a result, for example, of heavy trading activities). If an institution operating at a higher authorized multiple exceeds that limit, or allows its risk-based capital ratios to drop below the risk-based capital targets, OSFI will reduce that institution's limit and will require it to submit an action plan for achieving the lower multiple. The institution will also be required to operate at or below the lower level for four consecutive quarters, before being reconsidered for an increase in its multiple. These provisions create an economic incentive for banks to operate with a buffer that balances the expected gains from higher leverage against the expected costs of exceeding the limit after encountering a shock. The size of the desired buffer may also increase with the perceived variance of potential shocks. One implication of the buffer is that the regulatory limits may be constraining behaviour, even if observed leverage is not at the authorized maximum.

The Impact of Regulatory Limits

We now examine trends in historical leverage ratios to assess how regulatory limits may have affected the evolution of leverage at major Canadian banks.

Levels of leverage

The average leverage ratio at major banks exceeded 30 continuously over a 10-year period starting in the early 1970s and reached a peak of 40 in 1980 (Chart 1). Individual institutions had ratios as high as 50 over that period. With the introduction of regulatory limits, aggregate leverage declined dramatically in 1983 to a more moderate rate of 25, and it fell further over the second half of the 1980s. It is likely that the leverage constraints contributed to this downward trend. As noted earlier, although the formal limit was an assets-to-capital multiple of 30 until 1991, the effective limits for individual banks were set at lower levels over this period (particularly after 1985).[4] Since 1985, the average leverage ratio has remained consistently below 20.

International comparisons provide some perspective for evaluating the role of leverage constraints in recent years.

3 Since quarterly data for the regulatory definition of leverage are not available before 1993, Chart 1 also reports an alternative measure that is the ratio of total on-balance-sheet assets to shareholders' equity and subordinated debt. The two measures have followed similar trends over the period during which data for both series are available, although the level of the regulatory measure is about 0.9 higher on average.

4 Data for the effective leverage constraints are not available for the 1980s; however, anecdotal information suggests that they were below 25 after 1985.

Table 1 compares the changes in risk-weighted Tier 1 capital ratios and unweighted leverage ratios during the years leading up to the financial crisis. To facilitate comparison, the Tier 1 ratio is inverted so that an increase implies higher risk-weighted leverage. To achieve a consistent definition across countries, leverage is defined as the ratio of on-balance-sheet assets to shareholders' equity. Thus, if the leverage ratio rises by more than the inverted Tier 1 ratio, it would be explained by two potential factors: (i) an increase in the ratio of unweighted assets to risk-weighted assets, and/or (ii) Tier 1 capital rising at a faster rate than shareholders' equity. While explanation (i) could reflect a shift towards safer assets, it may also occur if the risk weights were not adequately capturing an increase in the true risk exposures. To isolate the relative importance of these two factors, Table 1 also reports changes in the ratio of unweighted assets to Tier 1 capital.

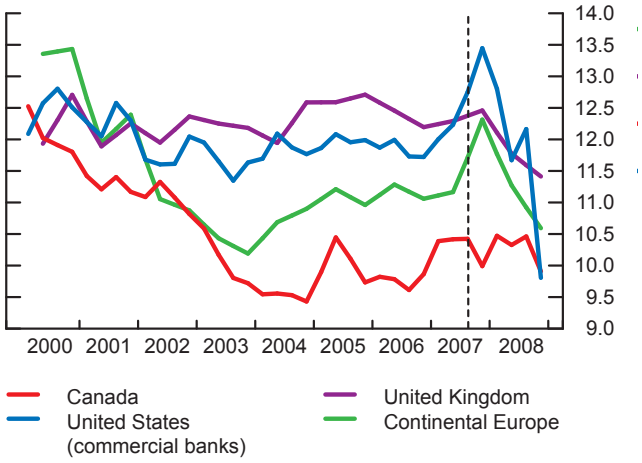
Table 1: Changes in Inverted Tier 1 Capital Ratios and Leverage
(2003Q4 to 2007Q3)

	Canada	U.S. commercial banks	U.S. investment banks	United Kingdom	Europe
Inverted Tier 1 ratio[a]	0.7	1.2	n.a.	0.2	1.5
Unweighted leverage ratio					
- UWA[b] to Tier 1 capital	2.3[c]	1.5	n.a.	-5.1	18.3
- UWA to shareholders' equity	1.2	-0.3	8.1	7.0	5.9

a. Ratio of risk-weighted assets to Tier 1 capital
b. UWA is unweighted on-balance-sheet assets.
c. The change is 2.6 using the Canadian regulatory definition of leverage.

The inverted Tier 1 ratios show small increases for both Canadian banks and major international peers over the period up to the third quarter of 2007 (Table 1 and Chart 2).[5] However, the trends for unweighted leverage ratios are less uniform across countries.[6] Measured by the ratio of unweighted assets to shareholders' equity, the average leverage ratio in Canada rose by only 1.2 during those years, in contrast to the significantly greater increases at major banks in a number of countries not subject to

Chart 2: Inverted Tier 1 capital ratio



Sources: Bloomberg and bank financial statements

regulatory constraints (Table 1 and Chart 3).[7,8] As noted previously, U.S. commercial banks are also subject to leverage requirements. Leverage at those institutions was stable in recent years, whereas leverage at U.S. investment banks (not subject to these constraints) began trending sharply upwards starting in 2004.

The combination of stable Tier 1 ratios and sharply rising leverage at some banks illustrates that risk-adjusted capital requirements were not sufficient to prevent a significant cyclical buildup of leverage in some countries in the pre-crisis period. This experience provides several lessons. First, in light of subsequent developments, it suggests that some risks were not being measured properly over this period. For example, weaknesses of risk-assessment methods led to the underpricing of risks in the trading book, which would have contributed to risk-adjusted capital ratios remaining relatively stable while leverage increased sharply at banks with high trading book activity (see CGFS 2009). The pronounced divergence between weighted and unweighted ratios in some countries also suggests that a simple leverage ratio would be a useful tool to complement the risk-weighted measure.[9]

5 The international comparisons use data for six major Canadian banks, ten large national and regional U.S. commercial banks, five large U.S. investment banks, six major U.K. banks, and nine major continental European banks.

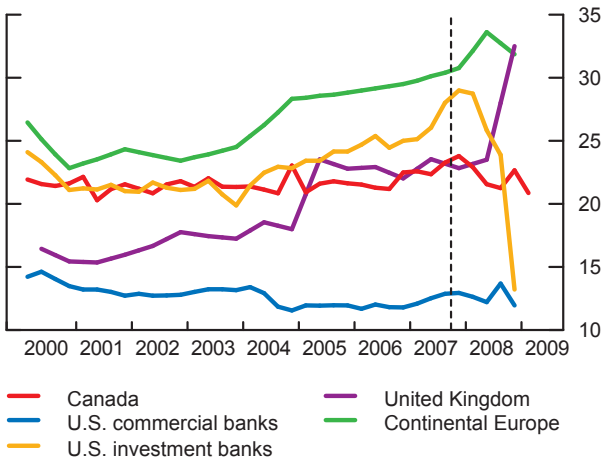
6 Accounting differences can affect international comparisons of measured leverage. For example, U.S. GAAP practices allow reporting of net derivative positions on the balance sheet, whereas Canadian GAAP and International Financial Reporting Standards (IFRS) require reporting of gross derivative positions. This difference means that the level of leverage at U.S. banks is understated relative to Canadian leverage.

7 The average leverage ratio increased to 30 at the world's 50 largest banks (CGFS 2009).

8 When measured as the ratio of unweighted assets to Tier 1 capital, leverage in the United Kingdom fell over this period (Table 1). Since the risk-adjusted Tier 1 ratio was virtually unchanged, this implies that there was a shift towards assets with higher risk weights. The difference between the two unweighted U.K. measures indicates that shareholders' equity decreased as a proportion of Tier 1 capital. The net effect is that the ratio of on-balance-sheet assets to shareholders' equity rose relative to the inverted Tier 1 ratio.

9 Hildebrand (2008) uses recent Swiss experience to emphasize the complementary role of a leverage ratio: "Looking at risk-based capital measures, the two large Swiss banks were among the best-capitalised large international banks in the world. Looking at simple leverage, however, these institutions were among the worst-capitalised banks. With the benefit of hindsight, we clearly should have put more emphasis on the risks of excessive leverage."

Chart 3: Banking sector leverage*



* Ratio of on-balance-sheet assets to total shareholders' equity
Sources: Bloomberg and bank financial statements

While it is difficult to quantify the effect of the leverage constraint, the above evidence suggests that it helped to mitigate the cyclical buildup in leverage in Canada.[10] The relatively low levels of leverage at the start of the financial crisis have meant that Canadian banks have faced less pressure to deleverage than some of their international counterparts, thereby mitigating the procyclical movements in the current downturn. Since the start of the financial crisis, the leverage ratio has moved within a narrow range in Canada. Elsewhere, capital injections have led to sharp reductions in leverage at U.S. investment banks, whereas increases in the notional value of derivative assets pushed the leverage of U.K. banks higher through the end of 2008 (Chart 3). Declines in capital caused by writedowns contributed to leverage remaining comparatively high for major banks in continental Europe.

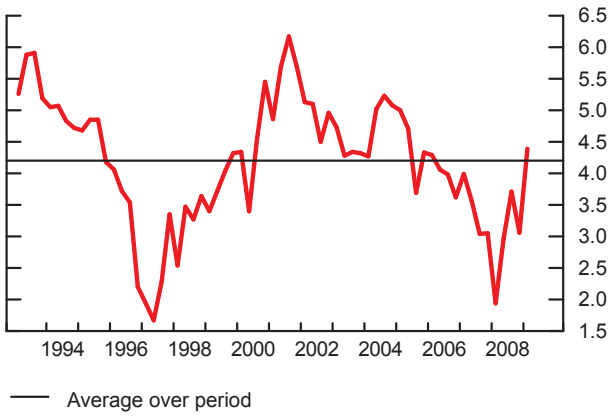
Trends in leverage buffers

As noted earlier, a bank will maintain a buffer as it balances the incentives to expand leverage against the costs of exceeding the limit. During the upswing of a credit cycle, it is expected that the leverage buffer would tend to decrease, but the need to satisfy the leverage constraint on an ongoing basis should ultimately restrain further decreases. To consider these questions, we examine how the buffer moves over a cycle and whether bank behaviour changes as leverage approaches the regulatory limit.

Chart 4 shows that the buffer between a bank's actual leverage and its authorized limit varies over time.[11] The typical buffer was elevated in the early 1990s in the aftermath of a recession and shrank when the economy strengthened. The average buffer moved up again in 2001 as output growth weakened and as the maximum assets-to-capital multiple was raised to 23 for qualifying institutions. It then fell back closer to the sample average in the following years.

Chart 4: Average buffer between actual leverage and its limit varies over time

Major Canadian banks



Source: OSFI

The buffer has a moderate negative correlation with a simple indicator of cyclical credit conditions, indicating some tendency to decline during boom periods.[12] However, there is empirical evidence that procyclical movements in leverage are mitigated by adjustments in behaviour. If some development pushes leverage too close to the authorized limit (as might occur during the upturn of a credit cycle), some banks tend to react by quickly raising the buffer in subsequent quarters.[13] This pattern is further evidence that the regulatory limit has helped to constrain procyclical increases in leverage ratios.

Other Issues

Several issues have been raised regarding potential adverse incentives arising from the use of unweighted leverage constraints. These issues are briefly reviewed in light of the Canadian experience.

10 The discussion of leverage buffers in the next section provides further guidance on the impact of the regulatory constraint.

11 Chart 4 reports leverage buffers starting in 1993 because quarterly data for the regulatory measure of leverage are not available for previous years, and information on the effective leverage constraints at individual banks is not available before 1991.

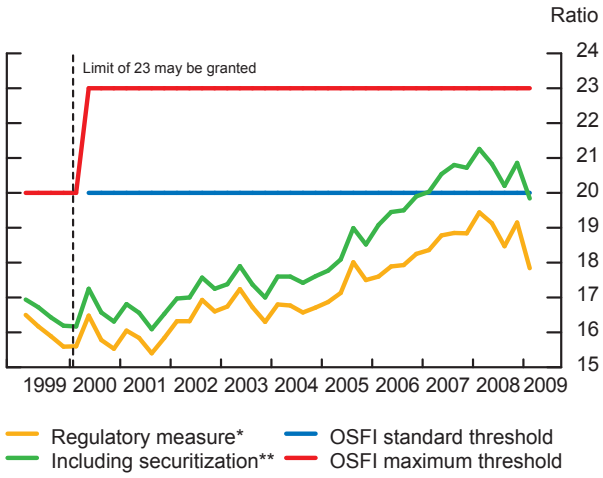
12 The average buffer exhibits a correlation coefficient of -0.35 with the trend in aggregate real credit growth (measured by the current four-quarter growth rate).

13 Crawford, Graham, and Bordeleau (2009) provide further statistical analysis, using data for individual banks.

A common criticism of a leverage ratio defined to include only on-balance-sheet assets is that it creates an incentive for banks to move assets off their balance sheets to bypass the leverage constraint. The Canadian regulatory measure does include some off-balance-sheet items (specifically, direct contractual exposures). Regarding other types of off-balance-sheet activity, securitized assets of major banks are currently a relatively small percentage (about 10 per cent) relative to their total on-balance-sheet assets. The gap between the regulatory definition of leverage and an augmented measure including securitized assets has risen somewhat in recent years, although part of the increase reflects a change in the reporting of securitization data (Chart 5).[14] A range of factors has led to greater securitization in many countries, so it is difficult to gauge to what extent the increase in Canada reflects incentives arising from the leverage constraint as opposed to other factors. Overall, the diversion of activity to off-balance-sheet assets does not appear to have significantly affected the trends for the regulatory measure in Canada. Nevertheless, broadening the coverage of off-balance-sheet assets in the regulatory definition of leverage would be a useful issue for future review.

A second potential concern is that banks will shift the mix of activity towards riskier assets as a way to boost their income when the leverage constraint is limiting overall balance sheet growth. In Canada, the ratio of risk-weighted assets to total balance sheet assets has been falling—not rising—in recent years, although the risk-measurement issues discussed previously may suggest some caution when using this indicator. Realized losses since the beginning of the crisis could also be used as an indicator of risk-taking behaviour before the crisis. All else being equal, the hypothesis predicts that jurisdictions with a leverage constraint (and thus an inducement to invest in riskier assets) would tend to have higher losses during the downturn. However, the available data show that capital market writedowns and loan losses at Canadian banks have been lower (relative to shareholders' equity) than for many of their international peers. Thus, despite the incentive to shift towards riskier assets when the constraint is binding, there is little evidence that this type of behaviour was prevalent in the years leading up to the financial crisis. This suggests that other aspects of the supervisory regime have mitigated the potential adverse effects on risk-taking behaviour.

Chart 5: Leverage of major Canadian banks



* On-balance-sheet assets plus certain off-balance-sheet items as a ratio of regulatory capital

** Includes unrecognized securitization of banks' own and third-party assets. Coverage of securitization data was broadened in 2006 (see footnote 14).

Source: OSFI

Conclusions

This article reviewed some lessons from the Canadian experience with leverage constraints over the past 25 years. The role of a leverage constraint is to act as a complement—not a substitute—for risk-weighted measures of capital adequacy. More broadly, it should be viewed as one component of the regulatory regime, rather than as a substitute for other risk-management and supervisory practices. Leverage at major Canadian banks was relatively stable during the years leading up to the financial crisis, in contrast to the significant increases at banks in a number of countries without leverage constraints. There is also evidence that some banks tend to raise their leverage buffers quickly when a shock pushes leverage too close to the authorized limit, which suggests that the limit helps to constrain increases in leverage during the upturn of a credit cycle. Relatively low levels of leverage at the start of the crisis have reduced the pressure for deleveraging during the downturn.

Various international groups, including the recent G-20 Working Group (2009) and the Basel Committee on Banking Supervision, have included a non-risk-based supplementary measure of capital adequacy on their lists of policy options to reduce procyclicality and strengthen the resiliency of the global financial system. When designing a supplementary leverage requirement, it will be important to mitigate the risk that it will create incentives for banks to shift activity to off-balance-sheet instruments or riskier assets. Strategies to achieve this objective would include selecting an appropriate definition of the regulatory measure, and designing the risk-weighted and simple leverage requirements in ways that avoid arbitraging behaviour.

14 Data collected on third-party securitized assets were expanded in 2006 to include all vehicles sponsored or administered, rather than only those with recourse provisions.

References

Committee on the Global Financial System (CGFS). 2009. "The Role of Valuation and Leverage in Procyclicality." CGFS Papers No. 34, April.

Crawford, A., C. Graham, and E. Bordeleau. 2009. "Regulatory Constraints on Leverage: Issues and Lessons from Canadian Experience." Bank of Canada Discussion Paper. Forthcoming.

Dickson, J. 2009. "Capital and Procyclicality in a Turbulent Market." Office of the Superintendent of Financial Institutions Canada, 8 January.

G-20 Working Group 1. 2009. "Enhancing Sound Regulation and Strengthening Transparency, Final Report." 25 March.

Hildebrand, P. 2008. "Is Basel II Enough? The Benefits of a Leverage Ratio." Lecture presented at the London School of Economics, 15 December.

Office of the Superintendent of Financial Institutions Canada (OSFI). 2007. Guideline A: "Capital Adequacy Requirements." November.

Procyclicality and Value at Risk

Peter Youngman

In the years leading up to the financial crisis, banks around the world, including those in Canada, became more heavily involved in financial markets. Securities and derivatives that banks actively buy and sell in financial markets make up the "trading book." Prudential regulations governing the trading book differ in many important respects from those governing the "banking book," which is the more traditional stock of loans and mortgages originated and held by banks. In the initial phase of the current financial crisis, banks suffered severe losses from instruments held in the trading book: in many cases, several times what standard models would have predicted (Standard & Poor's 2008). Given the significance of the trading book to international banks and its prominent role in the recent crisis, it is important that regulatory reforms aimed at reducing the procyclicality in the financial system address rules regarding trading book capital.

There is widespread agreement that, prior to the crisis, banks did not set aside sufficient capital to cover risks related to the trading book, especially credit, liquidity, and event risk. The Basel Committee on Banking Supervision (BCBS) has proposed amendments to strengthen capital requirements for the trading book (BCBS 2009b, 2009c) that would increase capital to cover these risks. The proposals may also moderate procyclicality, but more work remains to be done in overhauling the framework for measuring trading book risks, with particular focus on the systemic consequences of prudential capital requirements.

Current Framework for Trading Book Capital

Capital requirements for the trading book are based on the "Market Risk Amendment" (MRA) to the Basel I accord (BCBS 1996, 1997). Value-at-risk (VaR) models are the foundation of the MRA, and are an early example of the internal-models approach of Basel II, whereby banks are permitted to compute regulatory capital based on their own models, subject to certain qualitative and quantitative standards.[1]

Simply stated, a VaR model is a model of the distribution of future profits and losses of a bank's trading portfolio. VaR models combine information on a bank's trading positions across various products with statistical estimations of the probability distribution of the underlying market factors and their relation to each other. The final output of a VaR model is a VaR estimate, which is defined as the maximum amount of money that a bank would expect to lose over a defined period and with a defined confidence level. For example, if a bank has a 99 per cent, 1-day VaR of $100 million, this means that 99 times out of 100, the bank's trading portfolio should not lose more than $100 million the next day. Put another way, one day out of 100, the bank should expect to lose $100 million or more.

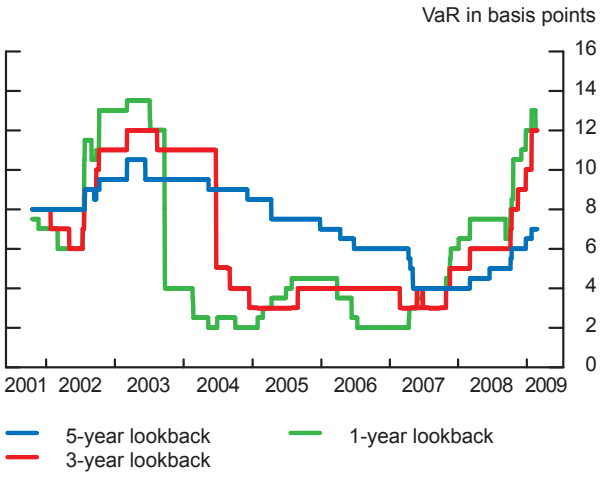
VaR models came into widespread use in the 1990s, as the trading activities of large international banks increased dramatically. The MRA does not specify the exact type of VaR model that a bank must use, but it does specify that banks must hold capital equivalent to three times the 99 per cent VaR with a 10-day holding period, averaged over the past 60 trading days. Banks must also use a minimum of one year of data to estimate the statistical behaviour of the market risk factors. Today, major banks use complex computer models to aggregate trading positions across the bank and to model the joint probability distribution of hundreds, or even thousands, of risk factors.

1 The MRA also provides the option of using a standardized approach. Large financial institutions, including the major Canadian banks, use the internal-models approach for assessing general market risk, although some use the standardized approach for determining specific risk in part, or all, of their trading portfolios.

The Procyclicality of VaR Models

Value-at-risk models have several widely recognized shortcomings and have been heavily criticized by academics and practitioners. While banks have developed many variants of VaR models, all of them still rely on historical data to estimate the probability distribution of future outcomes. Most banks use a relatively short period of data (the "lookback period") to estimate the probability distribution of market factors, and some use weighting schemes, whereby within the lookback period, more recent data points are given a higher weight. These techniques can ensure that estimated VaRs accurately reflect the stylized fact that many financial time series exhibit time-varying volatility. In this sense, such VaR models are "risk sensitive," in that they relate capital to current estimates of risk. This risk sensitivity results in VaRs that are cyclical: rising and falling with market volatility. Charts 1 and 2 show daily VaR estimates for Canadian equity and corporate bond markets, estimated with different lookback periods.[2]

Chart 1: One-day 99% VaR for BBB corporate bonds

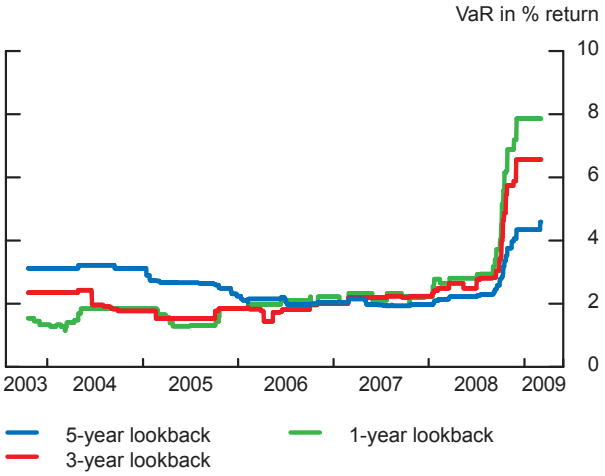


Sources: Bloomberg, Merrill Lynch, author's calculations

Note the sharp rise in VaRs since late 2008. A bank using VaR to set trading limits would use an increase in VaR as a signal to reduce its trading positions. From the perspective of that bank, the reduction in trading positions during a high-volatility period will reduce risk.

This type of dynamic is troubling if many market participants react to increased volatility in the same way. The herding hypothesis (Persaud 2001) holds that when many financial institutions use VaR to set risk limits, its cyclical

Chart 2: One-day 99% VaR for S&P/TSX Composite Index



Sources: Bloomberg, author's calculations

properties generate destabilizing effects in financial markets, whereby declines in asset prices cause VaRs to increase, which, in turn, leads to breaches of the VaR-based risk limits. Institutions respond to the limit breaches by closing out the risky positions, thus exacerbating the initial price decline and causing more volatility. Thus, the use of risk-sensitive measures that reduce risk for individual firms can create more risk in the system as a whole. While it is unlikely, at least in the short run, that firms react mechanistically to increases in VaR, there is some evidence that this dynamic was at work during the current crisis (Longworth 2009).

Another observation from Charts 1 and 2 is that a longer lookback period produces more stable VaR estimates that do not fall as quickly in quiet times, nor rise as sharply in crisis periods. The use of a longer lookback period may reduce short-run forecasting accuracy, but could reduce systemic risk by discouraging an excessive buildup of trading positions during quiet periods in the markets. With smaller trading positions, volatile periods in the markets would not be as damaging.

Other criticisms of VaR models centre on the difficulties in modelling financial asset prices, especially in the tail of the distribution, which is particularly relevant for risk management. While VaR models can be improved to better account for the statistical properties of financial time series, no model is perfect.

The MRA adjusted for some of the weaknesses discussed above. Setting the capital requirement on the average VaR over the past 60 days, instead of on yesterday's VaR, tends to smooth sharp changes in VaR coming from changes in market volatility (Jorion 2002). Multiplying the VaR by three is an adjustment that may account for the fact that most financial times series are known to have "fat tails," and that

2 The historical simulation approach was used to compute the VaR used in the charts. This is one of the methods commonly used by banks. The VaR computed for the S&P TSX Index assumes a long position; the VaR for corporate bonds uses the Merrill Lynch BBB corporate bond index and assumes a long position in spreads versus Government of Canada bonds.

some positions would not be able to be liquidated within the assumed 10-day holding period. In addition, the MRA stipulated that banks using internal models for trading book capital "must have in place a rigorous and comprehensive stress testing program." Stress testing has long been suggested as a way for risk managers to better understand exposures and to assess the impact of tail events, which may not be well captured by VaR models.

VaR Models and Financial Innovation

Over time, financial innovation shifted the focus of banks' trading activities away from traditional instruments and towards more complex securities and derivatives, such as collateralized debt obligations and credit default swaps. Compared with traditional instruments like government bonds and interest rate swaps, these new instruments had higher levels of credit and liquidity risks. In addition to long-standing doubts about VaR and its potential feedback effects on markets, prudential regulators were concerned that existing VaR models, which were focused on "general risk,"[3] were poorly suited to capturing the risks of these new products. This, in turn, led to a concern that the market risk framework gave banks incentives for "regulatory arbitrage," i.e., moving positions from the banking book to the trading book in order to benefit from lower regulatory capital charges (BCBS 2005).

Reflecting these concerns, the BCBS published a revised framework for the trading book in April 2005, often called Basel 2.5 (BCBS 2005). The changes sought to reduce incentives for regulatory arbitrage by establishing a new capital requirement, called the "incremental default risk" charge (IDR), which would cover credit risk in the trading book. A later document (BCBS 2007) laid out detailed qualitative and quantitative standards for the IDR, which were to be implemented in 2010. The new measures proposed by the BCBS, discussed below, have supplanted the IDR.

Mitigating Procyclicality in Capital Requirements for Market Risk

The financial crisis exposed some problems in the framework for managing market risk. Many banks posted trading losses well in excess of their VaR estimates, even exceeding the losses generated by stress scenarios (BCBS 2009a). In response to the weaknesses demonstrated by the financial crisis, the BCBS's Trading Book Group set out to strengthen these capital requirements. The group published two documents proposing amendments to the trading book capital framework (BCBS 2009b, 2009c). Final versions of the amendments are expected in September 2009, with implementation planned for the end of 2010. The BCBS has indicated that the implementation date could be extended if necessary to avoid increasing capital requirements during a stressful period (BCBS 2009d).

The documents propose major changes to capital requirements for the trading book. Among the most prominent are:

- A new "stress VaR" charge for general and specific market risk. The stress VaR is the VaR of current trading positions using an estimation window that includes a stressful period relevant to the bank's trading positions. The stress VaR would be multiplied by three and added to the existing VaR-based capital charge.
- A new Incremental Risk Charge (IRC). The IRC will cover default and migration risk on credit products in the trading book. The IRC will cover non-securitized credit products[4] using a 99.9 per cent confidence level and assuming a constant level of risk over a 1-year horizon. Securitized products are not eligible for the IRC. They will be subject to a capital charge taken from the securitization framework for the banking book. Capital requirements for credit-risky positions in the trading book will be based on the same soundness standard as in the banking book, but the unique characteristics of the trading book will be taken into account in computing capital.[5]
- An explicit requirement for banks to model all relevant pricing factors as risk factors in the VaR model, unless approval is obtained from the supervisor.

Adoption of the proposed amendments would significantly increase trading book capital. An increase is widely thought to be necessary, but it comes at a time when banks' capital is already under pressure. Members of the BCBS will be conducting quantitative impact studies in their respective countries, which should give the BCBS further insight into the appropriate timing for implementing the changes. The impact studies could also highlight areas where the proposals could have an adverse impact on market liquidity, for example, by reducing the willingness of banks to make markets in certain products.

The impact of the changes on procyclicality is difficult to assess. The new IRC should reduce incentives for regulatory arbitrage, which seems to have been an important source of procyclicality. The new stress VaR charge would prevent capital from falling too much in periods of low market volatility but would not reduce the procyclicality of

3 "General risk" refers to the risk of loss owing to changes in default-free interest rates, overall credit spreads, FX rates, broad equity market indexes, and commodity prices.

4 This would include, for example, corporate bonds and single-name credit default swaps.

5 In particular, the constant level of risk assumption is designed to provide some capital relief for holding positions in a trading book, where positions can be reduced in response to a decline in credit quality. Thus, the IRC charge need not be computed assuming that all positions will be held over the 1-year horizon, but rather that positions could be liquidated after a period of time, called the liquidation horizon. The minimum liquidation horizon is set at three months. Additionally, existing VaR models and the IRC take into account risk reduction that arises from hedging positions, in contrast to the banking book, where capital charges are additive.

other components of trading book capital, namely, the general- and specific-risk VaR models and the new IRC. The higher level of capital required for trading activities may also reduce the ability of banks to make markets in some instruments, thus reducing market liquidity.

Future Priorities for Policy-Makers

Given the widespread concern of policy-makers about procyclicality and feedback effects, and given the prominence of trading losses during the financial crisis, more work remains to be done on the overall framework for trading book capital. One possibility is for further refinements to existing VaR models, such as stress VaR, or more medium-term "through the cycle" approaches to estimating VaR.

Given the inherent limitations of VaR modelling, an alternative would be to reduce its central role in a regulatory framework for capital.[6] A revised framework could work from a principles-based approach, designed to capture all types of trading risk to an acceptable soundness standard, giving due consideration to the pitfalls of VaR modelling. For example, stress testing, currently part of Pillar II, could be brought into Pillar I capital requirements. Model-based capital requirements could be supplemented by simple position limits, analogous to the use of a leverage ratio for overall bank capital. This type of principles-based approach should be more resilient to financial innovation, ensuring that new risks are taken into account as they develop.

To complement microprudential reforms, policy-makers could address macroprudential concerns by developing tools to assess the evolution of trading positions and leverage in the financial system. This assessment could be used to identify systemwide vulnerabilities that, in turn, could feed back into the quantitative assessment of capital adequacy.

Conclusion

Value-at-risk models—the foundation of regulatory capital requirements for the trading book—have serious weaknesses, including the potential for inducing procyclicality in markets. Recent initiatives taken by the Basel Committee on Banking Supervision address some of the key weaknesses in the existing framework, but more remains to be done. Capital regulation could be improved by exploring the overall approach to risk management in the trading book, with particular attention to the systemwide implications of prudential regulation.

References

Basel Committee on Banking Supervision. 1996. "Amendment to the Capital Accord to Incorporate Market Risks." Basel: Bank for International Settlements (January).

———. 1997. "Modifications to the Market Risk Amendment." Basel: Bank for International Settlements (September).

———. 2005. "The Application of Basel II to Trading Activities and the Treatment of Double Default Effects." Basel: Bank for International Settlements (July).

———. 2007. "Guidelines for Computing Capital for Incremental Default Risk in the Trading Book—consultative document." Basel: Bank for International Settlements (October).

———. 2009a. "Principles for Sound Stress Testing Practices and Supervision." Basel: Bank for International Settlements (January).

———. 2009b. "Revisions to the Basel II Market Risk Framework." Basel: Bank for International Settlements (January).

———. 2009c. "Guidelines for Computing Capital for Incremental Risk in the Trading Book." Basel: Bank for International Settlements (January).

———. 2009d. "Initiatives on Capital Announced by the Basel Committee." Press Release. Basel: Bank for International Settlements, 12 March.

Finger, C.C. 2009. "VaR Is from Mars, Capital Is from Venus." *Research Monthly* (April), RiskMetrics Group.

International Monetary Fund. 2007. "Do Market Risk Management Techniques Amplify Systemic Risks?" *Global Financial Stability Report* (October): 52–76.

Jorion, P. 2002. "Fallacies about the Effects of Market Risk Management Systems." *Journal of Risk* 5 (1): 75–96.

Longworth, D. 2009. "Financial System Policy Responses to the Crisis." Speech to the Financial Markets Association of Canada, Toronto, Ontario, 12 March.

Persaud, A. 2001. "Sending the Herd Off the Cliff Edge: The Disturbing Interaction between Herding and Market-Sensitive Risk Management Practices." In BIS Papers, No 2. *Market Liquidity: Proceedings of a Workshop held at the BIS*. (April).

Standard & Poor's. 2008. "Trading Losses at Financial Institutions Underscore Need for Greater Market Risk Capital." *RatingsDirect*. 15 April.

6 See Finger (2009) for a discussion of this issue.

Procyclicality and Margin Requirements

Nadja Kamhi

This article explores the extent to which margin requirements induce procyclicality. Margin refers to the amount of equity (i.e., cash) as a share of total assets purchased on credit. The terms "margin" and "haircut" are often used interchangeably. A haircut refers to the percentage discount on the value of collateral that determines the amount of a loan (i.e., credit). A feature common to both is that they determine the maximum amount of leverage. The higher the margin, or haircut, the lower the maximum amount of leverage. The term "margin" is used throughout this article. Margin rules that stipulate lower margin requirements during boom times (liquid markets, low volatility) and higher margin requirements during down times (illiquid markets, high volatility) induce procyclical behaviour. For the definition, and the broader implications of procyclicality on market prices, see p. 31.

Many financial transactions employ margin requirements, including those carried out by clearing houses and futures exchanges, as well as repo agreements and security-lending transactions. This article reviews margin requirements as they apply to margin accounts and to capital requirements for the proprietary inventory positions of investment dealers in Canada. It begins with a high-level overview of the rules, followed by an examination of their procyclical aspects, and concludes with some recommendations.

Rules for Margin Accounts and Proprietary Inventory Capital

The rules governing margin accounts administered by investment dealers are set by the Investment Industry Regulatory Organization of Canada (IIROC) and are outlined in Dealer Member Rule 100.[1] Rule 100 generally applies to parties that do not qualify as an "acceptable counterparty" or an "acceptable institution" and that are therefore classified as "other."[2] Retail investors, unregulated financial firms, corporations with a net worth below $75 million, and trusts or private partnerships with less than $100 million in net assets are among the parties that fall into this category. Since "acceptable" parties are, in most cases, exempt from IIROC-imposed minimum margin rules, any margin requirement is entirely at the discretion of their investment dealer. The IIROC is currently reviewing this exemption.

Investment dealers are required to hold regulatory capital against their proprietary inventory positions, and this amount is also calculated using the margin rules detailed in Rule 100. In both cases, for margin accounts and for regulatory capital purposes, the objective of these rules is to set margin rates at levels that appropriately account for exposure to market risk. A high-level description of these rules as they relate to fixed-income and equity securities is provided below.

Fixed-Income Securities

Margin requirements for bonds, debentures, treasury bills, and notes are generally higher for securities with longer maturities, lower credit ratings, and for unhedged positions. For example, a Government of Canada bond with a maturity between 1 and 3 years carries a margin of 1 per cent, while a corporate bond of high credit quality and the same maturity is margined at 6 per cent. Margin requirements for other types of debt, foreign exchange, and derivative securities are also defined in IIROC Dealer Member Rule 100. These minimum margins are temporarily increased when price volatility increases beyond specific thresholds. This

1 IIROC Rule 100 is applied to a much wider set of financial instruments and, combined with other rules, has a broader set of applications than described in this article.

2 See General Notes and Definitions to IIROC Dealer Member Form 1 on the IIROC website for the definitions of acceptable counterparty and acceptable institution.

temporary increase, the bond margin surcharge, is 50 per cent of the margin normally required.

Equities

Current IIROC margin requirements for equities and warrants traded on major stock exchanges are set according to a "market price per share" methodology. Generally, for securities that are trading at or above $2 per share, the required margin is 50 per cent. If the securities are among the approximately 500 (highly liquid, low volatility) exempt securities, the margin is 30 per cent for client account positions and 25 per cent for Dealer Member capital requirements. Margin requirements go up to 60 per cent and 80 per cent for all securities that trade below $2 and $1.75 per share, respectively. Securities priced below $1.50 have a margin rate of 100 per cent (i.e., they cannot be carried on margin).

Equity margins based on the VaR method

Value at risk (VaR) is a widely used method for determining regulatory capital requirements (see "Procyclicality and Value at Risk" on p. 51) as well as margin rates. It allows one to calculate the expected amount of loss, given a desired confidence level and a specified holding period. The IIROC plans to introduce a method for calculating equity margins that is based on a single-position VaR. This new approach to margin rates, referred to as "basic margin rate," will also utilize measures of price risk and liquidity risk to arrive at margin rates for each equity security listed in Canada or the United States. More specifically, price risk will be assessed based on the highest level of daily price volatility calculated using trading data for the most recent 20, 90, and 260 days. Liquidity risk will be assessed based on the average daily traded volume and the public float value of securities.

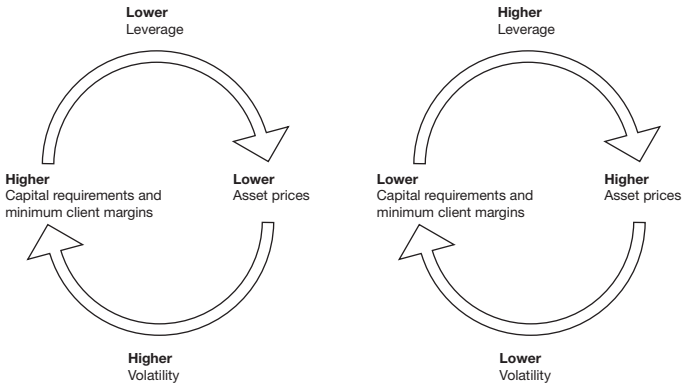
The Procyclicality of Margin Requirements

Client margin accounts are inherently procyclical, irrespective of margin rules. The minimum required margin for listed stocks trading at a price greater than $2 is 50 per cent of market value (30 per cent for highly liquid stocks). Thus, up to half of the total investment (or 70 per cent for liquid securities) may be borrowed from the investment dealer. The amount of the loan stays fixed, while the marked-to-market value of the portfolio fluctuates with market conditions. As the marked-to-market value of the investment grows, investors may take on more risk without contributing additional capital (i.e., purchase additional assets and drive the price up further). In contrast, as the marked-to-market value of the investment declines, investors are faced with margin calls and must deposit additional funds at a time when their portfolio is declining in value. Investors may choose to sell assets to meet margin calls, causing a further decline in asset prices. Thus, because of daily marking to market of securities positions and the use of leverage, margin accounts are inherently procyclical, regardless of the type of margin rules applied. When margin rules themselves are also procyclical, the effects are amplified.

Margin rules that prescribe higher margins during periods of increased price volatility, or as the prices of securities decline, exacerbate procyclicality. A case in point is the bond margin surcharge that is triggered when there is a significant increase in the volatility of bond prices. Since increased price volatility is often a by-product of illiquid markets and general market turmoil, the margin surcharge could serve to propagate the downturn because securities may need to be sold to meet the increased requirements for regulatory capital or margins. Margins on equity securities also exhibit procyclicality, since they progressively increase as the price of the security declines below $2. About half of TSX-listed securities currently trade at or below $2.50. Although their public float value is small, this is a significant increase compared with early 2007. The new margin rules for equities have not yet been implemented, but the proposed methodology would make these rules even more procyclical, since the margins would be closely tied to the near-term price volatility and liquidity of the securities.

Procyclicality will cause the regulatory capital requirements of investment dealers to rise during periods of increased volatility and to fall during boom times when volatility is subdued. Likewise, client margin rates will rise (fall) with increased (decreased) volatility. The resulting decrease (increase) in the leverage of firms and investors would cause asset prices to fall (rise). Subsequently, volatility is likely to rise (fall), feeding the propagation mechanism illustrated in Figure 1.

Figure 1: The procyclicality of asset prices: An illustration



Practical Considerations

IIROC Rule 100 sets the *minimum* required margins on margin accounts held at investment dealers. In practice, the margin rates set by investment dealers may be, and often are, higher than the required minimum. Rates are typically determined based on a combination of quantitative and qualitative characteristics. The quantitative model factors in characteristics of the asset such as asset type, term, price volatility, and liquidity, as well as the costs of investment dealers (e.g., clearing house collateral requirements). The qualitative aspect relates to the prevailing sentiment and/or subjective criteria and has the potential to make margin rates highly procyclical. From the perspective of the investment dealer, increasing margin rates reduces leverage and may be especially important during times of increased volatility. It is thus not surprising that since the start of the market turmoil, margins on a wide range of equity securities have gone up (in some cases, to 100 per cent), resulting in a large number of margin calls. Likewise, for fixed-income securities, estimates by Citibank suggest that average margins for investment-grade bonds in the United States have risen to about 18 per cent from 2 per cent (Citigroup Global Markets 2009). In Canada, margins on investment-grade bonds are currently close to 15 per cent, but comparisons over time and across asset classes are difficult, owing to a lack of official data.

Mitigating Procyclicality

One way to mitigate the procyclicality of margin rules is to make them less dependent on near-term market conditions. This involves determining price volatility and, hence, margin rates, using long historical data sets, making sure that past extreme events are captured in the data. If there are no extreme events in the data, then stress tests can be used to simulate such outcomes. This should lead to less variability in required minimum margin rates. It may, however, lead to higher margins on average.

As far as customer margin accounts are concerned, higher but stable margin rates would have the desired effect of reducing leverage, thereby making investors less susceptible to the sudden swings in wealth that encourage procyclical behaviour.

Finally, since investment dealers can impose margin rates above the minimum levels required, they are likely to do so during market downturns, thereby increasing the procyclicality in the system. To mitigate this behaviour, regulators could increase their monitoring of margins to prevent unjustified and reactionary increases, or provide dealers with guidelines for applying margins with a "through-the-cycle" perspective.

References

Citigroup Global Markets Ltd. 2009. *Flow and Structured Credit* (23 January).

Procyclicality and Compensation

*Étienne Bordeleau and Walter Engert**

The design of compensation arrangements is typically aimed at aligning the interests of a firm's decision makers with those of shareholders to maximize profits and share value over some time horizon. As a result, compensation arrangements invariably embed incentives that can influence firm behaviour. More specifically, performance-based compensation mechanisms, intended to align the behaviour of decision makers with shareholders' interests, can establish a range of incentives, particularly with regard to the time frame over which decision makers maximize profits and shareholder return. In the case of financial institutions, such compensation arrangements, focused, for example, on short-term returns or not adequately adjusted for risk, could contribute to behaviour that exacerbates the development of asset-price bubbles and leads to subsequent financial collapse, as seen recently in a number of financial systems around the world.

Of course, such compensation-based incentives do not operate in isolation from other influences on the behaviour of decision makers, such as the risk-control function of the institution, which could mitigate the effects of any perverse incentives from compensation arrangements. In practice, the net effect of these potentially competing influences on firm behaviour depends partly on their relative strengths within the firm. For instance, can the risk-control function adequately constrain risk taking in a specific unit of a bank motivated by the prospect of large cash bonuses tied to the annual operating profits of that unit? Importantly, the broader environment in which the financial institution operates, including regulation and market conditions, also influences the overall effect of the incentives embedded in compensation arrangements. In sum, the ultimate effect of compensation arrangements on risk-taking behaviour and, in turn, the development of asset-price bubbles, is complex and probably varies over time and with circumstances.

Nevertheless, compensation practices at large financial institutions are widely believed to have contributed to the financial crisis that began in 2007. For example, a recent report of the Financial Stability Forum (FSF) (discussed further below) argues that high short-term profits led to the payment of generous cash bonuses to employees at financial institutions without adequate regard for the longer-term risks implied by such practices. The report further notes that "multiple surveys find that over 80 per cent of market participants believe that compensation practices played a role in promoting the accumulation of risks that led to the current crisis."

In the next section, some stylized facts regarding the compensation arrangements at major Canadian and U.S. financial institutions are compared. However, a thorough assessment of various compensation practices and their effects on risk-taking behaviour should take into account a range of influences, including accounting, tax, and regulatory aspects, which can vary over time and across countries. The recently published *Principles for Sound Compensation Practices*, formulated by the FSF, are included at the end of this article. These principles are meant to guide supervisory oversight of compensation practices at financial institutions around the world.

Stylized Facts on Executive Compensation at Canadian and U.S. Banks

This section presents data indicative of broad patterns in executive compensation at Canada's five largest banks and at a sample of major U.S. financial institutions, including

* Thanks to Jason Allen, Pierre Duguay, Alejandro García, Céline Gauthier, Ben Gully, John Jussup, and Teodora Paligorova for helpful discussion and comments on an earlier version of this article.

Box 1

Banks and Data Sources

The Canadian banks considered here are the five largest banks: RBC Financial Group, Bank of Montreal, CIBC, TD Bank Financial Group, and Scotiabank. These banks hold 90 per cent of the assets of the Canadian banking sector and about three-quarters of the assets of the deposit-taking sector. The major banks also play a key role in virtually all aspects of financial services in Canada. Data on executive compensation at Canadian banks are from management proxy circulars prepared for the banks' annual meetings.

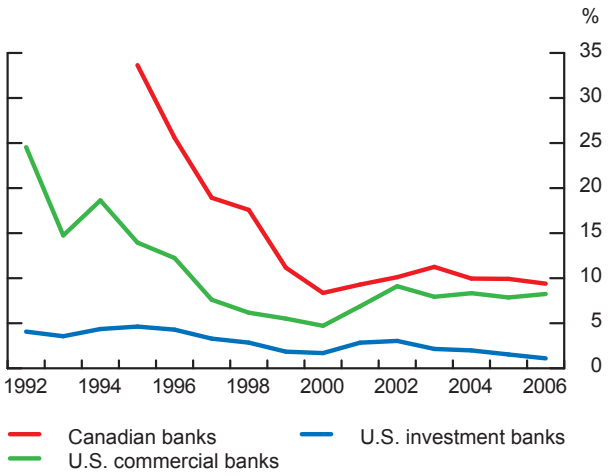
The U.S. commercial banks are selected from the top 20 U.S. banks in terms of assets as of 31 December 2004. Most of these banks have had a business mix broadly similar to that of the Canadian banks, benchmarked in a specific manner. That is, most of these U.S. banks have made a similar proportion of their revenue from retail banking. The U.S. commercial banks in this study are: Citigroup Inc., JPMorgan Chase & Co., Bank of America Corp., Wachovia Corp., Wells Fargo & Co., Washington Mutual Inc., U.S. Bancorp, SunTrust Banks Inc., National City Corp., Branch Banking & Trust Corp., Fifth Third Bancorp, Keycorp Limited, and The PNC Financial Services Group Inc. These institutions account for almost 80 per cent of the assets of the U.S. banking sector. The U.S. investment banks considered are Bear Stearns, Lehman Brothers Inc., Merrill Lynch & Co., Morgan Stanley, and The Goldman Sachs Group Inc. Data for the U.S. financial institutions are drawn from the ExecuComp database, maintained by Standard & Poors.

U.S. commercial and investment banks. (Box 1 provides information on the specific institutions covered and the data sources.) The focus here is on the compensation of the five top-ranking executives at these institutions, as identified in the proxy circulars for annual meetings and in the ExecuComp database.[1]

Chart 1 illustrates the evolution of executives' fixed (base) salaries relative to their total compensation at Canadian banks and U.S. financial institutions. Generally, the relative importance of fixed salary has been declining at all of these institutions. Notably, executives at U.S. investment banks have had relatively little in the way of fixed pay for many years—for example, about 2 per cent since 2000. Canadian banks, in contrast, have tended to have a higher, although also decreasing, share of executive compensation in the form of fixed pay, and this proportion has been stabilizing at around 10 per cent since the turn of the century. The relative importance of fixed pay at U.S. commercial banks has generally been trending somewhat below that at Canadian banks.

Chart 1 and subsequent charts suggest some degree of convergence in the pay practices of these groups of banks. Notably, all the Canadian banks in the sample began cross-listing their equity on the New York Stock Exchange in the mid-1990s (with the exception of Scotiabank, which cross-listed in 2002). According to Southam and Sapp (2008),

Chart 1: Fixed pay as a share of total compensation

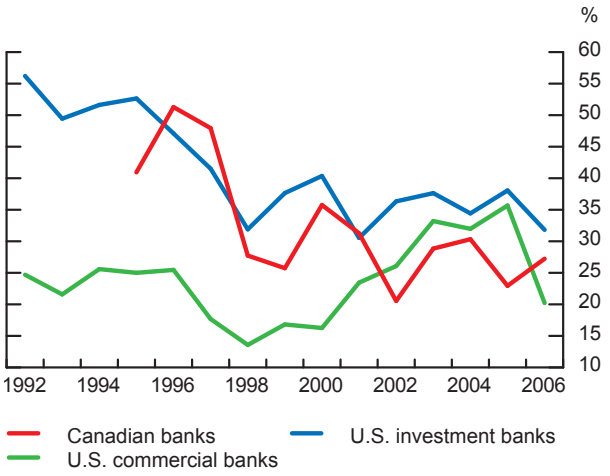


such cross-listing tends to encourage convergence of Canadian compensation towards U.S. practices. That is, enhanced integration associated with cross-listing reduces segmentation in the market for executive pay and encourages convergence in compensation structure and levels. At the same time, the increased prominence of variable performance pay might also reflect the growing importance of higher-variance revenues from financial market sources (as opposed to more traditional banking business) for commercial banks, particularly Canadian banks.

The next three charts consider elements of variable performance-based pay, that is, annual cash bonus, restricted stock grants, and stock options. Chart 2 shows

1 As pointed out by some observers, decision makers further down the institutional hierarchy may have compensation arrangements generating incentives that differ somewhat from those of the top executives considered here. At the same time, other things being equal, one might expect that the incentives offered to the most senior executives would influence decision making at lower levels of the organization as well.

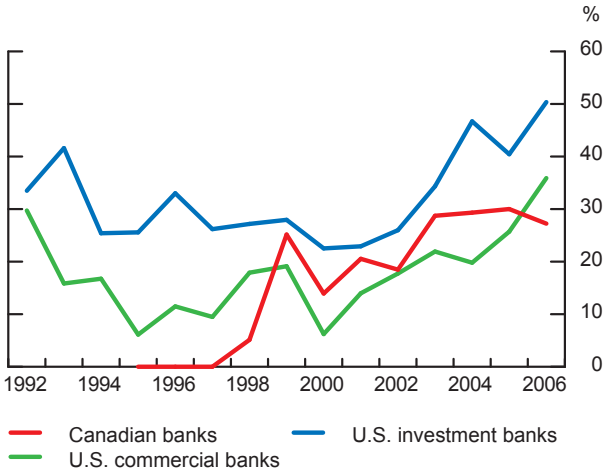
Chart 2: Annual cash bonus as a share of total compensation



that reliance on annual cash bonuses has declined over the sample period at Canadian banks and at U.S. investment banks, but has increased in relative importance at the U.S. commercial banks considered here, especially since 2000. Nevertheless, U.S. investment banks have relied the most on annual cash bonuses to compensate their top executives.

Chart 3 considers reliance on restricted stock grants. Such stock grants are compensation paid in the form of the employing institution's equity, where that equity is vested over a period of generally three (sometimes four) years. That is, certain rights associated with ownership of such stock are suspended for this period, such as the right to liquidate these positions. Chart 3 indicates that all institutions have been making greater use of restricted stock grants as a means of executive compensation over the sample period, particularly since 2000.

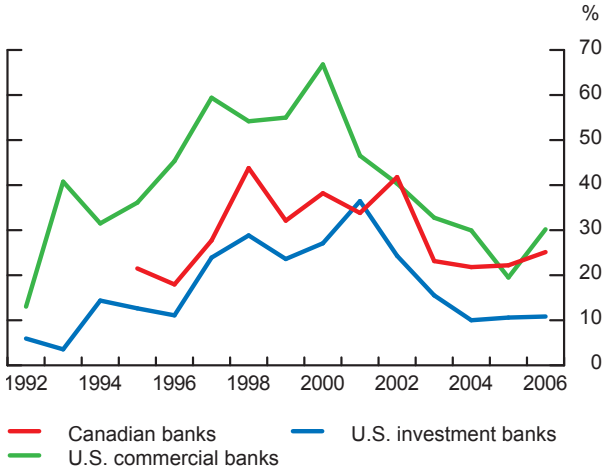
Chart 3: Restricted stock grants as a share of total compensation



Stock options are widely used to compcompensate executives at financial institutions. These plans work similarly at major Canadian banks and at U.S. commercial and investment banks. A key common feature appears to be a vesting period of four years. More specifically, in the first year after receiving options, an executive could exercise, at most, a maximum of 25 per cent of the options. The remaining 75 per cent could be exercised in segments of 25 per cent per year over three years. It is important to note that such stock options appear to have a long duration, for example, 10 years. However, stock options are typically exercised substantially earlier than their maximum duration (e.g., in five to seven years).[2] Another common feature is that when executives depart, they have between 30 and 60 days to exercise their remaining options; otherwise, they are forfeited.

Reliance on stock options is illustrated in Chart 4, which suggests that in the first part of the sample period, there was growing use of stock options to compensate executives at financial institutions, followed by a general decline in their importance since the early 2000s.[3] This pattern reflects broader trends associated with heavy use of stock options as executive compensation in general through the 1990s, which has been associated with some concern

Chart 4: Stock options as a share of total compensation



2 Documents supporting the ExecuComp database (at Standard & Poors' Compustat website) indicate that executives rarely wait until the expiration date to exercise their options. The rule of thumb used in that database is that options are exercised after 70 per cent of the eligible term of the option.

3 The ExecuComp database provides values for the stock options paid to executives of the U.S. institutions in the sample by applying a modified Black-Scholes formula for American-style options. The same methodology was applied to value Canadian stock options paid to Canadian bank executives.

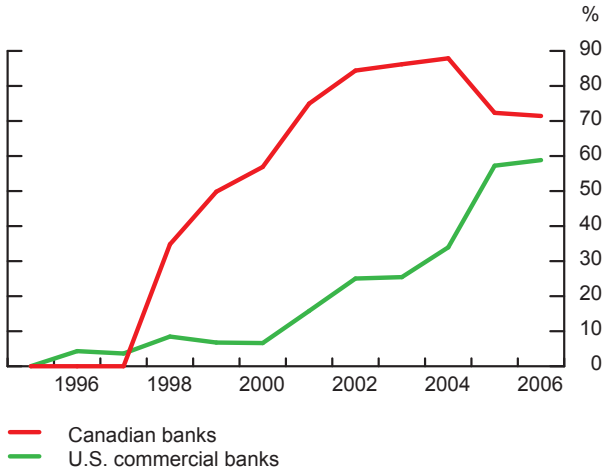
about their adverse effects on risk-taking behaviour, particularly at commercial banks. (See, for example, Chen, Steiner, and Whyte 2006, and Sanders and Hambrick 2007, who consider the case of U.S. banks.)

When considering different forms of variable performance-based compensation, such as those discussed above, the specific aspects of the compensation programs are, of course, important. For example, stock options that are in-the-money when granted would be similar to ordinary equity in terms of upside payout but would reduce compensation in the event of poor performance of the firm. Also, longer vesting periods associated with stock grants and options can improve their risk-mitigating properties. Similarly, where cash bonuses are paid, deferral of payouts (similar to vesting) and clawback features in the event of poor subsequent results can also provide risk-mitigating incentives. In addition, accounting, regulatory, and tax considerations may favour different forms of compensation, and these may vary by jurisdiction and over time.[4]

An important factor to consider when assessing the incentive effects of executive compensation arrangements is the amount of the decision makers' personal wealth that is at risk in the event that the institution makes imprudent decisions.[5] Of course, this is partly the point of providing compensation in the form of equity, such as restricted stock grants, particularly when vesting periods are long (say 5 to 10 years). Minimum share ownership requirements stipulate how much equity of the employing institution an executive must own indefinitely. Such a provision, for example, could require executives to hold equity worth 10 times their base salary indefinitely. Note also that such equity-ownership requirements at Canadian banks extend for a brief period (1 to 2 years) after retirement, providing some incentive to make prudent decisions even if retirement is imminent.

All the commercial banks considered here (except Washington Mutual) require their senior executives to own shares. As well, while the broad features of such programs seem to be similar across the various institutions, the amounts of required share ownership vary. Chart 5 shows the average minimum requirements for share ownership for chief executive officers (CEOs), given stock market valuations, weighted by total compensation, relative to total CEO compensation, for the Canadian and U.S. commercial banks in the sample.[6] These data also include shares owned by executives through compensation in the form of stock grants that must be held indefinitely (as long the CEO is in office). Chart 5 suggests that Canadian banks have required significantly greater stock ownership relative to total compensation on the part of their senior executives than have comparable U.S. commercial banks, although this gap appears to have been closed recently.

Chart 5: Minimum requirements for share ownership as a share of total compensation



Some of the features noted above suggest that compensation arrangements at major Canadian banks have had some relatively attractive attributes with regard to risk-taking behaviour, most notably, relatively large requirements for minimum share ownership. At the same time, the data surveyed have indicated convergence in the characteristics of executive compensation at major Canadian and U.S. banks. It must be stressed, however, that the particular effects on risk-taking behaviour of the various compensation practices discussed here, and the empirical implications of the differences over time or across the groups of institutions, are unclear. As observed above, other factors, such as the specific design of compensation arrangements, as well as the effectiveness of institutional risk management and prudential supervision, are also important features that condition the effects of the incentives created by particular compensation arrangements. These various considerations suggest that any oversight of compensation arrangements should take into account a range of factors, including governance.

Principles for Sound Compensation Practices

As emphasized by Jensen, Murphy, and Wruck (2004), "while executive compensation can be a powerful tool for reducing the agency conflicts between managers and the firm, compensation can also be a substantial source of agency costs if it is not managed properly." The recently published *Principles for Sound Compensation Practices*, formulated by the FSF, aim to provide for effective

4 For example, certain provisions of the U.S. Sarbanes-Oxley Act (2002) appear to have made the use of stock options as a compensation mechanism less attractive in the United States (Chhaochharia and Grinstein 2009).

5 In a prescient paper, Rajan (2005) argues that it is important to provide the right incentives for managers at financial institutions, so that they are not too myopic in their investment strategies and so that they internalize the risks that they take, by putting their personal wealth at stake. In a similar way, historically, in Canada (and elsewhere), bank shareholders were subject to double liability to sharpen incentives to discourage excessive risk taking. (See, for example, Hickson and Turner 2004.)

6 Such data do not appear to be readily available for investment banks.

management of compensation through several channels.[7] These Principles, which are reproduced below, are meant to guide supervisory oversight of compensation practices at financial institutions around the world. Note, however, that some aspects of the Principles may have already been incorporated by financial institutions and supervisors.

Effective governance of compensation

The boards of directors of major financial firms should exercise good stewardship of their firms' compensation practices and ensure that compensation works in harmony with other practices to implement balanced risk postures. The Principles need to become ingrained over time into the culture of the entire organization.

1. The firm's board of directors must actively oversee the compensation system's design and operation.
2. The firm's board of directors must monitor and review the compensation system to ensure the system operates as intended.
3. Staff engaged in financial and risk control must be independent, have appropriate authority, and be compensated in a manner that is independent of the business areas they oversee and commensurate with their key role in the firm.

Effective alignment of compensation with prudent risk taking

An employee's compensation should take account of the risks that the employee takes on behalf of the firm. Compensation should take into consideration prospective risks and risk outcomes that are already realized.

4. Compensation must be adjusted for all types of risk.
5. Compensation outcomes must be symmetric with risk outcomes.
6. Compensation payout schedules must be sensitive to the time horizon of risks.
7. The mix of cash, equity, and other forms of compensation must be consistent with risk alignment.

Effective supervisory oversight and engagement by stakeholders

Firms should demonstrate to the satisfaction of their regulators and other stakeholders that their compensation policies are sound. As with other aspects of risk management and governance, supervisors should take rigorous action when deficiencies are discovered.

8. Supervisory review of compensation practices must be rigorous and sustained, and deficiencies must be addressed promptly with supervisory action.
9. Firms must disclose clear, comprehensive, and timely information about their compensation practices to facilitate constructive engagement by all stakeholders.

The FSF has agreed that implementation of these principles should begin immediately and will be reinforced through supervisory efforts at the national level. National authorities, working through the FSF, will ensure coordination and consistency of approaches across jurisdictions.

7 The FSF brings together senior representatives of central banks, supervisory authorities, treasury and finance departments, international financial institutions, international standard-setting bodies, and committees of central bank experts. Its mandate is to assess vulnerabilities affecting the international financial system, identify and oversee action needed to address these vulnerabilities, and improve coordination and information exchange among the various authorities responsible for financial stability.

References

Chen, C., T. Steiner, and A. M. Whyte. 2006. "Does Stock Option-Based Executive Compensation Induce Risk-Taking? An Analysis of the Banking Industry." *Journal of Banking and Finance* 30 (3): 915–45.

Chhaochharia, V. and Y. Grinstein. 2009. "CEO Compensation and Board Structure." *Journal of Finance* 64 (1): 231–61.

Financial Stability Forum (FSF). 2009. *FSF Principles for Sound Compensation Practices*. Available at <http://www.fsforum.org/publications/r_0904b.pdf>.

Hickson, C. and J. D. Turner. 2004. "Free Banking and the Stability of Early Joint-Stock Banking." *Cambridge Journal of Economics* 28 (6): 903–19.

Jensen, M., K. Murphy, and E. Wruck. 2004. "Remuneration: Where We've Been, How We Got to Here, What Are the Problems, and How to Fix Them." Harvard NOM Working Paper No. 04-28.

Rajan, R. 2005. "Has Financial Development Made the World Riskier?" NBER Working Paper 11728.

Sanders, W. G. and D. Hambrick. 2007. "Swinging for the Fences: The Effects of CEO Stock Options on Company Risk Taking and Performance." *The Academy of Management Journal* 50 (5): 1055–78.

Southam, C. and S. Sapp. 2008. "Comparing CEO Compensation between Neighbours: What Can We Learn from Cross-Listed Firms?" University of Western Ontario, Richard Ivey School of Business Working Paper (January). Available at <http://ssrn.com/abstract=869868>.

Glossary

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>.

Canadian Acronyms

A

AcSB: Canadian Accounting Standards Board

ACSS: Automated Clearing Settlement System
A CPA system through which all payments not processed by the LVTS are handled.

C

CDIC: Canada Deposit Insurance Corporation
A federal Crown corporation created by Parliament that insures specified deposits of Canadians in case their bank or CDIC member institution fails.

CDOR: Canadian Dealer Offered Rate
The average rate for Canadian bankers' acceptances (BA) for specific terms-to-maturity, determined daily from a survey on bid-side rates provided by the principal market-makers, including the major Canadian banks. CDOR provides the basis for a floating reference rate in Canadian-dollar transactions analogous to LIBOR.

CDS: Canadian Depository for Securities Ltd.
Holding company for CDS Clearing and Depository Services Inc., Canada's national securities depository, clearing, and settlements hub

CDSX: Automated clearing and settlement system for securities. Operated by CDS Clearing and Depository Services Inc. and designated under the PCSA as systemically important.

CHT: Canada Housing Trust
Subsidiary of CMHC created to issue CMBs.

CICA: Canadian Institute of Chartered Accountants

CLAF: Canadian Lenders Assurance Facility
Created in October 2008, this temporary program provides insurance on the wholesale term borrowing of federally regulated and some provincially regulated deposit-taking institutions.

CLIAF: Canadian Life Insurers Assurance Facility
Created in January 2009, this temporary program provides insurance on the wholesale term borrowing of federally regulated life insurers.

CMB: Canada Mortgage Bond
CMBs are mortgage-backed securities issued by the Canada Housing Trust, with timely payment of principal and interest fully guaranteed by CMHC on behalf of the Government of Canada.

CMHC: Canada Mortgage and Housing Corporation
Canada's national housing agency: Canada's public provider of mortgage loan insurance, mortgage-backed securities, housing policy, and related programs.

CORRA: Canadian overnight repo rate average
A weighted average of rates on overnight general collateral repo transactions conducted through designated interdealer brokers.

CPA: Canadian Payments Association
Operates systems for the clearing and settlement of payments in Canada, namely ACSS and LVTS.

CSCF: Canadian Secured Credit Facility
A federal government facility unveiled as part of the Economic Action Plan in January 2009, which aims to improve access to financing for businesses and consumers through purchases of securities backed by loans and leases on vehicles and equipment.

D

DBRS: Dominion Bond Rating Service
A privately owned Canadian credit-rating agency

I

IIROC: Investment Industry Regulatory Organization of Canada
National self-regulatory organization that oversees all investment dealers and trading activity on debt and equity markets in Canada.

IMPP: Insured Mortgage Purchase Program
Department of Finance program created in October 2008 to purchase insured residential mortgages from Canadian financial institutions.

L

LVTS: Large Value Transfer System
An electronic system for the transfer of large-value or time-critical payments. Operated by the CPA and designated under the PCSA as systemically important.

N

NHA MBS: National Housing Act Mortgage-Backed Securities
Pools of amortized residential mortgages insured by CMHC under the National Housing Act (NHA), carrying an unconditional guarantee provided by the Government of Canada of timely payment of interest and principal to the investor.

O

OSFI: Office of the Superintendent of Financial Institutions
A federal agency whose mandate is to supervise all federally regulated financial institutions, monitor federally regulated pension plans, and provide actuarial advice to the Government of Canada.

P

PCSA: Payment Clearing and Settlement Act
Act of Parliament giving formal responsibility to the Bank of Canada for the oversight of clearing and settlement systems in Canada that could be operated in a manner that could pose systemic risk.

PRA: purchase and resale agreement
An open market operation in which the Bank of Canada purchases securities from eligible counterparties with an agreement to resell those securities at a specified date in the future, with the price differential representing the implicit interest rate paid by the counterparty.

S

SLF: Standing Liquidity Facility
Bank of Canada facility that provides access to overnight liquidity to direct LVTS participants against a set of eligible collateral instruments.

T

TLF: Term Loan Facility
A temporary Bank of Canada facility introduced in November 2008 that provides term lending to direct LVTS participants against an assignment of their non-mortgage loan portfolios as collateral.

TSX: Toronto Stock Exchange

Other Selected Abbreviations

A

ABCP: asset-backed commercial paper

ABS: asset-backed security

AIRB: Advanced Internal Ratings-Based approach
Under the Basel II framework, this approach allows banks to use internally estimated inputs to calculate their capital requirement in respect of the credit risk represented by a particular asset.

B

BA: bankers' acceptance
A negotiable short-term credit instrument created by a non-financial firm and guaranteed by a bank.

BCBS: Basel Committee on Banking Supervision
A forum for regular international co-operation on supervisory matters, served by a secretariat housed at the BIS.

BIS: Bank for International Settlements
An international organization that fosters international monetary and financial co-operation and serves as a bank for central banks.

C

CAP: Capital Assistance Program of the U.S. Treasury

CAR: capital-adequacy ratio

CDS: credit default swap

CGFS: Committee on the Global Financial System (BIS)
A BIS committee charged with monitoring developments in the global financial system for the central bank governors of the G-10 countries.

CLS: continuous linked settlement
A multi-currency cash settlement system (supporting trades in 17 major currencies), designed to eliminate settlement risk for foreign exchange payment instructions. Designated as systemically important under the PCSA.

CP: commercial paper

D

DB: defined benefit (pension plan)

DSR: debt-service ratio
Payments of interest (and principal) on household debt as a proportion of income.

E

ECB: European Central Bank

EME: emerging-market economy

EURIBOR: Euro Interbank Offered Rate
Benchmark interest rate used to gauge the cost of euro interbank term deposits within the euro zone.

F

FASB: U.S. Financial Accounting Standards Board

FCL: Flexible Credit Line
Crisis-prevention tool operated by the IMF to provide flexible financing to countries with very strong fundamentals, policies, and track records of policy implementation.

FDIC: U.S. Federal Deposit Insurance Corporation

FIRB: Foundation Internal Ratings-Based approach
Under the Basel II framework, this approach allows banks to generate their own estimates of probabilities of default (while all other risk inputs are generated based on Basel formulae) to be used in calculating the capital requirement of a particular asset.

FOMC: U.S. Federal Open Market Committee

FSB: Financial Stability Board
Created in 2009 by re-establishing the FSF with a broadened mandate and expanded membership that includes the G-20, Spain, and the European Commission. The FSB is serviced by a secretariat housed at the BIS.

FSF: Financial Stability Forum
Created by the G-7 in 1999 to promote international financial stability.

FX: foreign exchange

G

G-7: Group of seven industrialized nations (Canada, France, Germany, Italy, Japan, United Kingdom, and United States)

G-10: Group of major economics comprising the G-7 plus Belgium, the Netherlands, Sweden, and Switzerland

G-20: Group of twenty major economies (members are the G-7 plus Argentina, Australia, Brazil, China, India, Indonesia, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, and the current E.U.-presiding country).

GDP: gross domestic product

I

IASB: International Accounting Standards Board

IDR: incremental default risk
A capital charge proposed by the BCBS in 2005 to cover default risk in the trading book, to the extent that it was not included in standard VaR models.

IFRS: International Financial Reporting Standards (set by the IASB)

IMF: International Monetary Fund

IOSCO: International Organization of Securities Commissions

IRC: Incremental Risk Charge
A capital charge proposed by the BCBS in 2009 to cover credit, liquidity, and event risk in the trading book.

L

LGD: loss-given-default
Estimated loss to a creditor in respect of a default on a particular asset, expressed as a proportion of the total exposure of the creditor to that asset.

LIBOR: London Interbank Offered Rate
Daily benchmark interest rate used to gauge the cost for banks to borrow unsecured funds from other banks in various currencies in the wholesale international money market.

M

MRA: Market Risk Amendment
An amendment to the Basel I capital accord adopted in 1996 that established capital requirements for market risk in the trading book.

O

OIS: overnight index swap
Short-term interest rate swap where the reference interest rate is tied to an overnight interest rate (the CORRA in Canada). OIS is often used as a gauge of market expectations for future policy interest rates.

P

PD: probability of default
Estimated probability that a debtor will default on their obligations over a given time horizon.

PPIP: Public Private Investment Program of the U.S. Treasury

S

S&P: Standard & Poor's

T

TALF: Term asset-backed securities loan facility of the U.S. Federal Reserve

TMPG: U.S. Treasury Market Practices Group

TRWA: total risk-weighted assets
Total of all assets held by a financial institution, weighted for credit, market, and operational risk.

TSLF: Term securities lending facility of the U.S. Federal Reserve

V

VaR: value at risk
A statistical estimate of the maximum probable loss over a given time horizon with a given level of confidence. Used extensively by banks to measure risk arising from trading activities.

VIX: Measure of implied volatility obtained from option contracts on the S&P 500 Index.