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Financial System Review—2021

A stable and efficient financial system is essential for sustaining economic growth and raising living standards. In our *Financial System Review*, we identify the main vulnerabilities and risks in the financial system in Canada and explain how they have evolved over the past year.

The *Financial System Review* is a product of the Governing Council of the Bank of Canada: Tiff Macklem, Timothy Lane, Lawrence Schembri, Paul Beaudry and Toni Gravelle.

This report includes data received up to May 17, 2021.

Browse **previous issues** of the *Financial System Review*.

Overview

The Canadian financial system continues to function well despite the COVID-19 pandemic, and Canada's financial institutions have proved to be resilient during the crisis. Unprecedented fiscal and monetary policy support has been instrumental in keeping the financial system functioning well. The pandemic has, however, highlighted concerns about market liquidity.

Two key household vulnerabilities—high household indebtedness and imbalances in the housing market—have intensified over the past year. The housing market boom and the corresponding rise in mortgage debt support economic growth in the short term but increase the risk to the Canadian economy and financial system over the medium term.

The three remaining financial system vulnerabilities highlighted in previous issues of the *Financial System Review* continue to be relevant but have not changed significantly over the past year. These vulnerabilities are the mispricing of assets exposed to climate-related risks, cyber threats and fragile corporate debt funding from certain markets.

Key messages

- The Canadian financial system has proved to be resilient to the pandemic, thanks to a well-capitalized banking sector and strong support for households

and firms from governments and the Bank of Canada. Financial markets recovered quickly from early liquidity stress, and the Bank's extraordinary liquidity facilities are no longer required. Market participants remain confident in the ability of the system to withstand a severe negative shock.

- Globally, a strong risk appetite from investors has pushed up the prices of a range of assets. A change in market sentiment—perhaps due to a major setback in the fight against the global pandemic or in the associated economic recovery—could result in a sharp deterioration in global financial conditions. Such a repricing of risk could spill over into Canada and interact with the domestic vulnerabilities highlighted in this report.
- In Canada, the pandemic has had an uneven effect on households. With limited opportunities to spend combined with increased prudence, many households have accumulated savings and paid down consumer debt. But, at the same time, some households have taken on significantly more mortgage debt, and this is reflected in the increased issuance of mortgages with elevated loan-to-income ratios.
- Housing market activity is very strong, driven primarily by fundamental factors. Some housing markets, however, are showing signs of extrapolative price expectations. This means buyers may be purchasing homes because they expect prices to keep going up, which contributes to market imbalances and leaves homeowners vulnerable to future price declines. A large fall in house prices could weigh on consumption, particularly by highly indebted households, especially if accompanied by declines in employment and income.
- Severe financial stress among businesses has been limited, in part because of extraordinary fiscal support during the pandemic. But the reliance of some corporations on high-yield debt, which can be subject to sudden changes in investor sentiment, remains a vulnerability in the financial system.
- The financial system also remains vulnerable to a spike in demand for liquidity. Over the past two decades, potential demand from the asset management industry has outgrown the capacity of banks to provide fixed-income market liquidity to the financial system in periods of stress. This is not a new vulnerability, but the risk it poses for the stability of the financial system was highlighted by the episode of market liquidity stress experienced in spring 2020.
- Assets exposed to climate-related risks are generally mispriced. This can leave investors and financial institutions exposed to sudden losses in the value of carbon-intensive assets in the transition to a low-carbon economy.
- The interconnected nature of the financial system and the accelerated digital transformation of the economy underlie the vulnerability of the system to a cyber attack.

Global macrofinancial conditions

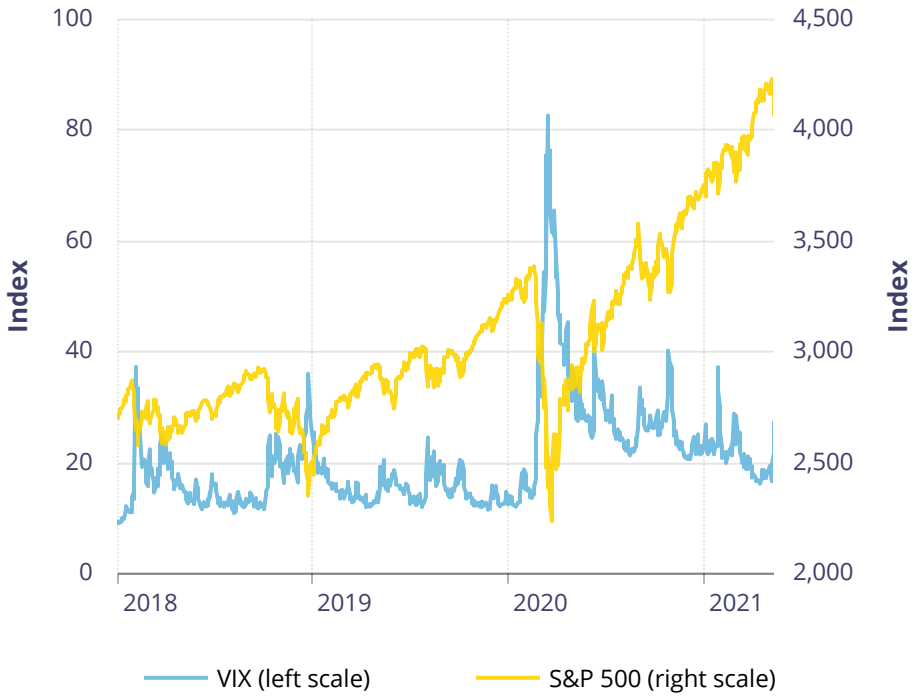
» Globally, valuations across a range of assets are elevated. With the global recovery from the pandemic underway, the growth outlook is robust across most advanced economies. Strong investor appetite for risk amid a global search for yield has pushed equity prices to new highs and credit spreads back near pre-pandemic levels.

» Accommodative financial conditions support short-term growth but may encourage excessive risk taking and a buildup of vulnerabilities, namely excessive leverage and asset mispricing.

The risk appetite of investors is strong, driven by an improved global economic outlook and by a search for yield in a low interest rate environment. Robust risk appetite is not a new phenomenon, but it has intensified since the middle of 2020. At this point of the economic cycle, the global outlook is very favourable, especially in advanced economies. This reflects two key developments. First, the acceleration of the COVID-19 vaccination campaigns has boosted investors' confidence in the economic recovery. Second, the large stimulus package in the United States is lifting US and global growth forecasts.

Investors' optimism is reflected in elevated valuations across a range of asset classes. For instance, equity prices are close to record highs globally, and implied volatility has declined considerably since the start of the pandemic (**Chart 1**).[1] In addition, indicators of risks in financial markets are historically low. As the economic outlook has improved, the widening corporate credit spreads experienced during the COVID-19 shock have mostly reversed (**Chart 2**). Although Canadian corporate debt issuance has slowed from its peak in the second quarter of 2020, when precautionary borrowing was high, Canadian firms are still taking advantage of strong investor appetite by issuing debt at a faster-than-usual pace. Also, extraordinary monetary stimulus by central banks is exerting downward pressure on government bond yields. However, benchmark sovereign yields have moved up in the first few months of 2021 alongside rising inflation expectations and improvements in the global outlook.

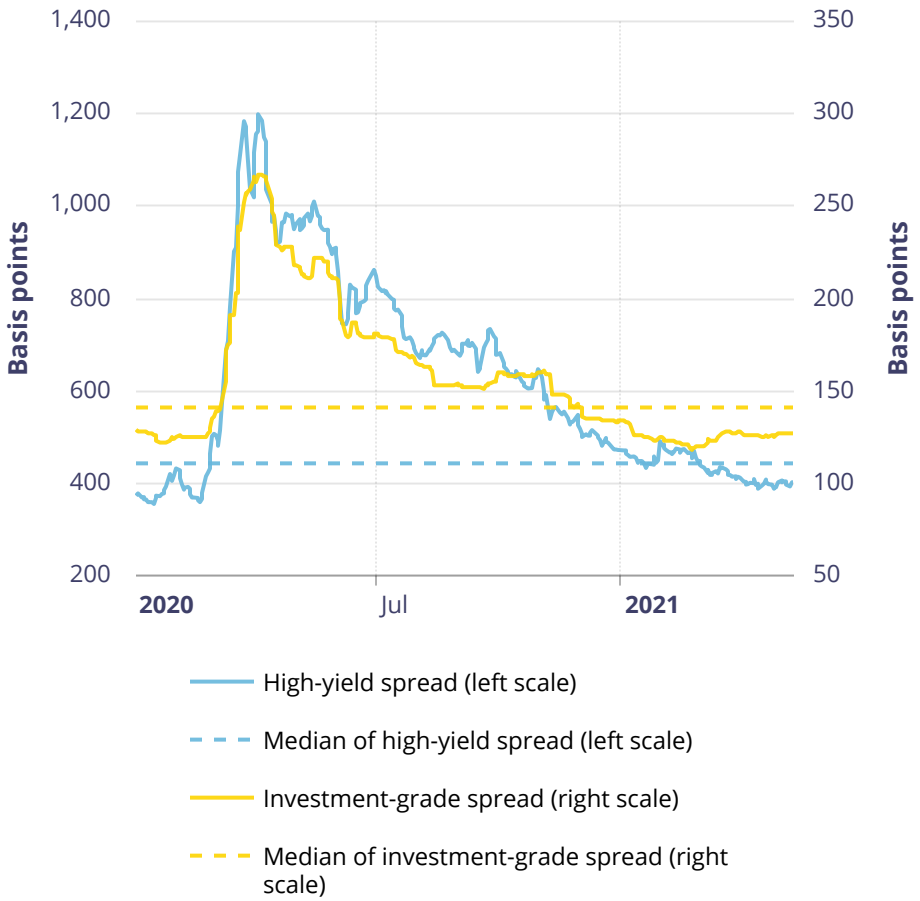
Chart 1: Equity prices are close to record highs, while volatility has decreased considerably since the start of the pandemic



Note: The VIX is a volatility index derived from options on the S&P 500 index.
Sources: Cboe Options Exchange, S&P Global, Bloomberg Finance L.P. and Bank of Canada calculations
Last observation: May 12, 2021

Chart 2: The widening corporate credit spreads experienced during the COVID-19 shock have mostly reversed

Yield spread between corporate and government bonds, by credit rating



Note: Data for the investment-grade spread are from the ICE BofA Canada Corporate Non-Financial Index. Data for the high-yield spread are from the ICE BofA US High-Yield Canadian Issuers Index. Medians are taken from 2015–19.
Sources: Bloomberg Finance L.P., Intercontinental Exchange Bank of America and Bank of Canada calculations
Last observation: May 12, 2021

Canada and most advanced economies face similar financial and economic realities. In its latest *Global Financial Stability Report*, the International Monetary Fund (IMF) identified several key vulnerabilities in the global financial system.[2] In particular, it pointed to signs of excessive risk taking and stretched valuations. Given these elevated financial vulnerabilities, a sudden decline in investors' risk appetite—perhaps due to a major setback in the global recovery from the pandemic—could result in a sharp deterioration in global financial conditions (**see section on risks**).

In addition, the IMF pointed to a re-evaluation of inflation risks as a potential source of risk repricing.[3] The impact of the pandemic on global potential gross domestic product (GDP) is particularly difficult to estimate and forecast at this time, as is the speed of the post-pandemic recovery in demand. With considerable monetary and fiscal support still ongoing, the temporary rise in inflation anticipated in some countries in the first half of 2021 could prove to be more persistent. A sharp rise in expected inflation could trigger a reassessment of risk and a repricing of assets (**see section on risks**).

The IMF also highlighted many of the same issues we note in this report. In particular, it pointed to the buildup of corporate and household leverage in response to accommodative financial conditions. It also noted concerns about the commercial real estate sector due to the structural shifts sparked by the pandemic, such as the growing importance of remote work and online shopping.

Globally, governments have taken on substantial additional debt to support their respective economies through the COVID-19 crisis and the post-pandemic recovery.[4] For highly indebted countries, this could limit the ability of governments to provide stimulus during future economic downturns, particularly in a higher interest rate environment. Some large emerging-market economies (EMEs) are facing a challenging situation. In addition to experiencing rising COVID-19 cases with new variants spreading rapidly, some EMEs have increasingly limited fiscal space. An increase in global interest rates would raise their debt servicing costs, further limiting their policy response to the pandemic. With a portion of their domestic debt denominated in US dollars, these countries are also vulnerable to an appreciation of the US dollar that could accompany rising interest rates. A fiscal or balance-of-payments crisis in one or many of these EMEs could cause a tightening in global financial conditions and lower commodity prices, which would negatively affect Canada.

The Bank is taking part in international discussions related to financial stability issues. **Find out** what the Bank is doing to improve the stability and resilience of the financial system through partnerships both in Canada and around the world.

These global risks represent potential threats to financial stability in Canada, and their implications are examined later in this report. The next section focuses on vulnerabilities within the Canadian economy and financial system.

Vulnerabilities in the Canadian financial system

The Bank is committed to promoting the economic and financial welfare of Canada. As part of this commitment, the Bank identifies and monitors areas of vulnerability in the economy and the financial system. Vulnerabilities are pre-existing conditions that can lead to episodes of financial stress or even a financial crisis. They can amplify and propagate shocks throughout the financial system. The interaction between vulnerabilities and shocks can lead to the realization of risks that can impair the financial system and harm the economy. Reducing and managing vulnerabilities increases the resilience of the financial system and supports financial stability.

At this time, the Bank sees six key vulnerabilities in the financial system:

- **Vulnerability 1: Elevated level of household indebtedness**
- **Vulnerability 2: Imbalances in the housing market**
- **Vulnerability 3: Fragile corporate debt funding from certain markets**
- **Vulnerability 4: High potential demand for market liquidity relative to supply capacity**
- **Vulnerability 5: Cyber threats**
- **Vulnerability 6: Mispricing of assets exposed to climate-related risks**

The Bank is also monitoring the **rapid evolution of cryptoasset markets**, another vulnerability that is emerging.

This section discusses these vulnerabilities, grouped by the area they are mainly associated with—households and the housing market, non-financial businesses and the financial system.

Households and the housing market

- Despite the ongoing pandemic, financial stress among most households appears to be limited. This is mainly due to unprecedented policy income support, low interest rates and the overall resilience of economic activity.
- Strength in the housing market is contributing to Canada's economic recovery from the pandemic. But it has also intensified the previously identified vulnerabilities of elevated household indebtedness and housing market imbalances. The housing boom appears to be driven primarily by fundamental factors. However, the Bank is seeing signs of extrapolative price expectations in some regions—people may be buying homes with the expectation that prices will continue to rise. When this happens, it can create unsustainable price dynamics. As well, many households are taking on large mortgages relative to their incomes. These highly indebted households have less flexibility to deal with sudden financial changes, such as a job loss or a drop in the price of their home.

Households

The pandemic had the potential to push many Canadian households into a highly precarious financial situation.[5] About one-third of the labour force was either unemployed or employed but substantially underutilized, and one in five mortgage borrowers did not have enough liquid assets to cover their mortgage payments for two months.[6]

Policy-makers provided households with considerable financial support. Underemployed Canadians have received and continue to receive income support. Financial institutions such as banks allowed households to temporarily defer payments on their loans through part of 2020. The Bank of Canada deployed extraordinary monetary easing to put downward pressure on short- and longer-term interest rates, which made credit more affordable for households.

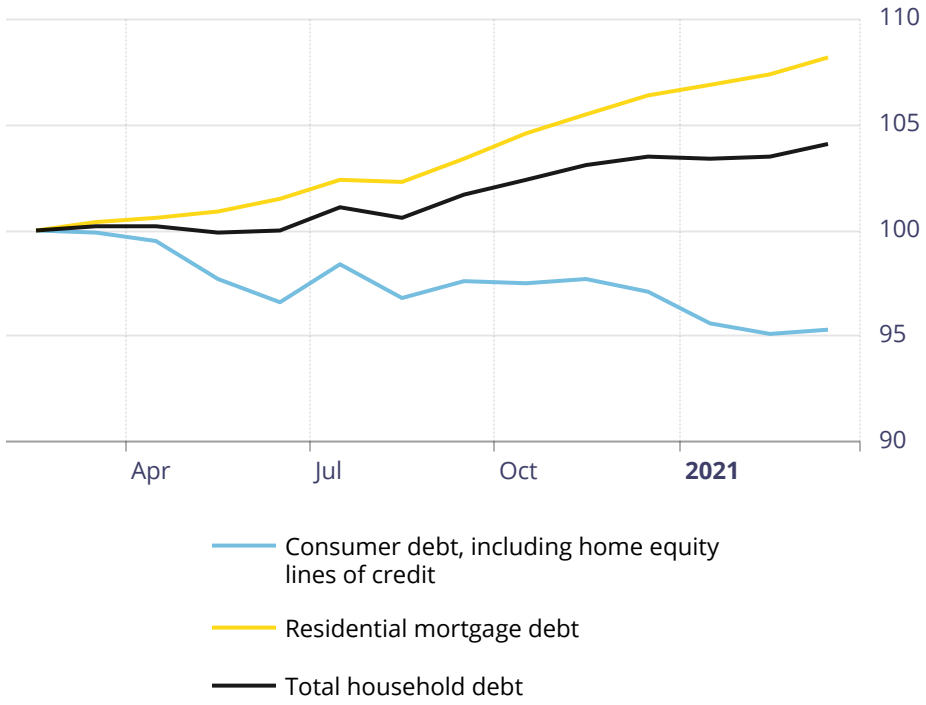
As a result, household finances, on average, have not deteriorated. In fact, total disposable income has increased substantially. Workers who lost employment income because of the pandemic received income support, while earnings of higher-income workers were largely unaffected. Many households—especially those with above-average income—have increased their savings both because they had fewer opportunities to spend and because uncertainty made some households more cautious about spending.[7] This has allowed many households to repay some debt—such as credit cards and lines of credit—as shown by a decline in the outstanding stock of consumer debt.

Indicators of financial stress, such as the share of households falling behind on loan payments, are still contained. In particular, the vast majority of households that benefited from loan deferrals last year have resumed regular payments.[8] Also, the number of personal bankruptcies fell by 40 percent in 2020 relative to 2019.

Still, an increase in mortgage debt has more than offset the decline in consumer debt (**Chart 3**).[9] Strong demand for residential housing and elevated house prices have driven this rise. As a result, total household debt has climbed by about 4 percent since the pandemic began and has picked up sharply since the middle of 2020.

Chart 3: Increasing mortgage debt is leading to a rise in total household debt

Aggregate balances by type of household debt, index: February 2020 = 100



Sources: TransUnion and Bank of Canada calculations Last observation: March 2021

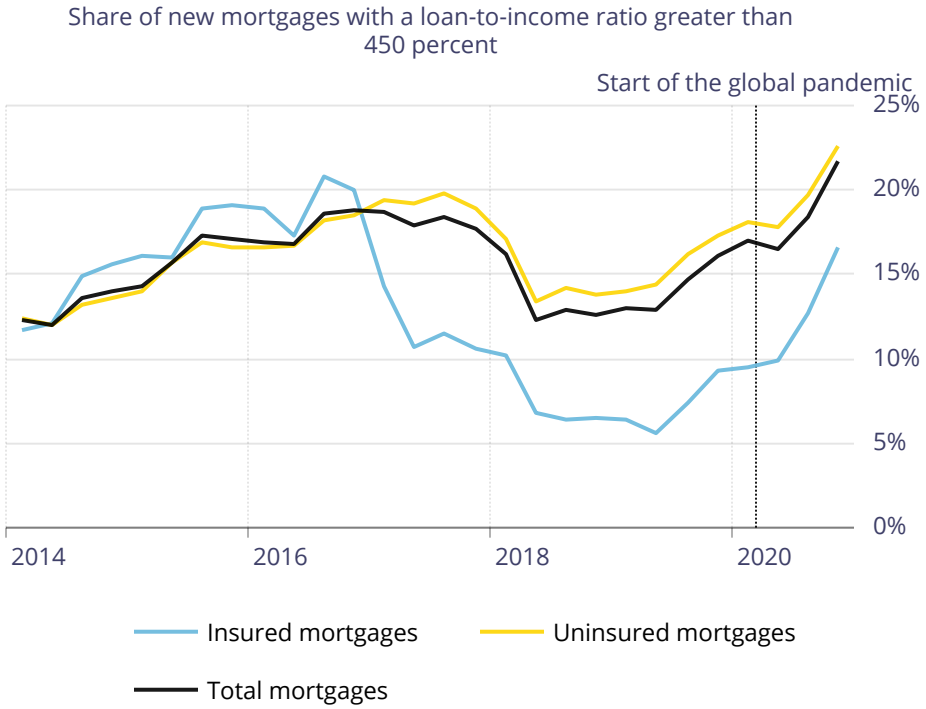
The vulnerability associated with elevated household indebtedness (Vulnerability 1) is significant and has increased over the past year. This vulnerability has built up over the past two decades as a growing share of Canadian households have accumulated high debt levels relative to their incomes.[10] Previously introduced mortgage stress tests and higher interest rates had slowed the accumulation of household debt and improved the quality of mortgage borrowing leading into 2019.[11] But since mid-2020 this trend has reversed. Some households have taken on significantly more mortgage debt, which is reflected in an increase in the share of new mortgages with high loan-to-income ratios.

To effectively assess the extent to which elevated household indebtedness is a vulnerability for the Canadian economy and the financial system, it is important to go beyond statistics such as the aggregate household debt-to-income ratio.[12] Debt and income are not uniformly distributed across households. That means measures of average household indebtedness can mask important information about households with greater debt and about their ability to service that debt when faced with income losses and higher interest rates.

The quality of new mortgage borrowing deteriorated during the pandemic. The share of newly issued mortgages with a loan-to-income (LTI) ratio above 450 percent rose substantially in the second half of 2020 (**Chart 4**). At 22 percent of all mortgages, this share is now above the range seen in 2016–17, before the Office of the Superintendent of Financial Institutions (OSFI) introduced the revised Guideline B-20. A larger number of highly indebted households makes the economic recovery and the financial system more vulnerable to shocks (**see section on risks**). Also, part of the increase in the share of high-LTI mortgages in 2020 occurred among households with a high loan-to-value (LTV) ratio (**Chart 5**). A historical analysis of mortgage originations reveals that borrowers with both a high LTI ratio and a high LTV ratio are associated with a greater risk of falling behind on debt payments (**Box 1**).

OSFI recently announced a possible adjustment to the interest rate used in stress tests on uninsured mortgages. **Learn more** about this announcement and how the Bank is collaborating with partners like OSFI to understand and address the vulnerability associated with elevated household indebtedness.

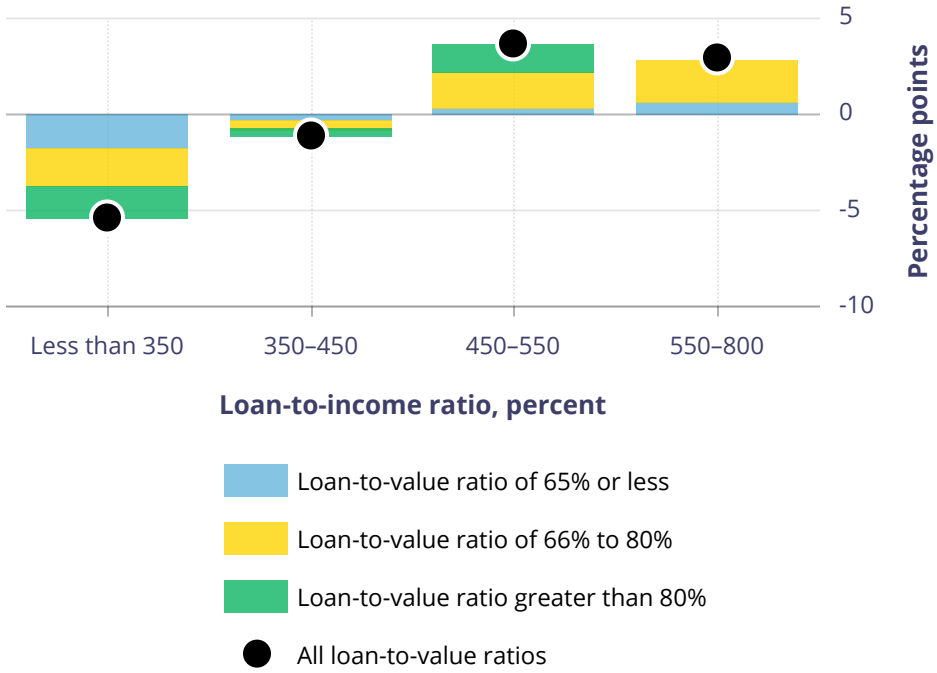
Chart 4: The share of new mortgages with a high loan-to-income ratio has surpassed its 2016–17 peak



Note: Data include purchases and refinancing originated by federally regulated financial institutions. Insured mortgages have a loan-to-value ratio greater than 80 percent. Uninsured mortgages have a loan-to-value ratio of 80 percent or less. A small portion of mortgages issued with a loan-to-value ratio of 80 percent or less are insured; however, these do not have a material impact on the plotted series.
Sources: Department of Finance Canada, regulatory filings of Canadian banks and Bank of Canada calculations
Last observation: 2020Q4

Chart 5: The buildup of new mortgage debt in 2020 came primarily from households with a high loan-to-income ratio and a high loan-to-value ratio

Change in the composition of new mortgage debt between 2019 and 2020



Note: The new mortgages are for house purchases only (excludes refinancing). The shares are weighted by the size of the mortgages. This chart covers only new mortgages issued by federally regulated financial institutions.
Source: Regulatory filings of Canadian banks Last observation: 2020

Box 1: Predictors of household financial stress

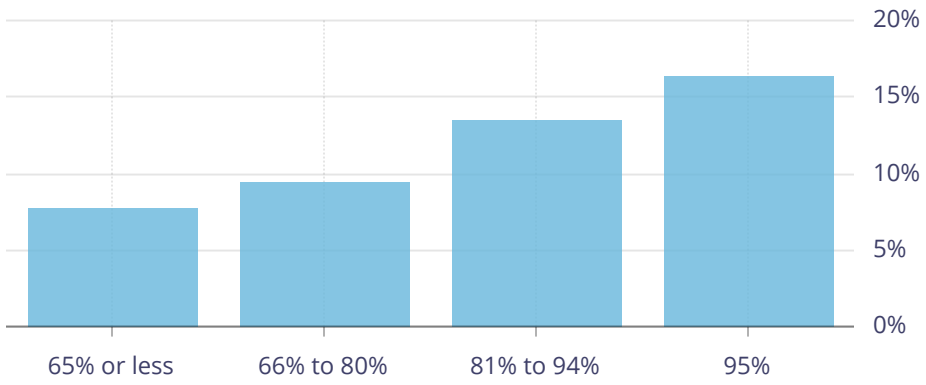
The Bank of Canada closely tracks the characteristics of mortgage originations to assess the evolution of household debt vulnerabilities. For instance, the share of new mortgages with loan-to-income (LTI) ratios above 450 percent has often been used as a key vulnerability metric. But little empirical research has been done on the link between initial mortgage characteristics—such as the size of the down payment, or the size of the loan compared with the borrower's income—and the riskiness of household debt in the Canadian context.[13]

To help fill this research gap, Bank staff have combined data on mortgage originations with data on consumer loan repayments. Staff have also developed a statistical model to assess the relevance of various mortgage and borrower characteristics—such as the LTI ratio, loan-to-value (LTV) ratio, mortgage rate and credit score—for predicting future household financial stress.[14, 15] The model is estimated using data from energy-intensive regions of Canada for mortgages issued between 2014 and 2017. This date range covers the period of economic fallout from the collapse in oil prices. Financial stress is defined as falling behind for at least 60 days on any debt payment, such as credit cards, within three years of obtaining a mortgage.

The results suggest that among the characteristics considered, the initial equity stake—or down payment—is the most economically significant factor associated with future financial stress. Generally, a high LTV ratio (a smaller equity share) increases the likelihood of falling behind on loan payments (**Chart 1-A**). This is because borrowers with high LTV ratios have less equity available in their homes to smooth any income disruptions (**see section on risks**). This is particularly the case when the LTV ratio exceeds the regulatory threshold of 80 percent, beyond which borrowers cannot qualify for mortgage refinancing.

Chart 1-A: A higher loan-to-value ratio is associated with a greater likelihood of future financial stress

Average predicted probabilities of financial stress, by loan-to-value ratio



Sources: TransUnion, regulatory filings of Canadian banks and Bank of Canada calculations

The LTI ratio also plays a role in predicting financial stress for uninsured mortgages.[16, 17] Normally, a higher LTI ratio implies a larger mortgage payment, which can be more difficult to manage in the face of a drop in income or an increase in mortgage rates.

Overall, these results suggest that mortgage borrowers with both a high LTV ratio and a high LTI ratio are most at risk of future financial stress. In addition to having a greater likelihood of falling behind on debt payments, households with a smaller equity stake and a larger loan compared with their income will generally have to cut discretionary spending by more than other households during a period of financial stress. When this happens to many households at the same time, it can cause a widespread decline in economic activity (**see section on risks**).

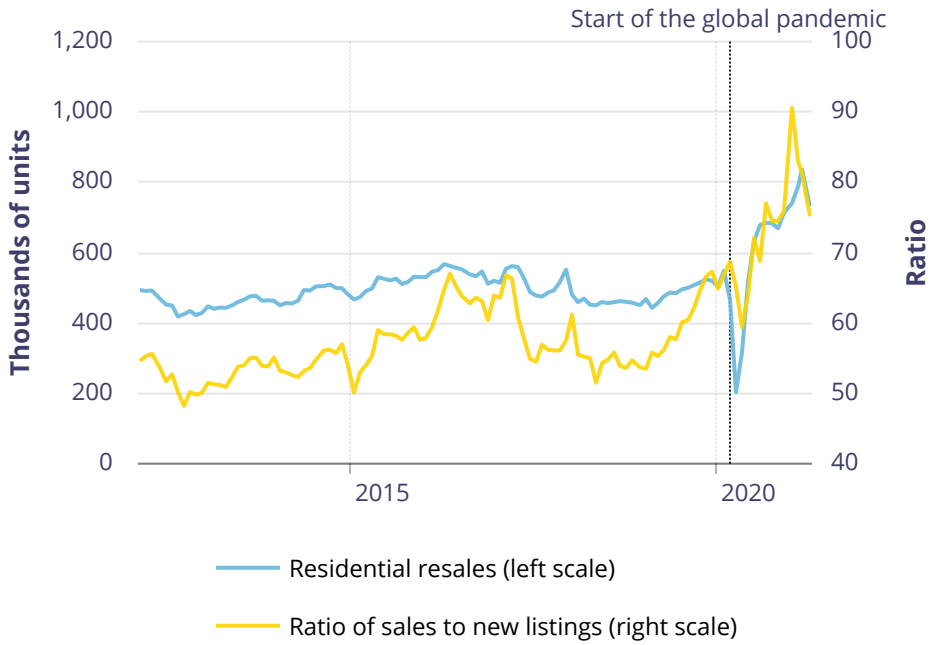
The housing market

The vulnerability associated with imbalances in the housing market (Vulnerability 2) has increased. Key developments in the housing market—exceptionally strong demand relative to supply, rapidly rising prices, expectations becoming extrapolative—all point to growing imbalances compared with a year ago. Increasing house prices relative to income contribute to rising leverage for homebuyers. Also, a misalignment of house prices in comparison to fundamentals can lead to a correction in prices in the future. This correction, in turn, can bring on financial stress for households since housing often represents their largest asset (**see section on risks**).

Activity in the housing market has been exceptionally strong during the pandemic.[18] Residential resales initially fell during the spring 2020 lockdown but rebounded strongly during the summer as containment measures eased. A large part of this initial rebound was due to pent-up demand. Since then, activity has continued to strengthen, with national resales reaching close to record highs in April 2021 (**Chart 6**). At the same time, the inventory of existing homes for sale has fallen to near record-low levels.

Chart 6: Housing resales are near record highs

National residential resales and ratio of sales to new listings

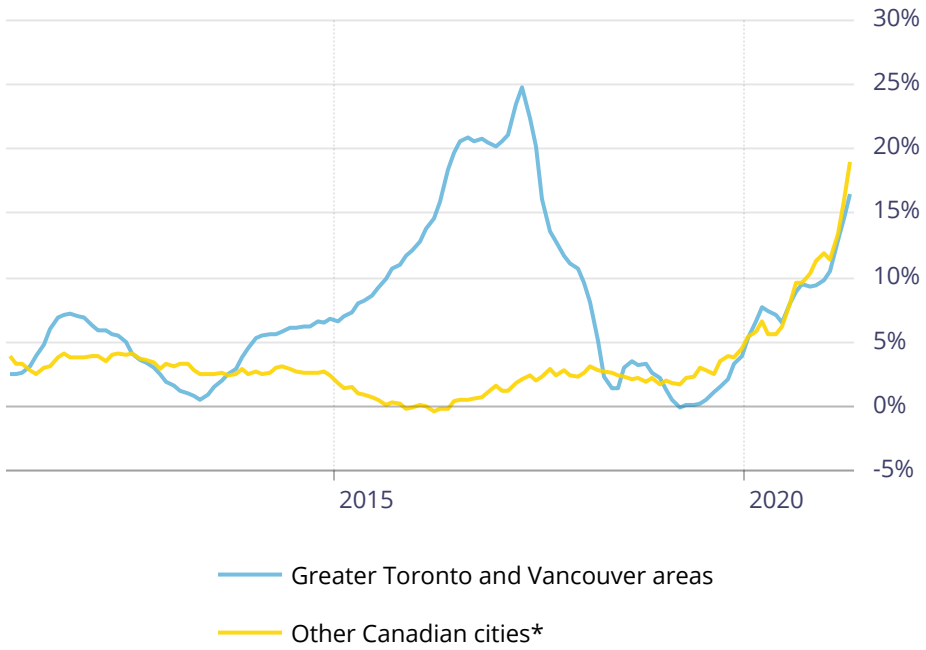


Note: Residential resales and new listings are seasonally adjusted at annualized rates.
Source: Canadian Real Estate Association Last observation: April 2021

Tightness in the market has led to broad-based increases in house prices. Robust demand for housing, combined with relatively limited supply, has caused rapid growth in house prices in most cities. As of April 2021, house prices were up 23 percent nationally relative to a year ago. The recent surge in prices is more widespread across cities than that observed in 2016–17 (**Chart 7**), which was mostly confined to the greater Toronto and Vancouver areas.

Chart 7: The rapid growth in house prices is more widespread across cities than it was in 2016–17

Year-over-year growth in quality-adjusted benchmark house prices



* Other cities include Calgary, Edmonton, Saskatoon, Regina, Winnipeg, Ottawa, Montréal, Québec, Moncton and St. John's.
Sources: Canadian Real Estate Association and Statistics Canada Last observation: April 2021

The strong increase in house prices largely reflects fundamental factors. The shift to working and learning from home during the pandemic has led to a preference for more living space. In response, demand and prices for single-family homes have increased significantly relative to those for condominiums. Locations outside of city centres have also increased in popularity, and house prices in peripheral areas have outpaced those in urban cores as a result. Record-low mortgage rates have further contributed to strong demand for housing.

The uneven impact of the pandemic has also likely played a role in the rising number of home purchases. The pandemic has caused little disruption to household incomes in the upper end of the distribution, which accounts for most homeowners.[19] It is likely that many households have drawn from accumulated savings to make larger down payments. Here again, high-income households are estimated to account for most of the increase in aggregate savings since the start of the pandemic.[20] Partly because of this, housing demand has remained strong despite the broader economic downturn and the decline in immigration.

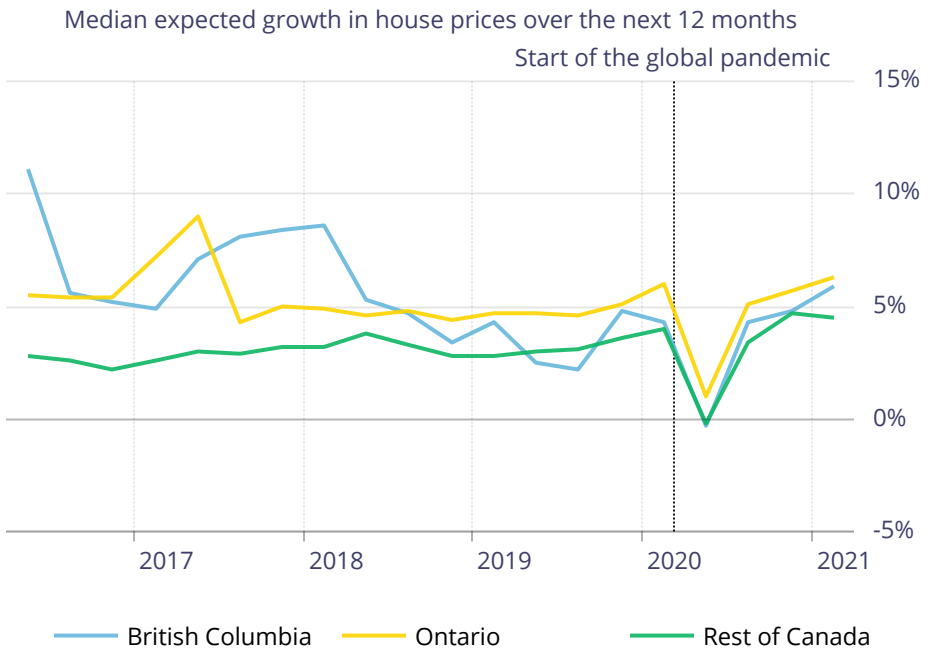
Supply factors have also contributed to price growth. In the short term, supply of new housing cannot fully adjust to a sudden increase in housing demand, especially not of the magnitude seen during the pandemic. This partly reflects structural impediments, such as land use planning and building regulations. Also, building materials, notably softwood lumber, have been in short supply, and containment measures have resulted in additional construction delays. New construction has increased in recent months, particularly in the single-family segment and in rural areas, but supply has not been able to keep up with strong demand.[21]

While fundamental factors sparked the rapid rise in house prices, a concern for financial stability is that the increase may also have been driven partly by expectations of future price increases. When house price growth is elevated, some households may be tempted to buy now for fear of higher prices in the future. In such a scenario, housing purchases are made sooner than they normally would, raising demand and prices, particularly when supply cannot keep pace. This dynamic of higher prices then draws more buyers into the market. It can also attract investors looking to buy and then sell a property soon after to make a quick profit, which adds to demand pressures. In this way, expectations of future price increases can become self-fulfilling for a time, further reinforcing the belief that prices will continue to rise in the future.

After a sustained period of rising prices, expectations can also become extrapolative, meaning people come to expect that prices will rise in the future simply because they have risen in the past, without regard to what fundamentals suggest. In this way, housing demand and prices can become disconnected from underlying fundamentals. As much as herding behaviour can push prices up, it can also lead to a future correction in house prices. Such a correction can have important implications for the stability of the financial system and the economy more broadly (**see section on risks**).

Some markets are showing signs of extrapolative expectations (Box 2). In a few cities, multiple offers for houses have become common and bidding wars have ensued. Final sale prices often surpass list prices by a large amount. Consumer expectations of price growth have gained momentum and become more widespread across parts of Canada than in 2016–17 (**Chart 8**).[22] A novel empirical approach to identifying episodes of extrapolative expectations at the local level suggests that some markets have become exuberant. Based on this new indicator (described in **Box 2)**, the Greater Toronto Area, Hamilton and Montréal are experiencing extrapolative house price expectations, and Ottawa is nearing this threshold.

Chart 8: Expectations of house price growth have increased and broadened regionally



Note: Expectations are measured by the interpolated median of expected growth in local house prices over the next 12 months for residents of Ontario and British Columbia. See M. Khan and T. Webley, "**Disentangling the Factors Driving Housing Resales**," Bank of Canada Staff Analytical Note No. 2019-12.
Source: Bank of Canada Canadian Survey of Consumer Expectations Last observation: 2021Q1

Box 2: A model-based indicator of house price exuberance

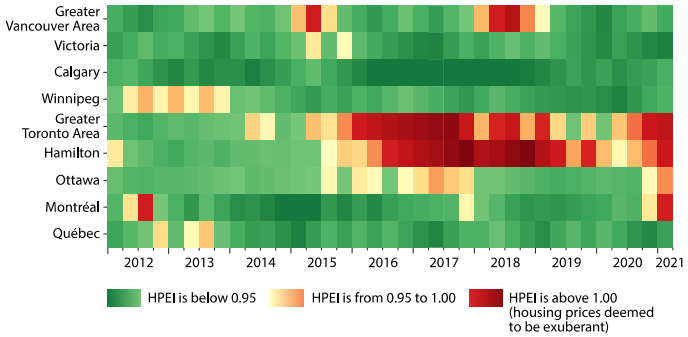
Sustained periods of rapid house price growth can create the expectation that prices will continue to rise in the future, even if such increases cannot be supported by supply and demand fundamentals. Such extrapolative expectations can become self-fulfilling when the prospect of higher future prices increases current demand. This exacerbates the initial run-up in prices, raising the likelihood of a costly adjustment in the future. To help detect periods of extrapolative expectations across Canadian cities, Bank of Canada staff have developed the House Price Exuberance Indicator (HPEI).[23]

The HPEI is derived from a behavioural model in which individuals have different beliefs about the future path of house prices. Some expect house prices to converge toward levels consistent with economic fundamentals such as income. But others are trend followers, believing rising prices today will mean rising prices tomorrow. The relative share of these different belief types varies over time and determines whether the housing market is exuberant. Specifically, the housing market is deemed to be exuberant when the HPEI exceeds 1, meaning house prices are expected to continue outpacing fundamentals. The HPEI is generated for select Canadian cities using quarterly data starting in 1988.

The heat map below (**Chart 2-A**) shows the HPEI for a set of Canadian cities. The colour-coding depicts the distance of the HPEI from 1—the point after which the colour turns red. As of the first quarter of 2021, the HPEI identifies three cities showing signs of house price exuberance: the Greater Toronto Area, Hamilton and Montréal. Ottawa is on the cusp of displaying extrapolative expectations too. The HPEI does not detect signs of house price exuberance elsewhere at this time. This reinforces the importance of taking a regional perspective when assessing housing market imbalances. Going forward, the HPEI will complement other data and methods used by the Bank to analyze imbalances in the Canadian housing market.

Chart 2-A: The Greater Toronto Area, Hamilton and Montréal are showing signs of house price exuberance

House price exuberance heat map



Note: HPEI is the House Price Exuberance Indicator.
Source: Bank of Canada calculations Last observation: 2021Q1

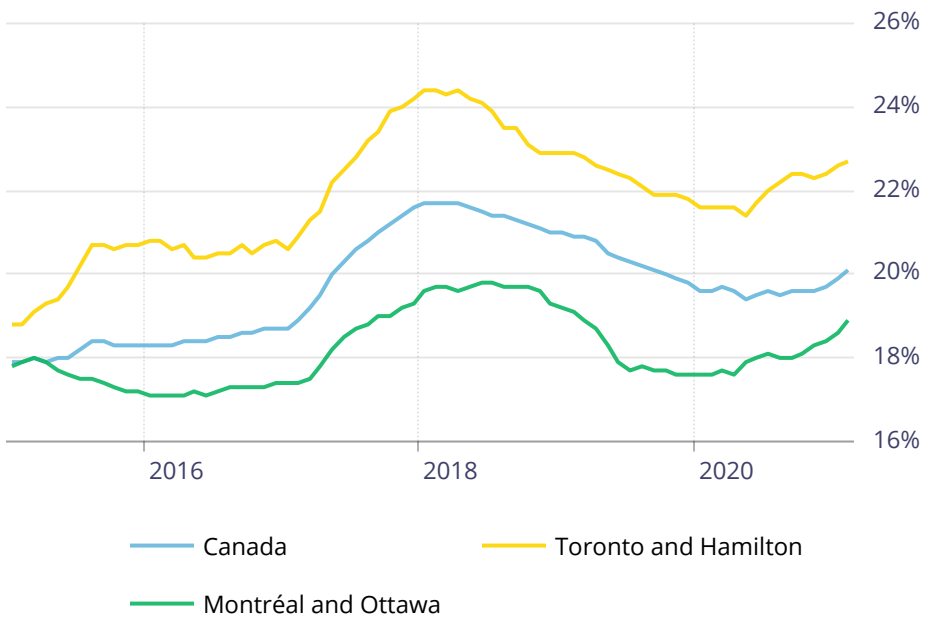
▶ ⇨ Description: The Greater Toronto Area, Hamilton and Montréal are showing signs of house price exuberance

The house price exuberance in some cities appears to be driven mainly by people buying a home to live in rather than by investor demand or house-flipping activity (Chart 9). Nevertheless, the share of properties purchased by investors—individuals who obtain a mortgage to purchase a property while maintaining a mortgage on another property—has been rising in recent months. Purchases by house flippers—individuals who buy and resell homes a short period later—have remained relatively stable in most cities except Ottawa and Montréal, where they have increased. In contrast to homes purchased as long-term investments, flipping activity accounts for only a small share of housing transactions.[24]

The federal government is proposing to tax vacant properties owned by foreign non-residents. This measure would likely reduce speculative demand in the housing market. **Find out** more about this proposal and how the Bank is collaborating with partners to understand and address the vulnerability associated with housing market imbalances.

Chart 9: Increased investor demand has not been a significant contributor to the current housing boom in Canada

Share of properties purchased by investors



Note: Investors are defined as borrowers who obtain a mortgage to purchase a property while maintaining a mortgage on another property. Investment properties include those that are rented out or left vacant, excluding vacation properties. The share of purchases associated with investors is computed using a 12-month rolling sum of mortgage originations.
Sources: TransUnion, regulatory filings of Canadian banks and Bank of Canada calculations
Last observation: February 2021

Non-financial businesses

- The past year has been challenging for the business sector due to widespread declines in revenue. Such an adverse impact on revenues could have had severe consequences for many businesses. But it seems that most firms have been able to manage cash flow pressures. Similar to households, businesses have also been supported by unprecedented government transfers, low interest rates and actions to restore market functioning during the crisis. As a result, severe financial stress has been limited across most firms. Still, for some, their future viability remains uncertain because much is still unknown about the post-pandemic economy.
- Some businesses rely on fragile funding sources—such as high-yield bonds or leveraged loans—that are vulnerable to changes in market sentiment. This remains a vulnerability of the financial system.

In spring 2020, the potential for a wave of business insolvencies was looming. Lockdowns and public health restrictions significantly reduced revenues, creating cash flow pressures for many businesses.[25] Some highly indebted firms were especially at risk of insolvency given their large, regular debt payments.[26]

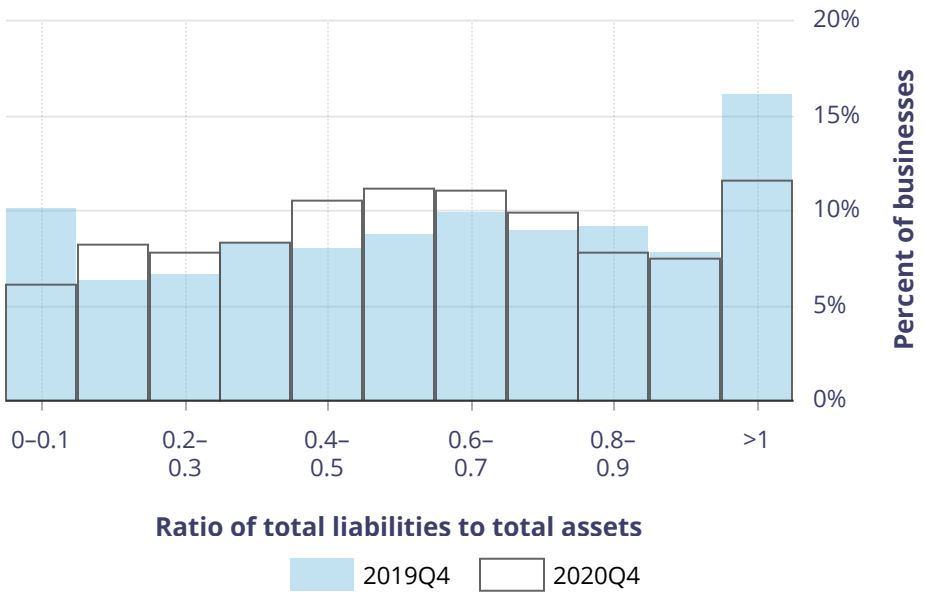
The balance sheets of most businesses have held up relatively well in an environment with extraordinary government support.[27] Before the pandemic, elevated business indebtedness was concentrated in commodity-related sectors. The pandemic created conditions for indebtedness to become a more broad-based phenomenon. However, government measures, such as wage and rent subsidies, helped firms in many sectors manage their cash flow needs. As a result, most businesses have not had to rely heavily on debt to get through the crisis. Overall, leverage of large businesses appears close to pre-pandemic levels.[28] It has fallen somewhat for highly leveraged firms, while it has risen mainly in businesses with low leverage (**Chart 10**).

Small businesses have been especially hard-hit by the pandemic. Although many have taken on debt through the Canada Emergency Business Account (CEBA), this debt has special features that mitigate vulnerabilities associated with traditional loans. In particular, loans issued under CEBA are interest-free and partially forgivable if businesses repay the outstanding balance (minus the amount available for forgiveness) by the end of 2022.

The distribution of debt service costs has also improved in recent quarters. For example, the share of businesses for which interest costs exceed their earnings has returned to near pre-pandemic levels.[29]

Chart 10: The distribution of corporate leverage has improved over the past year

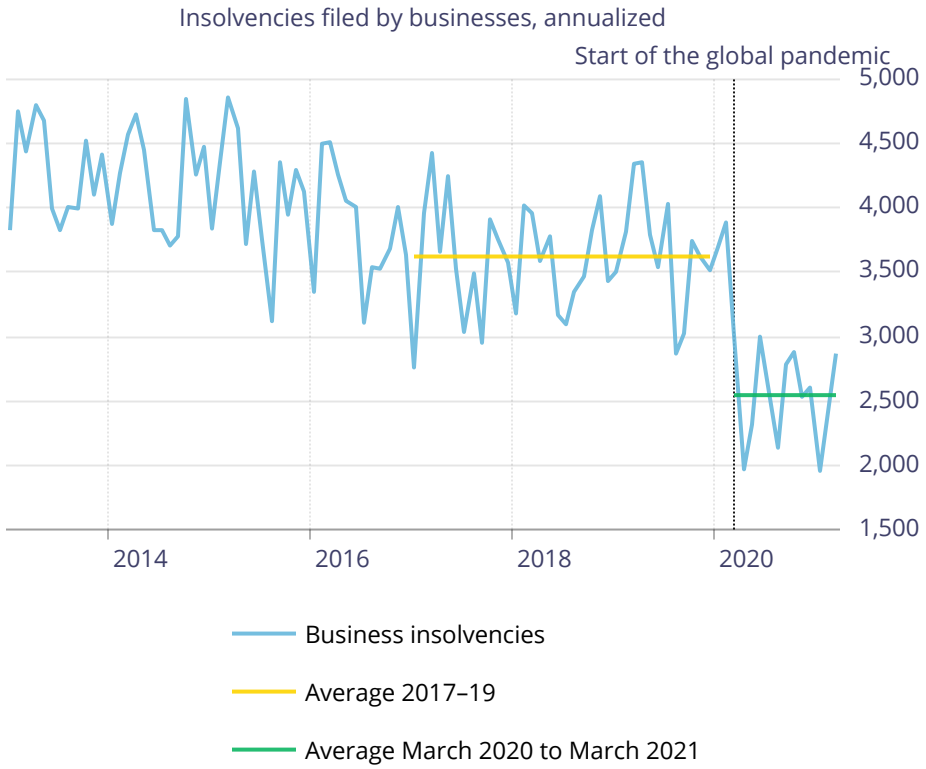
Distribution of businesses, by leverage ratio



Sources: Statistics Canada and Bank of Canada calculations Last observation: 2020Q4

The future viability of some businesses remains uncertain. Despite the economic crisis, the number of firms filing for insolvency during the pandemic has been unusually low (**Chart 11**).[30] This primarily reflects the exceptional financial support provided by governments to help businesses through the downturn. As the economy returns to normal—albeit unevenly across industries—and governments phase out their extraordinary support, the financial viability of some businesses may be at risk. Given this risk, a future increase in filings arising from pent-up insolvencies may occur. The Bank will continue to monitor the financial health of businesses for signs of stress.

Chart 11: Business insolvencies are 30 percent lower than their pre-pandemic levels

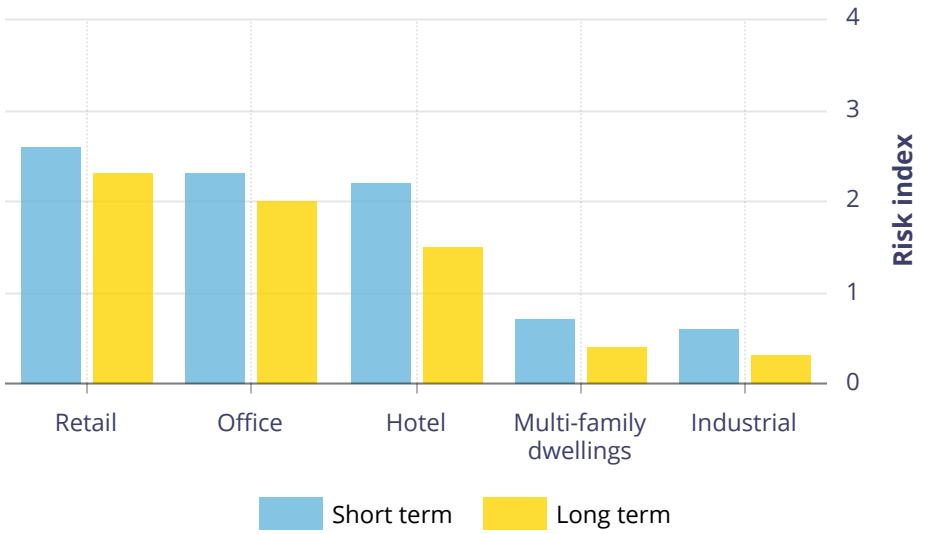


Sources: Office of the Superintendent of Bankruptcy and Bank of Canada calculations
Last observation: March 2021

Valuations of many commercial real estate subsectors have declined during the pandemic. This reflects the challenges they have experienced. Sales for brick and mortar retail stores have been weighed down by multiple lockdowns and the accelerated transition to online shopping. Hotels have seen unprecedented low occupancy rates due to the shutdown of the tourism and business travel industries. The outlook for demand in the office sector is uncertain due to the rapid shift to remote work. In contrast, industrial real estate has benefited from higher demand for warehouse capacity due to the boom in e-commerce. Because financial system participants are exposed to the commercial real estate sector, valuation declines could affect them, although differently depending on their exposure. Respondents to the Bank's spring 2021 Financial System Survey voiced different levels of concern about the commercial real estate subsectors (**Chart 12**).[31]

Chart 12: Financial system participants are somewhat concerned about the future of the retail and office segments of commercial real estate

Concern over commercial real estate subsectors in the short and long term



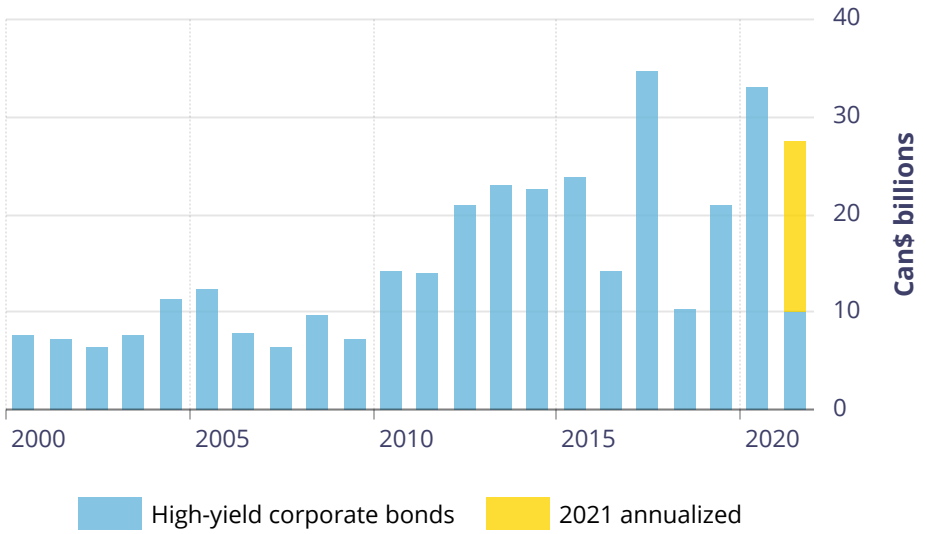
Note: Results are in response to the Financial System Survey questions: "In your view, how likely is a sharp valuation adjustment in the following subsectors of CRE in the shorter term?" and "How concerned are you about the following subsectors over the longer term?" Respective risk index weights: not at all likely/concerned: 0 points; slightly likely/concerned: 1 point; somewhat likely/concerned: 2 points; moderately likely/concerned: 3 points; extremely likely/concerned: 4 points.
Source: Bank of Canada Financial System Survey Last observation: spring 2021

The reliance of some businesses on certain fragile debt funding markets remains a vulnerability in the financial system (Vulnerability 3). As highlighted in the Bank's **2019 *Financial System Review***, businesses with low credit ratings have limited financing options. Typically, they turn to high-yield debt markets—for instance, by issuing high-yield corporate bonds or securing a leveraged loan.[32] Firms that rely on these debt markets are vulnerable to a sudden change in investor sentiment that could result in increased financing costs or reduced access to this type of financing.

The global search for higher returns has increased investor demand for high-yield assets. Because investors' risk appetite is elevated, these markets have been an attractive source of funding for low-rated Canadian corporations. High-yield spreads have narrowed recently to pre-pandemic levels, and high-yield bond issuance was elevated in 2020 and so far in 2021 (**Chart 13**). However, when global risk-free interest rates start normalizing, investor demand for high-yield debt could diminish. A shift in investor sentiment could lead to a sharp repricing of existing assets (**see section on risks**). If this were to happen, it would become more expensive and difficult to roll over existing debt and issue new high-yield bonds.

Chart 13: Issuance of high-yield bonds by Canadian corporations was robust in 2020 and remains strong in 2021

Nominal value of high-yield corporate bonds issued by Canadian firms



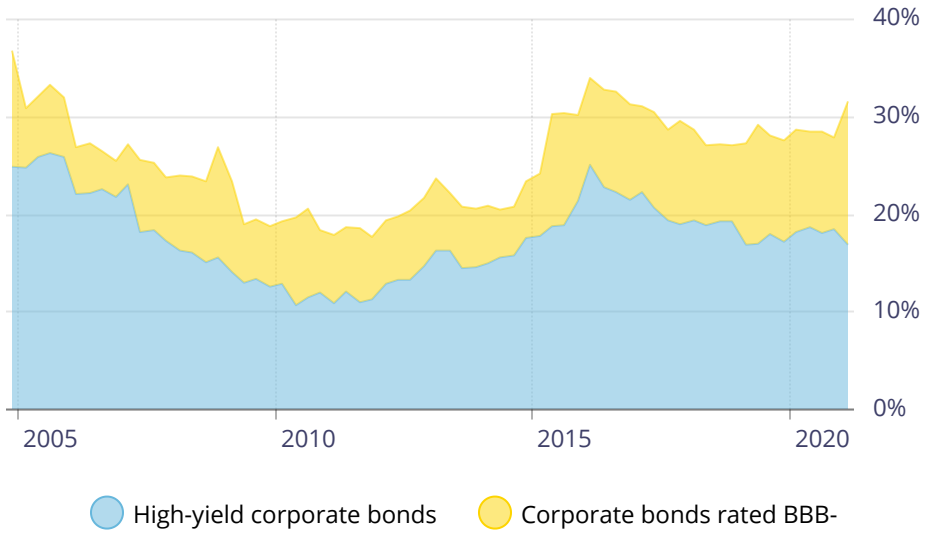
Sources: Bloomberg Finance L.P. and Bank of Canada calculations Last observation: May 13, 2021

Currently, high-yield bonds account for nearly 20 percent of the value of all rated bonds issued by Canadian corporations, with roughly 10 percent more rated at BBB- (**Chart 14**). Most of these high-yield and BBB- corporate bonds are issued by Canadian commodity-related corporations. This sector is therefore particularly vulnerable to a change in investor sentiment. The share of high-yield bonds increased notably following downgrades related to the oil price shock of 2014–15.

The extent of credit-rating downgrades has been limited during the pandemic, largely because of the extraordinary government support programs. However, the Bank will continue to monitor developments in these fragile debt funding markets as the economic recovery unfolds and governments wind down their support.

Chart 14: Together, high-yield and BBB- account for about 30 percent of corporate bonds issued by Canadian firms

Share of the stock of corporate bonds issued by Canadian firms, measured at face value



Note: High-yield corporate bonds include all bonds with credit ratings below BBB-.
Sources: Bloomberg Finance L.P., Intercontinental Exchange Bank of America and Bank of Canada calculations
Last observation: 2021Q1

Financial system

- The Canadian financial system has proved to be resilient during the COVID-19 crisis, thanks to a well-capitalized banking sector and strong policy support. Financial markets quickly recovered from early funding and market liquidity stress, and extraordinary liquidity support is no longer required.
- The COVID-19 crisis has highlighted the systemic implications of long-term trends. The potential demand for fixed-income market liquidity is growing faster than the current structure of fixed-income markets can supply in periods of stress. The digitalization of the economy creates further interconnections that increase the potential for system-wide disruption from cyber incidents in financial institutions or financial market infrastructures.

COVID-19 caused exceptional uncertainty in markets when it struck in March 2020, prompting financial market participants to seek to hold cash. Fixed-income markets came under extreme stress when many investors attempted to sell their financial assets and few participants were willing to buy. This was true even for the safest securities: Government of Canada bonds and treasury bills. At the same time, households and businesses became more cautious, drawing down their lines of credit, deferring loan payments and building up holdings of liquid assets.

The Bank intervened in a wide range of funding markets to ease liquidity strains and improve market functioning. The Bank increased the scope and amount of liquidity it provided to financial institutions. This helped them meet the greater demand for credit from other financial system participants, including households and businesses. The Bank also launched a suite of asset purchase facilities to restore smooth functioning in debt markets.

Financial markets are now functioning well, and the Bank has phased out the crisis programs and facilities focused on market liquidity. These programs and facilities had their intended effect. Market liquidity indicators have improved, and the use of the Bank's facilities and programs have declined for some time. The Bank continues to monitor market conditions and stands ready to reactivate the facilities if needed.[33]

Fixed-income market liquidity

The ability of the fixed-income market structure to support liquidity provision under stress has not kept pace with the asset management sector's potential demand for market liquidity (Vulnerability 4). Beyond the sheer size of the COVID-19 shock, this structural trend partly explains the unprecedented speed, scope and size of the interventions that were required to maintain liquid markets in spring 2020. Given the potential for market liquidity demand to spike, particularly during periods of stress, the implications of this long-term structural shift will persist well beyond the pandemic.[34]

The robust growth of the asset management industry over the past two decades means that more credit risk is intermediated and held outside the banking sector. Asset managers include institutions such as pension funds and insurance companies; they also include the managers of mutual funds and exchange-traded funds that manage the pooled investments of private investors. By aiming to meet the investment goals of their investors, asset managers help channel funds to borrowers and provide a valuable alternative to traditional banking. The growth of the asset management industry, from $2.4 trillion in assets under management in 2008 to $5.7 trillion in 2020, has been driven in part by:

- declining interest rates
- financial innovations
- demographic changes
- stricter banking regulation after the global financial crisis

Read more about recent trends in asset management and other types of non-bank financial intermediation (NBFI).

Asset managers rely on market liquidity to manage their risks. Banks have direct access to central bank money. By contrast, to meet the claims of their investors or counterparties, asset managers must either have cash on hand or obtain cash by borrowing against or selling securities in their portfolios. As a result, asset managers rely on market liquidity to quickly convert their securities into cash without drastically reducing their prices. As the asset management industry grows, it represents increased potential demand for market liquidity.

In addition to the growth of the industry, asset managers' dependence on market liquidity has increased with the evolution of their portfolios. In a low interest rate environment, asset managers have gradually shifted the composition of their portfolios toward assets that are less liquid. For instance, pension funds are increasingly investing in less liquid assets such as real estate, infrastructure and private equity.[35] Mutual funds have increased their allocations to corporate bonds from more liquid government bonds, including those with a lower quality of credit.[36] As asset managers diversify their portfolios to include riskier assets, the need to rebalance their portfolios in response to price changes may create additional liquidity needs. In addition, for higher returns, some asset managers have tended to leverage their investment portfolios through repurchase agreements (repos) and derivatives markets. The prices of the securities that they pledge as collateral or that underlie the derivatives they hold can expose them to liquidity risk. If these prices decline, as they often do during a crisis, asset managers would be required to post additional cash or other collateral to their counterparty as a margin, which may further increase their demand for liquidity.

Fixed-income markets rely on banks for liquidity, but banks face risk management constraints. Fixed-income transactions are generally not made directly between investors. They are typically intermediated by bank dealers. A bank dealer's ability to buy securities, and hence to support market liquidity, depends on the amount of risk that the bank's balance sheets can support. Other business lines (notably lending) compete for the use of this balance sheet space and may have become more attractive than market-making under the Basel III framework.

There may be imbalances in the demand for and supply of liquidity needed to support intermediation, particularly in times of stress. As the asset management sector grows and takes on less liquid assets, it becomes more likely that sudden spikes in liquidity demand will run up against banks' capacity to act as intermediaries for fixed-income transactions. The disruption to fixed-income markets in spring 2020 illustrates how growing demand for market liquidity relative to supply of intermediation can play out (**Box 3**).[37]

Find out what the Bank is doing to address imbalances in the demand for and supply of fixed-income market liquidity.

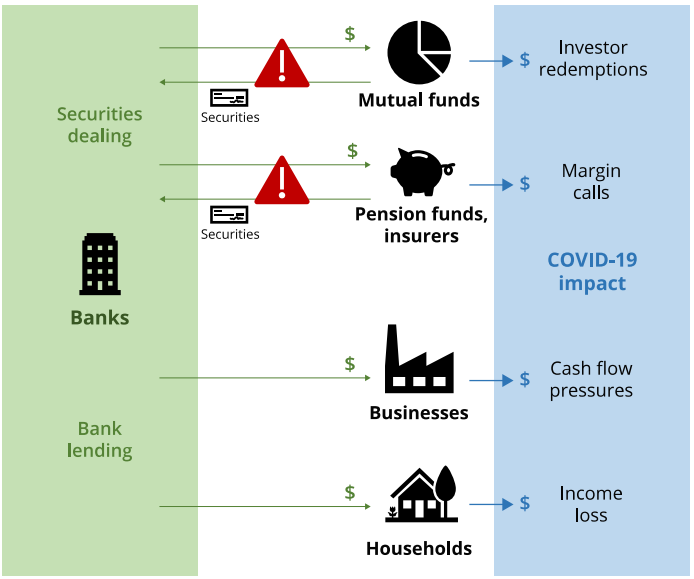
Box 3: Looking back at the spring 2020 episode of market liquidity stress

When large segments of the economy shut down with the onset of the COVID-19 pandemic in March 2020:

- many businesses and households lost their incomes and faced a great deal of uncertainty about the future
- market volatility increased sharply

Needing cash to ride out the turbulence, bank clients sought loans and drew down their lines of credit, investors redeemed money from investment funds, and market participants faced rising margin calls (**Figure 3-A**). For instance, margin calls on derivative positions were the greatest liquidity draw faced by large Canadian pension funds.[38]

Figure 3-A: COVID-19 increased demand for liquidity



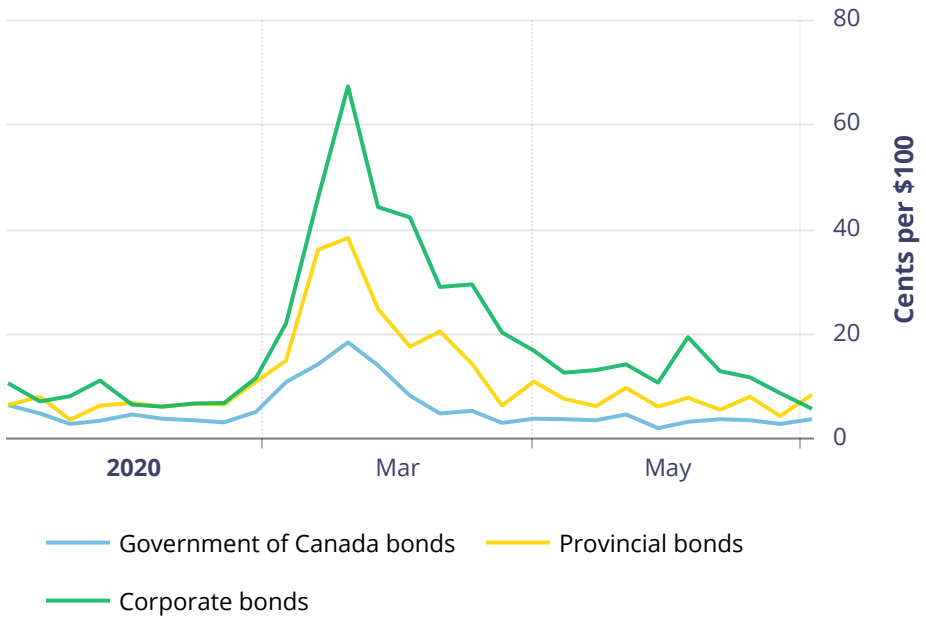
▶ ⇨ Description: COVID-19 increased demand for liquidity

To meet these claims, asset managers sought cash from a variety of sources, including selling fixed-income securities. In normal times, dealers can handle trade flows because there are plenty of buyers to offset the trades. However, there were few buyers during this turbulence. Bank dealers increased their purchases of these securities from their clients, but this competed with other bank activities for balance sheet space—notably, lending to households and businesses. The increase in fixed-income securities accounted for only 12 percent of the growth in Canadian banks' assets from January to March 2020, compared with a 24 percent increase from business loans.

As dealers' capacity to intermediate was depleted, the costs for asset managers to sell their securities rose sharply. Dealers became less inclined to accept riskier and less liquid securities such as corporate bonds (**Chart 3-A**). Even the highest quality, most liquid assets were not immune: trading costs in fixed-income markets suggest that dealers' capacity was not sufficient to absorb the large amounts of Government of Canada debt securities sold by a wide range of asset managers.[39]

Chart 3-A: The costs of trading rose for Government of Canada, provincial and corporate bonds

Bid-ask spread proxy, weekly median



Sources: Canadian Depository for Securities and Bank of Canada calculations

Last observation: July 3, 2020

The large persistent imbalances in the demand for and supply of liquidity led some fixed-income markets to completely freeze. This was resolved only when the Bank of Canada and other central banks took unprecedented actions to support liquidity in core funding markets.

Cyber security

Cyber threats (Vulnerability 5) remain an important vulnerability, given the highly interconnected nature of the financial system. A successful cyber attack on a major financial institution or financial market infrastructure has the potential for system-wide disruptions. It could also have significant consequences for the smooth and continuous delivery of financial services as well as high financial and reputational costs. Ultimately, public trust in the financial system rests on participants' ability to protect the system's day-to-day functioning. This means ensuring robust and resilient operations, which includes preserving the integrity of personal and financial data.

The pandemic has accelerated the digital transformation of the economy. Executives surveyed last summer by McKinsey & Company reported that the pandemic spurred a three-year leap in consumers' adoption of digital technologies and a six-year leap for businesses.[40] But this digital transformation comes with risk. Increased digitalization provides cybercriminals with more available "attack surface"—the entry points into a computer system or software.

Financial system participants remain concerned about potential cyber incidents. Respondents to the Bank's spring 2021 Financial System Survey continue to identify a cyber incident as one of the top three risks facing the financial system. They also view cyber threats as the top risk to their own institutions. Banks and insurance companies are particularly concerned about what a cyber incident could mean for them and the overall financial system.

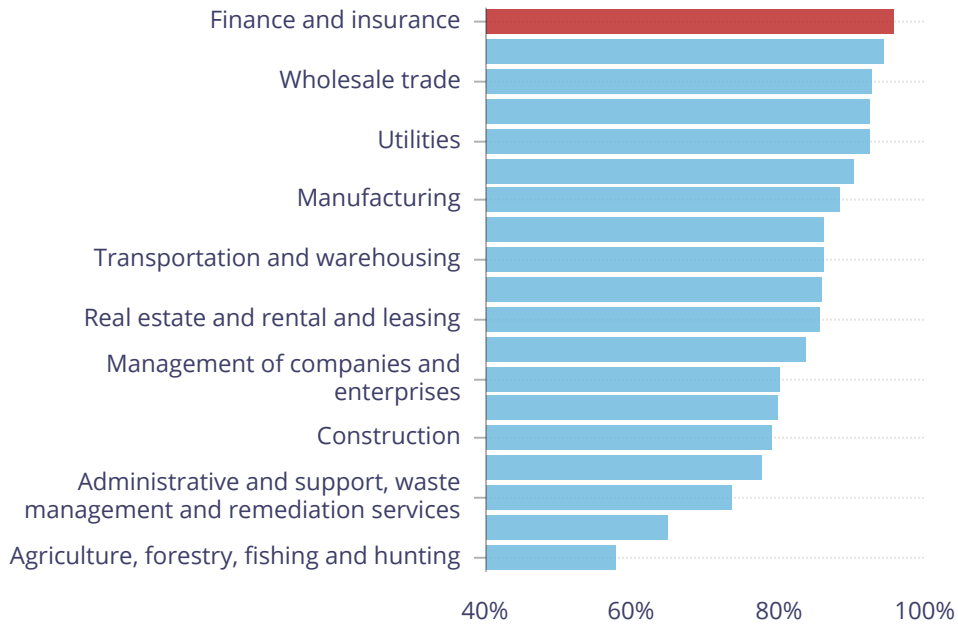
Since December 2020, several global cyber incidents involving third-party vendors have occurred. Perpetrators used multiple avenues to target and gain access to organizations' networks over an extended period. As a result, entities worldwide, both public and private, were compromised.

Financial institutions and authorities continue to invest in improving cyber resilience. The financial industry is a leading sector in cyber risk management (**Chart 15**). The most recent cyber attacks have reinforced third-party and supply-chain risk as a major source of concern for the financial sector. In response, financial institutions continue to enhance their security controls, including third-party risk management practices. These and other investments by individual businesses are crucial, but sector-wide action is needed to address broader implications of a successful cyber incident. That is why the Bank has been leading efforts to enhance collaboration and information sharing across the financial sector.

Find out what the Bank is doing to improve the financial system's resilience to cyber threats.

Chart 15: Among firms in the finance and insurance industry, 95 percent use at least one cyber risk management arrangement—more than in any other industry

Share of firms within each industry that use at least one cyber risk management arrangement



Note: Cyber risk management arrangements include written policies on cyber security, business continuity plans, employees or managers dedicated to cyber security, regular security updates to the operating system or software, and a cyber security insurance policy.
Sources: Statistics Canada and Bank of Canada calculations Last observation: 2019

Climate change considerations

Assets exposed to climate-related risks are generally mispriced (Vulnerability 6).[41] Climate change poses important risks to individual financial system participants and the stability of the financial system.[42] In general, inadequate information about the impacts of climate change can lead to them not being fully factored into the prices of financial instruments. This mispricing can leave investors exposed to sudden losses in the value of carbon-intensive assets as the economy transitions to a lower-carbon-emitting state. It also delays investments in the low-carbon infrastructure needed to achieve climate targets.

Risks to financial stability from climate change have two dimensions—physical and transitional. The value of financial assets or liabilities could be affected by:

- the actual or expected economic effects of continued climate change (physical)
- an adjustment toward a low-carbon economy (transitional)

Physical risks refer to the direct financial damages associated with increases in average global temperatures and changes in weather patterns. Climate change exposes people and assets to more frequent and intense weather events. For example, weather-related disasters such as forest fires can result in direct damage to infrastructure assets, and classification of an area as a floodplain can affect real estate values. When natural disasters strike households with high financial vulnerability, the effects on the financial system can be amplified (see **Box 4**).

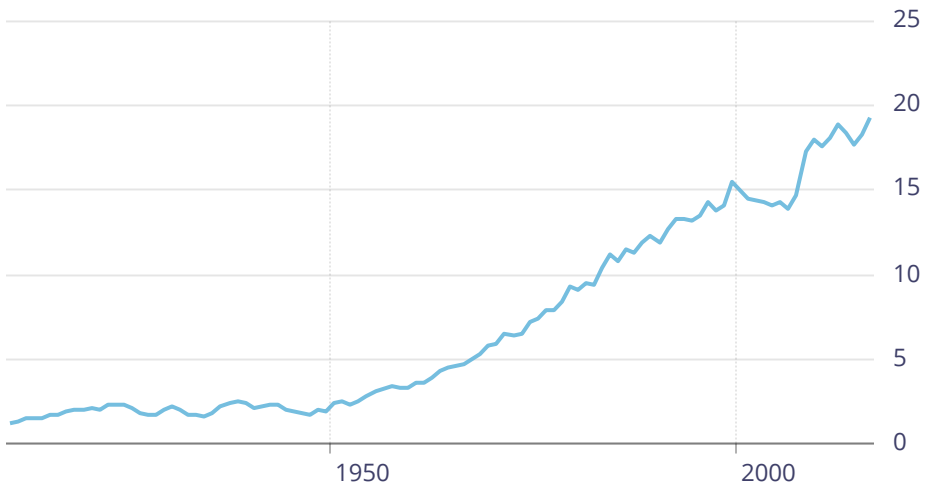
Transition risks arise in the financial system as it adapts to a low-carbon economy and changes in climate policy and regulation, technology, and consumer and investor attitudes. Such changes, if unanticipated, can cause a sudden revaluation of assets and reassessment of projected earnings, both in carbon-intensive sectors and in sectors connected to them through supply chains. This abrupt asset repricing could have large implications for a wide range of financial institutions that have significant exposures to these sectors.

Box 4: Assessing the intersection between household financial vulnerabilities and physical climate risks

Natural disasters related to climate change happen more frequently than in the past (**Chart 4-A**). These events can trigger financial distress among households that are affected severely. For example, following the 2016 wildfires in Fort McMurray, Alberta, the share of borrowers falling behind on their mortgage payments rose sharply.[43] Studying the intersection between household financial vulnerabilities and severe weather events is therefore an important step toward evaluating the resilience of the financial system to physical climate risks.[44]

Chart 4-A: The frequency of natural disaster events has increased over time

Number of natural disasters registered across Canada, 10-year moving average



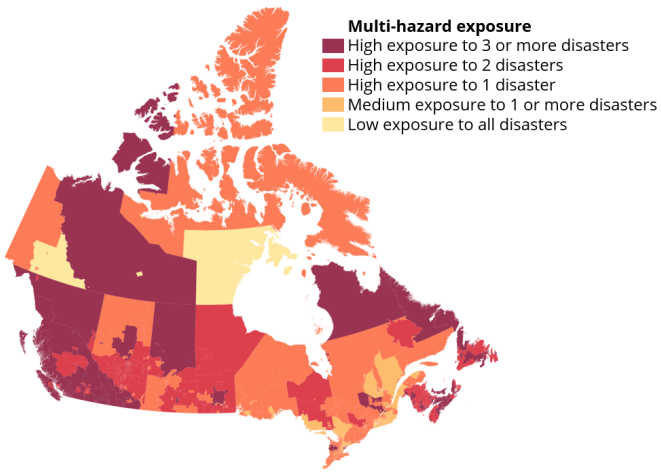
Note: Some of the increase in the number of natural disasters over time likely reflects more systematic reporting and better measurement by authorities.
Sources: Canadian Disaster Database and Bank of Canada calculations

Last observation: 2016

We use historical data from the Canadian Disaster Database (Public Safety Canada) to identify areas most exposed to natural disasters. These data allow us to map 15 types of disasters that occurred between 1900 and 2016 to forward sortation areas (FSAs).[45] We then construct a multi-hazard exposure index to classify FSAs based on exposure across all 15 types of disasters (**Figure 4-A**).

Figure 4-A: Exposure to different types of natural disasters varies by region across Canada

Multi-hazard exposure index, by forward sortation area



Source: The Canadian Disaster Database and Bank of Canada calculations

▶ ⇨ Description: Exposure to different types of natural disasters varies by region across Canada

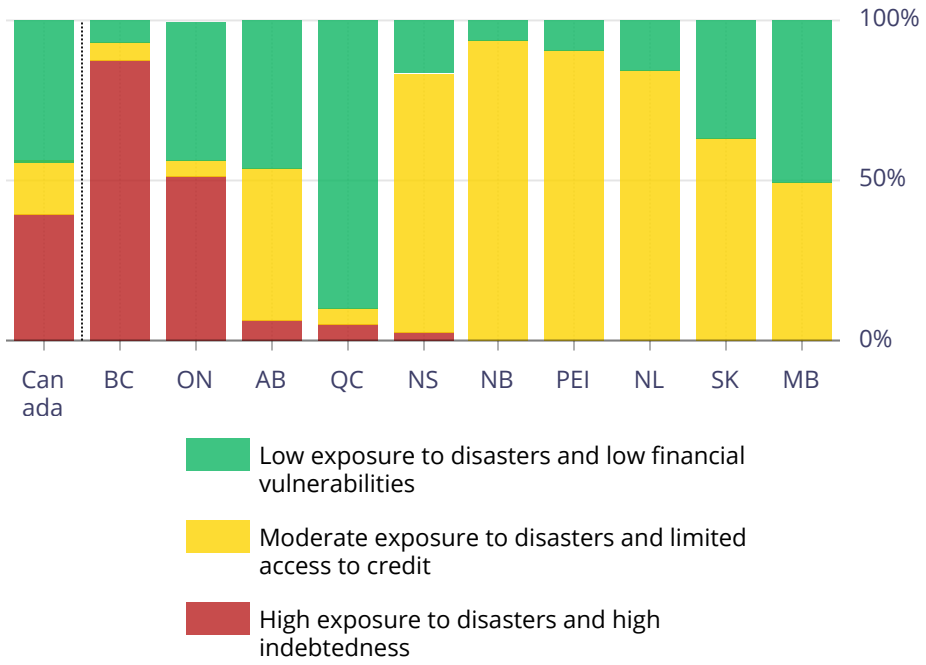
An unsupervised machine learning algorithm then sorts FSAs into distinct groups based on different combinations of financial vulnerabilities and multi-hazard exposure to natural disasters. The algorithm identifies three groups:

- **High exposure to natural disasters and high household indebtedness.** Physical destruction of assets in these FSAs would likely lead to larger financial system losses. These FSAs account for 39 percent of household debt in Canada and are mainly located in British Columbia and Ontario (**Chart 4-B**). This largely reflects the higher house prices in these regions.
- **Moderate exposure to natural disasters and reduced access to credit.** Households in these FSAs may have relatively limited ability to cope with a sudden disruption to their incomes due to credit constraints. They hold 17 percent of aggregate debt and tend to be in the Prairies and Atlantic provinces.
- **Low exposure to natural disasters and low financial vulnerability.** This group accounts for about 44 percent of household debt. Households in this group are primarily located in Quebec and, to a lesser extent, in Ontario and the Prairies.

These different combinations of disaster exposure and financial vulnerabilities could have implications for how natural disasters affect the economy and the financial system as well as for the appropriate policy responses.

Chart 4-B: Households vulnerable to both natural disasters and financial stress hold a large portion of household debt, particularly in British Columbia and Ontario

Household debt with varied exposures to natural disaster and financial vulnerabilities as a share of national and provincial household debt



Sources: Canadian Disaster Database, TransUnion and Bank of Canada calculations
Last observation: 2020Q3

Financial system participants need better information to appropriately assess and price physical risks and support the smooth transition to a low-carbon economy. The financial system plays a critical role in supporting the achievement of global climate targets. Many of the investments and innovations that will promote the transition to a low-carbon economy are capital-intensive, requiring the financial system to efficiently direct capital to the most promising sustainable investments.

To appropriately price assets exposed to climate-related risks and support the shift to a low-carbon economy, financial system participants need—and are increasingly demanding—better information. They require climate-data analysis combined with economic and financial information to guide their decision making. This data gap can be filled only if globally consistent standards for disclosure of climate-related financial risk are developed and widely adopted.[46] This will ensure that companies reliably, consistently and comparably measure and report their climate change exposures.

There is renewed momentum among governments and investors to address climate change. Nearly every nation has joined the Paris Agreement, with the goal of substantially reducing global greenhouse gas emissions. They also aim to cap global warming in this century to 2 degrees Celsius while pursuing the means to limit the increase even further to 1.5 degrees.[47] Canada and the United States have recently strengthened their pledges by joining a coalition of more than 100 countries committed to making their economies achieve net zero emissions by 2050.[48]

The investment decisions of financial market participants are increasingly informed by climate change considerations. Some investors are divesting from carbon-intensive assets altogether, while others are taking an advocacy approach and increasingly integrating environmental, social and governance (ESG) considerations into their investment portfolios. For instance, large asset managers (including Canada's eight largest pension funds) are encouraging ESG disclosure from the companies they invest in.[49] The flow of money into ESG funds globally in 2020 was roughly double that of 2019, which was about triple that of 2018. Canadian bond ESG issuance is also growing rapidly, going from less than $2 billion in 2017 to about $13 billion in 2020. However, this remains far short of what will be needed to fund the transition to net zero emissions by 2050.

Addressing climate change sooner will result in lower risk overall. The current global momentum to address climate change can have different impacts depending on the time horizon. Over the short term, a clearer definition of the ultimate goal and credible commitments to achieve it could mean that some transition risks materialize earlier than expected under the status quo. In particular, prices for certain assets tied to carbon-intensive industries could decline sooner than anticipated. Over a longer period, however, taking earlier action on climate change creates a smoother and more certain transition path, thereby reducing transition risks overall.

Acting now has a number of advantages for the economy and the financial system over the medium to long term:[50]

- It contributes to reducing both physical damages and risks.
- It avoids the need for more abrupt climate action to meet target deadlines later on, which would imply large transition risks in the future.
- It allows more time for new technologies to enter the market in response to price signals.

In sum, earlier action can lead to a more orderly and less costly transition to a low-carbon economy.

Find out what the Bank is doing to help improve the understanding, measurement and transparency of climate-related risks.

Cryptoassets

The popularity of cryptoassets has continued to increase over the past year. Their market capitalization has risen from about US$200 billion at the start of 2020 to more than US$2 trillion in May 2021.[51] Cryptoassets have become more accessible to investors in recent years with the arrival in Canada of closed-end funds and listed companies dealing in or mining cryptoassets. Over the past year, crypto exchange-traded funds have also emerged. These securities allow investors to access Bitcoin, Ethereum and other cryptoassets without having to hold or trade them directly. However, while these investments have received much attention from the media, their footprint remains small relative to the size of the financial market. In addition, price volatility stemming from speculative demand remains an important obstacle to the wide acceptance of cryptoassets as a means of payment. Despite the broadening institutional interest in cryptoassets, they continue to be considered high risk because their intrinsic value is hard to establish.

Among cryptoassets, stablecoins have emerged as a potential solution to price volatility.[52] Stablecoins are typically backed by a basket of assets, such as national currencies or traditional financial assets.[53] From a financial stability perspective, the less volatile nature of stablecoins could make them more suitable for use as a means of payment and store of value. But stablecoins still share some of the same risks as other cryptoassets. Notably, unless stablecoins are backed exclusively by Canadian dollars, their widespread adoption could inhibit the Bank's ability to implement monetary policy and act as lender of last resort.

The rapid evolution in cryptoasset markets is an emerging financial vulnerability. Despite their growing popularity, these markets are not of systemic importance in Canada, neither as an asset class nor as a payment instrument. But this could change if a large technology firm—a so-called Big Tech—with a sizable user base decided to issue a cryptocurrency that became widely accepted as a means of payment.

The regulatory response is taking form, but challenges remain. At this time, key regulatory challenges associated with cryptoassets include investor protection issues related to cryptoasset trading platforms and the use of cryptoassets in illicit transactions. The classification of cryptoassets and corresponding regulatory responses are also a challenge, given cryptoassets' unique features and the rapid pace at which they evolve.

In the context of its fight against money laundering and terrorist financing, the Financial Transactions and Reports Analysis Centre of Canada has issued new regulations and guidance for the treatment of cryptoassets and virtual asset service providers.[54] Some of these changes came into effect in June 2020 with further requirements starting in June 2021. In addition, the Canadian provincial securities commissions have clarified rules for trading platforms deemed to be dealing in cryptoassets that are securities.[55]

Risks and resilience

- The Canadian financial system has proved to be resilient during the global pandemic, thanks to a well-capitalized banking sector and unprecedented policy support.
- However, the vulnerabilities identified in this report, combined with elevated pandemic-related uncertainty, pose both short- and long-term risks. A large shock—for instance, one that could lead to a large decline in household income and house prices or to a global repricing of risk—could interact with these vulnerabilities and significantly impact the economic recovery from the pandemic.
- Despite these vulnerabilities, financial system participants remain confident in the resilience of the Canadian financial system. In addition, Bank staff analysis indicates that it would take a very large and persistent economic shock to impair lending from systemically important banks. Therefore, vulnerabilities are primarily macrofinancial in nature. This means that the repercussions of a trigger event would adversely affect the real economy through financial linkages even if the banking system remained solvent.

The financial system has played its role of shock absorber during the pandemic. The health crisis posed by COVID-19 has not turned into a financial crisis, mainly because of two factors:

- **Canadian banks were well capitalized going into the pandemic.** This is partly a result of international reforms undertaken after the global financial crisis to increase regulatory capital requirements. It also reflects OSFI's sound regulations and the prudent behaviour exhibited by Canadian financial institutions before and during the pandemic. In this context, systemically important banks can withstand substantial credit loss before breaching regulatory capital requirements; therefore, they have the capacity to continue acting as shock absorbers for the economy.
- **The extraordinary policy measures—fiscal, monetary and prudential—significantly reduced household and business insolvencies.** As a result, it is difficult to view the pandemic as a true test of the resilience of the financial system. Consequently, the vulnerabilities discussed in this report remain sources of concern that could serve to amplify and propagate major shocks hitting the economy in the future.

Analysis of financial system resilience

Bank staff conducted a reverse stress test to assess the amount of macroeconomic disruption needed to significantly impair Canada's banking system. In a traditional stress test, the starting point is the elaboration of a macroeconomic risk scenario that would likely generate stress in the banking system.[56] The next step is to estimate the financial impact of the risk scenario on banks, notably in terms of net interest margins and credit losses. Finally, the overall impact on banks is aggregated to assess the effect on their capital ratios, which are a key measure of overall bank resilience. If capital ratios fall below regulatory minimums, an individual bank, or the banking sector at large, is no longer deemed resilient.

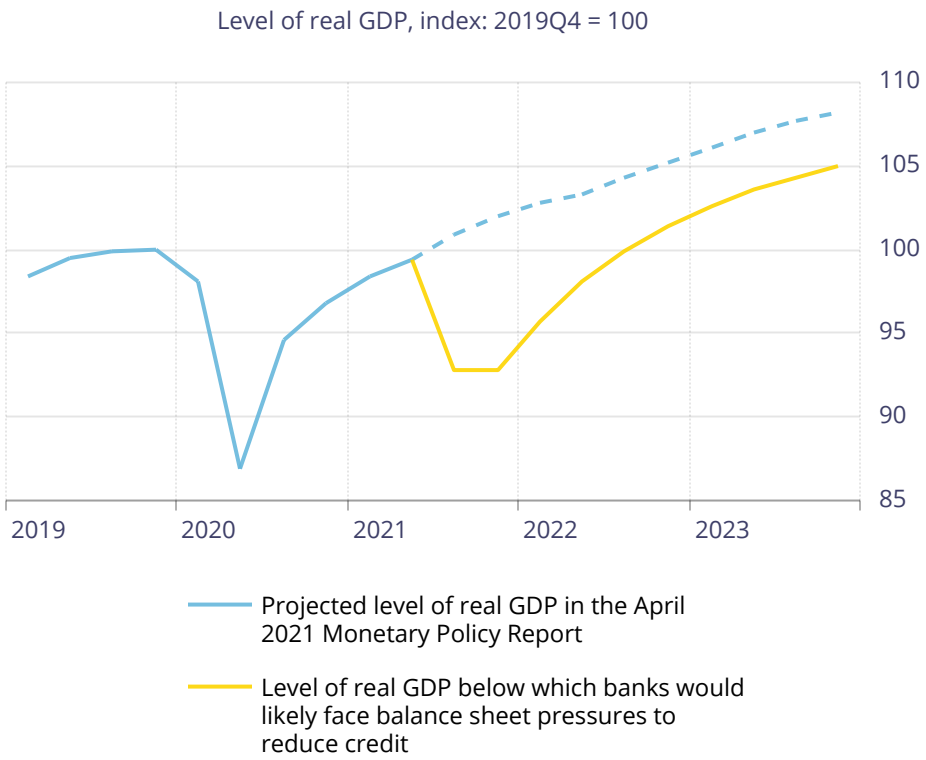
A reverse stress test sets out to answer the opposite question: How big would macroeconomic disruptions have to be to push the capital ratio of banks down to a concerning level? That concerning level of capital is chosen to be the bank capital ratio below which additional credit losses could lead to a disruption of the flow of credit to the economy. For instance, large credit losses could force banks to take defensive measures to protect their capital ratios, thereby reducing lending to riskier firms and households.

The Canadian economy would have to incur a severe shock—more persistent than the one experienced in early 2020—before the capital buffer of domestic systemically important banks (D-SIBs) and their credit supply would be impaired (Chart 16). Credit losses would have to be significantly higher than observed historically for the average D-SIB to reach the concerning level in capital ratios.[57] In particular, cumulative losses over a three-year period would have to be 2.6 times larger than observed during the 2008–09 global financial crisis and 1.7 times larger than during the recession of the early 1990s. In this scenario, the unemployment rate reaches 14.3 percent (i.e., higher than in the second quarter of 2020, when it reached 13.1 percent).

In this scenario, the resilience of D-SIBs depends on several assumptions:

- Governments do not implement additional policy support programs.
- The capital ratio of D-SIBs is reduced due to a compression of net interest margins and market losses.
- D-SIBs are not impacted via significant contagion from the rest of the financial system, for instance, from credit losses by small and medium-sized banks.

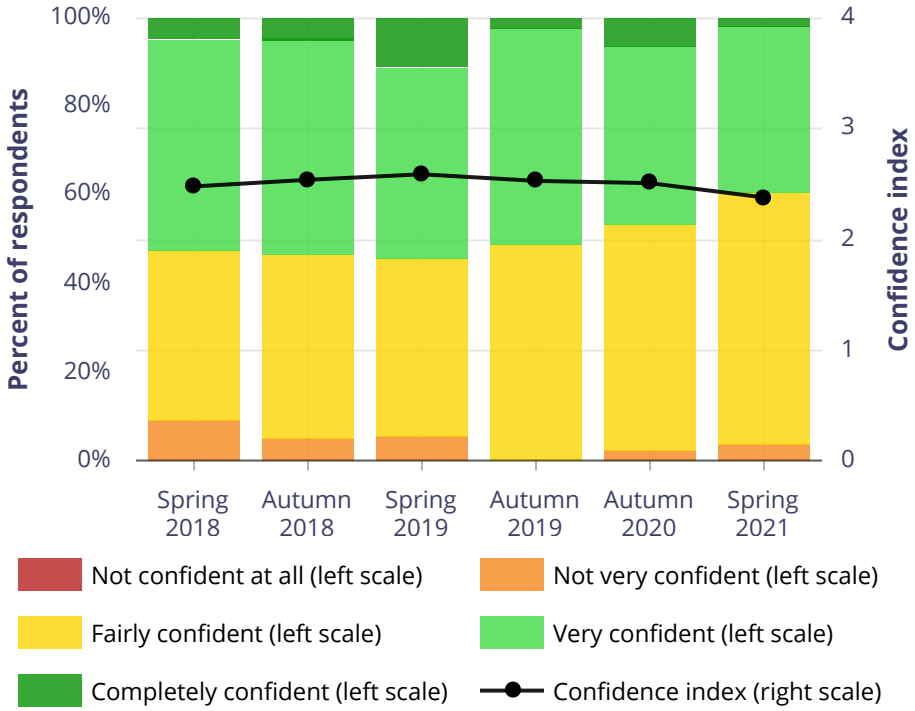
Chart 16: Impairing the bank lending channel would require a large and persistent negative shock to household and business income



Note: For illustration, the chart displays only one possible reverse-stress-test scenario that pushes the leverage ratio of an average domestic sytemically important bank down to 3.5 percent.
Source: Bank of Canada calculations

Market participants remain confident in the resilience of the Canadian financial system. The Bank's most recent Financial System Survey found that 96 percent of respondents are at least fairly confident that the financial system could withstand a severe impact (**Chart 17**).

Chart 17: Market participants remain confident in the resilience of the Canadian financial system



Note: Confidence index weights: not confident at all: 0 points; not very confident: 1 point; fairly confident: 2 points; very confident: 3 points; completely confident: 4 points. The Bank did not conduct the Financial System Survey in spring 2020 because of the COVID-19 pandemic.
Source: Bank of Canada Financial System Survey Last observation: spring 2021

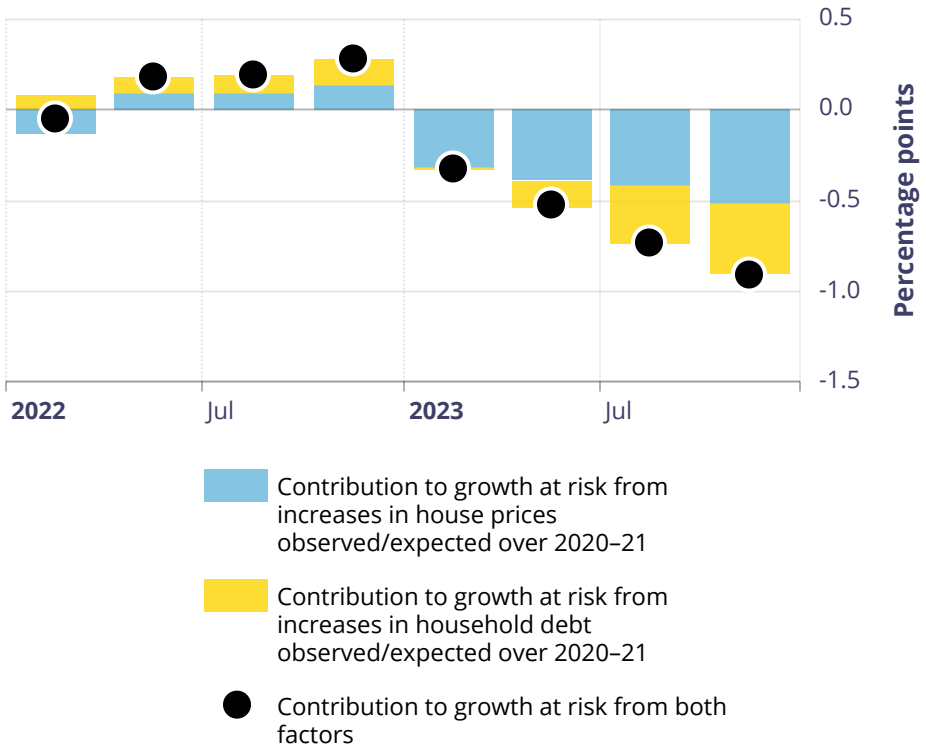
Growth at risk

The growth-at-risk framework evaluates the impact of aggregate macrofinancial risks on future economic growth. Specifically, growth at risk quantifies downside risks to the economy by estimating the rate of future GDP growth that should be exceeded in all but the worst 5 percent of outcomes.[58] This calculation does not depend on any specific risk scenario. Rather, it accounts for the effects of financial vulnerabilities and financial market stress on GDP growth outcomes based on the economic shocks typically observed in the past. Because it relies on statistical analysis of aggregate cross-country indicators, growth at risk does not fully capture the evolution of all financial system vulnerabilities discussed above.

Current financial system vulnerabilities increase the downside risk to future GDP growth. The robust growth in household credit and house prices observed since the beginning of the pandemic supports short-term growth. But it also contributes to a worsening of growth at risk in the medium term (**Chart 18**). In particular, by 2023, financial vulnerabilities reduce the expected GDP growth rate and tilt the risks to the downside (**Chart 19**).

Chart 18: Strong growth in debt and house prices over 2020–21 increases downside risks to GDP growth in 2023

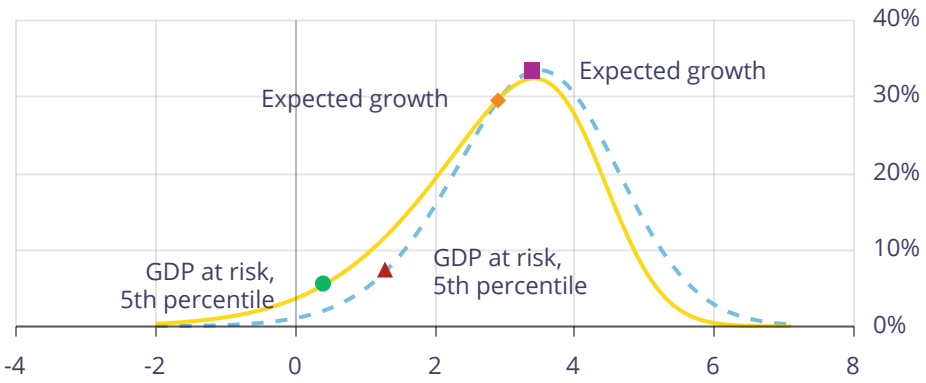
Contributions to the forecast of the 5th percentile of real GDP growth (year-over-year percentage change), based on the projection scenario in the April 2021 Monetary Policy Report



Source: Bank of Canada calculations

Chart 19: Elevated housing activity and household debt worsen growth at risk over the medium term

Density of year-over-year change in real GDP growth in 2023Q4, percent



Year-over-year change in real GDP growth in 2023Q4, percent

Counterfactual: excluding the effect of household debt and house price growth observed/expected over 2020–21

Projection for 2023Q4 given observed/expected 2020–21 data

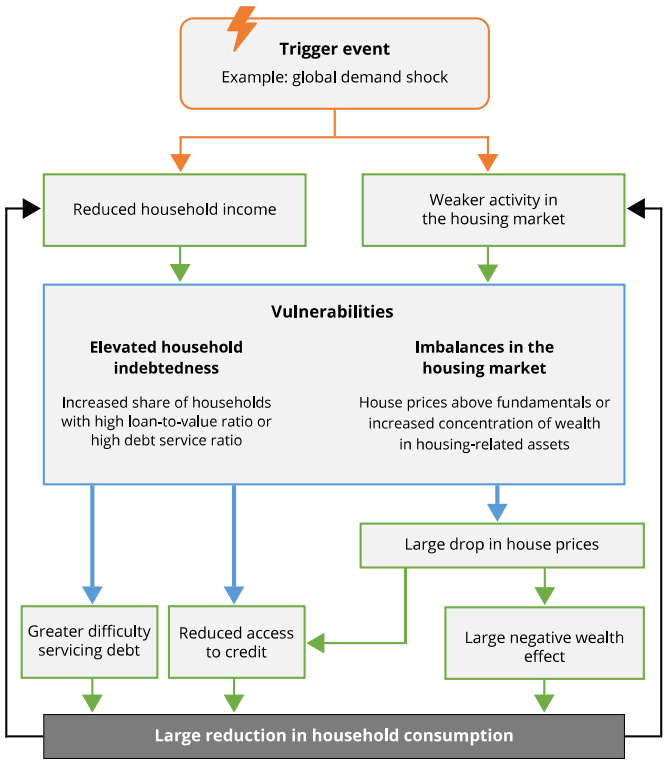
Source: Bank of Canada calculations

Risks and financial stability

A large decline in household income and house prices

An adverse shock to the Canadian economy would make it more difficult for households to service their debt and could also reduce their net worth and their access to credit (**Figure 1**). The impact of such an event would be greater today than in the past because a higher percentage of households now allocate a large share of their disposable income to debt servicing. That leaves them less room to manoeuvre in the face of a negative income shock. Consequently, some households would have to liquidate assets or reduce their spending significantly, or both.

Figure 1: Transmission channels of a large decline in household income and house prices



▶ ⇨ Description: Transmission channels of a large decline in household income and house prices

The rise in mortgage debt in Canada has contributed to and been influenced by higher house prices. Rising house prices mean that over time the average weight of housing in households' total assets has increased, from 36 percent in 2000 to just under 42 percent in 2020. The increase in the concentration of housing assets on households' balance sheets means that household net worth would decline by more if house prices fell, thereby requiring a large reduction in consumption to restore it. This is particularly relevant for highly indebted households who hold a higher than average share of their assets in housing. In addition, high debt levels have made debt service ratios much more sensitive to rising mortgage rates, making households more vulnerable at renewal time.

A decline in house prices would reduce households' access to credit. With their house serving as collateral, households can access credit during periods of economic stress through vehicles such as mortgage refinancing and home equity lines of credit. A significant drop in house prices would impair the ability of households to use such credit vehicles, meaning consumption would have to adjust by more than otherwise. The reduction in prices would likely be larger in markets experiencing extrapolative expectations, further compounding the negative wealth and collateral channels.

A housing market correction could occur without an external trigger. Recent increases in housing market imbalances, including rapid price increases, have been driven in part by forces that may not persist. The shift in consumer preferences toward larger, suburban homes could partially reverse after the pandemic. Also, low mortgage rates have increased demand and may have pulled forward some activity. In effect, housing transactions that would have normally occurred in the future are instead occurring now, which means that future demand could be lower. Finally, a slowdown in housing market activity could spark a large drop in prices if valuations are out of line with fundamentals.

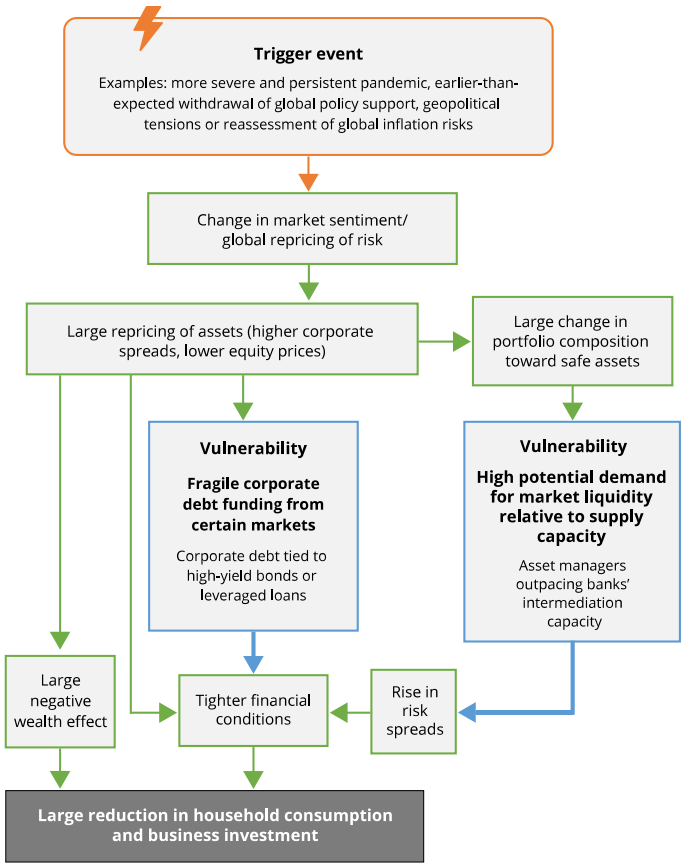
Vulnerabilities associated with households and the housing market are macrofinancial in nature. Thus, the repercussions of a trigger event would adversely affect both the real economy and the financial sector. Compared with previous issues of the *Financial System Review*, the focus of this report on macrofinancial effects represents a broader view of financial system vulnerabilities, incorporating risks to both borrowers and lenders. D-SIBs in Canada are required to maintain large capital and liquidity buffers to protect themselves and the financial system from economic downturns. As illustrated by the reverse stress test, they can absorb a significant amount of losses on their loan books before breaching capital regulatory requirements. Therefore, household debt and housing market vulnerabilities pose the risk that banks could incur capital losses and tighten their lending conditions, but they do not pose a significant systemic threat to bank solvency.

A global repricing of risk

A global repricing of risk assets would imply worsening global financial conditions (**Figure 2**). In recent years, investors have engaged in a global search for yield. They have moved a portion of their portfolios to equity, corporate debt and other types of assets—including by shifting toward the less liquid segments of these riskier asset classes—that typically generate higher yields. This search for yield has intensified since the middle of 2020 because yields on benchmark government securities are near historical lows. In this context, financial conditions could tighten considerably if a trigger event led to a global repricing of risk. Trigger events could include a more severe and persistent pandemic, an earlier-than-expected withdrawal of global policy support, or geopolitical tensions. It is also possible that a reassessment of global inflation risks could trigger a repricing of assets globally.

A sharp tightening of financial conditions would also affect banks' funding and therefore both their capacity to lend and the prices at which they lend to households and businesses. In aggregate, the higher financing costs would restrain both consumer spending and investment by firms. This is especially true for highly indebted households and firms. Their high levels of debt mean that higher interest rates would have a larger effect on their debt service ratios now than in the past.

Figure 2: Transmission channels of a global repricing of risk



▶ ⇨ Description: Transmission channels of a global repricing of risk

Existing financial vulnerabilities would amplify the impact on the economy of a large repricing of financial assets. As mentioned, a non-negligible portion of debt from businesses is tied to riskier forms of financing, such as high-yield corporate bonds and leveraged loans. These risk assets are vulnerable to a large global repricing and access constraints. If these occurred, firms relying primarily on these funding sources would then experience a large increase in their financing costs and would face difficulties issuing new debt or replacing maturing debt since few alternative sources of funding are available. Businesses in commodity-related industries are particularly vulnerable because of their reliance on these markets. A trigger event that significantly reduced the global demand for commodities could lead to credit downgrades in this sector, thereby compounding the funding challenges for firms relying on these markets. Finally, a repricing of assets exposed to climate-related risks could also cause an increase in financing costs for corporations in carbon-intensive sectors.

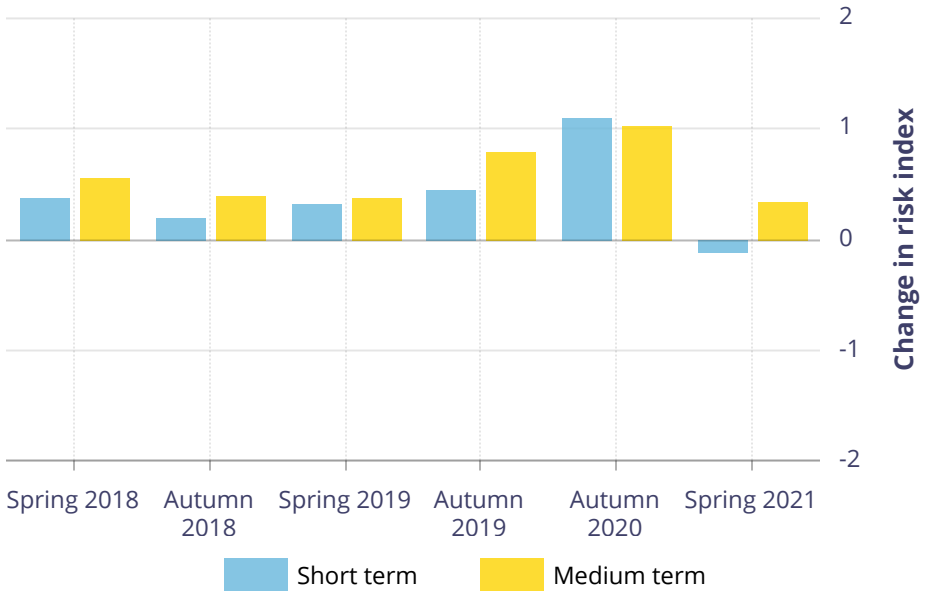
Similarly, the change in risk sentiment could lead to a spike in the demand for safe assets, such as Government of Canada treasury bills and bonds. Given the structural imbalance in market liquidity between banks' supply and asset managers' potential demand, a sudden increase in demand for market liquidity could impair market functioning and trigger another liquidity crunch. The increase in the liquidity premium would also directly hurt firms relying on market funding and indirectly impact them through higher bank financing costs.

Market views of risks

The Bank solicits the views of financial system participants through its Financial System Survey. The survey results are a useful benchmark to compare Bank views and analytical work with outside opinions. The survey also provides information in areas where the Bank has limited data or experience and helps identify new topics for analysis.

Despite higher perceptions of risk in the medium term, market participants remain confident in the resilience of the financial system.[59] The overall perception of short-term risk (less than one year) relative to the autumn 2020 Financial System Survey edged lower. Respondents attributed this mostly to the rollout of COVID-19 vaccination programs combined with ongoing monetary and fiscal policy support (**Chart 20**). The perception of risk in the medium term (one to three years) increased, though it has declined markedly from the previous survey and is at its lowest level since our surveys began in 2018. Participants cited as reasons uncertainty surrounding the withdrawal of monetary and fiscal policy support and reduced flexibility for policy-makers to respond to future shocks.

Chart 20: Market participants report that medium-term risk has risen, though by less than it had in autumn 2020



Note: Results are in response to the Financial System Survey question: "In your view, has the probability that an event with the potential to severely impair the functioning of the Canadian financial system will occur in the short term (0–12 months) and medium term (1–3 years) increased, decreased or remained the same compared with six months ago?" Change-in-risk index weights: decreased materially: -2 points; decreased slightly: -1 point; remained unchanged: 0 points; increased slightly: 1 point; increased materially: 2 points. The Bank did not conduct the Financial System Survey in spring 2020 because of the COVID-19 pandemic.
Source: Bank of Canada Financial System Survey Last observation: spring 2021

Safeguarding the financial system

» The Bank of Canada collaborates closely with domestic and international partners, both private and public, to improve the resilience of the financial system.

Domestically, the Bank is actively involved with federal and provincial authorities on issues pertaining to the financial system. The Bank chairs the **Heads of Regulatory Agencies** (HoA) and its **Systemic Risk Surveillance Committee** (SRSC), two federal-provincial forums for cooperation on financial sector issues (**Box 5**). The SRSC's work contributes directly to the Bank's assessment of the financial system that is published in the annual *Financial System Review*. The Bank also collaborates with federal, provincial and international authorities as well as industry through **financial system committees** to achieve its financial system goals. In particular, the Bank participates actively in the **Senior Advisory Committee** (SAC) and the **Financial Institutions Supervisory Committee** (FISC).

Internationally, the Bank contributes to discussions on financial system issues. Through many committees and working groups, the Bank regularly collaborates and shares information with other central banks, the IMF, the World Bank, the Financial Stability Board, G7 and G20 members, and the Bank for International Settlements.

Box 5: Activities of the Heads of Regulatory Agencies and the Systemic Risk Surveillance Committee over the past year

The **Heads of Regulatory Agencies (HoA)** is an important federal-provincial forum for cooperation on financial sector issues. Chaired by the Bank of Canada, the HoA brings together the Department of Finance Canada, the Office of the Superintendent of Financial Institutions, the Autorité des marchés financiers, the Ontario Securities Commission, the British Columbia Securities Commission and the Alberta Securities Commission. Its **Systemic Risk Surveillance Committee (SRSC)** facilitates information sharing and collaboration on the assessment of vulnerabilities and risks to the Canadian financial system. This committee includes all agencies that participate in HoA as well as the Canada Mortgage and Housing Corporation, the Canada Deposit Insurance Corporation, the BC Financial Services Authority and the Financial Services Regulatory Authority of Ontario.

Over the past year, the HoA and SRSC have discussed important financial system topics, including:

- vulnerabilities associated with the **housing market and household debt**
- **consumer protection** regimes and issues that affect consumer confidence
- **cryptoasset and stablecoin** developments and regulatory coverage
- **cyber resilience** of the financial sector and contingency planning
- trends in and exposures to the **commercial real estate** industry
- trends in **business insolvencies**
- Canadian and international policy work on **climate change and sustainable finance**
- **market liquidity issues** in fixed-income markets

The Bank continues to prioritize the following work with partners to improve the resilience of the financial system.

Household debt and housing market imbalances

The minimum qualifying interest rate proposed by OSFI will make the financial system more resilient. On April 8, 2021, OSFI announced it was restarting its consultation process on the minimum qualifying rate used in stress tests on uninsured mortgages by federally regulated financial institutions.[60] The new proposed qualifying rate, which could be effective starting June 1, 2021, is the higher of the mortgage contract rate plus 2 percentage points, or 5.25 percent.[61] In the current environment of very low interest rates, there is a greater likelihood that rates will rise in the future. This exposes households to the risk of higher debt service costs at renewal time. The more stringent qualification criterion would help to ensure that households are able to absorb these higher costs, protecting both the borrower and the lender.

Some recently announced budget measures should help reduce imbalances in the housing market. In particular, the federal government's proposal to tax vacant properties owned by non-residents would increase the supply of rental units and homes for sale. Similarly, investments in affordable housing would boost housing supply. These measures, along with the increase in the qualifying rate for the mortgage stress test, would better align housing supply and demand, which could help to moderate house price increases.

The Bank contributes to financial stability by helping to increase awareness about ongoing and emerging risks related to household finances and the housing market. Through the ***Financial System Review***, the **Financial System Hub** and speeches, the Bank shares pertinent research and analysis, drawing insights to help households, lenders and policy-makers better identify and mitigate risks. The Bank also actively engages in dialogue and information sharing with various federal and provincial authorities through committees such as the SAC and HoA, at both working-group and senior levels.

Financial market functioning

The Bank is contributing analysis to the international work plan and assessing domestic policy options to improve the resilience of fixed-income market liquidity. Market liquidity will be on the domestic and international agendas for the foreseeable future. The Financial Stability Board has developed a comprehensive work plan to enhance the resilience of the NBFI sector and the liquidity of core funding markets.[62] Canadian authorities are engaged in those efforts. Like other central banks, the Bank is considering how it might intervene in future crises and which counterparties would have direct access to its facilities.[63] As the Bank assesses a range of potential policy options, it will engage with market participants.

The Bank is working with important stakeholders in the Canadian financial system to improve the robustness and reliability of key Canadian interest rate benchmarks. Interest rate benchmarks are used globally to set payments for hundreds of trillions of dollars of financial contracts, such as variable-rate loans and derivatives. Authorities from across the globe have been working with market participants to reform these benchmarks and to transition markets from survey-based rates to rates with robust transaction-based calculation methodologies. With the announced end to the London Interbank Offered Rate (LIBOR), most actively traded global financial products, especially derivatives, are expected to transition to reference overnight risk-free rates.

The Bank has been heavily involved in work to reform Canada's key benchmarks, led by the **Canadian Alternative Reference Rate Working Group** (CARR), which was established in 2018 by the **Canadian Fixed-Income Forum**. CARR is focused on reviewing and improving two key benchmarks that are based on the Canadian dollar:

- **The Canadian Overnight Repo Rate Average (CORRA)** is a transaction-based overnight risk-free interest rate benchmark that represents the general secured overnight cost of funding for Government of Canada collateral. It is used primarily as the reference rate in several trillion dollars of overnight index swaps. CARR enhanced the calculation methodology of CORRA to reflect a wider range of transactions, making it more robust and representative of the entire market. The Bank took over the calculation and publication of CORRA in June 2020 and started publishing the CORRA Compounded Index in April 2021.[64, 65]

- **The Canadian Dollar Offered Rate (CDOR)** is the survey-based credit-sensitive term interest rate benchmark for financial products denominated in Canadian dollars. It represents the rate at which banks are willing to lend to clients with existing credit agreements through bankers' acceptances. Since CDOR relies on surveys, it is subject to the same manipulation and discontinuation risks that LIBOR faced. To ensure a smooth transition, market participants are encouraged to have robust fallbacks for CDOR. CARR has worked with the International Swaps and Derivatives Association (ISDA) to include CDOR in ISDA's recently released robust derivatives fallbacks. CARR has also developed and consulted on robust fallback language for floating rate notes that refer to CDOR. Finally, CARR is reviewing the efficacy of CDOR as a benchmark.

Cyber threats

The Bank's 2019–21 **Cyber Security Strategy** has been the foundation for its work on cyber threats over the past three years. The strategy focuses on enhancing the security of the Bank's own operations, collaborating with external partners to improve resilience and promoting robust cyber security standards within the financial sector.

Many of the cyber security initiatives the Bank leads are taking place through the **Canadian Financial Sector Resiliency Group** (CFRG). The CFRG is a public-private partnership the Bank launched in 2019. It brings together Canada's systemically important financial institutions, financial market infrastructures, regulators and federal government departments. The mandate of the CFRG is to coordinate responses to systemic-level operational incidents within the financial sector. The CFRG has developed and put in place an incident response protocol to respond in a coordinated manner to operational events, including cyber incidents. Recent initiatives include:

- **COVID-19 response:** During the first several months of the pandemic, CFRG members held weekly meetings to share operational status updates and discuss emerging issues, such as essential services designations and cyber threats. The CFRG also facilitated interactions with government bodies, such as Public Safety Canada and the Public Health Agency of Canada, and other critical infrastructure sectors.
- **CFRG simulation exercise**: In March 2021, the CFRG held its first simulation exercise that focused on the industry's reaction to a cyber incident against one of the critical sector participants. The exercise gave CFRG members a chance to practise how they would share information, coordinate their decisions and communicate with each other if this kind of major cyber incident were to occur.
- **Resilience of Wholesale Payments Systems (RWPS) initiative:** The RWPS is a collaboration between the Bank, Canada's largest banks and Payments Canada. To improve the resilience of the Canadian wholesale payments ecosystem, financial sector participants have completed two self-assessments of their wholesale payments system's controls and have agreed to meet standard industry benchmarks.

Climate-related risks

The Bank is supporting the financial sector to identify, understand and disclose its climate exposures through the development of scenario-based approaches. As part of a domestic pilot project, the Bank and OSFI have developed financial risk assessment methodologies and a set of Canada-specific climate scenarios that six participating financial institutions will apply to assess their portfolio exposures.[66] Earlier in May, the Bank and the Global Risk Institute hosted a webinar with a broad range of financial sector stakeholders to share the knowledge gained from the pilot thus far. This summer, the Bank and OSFI will conduct a survey of the wider financial sector to examine the feasibility and challenges of broader adoption of the pilot's methodologies. A final report on the pilot project, including the findings from the financial sector questionnaire, will be published toward the end of 2021.

Given the global nature of climate change, the Bank continues to be actively involved in the climate work of a variety of international bodies. The Bank was appointed to the steering committee for the international Network for Greening the Financial System (NGFS). Over the past year, Bank staff have made important contributions within the NGFS to promote a scenario-based approach to disclosures of climate-related risks.[67]

The Bank is also taking steps to reduce its own carbon footprint. Information on other initiatives the Bank has underway in the area of climate change is available in the Bank's **2020 Annual Report**.

Innovations in Canada's payment systems

Safe and robust payment systems are crucial to overall financial stability.[68] They enable consumers, businesses and government organizations to safely and efficiently purchase goods and services, make financial investments and transfer funds.

Payments Canada continues to move forward on two initiatives to modernize Canada's core payment systems.[69] The Bank is actively involved because it intends to oversee these systems after their launch.

- **Lynx**: The new large-value payment system is scheduled to be launched in the third quarter of 2021. It will be technologically advanced and highly resilient, and it will incorporate an enhanced risk model.
- **Real-Time Rail**: The new retail payments infrastructure will support instant payments for individuals and businesses. Its launch is targeted for September 2022.

The Bank continues to prepare for its new role supervising retail payment service providers.[70] The federal government has proposed a new retail payments supervision framework. Under the framework, the Bank would supervise payment service providers to ensure they comply with the requirements for operational risk management and fund safeguarding. In preparation for these new responsibilities, the Bank held discussions with industry representatives throughout 2020 to gather industry expertise about the retail payments landscape. The Bank will continue its industry engagement efforts as it works to design and implement this new supervisory framework.

Endnotes

Footnotes

1. Recent staff analysis finds that in Canada, the rise in market valuations between September 2020 and March 2021 can be attributed to improved earnings forecasts. See G. Ouellet Leblanc, J.-S. Fontaine and R. Shotlander, "**What Cured the TSX Equity Index after COVID-19?**" Bank of Canada Staff Analytical Note No. 2021-3 (March 2021).[←]

2. See International Monetary Fund, ***Global Financial Stability Report: Preempting a Legacy of Vulnerabilities*** (April 2021).[←]

3. See International Monetary Fund, ***World Economic Outlook: Managing Divergent Recoveries*** (April 2021).[←]

4. See International Monetary Fund, ***Fiscal Monitor: A Fair Shot*** (April 2021).[←]

5. For example, in the 2020 ***Financial System Review***, the Bank highlighted how a pessimistic economic scenario with no policy support could play out for households. In such a scenario, the share of households falling behind on mortgage payments could increase substantially.[←]

6. Liquid assets are the sum of deposits at financial institutions and balances in tax-free savings accounts and non-registered investment accounts. The proportions noted here are derived from Statistics Canada's 2016 Survey of Financial Security.[←]

7. For more information on the increase in household savings during the pandemic, see L. Schembri, "**COVID-19, Savings and Household Spending**" (speech delivered virtually to Restaurants Canada, Toronto, March 11, 2021).[←]

8. See G. Vallée, "**Monitoring Payment Deferrals During the COVID-19 Pandemic—Update, March 2021**," Bank of Canada (May 2021).[←]

9. To protect the privacy of Canadians, no personal information was provided to the Bank by TransUnion. The TransUnion dataset was "anonymized," meaning that it does not include information that identifies individual Canadians, such as names, social insurance numbers or addresses. In addition, the dataset has a panel structure, which uses fictitious account and consumer numbers assigned by TransUnion.[←]

10. In addition to debt levels, empirical evidence using cross-country analysis shows that periods of very rapid growth in credit tend to precede periods of financial stress. See M. Schularick and A. M. Taylor. "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870–2008," *American Economic Review* 102, no. 2 (2012): 1029–1061.[←]

11. In April 2021, the Bank received new custom data tabulations from Statistics Canada's 2016 Survey of Financial Security that confirm that the quality of household debt improved between 2016 and 2019. The share of households with a total debt-to-income ratio of 350 percent or more declined modestly from 15.7 percent in 2016 to 15.2 percent in 2019. When analyzing the stock of debt, the Bank considers highly indebted households to be those with a debt-to-income ratio above 350 percent. This is in contrast to flow data (new debt originations), for which we define the vulnerability as a loan-to-income ratio greater than 450 percent.[←]

12. The ratio of household debt to disposable income has decreased since the beginning of the pandemic. Disposable income growth has been robust given the unprecedented policy actions taken to support income. This aggregate indicator currently distorts the assessment of household leverage. This is because the increase in disposable income is likely driven by households in the lower segment of the income distribution, which tend to be renters. In contrast, the accumulation of mortgage debt likely comes from households in the upper portion of the income distribution.[←]

13. For the US context, see J. Y. Campbell and J. F. Cocco, "A Model of Mortgage Default," *Journal of Finance* 70, no. 4 (August 2015): 1495–1554.[←]

14. More specifically, Bank staff estimate a probit model in which a categorical indicator of financial stress is regressed on various mortgage characteristics, a series of control

variables, and time and location fixed effects. Further details on this analysis will be released in a forthcoming Bank of Canada staff analytical note.[←]

15. The other mortgage and borrower characteristics in the regression are whether the mortgage amortization period is 30 years, the borrower's age, the size of consumer debt payments relative to income, the mortgage rate type and term, the forward sortation area of the borrower, whether the borrower refinanced their mortgage, the lender, and the month and year of the mortgage origination.[←]

16. Uninsured mortgages typically account for most new mortgages issued in Canada. [←]

17. Alternative measures of affordability, such as the debt service ratio (DSR), yield similar results. This is not surprising given the large overlap between households with high LTIs and those with high DSRs. Over time, however, the LTI is likely to be a better through-the-cycle measure of vulnerabilities because it is not directly affected by changes in interest rates. Yet a secular decline in the equilibrium mortgage rate could lead to households being able to sustain higher LTIs without increasing their likelihood of future financial stress.[←]

18. For a more complete discussion of recent housing market dynamics in the context of elevated household debt, see M. Khan, O. Bilyk and M. Ackman, "**Update on Housing Market Imbalances and Household Indebtedness**," Bank of Canada Staff Analytical Note No. 2021-4 (April 2021).[←]

19. Based on Statistics Canada's 2018 Canadian Income Survey, the median after-tax household income among homeowners was $81,200 in 2018. In comparison, it was $43,800 for renters.[←]

20. See Bank of Canada, "Chart 10: Canadians accumulated on average $5,800 in extra savings in 2020," ***Monetary Policy Report*** (April 2021): 20.[←]

21. See Bank of Canada, "Box 4: Drivers of the strength in Canadian housing," ***Monetary Policy Report*** (April 2021): 14–15.[←]

22. Median expectations of growth in house prices from the Bank of Canada's Canadian Survey of Consumer Expectations tend to differ significantly from the growth rates of published indexes of house prices. Therefore, it is more informative to focus on changes in expectations over time than on absolute levels.[←]

23. For more details about this indicator, see U. Emenogu, C. Hommes and M. Khan, "**Detecting Exuberance in House Prices Across Canadian Cities**," Bank of Canada Staff Analytical Note No. 2021-9 (May 2021).[←]

24. Homes bought and resold within 6 months have accounted for about 1 percent of housing transactions at the national level in recent years. This share is around 2 percent for homes bought and resold within 12 months.[←]

25. According to the Canadian Survey on Business Conditions (Statistics Canada), over 60 percent of firms reported their revenues had declined in 2020 from 2019 levels. Nearly one in three businesses registered a decline in revenues of 30 percent or more over the same period.[←]

26. In its **2020 *Financial System Review***, the Bank analyzed what could happen to business loans held on the balance sheets of major banks under a pessimistic risk scenario. Under such a scenario, non-performing loans as a share of total bank loans rose from 1 percent at the end of 2019 to 6 percent when assuming some policy support and to 16 percent without policy support.[←]

27. For a more complete discussion of the business sector during the pandemic, see T. Grieder, M. Khan, J. Ortega and C. Symmers, "**COVID-19's Impact on the Financial Health of Canadian Businesses: An Initial Assessment**," Bank of Canada Staff Analytical Note No. 2021-8 (May 2021).[←]

28. At this point, knowing precisely how the pandemic has affected the business sector is difficult because comprehensive micro datasets detailing the financial health of firms are not yet available. Current data gaps are especially sizable for small and medium-sized enterprises (SMEs). SMEs often disclose financial information only once a year, when they submit their tax files to the government. Therefore, data on SMEs are

available to researchers only in an anonymized format with a substantial lag. Most of the data presented in this section pertain to medium-sized to large enterprises.[←]

29. Earnings in the interest coverage ratio refer to earnings before interest, taxes, depreciation and amortization.[←]

30. The insolvency filings reported here exclude larger companies that have been granted protection under the *Companies' Creditors Arrangement Act*. The Act allows insolvent businesses that owe their creditors more than $5 million the opportunity to restructure their business and financial affairs. In 2020, 60 firms filed under the Act, representing $8.8 billion in total liabilities, up from 38 firms in 2019 ($9.2 billion).[←]

31. For more details, see the ***Financial System Survey Highlights—Spring 2021***.[←]

32. Leveraged loans are high-yield syndicated loans provided to non-financial businesses, typically with non-investment-grade credit ratings. For more details, see Box 3 in the **2019 *Financial System Review***.[←]

33. See "**Bank of Canada Announces the Discontinuation of Market Functioning Programs Introduced During COVID-19**," market notice (March 23, 2021).[←]

34. These structural issues were noted globally. See, for example, Financial Stability Board, ***Holistic Review of the March Market Turmoil*** (November 17, 2020). Stresses manifested themselves somewhat differently around the world because of variations in market structures. For instance, prime money market funds (i.e., MMFs that hold non-government short-term securities) that play a key role in the US and European short-term funding markets experienced significant outflows. Leveraged investors such as hedge funds were also particularly affected in the United States. While MMFs and hedge funds are much smaller players in the Canadian market, Canadian investment funds were not immune to outflows. Open-ended funds, for example, experienced outflows. Some funds that hold less liquid assets had to use liquidity management tools (e.g., fees and gating), and securities regulators gave fund managers additional flexibility to use borrowing to manage liquidity demand from investor redemptions. See G. Ouellet Leblanc and R. Shotlander, "**What COVID-19 Revealed About the Resilience of Bond Funds**," Bank of Canada Staff Analytical Note No. 2020-18 (August 2020).[←]

35. Between 2007 and 2020, Canada's eight largest pension funds' allocation to alternative assets—real estate, private equity and infrastructure—grew from 21 percent to 35 percent. See G. Bédard-Pagé, A. Demers, E. Tuer and M. Tremblay, "**Large Canadian Public Pension Funds: A Financial System Perspective**," Bank of Canada *Financial System Review* (June 2016): 33–38.[←]

36. Between 2007 and 2020, Canadian fixed-income mutual funds' allocation to corporate bonds increased by 17 percentage points, and their allocation to BBB-rated corporate debt increased by 19 percentage points. See R. Arora, G. Bédard-Pagé, G. Ouellet Leblanc and R. Shotlander, "**Bond Funds and Fixed-Income Market Liquidity: A Stress-Testing Approach**," Bank of Canada Technical Report No. 115 (April 2019).[←]

37. For a full retrospective of the stress in fixed-income markets and a discussion of the potential policy implications, see J.-S. Fontaine, C. Garriott, J. Johal, J. Lee and A. Uthemann, "**COVID-19 Crisis: Lessons Learned for Future Policy Research**," Bank of Canada Staff Discussion Paper No. 2021-2 (February 2021).[←]

38. See G. Bédard-Pagé, L. Berger-Soucy, D. Bolduc, A. Demers, J.-P. Dion, M. Pandey and A. Walton, "COVID-19 Crisis: Liquidity Management at Canada's Largest Pension Funds," Bank of Canada Staff Analytical Note (forthcoming).[←]

39. After initially meeting the rising demand for liquidity from investors, albeit at higher prices, dealers reduced the supply of liquidity for Government of Canada securities in the week of March 9. See J.-S. Fontaine, H. Ford and A. Walton, "**COVID-19 and Bond Market Liquidity: Alert, Isolation and Recovery**," Bank of Canada Staff Analytical Note No. 2020-14 (July 2020).[←]

40. McKinsey & Company, "**How COVID-19 Has Pushed Companies over the Technology Tipping Point—And Transformed Business Forever**" (October 2020). [←]

41. This was highlighted notably by Canada's Expert Panel on Sustainable Finance, ***Final Report of the Expert Panel on Sustainable Finance—Mobilizing Finance for Sustainable Growth*** (Gatineau: Environment and Climate Change Canada, June 2019).[←]

42. See M. Carney, "**Breaking the Tragedy of the Horizon—Climate Change and Financial Stability**" (speech to Lloyd's of London, London, England, September 29, 2015).[←]

43. See O. Bilyk, A. T. Y. Ho, M. Khan and G. Vallée, "**Household Indebtedness Risks in the Wake of COVID-19**," Bank of Canada Staff Analytical Note No. 2020-8 (June 2020).[←]

44. Further details on this analysis will be released in a forthcoming Bank of Canada staff analytical note.[←]

45. Forward sortation areas are geographical areas identified by the first three characters of their postal code. There were 1,620 of these areas in the 2016 Census of Population.[←]

46. See International Organization of Securities Commissions (IOSCO), "**IOSCO Sees an Urgent Need for Globally Consistent, Comparable, and Reliable Sustainability Disclosure Standards and Announces Its Priorities and Vision for a Sustainability Standards Board under the IFRS Foundation**," media release (February 24, 2021).[←]

47. See United Nations Framework Convention on Climate Change, "**The Paris Agreement**."[←]

48. See Government of Canada, "**Net-Zero Emissions by 2050**," and The White House, "**FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing US Leadership on Clean Energy Technologies**" (April 2021)[←]

49. On November 25, 2020, managers of the eight largest pension funds in Canada—Alberta Investment Management Corporation, British Columbia Investment Management Corporation, Caisse de dépôt et placement du Québec, Canada Pension Plan Investment Board, Healthcare of Ontario Pension Plan, Ontario Municipal Employees Retirement System, Ontario Teachers' Pension Plan and the Public Sector Pension Investment Board—released a **joint statement** calling for widespread improvement of ESG reporting from Canadian businesses.[←]

50. See E. Ens and C. Johnston, "**Scenario Analysis and the Economic and Financial Risks from Climate Change**," Bank of Canada Staff Discussion Paper No. 2020-3 (May 2020).[←]

51. See "**Today's Cryptocurrency Prices by Market Cap**" from CoinMarketCap.[←]

52. See A. García, B. Lands and D. Yanchus, "**Stablecoin Assessment Framework**," Bank of Canada Staff Discussion Paper No. 2021-6 (April 2021).[←]

53. Less often, stablecoin issuers use automated approaches to maintain the peg. For instance, mathematical algorithms manage the supply of coins, consequently controlling their value relative to the reference asset.[←]

54. ***Regulations Amending the Regulations Amending Certain Regulations Made Under the Proceeds of Crime (Money Laundering) and Terrorist Financing Act*, 2019: SOR/2020-112**[←]

55. See Canadian Securities Administrators and the Investment Industry Regulatory Organization of Canada, "**Guidance for Crypto-Asset Trading Platforms: Compliance with Regulatory Requirements**," Staff Notice 21-329 (March 2021).[←]

56. The stress test embedded in the **2020 *Financial System Review*** rested on the lower bound of the range of scenarios presented in the **April 2020 *Monetary Policy Report***.[←]

57. In this particular scenario, the concerning level of capital is a leverage ratio of 3.5 percent, which is 0.5 percentage points above the regulatory minimum. It would

correspond roughly to a Common Equity Tier 1 (CET1) ratio of 8.7 percent for an average D-SIB.[←]

58. See T. Adrian, N. Boyarchenko and D. Giannone, "**Vulnerable Growth**," *American Economic Review* 109, no. 4 (2019): 1263–1289; and T. Duprey and A. Ueberfeldt, "**Managing GDP Tail Risk**," Bank of Canada Staff Working Paper No. 2020-3 (January 2020).[←]

59. For more detail, see the highlights of the **spring 2021 Financial System Survey**. [←]

60. See Office of the Superintendent of Financial Institutions, "**OSFI Proposes New Minimum Qualifying Rate for Uninsured Mortgages**," press release (April 8, 2021). [←]

61. The current qualifying rate is the greater of the contractual mortgage rate plus 2 percentage points or the benchmark rate published weekly by the Bank of Canada, which acts as the floor. The benchmark rate (five-year conventional mortgage rate) is currently 4.79 percent.[←]

62. See Financial Stability Board, ***Holistic Review of the March Market Turmoil*** (November 2020).[←]

63. See, for example, A. Hauser, "**From Lender of Last Resort to Market Maker of Last Resort via the Dash for Cash: Why Central Banks Need New Tools for Dealing with Market Dysfunction**" (speech to Reuters, London, January 7, 2021) and L. K. Logan, "**Treasury Market Liquidity and Early Lessons from the Pandemic Shock**" (speech to the Brookings-Chicago Booth Task Force on Financial Stability, October 23, 2020).[←]

64. See Bank of Canada, "**Bank of Canada Becomes Administrator of Canadian Overnight Repo Rate Average**," press release (June 15, 2020).[←]

65. See Bank of Canada, "**Bank of Canada to Begin Publishing CORRA Compounded Index**," market notice (April 6, 2021).[←]

66. See Bank of Canada, "**Bank of Canada and OSFI Launch Pilot Project on Climate Risk Scenarios**," press release (November 16, 2020).[←]

67. See, for instance, E. Ens and C. Johnston, "**Scenario Analysis and the Economic and Financial Risks from Climate Change**," Bank of Canada Staff Discussion Paper No. 2020-3 (May 2020).[←]

68. See P. Miller and A. Olivares, "**A Road Map to Payment Systems**," *The Economy, Plain and Simple*, Bank of Canada (July 2020).[←]

69. See Payments Canada, "**Modernization Delivery Roadmap**" (December 2020 update).[←]

70. Find out more information about the Bank of Canada's proposed role in a new framework for retail payments supervision on the Bank's **website**.[←]

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