COVID-19 and Financial Stability: Practice Ahead of Theory

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Acknowledgements

Abstract

The COVID-19 pandemic forced policy-makers to deploy a range of unprecedented measures to support the economy. In this discussion paper, we discuss the outcome of the economic measures implemented in the context of financial stability in Canada. We also present related challenging policy questions that are being tackled by staff at the Bank. These include the uneven impact of the pandemic on households' financial conditions and how it affects the transmission of policy, the challenges associated with setting banks' countercyclical capital buffers, detecting imbalances in a buoyant housing market, and policy coordination challenges.

Topics: Coronavirus disease (COVID-19); Financial stability; Financial system regulation and policies
JEL codes: H3, H84, G21, E61, E58

Résumé

La pandémie de COVID-19 a forcé les autorités à mettre en place une série de mesures exceptionnelles pour soutenir l'économie. Dans cette étude, nous nous intéressons aux effets de ces mesures dans l'optique de la stabilité financière au Canada. Nous présentons également les questions complexes qu'elles soulèvent et auxquelles le personnel de la Banque cherche des réponses, notamment les effets inégaux de la pandémie sur la situation financière des ménages et leur incidence sur la transmission des politiques, les enjeux associés à l'établissement de réserves de fonds propres contracycliques imposées aux banques, la détection de déséquilibres sur des marchés du logement en plein essor et les défis liés à la coordination des politiques.

Sujets : Maladie à coronavirus (COVID-19); Stabilité financière; Réglementation et politiques relatives au système financier
Codes JEL : H3, H84, G21, E61, E58

Introduction

The unprecedented nature of the COVID-19 pandemic forced policy-makers to act quickly and forcefully to contain the spread of the virus and offset the negative economic impact of the public health measures put in place. Although the risk of COVID-19 is still present, the economy is well into the recovery phase, and the time has come to reflect on what we learned from the economic and financial policy response.

In this paper, we first recap how policy-makers in Canada responded. We then highlight unexpected economic developments that contributed to making the COVID-19 crisis unusual and are now raising challenging policy questions related to financial stability. We also present ongoing work by Bank of Canada staff on these policy issues.

What happened and how policy-makers reacted

An unprecedented shock hit the real economy and put financial markets under stress

The COVID-19 shock hit in early 2020. Quickly, borders were closed and lockdowns were put in place to limit the spread of the virus. This led to a massive decline in output globally (**Chart 1**). In Canada, gross domestic product (GDP) fell by 5.3% in 2020, considerably more than the decline of 3% in 2009 during the global financial crisis.

Early in the pandemic, financial markets came under unprecedented stress. The funding costs of Canadian banks spiked in March 2020 (**Chart 2**).

Chart 1: Growth in gross domestic product in G7 countries slowed more in the pandemic than during the 2008–09 global financial crisis

Percent change in gross domestic product for G7 countries in national currencies
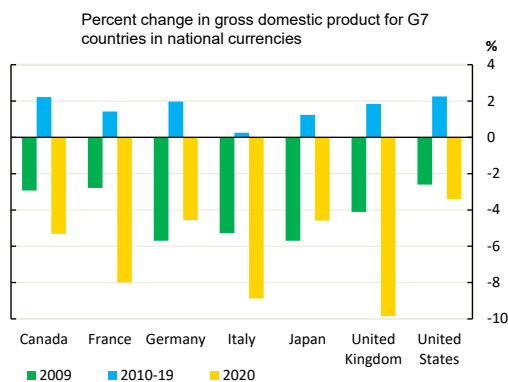
Source: International Monetary Fund   Last observation: October 2021

Chart 2: Funding costs for banks increased sharply in March 2020

Average funding spread for Canada's Big Six banks

Five-year funding costs for Canadian D-SIB banks
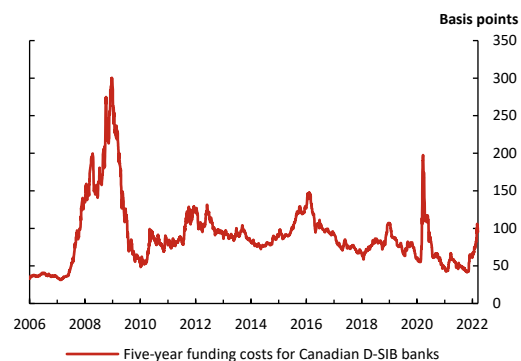
Note: Wholesale funding cost dynamics at Canada's Big Six banks, which are the Bank of Montreal, Bank of Nova Scotia, Canadian Imperial Bank of Commerce, National Bank of Canada, Royal Bank of Canada and Toronto-Dominion Bank.

Sources: BMO Sapphire and Bank of Canada calculations   Last observation: March 18, 2022

Governments acted quickly to support households and businesses

In Canada, the federal government launched an unprecedented stimulus package valued at about 9% of GDP in 2020. This package included direct transfers to workers who lost 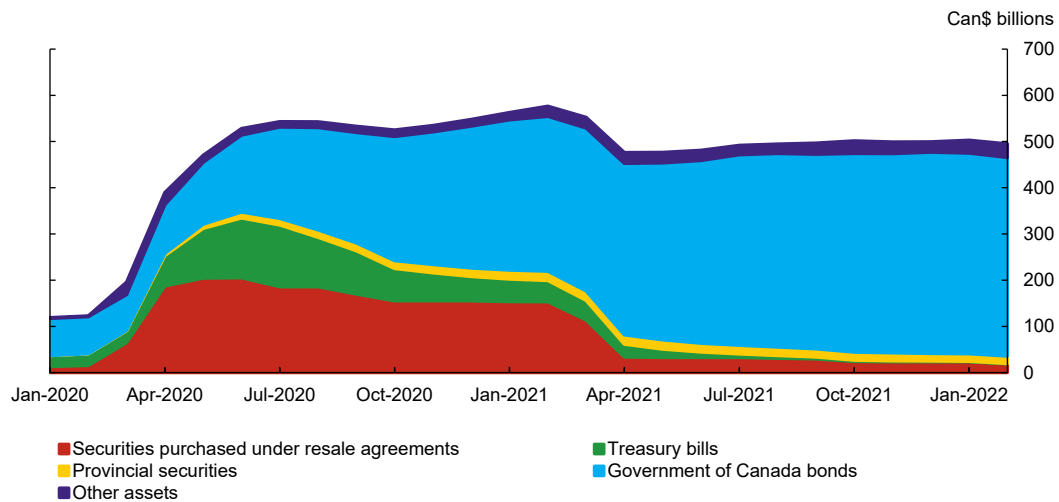their employment, wage and rent subsidies for businesses, loans to small and medium-sized enterprises and measures to improve the liquidity of households and businesses, such as payment deferrals on mortgages and taxes.

The Bank acted forcefully on multiple fronts

The Bank also acted quickly. In March 2020, the target for the overnight rate was cut by 150 basis points (bps) to the effective lower bound of 0.25%. Conditional forward guidance committed to keep the policy rate at the effective lower bound until excess capacity was absorbed and inflation was sustainably back to the target.

The Bank also launched a wide range of liquidity support programs, purchasing not only Government of Canada bonds but also corporate and provincial government bonds to ensure that financial markets kept functioning smoothly (**Chart 3**). The speed and scale of the response were truly unprecedented. The Bank launched more liquidity facilities in two weeks than it had in the two years following the global financial crisis.

Chart 3: **The Bank of Canada expanded its balance sheet at the onset of the pandemic**

Can$ billions

Legend:
- Securities purchased under resale agreements
- Provincial securities
- Other assets
- Treasury bills
- Government of Canada bonds

Source: Bank of Canada

Last observation: February 1, 2022

Financial regulation moved in tandem with fiscal and monetary actions

The Office of the Superintendent of Financial Institutions (OSFI) also stepped in and implemented regulatory measures to support credit flow into the real economy. The domestic stability buffer (DSB), the Canadian version of countercyclical capital buffers, was lowered by 125 bps. Cutting the countercyclical capital buffer is the most direct regulatory tool to relax capital requirements, and similar measures were put in place in Norway, Sweden, Switzerland and the United Kingdom, among many other countries. The impact of lowering the buffer on

lending capacity can be large. In March 2020, OSFI estimated that lowering the buffer by 125 bps would create up to $300 billion in additional lending capacity.[1]

The nature of the crisis required innovation in how regulatory rules were applied. Financial regulators made real-time adjustments to existing rules to ensure coherence between policy measures. For example, central bank reserves and sovereign-issued securities were excluded from the leverage ratio of banks. This change was aimed at ensuring that the leverage ratio was not a barrier to the Bank's quantitative easing efforts. Additionally, loans subject to payment deferrals were treated as performing loans to support the federal government's payment deferral programs.

Surprises and new directions for research

In this section, we focus on three economic phenomena that we observed during the COVID-19 pandemic that are puzzling. First, while pandemic restrictions impacted some households and businesses more than others, the overall financial conditions of households and businesses did not deteriorate as much as expected given the magnitude of the downturn.[2] Second, the financial system remained robust throughout the crisis, acting as a shock absorber rather than a shock propagator. And third, the housing market thrived, contrary to predictions from the early days of the pandemic.

We believe more research is required to better understand what led to these outcomes and to assess longer-term consequences of the policy responses. This research can then inform the design of potentially more efficient policy in the future.

Households were not hit as hard as expected

The measures put in place to limit the spread of the virus forced many businesses to curtail or stop their activities. Real GDP fell by 11.5% in the second quarter of 2020. Yet, the impact on households was not as dramatic as what would have been expected.

Household disposable income and savings rose over the pandemic and some of these gains remain in bank accounts (**Chart 4**). This can be explained partly by government support. Job losses occurred mostly in hard-to-distance sectors that tend to pay lower wages (**Chart 5**). For these lower-income households, fiscal transfers not only filled the loss of employment earnings but brought disposable income above its pre-pandemic level. In contrast, people in households with higher incomes tend to work in industries that were less affected by shutdowns and experienced smaller declines in their labour income. These households also spend relatively more on things such as meals at restaurants or vacations, but they were unable to because of

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[1] For more information, see Office of the Superintendent of Financial Institutions, "OSFI announces measures to support the resilience of financial institutions" (press release, March 13, 2020).

[2] For more on household heterogeneity and monetary policy, see S. Kozicki, "A world of difference: Households, the pandemic and monetary policy," (speech delivered virtually to the Federal Reserve Bank of San Francisco Macroeconomics and Monetary Policy Conference, San Francisco, March 25, 2022).

pandemic restrictions. As a result, higher-income households saw their savings rise substantially.

Chart 4: **The net worth of households increased across income quintiles**

Percent change in assets and liabilities between 2019Q4 and 2021Q4

Legend:
- Financial assets
- Non-financial assets
- Mortgage liabilities
- Non-mortgage liabilities
- Net worth
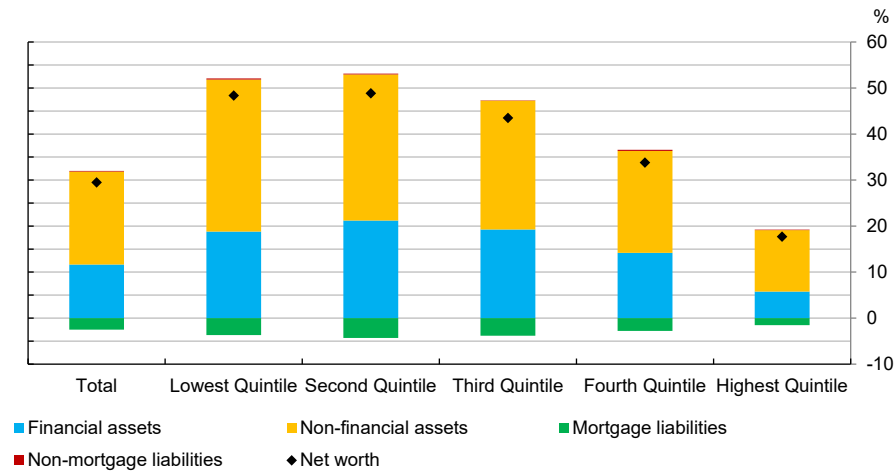
Source: Statistics Canada, Bank of Canada calculations   Last observation: 2021Q4

Chart 5: **Low-wage workers had the largest loss of labour income in 2020**

Percent change in labour income by wage quintile
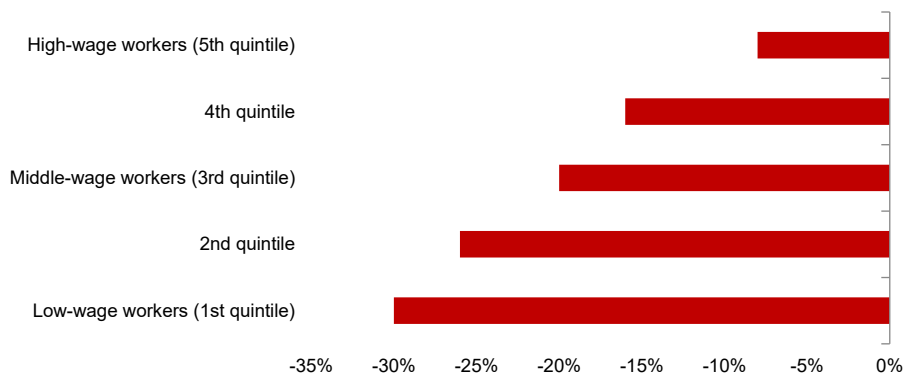
Source: Statistics Canada and Bank of Canada calculations   Last observation: 2020

Banks and financial authorities were also surprised by how well banks' loan books performed. The Bank's stress test conducted in the spring of 2020 assumed a significant buildup of provisions for credit loss.[3] Indeed, at the peak of the crisis, banks had raised their provisions to four times their pre-pandemic level, only to release them when non-performing loans stayed below their historical average (Grieder et al. 2021).

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[3] For more information, see Bank of Canada, *Financial System Review* (May 2020).

The unexpected strength of households and businesses in the face of an unprecedented health and economic crisis raises a few questions.

First, although on the surface the financial situation of households appears to have improved over the pandemic, heterogeneity in their balance sheet position could be a cause for concern. We observe conflicting data on the evolution of household indebtedness over the pandemic. On one hand, households accumulated extra savings and were able to pay off debt. On the other hand, the share of newly issued mortgages with a high loan-to-income ratio has reached new heights (**Chart 6**). Given the current tools at our disposal, it is difficult to assess how much this heterogeneity will affect the transmission of monetary policy or exacerbate vulnerabilities in the household sector (Alves et al. 2022).

Chart 6: **The share of households with high loan-to-income ratios has increased**

Share of new mortgages with loan-to-income ratios over 450%
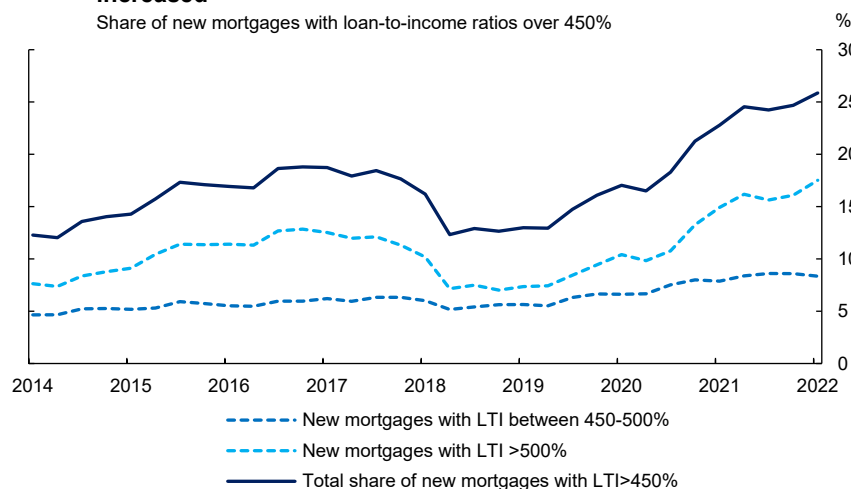
Source: Department of Finance Canada, regulatory filings of Canadian banks and Bank of Canada calculations

Last observation: 2022Q1

Work at the Bank to address these questions is ongoing. For instance, Kuncl, McWhirter and Ueberfeldt (2021) look at the impact of heterogeneity in household income on the transmission of shocks and the effectiveness of various policies. Their findings suggest that a shock disproportionally affecting lower-income households, such as the COVID-19 shock, amplifies the economic downturn because those who are hit the hardest tend to have a higher marginal propensity to consume. They also show that the fiscal policies put in place during the pandemic worked as intended by stimulating consumption and output and reducing household vulnerabilities.

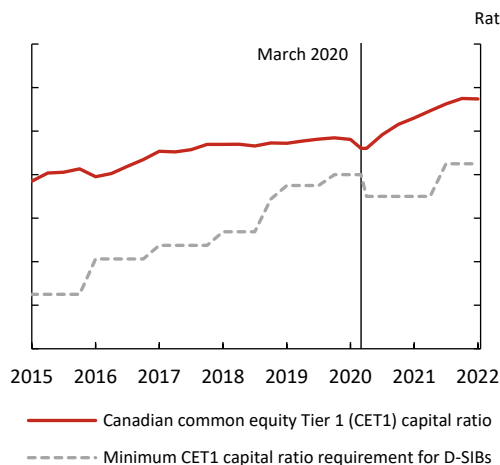## The financial system remained robust throughout the crisis

The COVID-19 shock tested the regulatory reforms implemented after the global financial crisis to improve the resilience of the financial system. As expected, the banking sector entered the pandemic in a strong solvency and liquidity position. Together with other policy supports, not

only were the buffers adequate to absorb the COVID-19 shock but, to some extent surprisingly, banks also emerged with even stronger capital and liquidity positions.
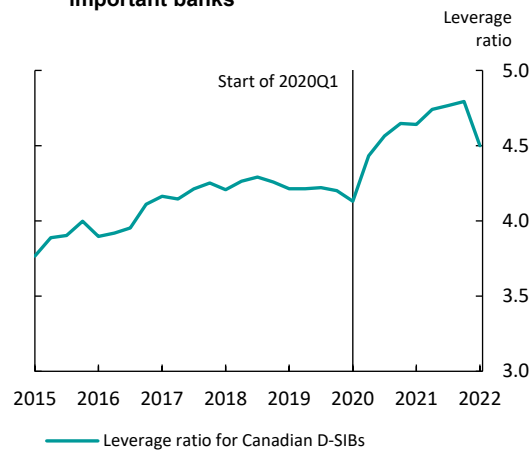
Chart 7 shows the evolution of capital and leverage ratios of Canadian domestic systemically important banks. In the years leading up to the pandemic, Canadian banks built up a sizable capital cushion and entered the pandemic with a capital ratio of 11%. Strong earnings together with restrictions on dividend distribution during the pandemic mean that the Big Six[4] now enjoy capital levels of over 12% of their risk-weighted assets.

Chart 7: The Big Six banks have built up strong capital and leverage ratios

a. **Capital ratio for Canada's systemically important banks**

b. **Leverage ratio for Canada's systemically important banks**

Canadian common equity Tier 1 (CET1) capital ratio

Minimum CET1 capital ratio requirement for D-SIBs

Leverage ratio for Canadian D-SIBs

Note: D-SIB is domestic systemically important bank. The dashed line for the minimum CET1 capital ratio includes the capital conservation buffer, domestic stability buffer and the capital surcharge for domestic systemically important banks. The current CET1 capital ratio requirement, including these abovementioned buffers, is at 10.5%.

Source: Office of the Superintendent of Financial Institutions

Last observation: January 31, 2022

This strong starting capital position and large fiscal support to firms and households also meant that banks did not have to dip into their capital buffers to sustain lending. Anecdotal evidence suggests that relaxed capital requirements helped to sustain the flow of credit by creating balance sheet space for drawdowns of corporate credit lines.

However, more formal empirical analysis is needed to inform the setting of the countercyclical capital buffers. We want financial regulation to be effective and efficient. The COVID-19 experience suggests that Basel III reforms made banks more resilient (BCBS 2021), but a proper assessment of the reforms needs to control for the effects of the large fiscal and monetary policy support.[5]

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[4] Canada's Big Six banks are Bank of Montreal, Bank of Nova Scotia, Canadian Imperial Bank of Commerce, National Bank of Canada, Royal Bank of Canada and Toronto-Dominion Bank.

[5] Preliminary findings can be found in a report by the Basel Committee on Banking Supervision task force on Basel III reform evaluation.

Bank staff are developing an analytical framework to inform our recommendation for setting countercyclical capital buffers so that a reduction, also known as a release, can foster credit extension during a downturn. Likewise, OSFI intends to review the DSB's design and range.[6] We focus on two issues requiring more work: countercyclical capital buffers and stress testing models.

What should be a framework for setting countercyclical capital buffers?

A countercyclical buffer, the only buffer under Basel III that can be released, is a macroprudential tool that can be used to moderate fluctuations in credit supply. Under Basel III, the buffer is set between 0% and 2.5%.

At the start of the COVID-19 crisis, the Canadian DSB was lowered to 1% to give banks more capital headroom to provide credit to households and firms. However, the regulator brought the buffer back to its ceiling of 2.5% in the summer of 2021 when confronted with the further buildup of housing vulnerabilities and elevated corporate debt levels. The decision was also supported by the fact that banks' capital levels had remained resilient, enabling them to support the economic recovery by maintaining the provision of credit to creditworthy households and businesses. The question is what analytical tools can help to define the maximum range for the setting of the countercyclical buffer and determine the optimal timing and pace of buffer release and buildup.

Models to analyze the countercyclical capital buffer

The Bank's view about the countercyclical capital buffer is based on banking models developed by Bank staff. A model developed by Ríos-Rull, Takamura and Terajima (2022) can assess the effects of countercyclical capital buffer release during a crisis. The model features heterogeneous banks making lending and funding decisions and facing an occasionally binding regulatory capital constraint. Banks can choose to default and exit the market, giving rise to a default-risk premium on their funding. This premium works as market discipline that complements capital regulations in preventing banks from taking excessive risk and helps them build up capital during normal times. Model simulations show that the effect of a countercyclical capital buffer release depends on whether banks are capital-constrained. The more constrained the bank, the larger the effect on credit supply. Since the capital levels of Canadian banks are higher than before the pandemic, the model suggests that current conditions in the banking system are favourable to raising the countercyclical capital buffer without causing a credit crunch.

Simulations of a small-scale dynamic stochastic general equilibrium (DSGE) model that can endogenously generate financial crises (García and Schroth 2021) suggest that an optimal countercyclical capital buffer based on household welfare would be much higher than the current ceiling of 2.5%. Increasing the top range of the buffer (i.e., allowing for more substantial

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[6] For more information, see OSFI, "OSFI maintains Domestic Stability Buffer at 2.50%" (press release, December 10, 2021).

adjustment of the buffer across the financial cycle and promoting high-quality lending) may bring economic gains from fewer and less severe financial downturns that outweigh the costs of lower economic activity during good times.

The future of stress-testing models

Stress tests provide insights about the resilience of banks. Stress testing for macroprudential policy setting, including countercyclical capital buffers, have taken on a key role in guiding policies during the pandemic. However, most stress tests are based on static balance sheet assumptions or assume some balance sheet categories follow exogenous paths, such as projected credit growth in the economy.

Stress-testing models need to be expanded in at least two areas. The first is the management actions of banks and their endogenous response to stress. Banks can and will react to a stress scenario. They can adjust their funding structure. They can also reduce exposure to some sectors buying lower-rated corporate bonds and increase exposure to safer sectors. Banks use defensive management actions to maintain their financial standing and to identify which actions need to be factored into an analysis of buffer usability.

The second area is the inclusion of a feedback loop between the financial system and the real economy.[7] For instance, if banks cut credit to some risky segments of the economy, they make themselves safer in the short run but may weaken economic growth in the long run. Weaker GDP growth further undermines the financial position of households and firms. The resulting increases in default rates and expected credit losses induce banks to cut lending even more. This gives rise to a trade-off between bank resilience and economic growth. The presence of a feedback loop allows us to study how regulatory policies in the financial system may affect economic growth and better calibrate regulatory polices, such as the countercyclical capital buffer.

We want to highlight some progress that has been made at the Bank in those two areas. First, the dynamic balance sheet (Hałaj and Priazhkina 2021) considers that banks adjusting the composition of their assets in response to stress creates some market externalities. Specifically, suppose the profitability of loans decreases because default risk increases. In turn, one bank may reduce the size of its loan portfolio. Such an endogenous response can enhance bank resilience (i.e., increase bank capital ratios), but at a cost of lower overall credit supply to the economy. Another bank may experience less competition in the market, implying a higher rate of potential income. Consequently, the second bank would reoptimize its lending behaviour and affect the profits of the first bank.

To illustrate this, we apply the scenario designed by the International Monetary Fund in the context of the 2019 Financial Sector Assessment Program (FSAP) to the Canadian banking

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[7] Usually, the prescribed high-severity stress-test scenarios try to *a priori* capture the potential negative consequences of interactions between the financial system and the real economy.

system (IMF 2020) (**Table 1**). The scenario is hypothetical, as is typical in stress tests, and describes the evolution of economic and financial indicators under severe but plausible stress. In the FSAP case, it starts with a disruption in international trade and global supply chains, followed by disorderly financial market adjustments and downturns in global housing markets and credit cycles. These external shocks result in a sharp housing market correction in Canada, a rise in domestic yields and a large depreciation of the Canadian dollar.

Table 1: Impact of the 2019 FSAP scenario on banks with static vs. dynamic balance sheet

	Change in loan supply (%)	Impact on resilience (Change in common equity Tier 1 capital ratio, in percentage points)	Impact on economic growth (Change in gross domestic product, in percentage points)
Static balance sheet	0.0	-4.3	0.0
Dynamic balance sheet	-5.2	-2.1	-3.9

Note: The change in loan supply affected by banks' management actions under stress creates a trade-off between bank resilience and economic growth. Results of simulations based on the International Monetary Fund (IMF) 2019 Financial Sector Assessment Program (FSAP) scenario and Halaj and Priazhkina (2021) framework. The credit growth path prescribed in the FSAP scenario is excluded from the set of variables used in the simulations. The IMF 2019 FSAP scenario is applied in the static balance sheet case, except for the credit growth, which is overwritten to be flat. Banks reoptimize the composition of their balance sheets in the dynamic balance sheet case.

Source: Bank of Canada calculations

Under this scenario, the average capital ratio in the analyzed group of banks drops by 2.1 percentage points at the end of the stress horizon if we allow banks to defend their solvency and liquidity positions (Hałaj and Priazhkina 2021). This would be achieved by reducing loans by 5.2%, particularly loans that are more risky or more impacted by the scenarios. Notably, the effect on capital ratios would be half of what was estimated under the static balance sheet assumption (i.e., the composition of banks' balance sheets is unchanged over the stress horizon). The dynamic balance sheet model provides an opportunity to study the impact of banks' strategic actions in times of stress. Reducing the number of loans, potentially to those in need of financing during a crisis, can further deteriorate economic conditions. Based on the New Keynesian DSGE model of Alpanda, Cateau and Meh (2018), we estimate that reducing the loan supply by 5.2% translates into a decline in GDP of almost 4 percentage points.

Housing market reached new heights during an economic downturn

During the pandemic, Canadian house prices reached record levels, with annual growth rates near 30% in February 2022. Double-digit house price growth was observed not only in Vancouver and Toronto but also in many markets (**Chart 8**), and bidding wars became common practice.

Chart 8: House price growth has reached record levels in Canada
Year-over-year growth in quality-adjusted benchmark house prices
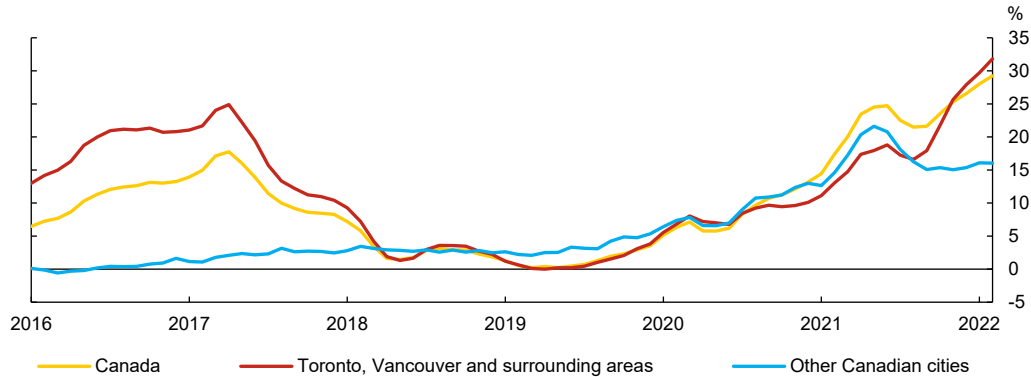
Note: Other cities include Calgary, Edmonton, Saskatoon, Regina, Ottawa, Montréal and Moncton.
Sources: Canadian Real Estate Association and Statistics Canada   Last observation: February 2022

Since a price correction in the housing market could threaten financial stability, policy-makers want to detect signs of imbalances early and understand how policies can amplify or mitigate these imbalances. Bank researchers have made some important progress in building tools to identify exuberance in the housing market and in developing macroeconomic models able to generate boom-and-bust cycles to help us better understand the implications for monetary policy.

Signs of exuberance in housing markets across the country

Robust income growth, changing preferences for more living space, low mortgage rates and limited supply of housing have together contributed to the strength in the housing market. However, these fundamentals can go only so far in explaining the house price growth we experienced. The key concern is whether and to what extent this house price growth was disconnected from fundamentals and is becoming self-fulfilling.

To help answer these questions, Emenogu, Hommes and Khan (2021) developed a model-based indicator of house price exuberance. In this model, heterogeneous agents switch endogenously between two types of house price expectations. Agents are either mean-reverting and expect house prices to converge toward their fundamental value or trend followers and believe that higher prices today will be followed by even higher prices in the future. The exuberance indicator is based on the relative fractions of mean-reverting and trend-follower agents. When the indicator exceeds 1.00 (i.e., more trend-follower agents), it signals that the housing market is entering a period when house price dynamics are self-reinforcing.

The model is estimated to fit Canadian house prices. **Chart 9** shows the strong correlation between the exuberance indicator for Toronto and the share of homes sold above their asking price. The exuberance indicator caught early signs of overheating in the Toronto housing market. In fact, when the indicator first exceeded 1.00 in early 2016, the share of homes sold over asking was hovering around 40%, and year-over-year house price growth was around 10%. A year later, the annual rate of price growth reached a peak of almost 30%.

Chart 9: **The exuberance indicator detected early signs of overheating in Toronto housing market in 2016-17**

HPEI (left scale)

Percentage of homes sold over asking (right scale)

Year-over-year house price growth (right scale)
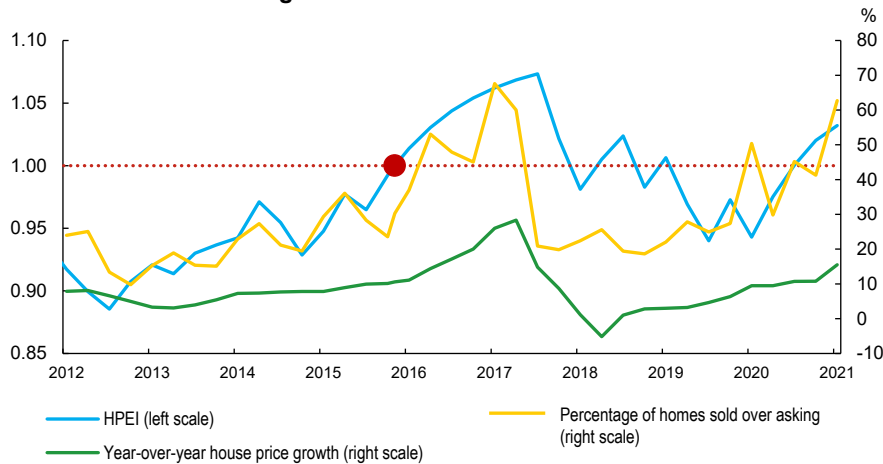
Note: HPEI is the House Price Exuberance Indicator. The housing market is considered exuberant when the HPEI exceeds 1.00, which would be above the red line. The red dot indicates when the indicator first exceeded 1.00 in early 2016.

Sources: Canadian Real Estate Association, Canadian Survey of Consumer Expectations, Realosophy Inc. and Bank of Canada calculations

Last observation: January 2021

The exuberance indicator can also shed light on the dynamics of house prices in different cities. The exuberance heatmap in **Chart 10** illustrates the evolution of the indicator for a large set of Canadian cities. The heatmap turns red once the indicator reaches 1.00, but the colour coding also shows which cities are getting close to this threshold. Since 2020, the heatmap has been turning red for more Canadian cities, suggesting that extrapolative expectations have contributed to the strong house price growth since the beginning of the pandemic.

Chart 10: **More housing markets have become overheated during the pandemic**

House price exuberance heat map

HPEI is below 0.95   HPEI is from 0.95 to 1.00   HPEI is above 1.00
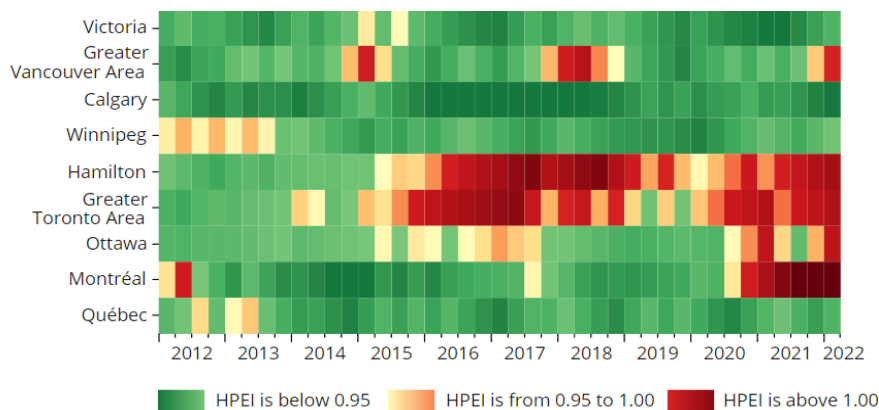
Note: HPEI is House Price Exuberance Indicator. House prices indicate low exuberance when the HPEI is below 0.95, shown in green. Similarly, house prices indicate moderate exuberance when the HPEI is between 0.95 and 1.00 and are deemed to be exuberant when the HPEI is above 1.00.

Source: Bank of Canada calculations

Last observation: 2022Q1

Building an empirical model to assess the macroeconomic impact of extrapolative expectations

To gain more insights on the macroeconomic impact of extrapolative house price expectations and the implications for monetary and macroprudential policies, researchers at the Bank developed a New Keynesian housing model with a non-trivial departure from rational expectations and occasionally binding borrowing constraints (Duprey and Harding, forthcoming). The economy features rational and non-rational agents forming expectations on future house prices. Non-rational agents follow a backward-looking forecasting rule, and their relative share depends on the past performance of their rule compared with the forward-looking forecasting rule of rational agents.

Preliminary simulations show that the existence of extrapolative expectations can better explain the housing boom during the pandemic compared with the same model under rational expectations. Moreover, extrapolative expectations can generate boom-bust housing cycles that are absent under rational expectations. This model will be a useful tool to evaluate the macroeconomic impact of housing booms and busts.

Policy-makers face a trade-off: a buoyant housing market in the near term can amplify downside risk later

Although a housing boom supports the economy, which may be beneficial during a downturn, the likelihood of a subsequent bust can create downside risks for future growth. The growth-at-risk framework for Canada (Duprey and Ueberfeldt 2020) illustrates this trade-off well. Extrapolative house price expectations, which are comparable to what we observed in 2021, remove 0.8 percentage points from the forecast for GDP growth after two years (**Chart 11**). The key insight is that house price growth fuelled by extrapolative expectations can support GDP growth in the near term for up to four or five quarters; but the accumulation of debt eventually turns into a drag on GDP growth seven to eight quarters into the future.

Chart 11: **Extrapolative house price expectations amplify the tail risk over the medium term**

Quarterly change in median and tail of forecast for gross domestic product

Percentage points

Count of quarters ahead of 2021Q4

■ Tail   ■ Median
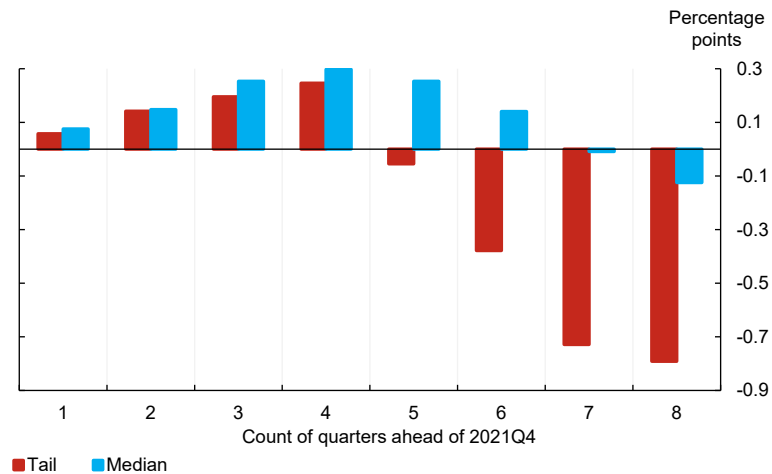
Note: The tail is measured as the fifth percentile of the distribution

Source: Bank of Canada calculations   Last observation: 2021Q4

This work demonstrates that fluctuations in the housing market may have a meaningful macroeconomic impact and that housing dynamics are relevant for monetary policy over and above the traditional view of "leaning" versus "cleaning." Under this view, the boom-and-bust cycle of housing markets is seen as a financial stability risk. We present it as also a macroeconomic risk that should be considered in setting monetary policy.

Challenges with coordination of policies

Canadian policy-makers opted for macroprudential tools to tame housing markets while continuing to support the economic recovery. In June 2021, OSFI raised the minimum qualifying rate for uninsured mortgages to 5.25% and strengthened many mortgage underwriting rules such as the total debt-service ratio.

The challenges associated with a soaring housing market during an economic downturn highlight fundamental questions about the interaction and coordination of monetary policy and macroprudential policy. The two policies have different objectives but can interact (Millard, Rubio and Varadi 2021). For example, monetary policy can shape risk taking, and macroprudential policy can affect growth and inflation. The Bank recognizes that low interest rates can increase speculative activities and leverage, which could lead to worse economic outcomes in the future. Monetary policy can afford to focus exclusively on inflation only if financial vulnerabilities are well guarded by macroprudential policies (Bank of Canada 2021).

Should the objective of monetary policy be revised to explicitly consider risk taking, or only insofar as it may affect inflation? Similarly, should macroprudential policy help support the macroeconomy? Researchers at the Bank are working to better understand the interactions

between monetary and macroprudential policies. For instance, Kuncl and Ueberfeldt (forthcoming) look at the impact of monetary policy and mortgage regulation in a New Keynesian model featuring household heterogeneity.

Concluding remarks

The health and economic crisis caused by COVID-19 has changed the way we work and live. Policy-makers had to act fast to mitigate the adverse economic effects of public health measures at the onset of the pandemic. The effectiveness of all the actions taken needs to be assessed to ensure the best possible policy response to large shocks in the future. Ending the extraordinary policy support is not a trivial task. And in general, how should fiscal, monetary and financial policies be coordinated?

The evolution of housing markets remains an ongoing issue for many developed countries, including Canada. While the housing boom may have helped return the economy to full employment, it has also increased the risk that attaining our inflation target will be more difficult if the trend reverses in the future. Assessing this dynamic trade-off in real time when setting monetary policy requires macroeconomic models that can generate boom-bust cycles. The housing boom also illustrates the need for coordination among policy-makers and raises many questions: When might monetary, macroprudential and microprudential actions be in conflict? How should bank stress tests and macrofinancial indicators integrate to deliver capital requirements that meet both microprudential and macroprudential objectives?

Finally, since financial institutions and other segments of financial markets are not isolated, the interconnectedness should be captured to better coordinate policy responses. In an interconnected financial system, shocks are propagated between banks and non-bank financial institutions and through financial market infrastructure such as clearing and settlement systems. Therefore, the next generation of stress tests should incorporate the interactions of those players. Future stress-test designs should also consider climate scenarios[8] and the operational resilience of financial market infrastructures in the event of a cyber attack.

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[8] A pilot scenario exercise has already been conducted by the Bank and OSFI. For more information, see Bank of Canada and Office of the Superintendent of Financial Institutions, "Using Scenario Analysis to Assess Climate Transition Risk" (2022).

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