



BANK OF CANADA
BANQUE DU CANADA

FINANCIAL SYSTEM REVIEW

June 2015

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For further information, contact:

Public Information
Communications Department
Bank of Canada
234 Laurier Avenue West
Ottawa, Ontario K1A 0G9

Telephone: 613 782-8111;
1 800 303-1282 (toll-free in North America)
Email: info@bankofcanada.ca; Website: bankofcanada.ca

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June 2015

The Assessment of Vulnerabilities and Risks section is a product of the Governing Council of the Bank of Canada: Stephen S. Poloz, Carolyn A. Wilkins, Timothy Lane, Agathe Côté, Lawrence Schembri and Lynn Patterson.

This report includes data received up to 4 June 2015.

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Preface

A stable and efficient financial system is essential for sustained economic growth and rising living standards. The ability of households and firms to channel savings into productive investments, allocate the associated risks, and transfer financial assets with confidence is one of the fundamental building blocks of our economy. Financial stability is defined as the resilience of the financial system in the face of adverse shocks that enables the continued smooth functioning of the financial intermediation process.

As part of its commitment to promote 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 the various liquidity and lender-of-last-resort facilities; overseeing key domestic clearing and settlement systems; conducting and publishing analyses and research; and collaborating with various domestic and international policy-making bodies to develop and implement policy. The Bank's contribution complements the efforts of other federal and provincial agencies, each of which brings unique expertise to this challenging area in the context of its own mandate.

The *Financial System Review* (FSR) is one avenue through which the Bank of Canada seeks to contribute to the longer-term resilience of the Canadian financial system. It brings together the Bank's ongoing work in monitoring vulnerabilities in the system¹ 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 the FSR, therefore, is an assessment of the downside risks rather than the most likely future path for the financial system. The context for this assessment is our baseline view of the evolution of the global and domestic economies, as well as the two-sided risk to the inflation outlook presented in the Bank of Canada's *Monetary Policy Report*. Economic and financial stability are interrelated, so the risks to both must be considered in an integrated fashion.

The FSR also summarizes recent work by Bank of Canada staff on specific financial sector policies and on facets 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.

¹ The report "Assessing Vulnerabilities in the Canadian Financial System," in this FSR, provides further details about this process.

Overview

The *Financial System Review* (FSR) summarizes the judgment of the Bank of Canada's Governing Council on the main vulnerabilities and risks to the stability of the Canadian financial system. The review begins with an examination of overall macrofinancial conditions to provide context for the domestic vulnerabilities and the assessment of the financial system risks for Canada.

Global economic growth is expected to strengthen over the course of 2015 and in 2016, owing to accommodative monetary policy, low oil prices and the gradual decline of the adverse impacts of deleveraging and financial repair. Divergence in growth prospects across regions will remain a key feature of the world economy, with the pickup in growth led by the United States.

As the global recovery progresses, monetary policy will start to normalize in advanced economies, and financial market volatility should begin to reflect two-sided interest rate risk, where interest rates could rise or fall depending on how economies evolve. A future rise in policy rates in certain advanced economies could lead to some financial and economic turbulence, including in some emerging-market economies (EMEs). In China, there is concern about the possibility of a sharp slowdown in economic growth amid falling property prices and slower growth in investment spending. In Canada, the economic impact from low oil prices remains uncertain.

Low oil prices also have important implications for the Canadian financial system. While the sharp drop in the price of oil by itself is unlikely to trigger significant systemic stress, low oil prices have increased the vulnerability of the system to a large, adverse shock to employment and incomes.

Ongoing reforms continue to strengthen the resilience of the global and Canadian financial systems. In addition to the continued implementation of agreed reforms, the G-20 priorities for 2015 include finalizing the design of the remaining reforms pertaining to (i) the capital, liquidity and leverage framework for banks; (ii) the initiatives to make over-the-counter (OTC) derivatives markets safer; and (iii) the measures to help end "too big to fail." Work aimed at strengthening the oversight and regulation of the shadow banking sector also continues. Several important interim objectives were achieved over the first half of 2015 at both the international and domestic levels.

Despite a more resilient global financial system, the Bank continues to monitor vulnerabilities and risks in the Canadian financial system. The Bank is highlighting three key financial system vulnerabilities in Canada.

1. Elevated level of household indebtedness

- The vulnerability associated with household indebtedness remains important and is edging higher, owing to an increase in the level of household debt and the ongoing negative impact on incomes from the sharp decline in oil prices. In addition, the quality of household debt may be decreasing at the margin, although the regulatory and policy environment continues to ensure that the overall quality of Canadian household debt remains high.

2. Imbalances in the housing market

- Regional divergences in resale activity and house price growth have become more evident, with an apparent trifurcation of the national market. Although house price growth on a national basis has slowed modestly, it continues to outpace income growth, and overvaluation in the Canadian housing market remains a concern.

3. Illiquidity and investor risk taking in financial markets

- Low global government bond yields continue to provide incentives for risk taking in financial markets, both globally and in Canada. At the same time, market liquidity in fixed-income markets has become less reliable. Asset price changes induced by a sudden adjustment of investor positions could be exacerbated by a lack of market liquidity, leading to increased volatility and price distortions across several Canadian financial markets.

One or several vulnerabilities could interact with a trigger event, which could then cause a risk to materialize. The assessment of each risk reflects a judgment about the probability that the risk will occur and the expected impact on Canada's financial system and economy if it does.

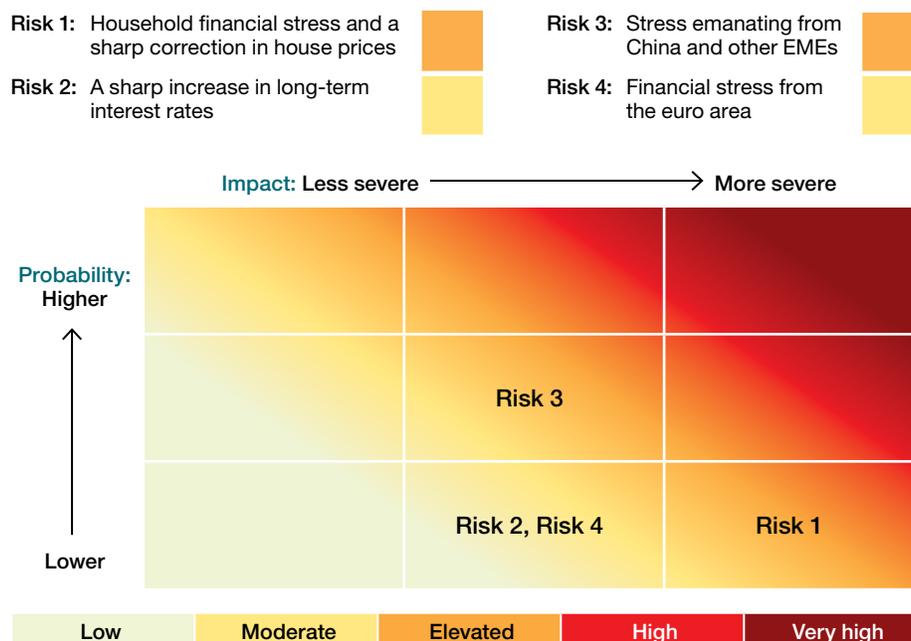
The four key risks to the Canadian financial system are similar to those identified in the December 2014 FSR.

1. The most important domestic financial system risk continues to be a broad-based decline in Canadian employment and incomes that significantly reduces the ability of households to service their debt, leading to a widespread correction in house prices.
 - Although this risk has increased marginally, due to a rise in the vulnerability associated with high household indebtedness, its overall rating remains "elevated," as in the December FSR.
 - The probability of this risk materializing is low, but if it were to materialize, the impact on the economy and the financial system would be severe.
 - Although the low price of oil has increased the vulnerability of the Canadian financial system to future adverse shocks, it is unlikely, on its own, to trigger significant financial system stress.
2. The possibility of sharply higher long-term interest rates globally and in Canada is another key risk. Market overreactions to surprise changes in monetary policy in the United States or Europe could result in a rapid rise in global risk premiums, with possible spillovers to domestic financing costs and asset prices.
 - The risk continues to be rated as "moderate," with a low probability and a moderately severe impact on the Canadian financial system if the risk were to materialize.

- Accommodative monetary policy by certain central banks is likely to provide some offset to an increase in global risk premiums, should they occur.
3. The transmission of economic and financial stress to the Canadian financial system from China and other EMEs through trade, commodity and financial channels is another risk.
 - The rating for this risk is “elevated”: the probability of the risk occurring is medium, and the effects on Canada would be moderately severe if such a risk materialized.
 - In China, the positive impact of financial reforms has been offset by falling property prices. In some EMEs, a stronger U.S. dollar, combined with low prices for oil and other commodities, continues to pose challenges.
 4. There is also a risk that financial stress in the euro area leads to global financial market volatility, a widespread repricing of risk and a flight to liquidity that would adversely affect Canadian financial markets.
 - The probability of this risk materializing has declined since December, leading to a downward revision of the overall risk assessment to “moderate.”
 - The positive effects of the European Central Bank’s (ECB’s) asset purchase program, a weaker euro and lower oil prices have reduced the risk of a sharp economic slowdown and sustained deflation in the euro area.
 - A default by Greece has become more likely than it was before, but it is less likely to result in severe euro-area financial stress.

A summary of the key risks to the Canadian financial system and their current rankings are presented in **Table 1**.

Table 1: Key risks to the stability of the Canadian financial system



Assessment of Vulnerabilities and Risks

This section of the *Financial System Review* (FSR) outlines the Governing Council's evaluation of the key vulnerabilities and risks to the Canadian financial system. After a brief survey of macrofinancial conditions, vulnerabilities in the Canadian financial system that could amplify and propagate shocks are identified and assessed. The principal risks to the Canadian financial system that may arise in the context of those vulnerabilities are then examined.

The objective of the FSR is not to predict the most likely outcomes for the financial system but to raise early awareness of key vulnerabilities, potential triggers and key risks, and to promote actions that reduce the likelihood of these risks materializing or the impact if they do occur. By its very nature, the FSR focuses on downside risks, which are usually low-probability events that tend to have the potential for a significant negative impact on the financial system and the economy if they occur. The focus on these downside risks should not be interpreted as a deterioration in the balance of risks around the economic outlook presented in the Bank's *Monetary Policy Report*.

Macrofinancial Conditions

Growth is picking up in some advanced economies

Accommodative monetary policy and low oil prices continue to support global economic activity. Strong labour market conditions and diminishing headwinds from deleveraging and fiscal policy suggest that U.S. economic growth is likely to strengthen, despite a weaker-than-expected start to the year. In the euro area, both economic growth and inflation expectations have improved modestly, and the risks around the outlook for the region have become more balanced. In contrast, the pace of economic activity has continued to slow in China and commodity-exporting EMEs.

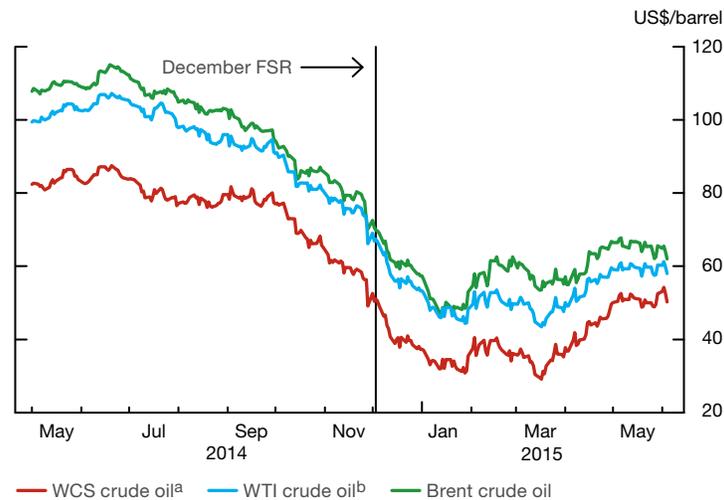
In Canada, the drop in oil prices and weaker-than-expected U.S. growth led to a contraction in economic activity in the first quarter. Nonetheless, the Canadian economy is still expected to rebound in the coming quarters because of the anticipated strengthening of the U.S. economy and supportive financial conditions.

Commodity prices remain well below levels of a year ago

Although oil prices have risen from recent lows, they remain well below levels seen one year ago, predominantly because of strong growth in global supply (Chart 1). Similarly, non-energy commodity prices continue to trend downward, owing to both commodity-specific supply-side factors and slowing demand growth, particularly from China.

Chart 1: Oil prices have risen from recent lows, following a sharp decline

Daily spot prices



a. WCS refers to Western Canada Select.

b. WTI refers to West Texas Intermediate.

Source: Bank of Canada

Last observation: 4 June 2015

Additional monetary policy easing measures have been implemented

In response to weak economic activity and disinflationary pressures, a number of central banks, including the Bank of Canada, have lowered their policy rate or introduced additional unconventional easing measures since the beginning of 2015. For global bond markets, the most influential of these was the announcement and implementation of larger-than-expected easing measures by the ECB, which led to sizable rallies in euro-area bonds and equities and a rapid depreciation of the euro.² These steps, as well as others in Sweden and Switzerland, have resulted in negative interest rates in several European countries (Box 1). In contrast, the Federal Reserve is expected to increase the federal funds rate this year.³

Long-term bond yields have recently risen

After declining in early 2015 in the wake of lower oil prices and the announcement of widespread additional monetary policy measures, global yields on long-term government bonds have risen and are now roughly unchanged from the time of the last FSR (Chart 2). Despite the increase, global bond yields remain highly supportive of economic activity.

² The asset purchase program was announced in January and implemented in March. It is conditionally scheduled to continue until September 2016.

³ J. L. Yellen, "The Outlook for the Economy" (speech to Providence Chamber of Commerce, Providence, Rhode Island, 22 May 2015).

Box 1

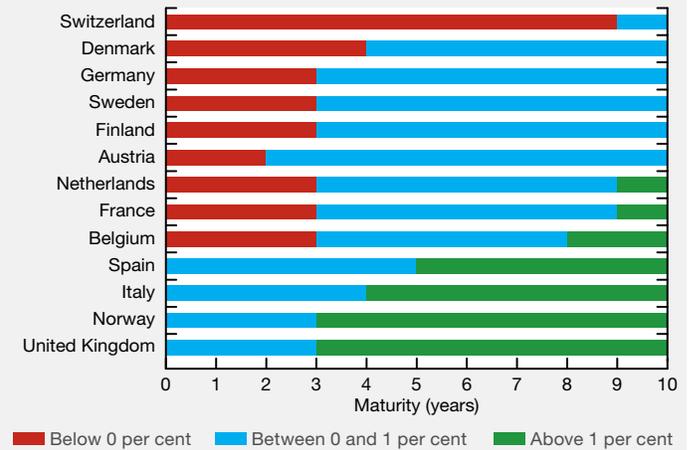
The Financial System Implications of Negative Interest Rates

Several European central banks have lowered their deposit rates to below zero in response to persistent economic slack and low inflation: the European Central Bank (ECB) and Sweden’s Riksbank have done so to achieve their inflation targets, while other European central banks have acted to defend their exchange rate pegs. For example, the Swiss National Bank initially supported the ceiling on the Swiss franc against the euro by introducing negative deposit rates.¹ Yields to maturity subsequently turned negative for European money market instruments as well as for longer-maturity bonds issued by several European sovereigns (Chart 1-A).

Negative nominal yields may appear surprising, since firms and households could hold cash to avoid negative returns. Holding cash, however, entails storage, insurance and other costs, so depositors will continue to deposit their cash at banks as long as the rates they are charged do not exceed these holding costs. Deposit rates have therefore turned negative for some large European businesses and institutional depositors—whose holding costs are large—but not for small depositors—whose holding costs are small—even in Switzerland and Denmark, where rates are the most negative. This indicates that it is possible to observe rates below zero as long as cash-holding costs are above a certain level.

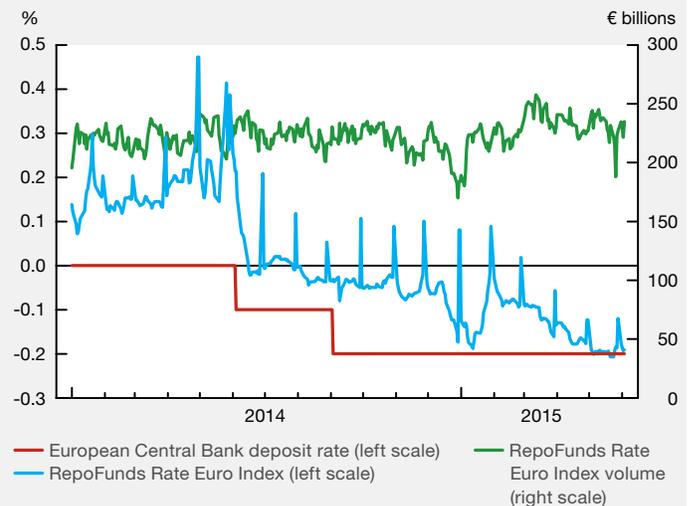
The transmission of negative policy rates to money and bond markets in Europe has not had a material adverse impact on market functioning. Trading volumes have remained stable, while benchmark rates such as the RepoFunds Rate and EONIA (the European Overnight Index Average) have turned negative (Chart 1-B). Nevertheless, crossing the boundary marked by a zero interest rate creates distinct challenges, given the institutional, regulatory and accounting features of markets and contracts. For example, issuing bonds with a negative yield appears inconsistent with setting the issuing price at par value—a common convention—because these bonds would have to offer negative coupons. Collecting coupon payments from investors is probably too costly to be implemented and is unlikely to be accepted by investors. Instead, bonds can be issued at negative market yields if their price is above par. For example, current 1- and 2-year German bunds bear no coupons, but they are sold at a premium above par, implying negative yields to maturity. Similar adjustments may be needed in other markets, including modifications to pricing models for interest rate derivatives and to floating rate notes. For example, European investors are now seeking contractual guarantees that they are not liable to borrowers when floating rates become negative.

Chart 1-A: Yields are negative in many European sovereign bond markets



Source: Bloomberg Last observation: 4 June 2015

Chart 1-B: Volumes in core funding markets have not declined with negative interest rates



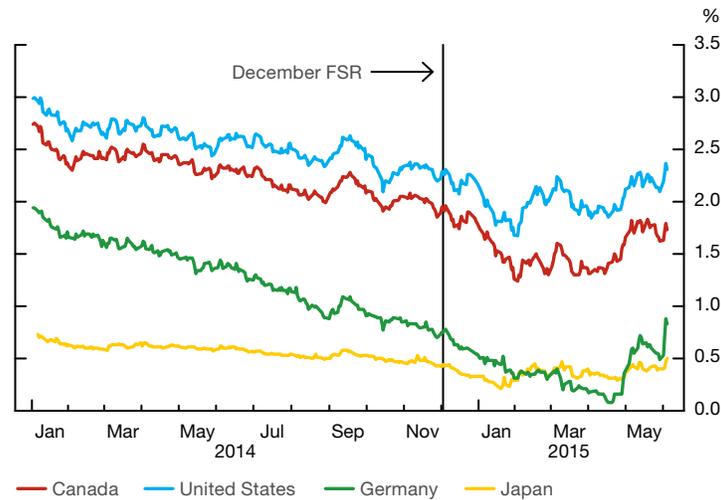
Source: Bloomberg Last observation: 4 June 2015

In the long run, technical advances may reduce cash-storage costs, raising the effective lower bound on interest rates. Negative interest rates may also bring about alterations in market structure, such as changes in contracts and accounting conventions. Such adjustments are likely to incur substantial fixed costs, which would be worth bearing only if negative interest rates are expected to persist. Authorities should carefully monitor developments associated with negative interest rates because they may introduce new and unintended vulnerabilities into the financial system.

¹ The Swiss National Bank eventually dropped the peg against the euro on 15 January 2015.

Chart 2: Since declining in early 2015, yields on long-term government bonds have returned to December levels

Yields to maturity on 10-year sovereign bonds



Source: Reuters

Last observation: 4 June 2015

The increases were led by 10-year German bund yields, which rose to 84 basis points from near zero in April, reversing the decline seen earlier in the year. The reversal was likely due, in part, to stronger-than-expected growth and inflation data in the euro area. Technical factors, such as the unwinding of crowded trading positions associated with the ECB's asset purchase program and some episodes of illiquidity, also played an important role.⁴ The increase in long-term yields in the euro area spilled over internationally, including to U.S. and Canadian markets, almost entirely erasing the decline in 10-year Government of Canada bond yields seen earlier in the year.

Compared with the summer of 2014, financial market volatility is higher, reflecting, in part, uneven growth prospects and the anticipated re-emergence of related two-way interest rate risk in some countries. Short-lived spikes in implied volatility have also been observed in various asset markets (Chart 3). For example, the recent bout of volatility in German bund markets affected government bonds globally, but with limited spillover to other asset classes outside of Europe.

Global equity indexes are higher, particularly in China, Japan and Europe. There have also been large exchange rate movements, reflecting differences in expected monetary policy and lower oil prices. In this environment, the U.S. dollar has generally appreciated against most major currencies since the last FSR (Chart 4).

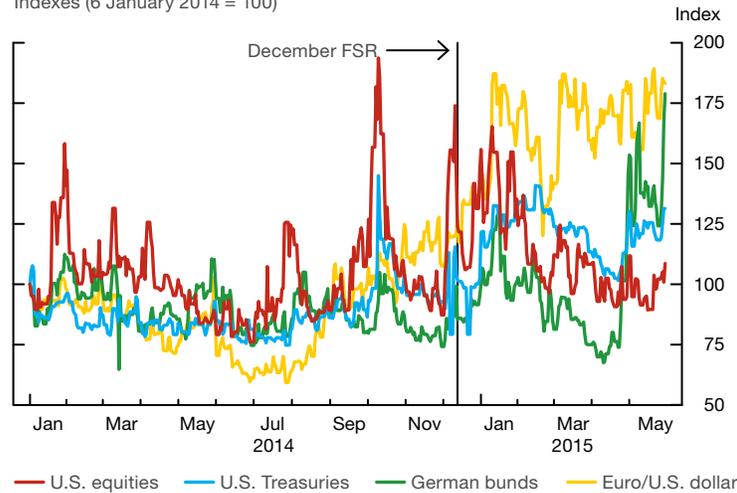
Financing conditions for Canadian businesses and households remain highly stimulative

The Bank of Canada reduced its policy rate in January to offset the impact of lower oil prices on real economic activity and to help bring inflation back to its 2 per cent target on a sustainable basis. Despite the recent reversal in global bond yields, financial conditions for Canadian households and firms remain highly stimulative.

⁴ Office of Financial Research, "The Sell-Off in Long-Term Bonds" (May 2015).

Chart 3: Some asset markets have seen an increase in implied volatility

Indexes (6 January 2014 = 100)



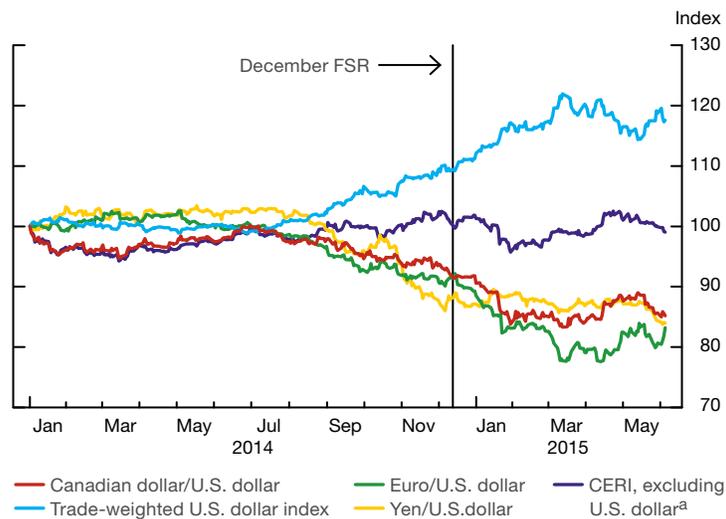
Note: Measures include VIX (U.S. equities), MOVE (U.S. Treasuries), 1-month at-the-money implied volatility of options on Euro-Bund futures (German bunds) and 1-month at-the-money implied volatility of options on the Euro/U.S. dollar.

Sources: Bloomberg and Bank of Canada calculations

Last observation: 4 June 2015

Chart 4: Despite recent volatility, the U.S. dollar continues to appreciate

Indexes (6 January 2014 = 100)



a. The Canadian-dollar effective exchange rate index (CERI) is a weighted average of bilateral exchange rates for the Canadian dollar against the currencies of Canada's major trading partners. A rise indicates an appreciation of the Canadian dollar.

Sources: Bank of Canada, U.S. Federal Reserve, European Central Bank and Bank of Japan

Last observation: 4 June 2015

Business borrowing rates remain below levels seen at the time of the December FSR, in spite of their recent uptick. Corporate bond yields also remain at low levels, accompanied by strong issuance. Both the *Senior Loan Officer Survey* and the *Business Outlook Survey* indicate an easing of credit conditions, with some tightening for commodity-related firms. Average consumer borrowing rates, including the average mortgage rate on new lending, have fallen by about 20 basis points since the end of December and have not reflected the more recent rise in yields on 5-year Government of Canada bonds.

The balance sheets of Canadian banks remain in good health

Major Canadian banks reported strong earnings in the quarter ending April 2015, despite the impact of low oil prices on economic activity and more volatile interest rates. Banks maintained higher-than-required regulatory capital and leverage ratios. The average common equity tier one (CET1) capital ratio for domestic systemically important banks (D-SIBs), weighted by assets, was 10.2 per cent, and the average Basel III leverage ratio stood at 3.9 per cent.⁵

Key Vulnerabilities in the Canadian Financial System

The Bank continues to highlight three key areas of vulnerability:

- the elevated level of household indebtedness,
- imbalances in the housing market, and
- illiquidity and investor risk taking in financial markets.

Vulnerability 1: Elevated Level of Household Indebtedness

The vulnerability associated with household indebtedness remains important and is edging higher, owing to an increase in the level of household debt and the ongoing negative effect on incomes of the sharp decline in oil prices. In addition, riskier forms of household borrowing are increasing at the margin, which warrants further monitoring. However, the first line of defence for managing this vulnerability lies with the borrower and the lender. Overall, the regulatory and policy environment continues to ensure that the quality of Canadian household debt remains high. As the economy stabilizes and interest rates begin to normalize, the most likely scenario is a gradual decline in this vulnerability.

Canadian household leverage remains high

The ratio of debt to disposable income is slightly higher, as expected, because the growth of household debt has been stronger than income growth, owing to the large drop in oil prices (Chart 5). At the same time, the share of household disposable income allocated to required payments on mortgage debt has been relatively stable since 2008 and delinquency rates for household loans remain low. The growth in aggregate measures of household assets has continued to outpace liabilities, pushing the aggregate level of household net worth to a historically high level.⁶ However, because of the importance of housing to the wealth of many Canadians, especially the middle class, their net worth remains vulnerable to a decline in house prices.

Since the end of 2014, the rate of growth of household credit has remained close to 5 per cent (Chart 6). Lower borrowing rates have supported the growth of mortgage credit, while consumer credit growth has slowed.

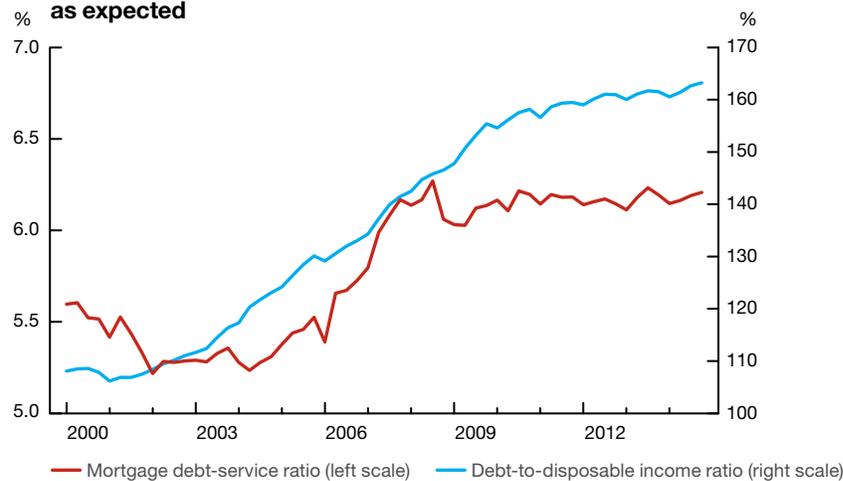
Households in oil-producing regions are among the most vulnerable to income shocks

The distribution of household debt across different regions in Canada provides additional context, particularly in light of the sharp drop in oil prices. Indebted Alberta households have relatively low levels of liquid financial assets, carry more debt and have a higher debt-service ratio than indebted

⁵ D-SIBs are required to maintain a minimum CET1 ratio of 8 per cent and a minimum leverage ratio of 3 per cent.

⁶ Aggregate household net worth increased by 7.5 per cent on a year-over-year basis in the last quarter of 2014 to reach a historical high of \$8.3 trillion.

Chart 5: The ratio of household debt to disposable income is slightly higher, as expected

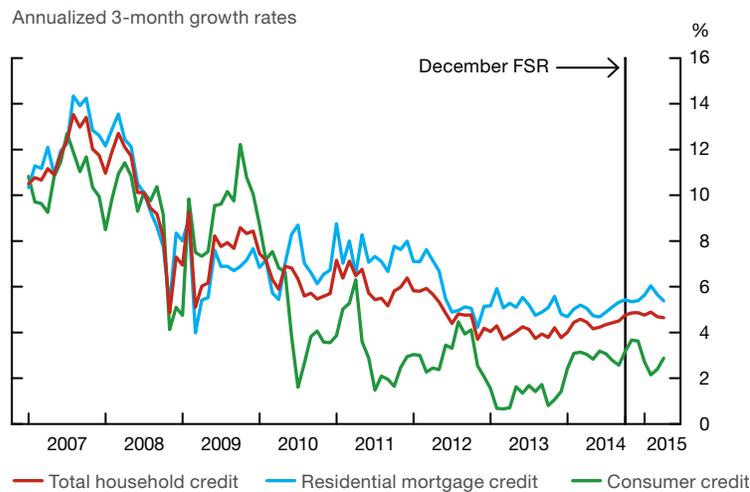


Note: The mortgage debt-service ratio is mortgage interest plus an estimate of the required principal repayment relative to income.

Sources: Statistics Canada and Bank of Canada calculations

Last observation: 2014Q4

Chart 6: The growth of household credit has been relatively stable



Source: Bank of Canada

Last observation: April 2015

households in other areas of the country (Table 2).⁷ Moreover, the proportion of highly indebted households in Alberta—those with a ratio of debt to gross income above 250 per cent—is among the highest in the country. In addition, unlike other provinces in Canada, a sizable proportion of mortgages in Alberta (and Saskatchewan) permit no recourse against individual borrowers in the event of default.⁸ With a slowing regional economy and a relatively

⁷ The debt-to-income ratios in Table 2 are calculated on the basis of gross, rather than disposable, incomes. The source of the data is the Canadian Financial Monitor (CFM) survey of households. Typically, the data from this survey understate the average debt of Canadian households, so the debt-to-income ratios tend to be lower than those produced by Statistics Canada. However, the CFM database allows an investigation of the distribution of household debt and its evolution, which cannot be done with aggregate data.

⁸ Creditors holding non-recourse mortgage loans are prevented from seizing other assets or incomes from borrowers in the event of a default if the proceeds from the sale of the house are not sufficient to pay off the loan and associated legal costs. Generally, mortgages to individuals that have a low loan-to-value ratio in Alberta and all mortgages in Saskatchewan are non-recourse loans while, in the rest of Canada, all mortgages are full-recourse loans. In Alberta, for example, about 35 per cent of mortgage loans held by federally regulated lenders are uninsured and non-recourse.

Table 2: Characteristics of indebted households, by province

	Ratio of debt to gross income (%)	Average income per household	Average debt per household	Households with ratio of debt to gross income > 250 (%)	Households with DSR ^a ≥ 40 (%)	Households with financial assets ^b < 1 month of debt payments (%)
British Columbia	138.1	\$82,442	\$113,846	23.0	6.3	8.8
Alberta	148.3	\$103,265	\$153,170	23.0	6.6	12.6
Saskatchewan and Manitoba	100.5	\$82,686	\$83,080	14.0	5.2	9.6
Ontario	127.6	\$85,607	\$109,225	19.1	5.1	10.8
Quebec	101.3	\$72,082	\$73,035	11.3	3.9	9.0
Atlantic provinces	105.1	\$69,129	\$72,628	10.0	4.2	16.3

a. The debt-service ratio (DSR) is measured as the ratio of a household's yearly debt payments (principal and interest) to that household's gross income.

b. Financial assets include chequing and savings accounts (tax-free savings accounts included), guaranteed investment certificates and other guaranteed investments, stocks, bonds, income trusts, and mutual funds and other investment funds. It excludes group pensions.

Source: Ipsos Reid, 2014 Canadian Financial Monitor

high proportion of their income at risk (e.g., through job losses and reductions in bonuses and overtime), some Alberta households could become financially strained.⁹ Automatic stabilizers, such as employment insurance, will help to reduce the negative effects on household incomes.

Some households are becoming more vulnerable to rising interest rates

The proportion of new mortgages being advanced at variable rates has increased over the past several years and has reached about 32 per cent (Chart 7). More than one-quarter of the outstanding stock of mortgages are at variable rates.

Low interest rates may lead some borrowers to take on additional, or larger, loans, although more disciplined borrowers might instead pay down their debt at a faster pace. However, an increase in interest rates¹⁰ could cause households with variable-rate mortgages to have higher-than-anticipated costs to service their debt.¹¹ This would be problematic for households with less discretionary income and fewer liquid financial assets. Most new borrowers with variable-rate mortgages must still satisfy debt-service criteria as though their mortgage payments were based on a higher qualifying rate, which provides some assurance that they have the financial capacity to accommodate higher interest rates.¹²

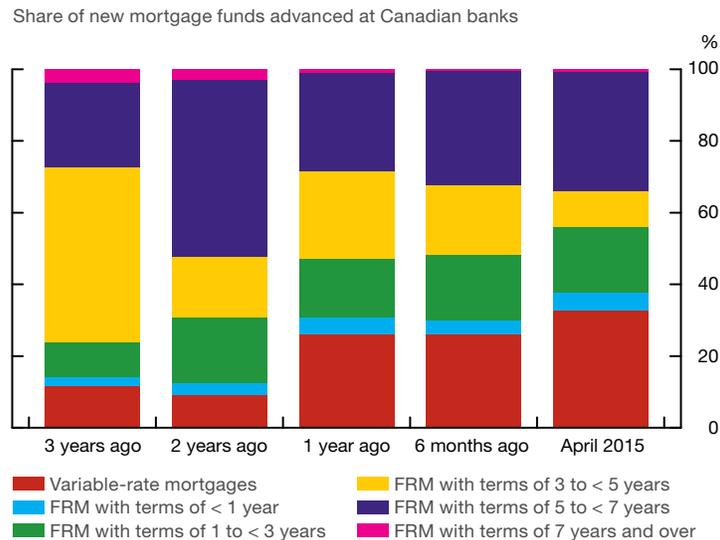
⁹ A significant increase in the number of defaults on non-recourse mortgages would result in greater financial losses to lenders, and more downward pressure on house prices, than in provinces with full-recourse mortgages. However, because homeowners with non-recourse, low-ratio mortgages have made a down payment of at least 20 per cent of the purchase price, house prices would need to fall by at least that much and not be expected to recover before borrowers with negative equity would even consider a strategic default on an outstanding mortgage. In addition, the negative impact of a loan default on a borrower's credit rating, as well as the loss of a home and investment, would be important considerations.

¹⁰ The prospect of a lower, neutral real interest rate may limit the potential rise in interest rates relative to historical norms. See C. Wilkins, "Monetary Policy and the Underwhelming Recovery" (speech to the CFA Society Toronto, Toronto, Ontario, 22 September 2014).

¹¹ Some variable-rate mortgages are structured to maintain the same regular payment amount throughout the mortgage term by adjusting the relative proportions of the interest payment and the principal repayment when there is a change in interest rates. If interest rates increase to a level where the monthly fixed payment is not enough to cover the interest costs, it may be possible to renegotiate the loan, although this could result in a financial penalty.

¹² Regulations for insured mortgages, as well as guidelines from the Office of the Superintendent of Financial Institutions for federally regulated financial institutions that issue uninsured mortgages, set out a qualifying rate for all variable-rate mortgages and for mortgages with terms of less than five years: the greater of the contractual interest rate of the mortgage or the 5-year fixed interest rate published on the Bank of Canada's website.

Chart 7: The share of new lending from Canadian banks that is at variable rates has increased



Note: New mortgage funds advanced include new mortgages, refinancing and renewals. FRM refers to fixed-rate mortgages.

Source: Regulatory filings of Canadian banks

Last observation: April 2015

Riskier forms of borrowing are increasing at the margin

Strong competition and low interest rates may be providing incentives for some lenders to engage in riskier lending activities, both in terms of loan characteristics and in the selection of borrowers. The most notable examples are mortgage lending to borrowers with lower credit quality and auto lending. Although they represent a very small segment of the mortgage market, some non-prime borrowers with weaker documentation of income or low credit scores who do not qualify for mortgage insurance are able to obtain an uninsured mortgage by making a larger down payment.¹³ (Box 2 discusses this and related issues in more detail.) In addition, the strong growth in auto lending has been accompanied by a tendency toward riskier loan characteristics and non-prime borrowers. About 70 per cent of the auto loans originated in the past year had terms of 72 months or longer,¹⁴ and loans to non-prime borrowers have been increasing at a faster pace than auto loans to prime borrowers.¹⁵ Auto loans remain a small part of household debt and the loan exposures of banks, but they are an emerging concern that may be another symptom of excessive borrowing being facilitated by some lenders.

¹³ Non-prime borrowers are generally characterized as having less capacity to make debt payments, weaker documentation of income and an imperfect credit history, which might include a series of missed payments that would contribute to a low credit score. There is a continuum of risk for non-prime loans, ranging from Alt-A and near-prime to the highest risk subprime segment. On the basis of available data, we consider mortgage borrowers with a credit score below 650 to be non-prime. However, the majority of uninsured residential mortgages have been issued to “prime” borrowers of higher credit quality who were not required to purchase mortgage insurance simply because they had sufficient funds to make a down payment of at least 20 per cent of the property value.

¹⁴ A longer amortization period enables consumers to purchase more expensive vehicles by stretching out the repayment schedule with a payment size that is similar to that of a lease. Longer terms also increase the likelihood that the outstanding balance of an auto loan is greater than the value of the vehicle, because vehicles depreciate relatively quickly, especially over the first few years of use. A negative equity position reduces a lender’s recovery rate of a loan in case of default.

¹⁵ On the basis of Equifax data, we consider auto loan borrowers with a credit score below 670 to be non-prime. About 25 per cent of all new auto loans issued in the past few years were to non-prime borrowers, and about 10 per cent of all outstanding consumer (non-mortgage) debt might be in the non-prime, low credit score category. Delinquency rates for instalment loans (the majority of which are auto loans) by non-deposit-taking institutions have been increasing over the past several years, but decreasing for those auto loans extended by deposit-taking institutions.

Box 2

Recent Developments in Mortgage Financing

Three important trends have emerged in the Canadian residential mortgage market over the past several years: (i) the growth of mortgage credit has continued to slow (from roughly 7 per cent to 5 per cent); (ii) uninsured mortgage lending has grown faster than insured mortgage lending (10 per cent versus 1 per cent, based on lending by federally regulated financial institutions (FRFIs));¹ and (iii) less-regulated entities such as mortgage finance companies (MFCs) and mortgage investment corporations (MICs) continue to increase their presence in the residential mortgage market. MFCs, in particular, have seen steady growth in the share of outstanding mortgage credit that they underwrite and service (from 10.5 to 12 per cent).

A number of policy changes have contributed to these trends.² First, guidelines for residential mortgage underwriting and criteria for mortgage insurance have been tightened, so that some borrowers face reduced access to mortgage financing and, in particular, may no longer qualify for mortgage insurance. Second, mortgage insurance premiums have increased. Third, the Canada Mortgage and Housing Corporation (CMHC) has adjusted the amount of new guarantees for National Housing Act Mortgage-Backed Securities (NHA MBS) and Canada Mortgage Bonds as well as the allocation methodology for NHA MBS, thereby supporting the issuance of insured residential mortgages by smaller lenders, including MFCs and small FRFIs.

Growth in uninsured residential mortgages

Faster growth in uninsured mortgages has occurred across all lenders over the past few years. Among FRFIs, the growth has been more pronounced at smaller banks and trust companies.³

Some new mortgages are uninsured, in part because existing homeowners may have benefited from an increase in house prices and may be able to finance a subsequent home purchase with a down payment larger than 20 per cent. However, part of the growing demand for uninsured mortgages involves the borrowers directly affected by the changes to mortgage insurance rules, including non-prime borrowers with limited income documentation or lower credit scores.

For example, based on lower credit scores, about one-third of new uninsured mortgages issued by small FRFIs over the past few years could be considered non-prime, although their share of the residential mortgage market overall is only 3 per cent. Other small lenders, including some credit unions, also lend to borrowers who may not qualify for insured mortgages.⁴ Within the non-prime category, a few small FRFIs are offering co-lending mortgage products that enable their customers to obtain uninsured mortgages with down payments of less than 20 per cent. Co-lending arrangements include a first mortgage from an FRFI, with a loan-to-value ratio of up to 80 per cent, and a second mortgage from a non-FRFI, such as an MIC, for an additional 5 to 10 per cent.⁵ From a broader perspective, non-prime uninsured mortgages are still a small portion of the mortgage market and, for FRFIs, the additional risk associated with these activities is addressed through higher capital requirements.

Increasing role of less-regulated lenders

Less-regulated lenders, including MFCs, are important participants in the residential mortgage market (Chart 2-A). Over the past several years, the servicing (and underwriting) of mortgages by MFCs, in particular, has been growing at a faster pace than the mortgage market itself (Chart 2-B). MFCs typically underwrite and service insured mortgages sourced from brokers. Because they tend to sell a large proportion of their mortgage loans to FRFIs and CMHC securitization programs, MFCs must abide by residential mortgage underwriting guidelines for FRFIs, even though they are not directly regulated by the Office of the Superintendent of Financial Institutions.⁶ They rely on a small number of funding sources that could be less stable than deposits—sales of mortgages and syndicated lines of credit from banks.⁷ Limited available data suggest that MFCs are highly lever-

(continued...)

1 Over the past five years, the share of uninsured residential mortgages in new lending by FRFIs has increased from about 60 per cent to about 70 per cent.

2 The policy framework for residential mortgage lending, including mortgage insurance, is described in A. Crawford, C. Meh and J. Zhou, "The Residential Mortgage Market in Canada: A Primer," Bank of Canada *Financial System Review* (December 2013): 53–63. Available at <http://www.bankofcanada.ca/wp-content/uploads/2013/12/fsr-december13-crawford.pdf>.

3 Since the end of 2012, uninsured mortgage lending by smaller FRFIs has grown by about 15 per cent per year, on average, compared with about 10 per cent by domestic systemically important banks. See Chart 8 in the December 2014 *Financial System Review*.

4 See Box 2 in the June 2014 *Financial System Review* for a broader discussion of smaller financial entities and their links to property market financing.

5 To comply with the Bank Act, FRFIs will only provide a first-priority mortgage for up to 80 per cent of the property value. The Office of the Superintendent of Financial Institutions (OSFI) also sets out guidelines for FRFIs related to the source of down payments and their effects on the debt-servicing capacity of the borrower. Market analysis of these products can be found on various websites related to mortgage brokers.

6 MFC-originated mortgages purchased by FRFIs must conform to OSFI Guideline B-20, and MFCs are motivated to follow the principles set out for mortgage insurers in OSFI Guideline B-21 so that mortgages can qualify for CMHC securitization programs. Banks that purchase mortgages from MFCs also typically demand a right of return, if it is determined that there has been negligent underwriting by the MFC. As such, MFC underwriting practices are largely in line with those of FRFIs, although they are not subject to the prudential requirements imposed on FRFIs.

7 Box 2 in the December 2013 FSR and Box 2 in the June 2014 FSR discuss less-stable funding sources and the associated vulnerabilities in relation to smaller financial entities, including smaller FRFIs and MFCs.

Box 2 (continued)

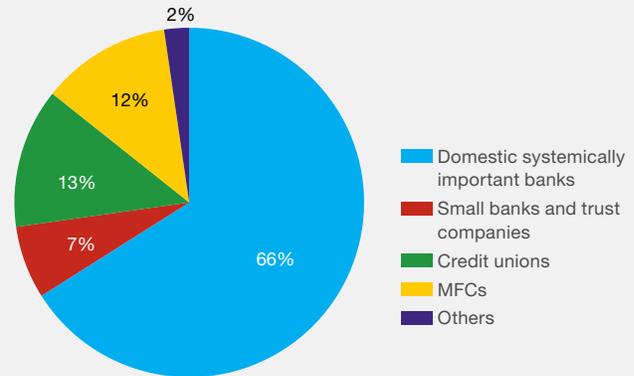
aged, leaving them less able to manage liquidity and maintain income following an increase in mortgage defaults (although mortgage insurance limits the eventual losses).

Potential implications for financial stability

Tighter requirements for mortgage insurance promote financial stability because they slow the growth of lower-quality mortgage debt. Although some non-prime borrowers obtain mortgages, they are required to qualify for an uninsured mortgage with a larger down payment, which also serves to contain financial system vulnerabilities. Uninsured mortgages are a concern only to the extent that down payments do not represent the homeowners' equity or that the credit risks are inappropriately underwritten and priced. In this context, lenders that cater to non-prime borrowers have strong incentives to take into account borrowers' underlying riskiness.⁸ However, co-lending arrangements warrant continued monitoring, particularly if they become a much larger part of the mortgage market, since they may reduce the effectiveness of financial system safeguards, such as limits on loan-to-value ratios and other requirements related to mortgage insurance.

The participation of MFCs and MICs in the residential mortgage market increases competition, but more transparency and analysis are needed to better understand their business models.

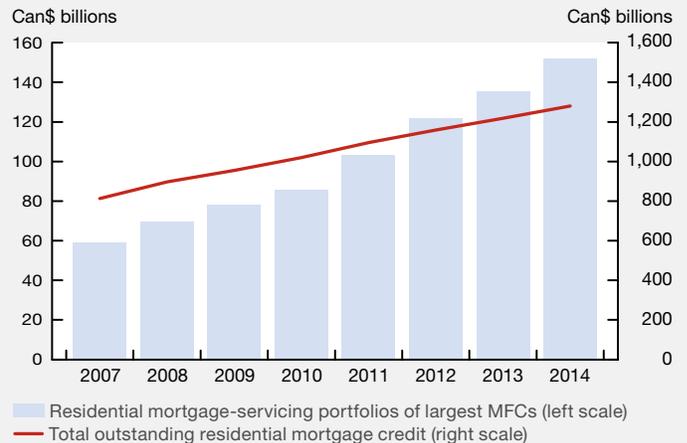
Chart 2-A: The estimated share of residential mortgages underwritten by mortgage finance companies is around 12 per cent



Source: Bank of Canada

Last observation: 2014Q2

Chart 2-B: Mortgage finance companies have continued to expand their servicing of residential mortgages



Sources: Bank of Canada, rating agencies reports, company websites and press releases

Last observation: December 2014

⁸ These incentives are reinforced by OSFI's monitoring and OSFI Guideline B-20, which sets out expectations regarding risk appetite with respect to mortgage lending, as well as the associated oversight, internal controls and monitoring.

Vulnerability 2: Imbalances in the Housing Market

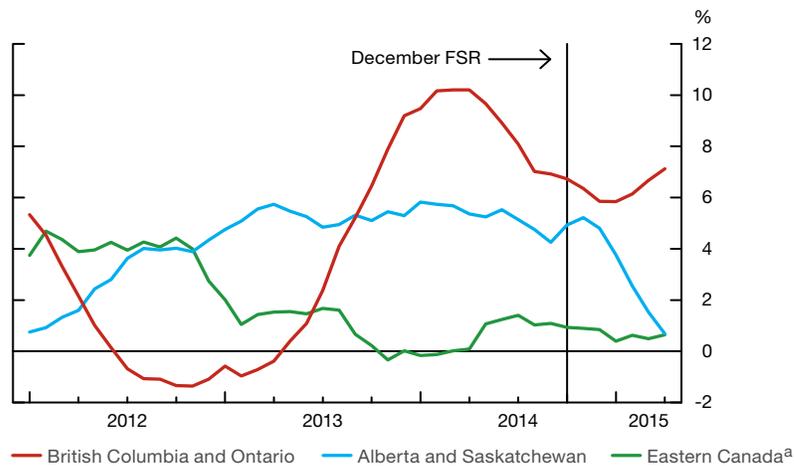
Regional divergences in housing resale activity and house price growth have become more evident, with an apparent trifurcation of the national market. Although house price growth on a national basis has slowed modestly, it continues to outpace income growth, and overvaluation in the Canadian housing market remains a concern. As the economy gains strength and interest rates begin to normalize, the most likely scenario is that house prices stabilize at a level consistent with the underlying fundamentals.

Regional property markets are experiencing diverging trends

Housing market dynamics in various regions have become more diverse (Chart 8 and Chart 9). Resale activity and price growth in British Columbia and Ontario are the strongest, while in Eastern Canada (Quebec and the

Chart 8: The growth rates of house prices in Canada have diverged across regions

6-month moving average of year-over-year growth in seasonally adjusted average prices

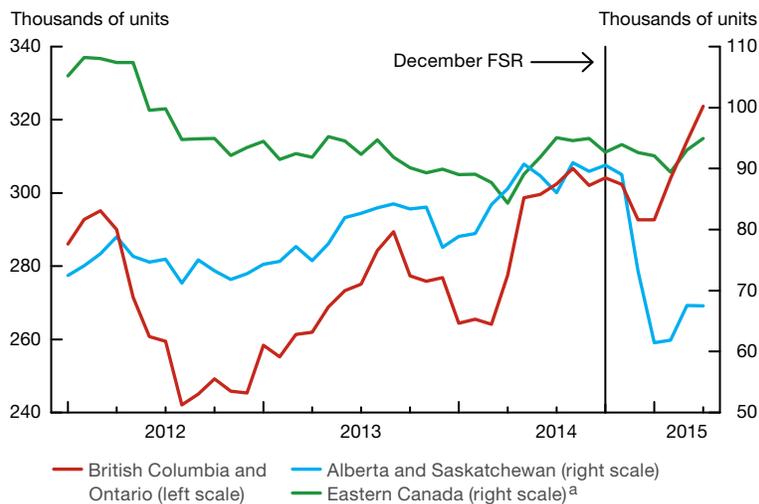


a. Eastern Canada consists of all real estate markets in Quebec, Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland and Labrador.

Sources: Canadian Real Estate Association and Bank of Canada calculations Last observation: April 2015

Chart 9: Resales in Alberta and Saskatchewan have declined sharply since the end of 2014

Resales, seasonally adjusted at annual rates



a. Eastern Canada consists of all real estate markets in Quebec, Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland and Labrador.

Source: Canadian Real Estate Association

Last observation: April 2015

Atlantic provinces), housing markets have been moderating for well over a year. At the same time, a sharp drop in the price of oil has led to a notable slowing in the housing markets of the western oil-producing provinces.

In British Columbia and Ontario, sales of existing homes relative to their 10-year average, as well as their price growth, have remained strong. Price growth in Vancouver is in the 5 to 6 per cent range on a year-over-year basis. As well, price growth is particularly high in the Toronto-Hamilton area, at more than 7 per cent on a year-over-year basis. The strength has been

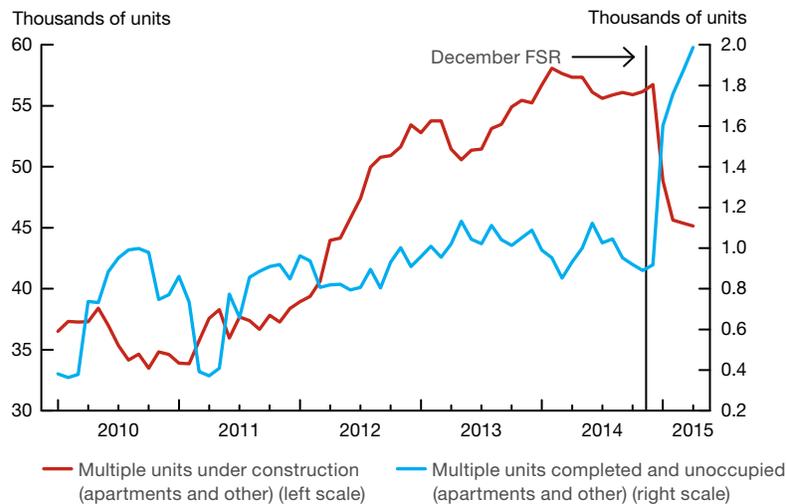
concentrated in single-family homes, whereas price growth in multiple-unit dwellings has been more modest, reflecting relatively more abundant supply. This divergence in price dynamics between singles and multiples is likely to continue, because inventories of high rises have recently increased with the completion of a significant number of Toronto condominium projects initiated in 2012 (Chart 10). Supply growth has moderated, however, as shown by the decline in units under construction in the city.

In Eastern Canada, resale activity since 2012 has broadly remained below its 10-year average, while standing inventories of unoccupied homes in some cities continue to increase. House price growth in Eastern Canada has been weak for some time and more recently has fallen below the growth of disposable income.

The most significant change in regional housing markets has been in the western oil-producing provinces. Housing markets in Alberta and Saskatchewan have slowed notably, reflecting the weaker pace of economic activity resulting from the decline in the prices of oil and other commodities. Resale activity in Alberta and Saskatchewan since the December FSR has fallen by around 25 per cent and 10 per cent, respectively. Year-over-year growth in house prices has decelerated sharply in Alberta following the significant drop in oil prices, while the slowdown in house price growth in Saskatchewan began in mid-2013.

Nationwide, commercial real estate valuations remain high across major urban centres, although the Calgary market for office space is beginning to show signs of softness alongside increases in vacancy rates. Upward pressure on vacancy rates is also expected in the Vancouver office market as a number of new buildings reach completion in 2015. Commercial property values in the retail sector in Canada have been relatively stable, despite the number of store closures over the past several months.

Chart 10: Standing inventories in the Toronto high-rise market have been increasing



Source: Canada Mortgage and Housing Corporation

Last observation: April 2015

Overvaluation in the Canadian housing market remains a concern

On a national basis, yearly house price growth has slowed somewhat since the December FSR, from about 5 per cent to about 4.5 per cent more recently. Despite the slowdown, house price growth continues to outpace income growth. Thus, concerns remain about potential overvaluation in the Canadian housing market.

As highlighted in the December 2014 FSR, there is no single, broadly accepted methodology for estimating the overvaluation of housing markets. Estimates for Canada are wide-ranging, with most of the point estimates in the 10 to 20 per cent range. The Bank's models continue to estimate that overvaluation in national house prices (as of the last quarter of 2014) ranges from 10 to 30 per cent. Some of the overvaluation could be explained by supply-side factors, as well as demand from foreign residents and new immigrants.¹⁶ Accounting for all of these factors would reduce the estimates of housing overvaluation in Canada. Despite these uncertainties, the national housing market likely remains somewhat overvalued.

Overall, high house prices in Canada are mainly the result of ongoing strength in consumer demand spurred on by historically low interest rates. As the economy gains strength and interest rates begin to normalize, the most likely scenario is one in which house prices stabilize in line with economic fundamentals.

Vulnerability 3: Illiquidity and Investor Risk Taking in Financial Markets

Low government bond yields continue to provide incentives for risk taking in financial markets, both globally and in Canada. At the same time, market liquidity in fixed-income markets has become less reliable. While highly leveraged positions are not evident in domestic markets, asset price changes resulting from a sudden adjustment of investor positions could be exacerbated by a lack of market liquidity, leading to increased volatility and price distortions across several Canadian financial markets.

Liquidity in fixed-income markets has become less reliable

Market liquidity has become less consistent in Canadian fixed-income markets, in both the government and corporate sectors, and could deteriorate rapidly during a financial stress event. While volatility may be gradually returning to more normal levels as a result of fundamental factors, a deterioration in market liquidity could amplify volatility if a large number of investors tried to unwind their positions in the same manner at the same time. This could lead to large investor losses and reduce investor confidence.

Certain trends observed in Canadian fixed-income markets are likely reducing market liquidity. First, the investor base in these markets has shifted. In particular, investment funds such as exchange-traded funds and mutual funds are now more important participants in the Canadian

¹⁶ A recent study shows that countries such as Canada, with high urban concentrations, are often associated with higher real estate prices. The study defines urban concentration as the average population per large city (cities with a population of over 3 million) expressed as a percentage of the country's total population. At 13.8 per cent, Canada is eighth in the country rankings. For further details, see "Debt and (Not Much) Deleveraging," McKinsey Global Institute (February 2015).

corporate bond market.¹⁷ In normal times, these funds hold sufficient cash buffers to cover investor redemptions. However, large redemptions may force funds to sell their assets, and the lack of market liquidity could intensify price movements. Bank of Canada analysis suggests that Canadian open-end mutual funds hold adequate amounts of cash buffers, which, coupled with low leverage, pose a limited risk of large sell-offs.¹⁸

Similarly, foreign investors now hold a larger share of the Canadian federal government bond market. As such, a domestic shock could be the catalyst for a rapid sell-off of these bonds. If a sell-off were accompanied by a decline in market liquidity, it could cause discontinuous price movements. However, many of the investors are foreign central banks and sovereign wealth funds, which tend to be patient, buy-and-hold investors aiming to diversify their portfolios. Their holdings therefore tend to be more stable.

Second, market-making activity is evolving, owing to regulations and other changes in market structure, such as the growth in electronic trading in bond markets. Internationally and in Canada, the Basel III requirements compel institutions to hold more high-quality liquid assets.¹⁹ While these requirements should make banks more resilient to liquidity stress, they have reduced the willingness of banks to commit capital to make markets in fixed-income instruments.

Incentives for risk taking by investors remain

Continued growth and increasing valuations in a variety of asset classes in Canada, such as the corporate bond and equity markets, suggest an ongoing search for higher returns by both domestic and foreign investors. Investors are taking on greater credit and liquidity risks to achieve higher returns. Canadian BBB-rated corporate spreads are close to their historical average since 2004 and are relatively unchanged, whereas the spreads on high-yield bonds have declined since early 2015 (**Chart 11**). Corporate issuance has been robust, with the value of outstanding non-financial corporate bonds rising from Can\$118 billion at the end of 2008 to Can\$220 billion at the end of 2014. Strong issuance has also been observed in the high-yield sector, especially in U.S. dollars (**Chart 12**).

Equity valuations in Canada have risen since the December FSR. The forward price-to-earnings ratio on the TSX Composite Index has pushed above historical averages and is close to all-time highs (**Chart 13**). Foreign investors continue to demand Canadian corporate bonds and equities, which is likely contributing to higher valuations in these markets (**Chart 14**).

A buildup of higher-risk positions, especially if accompanied by leverage, could lead to systemic stress if there were a sharp drop in asset prices. While there is limited evidence of highly leveraged investors, reduced levels of market liquidity, particularly in fixed-income markets, could cause difficulties in unwinding large positions and could amplify price changes, resulting in an increase in volatility and sizable losses for investors.

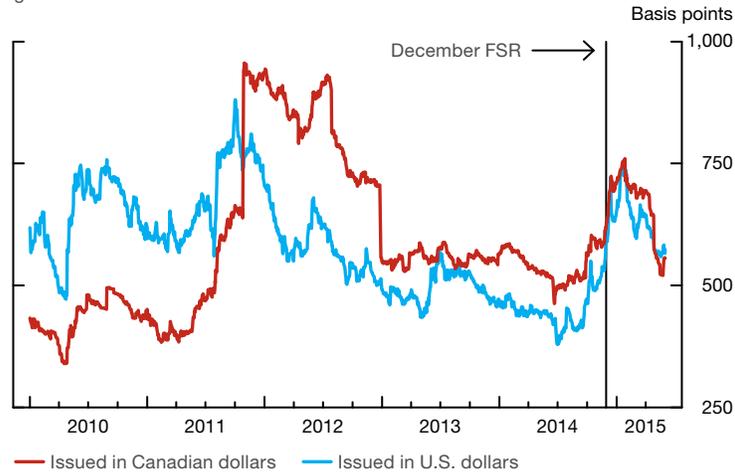
¹⁷ For example, mutual fund holdings of non-government bonds have increased from 7 per cent of outstanding bonds at the end of 2004 to 11 per cent at the end of 2014.

¹⁸ For more details, see S. Ramirez, J. Sierra Jimenez and J. Witmer, “Canadian Open-End Mutual Funds: An Assessment of Potential Vulnerabilities,” in this report.

¹⁹ For more information, see OSFI’s Liquidity Adequacy Requirements Guideline at http://www.osfi-bsif.gc.ca/eng/fi-if/rg-ro/gdn-ort/gl-ld/pages/lar_let.aspx

Chart 11: Spreads on Canadian high-yield corporate bonds have declined since early 2015

Option-adjusted spreads between high-yield bonds issued by Canadian firms and government bonds

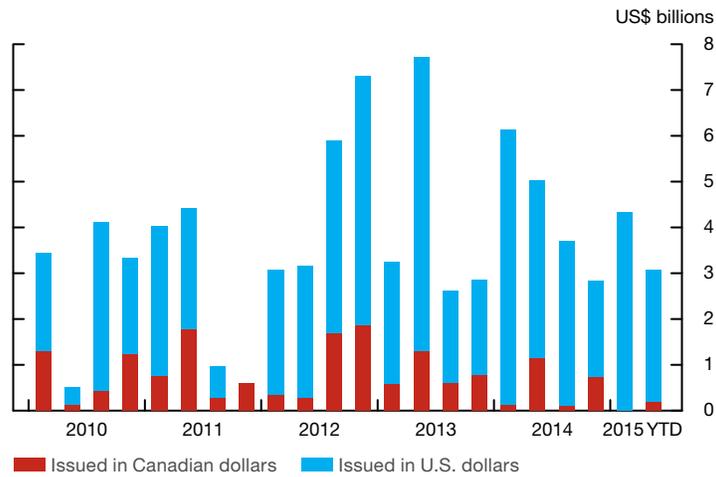


Note: The shifts in the level of the Canadian-dollar series, near end-2011 and near end-2012, are due to the inclusion and subsequent exclusion of bonds issued by Yellow Media Inc.

Source: Bank of America Merrill Lynch

Last observation: 4 June 2015

Chart 12: High-yield bond issuance by Canadian non-financial firms has remained strong



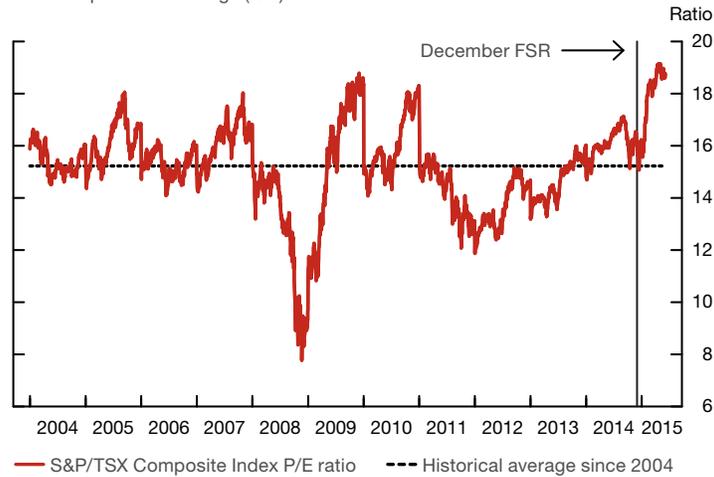
Note: \$9.5 billion of issuance in U.S. dollars by Valeant Pharmaceuticals International Inc. has been excluded from the amount for 2015Q1.

Source: Dealogic

Last observation: 4 June 2015

Chart 13: Equity valuations have pushed higher

Forward price-to-earnings (P/E) ratio



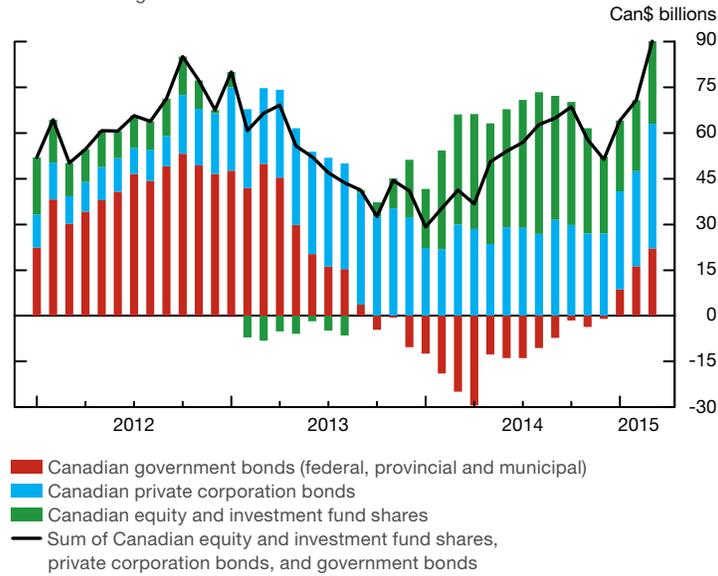
Note: The forward price-to-earnings ratio is computed as the ratio of the price over the 1-year forward estimate of earnings.

Source: Bloomberg

Last observation: 4 June 2015

Chart 14: Foreign investors continue to show strong demand for Canadian assets

12-month foreign flows into Canadian securities



Source: Statistics Canada

Last observation: March 2015

Key Risks

This section discusses the risks that the Governing Council judges to be the most important for assessing the stability of the Canadian financial system. The discussion of each risk includes an overall risk rating based on judgment regarding the probability of the risk materializing and the expected severity of the impact on the Canadian financial system if it did materialize.

Risk 1: Household Financial Stress and a Sharp Correction in House Prices

The most important domestic financial system risk continues to be a broad-based decline in Canadian incomes that significantly reduces the ability of households to service their debt, leading to a widespread correction in house prices. The most likely trigger is a large, persistent negative demand shock that leads to a severe recession and a sharp rise in unemployment nationwide. The risk could also be triggered by a combination of shocks that may include a sharp rise in global long-term interest rates (**Risk 2**).

Although the assessment of this risk has marginally increased because of the effects of the oil price shock, the rating for the risk remains “elevated,” as in the December FSR. The probability of this risk materializing is low, but the impact on the economy and the financial system would be severe if it were to materialize.

The probability of this risk occurring remains low

The Bank continues to expect a constructive evolution of imbalances in the household and housing sectors as the economy improves and interest rates begin to normalize. Nonetheless, household debt and housing vulnerabilities are elevated and have the potential to amplify a large and widespread decline in employment and incomes.

Despite a weak start to 2015, U.S. real GDP growth is projected to strengthen, led by private domestic demand. The U.S. recovery is expected to support the pickup in Canadian GDP growth and contribute to an increase in the share of aggregate demand consisting of non-energy exports and investment spending.

The sharp drop in oil prices since last June by itself is unlikely to trigger a systemic risk to the Canadian financial system because of the nature of the shock. Given that the oil price shock is predominantly supply-driven, the negative impact from low oil prices on aggregate income—while large—will be concentrated in the oil-producing regions. The negative effect is mitigated by the boost to discretionary income resulting from reduced spending on gasoline, stronger U.S. growth, a weaker Canadian dollar and stimulative monetary conditions (**Box 3**).

The impact on financial entities, financial markets and the economy could be severe

Lower oil prices have delayed the improvement to incomes and economic growth and have increased the financial vulnerability of some households. In the event of a deeper and more widespread shock to incomes, highly indebted households with limited liquid financial assets could have difficulty servicing their debt. Distressed homeowners could be forced to sell their homes or default on their mortgages and other consumer debt. Lenders with growing portfolios of foreclosed properties would add to the supply of homes for sale, putting downward pressure on house prices. In light of stretched

Box 3

An Assessment of the Financial System Risks Associated with Low Oil Prices

Bank researchers have analyzed the key transmission channels through which low oil prices could affect the Canadian financial system. Although low oil prices would adversely affect firms and households directly involved in the energy industry as well as some financial institutions, the nature of the shock and the diversity of the Canadian economy and financial system suggest that persistently low oil prices are unlikely to pose a systemic risk to the Canadian financial system.

The financial sector can be affected by low oil prices through both direct exposures to oil and related industries and indirect loan exposures to households and other businesses in the affected regions.

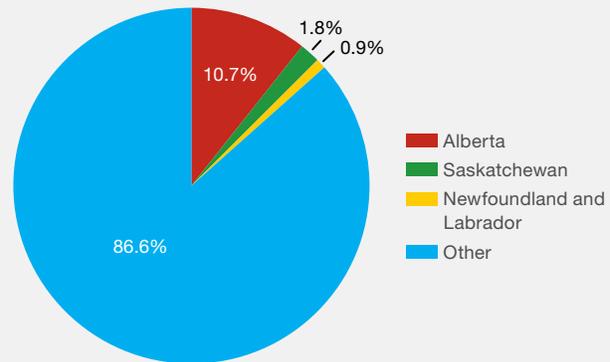
The direct loan exposures of Canadian domestic systemically important banks (D-SIBs) to the oil sector worldwide are relatively small, representing approximately 2 per cent of their total loans. Furthermore, the exposures of D-SIBs to oil and gas derivatives are actively hedged and are also relatively small.

Since energy represents about 20 per cent of the market capitalization of the Toronto Stock Exchange, some investors have incurred losses following the drop in the price of energy stocks. This effect has not been systemic, however, because there is no evidence that Canadian institutional investors are either overly exposed to the energy sector or that these exposures have been significantly leveraged.

Indirect exposures of Canadian D-SIBs to households and businesses are more substantial, however, with lending in the oil-producing provinces by Canadian D-SIBs representing approximately 13 per cent of their total loans (Chart 3-A).¹ As discussed in Vulnerability 2, lower oil prices have already led to a slowdown in provincial housing markets.² In addition, high household debt, reduced household incomes and a significant share of households with relatively few liquid financial assets in Alberta suggest that there is some potential for an increase in the rates of consumer loan and mortgage delinquencies in the oil-producing provinces (Table 2 in the main text).³

Chart 3-A: The loan exposures of Canadian domestic systemically important banks to potentially vulnerable provinces are material

Percentage of total loans at D-SIBs



Sources: Regulatory filings of Canadian banks and Bank of Canada calculations

Last observation: 2015Q1

Defaults on uninsured non-recourse mortgages are another possible source of losses for lenders. Mortgage insurers could also be exposed to potential losses on insured mortgages.⁴

The exposure of Canadian D-SIBs to commercial lending in the oil-producing provinces is about 3 per cent of their total loans. Within this category, lending related to commercial real estate could be particularly vulnerable to the oil price decline. In fact, in previous oil price cycles, lender losses on commercial real estate exposures have been larger than those related to residential real estate.

Overall, Canadian D-SIBs account for the largest share of lending in these provinces, but they are well capitalized and well diversified in terms of exposures and revenue sources and are thus resilient to regional losses.⁵ In contrast, regionally focused lenders are less diversified and more heavily exposed to regional real estate and commercial loans. Nonetheless, widespread lender distress across these provinces, similar to that experienced in the 1980s, is unlikely because of substantial improvements since then in regulatory and supervisory regimes and risk-management practices at financial institutions. Prudentially regulated lenders now hold much more capital and liquidity, reducing the likelihood and potential severity of widespread lender distress.

¹ These exposures include some for oil and gas. Since the sectoral composition of commercial loan exposures is not available on a provincial basis, it is not possible to exclude oil and gas exposures from these numbers. As a result, there is some double counting in our calculations of the estimated direct and indirect commercial exposures to the oil sector.

² Historical experience suggests that regional house price cycles, in terms of both the factors that cause the expansion as well as the correction, have typically not spilled over into other regions; consider, for example, the British Columbia housing market during the Asian crisis of the late 1990s.

³ In particular, the value of auto loans has been growing at a faster pace in Alberta than in other provinces, with more than one-third of new auto loans extended to non-prime borrowers.

⁴ Approximately 20 per cent of the mortgage insurance provided through the Canada Mortgage and Housing Corporation (CMHC) and more than 27 per cent of the insurance provided through Genworth Canada cover mortgages in these provinces, with a total exposure of over \$200 billion. See the CMHC's Mortgage Loan Insurance Business Supplement (31 March 2015) and Genworth Canada's 2014 annual report (31 December 2014).

⁵ D-SIBs represent about three-quarters of total loans in the oil-producing provinces, with small banks, credit unions and other lenders accounting for the remaining quarter.

house price valuations, large price corrections could ensue across Canada.²⁰ The resulting fire sale in housing could deplete the balance sheets of distressed households and lead to significant losses for financial institutions and mortgage insurers.

Financial markets would also be affected. Sharp declines in the prices of equity and corporate debt, as well as tighter bank lending conditions, would be expected, especially in the construction, real estate, financial and household sectors. Increasingly concerned foreign investors could also demand higher risk premiums for holding Canadian-dollar assets, adding to the rise in funding costs in all segments of the economy.

It is important to note, however, that the stress tests of the Canadian banking system in Canada's 2013 Financial Sector Assessment Program (FSAP) demonstrated that the Canadian D-SIBs are resilient: even though they would experience a decline in their capital position in a very severe stress scenario, they would maintain a solid ability to generate capital internally.²¹ Similarly, the FSAP stress test for large life insurers and the CMHC showed that the capital position of these institutions would deteriorate but would remain well above regulatory requirements.

Risk 2: A Sharp Increase in Long-Term Interest Rates

The second key financial system risk is sharply higher long-term interest rates, globally and in Canada. Stronger U.S. or European economic growth would lead to higher policy rates and a sustainable rise in long-term interest rates. However, financial stability concerns would arise if a spike in risk premiums resulted in a sharp increase in long-term interest rates. A variety of triggers could lead to such a rapid rise in global risk premiums; for example, market overreactions to surprise changes in monetary policy in the United States or Europe. Since movements in Canadian risk premiums tend to be correlated with changes in global risk premiums, the shock would immediately transmit to Canada, resulting in higher interest rates domestically.

This risk continues to be rated as “moderate.” Its probability is low, but the impact on the Canadian financial system would be moderately severe if the risk were to materialize.

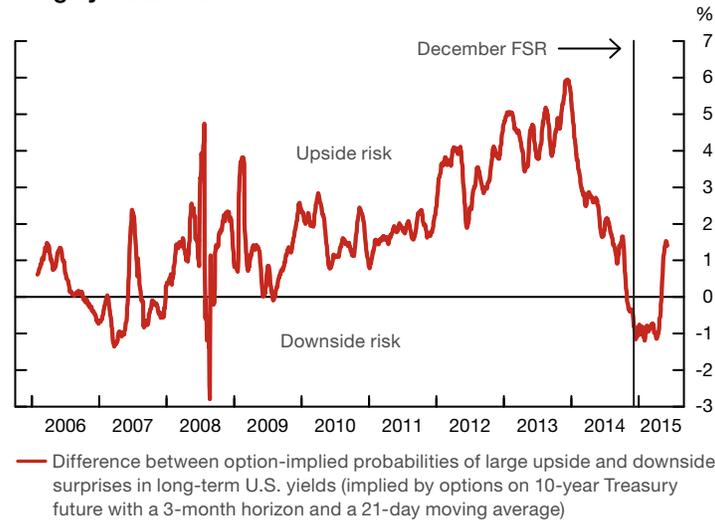
The probability of a sharp increase in global long-term interest rates continues to be low

Accommodative monetary policy by certain central banks is likely to provide some offset to an increase in global risk premiums, should they occur.

Risk measures derived from options prices on 10-year U.S. Treasury futures indicate that markets perceive the chance of a sharp upside movement as marginally higher than the chance of a sharp downside movement in long-term U.S. yields over the next three months. The measure of asymmetry (i.e., the difference between the upside and downside risk measures) suggests that the risk of a large unexpected rise in yields over and above the futures price was substantially higher at the beginning of 2014 and has since declined steeply (Chart 15). Some market commentators have even suggested that there is a possibility of an undersized reaction in the market in

²⁰ These corrections could be larger in those areas of the country with non-recourse mortgages (see Vulnerability 1 for more details).

²¹ Moreover, in such circumstances, banks would likely be raising equity to enhance their capital positions. See IMF, “Canada: Financial Sector Assessment Program; Stress Testing—Technical Note,” IMF Country Report No. 14/69.

Chart 15: Markets view the risks around long-term U.S. yields as roughly balanced

Sources: Bloomberg and Bank of Canada calculations

Last observation: 4 June 2015

response to an increase in the policy rate by the Federal Reserve (similar to the Greenspan conundrum; i.e., higher policy rates may not be transmitted across the yield curve).^{22, 23}

The Federal Reserve will exercise caution in the policy normalization process and strive to temper market reactions through clear communications. It has also adopted new repo facilities to ensure a smooth exit. At its March meeting, the Federal Open Market Committee released projections for future policy rates that are now closer to the market expectations implied by overnight index swaps. Moreover, past episodes, such as the “taper tantrum” in mid-2013 and the “flash rally” in U.S. bond markets in October 2014, suggest that a spike in interest rates is unlikely to persist, even if it were to occur.²⁴

Foreign portfolio investment flows could influence the transmission of higher interest rates to Canada

One of the channels through which higher interest rates would be transmitted to Canada is foreign portfolio investment flows. In the post-crisis period, Canada has experienced sizable foreign portfolio investment flows, particularly in Government of Canada (GoC) bonds, which has resulted in an increase in the share of GoC bonds held by foreigners (Chart 16).

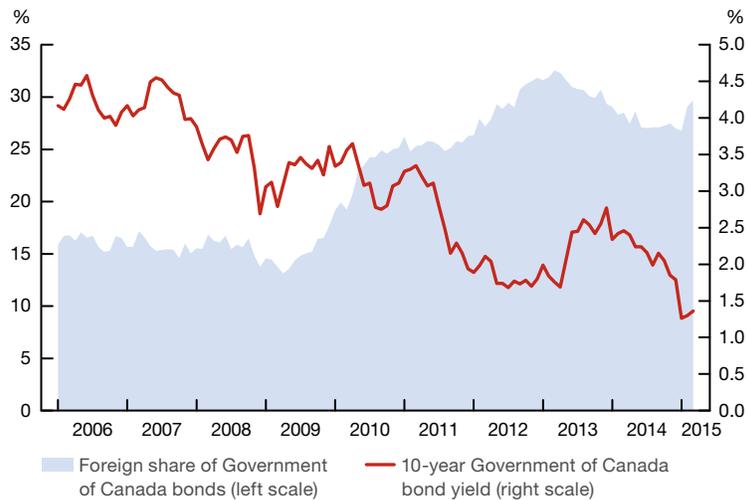
These portfolio investment inflows had a significant downward influence on interest rates in Canada, and there is a possibility for some reversal of these flows. The resulting portfolio investment outflows, combined with the potential for market liquidity to deteriorate quickly when unexpected events occur, could exacerbate the rise in Canadian interest rates. However, a large

²² The Greenspan conundrum refers to the behaviour of bond markets in 2004–05, when the Federal Reserve was raising the policy rate but long-term interest rates did not increase. Articles on the return of Greenspan’s conundrum have appeared in the financial press since August 2014. See, for example, “The Maddening Conundrum-Redux Conundrum,” FT Alphaville, 2 April 2015.

²³ If the Federal Reserve observed that long-term rates were not increasing, it might resort to more aggressive tightening or a sale of its government bond holdings to influence the yield curve.

²⁴ On 15 October 2014, the U.S. Treasury market witnessed a sharp intraday price change that led to a decline of 37 basis points in the 10-year yield, but it quickly reversed.

Chart 16: The share of Canadian federal government bonds held by foreigners has increased since the financial crisis



Sources: Bloomberg and Statistics Canada

Last observation: March 2015

share of GoC bonds is held by official investors, such as foreign reserve managers, who are less likely to rapidly reduce their holdings of GoC bonds in response to shocks.

The potential impact of this risk remains moderate

A mass repositioning by investors in response to a sudden increase in long-term interest rates could result in sharp price swings across many asset classes, including in Canada. Because of a decline in market liquidity, the adjustment process could be disorderly, leading to significant investor losses and reduced investor confidence.

An increase in interest rates could trigger a correction in Canadian equity markets because relative valuations are historically high. While some investors would incur losses, the broader implications for financial stability would be moderate, since equity markets tend to be relatively liquid and, currently, there is little evidence of high leverage among investors.

A material rise in interest rates would increase funding costs for Canadian financial and non-financial corporations, affecting their ability to roll over their debt and potentially leading to defaults. The high-yield and energy sectors are particularly vulnerable to defaults because they have been affected by lower oil prices. Higher long-term rates could also increase debt-service costs for Canadian households, which could lead to loan defaults and downward pressure on housing prices.

Risk 3: Stress Emanating from China and Other Emerging-Market Economies

The Canadian financial system is also exposed to potential economic and financial stress from a number of EMEs related to challenges in servicing their significant U.S.-dollar-denominated debts or to a financial disruption in China. Either scenario could cause broader EME stress, which could, in turn, be transmitted back to Canada through trade, commodity and financial channels.

The rating for this risk is “elevated.” The probability of it occurring is medium. The impact on Canada would be moderately severe if such a risk were to materialize.

The probability of an EME-related stress event continues to be medium

In China, the recent slowing in economic growth is being reflected in the performance of Chinese banks, where non-performing loans and delinquencies increased by about 40 per cent year-over-year in the second half of 2014. Much of the exposures in banking, as well as in shadow banking and the highly indebted local government sector, are tied to housing markets, where prices have been on a steady decline despite a relaxation of mortgage rules and declining interest rates.²⁵

The slowdown in the housing market may also be playing an important role in the rapid rise in Chinese equity valuations (Chart 17). China does not have a deep fixed-income market and thus has limited options for saving beyond investments in housing. Therefore, Chinese households appear to be increasingly turning to investing in the stock market. Stock indexes have climbed higher, in tandem with a sharp increase in margin debt, as Chinese investors continue to borrow to invest in equities. Indirectly and directly, banks have provided a large share of this financing.

Looking at the Chinese economy more broadly, the authorities seem to be managing the challenging task of rebalancing the economy and orchestrating a soft landing while containing financial stability risks. Financial sector reforms have continued,²⁶ as have the reforms in local government

Chart 17: Chinese house prices are in the midst of a correction while equity prices surge



Sources: Bloomberg, Soufun and China Index Academy

Last observation: May 2015

²⁵ In the first quarter of 2015, the National Bureau of Statistics of China (NBS) reported that housing starts were down by almost 20 per cent, developer land purchases had fallen by more than 30 per cent and sales were down by almost 10 per cent from a year earlier. Prices for new homes continue to fall. In March, this occurred in all 70 of the cities monitored by the NBS. Earlier this year, the minimum down payment for second homes was lowered from 60 per cent to 40 per cent.

²⁶ For example, interest rate deregulation has continued to reduce the spread between loan and deposit rates, and regulations related to the issuance of asset-backed securities by banks have been eased to increase their lending capacity.

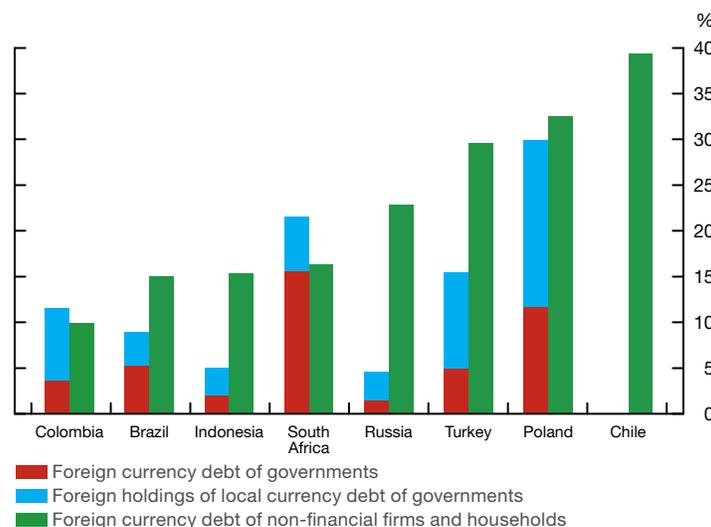
financing, and the growth in shadow banking activity is slowing.²⁷ Chinese authorities have the financial resources to prevent a collapse of the financial system in the event of widespread defaults in the shadow banking sector, although there would be significant challenges to preventing a hard landing in the economy in such a scenario.

In some other EMEs, a further appreciation of the U.S. dollar, combined with the high level of U.S.-dollar debt issued by firms and sovereigns, may lead to debt-servicing challenges (Chart 18).²⁸ Commodity-exporting EMEs are particularly vulnerable because they are also suffering a decline in revenues from the drop in oil and other commodity prices. Those with a high reliance on foreign capital flows, including from oil-related sovereign wealth funds, are even more vulnerable, particularly in light of the increased volatility in foreign exchange markets and the low liquidity in many EME financial markets. Some countries are also strained by ongoing political difficulties.

Despite this backdrop, the U.S.-dollar debt issued by EMEs could be hedged naturally or financially, reducing foreign exchange pressures.²⁹ In addition, although official reserves may have declined in some countries, in

Chart 18: There is significant exposure to foreign currency debt and foreign investors across emerging-market economies

As a percentage of GDP



Source: International Monetary Fund, *Navigating Monetary Policy Challenges and Managing Risks*, Global Financial Stability Report, April 2015

Last observation: 2014

²⁷ According to Moody's Investor Service, the growth rate of shadow banking activity in China has nearly converged to the rate of growth of nominal GDP, and trust company loans have been declining in proportion to outstanding bank loans as credit growth has shifted back toward the banking system. Trust sector exposure to real estate assets has been decreasing, although real estate continues to make up one-third of outstanding trust assets.

²⁸ In its April 2015 Global Financial Stability Report, *Navigating Monetary Policy Challenges and Managing Risks*, the IMF highlights the particular challenges for firms and for governments in EMEs related to foreign currency debt as well as foreign investor holdings of local currency debt. Although Chinese firms, particularly those in the real estate sector, also have sizable U.S.-dollar-denominated debt (i.e., an estimated gross issuance of about US\$130 billion in external bonds since 2010), this debt is fairly small relative to China's GDP.

²⁹ In June 2014, a public and private sector workshop co-hosted by the Committee on the Global Financial System and the Financial Stability Board's Standing Committee on the Assessment of Vulnerabilities concluded that EME corporate financing through foreign-denominated debt was on the rise, but currency mismatch was less of an issue than corporate leverage more generally. Both firm-level data and complementary scenario analysis suggested that unhedged corporations were a small part of the corporate universe of EMEs and that a relatively large shock would be needed to generate significant losses in individual countries.

most cases they still have ample foreign currency holdings to facilitate foreign currency debt payments or to mitigate excessive exchange rate volatility. For example, according to the Central Bank of the Russian Federation, Russia has sufficient reserves to cover 300 per cent of external debt payments coming due before mid-2016. Exchange rate adjustments under a flexible exchange rate regime would help reduce any adverse economic effects of financial stress.

The impact of these EME-related risks on Canada would be of moderate severity

A sharp slowdown in China would have global ramifications through trade, financial, commodity price and confidence effects, which would reduce the income and wealth of Canadians. The resulting financial losses could lead to a tightening in credit conditions that would further dampen economic activity in Canada. Sudden financial stress related to an EME default event could also be transmitted back to Canada through financial channels because the event could cause an outsized reaction in global financial markets, to which Canada is closely connected.

Risk 4: Financial Stress from the Euro Area

A significant stress event in the euro area is still a risk for Canada's financial system, although the rating has decreased from "elevated" to "moderate," primarily because the potential for a sharp economic slowdown in the euro area has declined since the December FSR. The most likely cause for euro-area stress in the near term is a default by Greece on its debt that affects other countries in the euro area through their direct financial and economic exposures to Greece, and through a potential "flight to safety." The latter could occur as investors pull funds out of other euro-area countries considered to be vulnerable, such as Portugal, Spain or Italy, threatening the balance sheets of their banks and sovereigns. While a credit event related to Greece is more likely than before, it is less likely to have extensive spillover effects across the euro area that are transmitted back to Canada. However, if a significant stress event in the euro area did materialize, the impact on Canada would be moderately severe.

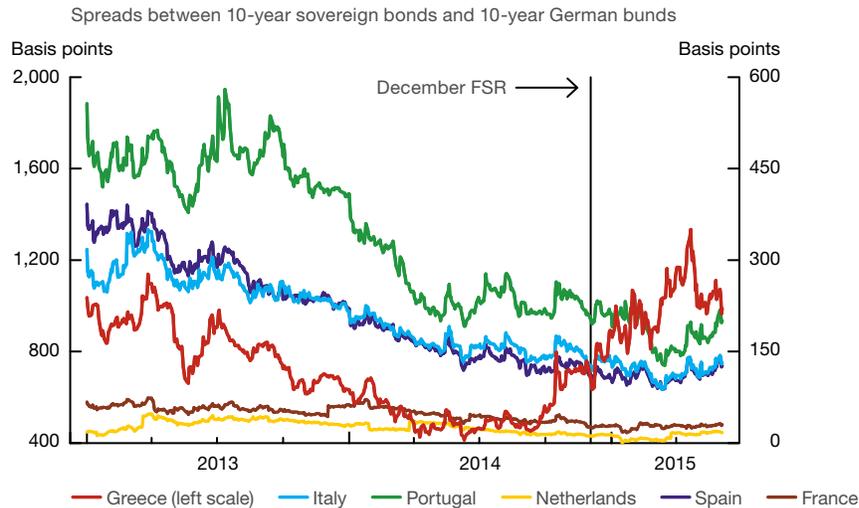
The probability of severe stress in the euro area has declined

At the time of the December FSR, the Bank highlighted the possibility that a sharp decline in euro-area economic activity, potentially combined with deflation, could threaten sovereign balance sheets and aggravate lingering vulnerabilities in the banking sector. Since then, the ECB's program of quantitative easing and the decline in oil prices have had a noticeable, positive effect on the euro-area economy. Recent economic data have been positive, while the risks around economic growth and inflation have become more balanced. European equity prices, including those of banks, have climbed since the beginning of the year. As a result, these factors reduce the likelihood of this trigger occurring. They also make the euro area more resilient to other stress.

Although market participants are suggesting that the probability that Greece will default on its debt is relatively high,³⁰ they also appear to be optimistic that the potential contagion across member countries would be limited. Greek 10-year bond spreads have widened sharply and equity prices have fallen,

³⁰ The probability of a default related to the sovereign debt of Greece, as implied by credit default swaps, is more than 70 per cent, based on a 5-year horizon.

Chart 19: Bond spreads in the rest of the euro area have not been affected by the situation in Greece



Source: Bloomberg

Last observation: 4 June 2015

while the bond spreads of other peripheral countries are relatively unchanged compared with December levels (Chart 19).³¹ At the same time, foreign private sector exposure to Greece is relatively low because the risk has been transferred to the European Union, the ECB and the International Monetary Fund. The exposure of European banks to Greece is much smaller than it was in 2012, and these banks are now better capitalized to absorb losses. Moreover, a policy framework is now available to manage such situations.³²

A stress event in the euro area would have a moderately severe impact on Canada

Stress from the euro area would affect Canada mainly through financial channels. Financial market volatility, widespread repricing of risk and a flight to liquidity by investors would affect Canadian financial markets, in particular because of the increased importance of foreign investors to domestic markets. Losses on external exposures and broad-based increases in wholesale funding costs would affect Canadian banks, although the latter would be mitigated insofar as market participants view domestic banks as having relatively stronger balance sheets than their global peers. Higher funding costs could lead to tighter credit conditions for Canadian households and businesses.

³¹ In addition, Portugal has completed about two-thirds of its 2015 bond-financing needs, which would limit any effects from a rise in yields related to a deterioration of Greece's situation.

³² For example, the implementation of the Single Supervisory Mechanism has helped strengthen confidence in the ability of European banks to handle stress. The European Stability Mechanism and the upcoming Single Resolution Mechanism and Fund will also help support financial stability in euro-area countries. These measures were discussed in the December 2013 FSR.

Potential Emerging Vulnerabilities and Risks in the Canadian Financial System

Globally, regulators have expressed concerns about potential vulnerabilities associated with asset managers.³³ In particular, this concern has focused on funds that invest in less-liquid assets while promising ample (typically daily) liquidity to investors. In such cases, a first-mover advantage may exist if redeeming investors receive a price that does not fully reflect the costs of liquidating the underlying assets. That is, during times of stress, investors may have an incentive to redeem, anticipating that other investors may also be redeeming, to avoid the liquidation costs associated with redemptions by other investors. Given the size of the largest global asset managers—and the potential for funds in an asset class to experience simultaneous redemptions—large redemptions could lead to a sharp fall in prices. These declines could precipitate more redemptions and fire sales of the underlying assets if funds were not managing their liquidity prudently.

In Canada, vulnerabilities associated with exchange-traded funds and open-end mutual funds are limited.³⁴ However, the behaviour of foreign global asset managers could, in principle, affect Canada, given the linkages between Canadian financial markets and those in the rest of the world. Thus, the Bank is working with other authorities to understand differences in asset-management activities and regulation across jurisdictions.

Safeguarding Financial Stability

Progress on the G-20 financial reform agenda continues to contribute to the resilience of the global financial system. The Financial Stability Board (FSB) is promoting full, consistent and prompt implementation of all agreed G-20 reforms so that intended results can be achieved in an effective and efficient manner with limited unintended, negative consequences.³⁵ In this context, a number of FSB peer reviews are under way to evaluate progress in implementing agreed reforms.³⁶

Most of the outputs on the FSB's 2015 work plan are targeted for delivery to the G-20 leaders at their November summit in Antalya, Turkey. In addition to continuing to implement and monitor the agreed reforms, the main priorities for this year include finalizing the design of the remaining post-crisis reforms in three areas: the capital, liquidity and leverage framework for banks; the initiatives to make over-the-counter (OTC) derivatives markets safer; and the measures to help end “too big to fail.” The Basel Committee on Banking Supervision (BCBS) is following up on the feedback received from a number of consultations launched in late 2014 related to the capital, liquidity and

³³ Financial Stability Board and International Organization of Securities Commissions (FSB-IOSCO), “Assessment Methodologies for Identifying Non-Bank Non-Insurer Global Systemically Important Financial Institutions,” Second Consultative Document, March 2015. Available at <http://www.financialstabilityboard.org/wp-content/uploads/2nd-Con-Doc-on-NBNI-G-SIFI-methodologies.pdf>.

³⁴ I. Foucher and K. Gray, “Exchange-Traded Funds: Evolution of Benefits, Vulnerabilities and Risks,” Bank of Canada *Financial System Review* (December 2014): 37–46; S. Ramirez, J. S. Jimenez, and J. Witmer, “Canadian Open-End Mutual Funds: An Assessment of Potential Vulnerabilities” (in this report).

³⁵ To this end, the FSB intends to begin publishing an annual consolidated report on the implementation of the regulatory reforms and their effects, the first of which will be delivered to the G-20 leaders in November.

³⁶ These include thematic peer reviews related to the reporting of OTC derivatives transactions to trade repositories, resolution regimes for the banking sector and implementing the policy framework for other shadow banking entities (non-bank financial entities other than money market funds). The latter is one element of the November 2014 G-20 road map toward strengthened oversight and regulation of shadow banking and is chaired by the Senior Deputy Governor of the Bank of Canada. In addition, in May, the FSB published a final version of the *Thematic Review on Supervisory Frameworks and Approaches for SIBs*.

leverage framework.³⁷ In addition, several important interim objectives in relation to the latter two areas were achieved over the first half of 2015, at both the international and domestic levels. We explain these in more detail below.

Making derivatives markets safer

To date, the greatest progress made on the key G-20 commitments for OTC derivatives markets—to improve transparency, mitigate systemic risk and protect against market abuse—has been in terms of regulations related to higher capital requirements for derivatives and trade reporting requirements. However, regulators continue to see challenges in terms of access to and usability of the data held by public trade repositories. To ensure that trade reporting provides authorities with the relevant data to assess systemic risks, the FSB, the Committee on Payments and Market Infrastructures (CPMI) and the International Organization for Securities Commissions (IOSCO) agreed in February on a work plan to standardize and aggregate trade reporting data for OTC derivatives.

In Canada, there has been considerable activity since the December FSR to advance OTC derivatives reforms. Securities regulators in Alberta, British Columbia, New Brunswick, Nova Scotia and Saskatchewan proposed rules that would form a derivatives reporting regime that is largely harmonized with existing regimes in Manitoba, Ontario and Quebec. Securities regulators also published for public consultation a proposed national instrument for the mandatory central clearing of certain standardized OTC derivatives. As well, OSFI finalized its expectations under Guideline B-7 with respect to the derivatives activities of federally regulated financial institutions, including trade reporting and central clearing. In addition to these initiatives on trade reporting and central clearing, the Canadian Securities Administrators (CSA) published a discussion paper on the regulation of trading facilities for OTC derivatives in Canada, including criteria for determining which OTC derivatives should be mandated to trade exclusively through such facilities.

Ending too big to fail

In terms of addressing the issue of too big to fail for banks, the FSB, the BCBS and the Bank for International Settlements launched a quantitative impact assessment and a market survey to inform the final adjustments to the proposed principles for total loss-absorbing capacity (TLAC) for global systemically important banks. They aim to finalize the international standard before the G-20's Antalya Summit. In Canada, the federal government announced in its 2015 budget that it intends to expand its resolution powers related to D-SIBs through the implementation of a bail-in regime, the Taxpayer Protection and Bank Recapitalization Regime.

The FSB and IOSCO have also published a second consultation paper on methodologies to identify non-bank, non-insurer global systemically important financial institutions. These include near-final methodologies for finance companies and market intermediaries (broker-dealers), a revised proposal for investment funds and a new proposed methodology for asset managers. This consultation will help authorities better understand systemic risks posed by entities in financial markets, including asset managers, and is the first step to designing appropriate policy tools to address such risks.

³⁷ These include revisions to the standardized approach for credit risk; designing a capital floor based on standardized, non-internal modelled approaches; outstanding issues related to the fundamental review of capital standards for banks' trading books; proposed criteria for identifying simple, transparent and comparable securitizations; and proposed guidance on accounting for expected credit losses.

While the growing use of central counterparties (CCPs) for standardized OTC derivatives transactions is reducing systemic risks, there is a need to ensure that CCPs themselves are not too big to fail. In this context, the FSB, the BCBS, CPMI and IOSCO have agreed on a coordinated work plan to promote the resilience, recovery planning and resolvability of CCPs. The key elements of the work plan include evaluating existing measures and determining whether more granular standards are required for the following: CCP resilience, including stress testing and loss-absorption capacity; recovery mechanisms, including loss-allocation tools; and resolution regimes and planning arrangements, including prefunded capital and liquidity resources in resolution.

Canada is also pursuing measures to increase resilience, recovery planning and resolvability for all Canadian financial market infrastructures (FMIs), including CCPs. In this context, amendments to the Payment Clearing and Settlement Act received royal assent on 16 December 2014. These amendments expanded and enhanced the Bank of Canada's oversight powers with respect to systems for the clearing and settlement of payment obligations and other financial transactions, better positioning the Bank to identify risks and respond in a timely and proactive manner.³⁸

Since the December FSR, payment clearing and settlement systems designated as systemically important by the Bank of Canada completed the first stage of the implementation of the CPMI-IOSCO Principles for Financial Market Infrastructures, the new international standard establishing minimum requirements for the risk management of systemically important financial market infrastructures. The Bank judges that standards pertaining to the management of both credit and liquidity risk (including those setting out expectations for the design of collateral and margin policies) are now broadly met. With this accomplishment, Canadian FMIs have now shifted their focus to implementing other standards, including recovery planning and procedures for operational risk and default management.³⁹ Meanwhile, the Bank and the CSA are in the process of clarifying expectations for implementing the international standards on tiered participation and recovery planning, with proposals for public consultation anticipated by year-end. Finally, the Bank, together with federal and provincial authorities, has also begun developing a resolution regime for FMIs that incorporates the FSB's Key Attributes of Effective Resolution Regimes for Financial Institutions within the context of the Canadian financial system and legal framework. This work will include developing policy proposals for legal, governance and communications frameworks, as well as FMI-specific resolution strategies, and is likely to be a multi-year initiative.

In the context of increasing resilience, recovery planning and resolvability for the Canadian financial system more broadly, the Bank of Canada launched a comprehensive consultation in May on its framework for financial market operations and its emergency lending assistance (ELA) policies.⁴⁰ The

³⁸ In April, the Department of Finance also launched a consultation on a proposed framework for the oversight of national retail payment systems to identify the types of risks, such as operational, market conduct and efficiency risks, that should be addressed by oversight measures, as well as the payment systems and payment service providers that should fall within the scope of oversight.

³⁹ The Bank's annual report on its FMI oversight activities provides more information on the risk-management priorities of each designated FMI. The report is available at <http://www.bankofcanada.ca/wp-content/uploads/2015/03/oversight-activities-2014-annual-report.pdf>.

⁴⁰ See C. Wilkins, "Liquid Markets for a Solid Economy" (speech to the Chambre de commerce du Montréal métropolitain, 5 May 2015) (<http://www.bankofcanada.ca/2015/05/liquid-markets-solid-economy/>); and L. Patterson, "Fine Tuning the Framework for the Bank's Market Operations" (speech to the CFA Society Vancouver, 14 May 2015) (<http://www.bankofcanada.ca/2015/05/fine-tuning-framework-bank-market-operations/>). The consultation documents can be found at <http://www.bankofcanada.ca/2015/05/public-consultations-bank-canada-framework-financial-market-operations/>.

proposed changes to the framework for market operations are meant to help liquidity in government bond markets in normal times and liquidity across key funding markets during periods of market-wide stress. The proposals for ELA are intended to clarify which institutions and market infrastructures would be eligible and the conditions and terms under which liquidity would be provided to them. The consultation period closes on 4 July 2015.

Reports

Reports examine selected issues of relevance to the Canadian and global financial systems.

Introduction

This section of the *Financial System Review* features two reports about financial system vulnerabilities. The first provides an overview of the Bank of Canada's approach to identifying and evaluating vulnerabilities in the Canadian financial system. The second demonstrates how that approach can be applied to assess vulnerabilities in the Canadian mutual fund sector.

Assessing Vulnerabilities in the Canadian Financial System, by Ian Christensen, Gitanjali Kumar, Césaire Meh and Lorie Zorn, presents the four common cyclical vulnerabilities that appear in financial systems and provides examples of both qualitative and quantitative indicators used to monitor these vulnerabilities across different sectors. The authors also discuss other inputs to the vulnerability assessment and, more generally, to the internal process used at the Bank of Canada for identifying, evaluating and communicating vulnerabilities and risks. Finally, the report highlights some of the key challenges the Bank and other authorities face in assessing financial system vulnerabilities and risks.

In **Canadian Open-End Mutual Funds: An Assessment of Potential Vulnerabilities**, Sandra Ramirez, Jesus Sierra Jimenez and Jonathan Witmer examine the liquidity and leverage characteristics of Canadian long-term, open-end mutual funds in terms of their potential systemic effects on the Canadian mutual fund sector as well as on the Canadian financial system more broadly. In their overall assessment of this sector, the authors consider the regulation, market size and ownership structure of mutual funds in Canada and provide observations about the industry globally.

Assessing Vulnerabilities in the Canadian Financial System

Ian Christensen, Gitanjali Kumar, Césaire Meh and Lorie Zorn

- Ongoing monitoring of vulnerabilities in the Canadian financial system is essential for assessing threats to financial stability and providing authorities with the necessary information for considering policy actions.
- The Bank of Canada regularly evaluates vulnerabilities in the Canadian financial system, such as (i) the degree of leverage, (ii) funding and liquidity issues, (iii) the pricing of risk, and (iv) opacity, in four main areas—financial sector entities, shadow banking, asset markets and the non-financial sector.
- The Bank’s approach to vulnerability and risk assessment builds on research related to amplification mechanisms and contagion through the financial system. It is comprehensive in terms of drawing on a wide range of data, innovative tools and other information. Nevertheless, important gaps in data, models and knowledge remain.
- The task of assessing financial system vulnerabilities is a dynamic one that will evolve with the constantly changing financial system, the availability of new information and the development of improved assessment techniques.

Introduction

Recent experience has reminded us that financial crises are extremely costly in terms of their negative effects on economic well-being. As such, it is incumbent upon authorities to understand the mechanics of financial system stress in order to prevent, or contain, financial crises. This knowledge can also help authorities to improve the overall stability and efficiency of the financial system.

Financial crises or, more generally, systemic stresses occur when trigger events interact with vulnerabilities to cause stress in the financial system. A vulnerability is a pre-existing condition that can amplify and propagate

shocks throughout the financial system. A trigger is the adverse shock that can spark systemic stress if the financial system is sufficiently vulnerable. Given a set of vulnerabilities and triggers, financial system risks can be assessed on the basis of expected loss to the system; i.e., the probability that the risk will materialize and the expected impact if it does. To use an everyday example, consider the following:

A large crack in a tree is a vulnerability because a trigger, such as a storm, could cause the tree to topple and cause extensive damage to nearby buildings, electrical wires and roadway access. Yet, if no storm occurs, such a risk event may not arise. Indeed, the tree may endure and eventually strengthen through growth. The likelihood of a severe storm, and the factors that contribute to various outcomes if the tree did fall over, determine the seriousness of this risk.¹

Since shocks are very difficult to predict, and policy-makers can often do little about their realization, focusing explicitly on identifying and measuring vulnerabilities is the most effective means for informing and directing the assessment of financial system risks. However, to detect vulnerabilities, it is necessary to know what to look for and where to look. This is not straightforward, since modern financial systems are dynamic and complex, and relevant information is not always available. In this report, we describe the approach used at the Bank of Canada to overcome some of these challenges.

To identify and evaluate vulnerabilities, Bank staff have implemented a methodology that is framed around the most common types of vulnerabilities and where they could appear in the financial system. These vulnerabilities were chosen based on past global experience,

¹ This example was provided by Stephen S. Poloz, Governor of the Bank of Canada, during the press conference marking the release of the June 2014 *Financial System Review* (Poloz 2014a).

as well as analysis conducted in academic and policy circles. The methodology incorporates a structured review of a wide array of information from various parts of the financial system, which is critical for discovering new behaviours and conditions, or known ones in unexpected places.

Operationalizing this approach requires quantitative and qualitative indicators, as well as analytical tools to process the information contained in them. It also requires judgment that reflects market intelligence about new and existing products, participants, activities and behaviours, and institutional knowledge about global influences and the regulatory environment. Regular discussions with the Bank's federal partner agencies on financial system vulnerabilities and risks are another key input. The result of this exercise is the identification of key areas of vulnerability in the Canadian financial system.

Methodology for Assessing Vulnerabilities

The Bank's approach to the explicit identification and evaluation of vulnerabilities draws from the body of research related to amplification mechanisms that lead to contagion (i.e., the spread of distress in one part of the financial system to other parts of the system).² In particular, our methodology is influenced by the work of Adrian, Covitz and Liang (2013) and Andrew Lo's four Ls of systemic risk: leverage, liquidity, linkages and losses.³

We classify vulnerabilities into two categories: cyclical vulnerabilities that evolve with the financial cycle and structural vulnerabilities that are inherent features of the financial system.⁴

The bulk of this report focuses on the following cyclical vulnerabilities:

- (i) **Leverage** refers to the degree to which assets are funded by debt.
- (ii) **Funding and liquidity** reflects the liquidity and maturity mismatches between the liabilities and assets of entities. We also include the degree of illiquidity in asset markets.
- (iii) **Pricing of risk** captures the extent to which market valuations and compensation for risk taking are not appropriate.

- (iv) **Opacity** refers to the degree to which information is not available about institutions and markets, such as asset holdings, counterparty exposures, prices and volumes traded, and the characteristics of financial products.

Past crises as well as academic research have highlighted that the potential for asset fire sales, asset price corrections and other forms of contagion is exacerbated when these vulnerabilities become excessive. Accordingly, authorities may seek to reduce or contain these vulnerabilities through regulation or other means of motivating different behaviour.

In addition, other features of the financial system that are relatively slower to evolve could contribute to the transmission of shocks (**Box 1**). We label these structural vulnerabilities, as follows:

- (i) **Domestic interconnectedness** measures linkages across the financial system that create the potential for contagion. These include common exposures as well as direct and indirect linkages across entities and activities.
- (ii) **External exposure** captures channels that could propagate shocks originating outside Canada.
- (iii) **Complexity** refers to complicated business models, organizational structures, technical systems, and financial products or relationships.

It may not be possible, or desirable, to alter these features, since they can mitigate risks and/or increase efficiencies in normal times. Nonetheless, structural vulnerabilities, such as the degree of interconnectedness between banks, can be of systemic importance. For example, stresses at a highly connected institution are more likely to affect other entities in the financial system. Thus, including structural vulnerabilities in the assessment helps to fully quantify the contribution of cyclical vulnerabilities to systemic risk.⁵

The Bank identifies vulnerabilities in four main areas: financial sector entities, shadow banking, asset markets and the non-financial sector.⁶ These sectors are not completely distinct from each other but, together, they provide broad coverage of the financial system. For example, financial markets capture the outcome of interactions between financial entities, while certain activities of financial entities are also captured within

² The literature includes Allen and Gale (2000); Geanakoplos (2003); Brunnermeier and Pedersen (2009); Adrian and Shin (2010); and He and Krishnamurthy (2012).

³ The four Ls are discussed in Bisias et al. (2012).

⁴ The distinction between the two types is not sharp, and many vulnerabilities can have both cyclical and structural aspects. However, for analytical convenience and to facilitate regular monitoring, we assign vulnerabilities to one of these two groups, based largely on the frequency at which the vulnerabilities evolve.

⁵ The Basel Committee on Banking Supervision has identified size; complexity; interconnectedness; lack of available substitutes or financial institution infrastructure for the services they provide; and global, cross-jurisdictional activity as criteria that determine whether a bank is systemically important (BCBS 2011).

⁶ Financial market infrastructures (FMIs)—multilateral systems that facilitate payment clearing or settlement—are not included here as a separate sector, although they are an important part of the financial system. FMIs support financial activity and are linked to all other areas of the financial system. As such, they are assessed mainly in the context of structural vulnerabilities.

Box 1

Structural Vulnerabilities in the Canadian Financial System

Modern financial systems are highly interconnected, complex and global in nature. These structural features are the result of the interactions among types of institutions, market practices, rules and regulation. In normal times, these features make the financial system more resilient to idiosyncratic shocks and create opportunities for diversifying risk. But in adverse periods they can be a means of propagating shocks; hence, we consider them structural vulnerabilities. We focus on three key structural vulnerabilities.

Domestic interconnectedness refers to direct and indirect linkages across entities and activities in the financial system, including common exposures. These connections contribute to the safety and efficiency of the system in normal times, but they also have the potential to pose systemic risk in periods of stress. Financial market infrastructures (FMIs)—the payment clearing and settlement systems that facilitate financial transactions—are a particularly relevant example. FMIs expedite transactions for participating financial entities, such as banks and investment dealers, allowing consumers and firms to purchase goods and services, make financial investments, and transfer funds. However, if one participant in the FMI chain fails, the ability of other participants to meet their own obligations could be adversely affected, potentially causing a series of failures that ultimately impairs the functioning of the financial system

External exposure refers to the propensity of any component of the financial system to be affected by an event or condition outside of Canada. Cross-border financial linkages between

Canada and other countries provide important benefits to Canadian households, businesses and governments but can also transmit vulnerabilities and shocks back to Canada. Domestic banks, for example, have substantial foreign exposures that can strengthen their ability to support the Canadian financial system and economy during localized periods of stress. However, these exposures also increase the banks' susceptibility to global risk events.

Complexity refers to complicated business models, organizational structures, technical systems, and financial products or relationships. It can arise naturally through financial innovation and risk diversification, as well as from extensive domestic interconnectedness or external exposures. Although complexity can be associated with positive elements of the financial system, it can also be a source of contagion should problems arise. For example, larger, more complex financial institutions typically engage in a wide range of financial activities, often through a number of affiliated subgroups, as a means of diversifying their revenues and offsetting sector- or geography-specific losses. This can be beneficial for shareholders and efficient for the financial system, but it can also expose financial institutions to more types of risks than simple credit losses. In addition, there is a greater likelihood for those risks to be misunderstood because complexity can impede monitoring by management, counterparties and regulators.

the shadow banking sector. Despite this overlap, such comprehensive coverage is desirable because it ensures a holistic view of vulnerabilities in the system and helps overcome measurement issues.

Implementing the Methodology

Quantitative and qualitative indicators

A variety of quantitative and qualitative indicators form the basis of the Bank's monitoring process. We provide some illustrative examples of quantitative metrics in **Table 1** that help inform our evaluation of the degree of cyclical vulnerabilities arising in key sectors of the financial system. These examples may pertain to certain subsectors, but the complete assessment takes into account a broader range of indicators from all subsectors.

Quantitative data are supplemented by qualitative information gathered from a range of sources, including regulatory bodies (both domestic and international), ratings agency reports, and industry participants. In addition, market intelligence, which includes market commentary, dialogues with buy-side and sell-side industry participants, and surveys, is used to complement quantitative evidence and to ensure that vulnerabilities are assessed as comprehensively as possible.

Further, a variety of empirical models can help assess vulnerabilities. Models are useful tools for quantifying vulnerabilities when direct measurement is not possible. However, when interpreting results, the assumptions underlying the model need to be kept in mind, and results should be considered in the context of other relevant information.

Given this structure for assessment, we provide a few examples of how we measure vulnerabilities in each of the four identified sectors.

Table 1: Typical quantitative indicators used to monitor cyclical vulnerabilities in the Canadian financial system

Sectors	Vulnerabilities			
	Leverage	Funding and liquidity	Pricing of risk	Opacity
Financial sector entities	<ul style="list-style-type: none"> Ratio of assets to equity Regulatory leverage ratio 	<ul style="list-style-type: none"> Regulatory liquidity measures Ratio of loans to deposits Liquidity of investments 	<ul style="list-style-type: none"> Return on equity Underwriting standards 	<ul style="list-style-type: none"> Amount of risk disclosure
Shadow banking	<ul style="list-style-type: none"> Ratio of assets to equity 	<ul style="list-style-type: none"> Terms of assets and liabilities 	<ul style="list-style-type: none"> Underwriting standards Haircuts Concentration of risk 	<ul style="list-style-type: none"> Financial innovation (new products, new practices)
Asset markets	—	<ul style="list-style-type: none"> Market liquidity metrics (e.g., bid-ask spreads) 	<ul style="list-style-type: none"> Asset valuations Implied and realized volatility Risk premiums 	<ul style="list-style-type: none"> Over-the-counter trading volumes
Non-financial sector	<ul style="list-style-type: none"> Ratio of debt to income Debt-service costs Composition of debt 	<ul style="list-style-type: none"> Holdings of cash and liquid assets 	—	<ul style="list-style-type: none"> Proportion of unlisted corporations

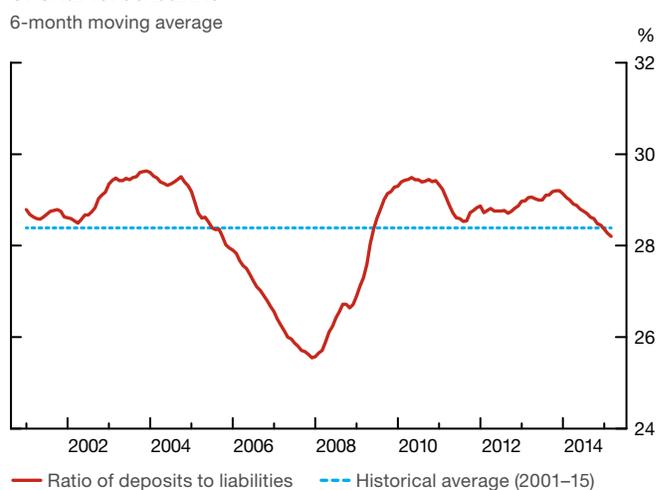
(i) Financial sector entities

This sector covers domestic systemically important banks, smaller banks, credit unions, trust companies, life insurance companies and pension funds. These bank and non-bank financial entities are key components of a modern financial system. However, they can pose systemic risk if they are highly leveraged, rely excessively on unstable sources of funding or overinvest in illiquid assets. If a major institution experiences difficulties, there is increased potential for systemic loss, owing to its greater interconnectedness with the rest of the financial system.

As became apparent during the recent crisis, banks need stable sources of funding that do not dry up rapidly in times of market stress. One indicator of stable funding for chartered banks is the share of deposits in total liabilities (Chart 1). The chart shows that retail deposits as a share of total liabilities declined between 2005 and 2008 during the buildup to the financial crisis.⁷ All else being equal, the more banks rely on deposits, the less vulnerable they are to shocks in funding markets. Other important indicators of funding liquidity for prudentially regulated institutions include regulatory and supervisory liquidity measures, such as the Liquidity Coverage Ratio, the Net Stable Funding Ratio and the Net Cumulative Cash Flow.⁸

To offset the impact of low interest rates, some entities, such as pension funds and life insurance companies, are investing more in illiquid assets (for example, real estate and infrastructure) than in the past. At the same time, they are making greater use of derivatives and repos for hedging and funding purposes, which may subject them to liquidity pressures if a stress event materializes.⁹

Chart 1: Retail deposits as a share of the liabilities of chartered banks



Note: Only non-derivative liabilities are considered.
Sources: Regulatory filings of Canadian banks and Bank of Canada calculations
Last observation: March 2015

⁷ A larger stock of non-core liabilities indicates vulnerability to crises. See Hahn, Shin and Shin (2013).

⁸ For more details, please refer to the Liquidity Adequacy Requirements Guideline by the Office of the Superintendent of Financial Institutions (www.osfi-bsif.gc.ca/Eng/fi-if/rg-ro/gdn-ort/gl-ld/pages/lar_gias.aspx).

⁹ Box 5 in the December 2012 *Financial System Review* describes tools used for leveraged liability-driven investment strategies by pension funds.

Box 2

Vulnerabilities in the Asset-Backed Commercial Paper Market Exposed by the Financial Crisis¹

The early period of the global financial crisis exposed a number of important vulnerabilities in the shadow banking sector that led to the collapse of the asset-backed commercial paper (ABCP) market in Canada in 2007. The crisis was triggered by investor concerns about U.S. subprime mortgages and the structured products backed by such mortgages.

ABCP programs, by design, lead to significant maturity mismatches, since long-duration assets are funded by short-term paper, which creates the potential for rollover risk that is typically mitigated by a liquidity backstop. Of the \$116 billion of outstanding ABCP at the end of July 2007, \$81 billion was sponsored by major Canadian commercial banks, while the rest (\$35 billion) was third-party (non-bank) ABCP with liquidity backstops, largely from foreign banks.

In hindsight, using the methodology outlined in this report may have helped capture vulnerabilities in the ABCP market along the following dimensions.

Pricing of risk—Typically, bank-sponsored ABCP has been a traditional form of asset securitization where the underlying assets are a combination of consumer loans, such as mortgages, auto leases and loans, and credit card receivables. However, third-party ABCP was backed by leveraged

and synthetic collateralized debt obligations, which in turn were backed by a variety of foreign-based assets, such as corporate bonds, asset-backed securities, mortgage-backed securities and credit derivatives. A comparison of the yields of bank-sponsored and third-party ABCP would have revealed that the spread between these notes was surprisingly narrow, suggesting that the market did not fully recognize the difference in risk between the two notes.

Opacity—The ABCP market was characterized by a lack of transparency about (i) the types of assets that were backing ABCP, (ii) the quality and liquidity of the asset portfolios of ABCP conduits, and (iii) the nature of the conduits' backup liquidity facilities.² As concerns about U.S. subprime mortgages arose, investors became more uncertain about their direct and indirect exposures, resulting in a loss of investor confidence.

Domestic interconnectedness—Stress in the ABCP market led ABCP conduits to draw on backup liquidity from sponsoring banks as investors started demanding redemptions. This created short-term funding pressures in the banking sector, resulting in contagion and the repricing of risk across domestic short-term funding markets.

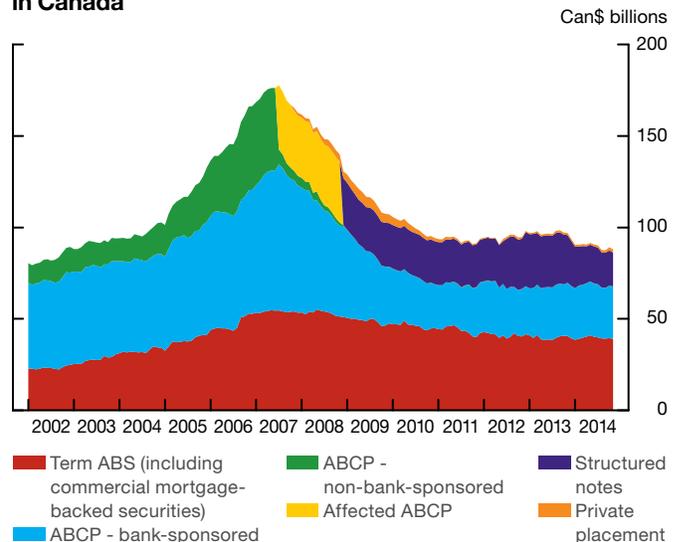
¹ This section is based on information contained in Kamhi and Tuer (2007a, b); IIROC (2008); and the Bank of Canada *Financial System Review* (June, December 2007).

² Liquidity facilities for third-party ABCP could be triggered only under the narrow conditions of a general market disruption.

(ii) Shadow banking

Shadow banking consists of credit intermediation outside the banking sector and involves significant liquidity and maturity transformation. It includes, for example, securitization and repo and securities lending, and extends to entities such as investment funds. Owing to the less regulated nature of the shadow banking sector, opacity is a particularly important vulnerability. For example, in private-label securitizations, relatively illiquid assets are pooled to create tradable securities such as asset-backed securities (ABS) and asset-backed commercial paper (ABCP) that can be used for funding. Securitization is potentially beneficial because it reduces funding costs and can increase the availability of high-quality assets. However, before the crisis, the rapid buildup in the amount of non-bank-sponsored ABCP outstanding in Canada was accompanied by a significant lack of information about the type and quality of the underlying assets (Chart 2). As a result, investors questioned the value of some instruments when concerns about U.S. subprime mortgages arose (Box 2).

Chart 2: Total private-label securitization outstanding in Canada



Source: Dominion Bond Rating Service

Last observation: December 2014

A synthetic exchange-traded fund (ETF) replicates returns on an index by entering into a swap contract with a counterparty and covering the cost of the swap through interest earned on a pool of collateral. Opacity about an ETF's potential exposures to counterparty and collateral risk may concern investors in the event of an adverse shock (Foucher and Gray 2014).

(iii) Asset markets

Asset markets include financial markets—equity, bond, currency and money markets—as well as property markets, both residential and commercial. Excessive risk taking in the financial system can manifest in a variety of ways, including compressed risk premiums and overvaluation in asset markets. A sharp drop in asset prices could adversely affect entities that are highly leveraged. However, detecting signs of overvaluation is a challenging task because it is hard to determine fundamental values. Hence, a variety of valuation metrics are used. For example, a simple, commonly used method for identifying signs of stretched valuations in equity markets is to compare the deviation of the average price-to-earnings ratio across all stocks on the S&P/TSX Composite Index with its 10-year historical average (Chart 3). Another possibility is to use the Fed model, which compares the earnings yield on equities with the yields on government and corporate bonds to determine the relative valuations of these assets.¹⁰

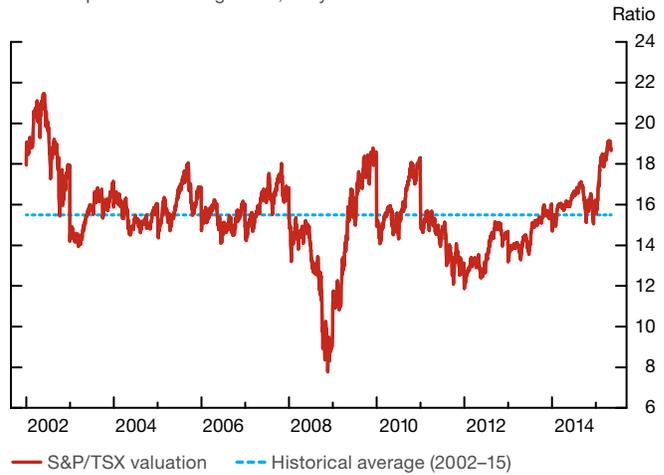
In property markets, the Bank examines measures of both stocks and flows, such as inventory levels, housing starts and resale activity, as well as house prices, to help detect potential imbalances in demand and supply at both the aggregate and regional levels. For example, the rate at which house prices are growing in different Canadian housing markets can suggest where the risk of overvaluation may be increasing or decreasing (Chart 4). The information from price measures is further refined through the calculation of simple price-to-income and price-to-rent ratios and compared with historical averages or trends. In addition, formal econometric models compare actual prices with current or expected long-run fundamental values implied by the models.¹¹

(iv) Non-financial sector

This sector includes households, non-financial corporations and governments. Extensive debt in the non-financial sector increases its sensitivity to changes in asset prices, interest rates and income and heightens the potential for losses by financial intermediaries. The

Chart 3: Detecting stretched valuations in equity markets

Forward price-to-earnings ratio, daily data

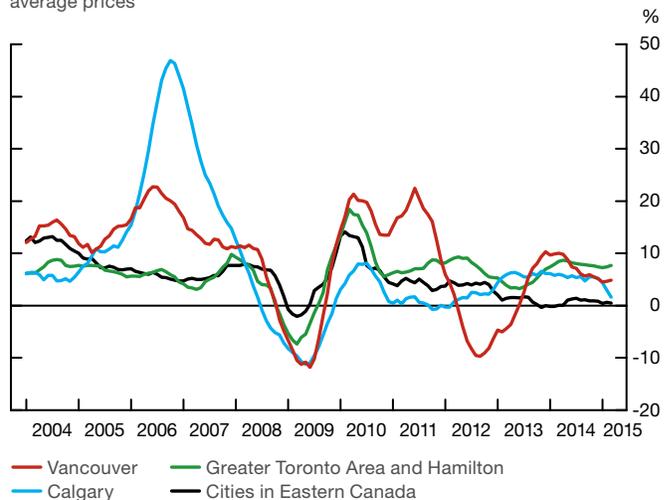


Source: Bloomberg

Last observation: 11 May 2015

Chart 4: Growth of house prices in Canada

6-month moving average of year-over-year growth in seasonally adjusted average prices



Source: Canadian Real Estate Association

Last observation: April 2015

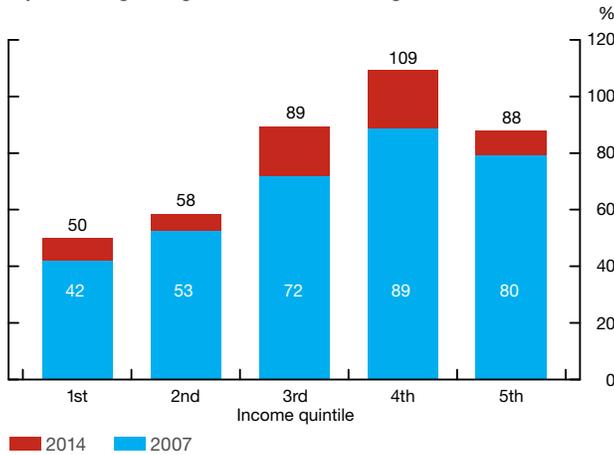
Bank monitors household debt and income levels; growth in the different components of household credit, household borrowing rates and debt repayment activity; and how these indicators are distributed. For example, it is useful to examine the debt-to-income ratio, a common indicator of household leverage, across different household income groups to determine the segments of the population where indebtedness may be concentrated and/or growing and, hence, which households are more vulnerable to a loss of their incomes (Chart 5). Another important element is to try to determine what parts of the financial system are most exposed to these vulnerable households.

¹⁰ The Fed model is discussed in the *Humphrey-Hawkins Report*, released by the Federal Reserve on 22 July 1997 (see www.federalreserve.gov/boarddocs/hh/1997/july/reportsection2.htm).

¹¹ Box 2 in the December 2014 *Financial System Review* discusses various approaches to estimating potential overvaluation in Canadian housing markets.

Chart 5: Median debt-to-gross income ratio for indebted households, by income quintile

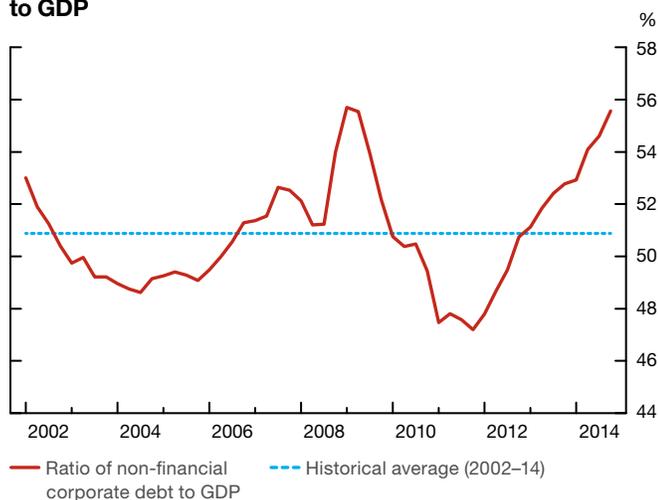
3-year moving average of the ratio of debt to gross income



Source: Ipsos-Reid

Non-financial corporate leverage can be evaluated at the firm level by different balance-sheet measures, such as the ratios of debt to equity or debt to assets, which indicate the extent to which internal financing can support external debt. At an aggregate level, the ratio of corporate debt to GDP is a measure of the extent to which the total debt of non-financial firms can be supported by economic activity (Chart 6). These indicators may convey different information. For example, balance-sheet measures of corporate leverage may fluctuate with movements in asset prices, while non-financial corporate debt in aggregate may fluctuate with economic cycles.

Chart 6: The ratio of total non-financial corporate debt to GDP



Sources: Statistics Canada and Bank of Canada calculations

Last observation: 2014Q4

Other inputs

Quantitative and qualitative indicators are complemented by a variety of analytical models. For example, dynamic term-structure models are used for estimating risk premiums in government and corporate bonds (Bauer and Diez de los Rios 2012). Bank staff also use a model of house price determination, based on 43 past house price cycles in 18 countries belonging to the Organisation for Economic Co-operation and Development, to estimate the amount of overvaluation in Canadian housing markets (Bauer 2014). Early-warning techniques are also used to identify vulnerabilities, by comparing current economic and financial indicators with data from periods leading up to past episodes of financial stress.¹² In addition, models can be used to determine how vulnerabilities might evolve under different macrofinancial conditions. For example, using microdata, the Bank’s Household Risk Assessment Model estimates the degree to which the situation of vulnerable households (i.e., those with high debt-service ratios) could worsen following a sizable increase in interest rates and unemployment.¹³

The evaluation of cyclical vulnerabilities in each sector is made on the basis of all the qualitative and quantitative information collected and analyzed. In addition, the interactions of cyclical vulnerabilities with structural vulnerabilities—domestic interconnectedness, external exposures and complexity—are examined. For example, excessive risk taking by a highly interconnected entity, such as a systemically important financial institution (SIFI), has the potential to generate losses in the entire financial system. There are, however, policies in place (additional capital requirements and enhanced supervision for SIFIs) that would limit the impact. To fully consider all of the factors that affect the level of vulnerability, judgment is applied that takes into account existing safeguards, supervision regimes, upcoming regulatory changes and other mitigating measures.

To obtain an overall assessment by sector, this exercise is performed for all underlying subsectors. Then the vulnerability assessments for each subsector are aggregated into an overall level of concern for each sector along each of the four cyclical dimensions of vulnerabilities.

The risk-assessment process at the Bank of Canada

The Bank’s Governing Council communicates its assessment of vulnerabilities and risks in the Canadian financial system twice annually in the *Financial System*

¹² For more on the use of early-warning models at the Bank of Canada, see Pasricha et al. (2013).

¹³ The Household Risk Assessment Model is described in Faruqi, Liu and Roberts (2012).

Review. These views are based upon many important inputs. Twice a year, Bank staff formally present an assessment of key financial system vulnerabilities and risks, existing and emerging, to the Governing Council. Following the presentation, the Governing Council meets to discuss their own impressions about vulnerabilities and risks, and to identify the most important ones to communicate to external audiences. This is the starting point for drafting the Assessment of Vulnerabilities and Risks section of the *Financial System Review*. However, this formal process builds on other information and insights that are informally accumulated on an ongoing basis. For example, the Governing Council receives regular updates from Bank staff on new data and analysis, regulatory developments and market intelligence. In addition, members of the Governing Council share information and discuss issues with the Bank's federal partners, including at meetings of the Senior Advisory Committee.¹⁴ Important information is also received through discussions with other organizations across the country and internationally; for example, Governing Council members participate in the Financial Stability Board's Standing Committee on the Assessment of Vulnerabilities, as well as various committees under the Bank for International Settlements.¹⁵ The combination of formal, structured decision making with less-structured information gathering, analysis and discussions to arrive at an overall view on vulnerabilities and risks in the Canadian financial system is similar to the process at the Bank that supports the *Monetary Policy Report*.

Challenges

Many authorities, including the Bank of Canada, are working to improve the analytical underpinnings for assessing financial system vulnerabilities and risks. These efforts include addressing some important gaps in data, models and knowledge.

The Bank of Canada relies on a range of data sources, but certain data are not available at the desired frequency or level of disaggregation. Other important data may not even be collected. Canadian authorities are working together

to expand and improve financial system data as part of a larger international effort to enhance the accurate assessment of risks to financial stability.¹⁶ For example, more timely and comprehensive data on household balance-sheet positions, including detailed household portfolios and demographic and socio-economic variables, would provide a more accurate picture of the distribution and evolution of household debt, income and wealth.

Although the Bank's development and use of innovative models for analyzing financial stability have been recognized internationally, there is still considerable scope to increase the use of quantitative methods in assessing vulnerabilities and risks. For example, the International Monetary Fund views the Bank's stress-testing model, the MacroFinancial Risk Assessment Framework (MFRAF), as being "at the frontiers of systemic risk stress testing" (IMF 2014). Nevertheless, Bank staff continue to make significant improvements to the quantitative framework for risk assessment, which includes MFRAF and other models, by (i) incorporating feedback effects between the real economy and bank balance sheets, and (ii) developing a tractable mapping among the identification of vulnerabilities, the dynamics of macroeconomic and financial variables under a stress scenario, and their effects across the financial system.¹⁷ This is a complex undertaking, given the numerous interlinkages and feedback effects in a dynamic financial system, that calls for extensive data, sophisticated techniques and computational power. The goal is to accumulate a set of tools that is as comprehensive as possible in terms of all sectors and all vulnerability measures.

More generally, the Canadian financial system is undergoing constant change; new entities are arriving, new markets are being established, and new activities and products are being created.¹⁸ In addition, any assessment of vulnerabilities and risks will be inherently incomplete because people will find new and more sophisticated ways to take on or create risks. Continuous dialogue with the private sector is essential to understanding these developments. Ultimately, the framework for the assessment of vulnerabilities and risks must be flexible and forward-looking to be able to seek out and adapt to new information, analytical improvements and changes in the financial system.

¹⁴ The Senior Advisory Committee is a forum for exchanging information and discussing financial system policy issues, such as proposals for legislative changes, the financial stability framework, and the regulatory framework and supervisory approach. The members of the Committee are the Governor of the Bank of Canada, the Superintendent of Financial Institutions, the Chair of the Canada Deposit Insurance Corporation, the Commissioner of the Financial Consumer Agency of Canada and the Deputy Minister of Finance, who chairs the Committee. In Budget 2015, the federal government also indicated that "the Capital Markets Regulatory Authority will contribute to SAC deliberations after it has begun operating." See http://www.budget.gc.ca/2015/docs/plan/ch4-1-eng.html#_Toc417204278.

¹⁵ These include the Basel Committee on Banking Supervision, the Committee on the Global Financial System, the Committee on Payments and Market Infrastructures, and the Markets Committee.

¹⁶ The G-20 Data Gaps Initiative was established by the International Monetary Fund and the Financial Stability Board in the aftermath of the global financial crisis to improve the availability of financial system data.

¹⁷ While important sectors are currently included, the coverage is not yet complete across the financial system and, to date, the impacts are limited to those affecting domestic systemically important banks.

¹⁸ Governor Poloz discussed the future of financial intermediation and its implications for financial stability in his December 2014 speech to the Economic Club of New York (Poloz 2014b).

Conclusion

A structured and systematic approach is critical for identifying, monitoring and evaluating vulnerabilities and, in turn, formulating a comprehensive assessment of risks to the Canadian financial system. Using various indicators and analytical tools, the Bank regularly tracks and analyzes the degree of leverage; various liquidity and funding issues; the pricing of risk; and the extent of opacity within the financial sector, shadow banking, asset markets and the non-financial sector. It also considers vulnerabilities that are more structural in nature, such as complexity, domestic interconnectedness and external exposures that can further magnify the potential for contagion. The twice-yearly assessment of vulnerabilities considers a wide range of data, analysis and information from inside and outside the Bank, including from other authorities that have a role in maintaining financial system stability. The key findings of this

assessment are summarized and used in regular discussions on risks to the financial system with the Bank's federal partners, and communicated to the public in the *Financial System Review*.

The Bank's assessment framework is a work in progress, and ongoing efforts are aimed at introducing greater quantitative rigour. Authorities around the world are also developing their approaches to the assessment of vulnerabilities and risks, and the Bank is sharing information as well as learning from their experiences.¹⁹ Bank staff are working to identify and obtain more relevant data and to develop models of different areas of the financial system and their linkages. While this is a complex undertaking, it will ultimately help the Bank and other Canadian authorities to promote financial stability.

¹⁹ In April, the Bank hosted a workshop for central banks and authorities from around the world where the discussions focused on assessing vulnerabilities in and risks to the financial system.

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Canadian Open-End Mutual Funds: An Assessment of Potential Vulnerabilities

Sandra Ramirez, Jesus Sierra Jimenez and Jonathan Witmer

- Mutual funds provide retail investors with access to a broad range of investment opportunities. Globally, mutual funds have grown considerably in recent years and have become important players in many securities markets, prompting regulatory interest in vulnerabilities that could emanate from the sector.
- This report finds that vulnerabilities arising from Canadian mutual funds are currently limited:
 - (i) Funds hold an adequate amount of cash, given the underlying liquidity of their investments, and have a stable investor base, limiting risks from liquidity and maturity transformation.
 - (ii) Since the degree of leverage held by a fund is restricted by securities regulation, funds have low leverage ratios and limited derivatives exposures.
 - (iii) Even the largest funds are not dominant players in the securities markets in which they invest.

investors. In addition, investors in open-end mutual funds are able to purchase shares from the fund or sell shares to the fund on a daily basis.¹

Mutual funds are becoming increasingly important players in financial markets globally. For example, U.S. mutual funds now hold 20 per cent of U.S. corporate bonds and foreign bonds held by U.S. residents (**Chart 1**). This proportion has doubled since the 2007–09 global financial crisis. Although Canadian mutual fund assets under management have also grown, this growth has been more subdued. For example, the increase in their relative importance in the Canadian non-government and foreign-issuer bond markets has been less pronounced.² Canadian mutual funds also represent a smaller share of GDP in comparison with U.S. funds. Canadian long-term mutual fund assets under management amounted to Can\$1.1 trillion in December 2014—about 54 per cent of Canada's GDP.³

Introduction

A mutual fund is a professionally managed investment vehicle that pools money from individuals and corporations and invests in securities. It channels savings to productive investments through capital markets and offers investors a number of advantages over direct investments, including access to professionally managed, diversified portfolios of assets, reduced transaction costs due to economies of scale and an expanded set of investable securities available to retail

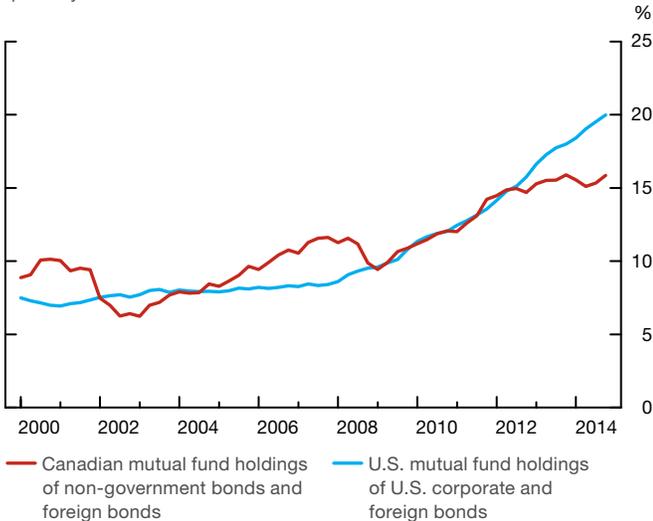
¹ In contrast, closed-end funds issue a fixed number of shares in an initial public offering, which later trade in secondary markets. Investors in closed-end funds cannot redeem shares (i.e., they must sell their shares to other investors rather than sell them back to the fund). An exchange-traded fund (ETF) is another type of investment fund that is traded on a stock exchange. Unlike in a closed-end fund, the amount of shares outstanding in an ETF can be increased or decreased after the initial public offering by authorized participants. Foucher and Gray (2014) analyze the benefits, vulnerabilities and risks of ETFs.

² Non-government bonds include bonds and debentures issued by Canadian corporations with an original maturity of more than one year. These bonds could be denominated in Canadian dollars or a foreign currency and include mortgage-backed securities, Canada Mortgage Bonds and other bonds issued by government-backed enterprises.

³ This estimate, from the Investment Funds Institute of Canada, excludes money market funds.

Chart 1: U.S. mutual funds are becoming more important participants in U.S. corporate markets

Mutual fund holdings of sector debt as a share of total sector debt outstanding, quarterly data



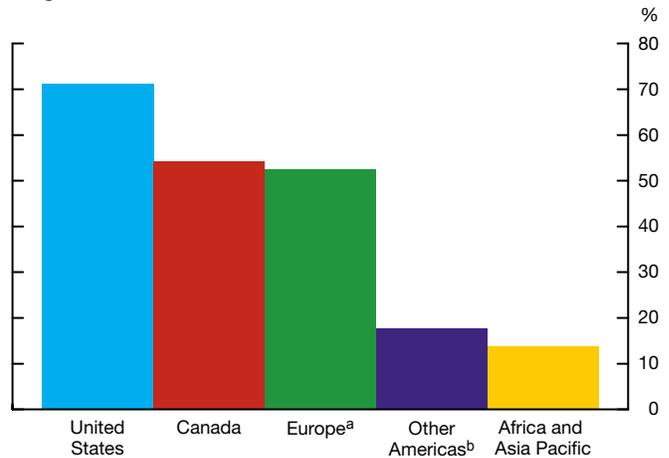
Note: A foreign bond represents domestic residents' investment in bonds issued by non-residents.

Sources: Statistics Canada and the U.S. Federal Reserve

Last observation: 31 December 2014

Chart 2: Canada's mutual fund industry represents 54 per cent of GDP

Long-term mutual fund assets as a share of GDP



a. Europe includes all countries within the European continent.
 b. "Other Americas" includes countries in North and South America, excluding the United States and Canada.

Sources: Investment Company Institute and CIA *World Factbook*

Last observation: 31 December 2014

In comparison, U.S. long-term mutual fund assets under management represented over 70 per cent of U.S. GDP in 2014 (Chart 2).⁴

From a financial stability perspective, the growing importance of mutual funds should be welcome since, under securities regulation, such funds are more transparent and less leveraged than many other participants in the market (Box 1). As regulatory requirements for capital and liquidity alter the capacity of commercial banks to intermediate in securities markets, end investors such as mutual funds are poised to become more important participants in these markets.

Because of the growing significance of mutual funds in markets worldwide and, in particular, the large size of individual funds or of total assets being managed by a single manager, the Financial Stability Board and the International Organization of Securities Commissions (FSB-IOSCO 2015) and the U.S. Office of Financial Research (OFR 2013) have expressed concerns that

⁴ The relative size of each jurisdiction's mutual fund market is likely a function of various structural factors, such as pension policy, tax policy and regulatory structure.

vulnerabilities in mutual funds could transmit stress to the broader financial system. In particular, the liquidity and maturity transformation service that large open-end funds provide might result in their not having enough cash and other liquid assets to cover a sharp increase in investor redemptions in some circumstances. Ultimately, this potential cash shortage could lead to distressed asset sales and losses for investors, creditors and counterparties such as commercial banks. These effects could amplify shocks into broader financial markets if counterparty exposures, and the funds involved, are large.

This report examines the potential vulnerabilities in Canadian long-term open-end mutual funds.⁵ It first examines vulnerabilities within the mutual fund sector and then assesses vulnerabilities that could emanate from the sector to the Canadian financial system. Overall, we find that these vulnerabilities are limited.

⁵ Considering the small size of the sector, we do not focus on money market funds, which may have a greater redemption risk, since the fund share price is fixed rather than floating (Witmer 2012). The International Organization of Securities Commissions (IOSCO 2012) has provided recommendations to mitigate the systemic risks associated with money market funds.

Box 1

Regulation of Canadian Mutual Funds

In Canada, the distribution and sale of mutual fund shares are regulated by provincial securities commissions. An informal council of securities regulators, the Canadian Securities Administrators (CSA), coordinates provincial securities regulation through national instruments.¹ The main regulatory framework for open-end mutual funds is contained in National Instrument 81-102 *Investment Funds* (NI 81-102), which includes operational requirements regarding custodianship of a fund's assets, the structure of portfolio management fees and redemption of a fund's shares.² It also includes restrictions on short-sales, limits to ownership concentration and leverage, restrictions on the use of derivatives, and regulations limiting a fund's ability to undertake securities-financing transactions. Other national instruments

contain additional guidelines: disclosure requirements are specified in NI 81-101 and NI 81-106; the independent review committee requirements are in NI 81-107; and rules for sales practices are contained in NI 81-105.

Some funds operate under National Instrument 81-104 *Commodity Pools* and are thus able to invest in specified derivatives and physical commodities in a manner that is not permitted in NI 81-102. As well, funds may apply to be exempted from some of the NI 81-102 rules. Recently, in response to an interest by fund managers to offer funds that invest outside the limits in NI 81-102, the CSA has put forward an Alternative Funds Proposal to allow such funds to pursue strategies and invest in securities not permitted under NI 81-102. As part of this proposal, the CSA is considering feedback on various issues, including different naming conventions for these alternative funds, a proposed maximum leverage ratio for alternative funds and allowing these funds to undertake short-selling beyond the limits in NI 81-102 (Canadian Securities Administrators 2015).

- 1 For more information on the CSA, see <http://www.securities-administrators.ca/aboutcsa.aspx?id=77>.
- 2 For example, a fund may suspend redemptions if normal trading of securities that represent at least 50 per cent of the fund's assets is suspended on exchanges or upon the approval of securities regulators.

Canadian Mutual Funds: Potential Vulnerabilities

The Bank of Canada's approach to assessing vulnerabilities in the Canadian financial system identifies four vulnerabilities that have the potential to create systemic risk: funding and liquidity mismatch, leverage, the pricing of risk, and opacity (Christensen et al. 2015). Since mutual funds are generally transparent (i.e., they disclose their entire portfolio on a semi-annual basis), this report focuses on the first two vulnerabilities: funding and liquidity mismatch and leverage.

Funding and liquidity vulnerabilities are low

A mutual fund provides investors with the ability to hold illiquid assets (those that cannot be readily sold, used as margin or used as collateral to raise funds) or assets with long maturities in a vehicle that offers day-to-day liquidity. However, this potential for maturity and liquidity transformation exposes the fund to the risk of large redemptions and could create a first-mover advantage if the price at which investors redeem their shares is greater than the price the fund will receive for liquidating the underlying assets. This can occur with money market funds that maintain a fixed share price but is less likely to occur with the long-term mutual funds examined here, since they maintain a variable share price. In long-term mutual funds, this first-mover advantage can happen if

the fund incurs significant liquidation costs when selling its assets that are not reflected in the price (net asset value, or NAV) paid to redeemers.⁶ Since the first-mover advantage is stronger in funds that hold more illiquid, infrequently traded assets (Chen, Goldstein and Jiang 2010), this financial stability concern is likely to be more acute in fixed-income funds that hold less-liquid assets.

Large redemptions from a fund or group of funds should not, in themselves, cause a disruption to the market prices of the underlying assets. Three conditions must be met for large redemptions to lead to disruptive fire sales:⁷ (i) all other sources of liquidity for the fund must be exhausted, requiring the fund to sell its less-liquid portfolio holdings to meet the redemption requests; (ii) the sale by the fund (or group of funds) has to be large relative to the overall market into which it is selling; and (iii) other investors and market-makers—who would normally provide liquidity to the fund by buying or selling the underlying assets—must also be constrained to the point that they would require an abnormally high discount to purchase the security.

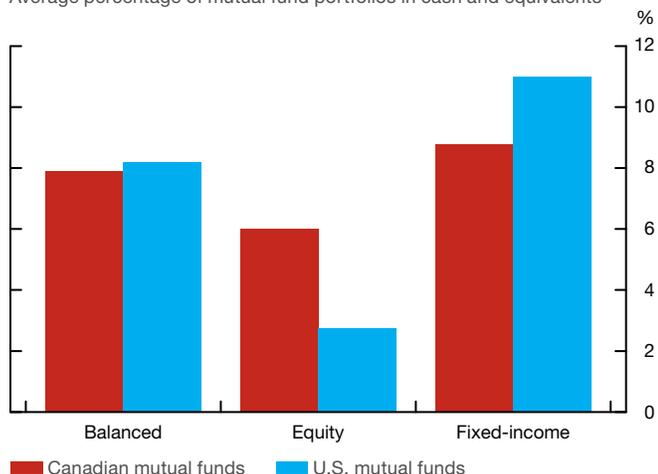
⁶ This effect may be limited for two reasons. First, the fund manager has a duty to treat its unitholders fairly and not give preferential treatment to any unitholder (e.g., first movers). Second, funds are often aware of large redemptions occurring during the day and may attempt to sell less-liquid assets before the end of day, thus reflecting the cost of these redemptions in the end-of-day price that the redeeming unitholders receive.

⁷ A fire sale is a forced sale of assets at a dislocated price (Shleifer and Vishny 2011).

In general, Canadian mutual funds appear to be managing this liquidity risk effectively. First, funds are limited in the amount of illiquid assets they can include in their portfolio, and those that hold illiquid assets should and do hold more cash and cash equivalents.⁸ For example, funds that invest in fixed-income securities hold more

Chart 3: Funds holding less-liquid securities tend to hold more cash

Average percentage of mutual fund portfolios in cash and equivalents



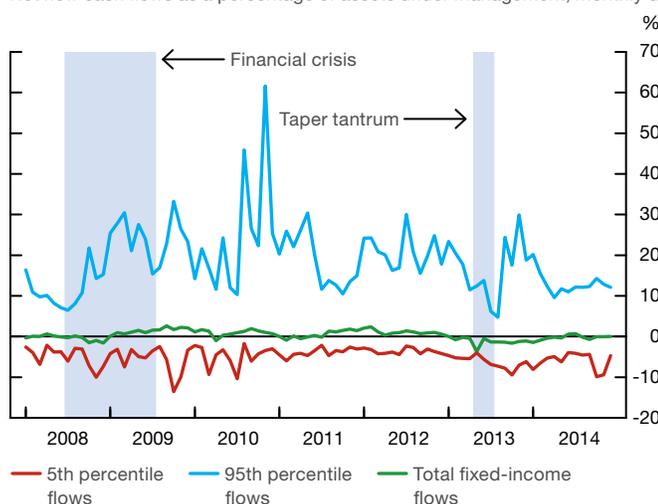
Note: These data exclude funds of funds.

Source: Morningstar

Last observation: 31 January 2015

Chart 4: Flows of Canadian fixed-income funds have been stable during past stress episodes

Net new cash flows as a percentage of assets under management, monthly data



Note: The “taper tantrum” refers to the episode in the summer of 2013 following remarks that the former Chairman of the Federal Reserve, Ben Bernanke, made in a speech on 22 May regarding the possible curtailing of the Federal Reserve’s asset purchase programs.

Sources: Morningstar and Investment Funds Institute of Canada

Last observation: 31 December 2014

cash and equivalents than funds invested in equities, which are generally considered to be more-liquid investments (Chart 3).⁹ Within the fixed-income category, U.S. funds with less-liquid securities hold more cash (International Monetary Fund 2015). Second, the average cash holdings of funds can cover redemptions under most circumstances. The average fixed-income fund keeps enough cash and equivalents to cover unusually large redemptions.¹⁰ In addition, Canadian mutual funds have a predominantly retail investor base that is focused mostly on long-term investing.¹¹ Although it is theoretically possible, for example, for all investors in Canadian fixed-income funds to redeem their shares *en masse*, Canadian fixed-income flows have been stable during past periods of stress (Chart 4).¹² As well, in the United States, monthly outflows by category have not been large historically, even during times of market stress (Collins 2015).

Leverage in Canadian mutual funds is limited

Leverage allows mutual funds to increase their exposure to a particular asset or asset class. In addition to borrowing, mutual funds can obtain leverage synthetically through the purchase of derivatives or structured securities with embedded leverage.¹³ Sometimes, exposure through synthetic leverage can be more cost-efficient and liquid than an underlying investment in the physical asset.¹⁴ Large amounts of leverage can amplify financial stress, however, by increasing the likelihood of margin calls, liquidity constraints and, ultimately, asset sales by a fund. Increased leverage can also cause a fund’s losses to spread to its creditors and derivatives counterparties, which may include systemically important financial institutions.

In Canada, securities regulation limits the potential for a mutual fund to be leveraged. For example, National Instrument 81-102 *Investment Funds* specifies that cash

⁹ To avoid double-counting, this analysis excludes funds of funds (mutual funds that invest in other mutual funds instead of holding securities directly), which will be discussed later in the report.

¹⁰ In 2013, the average fixed-income fund held about 10 per cent of its assets in cash equivalents, while only 5 per cent of fixed-income funds experienced monthly outflows greater than 6 per cent of their assets, on average, during this period.

¹¹ During the financial crisis, institutional U.S. money market funds experienced more outflows than retail funds did during the run on the Reserve Primary Fund in September 2008 (McCabe 2010; Schmidt, Timmermann and Wermers 2014).

¹² Chart 4 shows measures at the 5th and 95th percentiles of net flows across fixed-income funds for each month, together with industry total flows. For example, in December 2012 the 5th percentile of net flows was -4.2 per cent, indicating that 5 per cent of fixed-income funds had net flows less than -4.2 per cent (i.e., net outflows greater than 4.2 per cent) in that month.

¹³ For example, in the United States, 65 of the top 100 fixed-income funds by size as of 2004 used credit default swaps (CDSs) between 2004 and 2008, and the mean total notional value of these CDSs relative to the funds’ NAV increased from 2 per cent to almost 14 per cent (Adam and Guettler 2010).

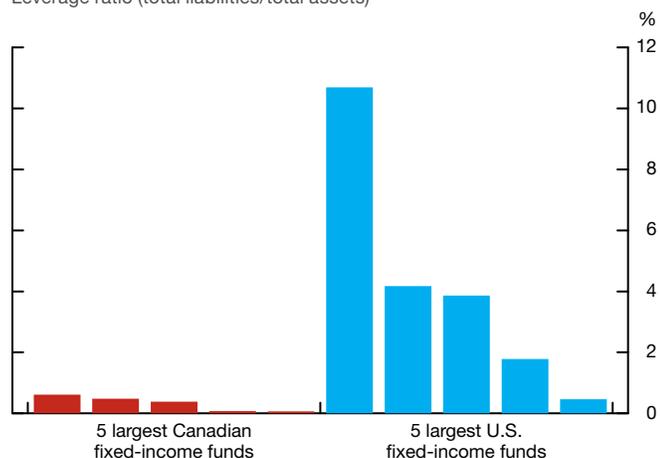
¹⁴ Individual retail investors may prefer to access derivatives trading through mutual funds, since they are unable to access them directly because transactions are either too large or uneconomical (Johnson and Yu 2004).

⁸ National Instrument 81-102 *Investment Funds* restricts a mutual fund from having more than 15 per cent of its net asset value in illiquid assets.

borrowings and the provision of a “security interest over any of its portfolio assets” are allowed only if they are temporary and used to meet redemptions or to settle transactions and do not exceed 5 per cent of the fund’s assets. This instrument also includes limits on derivatives exposures, short-selling and the ability to undertake securities-financing transactions. As a result of this regulation, all of the largest fixed-income mutual funds in Canada have leverage ratios (the ratio of liabilities to assets) of less than 1 per cent (Chart 5).¹⁵

Chart 5: Canadian fixed-income funds have low leverage ratios

Leverage ratio (total liabilities/total assets)



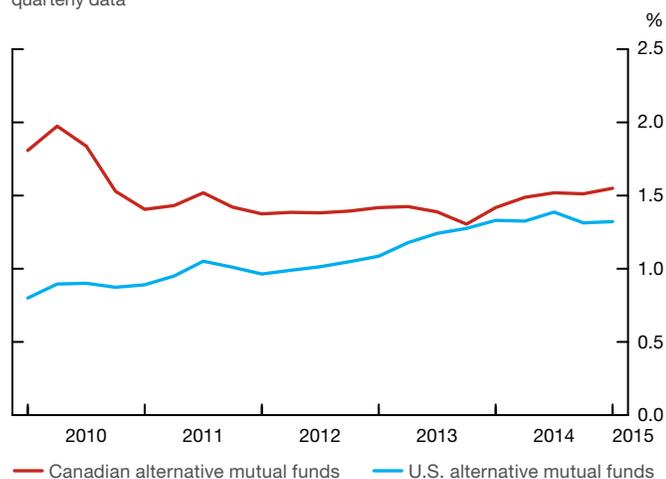
Note: These data exclude funds of funds.

Sources: Morningstar and funds’ latest annual or semi-annual reports

Last observation: 31 March 2015

Chart 6: Alternative mutual funds account for less than 2 per cent of the industry

AUM of alternative mutual funds as a percentage of total industry AUM by country, quarterly data



Note: AUM = assets under management. These data exclude funds of funds.

Source: Morningstar

Last observation: 31 March 2015

In comparison, the leverage ratios of the largest U.S. fixed-income funds range up to 11 per cent, but most of these liabilities are payables associated with the purchases of portfolio investments. None of the largest Canadian mutual funds has derivatives-related liabilities (the market value of current exposures) greater than 0.5 per cent of its assets.¹⁶ It therefore seems unlikely that problems in a creditor or derivatives counterparty could transmit stress to the fund. Similarly, it is also unlikely that problems in one of these funds could cause substantial losses to its creditors or derivatives counterparties, especially since counterparties are typically much larger than the funds themselves.

Alternative funds (i.e., publicly offered investment funds that have investments or strategies not permitted under National Instrument 81-102) may have greater redemption risk than traditional mutual funds, given that some of these funds hold illiquid assets (e.g., real estate) or use more derivatives than traditional mutual funds do (Box 1).¹⁷ However, since alternative funds account for less than 2 per cent of Canadian mutual fund assets, it is unlikely that stress in this sector would be transmitted more broadly (Chart 6).

Canadian Financial System Vulnerabilities to Mutual Funds

A material adverse shock to a mutual fund will not likely transmit broader stress to the Canadian financial system since these funds are not large or highly interconnected with other parts of the system.

No single Canadian mutual fund is large enough to directly cause systemic stress

The largest mutual funds in Canada are not dominant players in the markets in which they invest. Only six Canadian funds (one equity fund, two fixed-income funds and three balanced funds) have more than Can\$10 billion in assets (Chart 7).¹⁸ Four of these funds hold primarily equities and account for less than 1 per cent of the total market capitalization of the Toronto Stock Exchange. Moreover, they are not dominant players relative to other funds in their categories. For example, the five largest Canadian equity, balanced and fixed-income mutual funds hold 9, 20 and 21 per cent of fund assets under management in their respective categories (Chart 8).

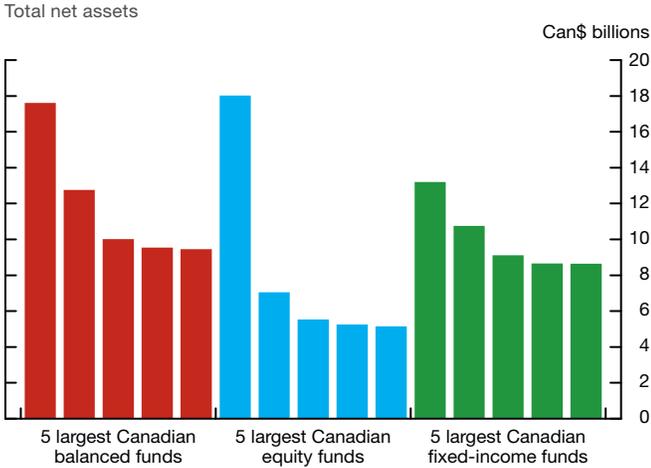
¹⁶ Fund annual reports do not provide information on potential future exposures.

¹⁷ While hedge funds pursue strategies using leverage and derivatives, they manage the associated liquidity risk by imposing redemption restrictions such as gates (i.e., limitations on the amount of withdrawals on any withdrawal date to a stated percentage of a fund’s net assets) or lock-up periods.

¹⁸ This is one-tenth of the threshold used by the Financial Stability Board in its initial criteria for identifying a fund as globally systemically important (FSB-IOSCO 2015).

¹⁵ The leverage ratios of the largest equity and balanced funds are even smaller.

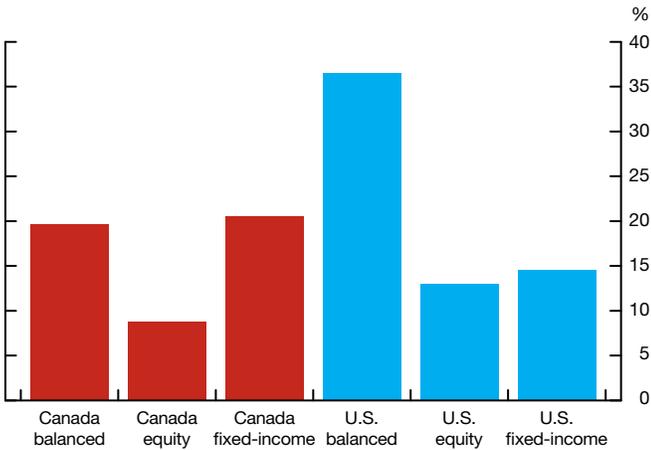
Chart 7: Only six mutual funds in Canada have more than Can\$10 billion in assets



Note: These data exclude funds of funds.
Sources: Morningstar and funds' latest annual or semi-annual reports
Last observation: 31 December 2014

Chart 8: Large funds are not dominant players in their markets

AUM of 5 largest mutual funds as a percentage of category AUM, in Canada and the United States

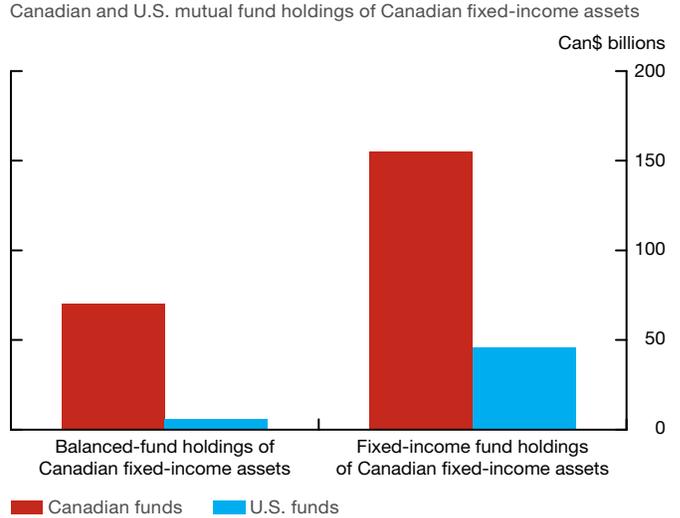


Note: AUM = assets under management. These data exclude funds of funds.
Source: Morningstar
Last observation: 31 December 2014

U.S.-domiciled fixed-income funds are important but not dominant participants in Canadian bond markets

Although some U.S.-domiciled funds are larger, more leveraged and more complex than Canadian funds, the exposure of the Canadian market to stress in a particular U.S. fund is limited. While, individually, the largest U.S. fixed-income funds are much bigger than their Canadian counterparts, they have smaller holdings of Canadian assets than the largest Canadian funds do. As well, in the aggregate, U.S. funds hold fewer Canadian fixed-income assets than Canadian funds do (Chart 9).

Chart 9: U.S. funds hold fewer Canadian fixed-income assets than Canadian funds do



Note: These data exclude funds of funds.
Source: Morningstar
Last observation: 31 December 2014

Funds are unlikely to simultaneously engage in a disruptive sell-off of less-liquid fixed-income assets

Fixed-income mutual funds have similar objectives and many measure their performance against the same benchmark, which exposes them to the same shocks and generates common exposures. As at December 2014, approximately 60 per cent of domestic fixed-income mutual funds (by assets under management) in Canada benchmarked their performance against the FTSE TMX Canada Universe Bond Index.¹⁹ Fund managers that follow the same benchmark could behave similarly in a period of stress. For example, fear of job loss through underperformance relative to his or her peers may cause a manager to follow investment strategies that are similar to those of other fund managers in the category. This “last-place aversion” could also motivate fund managers to sell investments at the same time as others.²⁰

However, the most widely followed benchmarks are usually composed of large, liquid and highly rated securities. As well, about 30 per cent of fixed-income assets are held directly by balanced funds that invest a large proportion of their portfolios in equities, which are more liquid. Therefore, these funds would be unlikely to engage in a disruptive sell-off of less-liquid fixed-income assets. Further, flows of fixed-income funds have been stable across the industry during past periods of stress (Chart 4).

¹⁹ However, other benchmarks are often subindexes of those that are most widely followed.
²⁰ Morris and Shin (2014) show how last-place aversion can result in a sharp rise in risk premiums following a small tightening of monetary policy. This rise is increasing as mutual funds become more important participants in markets.

Stress is unlikely to be propagated through a mutual fund family

A mutual fund family is a group of funds administered and sold by the same mutual fund management firm. In Canada, the top 10 mutual fund management firms manage close to 70 per cent of Canadian mutual fund assets,²¹ and many of these firms are wholly owned subsidiaries of Canadian banks or insurers. While stress in one mutual fund could be transmitted to other funds in the family or to the management firm (and affiliated financial institution), this potential is well contained.

The fund management firm and affiliated financial institution are unlikely to suffer losses associated with a poorly performing fund. First, since funds are separate legal entities from their management firm and other funds, their interconnectedness is limited (Box 2). Second, unlike money market funds, there is no implicit guarantee that a fund will maintain its price at a certain level and, therefore, there should be no expectation that

the fund management firm or its affiliate would support a poorly performing fund. Third, although the fund management firm or its affiliate may in some rare cases provide explicit guarantees to the fund, any such exposures to mutual funds that banks have would attract prudential capital and liquidity requirements.²² In addition, since the mutual funds are much smaller than the financial institutions, even if support were required, the large Canadian banks should be well positioned to cope with any stress emanating from funds of their affiliated asset manager.

Regarding funds of funds, the associated vulnerability is also limited. In Canada, approximately one-quarter of mutual fund assets is in funds of funds, the largest of which is Can\$17 billion. Although the fund-of-funds structure could be a source of contagion within a mutual fund family, it can also mitigate the effect of outflows from the underlying funds. For example, a fund of funds could purchase shares in an underlying

²¹ In contrast, as at 31 December 2013, the share of U.S. mutual fund assets managed by the 10 largest U.S. firms was 53 per cent.

²² Occasionally, the fund management firm or an affiliate promises to support the fund by, for example, buying fund assets (e.g., mortgages) or providing liquidity when redemptions exceed the fund's liquid assets.

Box 2

Legal Structure of Canadian Open-End Mutual Funds

An open-end mutual fund is a professionally managed investment vehicle that pools money from individuals and corporations and invests in securities. Most open-end mutual funds in Canada (approximately 90 per cent) are organized as trusts, which are separate legal entities from the management company that administers them and from other funds that belong to the same family.¹ Investors are unitholders (i.e., owners) of the fund. The fund manager is the entity that establishes the fund, directs its business and operations, and provides services or retains the third-party services required to operate the fund (Table 2-A). In some cases, these third-party service providers are affiliated with the fund manager.

Table 2-A: Organization and management of an open-end mutual fund

Stakeholder	Responsibility
Unitholder	Owns a share of the assets of the fund.
Independent review committee	Reviews and provides input on conflict of interest matters; provides advice on issues relating to the management of the fund; and prepares an annual report on its activities. The independent review committee is composed of members that are independent from the fund manager and entities related to the fund manager.
Fund manager	Establishes the fund; acts as trustee of the fund's assets; directs its business and operations; and provides services or retains third-party services, such as portfolio management.
Principal distributor	Markets and sells units of the fund.
Custodian	Holds the fund's assets, maintaining them separately to protect unitholder interests.
Auditor	Certifies the fund's financial statements.
Registrar	Keeps records of who owns the fund's units.
Securities-lending agent	Administers securities-lending transactions entered into by the fund.

Source: Bank of Canada using information from various simplified prospectuses

¹ In Canada, mutual fund corporations have recently grown in size and now represent the remaining 10 per cent of Canadian mutual fund assets. Mutual fund corporations have risen in popularity because they provide additional tax benefits that are not provided by mutual fund trusts. A single mutual fund corporation may be composed of several funds, each represented by a different class of shares. Thus, while still separate legal entities from their management company, mutual funds within the corporation are not separate legal entities.

fund that is experiencing outflows, thereby lessening the likelihood that the outflows would lead to a fire sale at the underlying fund.²³

Conclusion

Mutual funds have grown markedly in Canada and around the world. Since this growth is the result of a demographic change in which an aging population increases its savings toward retirement, a trend that is likely to continue into the future (Haldane 2014), it is important to understand the nature of any vulnerability this ongoing shift could create in the financial system. Overall, Canada's largest mutual funds do not represent an important area of vulnerability for the Canadian financial system at this time. They are not dominant players in their markets and, because of regulation, they use limited leverage; they also hold a sufficient level of cash and

other sources of liquidity to manage investor redemptions. Funds that invest in less-liquid securities also tend to hold relatively more cash and other liquid assets.

Since fixed-income mutual funds represent a non-negligible proportion of Canadian corporate and government fixed-income markets, a sell-off triggered by outflows could, at least in principle, cause significant price volatility in these markets. Nevertheless, redemption behaviour during past periods of stress was contained, suggesting that this potential vulnerability is limited. Finally, although many Canadian fund management firms are affiliated with a major bank, these banks are unlikely to suffer losses from stress in any of the management firm's funds, since funds and their management firms are separate legal entities and there is no implicit expectation that a long-term mutual fund's price would be supported to maintain a certain value.

Given the continued growth in mutual funds and the potential, in principle, for vulnerabilities to emerge in the future, the Bank of Canada will continue to monitor developments in this sector.

²³ For evidence of this mechanism, see Bhattacharya, Lee and Pool (2013). Some funds of funds may have a fixed allocation to underlying funds and may rebalance their portfolio automatically. Therefore, they may not necessarily purchase shares in an underlying fund with the intent of providing a liquidity buffer to the underlying fund.

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