

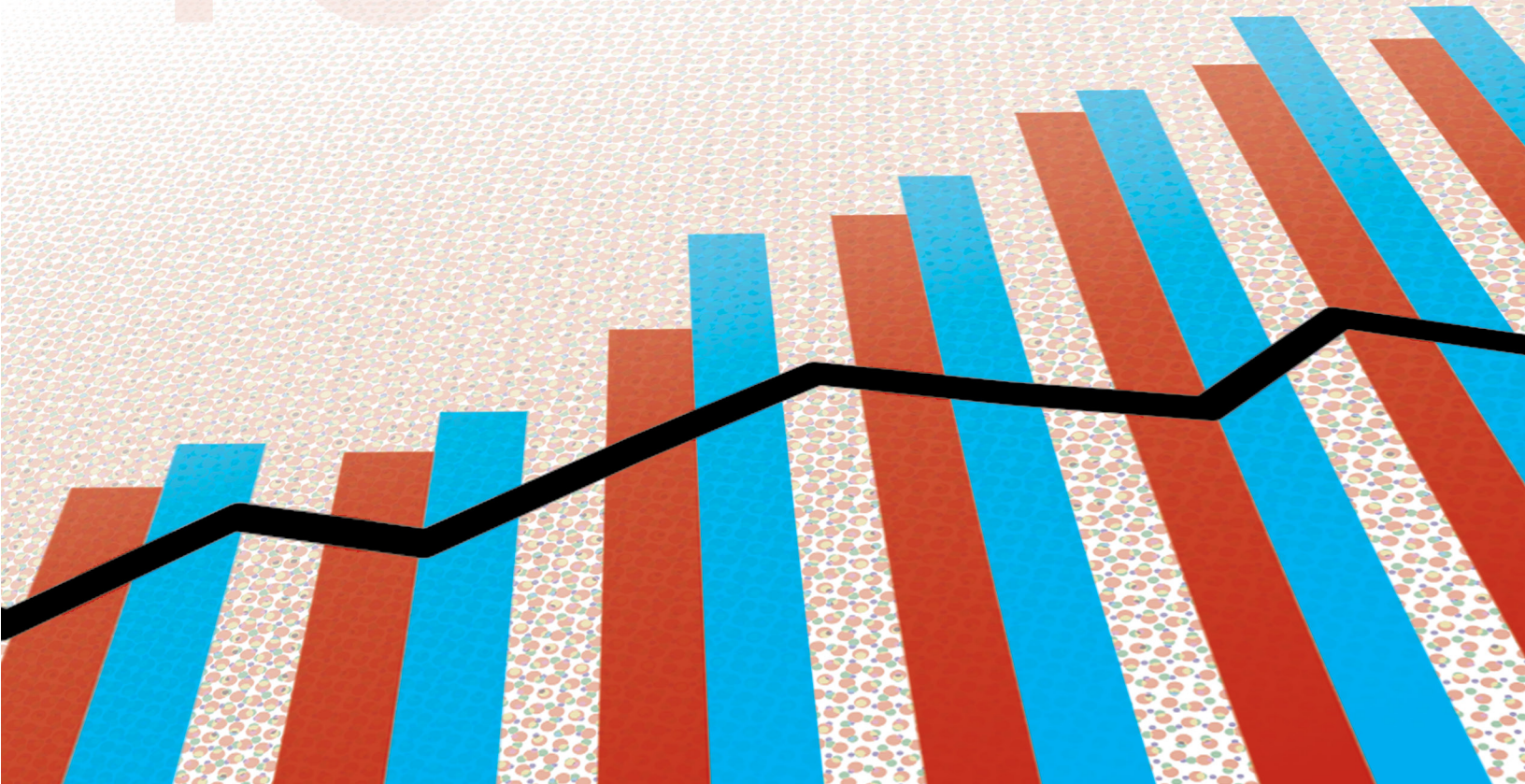


BANK OF CANADA  
BANQUE DU CANADA

# FINANCIAL SYSTEM REVIEW

December 2015

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The *Financial System Review* is available on the Bank of Canada's website at [bankofcanada.ca](http://bankofcanada.ca).

**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](mailto:info@bankofcanada.ca); Website: [bankofcanada.ca](http://bankofcanada.ca)

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# Financial System Review

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December 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 8 December 2015, except for Statistics Canada's National Balance Sheet Accounts, which were updated on 14 December 2015.

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# Preface

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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, manage the associated risks, and acquire and dispose of 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 various liquidity and lender-of-last-resort facilities; overseeing key Canadian payment clearing and settlement systems; conducting and publishing analyses and research; and collaborating with 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 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 system with a view to identifying potential risks to its overall soundness, as well as highlighting the efforts of the Bank, and other Canadian 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 Canadian 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 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.

# Overview

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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 analysis of Canadian vulnerabilities and the assessment of the financial system risks for Canada that follow.

Global economic growth remains modest. The U.S. economy is experiencing a solid expansion, while the pace of activity in some emerging-market economies (EMEs) has slowed, weighing on commodity prices. In Canada, economic momentum has firmed in the second half of 2015, as expected. Going forward, global growth is projected to pick up, while downside risks to this outlook have decreased slightly and are increasingly concentrated in EMEs.

The global financial system continues to adapt to important cyclical and structural changes, including shifts in economic growth across regions, changes in global capital flows, profound adjustments in commodity prices and major exchange rates, as well as the impacts of ongoing financial sector regulatory reforms and uncertainty about central bank actions.

There have been several notable developments in global financial markets since the June FSR. In August, market volatility spiked temporarily in response to concerns about the Chinese economy. Monetary policy divergence has become a more prominent theme: market expectations of an increase in U.S. policy interest rates have recently firmed and the European Central Bank (ECB) announced new easing measures. Overall financial conditions in Canada and other advanced economies remain accommodative despite an increase in corporate bond spreads.

An ambitious regulatory reform agenda continues to improve the resilience of the global and Canadian financial systems. Overall, the Canadian financial system is stable and is functioning effectively.

The Bank is highlighting three key financial system vulnerabilities in Canada.

## 1. Elevated level of Canadian household indebtedness

- Household debt is increasing due to the strength in mortgage credit growth spurred by low interest rates and rising house prices. Income growth is not keeping pace, leading to higher household indebtedness. In addition, debt has become more concentrated over time in the hands of more highly indebted younger households, who may have less capacity

to cope financially with a job loss or an unexpected interest rate increase. The household sector is therefore less resilient and, during times of stress, defaults may increase, creating losses for lenders. Nonetheless, the most likely scenario is a gradual decline in this vulnerability as the economy and incomes grow and interest rates slowly normalize.

## 2. Imbalances in the Canadian housing market

- The rise in household debt stemming from mortgage credit growth both supports and is fuelled by ongoing increases in house prices. Regional housing markets continue to evolve along different tracks, with strength in price growth and activity particularly concentrated in Vancouver and Toronto. The rapid growth in prices in these housing markets increases their vulnerability to an adverse shock to housing demand.

## 3. Uncertain market liquidity in fixed-income markets

- Fixed-income markets are perceived to have become more prone to bouts of illiquidity in many jurisdictions, including Canada. A rapid drop in market liquidity could amplify price changes and increase volatility, inducing widespread portfolio adjustments among investors and leading to transmission of stress across other asset classes and market participants.

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. Risks are highlighted in the FSR to illustrate the possible effects of vulnerabilities on the financial system. The selected risks are not intended to be a comprehensive list of potential negative outcomes, and they may change over time to allow for the examination of different triggers and vulnerabilities.

Three of the four key risks to the Canadian financial system are similar to those identified in the June 2015 FSR. In light of the large fall in commodity prices, a new risk of prolonged weakness in commodity prices has been added, while the risk associated with severe financial stress in the euro area has been removed.

1. The most important domestic financial system risk continues to be that of a severe recession and a sharp, widespread rise in unemployment that reduce the ability of households to service their debt, leading to a broad-based decline in house prices.
  - The rating of this risk remains "elevated," as in the June FSR.
  - Vulnerabilities associated with high household debt and imbalances in the housing market continue to edge higher. If the risk were to materialize, the impact on the economy and the financial system would be severe. However, the financial system is resilient; the implementation of recent reforms has increased capital and liquidity buffers. In addition, the expected strengthening of economic growth both globally and in Canada implies that the probability of this risk materializing remains low.



2. The Canadian financial system remains exposed to the possibility of sharply higher global risk premiums.<sup>1</sup> Market overreaction to increased uncertainty about global economic growth or future monetary policy in the United States or Europe could result in a rapid rise in global risk premiums, with spillovers to Canadian asset markets and adverse effects on financing costs.
  - The risk continues to be rated as “moderate,” with a low probability of occurring and a moderately severe impact on the Canadian financial system if it were to materialize.
  - Central banks could adjust their monetary policies, which may mitigate the increase in global risk premiums and its adverse effects.
3. The Canadian financial system could be disrupted by economic and financial stress in China and other EMEs.
  - The rating for this risk is “elevated”: the probability of it occurring is medium, and the effects on the financial system would be moderately severe if it materialized.
  - The Chinese economy and financial system are in the midst of a major structural transition, while growth in other EMEs—particularly those that depend on commodity exports—has disappointed. A further slowdown in growth or a disorderly depreciation of local currencies could trigger key financial sector vulnerabilities in EMEs, including a significant buildup in sovereign and corporate debt, some of which is denominated in foreign currencies.
4. Prolonged weakness in commodity prices, at current or somewhat lower levels, could adversely affect the Canadian financial system.
  - The risk is rated as “moderate.”
  - There is a medium probability that commodity prices will remain weak for a protracted period of time and lead to increased financial system stress. The diversity of the Canadian economy and financial system suggests that the severity of the risk, should it materialize, would be relatively low.

The risk that financial stress in the euro area could adversely affect the Canadian financial system is no longer highlighted. The overall financial situation in Europe has stabilized as European authorities have made some progress on reforms to address structural weaknesses and financial vulnerabilities. Actions taken by the ECB have reduced financial fragmentation between the periphery and the core countries. The successful negotiation of a Greek bailout deal and the removal of legal uncertainty around the ECB’s Outright Monetary Transactions have decreased the probability of a Greek exit from the euro area. Stress tests on Greek banks have also revealed a lower capital shortfall than expected, and Greek bond spreads have since declined. Nonetheless, it remains possible that another flare-up of stress could occur.<sup>2</sup> The Bank continues to monitor the situation closely.

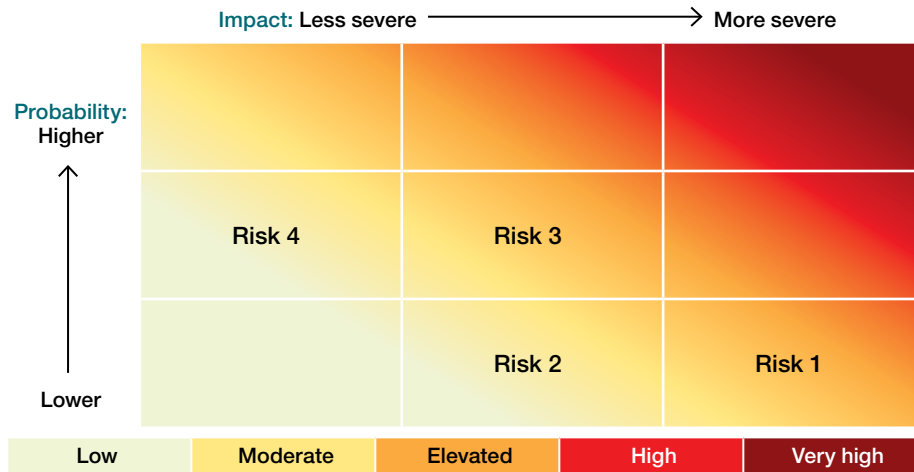
A summary of the key risks to the Canadian financial system, together with their current rankings, is presented in **Table 1**.

<sup>1</sup> The name of Risk 2 in this FSR has changed to clarify the risk scenario, but the scope of the risk remains the same as in the June 2015 FSR.

<sup>2</sup> According to the International Monetary Fund (IMF), the level of Greek debt remains unsustainable. See “Statement by IMF Managing Director Christine Lagarde on Greece,” Press release No. 15/381, 14 August 2015, at <https://www.imf.org/external/np/sec/pr/2015/pr15381.htm>.

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

Risk 1: Household financial stress and a sharp correction in house prices	
Risk 2: An abrupt increase in global risk premiums	
Risk 3: Stress emanating from China and other EMEs	
Risk 4: Prolonged weakness in commodity prices	



# Assessment of Vulnerabilities and Risks

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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, key vulnerabilities in the Canadian financial system that could amplify and propagate shocks are identified and examined. The principal risks to the Canadian financial system that may arise in the context of those vulnerabilities are then assessed.

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 mitigate these vulnerabilities and reduce the likelihood of the risks materializing or their impact if they do occur. The FSR therefore focuses on downside risks, which are usually low-probability events that have the potential for a significant negative impact on the financial system and the economy should they occur.<sup>3</sup>

## Macrofinancial Conditions

### *Prospects for economic growth are shifting around the globe, in concert with material movements in exchange rates and commodity prices*

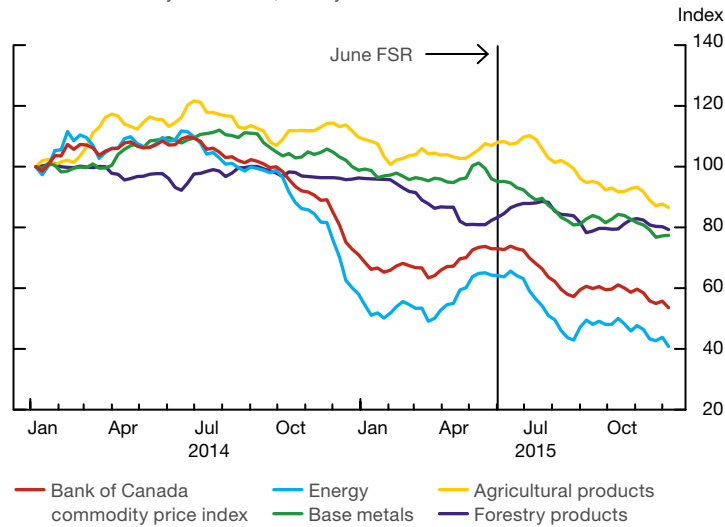
The U.S. economy has continued its solid expansion, while the recovery in other advanced economies is progressing more gradually. Softening growth in a number of emerging-market economies (EMEs)—including from a major structural transition in China—has weighed on global economic activity, commodity prices and investor sentiment (Chart 1). In Canada, there has been a pickup in growth in the second half of 2015, with ongoing weakness in the resource-intensive industries being more than offset by positive developments in other sectors. Divergent prospects for growth and monetary policy across major economies, combined with large declines in global commodity prices, have led to significant exchange rate adjustments over the past 18 months (Chart 2).

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<sup>3</sup> The focus on these downside risks should not be interpreted as implying a deterioration in the balance of risks around the economic outlook presented in the Bank's *Monetary Policy Report*.

**Chart 1: Commodity prices have weakened further**

Indexes: 7 January 2014 = 100, weekly data

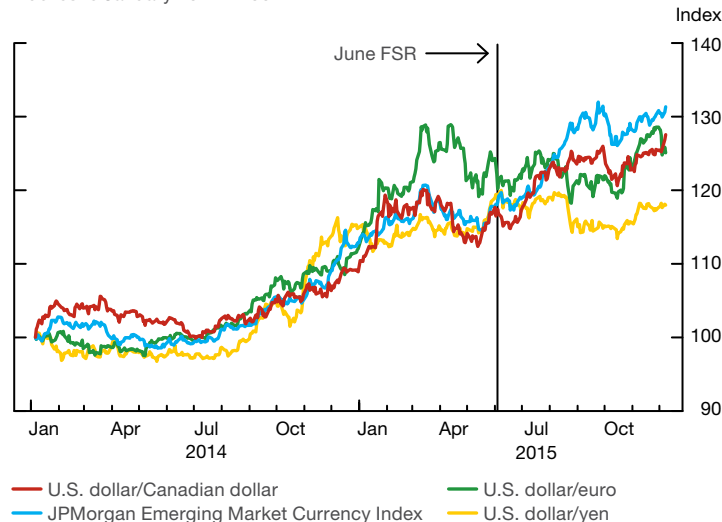


Source: Bank of Canada

Last observation: 8 December 2015

**Chart 2: The U.S. dollar has appreciated sharply over the past 18 months**

Indexes: 6 January 2014 = 100



Note: The JPMorgan Emerging Market Currency Index is an index of emerging-market currencies against the U.S. dollar and has been inverted to allow comparability with other exchange rates.

Sources: Bloomberg, European Central Bank, Bank of Japan and Bank of Canada (including calculations)

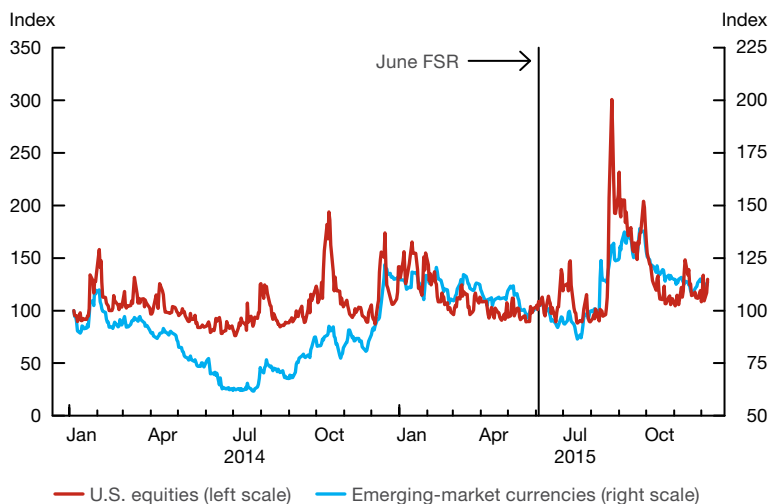
Last observation: 8 December 2015

### *Concerns about the outlook for growth in China triggered a bout of market volatility*

Heightened market concerns about the implications of slowing Chinese growth for the global economy, a decline in the value of the renminbi and a correction in Chinese equity markets triggered a bout of higher volatility in global financial markets in August. Global equity prices and many emerging-market currencies, for example, experienced sharp increases in implied volatility at this time (Chart 3). This heightened volatility was short-lived, however, with market conditions stabilizing in early October.

**Chart 3: After increasing sharply in August, implied volatility has diminished**

Indexes: 6 January 2014 = 100



Note: Measures include the VIX (U.S. equities) and the JPMorgan Emerging Market Volatility Index (emerging-market currencies).

Source: Bloomberg

Last observation: 8 December 2015

### *Expectations of a rise in the federal funds rate have firmed*

Despite the spate of higher market volatility across markets in August and September, government bond yields worldwide have traded in a relatively tight range since the June FSR. U.S. Treasury yields started to rise in early October because of rekindled expectations of tightening by the Federal Open Market Committee, and markets are now pricing in a high likelihood of a rate increase in December. Nonetheless, markets continue to expect a very gradual increase in rates thereafter, and estimated term premiums priced into Treasury yields remain at exceptionally low levels. The European Central Bank (ECB) announced new easing measures at its December meeting, including a 10-basis-point cut in the deposit rate and an extension of the asset-buying program into 2017. Overall, government bond yields remain slightly above their recent lows (Chart 4).

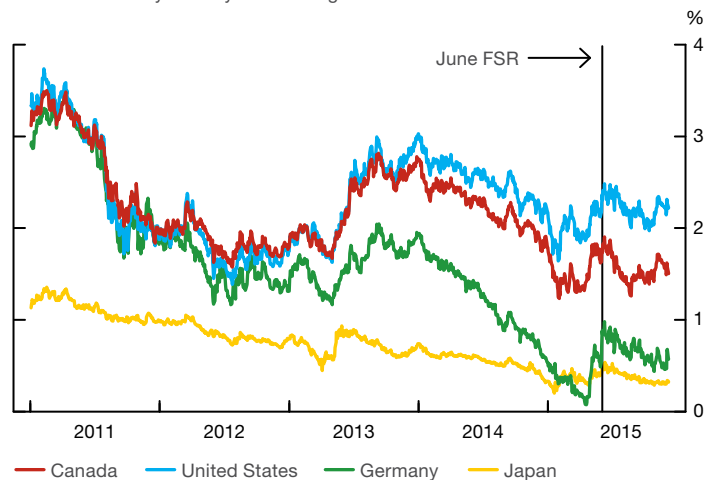
In Canada, longer-term government bond yields have generally moved in line with those in the United States, while shorter-term yields have risen less, reflecting perceived differences in monetary policy prospects. There has been a greater divergence between U.S. government bond yields and those of some other jurisdictions—notably, the euro area and Japan. Monetary policy divergences have re-emerged as an important factor in exchange rate markets.

### *Credit market conditions have generally tightened...*

Conditions in corporate bond markets have tightened since the June FSR, with spreads on U.S. high-yield bonds increasing, driven in large part by higher spreads on bonds issued by the oil and gas sector. U.S. investment-grade spreads have also widened, possibly reflecting investor concerns about increased leverage, as indicated by slower earnings growth amid continued strong bond issuance (Chart 5).

**Chart 4: Yields on long-term government bonds remain slightly above recent lows**

Yields to maturity on 10-year sovereign bonds

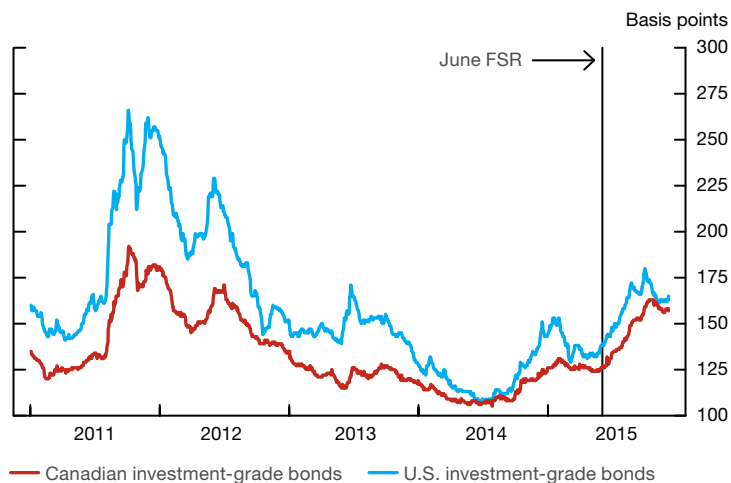


Source: Bloomberg

Last observation: 8 December 2015

**Chart 5: U.S. and Canadian corporate bond spreads have widened**

Option-adjusted spreads between corporate bonds and government bonds



Source: Bank of America Merrill Lynch

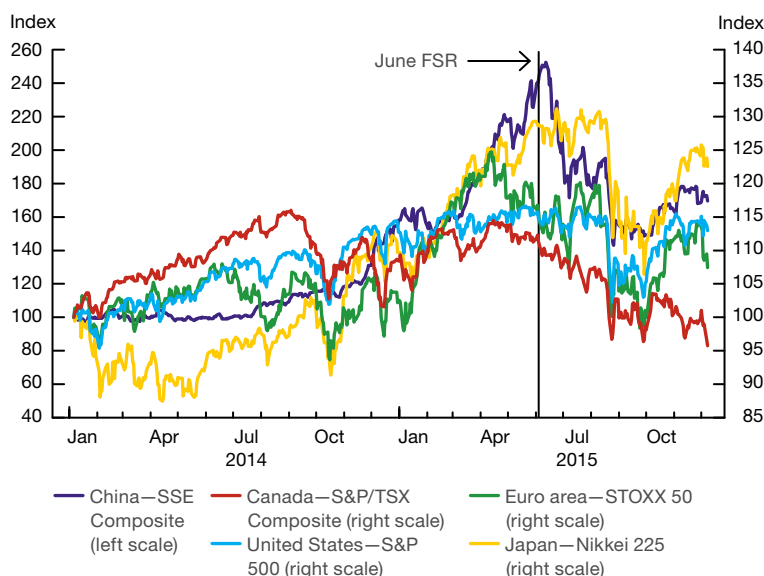
Last observation: 8 December 2015

In contrast to the tightening in credit conditions, U.S. equities have recovered almost all of their August decline and have again moved close to record highs (**Chart 6**). This recovery occurred despite a decline in earnings from levels seen last year, caused in part by the stronger U.S. dollar. As a result, valuation levels as measured by price-to-earnings ratios remain above their historical norms. Most other global equity markets have rebounded somewhat from their August lows. However, Canadian equities—given their large exposure to commodities, at roughly 30 per cent of the S&P/TSX Composite Index—have declined by almost 15 per cent since the June FSR and have not recovered from the decline in August.

Some market anomalies have also emerged in recent months. For example, U.S.-dollar interest rate swap spreads (the spread between the fixed leg of a swap and the corresponding Treasury yield), across tenors of 3 years

**Chart 6: Many equity indexes have rebounded following August's sharp decline**

Indexes: 6 January 2014 = 100



Source: Bloomberg

Last observation: 8 December 2015

and above, have become negative.<sup>4</sup> These spreads are typically positive to provide a premium for counterparty risk in swaps. The spreads turned negative during the financial crisis, reflecting bank funding stresses. Although the recent decline is likely driven by different factors, it remains important to monitor these anomalies since they could indicate market stresses that could exacerbate liquidity concerns.<sup>5</sup>

### *...yet financing conditions for Canadian households and businesses remain stimulative*

Average borrowing rates for households and businesses in Canada initially declined following the Bank's policy rate cut in July but subsequently increased due, in part, to changes in bank funding costs. Canadian corporate investment-grade bond yields also rose, from 2.6 per cent in June to their current level of 2.8 per cent, as a result of some widening of corporate spreads. Overall, financing conditions for households and businesses in Canada remain stimulative.

### *The balance sheets of Canadian banks remain healthy*

The Big Six Canadian banks reported strong earnings for the 2015 fiscal year, with provisions for credit losses continuing to be low despite the impact of weak oil and other commodity prices on economic activity. The banks have also continued to build up their capital bases, on average, with common equity Tier 1 capital ratios and Basel III leverage ratios both improving and exceeding minimums required by the Office of the Superintendent of Financial Institutions (OSFI). In addition, regulatory liquidity measures indicate solid liquidity positions: the average Liquidity Coverage Ratio is well above regulatory minimums and is available to be drawn down to manage liquidity risk during a period of financial stress.

<sup>4</sup> Other anomalies include elevated secured funding costs relative to unsecured funding and movements in cross-currency basis swaps.

<sup>5</sup> Market observers have suggested a wide range of explanations related to the effect of various regulatory reforms and the impact of sustained low interest rates.

Access to short- and long-term funding markets in Canada, the United States and abroad remains favourable for the Big Six banks. However, long-term unsecured funding spreads for the Big Six banks have increased by 25 to 30 basis points over the past three months, in line with broader market developments.

Reforms of money market funds in the United States are expected to reduce the availability of U.S.-dollar money market funding to Canadian banks—currently an important source of short-term U.S.-dollar wholesale funding for the Big Six banks.<sup>6</sup> Canadian banks are making alternative funding arrangements ahead of the October 2016 effective date for the new rules.

## Key Vulnerabilities in the Canadian Financial System

The Bank continues to identify two key areas of vulnerability related to households:

- the elevated level of Canadian household indebtedness and
- imbalances in the Canadian housing market.

A third vulnerability related to financial markets has been refined:

- uncertain market liquidity in fixed-income markets.

### Vulnerability 1: Elevated Level of Canadian Household Indebtedness

Household debt is increasing due to the strength in mortgage credit growth spurred by low interest rates and rising house prices. Income growth is not keeping pace, leading to higher household indebtedness. In addition, debt has become more concentrated over time in the hands of more highly indebted younger households, who may have less capacity to cope financially with a job loss or an unexpected interest rate increase. The household sector is therefore less resilient and, during times of stress, defaults may increase, creating losses for lenders. Nonetheless, the most likely scenario is a gradual decline in this vulnerability as the economy and incomes grow and interest rates slowly normalize.

#### *Household debt has increased faster than income, driven by the growth of residential mortgage credit*

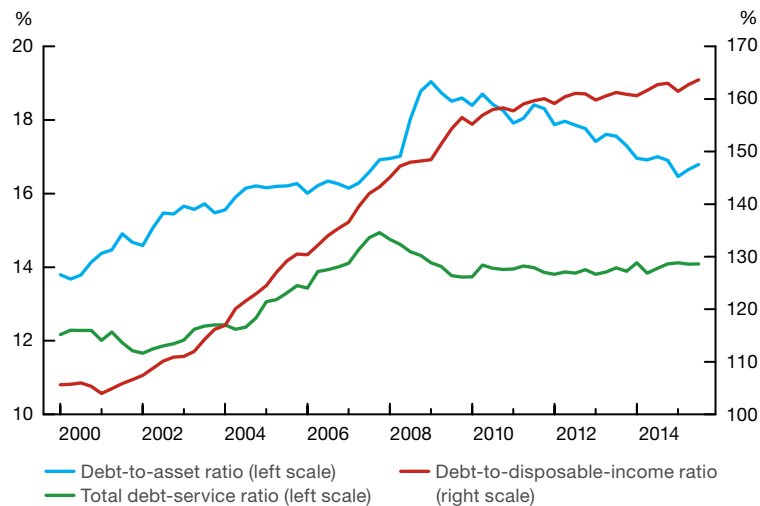
The ratio of household debt to disposable income continues to edge higher on a year-over-year basis (Chart 7).<sup>7</sup> Household credit growth in October reached about 5 per cent on the strength of residential mortgage credit growth (about 6.5 per cent at an annualized 3-month rate). Both the increasing number and size of mortgages issued by banks have contributed to the rise in mortgage credit seen over recent years, with the size growing at a faster pace. In contrast, consumer credit growth has slowed to about 2 per cent. The use of credit cards as a means of payment has been trending upward, but it has not been accompanied by a large increase in their use for borrowing purposes (Box 1).

<sup>6</sup> See the press release at <http://www.sec.gov/News/PressRelease/Detail/PressRelease/1370542347679>.

<sup>7</sup> Statistics Canada recently released historical data revisions to the National Balance Sheet Accounts that change these measures of indebtedness going back to 1990. The revised data do not affect our assessment of the evolution or the importance of vulnerabilities in this sector.



**Chart 7: The debt-to-income ratio continues to edge higher**



Sources: Statistics Canada and Bank of Canada calculations

Last observation: 2015Q3

*Other measures of aggregate household indebtedness have not increased but may understate the extent of the vulnerability*

Household asset growth continues to outpace the growth in household debt, pushing down the aggregate debt-to-asset ratio, although it remains above pre-crisis levels. However, since their home is the most important asset for most Canadian borrowers, their overall net worth remains susceptible to a decline in house prices.

The debt-service ratio has remained stable since 2007, with declining interest rates and rising incomes offsetting a higher level of debt.<sup>8</sup> As the economy improves, income growth will increase, improving households' ability to service debt, although interest rates are also likely to rise.

The proportion of new mortgage loans issued by banks that have variable rates or terms of less than one year has been on the rise for several years and is high, at about 40 per cent in the first three quarters of 2015, compared with about 30 per cent for all of 2014. Borrowers with short-term and variable-rate mortgages can take advantage of lower interest rates to improve their debt-service ratios or pay down their mortgages faster. If rates were to rise more quickly than expected, however, higher total payments or reduced principal repayments (depending on the contract) would increase the vulnerability of some borrowers. To lessen this vulnerability, banks require borrowers to qualify for their mortgages at the higher 5-year fixed interest rate when taking out a variable-rate mortgage or a mortgage with a fixed term of less than 5 years.

*A growing proportion of debt is being held by highly indebted younger households*

The ratio of aggregate household debt to income has risen in most of the past 50 years, propelled by improved access to credit, demographic trends and changing attitudes toward home ownership and debt (among other factors). What matters most for assessing debt sustainability, however, is

<sup>8</sup> Since the June FSR, Statistics Canada has introduced the total debt-service ratio, which includes principal and interest payments for both mortgage and consumer debt. In previous FSRs, the Bank presented its own debt-service ratio that included principal plus interest for mortgages only.

Box 1

## Credit Cards: Disentangling the Dual Use of Borrowing and Spending

Over the past 15 years, aggregate credit card balances in Canada have more than doubled, reaching about \$84 billion in the second quarter of 2015.<sup>1,2</sup> Since these balances are snapshots of the total charges on the credit cards of households before they make their monthly repayments, the growth in balances might reflect increased use of credit cards either as a method of payment or for short-term borrowing.

Using household-level data from the Canadian Financial Monitor (CFM), it is possible to distinguish between two types of credit card users: the *convenience user* and the *borrower*.<sup>3</sup> The convenience user relies on credit cards exclusively as a means of payment, making purchases and paying off outstanding balances in full within the allowable time limit. In contrast, the borrower does not fully repay the amount due, facing interest charges on unpaid balances. From a financial stability standpoint, the convenience user does not represent a vulnerability, since choosing to use a credit card simply reflects a preference over other means of payment, possibly due to ease of use or to benefits from rewards programs.<sup>4</sup> Increased borrowing, on the other hand, can lead to an accumulation of unsecured interest-bearing debt and higher household leverage and may become a source of vulnerability, particularly if it is concentrated among households with lower and less-stable incomes.

Analysis of CFM data suggests that credit cards are increasingly being used by Canadian households as a method of payment rather than for borrowing. For example, average credit card spending per household has risen by roughly one-third, while average outstanding balances—after peaking around 2010—have now declined to levels observed in 1999 (Chart 1-A). Further, the majority of credit card owners in Canada are convenience users who do not carry any credit card debt: the proportion of convenience users grew from 48 per cent in the early 2000s to 55 per cent in recent years. Convenience users have also been increasingly spending more than households that use credit cards for borrowing. Finally, average balances carried by borrowers have dropped since the financial crisis. This decline has been broad-based across different household income

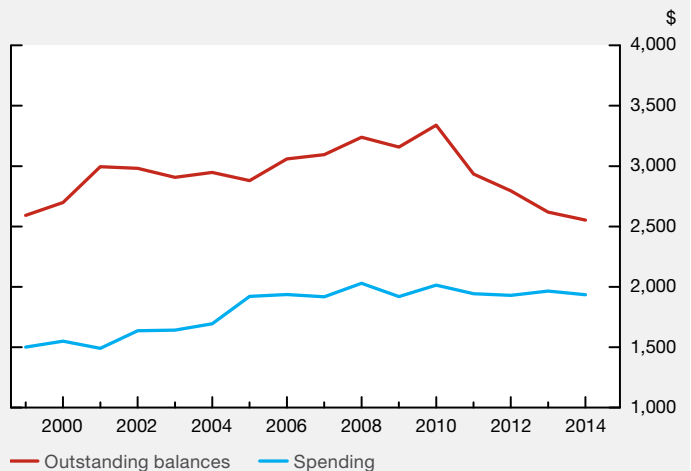
groups, home-ownership status, region of residence and most age groups.

The microdata also reveal substantial heterogeneity in the characteristics of credit card users: households with the highest outstanding balances are high-income renters, while spending is much higher among high-income homeowners (Chart 1-B). The difference in borrowing across

(continued...)

**Chart 1-A: Credit cards are increasingly being used as a payment method rather than as a loan product**

Average outstanding balances and spending per household with a credit card



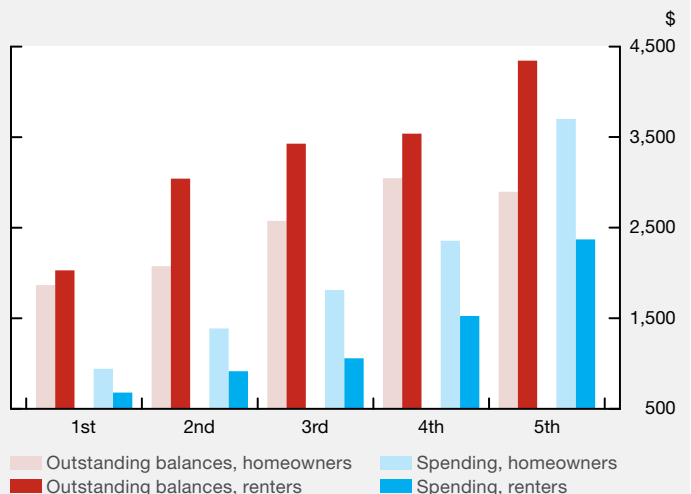
Note: Constant 2014 dollars

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

Last observation: 2014

**Chart 1-B: Across all income quintiles, renters are borrowing more and spending less than homeowners**

Average outstanding balances and spending per household with a credit card, 2012–14, by income quintile



Note: Constant 2014 dollars

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

1 The analysis in this box is drawn from O. Bilyk and B. Peterson, "Credit Cards: Disentangling the Dual Use of Borrowing and Spending," Staff Analytical Note No. 2015-3, Bank of Canada, 2015.

2 Data are from Equifax. Balances normalized by household income have also increased. A similar trend can be found in chartered bank data. See Statistics Canada, CANSIM Table 176-0011.

3 Specifically, CFM data from Ipsos Reid contain self-reported information on monthly credit card charges and balances outstanding after the last payment.

4 See C. S. Henry, K. P. Huynh and Q. R. Shen, "2013 Methods-of-Payment Survey Results," Staff Discussion Paper No. 2015-4, Bank of Canada, 2015; and B. S. C. Fung, K. P. Huynh and L. Sabetti, "The Impact of Retail Payment Innovations on Cash Usage," Staff Working Paper No. 2012-14, Bank of Canada, 2012.

Box 1 (continued)

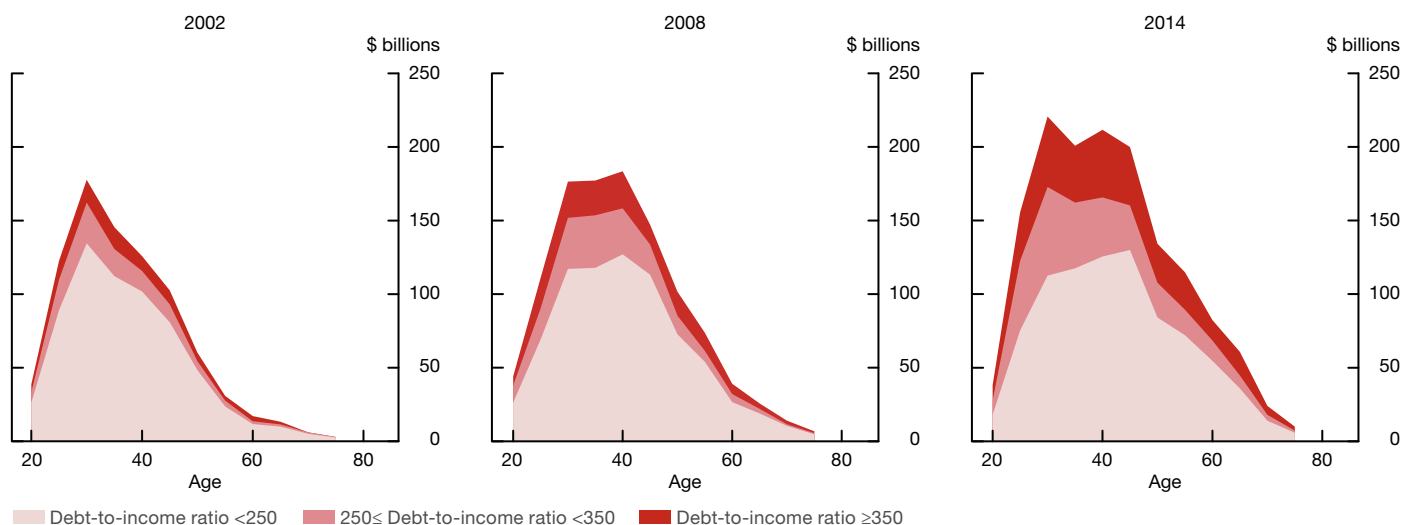
renters and homeowners could reflect differences in access to alternative sources of short-term credit by these two groups. For example, homeowners can borrow against their houses and can access cheaper forms of borrowing, such as home equity lines of credit, while renters cannot. High-income renters are nevertheless more likely to own low interest rate credit cards.<sup>5</sup> The higher incomes of these

households and their capacity to repay, taken together, moderate the extent to which their credit card borrowing represents a vulnerability for the financial system. Continued monitoring and deeper analysis are warranted, however, since further credit card borrowing at high interest rates could be a future vulnerability.

<sup>5</sup> Data from the 2013 Methods-of-Payment Survey indicate that 16 per cent of renters have credit cards with an interest rate below 5 per cent, compared with 11 per cent of homeowners.

**Chart 8: The increase in household debt has been driven by highly indebted households under the age of 45**

3-year averages in 2014 dollars



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

determining which households have taken on the most debt and whether they are able to repay it. Models used by the Bank suggest that the likelihood of a household being unable to make its debt payments after an adverse event increases significantly when the household has debt exceeding 250 per cent of its gross income and even more sharply when this ratio exceeds 350 per cent.<sup>9</sup> The proportion of indebted households with debt exceeding 350 per cent of their gross income has doubled since the pre-crisis period, from 4 per cent to 8 per cent (Chart 8).<sup>10, 11</sup> The share of household debt held by highly indebted households is increasing, rising from 28 per cent to 40 per cent for those with a debt-to-income ratio

<sup>9</sup> The estimates in this paragraph are obtained using techniques described in G. Cateau, T. Roberts and J. Zhou, “Indebted Households and Potential Vulnerabilities for the Canadian Financial System: A Microdata Analysis,” in this issue (pages 49–58).  
<sup>10</sup> Approximately 720,000 households in Canada have debt-to-income ratios greater than 350 per cent. If house prices were to decline by 10 per cent, 156,000 (21.5 per cent) of these households would have a negative net worth.  
<sup>11</sup> A similar analysis is conducted in C. Alexander and P. Jacobson, “Mortgaged to the Hilt: Risks from the Distribution of Household Mortgage Debt,” C.D. Howe Commentary No. 441, December 2015. Alexander and Jacobson differ in their focus on mortgage debt rather than total debt and in analyzing disposable rather than gross income.

greater than 250 per cent and from 13 per cent to 21 per cent for those with a debt-to-income ratio greater than 350 per cent. This amounts to close to \$400 billion of debt in the hands of households with debt-to-income ratios over 350 per cent.<sup>12</sup> Compared with less-indebted borrowers, highly indebted borrowers tend to be younger and have lower incomes, making them slightly more susceptible to a decrease in employment income in a typical economic downturn. The highly indebted borrowers are also more likely to live in British Columbia, Alberta or Ontario, where gains in house prices have been the largest.

### *A rising share of mortgage lending is uninsured*

Insured mortgages represent the predominant form of outstanding mortgages originated by Canadian banks. While the value of insured mortgages is stable, uninsured mortgages grew by 14 per cent on a year-over-year basis in October. These loans have 20 per cent down-payment requirements, leading to high owner equity. Banks must also hold additional capital against uninsured mortgage loans to protect them and the financial system from potential losses due to defaults. Uninsured loans become more of a financial stability concern if households borrow part or all of the necessary down payment, raising their leverage and exposing lenders to potential losses. Available evidence suggests, however, that borrowing of down payments to meet the 20 per cent threshold is not large.<sup>13</sup>

### *The mortgage market has become more complex*

Brokers account for an estimated 35 per cent of all mortgage activity in 2015, compared with 30 per cent in 2012. Among first-time homebuyers, 55 per cent of mortgages are originated by brokers.<sup>14</sup> Many lenders, including mortgage finance companies (MFCs) as well as smaller federally regulated banks and trust companies, rely on brokers to originate a large share of their mortgage loans. Concurrently, the large banks have decreased their direct dealings with brokers and have increased their indirect access to brokered mortgages by purchasing them from MFCs. The increased use of these lending channels has served to enhance the efficiency and competitiveness of the mortgage market, to the benefit of borrowers.

At the same time, however, the expansion of these lending channels has increased the complexity in the mortgage market. For example, a loan might be originated by a broker, underwritten and serviced by an MFC, insured by a mortgage insurer and securitized or purchased by a bank.<sup>15</sup> OSFI's Guideline B-20 on residential mortgage underwriting and Guideline B-21 on residential mortgage insurance underwriting directly apply only to federally regulated lenders and mortgage insurers. Less-regulated lenders that do not comply with these standards jeopardize their access to crucial insurance and securitization programs, as well as their ability to sell mortgages to banks. To ensure that good lending standards are maintained, incentives are aligned and fraud is prevented, strong risk management is necessary along the entire lending chain, enforced by close monitoring and effective supervision.

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<sup>12</sup> This estimate assumes that the proportion of debt held by highly indebted households has stayed constant since 2014.

<sup>13</sup> See Box 2, "Recent Developments in Mortgage Financing," Bank of Canada *Financial System Review* (June 2015): 14–15.

<sup>14</sup> See CMHC, "2015 Mortgage Consumer Survey" (March).

<sup>15</sup> The mortgage securitization process is described in A. Mordel and N. Stephens, "Residential Mortgage Securitization in Canada: A Review," in this issue (pages 39–48).

## Vulnerability 2: Imbalances in the Canadian Housing Market

The rise in household debt driven by the growth of mortgage credit both supports and is fuelled by ongoing increases in house prices. Elevated house prices, particularly when accompanied by high leverage, can be a financial system vulnerability. For example, a downturn in house prices could undermine collateral values and result in losses for both lenders and mortgage insurers if the borrower defaults.

The major national housing market indicators remain elevated, but strength has become more heavily concentrated in the Greater Vancouver and Greater Toronto areas (GVA and GTA). The rapid growth in prices in these housing markets increases their vulnerability to an adverse shock to housing demand.

### Regional housing markets continue to evolve along different tracks

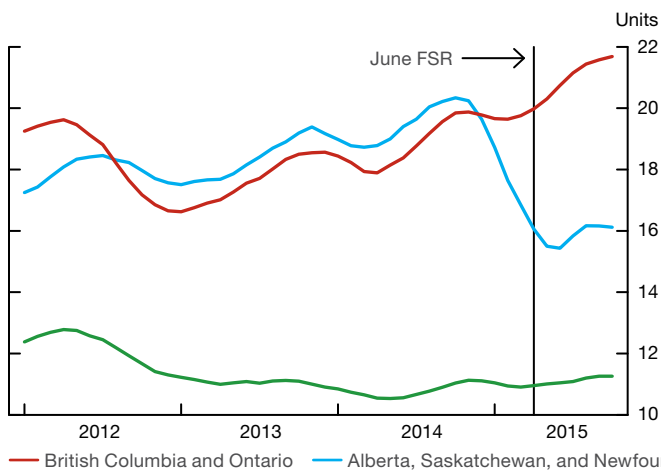
National resale activity (per person) has been increasing and is at its highest level since 2010. A tighter resale market has helped to boost the growth in house prices, which is now about 6 per cent on a year-over-year basis.

Increases in the national data mask an important trifurcation of the housing market. In British Columbia and Ontario, the levels of resale activity and price growth are high and have increased since the June FSR (Chart 9). In particular, year-over-year price growth in the MLS Home Price index (HPI) has edged up in Toronto since the June FSR and stood at 10 per cent as of October. For Vancouver, yearly price growth has been picking up over recent months, reaching 15 per cent in October, boosted by price growth for single-family homes.

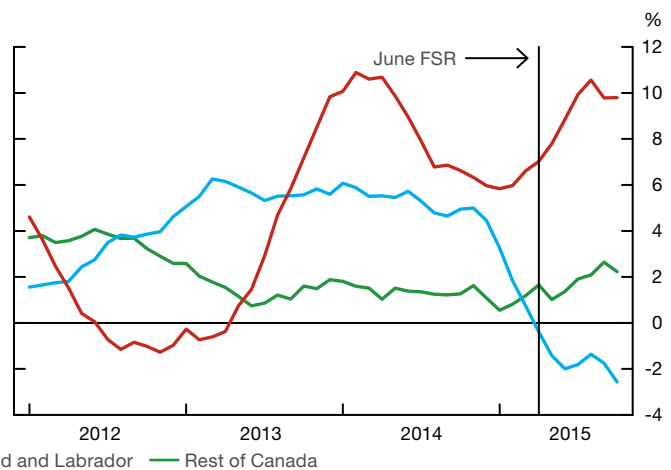
In contrast, and consistent with the weakness in the oil and gas sector, resale activity in the Prairies has fallen sharply over the past year, albeit from high levels, while average prices have declined modestly. In the rest of Canada, there has been a moderate increase in resale activity and prices, partially attributable to the effects of lower mortgage rates, with price growth remaining broadly in line with the average growth in household income.

**Chart 9: The trifurcation of the housing market persists**

a. Annualized resales per 1,000 persons



b. Average price growth



Note: The charts represent a 6-month moving average in seasonally adjusted annualized resales per 1,000 persons (age 15+) and year-over-year growth in average prices.

Sources: Canadian Real Estate Association and Bank of Canada calculations

Last observation: October 2015

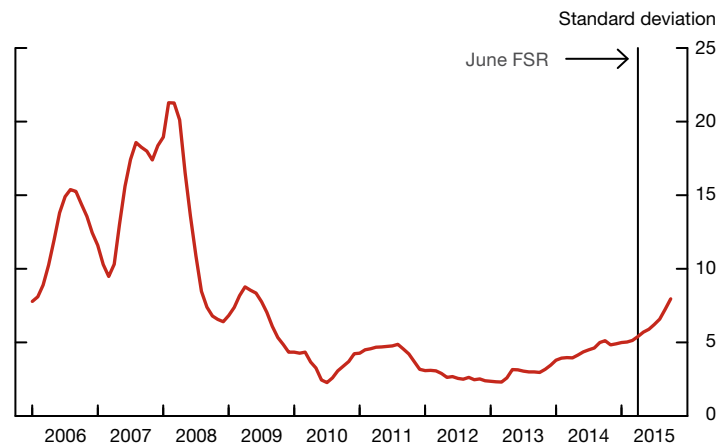
**Growth of house prices in Canada has become increasingly concentrated in two major centres**

Overall, price growth is diverging across major Canadian metropolitan centres. The standard deviation of the year-over-year growth in house prices across the 11 real estate markets in the MLS HPI is now at a 6-year high, driven by concentrated price growth in Vancouver, Toronto and the cities that surround them and in contrast to the softness seen elsewhere (Chart 10).<sup>16</sup> This suggests that any recent exacerbation of housing sector imbalances has become increasingly limited to a small number of areas. Nevertheless, the Vancouver and Toronto markets are large and represent about one-third of both the value of the total Canadian housing stock and the outstanding stock of mortgage debt. A rapid correction in one or both of these markets would have a large direct effect on the Canadian economy and the financial sector.

**A number of factors explain the strength of the Greater Vancouver and Greater Toronto housing markets**

The growth of house prices in the GVA and the GTA has outpaced income growth in recent years. Migration, driven in part by employment opportunities, is likely an important factor for explaining the strength of demand and price growth in these two centres. The year-over-year rates of employment growth in Toronto and Vancouver have recently picked up and are now close to 4 per cent, four times higher than the Canadian figure. Furthermore, survey evidence recently released by the Canada Mortgage and Housing Corporation (CMHC) suggests that the ownership of condominium apartments by non-residents is more concentrated in these two centres and their downtown neighbourhoods than in the rest of the country.<sup>17</sup> Supply constraints such as geography and land-use regulation have amplified the effect of strong housing demand on prices.<sup>18</sup> This can be seen in the appreciation of prices of single-family homes in these two housing markets, which (in the MLS HPI)

**Chart 10: The variation of house price growth across markets is at a 6-year high**



Note: Standard deviation of year-over-year "demeaned" growth rates for the 11 real estate markets covered by the MLS Home Price Index

Source: Canadian Real Estate Association

Last observation: October 2015

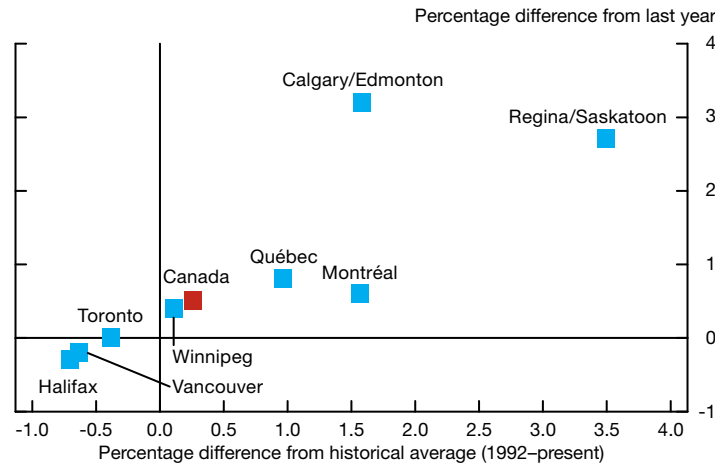
<sup>16</sup> The high standard deviation of the year-over-year price growth before 2008 can be explained by relatively strong price growth in British Columbia, Alberta and Saskatchewan compared with the rest of Canada.

<sup>17</sup> See CMHC, *Housing Market Insight* (December 2015).

<sup>18</sup> See L. Schembri, "The Long-Term Evolution of House Prices: An International Perspective" (speech to the Canadian Association for Business Economics, Kingston, Ontario, 25 August 2015).

**Chart 11: Rental vacancy rates in some Prairie cities are high and rising quickly**

Percentage change for apartment vacancy rate



Note: This chart uses October 2015 vacancy rates. Combined cities are a simple average.

Source: Canada Mortgage and Housing Corporation

was 20 per cent (GVA) and 12 per cent (GTA) on a year-over-year basis in October, outpacing that for apartments (mainly condominiums) by a factor of about two. Despite the important roles played by all of these elements, high price levels and the speed of the price increases in these two markets over the past year raise the concern that some of the activity in these markets is being driven by self-reinforcing expectations of future price gains, thereby increasing the likelihood of a correction.

### *The likelihood of an overbuild in housing is assessed as low*

Persistently strong price growth creates the potential for an excessive supply response, but to date there is limited evidence that this is occurring. In Vancouver, the number of unsold condo units per person continues to decline. Conversely, in Toronto there has been a notable increase in the number of standing condo inventories per person over the past year, due to a large number of reported completions at the beginning of the year. However, Toronto's apartment vacancy rate is in line with its long-term average and has been stable over the past year, suggesting that demand is strong enough to absorb supply in the rental market. In contrast, Prairie cities such as Calgary, Edmonton, Regina and Saskatoon all have rising inventories per person and apartment vacancy rates over the past year (Chart 11). This is likely symptomatic of commodity-related economic weakness, however, rather than being solely attributable to excess supply fuelled by past strong demand and rapid growth in house prices.

### *Rule changes help to mitigate the buildup of vulnerable debt and imbalances in the housing market*

This month, Canadian authorities proposed or announced several changes to mortgage finance rules that will help to mitigate the vulnerabilities associated with elevated household debt and imbalances in the housing market:

1. Down-payment requirements for insured mortgages will be increased for houses priced between \$500,000 and \$1 million.<sup>19</sup>

<sup>19</sup> See "Government of Canada Takes Action to Maintain a Healthy, Competitive and Stable Housing Market," available at <http://www.fin.gc.ca/n15/15-088-eng.asp>.

2. OSFI proposed higher capital requirements for federally regulated lenders and private mortgage insurers.<sup>20</sup> These requirements would apply specifically in cases where house prices are increasing rapidly or are high relative to income. Higher capital requirements may also be put in place where there are material concerns related to loan documentation or compliance with other insurance rules.
3. CMHC will increase fees and make changes to limits for government-backed securitizations.<sup>21</sup>

These measures will be implemented over the course of 2016. Taken together, they increase the equity position of homeowners as well as the capital of lenders and mortgage insurers and encourage all three to better manage mortgage-related risks. Their impact should be strongest in markets such as the GVA and GTA, where house prices are increasing and many fall within the \$500,000 to \$1 million range. These measures are a constructive response and should help to gradually reduce the extent of these vulnerabilities.

### Vulnerability 3: Uncertain Market Liquidity in Fixed-Income Markets

Fixed-income markets are perceived to have become more prone to bouts of illiquidity in many jurisdictions, including Canada. A rapid drop in market liquidity could amplify price changes and increase volatility, thereby inducing widespread portfolio adjustments among investors and leading to transmission of stress across other asset classes and market participants.<sup>22</sup>

#### *Concerns about the level of liquidity in fixed-income markets remain*

Globally, participants in fixed-income markets have raised concerns about market liquidity in terms of both the decline in its level and its greater fragility. Large price swings during events such as the “flash rally” in U.S. Treasury markets in October 2014 and the “bund tantrum” in April this year, while short-lived, have led some to believe that there is increased risk for liquidity in fixed-income markets to suddenly decline. Adjustments in market liquidity are likely occurring globally, including in Canadian fixed-income markets.

Within fixed-income markets, corporate bond markets are typically less liquid than government bond markets, particularly in Canada, because of the many relatively small bond issues and the concentrated investor base. Market participants in Canada suggest that the level of liquidity remains largely unchanged for benchmark Government of Canada (GoC) bonds, but they have reported some decline in liquidity for non-benchmark GoC bonds and corporate bonds.<sup>23</sup> Generally, investors state that more time is needed to execute large transactions than in the past, particularly in the corporate bond market, and that they have altered their behaviour to account for changes in liquidity.

<sup>20</sup> See “Updating Capital Requirements for Residential Mortgages,” available at <http://www.osfi-bsif.gc.ca/Eng/fi-if/in-ai/Pages/cptreqmtg.aspx>.

<sup>21</sup> See “CMHC Announces Changes to Its Securitization Programs,” available at <http://cmhc.ca/en/corp/nero/nere/2015/2015-12-11-0900.cfm>.

<sup>22</sup> In the June FSR, the third Canadian financial system vulnerability was described as “illiquidity and investor risk taking in financial markets.” Here, we disentangle the two aspects and focus more sharply on ongoing adjustments in market liquidity in Canadian fixed-income markets. Excessive investor risk taking is discussed in Box 2.

<sup>23</sup> The Bank of Canada organized the Canadian Fixed-Income Forum for financial market participants to share information on Canadian fixed-income markets. Some of the market opinion reported here comes from the first meeting of the forum. For more information, see <http://www.bankofcanada.ca/markets/canadian-fixed-income-forum>.



## Box 2

## Risk Taking in Financial Markets

In the June FSR, the third identified financial system vulnerability included excessive risk taking by participants in financial markets. Strong high-yield bond issuance, low corporate spreads and high valuations in equity markets were cited as possible evidence for the mispricing of assets. However, a correction in asset prices alone need not lead to intense financial system stress unless it is accompanied by other vulnerabilities—such as high leverage or mismatches in the liquidity or maturity of assets and liabilities on the balance sheets of investors who hold those assets.<sup>1</sup>

In recent years, investment funds such as mutual funds and exchange-traded funds have grown in size and now hold a larger portion of bond markets. This growth has been spurred by the low interest rate environment that has prevailed since the crisis, which has induced investors to search for yield and corporations to issue more bonds. Fixed-income mutual funds have attracted attention in many jurisdictions because, in some cases, they offer on-demand redemptions that allow investors to redeem on a daily basis even when funds hold relatively illiquid securities.<sup>2</sup> Large redemptions, coupled with a sudden decline in market liquidity (as in **Vulnerability 3**), could force these funds to sell in periods of low liquidity, further amplifying

price swings. In Canada, available evidence suggests that these funds do not have high leverage or serious liquidity mismatches.<sup>3</sup> Mutual funds holding more illiquid assets also tend to hold more cash and cash equivalents, and regulations restrict their leverage.

Certain pension funds have also responded to low interest rates by increasing their holdings of illiquid assets, including real estate, private equity and infrastructure, to earn the liquidity and maturity premiums.<sup>4</sup> A small number of the largest funds also use leverage in their investment strategies.<sup>5</sup> Yet pension funds have a very stable funding source in their pension contributors, they are not generally subject to rapid withdrawals and the leverage in this sector is still quite modest.

Although the available evidence for serious financial system vulnerabilities due to excessive risk taking is not compelling at this time, the incentives to increase leverage and accumulate less liquid assets remain, and excessive risk taking may manifest in new ways or in new parts of the financial system.

1 See M. K. Brunnermeier and I. Schnabel, 2015, "Bubbles and Central Banks: Historical Perspectives," Princeton University Working Paper, January.

2 The Securities and Exchange Commission has recently proposed new rules to manage liquidity risk in mutual funds in the United States. See the press release at <http://www.sec.gov/news/pressrelease/2015-201.html>.

3 See S. Ramirez, J. S. Jimenez and J. Witmer, "Canadian Open-End Mutual Funds: An Assessment of Potential Vulnerabilities," Bank of Canada *Financial System Review* (June 2015): 47-55; and I. Foucher and K. Gray, "Exchange-Traded Funds: Evolution of Benefits, Vulnerabilities and Risks," Bank of Canada *Financial System Review* (December 2014): 37-46.

4 Pension plans have a variety of structures and investment philosophies. Not all exhibit the same vulnerabilities. In particular, there are important differences between defined-benefit and defined-contribution pension plans.

5 See, for example, Box 5, "Tools Used for Leveraged Liability-Driven Investment Strategies," Bank of Canada *Financial System Review* (December 2012): 37.

Although difficult to measure, the increased potential for market liquidity to evaporate is a worry for investors and issuers, as well as a systemic concern. A sudden decline in market liquidity could exacerbate price changes and increase volatility, especially if many investors tried to unwind their positions in the same manner at the same time. Liquidity strains could be amplified, for example, through vulnerabilities in open-ended investment funds (**Box 2**) and could spread to other markets through portfolio adjustments to price changes by other asset holders. The effects could spill over to funding markets, affecting bond issuers as well.

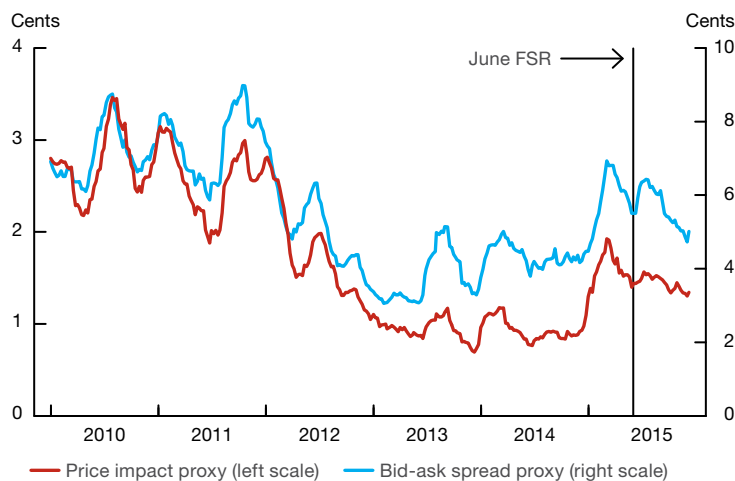
### *Some measures of market liquidity show stable levels of liquidity in recent years*

Quantitative measures of liquidity, such as proxies for the price impact and bid-ask spread on GoC bonds, suggest that market-wide liquidity in the GoC bond market has deteriorated slightly since the beginning of 2015 but remains well within the range observed in the post-crisis period (**Chart 12**). In addition, although a measure of the price dispersion of all GoC bonds has risen recently, suggesting some decline in liquidity, it remains within its long-run historical range (**Chart 13**).<sup>24</sup> This measure suggests that liquidity

24 See J.-S. Fontaine and G. Nolin, "Measuring Limits to Arbitrage in Fixed-income Markets," Staff Working Paper, Bank of Canada, forthcoming.

**Chart 12: Certain measures of market-wide liquidity in Government of Canada bond markets have been stable in recent years**

12-week moving average, weekly data



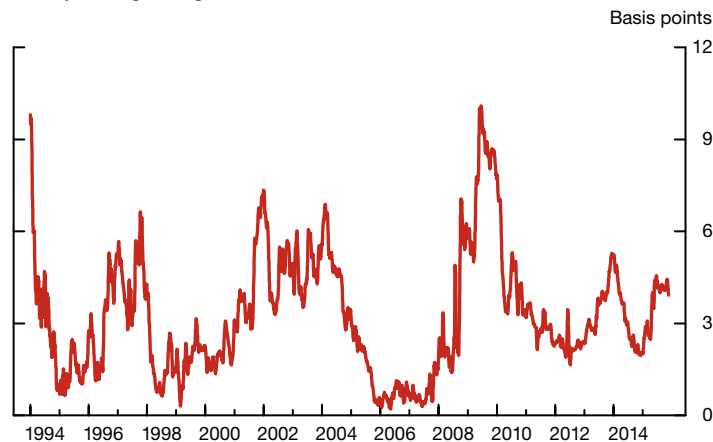
Note: Lower values indicate higher liquidity.

Sources: Canadian Depository for Securities and Bank of Canada calculations

Last observation: 8 December 2015

**Chart 13: Price dispersion of Government of Canada bonds remains within its historical range**

Price dispersion index of Government of Canada bonds, 10-day moving average



Note: The price dispersion index is the quadratic mean of the relative value measures of all Government of Canada bonds with a time to maturity of between 1 and 10 years.

Sources: FTSE TMX Canada and Bank of Canada calculations

Last observation: 8 December 2015

was abnormally abundant before the financial crisis, dropped sharply during the crisis and has since recovered. Current levels of price dispersion are similar to levels seen before 2004. While these measures capture some key elements of liquidity, they do not provide a complete picture of the current state of market liquidity or the uncertainty around it (Box 3).

Similar measures calculated for sovereign bonds in other countries, such as the United States, the euro area, Japan and emerging markets, point to similar trends in current liquidity conditions.<sup>25</sup> The current level of market

<sup>25</sup> For the United States, see the Federal Reserve Bank of New York's blog, "Liberty Street Economics," available at <http://libertystreeteconomics.newyorkfed.org/2015/08/introduction-to-a-series-on-market-liquidity.html>. For other countries, see IMF, *Global Financial Stability Report*, October 2015.

## Box 3

## Measures of Market Liquidity for Government of Canada Securities

A liquid market is one in which investors can buy or sell a security within a desired time interval, in the desired quantities and at a price close to its current level. Market liquidity combines several elements, including execution costs, the quantity traded and the time required to complete a trade, and there are inherent trade-offs among these elements. A single indicator cannot capture all the elements of market liquidity, but several metrics can help gauge it. This box provides details on the construction and interpretation of some liquidity metrics for Government of Canada (GoC) bond markets.

A low cost of executing a transaction, reflected by a low bid-ask spread, is an indicator of a liquid market. Observed prices of transactions for GoC bonds allow for the construction of a proxy for the bid-ask spread (Chart 12 on page 20). Under simple assumptions, this bid-ask spread proxy separates observed price changes that are occurring because of new information from those occurring because of prices bouncing between the bid and the ask.<sup>1</sup>

The liquidity of a market is also reflected in market depth, which refers to the ability of the market to absorb large purchases or sales without a significant impact on prices. The price impact proxy is based on the fact that in a deep market, large trades have a smaller effect on prices.

Observed price changes for transactions with various sizes are used to estimate the average price impact every day.<sup>2</sup>

A drawback of these transactions-based metrics is that frequently traded bonds are overrepresented in the data. Averaging across all bonds may therefore hide important information about differences in liquidity between different types of bonds. Other jurisdictions have constructed similar proxies for the bid-ask spread and price impact to assess liquidity conditions.

An indirect proxy for market liquidity can be calculated based on the price dispersion of GoC bonds with similar characteristics (Chart 13 on page 20). Under perfect market conditions, securities with identical cash flows should have identical prices. Large deviations from this law of one price imply that market liquidity is relatively poor. In a well-functioning market, the measure of price dispersion would be low, which is indicative of higher market liquidity.

Overall, these proxies provide little evidence of significant changes in liquidity in recent years. This suggests that the adjustments in market liquidity may be taking place along other dimensions—for example, in terms of the time needed to complete large transactions or the ability of market liquidity to recover after stress events.

<sup>1</sup> See R. Roll, "A Simple Implicit Measure of the Effective Bid-Ask Spread in an Efficient Market," *Journal of Finance* 39, no. 4 (1984): 1127-39.

<sup>2</sup> See Y. Amihud, "Illiquidity and Stock Returns: Cross-Section and Time-Series Effects," *Journal of Financial Markets* 5, no. 1 (2002): 31-56.

liquidity appears normal by certain measures. But adjustments to liquidity may be taking place along other dimensions, such as an increase in the time needed to complete trades, which may not be fully captured by the measures noted above.

### *Structural and cyclical factors are affecting market liquidity*

Liquidity typically declines in periods of stress. However, structural and cyclical changes to the financial system may be making liquidity less reliable in normal times, suggesting that it could substantially worsen in times of stress. The IMF *Global Financial Stability Report* (October 2015) finds evidence of an association between the level of liquidity and its resilience, in addition to signs of increased liquidity co-movement across asset classes. On a global basis, market liquidity is adjusting to regulation and technology, as well as to unconventional monetary policies and the level and volatility of interest rates. But it is difficult to disentangle and quantify the effects of the different factors.

Regulations such as the Basel III capital, leverage and liquidity rules, over-the-counter derivatives reforms, and the Volcker Rule have been adopted to improve the resilience of the financial system. Many business models and risk-management practices prevailing before the crisis were revealed to be

flawed. Post-crisis regulatory reforms are strengthening risk-management practices, increasing transparency and making financial institutions, including market-makers, more robust to liquidity and solvency risks. But these regulations impose balance-sheet constraints and restrict trading, which may increase the cost of market-making, potentially leading to lower and more uncertain liquidity.<sup>26</sup> Investors may have to adapt to the resulting decreased intermediation and higher costs of trading, which could imply that more time may be needed to complete a trade of the desired size.

Cyclical factors, including bouts of higher interest rate volatility, have led to higher inventory risk-management costs for dealers, resulting in a rise in the costs of supplying market liquidity. Low interest rates also increase incentives to fail to deliver promised securities in the repo market by reducing the opportunity cost of failing. More frictions in the repo market, in turn, hamper market-making since market-makers use the repo market to finance long positions and cover short positions.

A particular issue in Canada has been the rise since 2009 in the holdings of GoC bonds by foreign buy-and-hold investors, which has reduced the number of bonds available for trading in cash and repo markets.<sup>27</sup> To help improve liquidity in the GoC bond market, the Bank has made changes to its framework for market operations by reducing its participation at primary auctions of GoC nominal bonds.<sup>28</sup> Anecdotal evidence suggests that recent sales of GoC bonds by some reserve managers likely relieved some of the pressures in the Canadian repo market associated with the scarcity of specific GoC bonds, although the impact was likely small.

Outside Canada, flash events—where sudden price changes take place that are not explained by fundamentals and are rapidly reversed—have occurred in a range of asset markets, including bond markets. The decline in market liquidity during some of those events has been tied to the increased presence of high-frequency traders, whose presence in GoC and Canadian corporate bond markets is currently limited.

## Key Risks

This section examines risk scenarios for the Canadian financial system in which trigger events are transmitted and amplified by vulnerabilities, resulting in adverse impacts on the financial system and the economy. The purpose is to illustrate the potential effects of vulnerabilities rather than to identify all possible negative scenarios. Each risk includes an overall risk rating based on Governing Council's judgment regarding the probability of the risk occurring and the expected severity of the impact on the Canadian financial system if it were to materialize.

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

The most important domestic financial system risk remains a severe recession and a sharp, widespread rise in unemployment that reduce the ability of households to service their debt, causing a broad-based decline in house

<sup>26</sup> See W. Dudley, President and Chief Executive Officer of the Federal Reserve Bank of New York, "Regulation and Liquidity Provision" (remarks at the Securities Industry and Financial Markets Association Liquidity Forum, New York City, 30 September 2015).

<sup>27</sup> The share of GoC bonds held by foreign investors has increased from around 15 per cent in September 2009 to roughly 33 per cent in September 2015 (Source: Statistics Canada CANSIM tables 176-0071 and 376-0146).

<sup>28</sup> See "Changes to Bank of Canada's Framework for Financial Market Operations" at <http://www.bankofcanada.ca/2015/09/changes-bank-canada-framework>.

prices. The most likely trigger is a large, negative demand shock. The risk is rated as “elevated,” as in the June FSR. The probability of the risk materializing remains low, but the potential impact on the economy and the financial system if the risk were to materialize would be severe.

### *The probability of this risk occurring remains low*

As expected, a pickup in exports and the impact of monetary easing have helped return the Canadian economy to growth, which should reduce the probability of this risk being triggered over time. The effect of the oil price shock is evolving largely as anticipated at the time of the June FSR, although commodity prices have fallen by more than was expected, and this decline has further reduced Canadian incomes and wealth. Employment insurance claims have risen in the oil-producing regions, but to date there is no evidence of a significant increase in loan delinquency rates or of a hard landing in the housing market. More time is required before we can safely rule out these possibilities.

### *The potential impact is severe because of concentrated and increasing household debt, in addition to housing market imbalances*

The high and increasing level of household debt, particularly mortgage debt held by highly indebted households, makes the overall economy and the financial system susceptible to significant losses if this risk were to materialize. The proportion of highly indebted households is highest in British Columbia, followed by Alberta and Ontario. However, relative to the United States before the crisis, Canada has fewer highly indebted households, and these households have more financial resources.<sup>29</sup>

A sharp, widespread rise in unemployment could force some vulnerable homeowners to sell their homes or default on their mortgages and other consumer debt. Large house price corrections could ensue across Canada, particularly in Vancouver and Toronto, if investors who had purchased houses primarily on the expectation of future price increases decided to sell.

### *Stress in the housing market would have broad effects on the Canadian economy*

An extreme but plausible adverse shock that reduces the ability of households to service their debt and leads to a broad-based decline in house prices would have large direct effects on Canadian lenders and mortgage insurers. Still, results from stress tests show that there are sufficient buffers in the financial system to withstand such a scenario.<sup>30</sup> The Big Six Canadian banks have further increased the quantity and quality of their capital in recent years and are supported by government-backed mortgage insurance programs and high homeowner equity.<sup>31</sup> Losses on auto debt and unsecured household credit would be significant but manageable and cushioned by high capital requirements on these exposures.

Nonetheless, should this risk materialize, the impact on the broader Canadian economy would still be quite large. The capacity of the financial system to offer credit and liquidity would suffer as banks and other financial

<sup>29</sup> See G. Cateau, T. Roberts and J. Zhou, “Indebted Households and Potential Vulnerabilities for the Canadian Financial System: A Microdata Analysis,” in this issue on pages 49–58.

<sup>30</sup> See K. Anand, G. Bédard-Pagé and V. Traclet, “Stress Testing the Canadian Banking System: A System-Wide Approach,” Bank of Canada *Financial System Review* (June 2014): 61–68.

<sup>31</sup> Recent stress tests by CMHC suggest that it has sufficient capital to handle an extreme but plausible house price correction. For example, see the speaking notes for E. Siddall (President and Chief Executive Officer, Canada Mortgage and Housing Corporation) at the Panel Session of the Global Risk Institute Annual Conference (Toronto, 10 November 2015).

institutions took steps to manage their exposures in the face of increasing defaults and more difficult funding conditions, with further negative implications for economic activity.

### Risk 2: An Abrupt Increase in Global Risk Premiums

The second key financial system risk is a sudden increase in risk premiums, both globally and in Canada, which would lead to lower financial asset prices and higher consumer and business borrowing rates. Such a scenario could be triggered by, for example, a market overreaction to an increase in uncertainty about global growth or about future monetary policy in the United States or Europe. A large and persistent increase in global risk premiums would lead to increased volatility and disruptions in many financial markets, including in Canada. A rise in funding costs, in turn, could lead to a rise in defaults across the financial and non-financial sectors, with adverse effects on the Canadian economy.

This risk continues to be rated as “moderate,” with a low probability of occurring. The severity of the impact on the Canadian financial system if this risk were to materialize is assessed as moderate.

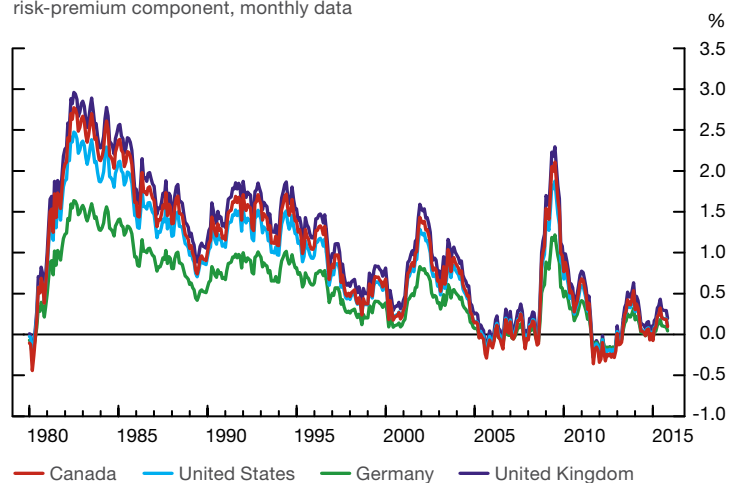
The most likely scenario, however, is that stronger global growth will lead to gradually increasing policy rates and a sustainable rise in long-term interest rates. Consequently, financial system vulnerabilities associated with household borrowing and search-for-yield behaviour in a low interest rate environment would decline.

#### *The probability of this risk materializing remains low*

Estimated global risk premiums continue to be low relative to historical norms, especially for equities and long-term government bonds, suggesting that there is potential for them to increase sharply (Chart 14). However, the Federal Reserve has clearly communicated that it intends to exercise caution in the process of policy normalization. In its October statement, the Federal Reserve explicitly enumerated the combination of factors that would determine the timing of liftoff, which has reduced the possibility

**Chart 14: Global risk premiums on long-term government bonds remain low**

Yields on 10-year zero-coupon government bonds, estimated term-structure risk-premium component, monthly data



Sources: U.S. Federal Reserve, Bank of England, Deutsche Bundesbank and Bank of Canada (including calculations)

Last observation: November 2015

of surprising market participants. Moreover, should global risk premiums increase sharply, central banks could adjust their monetary policies, which may mitigate the increase and its adverse effects.

### *The potential impact of this risk remains moderately severe*

A sudden increase in risk premiums abroad would drive up interest rates and lead to a broader decline in the prices of financial assets in Canada. While corporate bond spreads have increased recently, they could rise further if market liquidity suddenly declined. Rapid price changes and the resulting losses could induce a variety of market participants to simultaneously adjust their portfolios, leading to spillovers of volatility across many asset markets.

Tighter financial conditions, combined with increased risk aversion, would adversely affect financial institutions. Higher interest rates would raise debt-servicing costs for highly indebted Canadian households. An increase in funding costs for non-financial corporations would affect their ability to issue or roll over debt, which could in turn lead to a reduction in business investment.

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

The Canadian financial system is exposed to economic and financial stress arising from significant disruptions in China and other EMEs. Disruptions could be triggered by a further slowdown in EME economic growth or a disorderly depreciation of their currencies. In the past, the Bank has highlighted the commodity and trade channels for transmitting stress to Canada. Recent events suggest, however, that financial and confidence channels of contagion may be larger than previously thought.

As in the June FSR, this risk is rated as “elevated.” Its probability of occurring is medium, but the impact on the Canadian financial system would be moderately severe if it were to materialize.

### *The probability of EME-related stress continues to be medium*

China is in the midst of a major structural transition in its economy and financial system. The initial policy response to the decline in the Chinese equity market highlighted uncertainty among market participants about the consistency and direction of Chinese domestic policy. In addition, growth in other EMEs has disappointed as a result of the slowdown in growth in China, lower commodity prices and various country-specific factors.

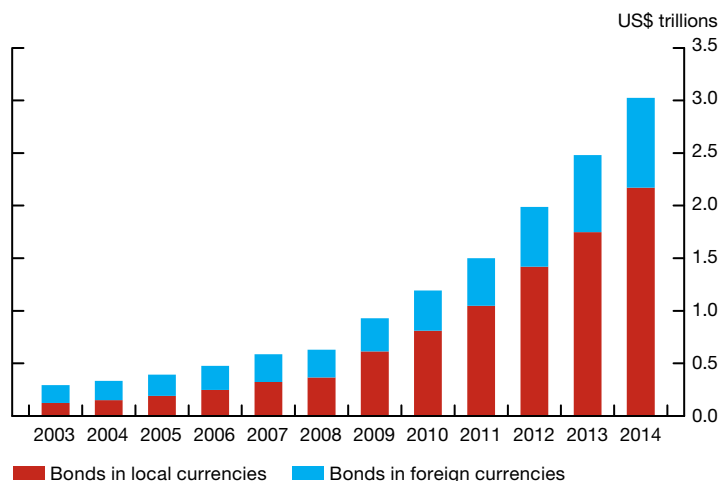
Favourable post-crisis financial conditions have led corporations in China and other EMEs to significantly increase leverage for a number of years, particularly in the construction and resource sectors, with some of the new debt being issued in foreign currencies.<sup>32</sup> Since 2009, EME corporate borrowing has increased substantially: the stock of bonds outstanding rose from US\$929 billion to US\$3,025 billion at the end of 2014, including an increase in foreign currency bonds from US\$315 billion to US\$855 billion (Chart 15).

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<sup>32</sup> See IMF, *Global Financial Stability Report*, October 2015.

**Chart 15: Emerging-market corporations have substantially increased borrowing through bonds since the crisis**

Emerging-market non-financial corporate bonds outstanding, by currency of issuance



Source: International Monetary Fund

Last observation: 2014

The increase in leverage in commodity-exporting firms has heightened the exposure of certain EMEs to weaker commodity prices. In addition, other EME firms that borrowed in U.S. dollars have also become increasingly exposed to a depreciation of their local currencies.<sup>33</sup>

A further slowdown in EME economic growth or a disorderly depreciation of EME currencies could lead to an increase in corporate defaults and greater stress on local financial systems, with broader spillovers to economic activity. Nonetheless, the impact may be less severe than in the past since many EMEs have become more resilient over time, with sounder financial systems, stronger fiscal positions and improved monetary policy frameworks that include inflation targeting and increased exchange rate flexibility.

***The impact of these EME-related risks on Canada would be moderately severe***

The primary channels of transmission to Canada highlighted in previous FSRs have been (i) lower commodity prices that would reduce Canada’s terms of trade and incomes and (ii) slower trade, which would dampen foreign demand for Canadian goods and services.

Direct exposures of the Canadian banking sector to China and other EMEs are low, for the most part. Banks’ indirect exposures through U.S. and European banks are harder to quantify, but strengthened bank balance sheets reduce the risk of losses spilling over to Canadian banks.

Spillovers from China and other EMEs to Canadian financial markets over the summer suggest that confidence channels may be stronger than originally thought. Although the overall impact on global and Canadian financial markets was short-lived, there is a risk that a future disturbance could prove to be more persistent and disruptive. Over time, China’s financial system is likely to become more integrated with the global system, strengthening the potential transmission channels.

<sup>33</sup> Some EME borrowers use U.S.-dollar borrowing to hedge revenues that are received in U.S. dollars. They are therefore less vulnerable to U.S.-dollar appreciation.



## Risk 4: Prolonged Weakness in Commodity Prices

There is a risk that strong global supply continues to exceed demand, leading to prolonged weakness in commodity prices at current or somewhat lower levels, with adverse implications for the Canadian financial system. This risk is rated as “moderate.” The probability of the risk occurring is medium, and the severity of the impact on the Canadian financial system if it were to materialize is assessed as relatively low.

### *The probability of this risk materializing is medium*

As in previous commodity price cycles, an extended period of high prices motivated a gradual but significant increase in production capacity, which in turn has led to a reversal of price gains. This dynamic has been apparent historically in both oil and base metals markets, with the most recent cycle beginning in the early 2000s. Strong supply, particularly in light of the relative weakness of demand growth, supports the possibility that prices could remain persistently low at current or somewhat lower levels.

Other key Canadian commodities, such as forestry and agriculture, did not experience as large a run-up in prices through the 2000s. Forestry has already restructured significantly, and prices have been more stable recently, with some upside potential from the housing recovery in the United States.

### *The severity of the impact on the Canadian financial system would be relatively low*

Since Canada is a net exporter of commodities, low commodity prices weigh on Canada’s terms of trade, incomes and wealth. Given that this risk scenario is supply driven, the negative impact of prolonged weakness in commodity prices on aggregate income, while large, would be concentrated in commodity-producing regions. Negative spillovers to the rest of the country would occur through reduced demand for mobile labour and for domestically supplied intermediate inputs. In contrast, low commodity prices are favourable for firms that use commodities as inputs. Low commodity prices also tend to exert downward pressure on the value of the Canadian dollar as well as support activity in Canada’s major trading partners. Both of these factors would add to demand for Canadian exports.

The Canadian financial sector would be affected by protracted low commodity prices through both direct exposures to industries in and related to the commodity sector and indirect loan exposures to affected households and other businesses. The Big Six Canadian banks would be directly affected through the deteriorating performance of loans to commodity producers. The direct lending to these sectors by the Big Six banks is small relative to their total lending books, however, with oil and gas representing about 2 per cent of total loans (\$44 billion) and mining representing less than 1 per cent (\$15 billion).<sup>34</sup> Overall, the direct lending exposures of banks to the energy and mining sectors are less important than in the 1980s, when sharp declines in commodity prices—after several years of increases—contributed to financial stress in many countries.

Prolonged weakness in commodity prices would likely also be transmitted through lower equity prices, wider spreads on bonds issued by the affected industries and some corporate defaults among derivatives counterparties.

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<sup>34</sup> These estimates do not include undrawn lines of credit but likely overestimate true exposures because they do not account for the effects of hedging and other mitigants of credit risk.

Together, the oil and gas sector and the metals and mining sector account for \$257 billion in outstanding bonds and about 26 per cent of the market capitalization of the S&P/TSX Composite Index, or \$489 billion.<sup>35</sup>

The indirect exposures of the Big Six banks to households and businesses are more substantial than the direct exposures. Loans to the oil-producing regions—including household mortgages and commercial real estate loans—represent about 13 per cent, or \$320 billion, of total loans extended by the Big Six banks.<sup>36</sup> Indirect exposures associated with mining and quarrying are more widespread across Canada, since production in this sector spans Labrador, Quebec, Northern Ontario and British Columbia.

Although prolonged weakness in commodity prices would have a significant adverse effect on certain industries and regional economies, the diversity of the Canadian economy suggests that the resulting stresses on the Canadian financial system would be manageable. Overall, the Big Six Canadian banks are well capitalized and well diversified in terms of exposures and revenue sources and are thus resilient to industry-specific and regional losses. However, regionally focused lenders, which tend to be less diversified and more exposed to regional real estate and commercial loans, could face larger losses.

Alternatively, if there was an additional large and broad-based drop in commodity prices, the impact on the Canadian financial system would become much more important. In such an environment, financial pressures on commodity producers, particularly those that are more highly leveraged, could become intense. Likewise, the impact on households and supporting businesses would be more severe. A credit event associated with a global resource company could spill over into a widespread tightening in financial conditions, extending well beyond this sector and into the global financial system. Countries such as Canada with high exposures to commodities would be particularly affected. The direct and indirect effects of such a large commodity price decline on the financial system and the economy could cause a widespread rise in unemployment, triggering Risk 1.

## Selected Financial System Developments

This section highlights selected emerging trends and changes in the financial system that the Bank of Canada is monitoring.

We discuss two financial innovations related to the burgeoning field of financial technology (FinTech) and explain both the benefits of these innovations and the vulnerabilities that may emerge if they develop into major parts of the Canadian financial system. The Bank also identifies and assesses financial system developments through monitoring the shadow banking sector. In **Box 4**, we explain how the Bank has refined its approach to the coverage of the shadow banking sector.

### Digital Currencies

Several hundred digital currencies (or cryptocurrencies) have been introduced since the creation of Bitcoin in 2009. Each represents its own unit of account separate from any sovereign currency. Digital currencies offer potential benefits, including enabling micropayments on the Internet and reducing the cost of international remittances. To date, however, no digital

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<sup>35</sup> Market data are as at 1 December 2015.

<sup>36</sup> This estimate does not include the exposure-reducing effects of mortgage insurance, collateral and hedging activities.

## Box 4

**Shadow Banking (Non-Bank Financial Intermediation): A Refined Definition**

Non-bank financial intermediation, also referred to as shadow banking or market-based finance, has been an important and growing source of innovation and competition over the past 20 to 30 years. But the financial crisis showed that this sector is highly interconnected with other parts of the financial system and can be a source of financial system vulnerabilities if it is not adequately regulated and supervised. In their approach to regulating these activities, authorities therefore need to strike a balance between maintaining financial stability on one hand and facilitating innovation and competition on the other.

Regardless of its label, the definition of the sector is important because it helps to focus monitoring on those parts of the financial system that may be growing rapidly in response to financial innovation or possibilities for regulatory arbitrage and thus may be a source of potential vulnerabilities.

The Bank of Canada recently refined its definition of this sector, shifting from a purely activity-based approach to one where both the activity and the entity performing the activity are considered. This approach can better capture potential vulnerabilities stemming from the market activities of regulated entities, as well as those resulting from leverage and maturity mismatches that may arise on the balance sheets of less-regulated entities. The refined definition is similar in spirit to the Financial Stability Board's framework for monitoring international shadow banking.<sup>1</sup>

Under the new definition, this sector consists of those entities or activities that

- (i) conduct or facilitate a chain of credit intermediation,
- (ii) involve a material degree of maturity or liquidity transformation, and
- (iii) are at least partially outside the prudential regulation of the Office of the Superintendent of Financial Institutions and provincial prudential authorities.

Some degree of balance-sheet leverage is often indicative of, but is not necessary to define, entities or activities in this sector.

Among the activities currently monitored by the Bank as part of this sector are certain repo and securities-lending transactions as well as securitization activities, including term asset-backed securities, commercial mortgage-backed securities and asset-backed commercial paper. Relevant entities include non-prudentially regulated mortgage and non-mortgage lenders, non-bank broker-dealers and credit-based investment funds. Pension funds are not considered shadow banking and are monitored separately. However, their repo and securities-lending activities are captured in the monitoring of this sector.

Measuring the entities and activities is challenging because, by their nature, they are less regulated, making it more difficult to obtain complete information. The Bank is working toward closing these data gaps in collaboration with other authorities.

<sup>1</sup> See FSB, *Global Shadow Banking Monitoring Report*, November 2015.

currency has achieved broad acceptance in any country. From March to September 2015, Bitcoin recorded a global average of 120,000 transactions per day, while the average number of debit and credit card transactions was about 21 million per day in Canada alone.

Because of the potential for future growth in cryptocurrencies, the Bank has been monitoring developments in digital currencies and other forms of electronic money and payments, as well as studying their implications and the risks they pose to the Canadian financial system and the Bank. In addition, the Bank is researching the potential role of central banks as either overseers or issuers of digital currencies.<sup>37</sup>

The Bank has identified two broad concerns. First, digital currencies are designed to have decentralized governance and operating frameworks, without a single body in control or a single operator of the system. In addition, these currencies aim to operate internationally. These payment schemes therefore present new challenges for central banks in their role of

<sup>37</sup> For more information about digital currencies and the Bank's research in this area, see the e-money section on the Bank's website at <http://www.bankofcanada.ca/research/e-money>.

ensuring that systemic risk in payments systems is controlled and for other regulators responsible for enforcing anti-money-laundering, tax and other laws.

Second, the widespread adoption of a digital currency as a means of payment would lessen an economy's reliance on the sovereign currency and could therefore adversely affect the central bank's ability to effectively conduct monetary policy and act as the lender of last resort. Given the limited use of digital currencies, however, this risk is very low at this time. The evolution of the risk will depend on the manner and pace of the integration of digital currencies into the traditional financial system.

Beyond the effects of the currencies themselves, the technology supporting them—a distributed ledger referred to as a *blockchain*—is prompting some financial institutions and infrastructure providers to rethink how transactions are carried out for many different types of assets. The Bank is closely following the opportunities and risks created by these developments.

### Peer-to-Peer Lending

Peer-to-peer (P2P) lending is the practice of individuals lending money to other individuals through websites. It is one of a wider group of practices that together are called crowdfunding.<sup>38</sup> Although P2P lending originally matched lenders and borrowers on a one-to-one basis, it has largely evolved into marketplace lending, where institutional and individual investors lend into a pool that borrowers can access. P2P loans are typically unsecured personal loans but can also be start-up and small-business loans. This innovation provides borrowers with the convenience of online financing within minutes of making the application, including the online advance of funds to the borrower's bank account, while investors benefit from potentially high returns.

P2P lending has experienced rapid growth over the past decade but remains small outside the United States and the United Kingdom, probably due, in part, to differences in the regulatory environment across countries. In Canada, P2P lenders first appeared in late 2014, beginning with Grow (formerly GroupLend), Borrowell and, more recently, Lending Loop.

Because of its small share of financing in Canada (well below 0.01 per cent of the unsecured personal loans of large banks), P2P lending does not currently pose significant risk to the financial system. Its future growth will depend on the response of traditional lenders to these new entrants and on the regulatory environment in which P2P lenders will operate.

There could be financial system risks associated with P2P lending if it became larger. P2P platform providers act as financial intermediaries but are not always subject to rules designed to mitigate systemic risk. For example, the P2P platforms do not participate directly in loans and therefore have little "skin in the game," and they are not subject to the risk-retention rules that apply in securitization markets. P2P platforms also operate with little capital and might be subject to a disorderly default if new loan volumes were to suddenly decline. P2P lending may create additional risks related to borrower protection, cyber security and money laundering. The Bank continues to monitor the development of P2P lending and to assess the associated risks.

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<sup>38</sup> See E. Kirby and S. Worner, "Crowd-Funding: An Infant Industry Growing Fast," IOSCO Staff Working Paper No. 3, 2014.

## Safeguarding the Financial System

### The Bank of Canada's Revised Framework for Financial Market Operations and Emergency Lending Assistance

The Bank recently implemented a number of changes to its framework for financial market operations and clarified its emergency lending assistance policies in support of the financial system.<sup>39</sup> The changes to the operating framework help to implement monetary policy effectively and safeguard financial stability by improving the Bank's ability to channel a greater amount of liquidity to the counterparties that need it most. They also support the Bank's monitoring of liquidity conditions in term funding markets. The Bank also added to its tool kit a more flexible bilateral liquidity facility that it can use, should the Bank deem it necessary, to support the stability of the Canadian financial system during a period of market-wide stress.

In addition, the Bank updated its policies for providing emergency lending assistance to eligible financial institutions and financial market infrastructures (FMIs). The revised policies strengthen the resilience of Canada's financial system by expanding the scope of eligible collateral, clarifying eligibility conditions for provincially regulated entities, and aligning the policies to support the recovery and resolution process.

### Making Canadian Bond Markets More Transparent

Post-trade regulatory reporting in bond markets is important to allow authorities to adequately monitor and react to vulnerabilities such as the uncertainty of market liquidity or a buildup of risk exposures in financial institutions. Canadian regulatory authorities are co-operating to improve their access to high-quality data on fixed-income trades. In November 2015, the Investment Industry Regulatory Organization of Canada (IIROC) launched the Market Trade Reporting System (MTRS) 2.0, a regulatory data repository for cash and repo trades of the bills and bonds issued by sovereigns and corporations. In MTRS, IIROC-registered broker-dealers and government securities distributors will report every trade to IIROC. This will greatly improve the quality and timeliness of regulatory data on fixed-income transactions.

### Cyber Security for Financial Market Infrastructures

As part of its oversight role, the Bank of Canada monitors the ability of FMIs to manage cyber risks, including the ability to survive a cyber attack.<sup>40</sup> In the first quarter of 2015, domestic FMIs examined their current cyber security practices against the National Institute of Standards and Technology cyber security framework and shared this work with the Bank. While there were no findings that required urgent remedial action, addressing the main areas for improvement identified in the exercise is one of the Bank's priorities in 2016 for each domestic designated FMI. Additional guidance will be provided in 2016 when the Committee on Payments and Market Infrastructures and the International Organization of Securities Commissions working group

<sup>39</sup> See "Completion of Public Consultations: The Bank of Canada's Framework for Financial Market Operations and Its Emergency Lending Assistance Policies," 30 September 2015. Available at <http://www.bankofcanada.ca/2015/09/completion-public-consultations-bank-canada-framework>.

<sup>40</sup> The Governor of the Bank of Canada has designated the following domestic FMIs as systemically important to Canada's financial system and subject to the Bank's oversight, in conjunction with provincial regulators, where appropriate: the Large Value Transfer System, CDSX and the Canadian Derivatives Clearing Corporation. For further background information, see H. Gallagher, W. McMahon and R. Morrow, "Cyber Security: Protecting the Resilience of Canada's Financial System," Bank of Canada *Financial System Review* (December 2014): 47–53.

on cyber resilience publishes its cyber security guidance to support the implementation of the Principles for Financial Market Infrastructures. An important component of the guidance will be the need to share information on cyber threats among industry participants and regulators. In Canada, the Joint Operational Resilience Management program brings together representatives from the Bank of Canada, major Canadian banks, domestic FMI and the Department of Finance to examine how legal and other operational issues can be overcome to allow FMIs, FMI participants and law enforcement to share threat intelligence.

## International Regulatory Reforms

According to a recent Financial Stability Board (FSB) report, there has been steady but uneven progress toward completing the implementation of post-crisis international regulatory reforms in four key areas: (i) building resilient financial institutions, (ii) ending “too big to fail,” (iii) making derivatives markets safer and (iv) transforming shadow banking into resilient market-based finance.<sup>41</sup> As summarized in **Table A-1** in the appendix, Canada has made substantial progress in developing and implementing reforms to its financial sector regulation.

Recent progress on the international regulatory reforms includes the publication in November of the FSB’s standard on Total Loss-Absorbing Capacity for global systemically important banks (G-SIBs).<sup>42</sup> As part of efforts to end too big to fail, the standard is designed to ensure that banks have sufficient loss-absorbing capacity to implement an orderly resolution in the event of failure. The standard will be phased in for most G-SIBs between 2019 and 2022 and is likely to influence the final design of the Canadian requirements for higher loss-absorbency, which would apply to domestic systemically important banks as part of the anticipated introduction of a bail-in regime in Canada.

In November, the FSB also published the results of a thematic peer review on trade reporting for over-the-counter derivatives markets.<sup>43</sup> The peer review explains that the majority of FSB member jurisdictions, including Canada, have reporting requirements in place but that more work is needed to address issues of data quality and to remove legal barriers to reporting and data access.

Canadian authorities also play an important role in the FSB’s efforts to strengthen oversight and regulation of the shadow banking sector. The Bank is chairing a peer review of the implementation of the FSB policy framework for non-bank financial entities other than money market funds, and OSFI is co-chairing work on asset managers and global systemically important financial institutions other than banks and insurance companies.<sup>44</sup>

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<sup>41</sup> See FSB, *Implementation and Effects of the G20 Financial Regulatory Reforms: Report of the Financial Stability Board to G20 Leaders*, 9 November 2015.

<sup>42</sup> See FSB, *Principles on Loss-Absorbing and Recapitalisation Capacity of G-SIBs in Resolution: Total Loss-Absorbing Capacity (TLAC) Term Sheet*, 9 November 2015.

<sup>43</sup> See FSB, *Thematic Review on OTC Derivatives Trade Reporting: Peer Review Report*, 4 November 2015.

<sup>44</sup> See FSB, *Transforming Shadow Banking into Resilient Market-Based Finance: An Overview of Progress*, 12 November 2015; and OSFI, “Remarks by Deputy Superintendent Mark Zelmer to the C.D. Howe Institute,” Toronto, 8 December 2015.

## The Importance of Monitoring the Impact of Reforms

Now that reform implementation is well under way, the Bank and other authorities are turning toward evaluating the combined effects of the reforms on the global and Canadian financial systems. Authorities are studying how the different reforms interact, including how institutions and markets are responding to the new rules. This is necessary to understand whether additional changes might be required to mitigate any unintended negative effects of the reforms.

## Appendix: Canada's Implementation of Regulatory Reforms

**Table A-1: Key elements of Canada's progress in implementing regulatory reforms (2009–15)**

Building resilient financial institutions <sup>a</sup>	
<b>Risk-based capital regulations</b>	<p>The Office of the Superintendent of Financial Institutions (OSFI) required Canadian banks to meet target capital ratios in excess of the Basel III minimum requirements on 1 January 2013 on an “all-in” or fully phased-in basis. The capital conservation buffer will be phased in between 2016 and 2019. The countercyclical capital buffer will be implemented beginning in 2016.</p> <p>OSFI has instituted a 1 per cent capital surcharge on designated domestic systemically important banks (D-SIBs). The Quebec Autorité des marchés financiers (AMF) has applied an equivalent surcharge to Desjardins.</p>
<b>Liquidity standards<sup>b</sup></b>	OSFI required Canadian banks to fully meet the Liquidity Coverage Ratio (LCR), beginning in January 2015, with no phase-in period. The Net Stable Funding Ratio (NSFR) is to be implemented by 2018.
<b>Leverage</b>	OSFI implemented a minimum 3 per cent leverage requirement for all federally regulated deposit-taking institutions in 2015Q1, 3 years ahead of international timelines.
Ending “too big to fail”	
<b>Identifying systemically important financial institutions (SIFIs)</b>	<p>No Canadian banks or insurance companies have been identified as globally systemically important. OSFI has designated the Big Six banks as D-SIBs. The AMF has designated Desjardins as systemically important in the Quebec financial system.</p> <p>The international framework for non-bank, non-insurance SIFIs has yet to be finalized.</p>
Recovery and resolution	
<b>Banks<sup>c</sup></b>	<p>Recovery plans have been prepared by D-SIBs since 2011, with guidance from OSFI.</p> <p>The Canada Deposit Insurance Corporation (CDIC) has produced resolution plans for D-SIBs since 2012 and is undertaking periodic resolvability assessments. In 2015, the Government of Canada asked Canada's D-SIBs to be responsible for preparing resolution plans.</p> <p>Since 2011, OSFI and the CDIC have hosted annual crisis-management groups with D-SIBs and the relevant authorities.</p> <p>In 2014, the Government of Canada consulted publicly on a proposed Taxpayer Protection and Bank Recapitalization (i.e., bail-in) regime and proposed a D-SIB Higher Loss Absorbency (HLA) requirement of between 17 and 23 per cent of risk-weighted assets. This requirement is largely consistent with the international Total Loss-Absorbing Capacity requirement for G-SIBs.</p>
<b>Insurance companies</b>	International HLA requirements for global systemically important insurers have yet to be finalized.
<b>Financial market infrastructures (FMIs)</b>	<p>The Bank, in coordination with the Canadian Securities Administrators, recently launched a public consultation on supplementary guidance related to FMI recovery planning in the Canadian context.</p> <p>Joint work on developing resolution strategies and core elements of the legal framework for a resolution regime for FMIs is progressing.</p>
Making derivatives markets safer	
<b>Reporting to trade repositories (TRs)</b>	<p>Final rules for reporting to TRs are in place in Manitoba, Ontario and Quebec. Reporting came into effect at the end of October 2014 and was extended to end-users in June 2015. In November 2015, these provinces proposed rule amendments in relation to inter-affiliate reporting requirements and the public disclosure of TR data.</p> <p>In early 2015, British Columbia, Alberta, Saskatchewan, New Brunswick and Nova Scotia consulted publicly on a multilateral instrument (MI) on trade reporting. The MI is expected to be finalized by year-end. Efforts are under way to harmonize rules across provinces.</p>
<b>Trading on exchanges or electronic platforms</b>	In early 2015, the Canadian Securities Administrators (CSA) consulted publicly on proposed requirements for trading platforms. Work on the rule is ongoing.
<b>Clearing through central counterparties</b>	<p>OSFI revised its Derivatives Sound Practices Guideline effective November 2014, which states that federally regulated financial institutions should clear standardized over-the-counter (OTC) derivatives, where practicable. Basel III capital requirements in OSFI's Capital Adequacy Requirements Guideline provide a further incentive for central clearing of OTC derivatives.</p> <p>The CSA is consulting publicly on national instruments for clearing as well as on segregation and portability. A third consultation, which includes determinations of mandatorily clearable derivatives, is expected in early 2016.</p>

a. See É. Chouinard and G. Paulin, “Making Banks Safer: Implementing Basel III,” Bank of Canada *Financial System Review* (June 2014): 53–59.

b. See T. Gomes and C. Wilkins, “The Basel III Liquidity Standards: An Update,” Bank of Canada *Financial System Review* (June 2013): 37–43.

c. See A. Lai and A. Mordel, “The Resolution of Systemically Important Financial Institutions,” Bank of Canada *Financial System Review* (June 2012): 37–42.

(continued...)



**Table A-1: Key elements of Canada’s progress in implementing regulatory reforms (2009–15) (continued)**

<b>Higher capital and margin requirements for non-centrally cleared trades<sup>d</sup></b>	OSFI published a draft margin guideline for public consultation in October 2015. In line with international expectations, the final guidance is expected to become effective as of September 2016. A CSA consultation paper on margin requirements is expected to be published in the first half of 2016.
<b>Enhancing the oversight and regulation of the shadow banking sector</b>	
<b>Assessing and mitigating risks from shadow banking entities</b>	Canadian authorities are monitoring shadow banking entities other than money market mutual funds, including through participation in Financial Stability Board information-sharing exercises and regular domestic monitoring of shadow banking. <sup>e</sup>
<b>Dampening procyclicality and financial stability risks in securities financing transactions</b>	The Bank of Canada is encouraging central clearing of repo transactions to promote resilience in this core funding market. <sup>f</sup> Improved monitoring of repo markets will be possible using more-granular and frequently reported data from the new Market Trade Reporting System 2.0. Minimum haircuts on repo transactions will be implemented in 2018 through Basel III rules.

d. See N. Chande, S. Lavoie and T. Thorn, “Margining for Non-Centrally Cleared Over-the-Counter Derivatives,” Bank of Canada *Financial System Review* (December 2013): 45–51.

e. See T. Gravelle, T. Grieder and S. Lavoie, “Monitoring and Assessing Risks in Canada’s Shadow Banking Sector,” Bank of Canada *Financial System Review* (June 2013): 55–63.

f. See N. Chande, N. Labelle and E. Tuer, “Central Counterparties and Systemic Risk,” Bank of Canada *Financial System Review* (December 2010): 43–50; and P. Chatterjee, L. Embree and P. Youngman, “Reducing Systemic Risk: Canada’s New Central Counterparty for the Fixed-Income Market,” Bank of Canada *Financial System Review* (June 2012): 43–49.

## Reports

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

### Introduction

This section of the *Financial System Review* features two reports on significant developments in the financial system related to household finances: the importance of residential mortgage securitization for Canadian housing finance and the changing patterns of indebtedness of Canadian households.

In **Residential Mortgage Securitization in Canada: A Review**, Adi Mordel and Nigel Stephens explain how two types of mortgage securitization—private and public—have evolved in Canada over the past 15 years. The authors analyze the benefits as well as the potential financial system vulnerabilities that accrue from public securitization. They conclude by discussing the policies that could be considered to reinvigorate private securitization in Canada.

**Indebted Households and Potential Vulnerabilities for the Canadian Financial System: A Microdata Analysis**, by Gino Cateau, Tom Roberts and Jie Zhou, uses household-level data to identify the demographic and socio-economic characteristics of indebted households and their evolution over the past 10 years. The report highlights the growing share of debt held by highly indebted households and assesses the resilience of households and the overall financial system to severe shocks.

# Residential Mortgage Securitization in Canada: A Review

*Adi Mordel and Nigel Stephens*

- Residential mortgage securitization (together with mortgage insurance) plays an important role in the Canadian system of housing finance, especially given the rising share of government-supported (i.e., public) securitization over the past 15 years.
- The main social benefit for Canadians of public securitization is the support it provides for both diversity of choice and access to mortgage financing through a stable, cost-effective supply of funding to mortgage lenders. Public securitization also supports competition in the mortgage market by providing funding to small lenders,<sup>1</sup> which have fewer alternative funding sources. Financial institutions also benefit from public securitization by using these highly rated assets to meet regulatory requirements.
- The recent increase in public securitization has also led to public discussions about the government's exposure to the housing market, the balance between investment in residential real estate and other forms of investment, and the potential effects on household borrowing and the housing market. One approach to reducing the government's involvement in the housing market would be to consider adopting measures to reinvigorate private mortgage securitization in Canada.

## Introduction

Mortgage securitization, the process of converting illiquid mortgage loans into tradable securities, plays an important role in the Canadian financial system. Over the past 15 years, the share of mortgage credit in Canada that has been securitized has grown from about

10 per cent to 33 per cent. Of the amount securitized during that period, the share executed through public securitization increased from 50 per cent to almost 100 per cent.

In this report, we analyze the evolution of both public and private mortgage securitization in Canada to better understand the underlying public policy and economic determinants.

In particular, we consider the uses of mortgage securitization by financial institutions (FIs) to meet their funding needs and regulatory liquidity requirements. As well, we estimate that significant benefits accrue to the financial system as a whole from public securitization. Aggregate mortgage funding costs are reduced by about \$870 million annually. In addition, Canadian FIs save at least \$120 million per year for every \$100 billion of National Housing Act Mortgage-Backed Securities (NHA MBS) held for regulatory liquidity adherence.<sup>2</sup>

We then review potential implications of the extent of public securitization, noting that the Canadian government has taken steps to adjust its framework for housing finance to restrain the growth of public securitization. We conclude with a discussion of policies that could be considered to reinvigorate private securitization in Canada.

<sup>1</sup> In this report, the term "small lenders" refers to all financial institutions that access public securitization programs in Canada, excluding the Big Six banks.

<sup>2</sup> On 11 December 2015, the government announced changes to its public securitization programs. The estimates in this report are based on the guarantee fees that existed before the 11 December announcement. See the Canada Mortgage and Housing Corporation press release at <http://www.cmhc-schl.gc.ca/en/corp/nero/nere/2015/2015-12-11-0900.cfm>.

## Mortgage Securitization in Canada: The Context

### Institutional background

The federal government supports housing finance in Canada through mortgage insurance and public securitization programs.<sup>3</sup> Federally regulated lenders are required to obtain mortgage insurance on loans in which the homebuyer has made a down payment of less than 20 per cent of the purchase price.<sup>4</sup> Mortgage insurance is provided by the Canada Mortgage and Housing Corporation (CMHC) and private insurers; insurance from both sources is guaranteed by the government, although not to the same degree.<sup>5</sup>

In Table 1, we illustrate the interaction between mortgage insurance and securitization in Canada. Public securitization is provided through the NHA MBS and Canada Mortgage Bond (CMB) programs, both administered by CMHC (Box 1 provides further detail on these types of securities). Both programs use only insured mortgages; public securitization of uninsured mortgages does not exist in Canada.

**Table 1: Types of residential mortgage securitization in Canada**

Securitization	Underlying mortgage type	
	Insured	Uninsured
Public	National Housing Act Mortgage-Backed Securities and Canada Mortgage Bonds	Does not exist
Private-label	Intention to disallow announced	Asset-backed commercial paper and residential mortgage-backed securities

Note: Covered bonds are a direct obligation of financial institutions issuing the bonds and, hence, are not considered securitizations. Investors have recourse to the covered pool in the event of issuer default.

Source: Bank of Canada

Private-label securitization has existed in Canada since 1985. To reduce taxpayer exposure and encourage development of private mortgage markets, the government announced its intention to prohibit the use of insured mortgages as collateral in non-CMHC securitization vehicles.<sup>6</sup> To date, private-label securitization of

uninsured mortgages primarily consists of short-term asset-backed commercial paper (ABCP)<sup>7</sup> and some longer-term residential mortgage-backed securities (RMBS). New issuance of RMBS has been close to non-existent in Canada in recent years.

Covered bonds are another important source of funding that used to be backed by insured mortgages. However, in April 2012, the federal government announced a registered covered bond framework to be administered by CMHC. Under the framework, the bonds are only backed by uninsured mortgages. Subject to the prudential limit established by the Office of the Superintendent of Financial Institutions (OSFI), an FI can have outstanding covered bonds of no more than 4 per cent of its total assets. To date, under the framework, total issuance stands at over \$70 billion. Covered bonds are an alternative to public and private securitization as a source of funding for FIs.<sup>8</sup>

Table 2 compares the level of government involvement in the mortgage market across Canada, the United States, the United Kingdom and Australia. Compared with the United States, Canada exhibits a higher level of government involvement in mortgage insurance but a lower level of involvement in mortgage securitization. Australia has an active private mortgage insurance system with no public support, while the United Kingdom's private mortgage insurance system is limited. The United Kingdom also has temporary public mortgage insurance programs created by the government during the financial crisis. The table also indicates that the four countries have broadly similar rates of home ownership.

**Table 2: Cross-country comparison (per cent)**

	Canada	United States	United Kingdom	Australia
Share of public mortgage insurance	58.0	14.0	0.4	0
Share of public securitization	34.0	55.0	0.0	0
Home-ownership rate	67.6	65.1	64.6	67

Note: Public insurance in Canada is the insurance-in-force, i.e., the total amount of outstanding loan balances covered by mortgage loan insurance policies by CMHC and private insurers. For the United States, public insurance relates to Federal Housing Administration and Veterans Affairs loans, which are insured by the federal government. For the United Kingdom, it is the NewBuy Guarantee and the Help to Buy programs. Share of public insurance is to outstanding mortgage debt as of 2013 (for the United Kingdom, as of 2014). Shares of public securitization to outstanding mortgage debt for Canada and the United States are as of 2014. U.S. data are from the Securities Industry and Financial Markets Association and the Federal Reserve Board and are based on the ratio of agency MBS outstanding to total mortgage credit. See Chart 1-A for the Canadian data. Home-ownership rates are as of 2013 except for Australia (2011).

Source: Bank of Canada

3 The government also supports housing finance through other means, including tax credits and RRSP withdrawals for first-time home buyers.

4 Low-ratio mortgages (with down payments greater than 20 per cent) can also be insured by CMHC and private insurers with portfolio or transactional insurance. See Crawford, Meh and Zhou (2013) for a detailed discussion of the Canadian mortgage market.

5 CMHC mortgage insurance has a 100 per cent public guarantee, while for private insurers it is only 90 per cent. The government guarantee is activated when the insurer fails to honour its commitment to the lender.

6 See Government of Canada (2015).

7 About 20 per cent of the underlying residential mortgages backing ABCP are uninsured at present.

8 See the 2015 report by the C.D. Howe institute, "How to Make the World Safe for (and from) Covered Bonds" (Poschmann 2015).

Box 1

## National Housing Act Mortgage-Backed Securities and Canada Mortgage Bonds

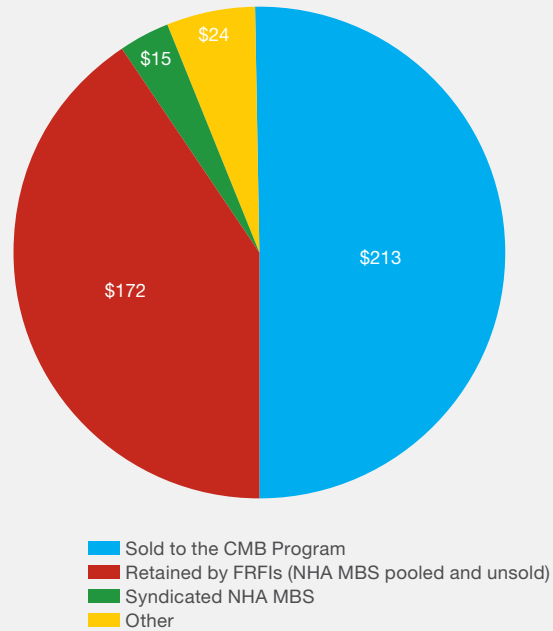
The NHA MBS Program, introduced in 1987, allows financial institutions (FIs) to issue mortgage-backed securities (MBS) that are backed by pools of residential mortgages insured under the *National Housing Act*. NHA MBS investors are not subject to payment risk or the underlying mortgage credit risk, owing to the Canada Mortgage and Housing Corporation’s (CMHC) timely payment guarantee of interest and principal, as well as the insurance on the underlying mortgages. Before 2015, the annual cost of guaranteeing the timely payment on a typical 5-year NHA MBS was four basis points.<sup>1</sup> Although investors face no credit risk, they are exposed to prepayment risk on the underlying mortgages that offer amortizing monthly cash flows. The majority of NHA MBS are fixed rate and are issued for a 5-year term, reflecting the popularity of the 5-year fixed-rate mortgage.

Since 2001, NHA MBS could be sold to the Canada Housing Trust (CHT), which funds these purchases by issuing Canada Mortgage Bonds (CMB). Similar to NHA MBS, CMB offer investors a timely payment guarantee; the guarantee fee is paid up front by the participating financial institution. Approximately half of newly issued CMB are fixed rate for 5-year terms. Unlike NHA MBS, the CMB Program converts monthly amortizing cash flows into typical bond-like payments (i.e., semi-annual or quarterly coupon payments and a final full principal payment). Thus, CMB appeal to a much broader investor base, and funding can be achieved at a relatively lower cost than for NHA MBS.

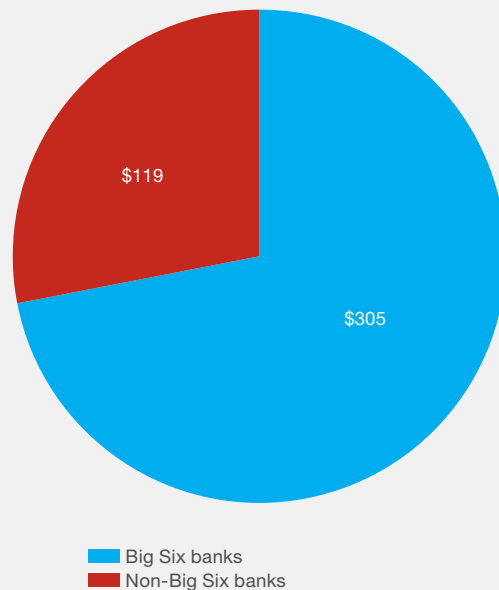
The public policy objectives of the NHA MBS and CMB programs are to “contribute to the efficient functioning, competitiveness, and stability of the housing finance system by helping ensure lenders and, in turn, borrowers have access to a reliable source of funding for residential mortgages regardless of economic cycles and market conditions” (CMHC 2014). These objectives address the goal of providing a reliable funding source throughout the economic cycle and supporting competition in mortgage lending by supplying cost-efficient funding to small lenders that have limited access to alternative sources. Figure 1-A provides breakdowns of the total amount of outstanding NHA MBS of approximately \$425 billion by usage and issuer.

**Figure 1-A: Composition of outstanding National Housing Act Mortgage-Backed Securities as of June 2015**

By usage, Can\$ billions



By issuer, Can\$ billions



Note: FRFIs are federally regulated financial institutions. Retained NHA MBS are reported as pooled but unsold by FRFIs. Syndicated NHA MBS are not sold only by the bank that created them, but rather by a syndicate of dealers. “Other” captures all remaining NHA MBS.

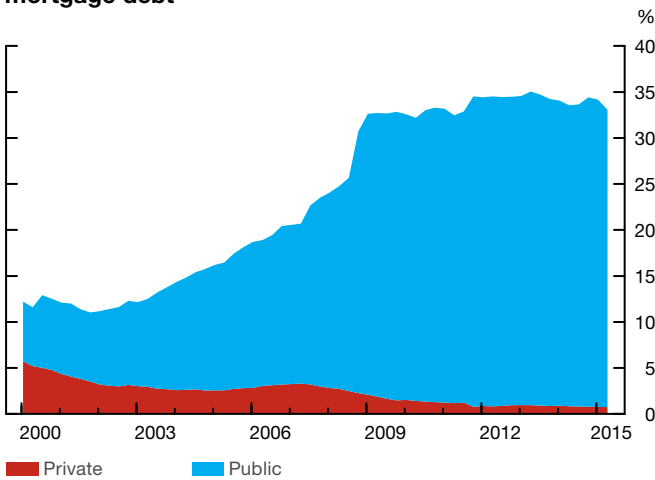
Sources: Canada Mortgage and Housing Corporation and Office of the Superintendent of Financial Institutions

<sup>1</sup> The cost of the annualized guarantee fee is higher than four basis points when the average life of the 5-year NHA MBS is less than five years. If, for example, the average life were three years, the cost would be roughly seven basis points.

## Market developments

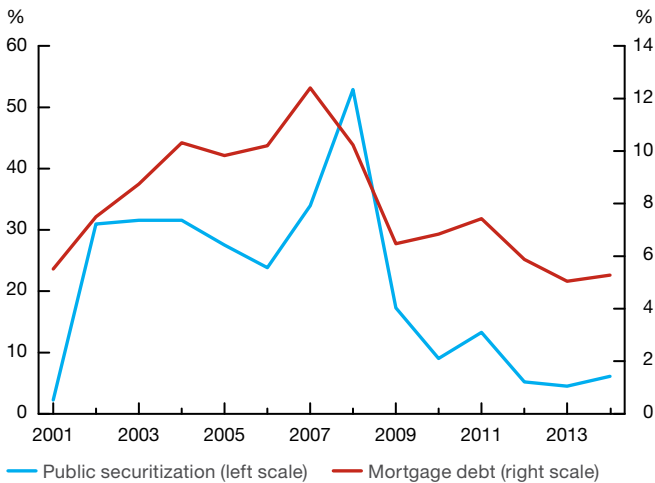
Chart 1-A shows the substantial rise in the share of outstanding securitized mortgage debt. In 2000, only about 10 per cent of the outstanding mortgage debt was securitized, and half of that was through private programs. By 2015, about a third of the outstanding mortgage debt was securitized, almost all through public programs. Not surprisingly, mortgage credit in Canada has tended to move directionally with public securitization, as is evident in Chart 1-B, which compares the annual growth rates for the two series.

**Chart 1-A: Ratio of outstanding securitization to residential mortgage debt**



Sources: Canada Mortgage and Housing Corporation and Statistics Canada Last observation: June 2015

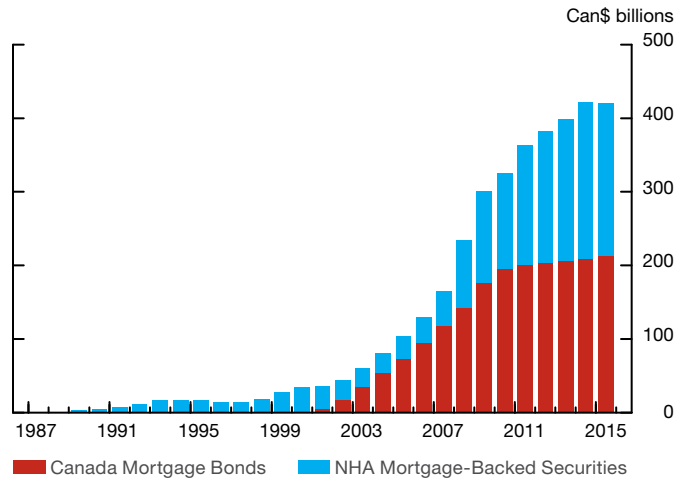
**Chart 1-B: Growth rates of outstanding public securitization and residential mortgage debt**



Sources: Canada Mortgage and Housing Corporation and the Bank of Canada Last observation: December 2014

The rapid expansion of public securitization is especially evident in the period between 2008 and 2010, in response to the Insured Mortgage Purchase Program, which allowed mortgage lenders to pool insured mortgages into NHA MBS and sell them to CMHC to obtain additional liquidity during the financial crisis.<sup>9</sup> Currently, the stock of public securitization continues to increase, although at a slower pace, in part because of limits imposed by the government on NHA MBS and CMB issuance (Chart 2).<sup>10</sup>

**Chart 2: Outstanding public mortgage securitization**



Source: Canada Mortgage and Housing Corporation Last observation: June 2015

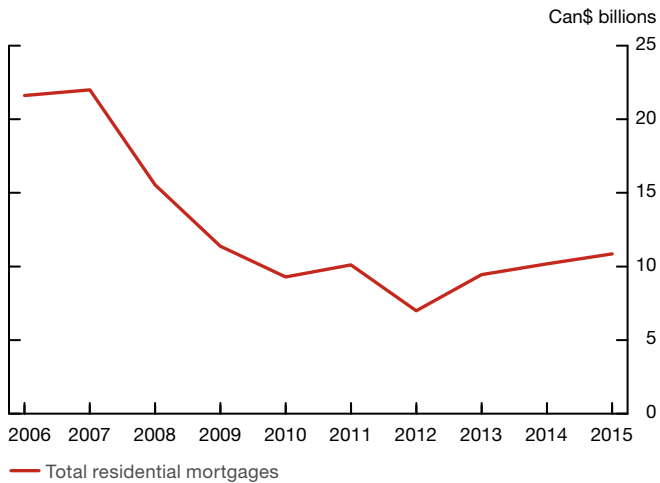
Before the financial crisis, there was also an active market for ABCP and, in 2006, approximately \$20 billion of the underlying assets were residential mortgages (some of which were insured). The non-bank-sponsored ABCP market, which mainly invested in complex credit derivatives known as collateral debt obligations that were backed by U.S. subprime mortgages, experienced severe disruptions in the summer of 2007, since issuers were unable to roll over their short-term debt.<sup>11</sup> Since then, the ABCP market has contracted substantially and, as of June 2015, only about \$10 billion of the outstanding securities were backed by residential mortgages (Chart 3).

Several factors explain the rising share of public securitization in Canada from both the demand and supply perspectives. For FIs, CMB are a cost-effective funding

<sup>9</sup> A description of the program is available at <http://www.parl.gc.ca/content/lop/researchpublications/prb0856-e.htm>.

<sup>10</sup> While annual issuance of CMB since 2013 has been held to \$40 billion a year, the annual issuance of NHA MBS was lowered to \$80 billion a year for 2014 and 2015 (from \$85 billion in 2013).

<sup>11</sup> Kamhi and Tuer (2007) discuss the collapse of the non-bank ABCP market in Canada.

**Chart 3: Outstanding residential mortgages funded through asset-backed commercial paper**

Source: Dominion Bond Rating Service

Last observation: June 2015

tool, especially for smaller institutions that do not have a branch network of deposits and lack alternative funding sources. As well, from a regulatory perspective, NHA MBS qualify (as do CMB) as high-quality liquid assets (HQLA) under the terms of the Basel III Liquidity Coverage Ratio (LCR).<sup>12</sup> As of June 2015, about 40 per cent of the outstanding stock of NHA MBS was retained by federally regulated FIs, which could help them meet the LCR requirement.

For NHA MBS and CMB, investors also benefit from a timely payment guarantee (offered by the government through CMHC for a fee, called the guarantee fee) on the securities' interest and principal. This enhances demand for the securities, since investors do not face credit risk or uncertainty as to the timing of cash flows from the securities. In addition, the timely payment guarantee allows NHA MBS and CMB to be government securities from a credit perspective, which enhances their attractiveness to investors.

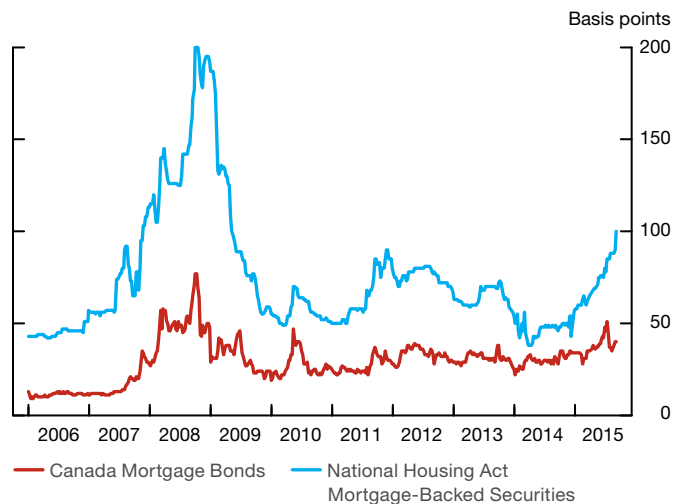
## Quantifying the Impact of Government-Supported Securitization

In this section, we examine the potential impacts of public securitization in Canada, specifically, the benefits that accrue to the financial system and

<sup>12</sup> Under Basel III, a bank needs to have an adequate stock of unencumbered HQLA that can be converted easily and immediately in private markets into cash to meet their liquidity needs for a 30-calendar-day liquidity stress scenario. The LCR is the ratio of the stock of HQLA to total net cash outflows. The standard requires that, absent a situation of financial stress, the value of the ratio should be no lower than 100 per cent (i.e., the stock of HQLA should at least equal total net cash outflows). During a period of financial stress, however, institutions may use their stock of HQLA, thereby causing the ratio to fall below 100 per cent.

FIs, and attempt to quantify two of them: the cost-effectiveness of funding and the regulatory benefit of meeting the LCR.<sup>13</sup>

Canadian mortgage lenders and borrowers benefit from the certainty and availability of funding provided by CMHC securitization, especially through the CMB Program. The regular schedule of CMB issuance and relatively steady issuance volumes on a quarterly basis provide lenders with certainty of cost-effective funding, which is valuable for business planning purposes. That value was highlighted in 2008 during the financial crisis, when access to market funding for FIs worldwide became severely restricted. During that time, the CMB Program continued to issue bonds on its regular schedule, in increased volumes, albeit at wider spreads. This is shown in Chart 4, which reports indicative (expected) spreads for new issuances of NHA MBS and CMB over 5-year Government of Canada bonds.

**Chart 4: Spreads of NHA MBS and CMB over 5-year Government of Canada bonds**

Source: Royal Bank of Canada

Last observation: September 2015

Another important benefit of government-backed securitization programs is that they limit severe procyclical contractions in the extension of mortgage credit during a crisis, when access to funding may be impaired. For example, between 2008 and 2014, the average annual growth rate in outstanding mortgage credit in Canada was 6 per cent, whereas in the United States, mortgage

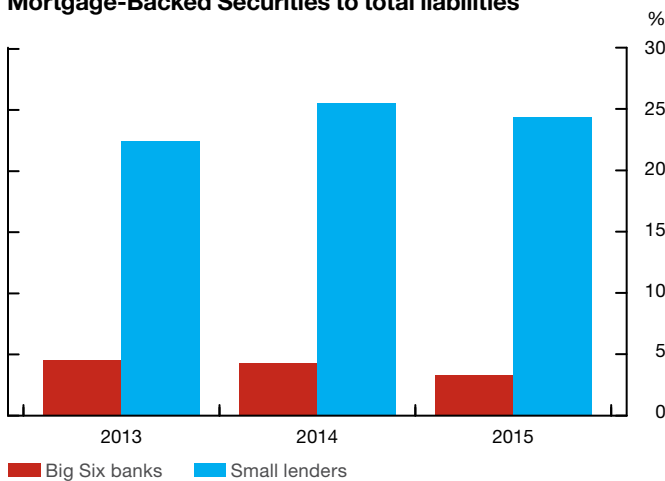
<sup>13</sup> It is challenging to disentangle the benefits of mortgage insurance from those of securitization. For that, we would need a type of mortgage securitization that does not exist in Canada, one in which the government provides a timely payment guarantee on MBS that are backed by uninsured mortgages (Table 1). Evidence from the United States suggests that in the 1990s and 2000s, the difference in interest rates for borrowers between mortgages that were more easily securitizable and those that were not was up to 24 basis points (Adelino, Schoar and Severino 2012).

credit contracted by approximately 2 per cent per year, even after accounting for the increased issuance of MBS by government-sponsored enterprises. While there were clearly other important factors at play, public securitization in Canada helped support growth in mortgage credit during this period. Finally, Canadian banks also use NHA MBS and CMB as collateral in repo transactions. Gravelle, Grieder and Lavoie (2013) document that these securities account for about 20 per cent of repo collateral (classified as obligations of Crown corporations). Further, FIs can pledge NHA MBS and CMB in the Large Value Transfer System, which allows them to use other securities for other purposes.

### The cost-effectiveness of public securitization

Canadian institutions use a variety of sources to meet their funding needs, with the mix depending on the cost-effectiveness of the options. Funding sources for the Big Six banks include wholesale instruments such as short-term debt and senior unsecured bonds, covered bonds backed by pools of mortgages, securitized issuances (including the NHA MBS and CMB programs and vehicles backed by credit card receivables), and retail and corporate deposits. Funding by the large Canadian banks may also take place in a variety of currencies, in particular for senior unsecured bonds and covered bonds, with the foreign currency proceeds typically swapped back to Canadian dollars. Small lenders are more limited in their funding options and rely to a greater extent on the NHA MBS and CMB programs for funding, as indicated in Chart 5.

**Chart 5: Ratio of outstanding National Housing Act Mortgage-Backed Securities to total liabilities**



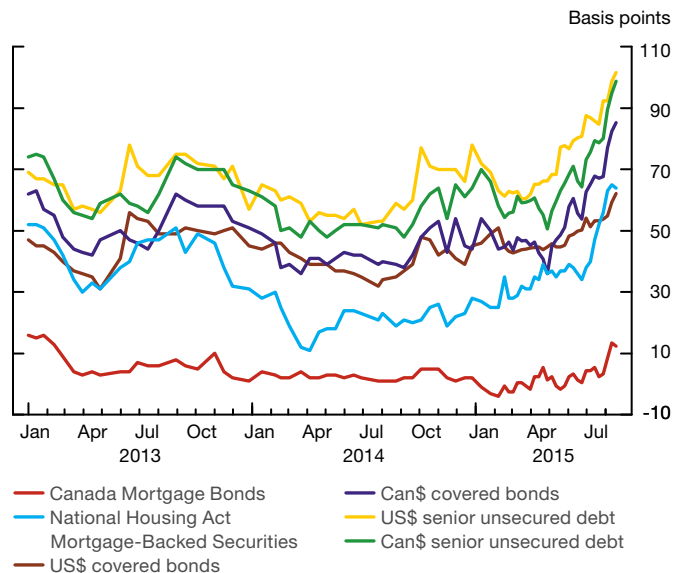
Note: Ratios are as of June of each year.  
 Sources: Office of the Superintendent of Financial Institutions and Canada Mortgage and Housing Corporation  
 Last observation: June 2015

We estimate the cost-effectiveness of funding from the NHA MBS and CMB programs by comparing their cost of funds with the cost of the next-cheapest source of long-term wholesale funding. We measure how much funding costs for lenders would rise if the NHA MBS and CMB programs did not exist.

This approach follows the methodology employed by CMHC’s evaluation of the CMB Program, which was prepared by KPMG and released in 2008.<sup>14</sup> Although the approach allows us to compare the cost-effectiveness of the NHA MBS and CMB programs, its drawback is that the methodology requires some simplifying assumptions; namely, that the funding cost of the next-cheapest alternative would not increase if the programs ceased, that funding in sufficient size would be available from the alternative, and that CMB and NHA MBS funding is raised only at the 5-year term.

Since funding costs on the cheapest alternative change over time, as indicated in Chart 6, we report a range for the funding advantage of CMB and NHA MBS in Table 3, which is based on the chart.<sup>15</sup> The table indicates that, over the sample period, the average cost advantage for a Big Six bank from the CMB Program relative to the next-best alternative was about 40 basis points, and the relative benefit of NHA MBS was about 11 basis points.

**Chart 6: Indicative 5-year all-in funding costs (as spread to 3-month CDOR)**



Note: CDOR = Canadian-Dollar Offered Rate  
 Source: Dealer quotes  
 Last observation: September 2015

<sup>14</sup> *Canada Mortgage Bonds Program Evaluation* (KPMG 2008).  
<sup>15</sup> Funding costs are based on biweekly dealer quotes between January 2013 and September 2015 and include guarantee and syndication fees. Guarantee fees on NHA MBS and CMB are based on the fee level before 1 April 2015. Funding costs are swapped back to Canadian dollars and expressed in terms of a spread to the 3-month Canadian-Dollar Offered Rate.



For comparison, the KPMG report, which evaluated only the CMB Program over the 2001–06 period, concluded that the average cost advantage of that program over the next-best alternative was about 18 basis points.

**Table 3: All-in funding cost advantage of Canada Mortgage Bonds and NHA Mortgage-Backed Securities versus the next-cheapest private alternative (basis points)**

	Minimum	Average	Maximum
CMB	28	40	51
Syndicated NHA MBS	0	11	28

Source: Bank of Canada

Estimating the cost advantage of NHA MBS and CMB as funding sources for small mortgage lenders is more difficult. On the one hand, the cost of CMB funding is higher for lenders who require third-party assistance in the CMB swap and sourcing of replacement assets backing CMB issues, reducing the relative cost advantage of CMB funding.<sup>16</sup> On the other hand, the cost of alternative sources of wholesale funding for small lenders is generally higher than that of the Big Six banks, increasing the relative cost advantage of CMB funding. In addition, to the extent that small lenders meet a higher proportion of their total funding needs through the NHA MBS and CMB programs than do the Big Six banks (as indicated in Chart 5), the programs provide a greater relative advantage to small lenders.

Given the overall supply constraint on CMB and NHA MBS, small lenders also benefit from the allocation methodology used by CMHC to distribute NHA MBS issuance and CMB funding among FIs. Available funding is allocated equally to all FIs, regardless of their size or requests for funding. As a result, small lenders are able to access the public securitization programs for a greater relative share of their funding needs, providing more-stable funding sources and helping them to compete against other mortgage lenders.

One can roughly estimate the alternative private funding costs for small lenders by considering an RMBS issuance completed in 2014. The weighted average spread of all the tranches issued in the market was about 40 basis points over NHA MBS. Assuming that the averages from Table 3 are representative, the issuer paid its RMBS investors about 70 basis points more than what it would have paid for CMB funding.

Based on the current outstanding stock of NHA MBS and CMB, and assuming that their relative funding cost advantage is the same across all institutions, we estimate the aggregate annual funding benefit of these programs to be about \$870 million for all FIs that access the programs.<sup>17</sup>

## The use of public securitization to meet the Liquidity Coverage Ratio

The Basel Committee on Banking Supervision requires banks to have (at a minimum) sufficient HQLA to cover stressed cash outflows over a 30-day period (BCBS 2013). The total amount of HQLA distinguishes between the highest-quality liquid assets (Level 1 HQLA) and those that are somewhat less liquid (Level 2 HQLA). While there is a cap on the amount of Level 2 assets (they can comprise no more than 40 per cent of total HQLA), there is no cap and no haircut on Level 1 assets. In this sense, they can be held in unlimited amounts for LCR purposes (i.e., total HQLA requirements can be met entirely by any specific Level 1 asset).<sup>18</sup>

Both NHA MBS and CMB qualify as Level 1 assets. They have the added advantage of carrying a zero risk-weight capital requirement because they are government guaranteed.<sup>19</sup> However, NHA MBS are an attractive instrument for FIs to hold for the LCR because they are readily convertible from mortgages on their books and have a higher yield than Government of Canada bonds and CMB.

The advantage of using NHA MBS to meet the LCR requirement can be estimated by considering the cost of holding the next-cheapest alternative, provincial bonds—which also qualify as Level 1 assets. We compare the cost of converting insured mortgages to a 5-year NHA MBS held for the LCR versus buying provincial bonds for the LCR by funding the purchase through the cheapest wholesale funding instrument, covered bonds, on the assumption that the NHA MBS and CMB programs did not exist.

<sup>16</sup> Lenders participating in the CMB Program must substitute maturing NHA MBS sold to the Canada Housing Trust with replacement assets and must engage in a swap with CHT where they exchange the interest flows on CMB issues with those on the securities backing the CMB.

<sup>17</sup> As of June 2015, the stock of outstanding CMB totalled \$213 billion, whereas the estimated outstanding stock of syndicated NHA MBS stood at about \$15 billion. Multiplying the outstanding amounts of these instruments by their respective average cost advantages (40 basis points and 11 basis points, respectively) yields a total benefit of about \$870 million.

<sup>18</sup> For further discussion on the Basel III liquidity standards, see Gomez and Wilkins (2013).

<sup>19</sup> According to OSFI, because NHA MBS are guaranteed by CMHC, they receive a zero per cent risk weight in recognition of the fact that obligations incurred by CMHC are legal obligations of the Government of Canada. See [http://www.osfi-bsif.gc.ca/eng/fi-if/rg-ro/gdn-ort/gi-ld/Pages/CAR\\_chpt3.aspx](http://www.osfi-bsif.gc.ca/eng/fi-if/rg-ro/gdn-ort/gi-ld/Pages/CAR_chpt3.aspx).

Table 4 indicates that the benefit of NHA MBS for LCR purposes differs, based on the amount issued.<sup>20</sup> For the first \$6 billion, FIs would save, on average, 22 basis points, and for any amount issued above \$6 billion, FIs would save about 12 basis points. This means that, for FIs in aggregate, the benefit for each \$100 billion of NHA MBS held for LCR purposes amounts to at least \$120 million annually.<sup>21</sup>

**Table 4: The cost advantage of adhering to the Liquidity Coverage Ratio with NHA Mortgage-Backed Securities vs. provincial debt**

Annual cost of creating NHA MBS	For the first \$6 billion: 10 basis points Any amount above \$6 billion: 20 bps
Cost to hold provincial bond for the LCR	
Issue covered bond	Canadian-Dollar Offered Rate + 44 bps
Return on provincial bond	CDOR + 12 bps
Total holding cost	32 bps
Cost differential	for the first \$6B: 22 bps for any amount above \$6B: 12bps

Source: Bank of Canada

## Potential Implications of Government-Supported Programs

Although benefits accrue to mortgage lenders from accessing CMHC securitization programs, there are also risks associated with these programs. There is the risk that CMHC will be called upon under the timely payment guarantee to meet interest and/or principal payments on NHA MBS or CMB issues. CMHC reserves for this risk by charging lenders guarantee fees, and it holds capital against its securitization exposures of about \$1.6 billion (year-end 2014). There are, however, other potential vulnerabilities and risks associated with public securitization from a financial stability perspective that may not be fully incorporated in the level of guarantee fees. We review those below.

### Impact on the supply of mortgage credit

Since lenders can securitize mortgages under the public securitization programs in a cost-effective manner, they may overextend mortgage credit and underinvest in other productive assets (such as small business loans). The latter may occur because mortgage-backed

funding for FIs through public securitization is more cost-effective and stable than non-mortgage-backed funding, creating an incentive to extend more mortgage credit than would occur without public securitization. An increase in mortgage credit could lead to more leveraged households and elevated house prices.

While public securitization programs may support competition, they may also increase vulnerabilities in the financial system by influencing the business models of mortgage lenders. For example, mortgage finance companies (MFCs) are important participants in the residential mortgage market. MFCs typically underwrite and service insured mortgages sourced from brokers. They tend to sell a large proportion of their mortgage loans to federally regulated financial institutions (FRFIs), which may use them in CMHC securitization programs for funding or regulatory purposes, or into CMHC securitization programs. In this way, MFCs rely to a considerable extent on funding from public securitization programs. Without these programs, it is not clear if MFCs' other sources of funding, which are less stable than deposits (e.g., syndicated lines of credit from banks), would be reliable and large enough to support their mortgage activities.

MFCs are less-regulated lenders (i.e., they are not directly regulated by OSFI), although they must abide by residential mortgage underwriting guidelines for FRFIs.<sup>22</sup> Limited available data also suggest that MFCs are highly leveraged, leaving them less able to manage liquidity and maintain income following an increase in mortgage defaults (although mortgage insurance limits the eventual losses). The participation of MFCs (supported by public securitization programs) in the residential mortgage market increases competition, but more transparency and analysis are needed to better understand their business models and their potential impact on financial system risk (see the June 2015 *Financial System Review*).

### Use of securities for regulatory requirements

As noted earlier, since NHA MBS (and CMB) qualify as Level 1 assets, FIs can use them in unlimited amounts to meet the LCR requirement. As of year-end 2014, about \$184 billion in NHA MBS were retained on-balance-sheet, mainly by the Big Six banks, and NHA MBS represent the most effective asset for FIs to use for LCR purposes.

From a public policy perspective, when the government was restricting the use of portfolio mortgage insurance to limit public exposure to housing finance, it noted that “[T]hese measures will restore taxpayer-backed portfolio

<sup>20</sup> The cost of 5-year NHA MBS is based on the guarantee fee schedule as of 1 April 2015. For the first \$6 billion, the upfront guarantee fee was set at 0.30 per cent, or 10 basis points annually, assuming that the average life of NHA MBS is three years. Similarly, for any amount above \$6 billion, the fee was set at 0.60 per cent, or 20 basis points annually. We exclude the cost of insuring the mortgages. Spread levels are relative to the 3-month CDOR and are based on average biweekly dealer quotes between January 2013 and September 2015. We use 5-year Ontario bonds as the provincial proxy.

<sup>21</sup> Holding CMB for collateral purposes is more expensive than holding provincial bonds, given the relatively lower yield on CMB. However, the liquidity of CMB may make them an attractive security for LCR purposes.

<sup>22</sup> 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.

insurance to its original purpose of allowing access to funding for mortgage assets” (Government of Canada 2013).

Effective 1 April 2015, CMHC increased the guarantee fees applied to NHA MBS for each FI and, in particular, doubled the fees on issuances above \$6 billion.<sup>23</sup> In addition to encouraging the development of alternative funding options in the private market, the differential guarantee fee structure may reflect the variety of ways in which FIs use NHA MBS. It is also consistent with the program’s stated objective of promoting competition, since smaller lenders, who are more likely to use NHA MBS for funding and demand less than the \$6 billion cut-off, will be paying lower fees than FIs that demand larger amounts.

### Effect on alternative funding models

Alternative funding vehicles, such as private-label securitization markets, can be used to fund mortgages and transfer and diversify risk in a way that would benefit the real economy (BoE and ECB 2014). In Canada, the availability of low-cost publicly guaranteed funding may reduce the incentive for FIs to explore the development of alternative mortgage funding vehicles, namely private-label mortgage securitization. For example, during its review of the CMB Program, KPMG interviewed representatives of the big five banks, which indicated that “in the absence of the CMB program, private securitization vehicles would have been issued, probably by the big five banks as single issuers and possibly as multi-seller vehicles for smaller players” (KPMG 2008, p. 31).

It is not certain, however, that FIs would develop alternative funding models if access to public securitization programs were reduced. FIs could choose to utilize existing funding sources to a greater extent in situations where the benefits of the alternative models are uncertain, set-up challenges are high and their additional funding needs may not be large.<sup>24</sup> Private securitizations may also be limited, since they cannot be backed by insured mortgages. As such, the development of private vehicles depends in part on the growth rate of uninsured mortgage credit and the extent to which it outstrips FIs’ existing funding sources.

## Policy Options to Promote Private Securitization

The government could continue to reduce public involvement in the housing market by adopting policy measures to promote a private-label securitization market.<sup>25</sup> In addition, the government could consider changes to public securitization, which could take the form of some or all of the following: further increases in the cost to access CMHC programs, additional reductions in the issuance caps under CMHC programs or restrictions on the eligibility of lenders able to participate in the programs.

Fostering a private-label mortgage securitization market in Canada could help to achieve a rebalancing of private and public securitization. Such a market could benefit the economy by helping lenders fund assets and diversify risks (Schembri 2014; BoE and ECB 2014). In that respect, the Bank of Canada announced that, as of April 2015, term asset-backed securities of high quality, including residential mortgage-backed securities, would be considered as eligible collateral for the Standing Liquidity Facility (SLF).<sup>26</sup> Other measures that could promote an appropriate framework for private-label mortgage securitization include principles for eligible collateral, reporting requirements and structure standardization.

Some steps to reduce public securitization have already been put in place. As part of its 2014 budget, the federal government announced that it would implement measures to reduce taxpayer exposure to the housing sector and increase market discipline in residential lending. For example, while the annual issuance of CMB since 2013 has been kept at \$40 billion a year, the annual issuance of NHA MBS was lowered to \$80 billion a year for 2014 and 2015 (from \$85 billion in 2013) (GoC 2014). And, as mentioned earlier, the government also raised the guarantee fees on NHA MBS and CMB as of 1 April 2015, and announced further changes on 11 December 2015 (effective July 2016), to encourage the development of alternative funding options in the private sector.

Going forward, the government has other options in addition to a further increase in guarantee fees or a reduction in issuance caps on these securities. It could also consider an auction-based mechanism whereby the right to issue NHA MBS and the allocation of funding under the CMB Program could be distributed based on bidding by financial institutions. As such, an institution in need of funds would be willing to offer a higher price.

<sup>23</sup> See [http://www.cmhc-schl.gc.ca/en/hoficlincl/mobase/upload/MBS\\_Advice\\_Guarantee\\_Fee\\_Increase-Dec-1-2014.pdf](http://www.cmhc-schl.gc.ca/en/hoficlincl/mobase/upload/MBS_Advice_Guarantee_Fee_Increase-Dec-1-2014.pdf). For the issuance of 5-year NHA MBS of up to \$6 billion, the upfront guarantee fees increased from 0.20 per cent to 0.30 per cent. For any amount above \$6 billion, the fee was set at 0.60 per cent. For the issuance of a 5-year CMB, the guarantee fee was raised from 0.20 per cent to 0.40 per cent.

<sup>24</sup> One alternative model is covered bonds, which are limited to four per cent of the total applicable assets of the deposit-taking institution.

<sup>25</sup> Another alternative could be to expand the use of covered bonds as a source of mortgage funding. See Poschmann (2015).

<sup>26</sup> For a detailed description of this change, see <http://www.bankofcanada.ca/2015/01/planned-changes-assets-eligible-collateral/>.

This approach might be appropriate, since prices would more accurately reflect demand and the riskiness of the lenders.<sup>27</sup> However, this mechanism could impair the competitive position of smaller lenders on a relative basis.

Another approach could be to lower the size of the CMB Program and dedicate it to small lenders, recognizing that small lenders do not enjoy the same access to funding as large lenders. An alternative that is less distortionary than quantity constraints is for the government to consider setting higher fees for large lenders that participate in the programs. In general, both options would be consistent with the policy objectives of the CMHC securitization programs and with the philosophy that government intervention in the market should take place only in cases of market failure.

<sup>27</sup> An institution that needs funding will offer a higher yield than an institution with less-pressing needs at the time it submits its auction offer to CMHC.

## Conclusion

The public “footprint” in the Canadian mortgage securitization market has increased in recent years. The public role provides stable mortgage funding for FIs and promotes competition from small lenders in that market. It also has consequences for the allocation of savings, the business models chosen by small lenders and the cost of regulatory compliance by banks.

This increase in the public footprint has led to a discussion about the government’s role in housing finance from a range of perspectives, including that of financial stability. The government has implemented a number of measures in recent years to reduce the public’s involvement. Further discussion and analysis of potential policy options, including those to promote private mortgage securitization, would be useful.

## References

- Adelino, M., A. Schoar and F. Severino. 2012. “Credit Supply and House Prices: Evidence from Mortgage Market Segmentation.” NBER Working Paper No. 17832.
- Bank of England and the European Central Bank (BoE and ECB). 2014. “The Case for a Better Functioning Securitisation Market in the European Union.” Joint Discussion Paper, May.
- Basel Committee on Banking Supervision (BCBS). 2013. “Basel III: The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools.”
- Canada Mortgage and Housing Corporation (CMHC). 2014. *Canadian Housing Observer 2014*.
- Crawford, A., C. Meh and J. Zhou. 2013. “The Residential Mortgage Market in Canada: A Primer.” Bank of Canada *Financial System Review* (December): 53–63.
- Gomes, T. and C. Wilkins. 2013. “The Basel III Liquidity Standards: An Update.” Bank of Canada *Financial System Review* (June): 37–43.
- Government of Canada (GoC). 2013. *Economic Action Plan 2013*. March.
- Government of Canada (GoC), 2014. *Economic Action Plan 2014*. February.
- . 2015. *Economic Action Plan 2015*. April.
- Gravelle, T., T. Grieder, and S. Lavoie. 2013. “Monitoring and Assessing Risks in Canada’s Shadow Banking Sector.” Bank of Canada *Financial System Review* (June): 55–63.
- Kamhi, N. and E. Tuer. 2007. “The Market for Canadian Asset-Backed Commercial Paper, Revisited.” Bank of Canada *Financial System Review* (June): 13–16.
- KPMG LLP. 2008. *Canada Mortgage Bonds Program Evaluation*. Available at [www.cmhc.ca/en/hoficlincl/in/camobo/upload/CMB-Evaluation-Jun08.pdf](http://www.cmhc.ca/en/hoficlincl/in/camobo/upload/CMB-Evaluation-Jun08.pdf).
- Poschmann, F. 2015. “How to Make the World Safe for (and from) Covered Bonds.” C. D. Howe Institute E-Brief. Available at <http://www.cdhowe.org/how-make-world-safe-and-covered-bonds>.
- Schembri, L. L. 2014. “Housing Finance in Canada: Looking Back to Move Forward.” *National Institute Economic Review* 230 (1): R45–R57.

# Indebted Households and Potential Vulnerabilities for the Canadian Financial System: A Microdata Analysis

Gino Cateau, Tom Roberts and Jie Zhou

- Over the past decade, an increasing proportion of households in Canada have become highly indebted relative to their income. The proportion of indebted households with ratios of debt to gross income exceeding 350 per cent has increased from 4 to 8 per cent since the pre-crisis period. These households now hold about one-fifth of total outstanding household debt.
- Consistent with the increase in house prices experienced over the past decade, the rising incidence of highly indebted households has been more prominent in British Columbia, Alberta and Ontario. The increase also tends to be more concentrated in younger and lower- to middle-income households.
- Model simulations that take into account the larger share of highly indebted households suggest that an increase in unemployment and interest rates could have a larger impact on the financial system now than it did in the pre-crisis period.
- The vulnerability of the financial system to household indebtedness ultimately depends on whether financial institutions can withstand losses emanating from the household sector. Stress tests of the Canadian banking system suggest that systemically important Canadian banks are resilient even though they experience declines in their capital positions in a very severe stress scenario.

## Introduction

To effectively assess the extent to which elevated household indebtedness is a vulnerability for the Canadian economy and financial system, it is important to go beyond aggregate statistics such as the total

household debt-to-income ratio.<sup>1</sup> Since debt and income are not uniformly distributed across households, aggregate measures of household indebtedness can mask important information about those households that hold more debt and their ability to repay that debt when faced with shocks to incomes and interest rates.

In this report, we use household-level data from the Canadian Financial Monitor (CFM) to identify the demographic and socio-economic characteristics of indebted households and their evolution over the past 10 years.<sup>2</sup> The household-level analysis enables us to obtain a more granular picture of household indebtedness in Canada, deepen our understanding of the resilience of indebted households to adverse shocks and enhance our assessment of the financial system vulnerability stemming from elevated household indebtedness.

Our work complements regular analysis presented in issues of the *Financial System Review*, as well as some recent research on household debt, such as Uppal and LaRochelle-Côté (2015a, 2015b), Alexander and Jacobson (2015), and Crawford and Faruqui (2011–12). Uppal and LaRochelle-Côté (2015a, 2015b) use

1 A vulnerability is a pre-existing condition that can amplify and propagate shocks throughout the financial system. See Christensen et al. (2015) for further discussion on the Bank of Canada's approach to vulnerability assessment.

2 The Canadian Financial Monitor is a survey conducted by Ipsos Reid that collects information on households' balance sheets, income, debt payments, and other financial and demographic characteristics. The survey data span from 1999 to 2014 and cover approximately 12,000 households each year. Responses are weighted to generate a representative sample of the Canadian population. One limitation of the survey is that information on income, mortgage and house values is recorded in ranges and is top-coded, i.e., values above certain upper bounds are censored. For the purpose of our analysis, we use midpoints as reported values whenever answers are provided in ranges. We also use multi-year averages over time to reduce sampling variability. Since a change to the administered questionnaire in 2005 affected the measurement of income, we conduct our analysis from 2005 on.

Statistics Canada’s 1999 and 2012 Survey of Financial Security (SFS) to study changes in debt, assets and net worth among Canadian families across selected characteristics. They find significant increases in both assets and debt in the 1999–2012 period, although there were differences across family types.<sup>3</sup> They also find that wealth increased more quickly among the most affluent families, largely because of a rise in the value of their assets. Alexander and Jacobson (2015) use the SFS and focus on the distribution of mortgage debt across households, finding pockets of vulnerability by income, age and region. Crawford and Faruqui (2011–12) find that falling interest rates, rising house prices and financial innovation have likely underpinned the rise in outstanding mortgage and consumer debt since the late 1990s. Our contribution to this research is to identify characteristics of highly indebted households and assess their resilience to various shocks.

## The Distribution of Debt Across Canadian Households: Salient Characteristics

We begin by looking at the incidence of household debt in Canada over the past 10 years. To facilitate pre- and post-financial-crisis comparisons, we report results over two time periods: 2005–07 and 2012–14.<sup>4</sup>

Roughly 70 per cent of Canadian households held some debt in the past decade (Table 1).<sup>5</sup> This proportion is lower than the 77 per cent peak reached in the United States before the 2007–09 global financial crisis. For the post-crisis period, the proportion is lower than in economies such as Australia, Norway and Sweden, which have similar macro policy frameworks and experienced similar conditions to those in Canada during and after the crisis.<sup>6</sup> Abstracting from cyclical factors, cross-country

**Table 1: Incidence of household debt in Canada**

	2005–07	2012–14
<b>Proportion of indebted households in Canada (per cent)</b>	70.4	69.2
<b>Incidence of debt by type (per cent)</b>		
<i>Households with mortgages only</i>	6.9	8.6
<i>Households with both mortgages and consumer debt</i>	27.4	25.9
<i>Households with consumer debt only</i>	36.1	34.7
<b>Share of household debt (per cent)</b>		
<i>Mortgages</i>	71.2	77.4
<i>Consumer debt</i>	28.8	22.6

Source: Ipsos Reid

differences in the incidence of debt likely reflect differences in housing finance policies and household preferences regarding home ownership, as well as demographic and other institutional factors.

Looking at the composition of household debt over the past decade, we find that roughly 35 per cent of Canadian households held mortgages, while about 60 per cent had some type of consumer (non-mortgage) debt.<sup>7</sup> In terms of value, however, mortgages accounted for the vast majority of total household debt. An important observation is that the share of mortgages in total household debt has increased over time, rising from 71 per cent in the 2005–07 period to 77 per cent in the 2012–14 period, reflecting the increase in home ownership and house prices over the past decade.

Table 2 shows the incidence and share of household debt across different income quintiles, net worth quintiles, age and education categories, and regions.<sup>8,9</sup>

We find that the incidence of debt tends to be higher in households with higher incomes, those with more education and those in the middle net worth categories. These households also hold a bigger share of total household debt. Consistent with the life-cycle theory of consumption, the incidence of debt also tends to

<sup>3</sup> Debt grew faster, for example, among families with a major income earner aged 35 to 44 and among couples with children under 18, and its growth was mainly due to mortgage borrowing. The value of assets also grew with rising real estate values. For non-homeowners, singles and families with major income earners aged 15 to 34, increases in debt were not matched by a statistically significant rise in assets.

<sup>4</sup> Analysis on a year-over-year basis yields similar results. The 2008–11 period generally follows the trend over the past decade.

<sup>5</sup> While the percentage of indebted households in the CFM is broadly equivalent to numbers found in the SFS, there can be discrepancies between the two surveys because of different sampling and weighting methodologies. The SFS, for example, suggests an increase in the incidence of debt from 69.4 per cent in 2005 to 71.1 per cent in 2012.

<sup>6</sup> In Australia, 71.7 per cent of households had debt in 2013–14 (Australian Bureau of Statistics). In Norway, 84 per cent of households had registered debt in 2012 (Households’ Income and Wealth Statistics from Statistics Norway), while in Sweden, about three-quarters of households had mortgages over 2010–14 (Alfelt and Winstrand 2015). Canada has a higher proportion of indebted households than euro-area economies that were more directly affected by the crisis, such as Spain, Italy and Ireland, in which 50, 25 and 57 per cent of households, respectively, were in debt (2011 Eurosystem Household Finance and Consumption Survey and Ireland Central Statistics Office). In the United States, 74.5 per cent of households had debt in 2013 (Survey of Consumer Finances).

<sup>7</sup> Consumer debt includes secured and unsecured lines of credit, credit card debt, leases, student loans and other consumer loans. See Crawford and Faruqui (2011–12) for further details.

<sup>8</sup> We also looked at differences between the incidence of mortgage and consumer debt across the various categories. We found that the incidence of mortgage debt was relatively similar across provinces but was much more prominent across higher-income quintiles, younger households and those with university degrees. Households in lower-income and older age groups relied more extensively on consumer debt. In terms of share of total household debt, consistent with the results in Table 1, mortgages were the dominant type of household debt across all categories.

<sup>9</sup> In the 2014 CFM data, the dollar ranges for the 1st to 5th income quintiles are less than 35k, 35k to 55k, 55k to 85k, 85k to 125k, and 125k and above. The dollar ranges for net worth quintiles are less than 6.2k, 6.2k to 80.8k, 80.8k to 254.5k, 254.5k to 566.6k, and 566.6k and above.

**Table 2: Incidence of household debt, by demographic and socio-economic characteristics**

Category	Incidence of household debt, by category (per cent)		Share of total household debt (per cent)	
	2005–07	2012–14	2005–07	2012–14
<b>Income quintile</b>				
<i>1st – lowest</i>	51.4	53.0	4.1	4.9
<i>2nd</i>	68.1	66.9	10.8	10.8
<i>3rd</i>	76.6	74.7	17.4	19.9
<i>4th</i>	81.9	78.5	29.8	28.3
<i>5th</i>	80.2	77.1	36.6	34.3
<b>Net worth quintile</b>				
<i>1st – lowest</i>	74.7	71.9	16.7	16.3
<i>2nd</i>	66.0	65.1	12.8	15.7
<i>3rd</i>	77.9	79.9	26.5	30.7
<i>4th</i>	73.6	70.7	25.0	22.3
<i>5th</i>	60.7	59.7	18.9	15.0
<b>Age</b>				
<i>&lt; 35</i>	84.5	77.0	28.8	25.8
<i>35–44</i>	82.4	79.6	32.6	28.2
<i>45–54</i>	76.0	73.3	23.6	23.5
<i>55–64</i>	65.3	65.8	10.3	14.1
<i>≥ 65</i>	42.5	53.7	4.8	8.4
<b>Education</b>				
<i>≤ High school</i>	63.1	62.5	19.5	15.4
<i>Some post-secondary education</i>	75.4	72.1	44.5	41.4
<i>≥ Bachelor's degree</i>	71.1	70.4	35.8	43.0
<b>Region</b>				
<i>British Columbia</i>	69.0	66.7	16.3	15.2
<i>Alberta</i>	74.1	71.6	12.1	15.0
<i>Saskatchewan-Manitoba</i>	66.6	67.5	5.2	5.8
<i>Ontario</i>	71.8	70.2	43.2	40.0
<i>Quebec</i>	67.5	68.5	17.3	18.3
<i>Atlantic provinces</i>	73.9	69.8	6.0	5.6

Source: Ipsos Reid

decrease with age. As younger households expect their future income to increase, they build up debt early in adulthood to finance consumption and then save (and reduce their debt) during middle age to accumulate wealth to support spending during retirement years. Not surprisingly, then, more than half of total debt was held by households under 45 years of age, even though they made up about 40 per cent of all households in 2012–14.

There were a few notable changes over the past decade. First, the share of total debt held by Albertans increased the most, while the share held by households living in Ontario declined the most. This likely reflects a younger demographic profile in Alberta than in Ontario. It also reflects the actual and expected relative performance of the two economies over the two periods—a situation

that could change with the recent downturn in the energy sector. Second, the proportion of indebted households and the share of debt held by those in the oldest age category (65 and above) have increased sharply. This is likely because baby boomers comprise a large fraction of the population and many of them are entering this age category. Relative to previous generations, baby boomers have higher home-ownership rates (Hou 2010), have longer life expectancies, are working longer and have benefited the most from rising house prices. These factors may have contributed to a capacity to hold more debt than previous cohorts. Third, the share of debt held by households with higher education (a bachelor's degree or above) has increased significantly. Finally, the share of debt held by the wealthiest households

has declined, while households in middle net worth categories have taken on a larger share of total household debt over time.

While these observations provide a useful picture of the exposure of Canadian households to debt, further analysis is required to determine whether indebted households are vulnerable to shocks affecting their ability to repay. In the next section, we examine the characteristics of households that are highly indebted and that may therefore be vulnerable to shocks.

## Characteristics of Highly Indebted Households in Canada

We define households as *highly indebted* if their debt-to-income ratio, calculated as the total amount of debt divided by *gross* household income, exceeds a certain threshold.<sup>10</sup> We determine this threshold by using the Bank of Canada's Household Risk Assessment Model (HRAM) (Faruqui, Liu and Roberts 2012) to analyze which households, ranked in different debt-to-income categories, are more susceptible to arrears on their debt under a hypothetical stress scenario.<sup>11</sup> We find that the incidence of arrears increases significantly for households with debt-to-income ratios between 250 and 350 per cent, with even sharper increases for households with debt-to-income ratios above 350 per cent (see Appendix). Therefore, for the remainder of this report, we consider households with debt-to-income ratios of 350 per cent and above to be highly indebted households.<sup>12</sup>

Table 3 shows that the proportion of indebted households with a debt-to-income ratio above 350 per cent doubled from around 4 per cent during the 2005–07 pre-crisis period to around 8 per cent in 2012–14.<sup>13</sup> Importantly, their share of total household debt was around 21 per cent in 2012–14, up from 13 per cent in 2005–07. Mortgages account for the bulk of that debt, with their importance growing from 80 to 87 per cent over the two periods. Since real estate assets account for about 90 per cent of these indebted households' total assets, their net worth could be particularly affected by a house price correction.

<sup>10</sup> Since disposable income is not available in the CFM, we use the gross income measure.

<sup>11</sup> We consider a household to be in arrears if it has been late on its debt-payment obligations for three months or more.

<sup>12</sup> For convenience, we will refer to this debt-to-income category as "above 350 per cent" in the text of this report.

<sup>13</sup> Focusing on households with mortgage debt, Alexander and Jacobson (2015) find that the proportion of highly indebted households roughly doubled between 2005 and 2012 (from 5.5 per cent to 10.8 per cent). Using Statistics Canada's SFS data, they define households as highly indebted if their ratio of mortgage debt to disposable income exceeds 500 per cent. Using CFM data, we find similar numbers when we define highly indebted households as those with a ratio of mortgage debt to gross income above 350 per cent (which is roughly equivalent to a ratio of mortgage debt to disposable income of 500 per cent assuming a tax rate of 30 per cent).

Despite the greater incidence of highly indebted households in Canada, the debt-service and financial-assets-coverage ratios of these highly indebted households have improved over time.<sup>14, 15</sup> Indeed, the median household in this group faced lower debt-service costs and had more financial assets to service debt payments in the post-crisis period than it did before the crisis. More generally, fewer of the highly indebted households had very high debt-service ratios (40 per cent or higher) and more of them would be able to cover their debt payments over the next month in the case of emergencies.<sup>16</sup> While these results suggest that the highly indebted households are now in a better position to service their debt payments, this situation likely reflects the prolonged period of declining interest rates following the crisis. It could change materially in an environment of rising interest rates.

Given the non-negligible and increasing proportion of highly indebted households in Canada, we now dig deeper into their demographic and socio-economic characteristics to try to determine whether they are financially vulnerable. Although the increase in the proportion of highly indebted households has been fairly broad-based, some important differences can be seen across groups (Table 4).

For example, the percentage increase in the incidence of highly indebted households was largest for those between 35 and 54 years of age and among those with a high school education or less. Across income quintiles, the increase in the incidence of highly indebted households more than doubled for the middle-income quintiles, while the percentage increase was smaller for the lowest-income group and actually dropped for the highest-income quintile. A similar picture emerges across wealth quintiles. Overall, it appears that the increase in the proportion of highly indebted households after 2005 was more concentrated in younger, low- to middle-income and low- to middle-wealth groups. One

<sup>14</sup> The debt-service ratio is defined as monthly debt payments divided by gross household income. It measures the ability of a household to service monthly debt payments, taking into account income, interest rates and principal payments. The financial-assets-coverage ratio is defined as total non-pension financial assets (i.e., all cash, GICs, bonds, stocks and mutual funds held outside of a group pension plan) divided by monthly debt payments. It captures the number of months a household would be able to draw on its financial assets to service debt payments in response to adverse shocks.

<sup>15</sup> These patterns are also true for all indebted households. Their median debt-service ratio decreased from 13.5 to 12.9 per cent from 2005–07 to 2012–14. Their median financial-assets-coverage ratio increased from 20.1 months to 26.1 months, while the median proportion of real estate assets in total assets for indebted households increased from 55.7 to 65.4 per cent over the same period.

<sup>16</sup> Consistent with banking industry standards, a household is considered to be more likely to have difficulty making loan payments when its debt-service ratio is 40 per cent or higher. Dey, Djoudad and Terajima (2008) find an increasing likelihood of mortgage delinquency with debt-service ratios above 35 per cent.



**Table 3: Incidence of highly indebted households**

Households with a debt-to-income ratio of 350 per cent and above	2005–07	2012–14
<b>Share of all indebted households (per cent)</b>	4.1	7.9
<i>Proportion with debt-service ratio of 40 per cent or higher (per cent)</i>	55.1	35.7
<i>Proportion with financial-assets-coverage ratio of less than 1 month (per cent)</i>	22.5	20.7
<b>Share of household debt (per cent)</b>	12.7	20.7
<i>Proportion in mortgages (per cent)</i>	79.8	86.6
<b>Other metrics of financial health</b>		
<i>Median debt-service ratio (per cent)</i>	43.1	34.2
<i>Median financial-assets-coverage ratio (number of months)</i>	5.5	6.5
<i>Median proportion of real estate in total assets (per cent)</i>	84.4	89.7

Source: Ipsos Reid

**Table 4: Incidence of highly indebted households, by demographic and socio-economic characteristics**

Category	Incidence of highly indebted households among indebted households, by category (per cent)		Share of total household debt (per cent)	
	2005–07	2012–14	2005–07	2012–14
<b>Income quintile</b>				
<i>1st – lowest</i>	9.2	14.2	1.9	3.1
<i>2nd</i>	5.6	12.6	2.8	4.9
<i>3rd</i>	4.2	9.4	2.9	6.1
<i>4th</i>	1.8	5.3	2.1	4.7
<i>5th</i>	1.6	1.4	2.9	1.9
<b>Net worth quintile</b>				
<i>1st – lowest</i>	5.0	8.3	3.3	4.4
<i>2nd</i>	4.2	9.0	1.7	4.4
<i>3rd</i>	4.7	12.0	2.8	7.1
<i>4th</i>	3.8	6.6	3.0	3.6
<i>5th</i>	2.5	2.4	1.8	1.2
<b>Age</b>				
<i>&lt; 35</i>	5.0	9.7	4.0	5.6
<i>35–44</i>	4.7	9.7	3.8	5.6
<i>45–54</i>	3.5	7.7	2.6	4.6
<i>55–64</i>	3.4	6.5	1.5	2.9
<i>≥ 65</i>	2.9	5.5	0.8	1.9
<b>Education</b>				
<i>≤ High school</i>	3.7	8.1	2.5	3.7
<i>Some post-secondary education</i>	4.5	8.3	5.9	9.3
<i>≥ Bachelor's degree</i>	3.9	7.3	4.2	7.7
<b>Region</b>				
<i>British Columbia</i>	7.5	13.6	3.5	5.1
<i>Alberta</i>	4.1	10.9	1.3	3.7
<i>Saskatchewan-Manitoba</i>	2.3	4.9	0.4	0.7
<i>Ontario</i>	4.4	8.5	5.1	8.0
<i>Quebec</i>	2.7	5.0	1.8	2.6
<i>Atlantic provinces</i>	2.4	3.6	0.6	0.6

Source: Ipsos Reid

potential explanation for this result is the already-noted rising house prices, which have outpaced income growth and have led many households to take on larger mortgages to finance their house purchases. Given that real estate assets now account for a much larger fraction of the assets of indebted middle-income households, these households could be more affected than in the past in the event of a house price correction.<sup>17</sup> Regionally, Alberta registered the biggest jump in the share of highly indebted households, nearly tripling from about 4 to 11 per cent.

These dynamics translate into a pool of highly indebted households that are relatively younger than the pool of less-indebted households (i.e., those with a ratio of debt to gross income below 350 per cent); have lower income and wealth; are less likely to have a bachelor’s degree; and are more likely to live in British Columbia, Alberta or Ontario (Table 5).

**Table 5: Key differences between the pools of highly indebted and less-indebted households over 2012–14**

Category	Highly indebted households DTI ≥ 350%	Less-indebted households 0 < DTI < 350%
Income (median)	\$50,970	\$79,000
Net worth (median)	\$96,840	\$152,500
Age (median)	44	48
Proportion with a bachelor’s degree or above (per cent)	33.6	36.6
Proportion in British Columbia, Alberta and Ontario (per cent)	76.3	58.8

Note: DTI = debt-to-gross income ratio  
 Source: Ipsos Reid

## The Exposure of Highly Indebted Households to the Risk of Job Loss

Now that we have identified the characteristics of highly indebted households, we investigate whether they face a greater risk of job loss than the average household. A sharp and persistent income decline due to job loss could cause highly indebted households to default on their debt, contributing to financial system stress.

The risk of job loss tends to be associated with a range of socio-economic and demographic factors such as age, education, region and employment sector. To reflect this tendency, HRAM makes use of work from Chan, Morissette and Frenette (2011) to compute a relative risk of layoff for a household with given socio-economic characteristics. By doing so, the model can capture some of the patterns seen in past recessions,

whereby the likelihood of being laid off was higher among young workers, individuals with no university degree, and those employed in the primary, construction and manufacturing industries.<sup>18, 19</sup> The relative risk of layoff for a particular household can then be compared with the expected probability of layoff for a household whose socio-economic characteristics are the average among all households in the workforce. For example, a relative risk factor of 0.5 means that a household is expected to encounter only half the risk of layoff that an average household encounters. Conversely, a relative risk factor of 3.0, which might be more indicative of a younger employee with less work experience and education, or an employee in a sector with more job turnover, would mean that a household has three times the average risk of layoff. We use our results to construct the distribution of household debt by relative risk of layoff.

Table 6 and Chart 1 compare the share of household debt held by households based on their relative risk of layoff and across different debt-to-income categories. A number of insights emerge. First, the majority of household debt (about 80 per cent) is held by households that have an average or lower-than-average risk of a layoff. Second, for less-indebted households, about 22 per cent of their debt is held by those that have a very low risk of layoff. The respective share for highly indebted households is lower, at 17 per cent. Third, there does not appear to be a significant difference between highly indebted and less-indebted households regarding above-average risk of losing their jobs—the most pertinent group from a financial stability perspective. For both sets of households, about 19 per cent of the debt is held by those with higher-than-average risk of job loss. Given that households with debt-to-gross income ratios above 350 per cent hold about

**Table 6: Share of total debt, by risk of layoff**

Relative risk of layoff		Share of total household debt (per cent)	
		DTI < 350%	DTI ≥ 350%
Very low	0–0.5	21.8	16.7
Medium-low	0.5–0.75	30.4	35.5
Average	0.75–1.25	29.0	29.9
Medium-high	1.25–1.75	10.7	8.9
Very high	≥1.75	8.1	9.1

Note: DTI = debt-to-gross income ratio  
 Sources: Ipsos Reid and Bank of Canada calculations

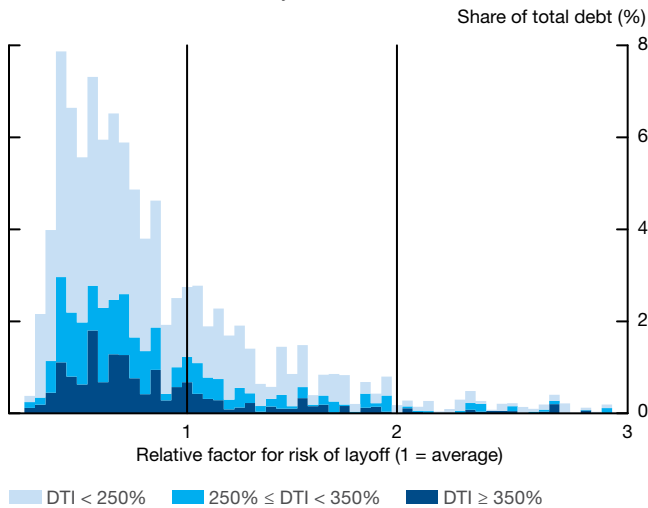
<sup>18</sup> Primary industries include agriculture, forestry, fishing, mining, and oil and gas.

<sup>19</sup> Chan, Morissette and Frenette (2011) use Statistics Canada’s Labour Force Survey (LFS). Because the socio-economic information in the LFS does not correspond exactly to data available in the CFM, certain variables such as job tenure, for example, must be replaced with an age-determined proxy.

<sup>17</sup> From 2005–07 to 2012–14, the median share of real estate assets in total assets increased from 36, 58, 65 and 63 per cent to 55, 69, 74 and 70 per cent for the second, third, fourth and fifth (highest) income quintiles, respectively.

**Chart 1: Most debt is held by households with average or below-average risk of layoff**

Distribution of debt relative to layoff risk



Sources: Ipsos Reid and Bank of Canada calculations

Last observation: 2014

21 per cent of total household debt, this means that about 4 per cent of all household debt is held by highly indebted households that are also at a higher-than-average risk of losing their jobs.

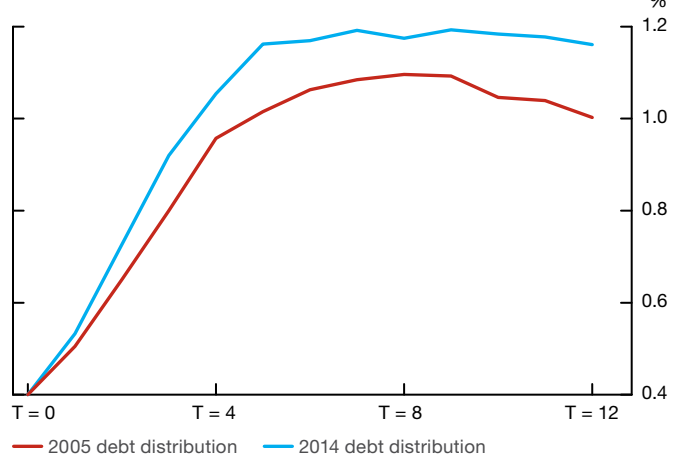
## Estimating the Impact of an Adverse Shock on Canadian Households

Shocks affecting the ability of households to repay their debt, such as unemployment or interest rate shocks, can reveal weaknesses in household finances that would otherwise not be apparent in a stable economic environment. In this section, we use HRAM to analyze the impact of a hypothetical stress scenario on the rate of household debt in arrears. We focus on the shock scenario's arrears rate since it is a more comprehensive measure of potential vulnerability in current household finances. Indeed, rather than reflecting only one dimension of household finances, such as debt payments relative to income, a household would likely end up in arrears through a confluence of factors, such as elevated indebtedness, sensitivity to income shocks and an inadequate financial asset buffer.

To gauge the effect of an adverse shock in light of the greater incidence of highly indebted households in Canada in recent years, we compare the impact of a stress scenario around two sets of initial conditions: household balance-sheet positions in 2005 (when about 4 per cent of indebted households had debt-to-income ratios greater than 350 per cent) and in 2014 (when about 8 per cent of indebted households had debt-to-income ratios greater than 350 per cent). Our scenario involves

**Chart 2: A greater incidence of highly indebted households leads to a greater increase in arrears under a stress scenario**

Household arrears rate



Source: Bank of Canada calculations

simultaneous increases in the unemployment rate and the household borrowing rate of 3 and 2 percentage points, respectively, that persist for three years.<sup>20,21</sup> Chart 2 shows the impact on a starting-point arrears rate of 0.4 per cent.

We find that the greater incidence of highly indebted households in 2014 relative to 2005 results in a more pronounced increase in arrears following the same shock. With debt levels higher relative to income in 2014 than in 2005, households faced with shocks that lower income or increase debt payments exhaust their financial assets and fall into arrears more quickly.<sup>22</sup> After one year, the increase in arrears is roughly 16 per cent greater under the 2014 debt distribution (65 basis points compared with 56 basis points in 2005). After three years, the increase in arrears is roughly 27 per cent greater under the 2014 debt distribution (76 basis points compared with 60 basis points in 2005). Although the additional 16 basis points in arrears arising from the

<sup>20</sup> The likelihood of a scenario of this severity is judged to be low.

<sup>21</sup> Although an economic downturn would typically result in a more accommodative policy stance on interest rates, household borrowing rates are assumed to increase as a result of higher risk premiums in the downturn or higher longer-term interest rates due to external forces. For each set of initial conditions, the increase in arrears is calculated relative to the control scenario of stable macrofinancial conditions with no shock to either unemployment or borrowing rates. Note also that similar increases in unemployment to what we assume in our scenario have been witnessed in previous economic downturns: the recession of the early 1990s saw a rise of more than 3 percentage points for about three years, while the recent financial crisis saw an increase of up to about 2 percentage points for two years.

<sup>22</sup> Our analysis does not take into account equity that indebted households may have in their homes. Because the stress scenario is performed *relative* to a "control" scenario of normal conditions, this channel will likely worsen the impact. A severe unemployment shock is likely to be accompanied by a decline in house prices and reduced access to credit; thus, households would have relatively *less* ability to access this equity either through additional borrowing or a house sale.

## Box 1

## Household Indebtedness: A Canada–United States Comparison

Further perspective can be gained on the quantitative importance of highly indebted households by comparing the Canadian situation with that of the United States before the 2007–09 financial crisis.

Table 1-A shows that fewer Canadian households over the 2012–14 period held any debt compared with their U.S. counterparts in 2007 (69 per cent in Canada versus 77 per cent in the United States). Among indebted households, Canada has a smaller proportion with a debt-to-income ratio of 350 per cent or above (7.9 per cent versus 12.8 per cent in the United States), and these households hold a smaller share of total household debt (20.7 per cent versus 34.6 per cent). Moreover, among highly indebted households, the proportion with a high debt-service ratio (40 per cent or above) or with financial assets worth less than one month of debt payments was smaller in Canada than in the United States.<sup>1</sup>

While it is beyond the scope of this report, a complete comparison of household indebtedness in Canada and the United States should also consider institutional differences between the two countries, such as mortgage interest deductibility, length of fixed-term mortgages, recourse versus non-recourse laws, and the extent and effectiveness of government involvement in the housing market (see, for

<sup>1</sup> The results are similar if we focus on households with a debt-to-income ratio above 250 per cent.

**Table 1-A: Incidence of debt and highly indebted households in Canada and the United States**

	Canada 2012–14	United States 2007
<b>All indebted households Incidence (per cent)</b>	69.2	77.0
<b>Households with a debt-to-income ratio of 350 per cent and above</b>		
<b>Incidence among indebted households (per cent)</b>	7.9	12.8
<i>Proportion with debt-service ratio of 40 per cent or more (per cent)</i>	35.7	70.7
<i>Proportion with financial-assets- coverage ratio of less than 1 month (per cent)</i>	20.7	26.0
<i>Share of total household debt (per cent)</i>	20.7	34.6

Sources: Ipsos Reid and the Federal Reserve 2007 Survey of Consumer Finances

example, Crawford, Meh and Zhou (2013) and Schembri (2014)). Overall, these statistics suggest that indebted households in Canada in 2012–14 were less vulnerable than their U.S. counterparts were during the lead-up to the crisis. Moreover, the relatively robust position of Canadian financial institutions, more stable sources of mortgage funding and higher mortgage underwriting standards in general all contribute to the resilience of the Canadian financial system.

shock may appear small, it is meaningful in the context of Canadian historical experience. For comparison, during the financial crisis, the rate of households in arrears in Canada went from 0.30 to 0.65 per cent, an increase of 35 basis points.<sup>23</sup>

While these simulations show how initial conditions regarding household balance sheets can magnify the impact of adverse shocks,<sup>24</sup> the vulnerability of the financial system to household indebtedness will

<sup>23</sup> Both the level of arrears in Canada and its increase during the crisis are small compared with those in the United States. The pre-crisis level of loans 90 days or more in arrears in the United States was roughly 2 per cent of the total loan balance. It peaked above 9 per cent during the crisis. See **Box 1** for additional observations from a Canada–United States comparison.

<sup>24</sup> Cross-country research from the Organisation for Economic Co-operation and Development (2013) finds that high debt levels can create vulnerabilities that amplify and transmit macroeconomic and asset-price shocks. When household debt rises above trend, the likelihood of a sharp economic downturn increases. Baker (2014) and Mian and Sufi (2010, 2014) find that the elasticity of consumption to income is significantly higher among highly indebted households than in low-debt households and that the buildup in household debt in the lead-up to the crisis significantly worsened the decline in consumption. Brunnermeier and Sannikov (2014) also show that economies with high degrees of leverage face a greater risk of falling into downward spirals with defaults and excessive deleveraging.

ultimately also depend on whether financial institutions can withstand the losses stemming from the household sector. With Basel III regulatory reforms requiring banks to hold more and higher-quality capital and to satisfy liquidity standards (Chouinard and Paulin 2014), Canadian banks are now in a better position to navigate through periods of stress. Further, stress tests of Canadian financial institutions such as in Canada's 2013 Financial Sector Assessment Program (FSAP) (IMF 2014) typically suggest that even though Canadian domestic systemically important banks experience a decline in their capital position in very severe stress scenarios, they maintain a solid ability to generate capital internally.<sup>25</sup> Similarly, the FSAP stress test for large life insurers and the Canada Mortgage and Housing Corporation showed that although the capital position of these institutions would deteriorate, it would remain well above regulatory

<sup>25</sup> The FSAP scenario involved the Canadian economy facing financial headwinds from a large negative foreign demand shock, falling commodity prices, rising uncertainty, and unfavourable effects on confidence and wealth that affect both businesses and households. This culminated in a severe and persistent recession of nine quarters with a peak increase in unemployment of 5.9 percentage points, a 33 per cent decline in house prices and significant deleveraging from indebted households to repair their balance sheets.

requirements. While this supports the view of the overall strength and resilience of the Canadian financial system, caution is nevertheless warranted since the effects of such adverse shocks could be larger if feedback loops between the financial system and the real economy were more significant or if non-linearities (e.g., selling assets in a downturn) were more pronounced than anticipated.

## Conclusion

This report uses household-level data to gain insights into the characteristics of indebted households in Canada. We find that the share of highly indebted households in Canada has doubled since the pre-crisis period and that they now hold about one-fifth of total household debt (about 20 per cent of which is in the hands of households with an above-average risk of losing their jobs). Distributional analysis along several socio-economic dimensions indicates that highly indebted households have become more prevalent

across lower- to middle-income groups, in younger households, and in British Columbia, Alberta and Ontario. Further, simulation results suggest that the more stretched balance-sheet positions of indebted Canadian households in recent years can magnify the impact of adverse shocks on the financial system.

That said, the vulnerability of the financial system also depends on whether financial institutions can withstand the losses stemming from the household sector. Financial institutions in Canada proved to be resilient during the crisis. With an effective regulatory and supervisory regime in place and further strengthening of the regulatory framework through Basel III measures, Canadian banks are in a strong position to withstand pressures stemming from the household sector. The Bank of Canada continues to monitor the state of household finances as well as other key elements that, together, determine the robustness of the Canadian financial system.

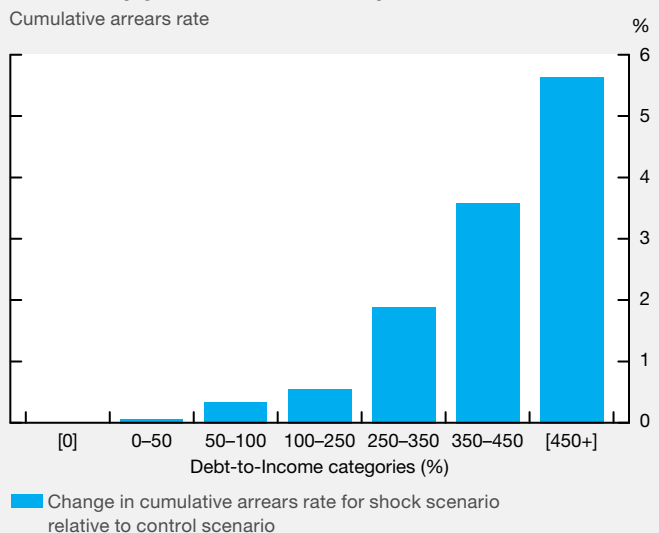
## Appendix

### Identifying a Vulnerability Threshold for the Debt-to-Income Ratio

Simulation experiments corroborate the finding that a higher debt-to-income burden is associated with an increased likelihood of a household encountering financial distress, leading to arrears in debt payment obligations. A higher debt-to-income burden gives a household less opportunity to accumulate savings and provides a smaller margin in the event of losses to income or increases in interest rate payments.

Chart A-1 contrasts the increase in the rate of arrears across different debt-to-income categories under a hypothetical stress scenario with simultaneous increases in the unemployment and household borrowing rates of 3 and 2 percentage points, respectively. We find that under our stress scenario, the incidence of arrears increases non-linearly with the debt-to-income ratio. In particular, the increase in arrears becomes more significant for debt-to-income ratios beyond 250 per cent, with sharper increases for households with a debt-to-income ratio above 350 per cent.

**Chart A-1: Household arrears become more significant in debt-to-income categories above 250 per cent but increase more sharply in those above 350 per cent**



Sources: Ipsos Reid and Bank of Canada calculations

Last observation: 2014

## References

- Alexander, C. and P. Jacobson. 2015. "Mortgaged to the Hilt: Risks from the Distribution of Household Mortgage Debt." C.D. Howe Institute Commentary No. 441 (December).
- Alfelt, G. and J. Winstrand. 2015. "The Indebtedness of Swedish Households – 2014 Update." Sveriges Riksbank *Economic Commentary* No. 1 (January).
- Baker, S. R. 2014. "Debt and the Consumption Response to Household Income Shocks." Stanford University (April).
- Brunnermeier, M. K. and Y. Sannikov. 2014. "A Macroeconomic Model with a Financial Sector." *American Economic Review* 104 (2): 379–421.
- Chan, P. C. W., R. Morissette and M. Frenette. 2011. "Workers Laid-off During the Last Three Recessions: Who Were They, and How Did They Fare?" Statistics Canada, Cat. No. 11F0019M — No. 337.
- Christensen, I., G. Kumar, C. Meh and L. Zorn. 2015. "Assessing Vulnerabilities in the Canadian Financial System." Bank of Canada *Financial System Review* (June): 37–46.
- Chouinard, É. and G. Paulin. 2014. "Making Banks Safer: Implementing Basel III." Bank of Canada *Financial System Review* (June): 53–59.
- Crawford, A. and U. Faruqui. 2011–12. "What Explains Trends in Household Debt in Canada?" *Bank of Canada Review* (Winter): 3–15.
- Crawford, A., C. Meh and J. Zhou. 2013. "The Residential Mortgage Market in Canada: A Primer." Bank of Canada *Financial System Review* (December): 53–63.
- Dey, S., R. Djoudad and Y. Terajima. 2008. "A Tool for Assessing Financial Vulnerabilities in the Household Sector." *Bank of Canada Review* (Summer): 45–54.
- Faruqui, U., X. Liu and T. Roberts. 2012. "An Improved Framework for Assessing the Risks Arising from Elevated Household Debt." Bank of Canada *Financial System Review* (June): 51–57.
- Hou, F. 2010. "Homeownership over the Life Course of Canadians: Evidence from Canadian Censuses of Population." Statistics Canada, Cat. No. 11F0019M — No. 325.
- International Monetary Fund (IMF). 2014. "Canada: Financial Sector Assessment Program; Stress Testing—Technical Note." IMF Country Report No. 14/69.
- Mian, A. and A. Sufi. 2010. "Household Leverage and the Recession of 2007–09." *IMF Economic Review* 58 (1): 74–117.
- . 2014. *House of Debt: How They (and You) Caused the Great Recession, and How We Can Prevent It from Happening Again*. Chicago, IL: University of Chicago Press.
- Organisation for Economic Co-operation and Development (OECD). 2013. "Debt and Macroeconomic Stability." Economics Department Policy Note No. 16.
- Schembri, L. L. 2014. "Housing Finance in Canada: Looking Back to Move Forward." *National Institute Economic Review* No. 230 (November): R45–R57.
- Uppal, S. and S. LaRochelle-Côté. 2015a. "Changes in Debt and Assets of Canadian Families, 1999 to 2012." *Insights on Canadian Society*. Statistics Canada, Cat. No. 75-006-X (April).
- . 2015b. "Changes in Wealth Across the Income Distribution, 1999 to 2012." *Insights on Canadian Society*. Statistics Canada, Cat. No. 75-006-X (June).