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# COVID-19 crisis: Liquidity management at Canada’s largest public pension funds

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*Bank topics: Coronavirus disease (COVID-19); Financial institutions; Financial markets*

*JEL codes: G23, G01, E58*

## Introduction

In March 2020, the rapid global spread of COVID-19 caused whole industries to shut down temporarily and businesses and households to lose income. Faced with the resulting uncertainty about the future path of the global economy, many investors sought to hold cash. This forced many asset managers to sell securities to raise funds, leading to an episode of severe market stress.

This episode presents an opportunity to examine:

- how different types of market participants behave during a crisis
- the impact of this crisis behaviour on financial markets

For example, the Bank of Canada and various international organizations have identified potential vulnerabilities in the financial system related to the growing role of non-bank financial institutions in financial intermediation (Fontaine et al. 2021; Financial Stability Board, 2020).

In this note, we examine the combined behaviour of the eight biggest Canadian public pension funds—known as the Big Eight—in March 2020.[1] The Big Eight are among the largest participants in Canadian financial markets, managing 11 percent of total Canadian-dollar assets in the financial system.

Bédard-Pagé et al. (2016) highlight that large Canadian pension funds could play a role in stabilizing the financial system during a crisis by purchasing assets while prices are depressed. This depends in part on how pension funds manage liquidity risk in a crisis—that is, how they provision to meet increased demands for cash and collateral. Liquidity risk has risen over time, with increasing allocations to illiquid assets and, in some cases, use of leverage and derivatives. As a result, pension funds have modified their risk management practices.

Building on Bédard-Pagé et al. (2016), we use proprietary data from the Big Eight, our findings from interviews with each of the Big Eight, and data from the Market Trade Reporting System to revisit previous assumptions. Our analysis focuses on fixed-income markets because they include core funding markets (Fontaine, Selody and Wilkins 2009).

### Key findings

- The Big Eight experienced large demands for liquidity in March 2020, as would be expected during an episode of severe market stress. These demands were mainly from margin calls on their derivatives positions. Stress in short-term funding markets, specifically an inability to roll over US commercial paper, caused concerns that other

[1] The Big Eight include the Canada Pension Plan Investment Board, Caisse de dépôt et placement du Québec, the Ontario Teachers' Pension Plan, the British Columbia Investment Management Corporation, the Public Sector Pension Investment Board, the Alberta Investment Management Corporation, the Ontario Municipal Employees Retirement System and the Healthcare of Ontario Pension Plan.

funding markets could become unavailable. This led some funds to build up precautionary liquidity.

- The Big Eight were generally resilient in meeting liquidity demands and used a variety of strategies at the height of the crisis. These strategies included:
    - raising cash using equities as collateral
    - increasing term repurchase agreements (repos)
    - withdrawing purchases and outright sales of bankers' acceptances (BAs)

  The relative importance of these strategies varied across funds. However, the total demand for liquidity likely added to stress in Canadian core funding markets.

- During the most acute period of market stress, the Big Eight's asset purchases were more limited than hypothesized in Bédard-Pagé et al. (2016):
    - Some funds purchased equities as prices declined in order to maintain target asset allocations. This portfolio rebalancing resulted in corresponding sales of Government of Canada bonds, potentially contributing to stress in that market.
    - However, a majority of funds delayed rebalancing until April, when the market volatility and uncertainty were mostly resolved.
    - Some funds made opportunistic purchases of Canadian corporate and provincial bonds, but these were relatively small because funds exercised caution in volatile market conditions.

- The crisis reiterated that well-functioning core funding markets—such as Government of Canada bonds and treasury bills, repos and BAs—are critical to pension funds and other market participants during a crisis (Fontaine, Selody and Wilkins 2009). Disruptions in these markets can hinder the ability of institutions to source liquidity and rebalance their portfolios. It can also lessen their willingness to take on new risk.[2]

## How large Canadian pension funds manage their liquidity risk

Liquidity risk is among the most important risks that pension funds need to manage. This is the risk that pension funds will not be able to meet their cash and collateral obligations. If liquidity needs are not well provisioned for, then adverse scenarios could force funds to sell less-liquid assets at depressed prices and incur financial losses.

Two important sources of liquidity risk are leverage and access to funding markets:

- Leverage (e.g., from derivatives) may require large amounts of cash and securities to be posted as margin in volatile markets.

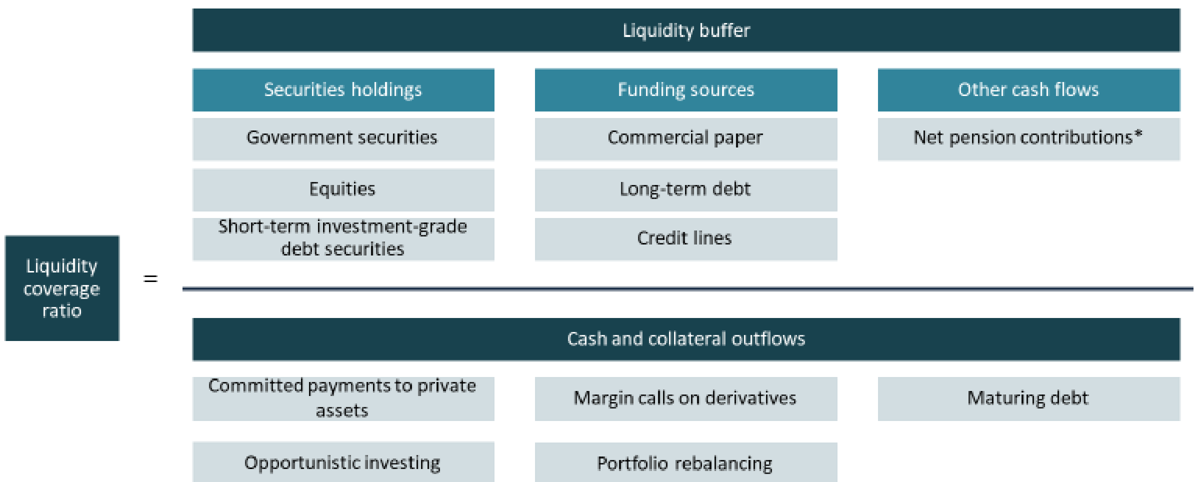
[2] The importance of funding markets is discussed in greater detail in Fontaine et al. (2021).

- Access to funding markets is critical to meet increased demands for cash in a crisis and to roll over existing positions (e.g., repos).

## Liquidity coverage ratio

The Big Eight's liquidity management is described by their liquidity coverage ratios (LCRs). The LCR is the ratio of assets that can be used to source liquidity (the liquidity buffer) to potential liquidity outflows in a stress scenario. Funds aim to maintain their LCRs above one at all times. **Figure 1** provides a hypothetical example of the LCR of a large pension fund.[3]

**Figure 1: Illustrative example of the liquidity coverage ratio**




*Net pension contributions refers to pension contributions minus payments.

Liquidity buffers are not predominantly made up of cash (**Figure 1**). Instead, they consist of high-quality assets and funding sources. All pension funds assume they can sell assets in their respective buffers, provide them as margin or use them as collateral to raise cash at a reasonable cost in a crisis. Additionally, some pension funds assume they can continue to draw on funding sources in the liquidity buffer during a crisis.

However, as we will show below, in March 2020, liquidity in some of these assets, including core markets, was challenged, and some funding sources became unreliable.

[3] The Big Eight operate under different regulations and tax laws that affect how they structure funding activities. For example, not all funds are permitted to borrow by issuing securities. The LCR illustrated here is generic and does not capture these differences.

## Provisioning for new investments in a crisis

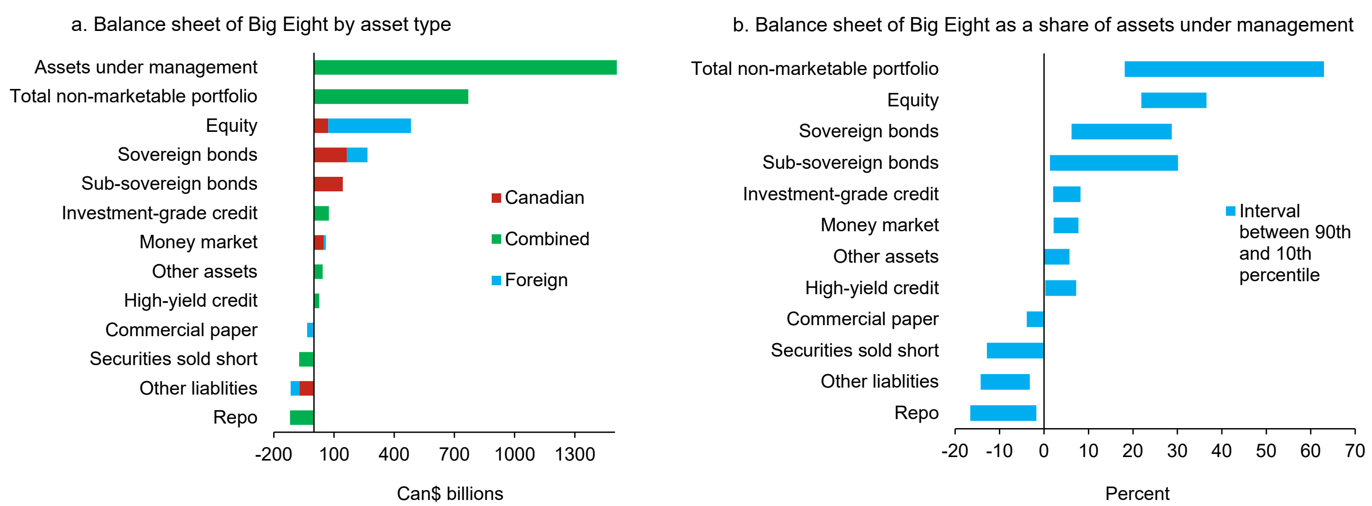
Pension funds can calibrate liquidity buffers to allow for new and opportunistic investments if asset prices are expected to rise following a crisis. The ability to invest strategically in a crisis reflects structural differences between pension funds and other asset managers. Pension funds have a relatively long investment horizon, making them less sensitive to periods of high volatility. In addition, they receive steady contributions from members and are not subject to investor redemptions.

## Large and diverse portfolios

The Big Eight all apply some form of LCR framework. However, components and calibrations vary across plans depending on their legal structure, asset allocation, leverage, derivative exposures, liability structure and risk tolerance. This translates into a diverse set of liquidity management strategies.

Around half of the Big Eight's total assets are financial securities and derivatives (**Chart 1**, panel a). The most liquid of these securities are allocated to the liquidity buffer.[4] The funds are diverse in their distribution of holdings, especially in government bonds (sovereign and sub-sovereign), repos and securities sold short (**Chart 1**, panel b).

**Chart 1: The Big Eight have large and diverse balance sheets**




Note: To anonymize the data presented in Chart 1, panel b, we calculate the 10th and 90th percentiles by the individual funds' values. The endpoints of the intervals therefore represent the distribution but do not correspond to individual funds. The Big Eight are the Canada Pension Plan Investment Board, Caisse de dépôt et placement du Québec, the Ontario Teachers' Pension Plan, the British Columbia Investment Management Corporation, the Public Sector Pension Investment Board, the Alberta Investment Management Corporation, the Ontario Municipal Employees Retirement System and the Healthcare of Ontario Pension Plan.

Source: Big Eight proprietary data

Last observation: December 2019

[4] Private assets include real estate, infrastructure, private equity and other private investments.

## The Big Eight experienced two main liquidity demands in March 2020

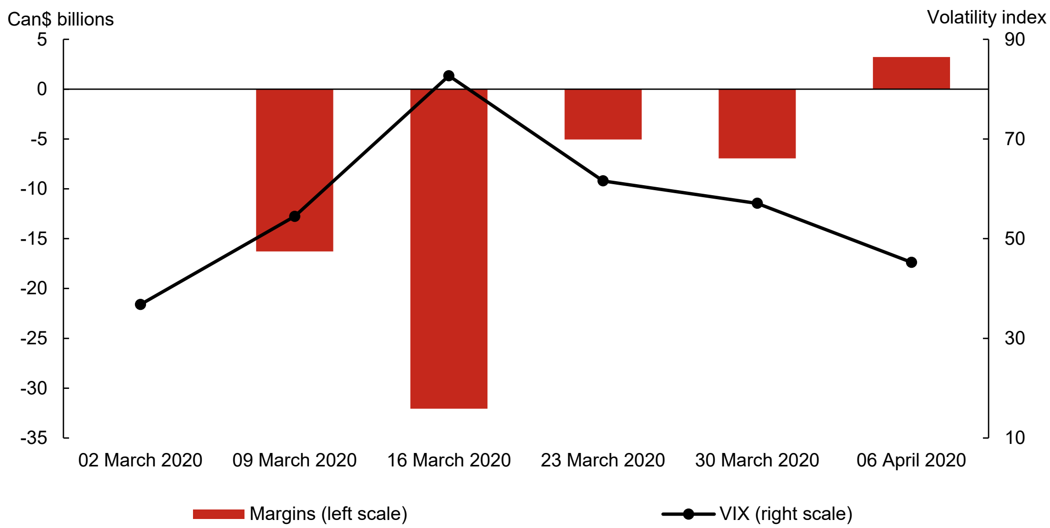
The severe market stress of March 2020 placed large demands on pension funds' liquidity buffers. These came from two primary sources: margin calls and the inability to issue US commercial paper.[5]

### Margin calls

In total, the largest draw on the Big Eight's liquidity buffers in March 2020 came from margin calls. These were driven mainly by positions in equity and foreign exchange derivatives. Anecdotal evidence suggests that the Big Eight were generally well-prepared for these because the size of margin calls was in-line with the assumptions in their LCRs.

Cumulative margin calls peaked at around $30 billion in the week of March 16 in total across the Big Eight. This coincided with the peak of market volatility, as illustrated by the CBOE Volatility Index (VIX) (**Chart 2**). The magnitude of the liquidity draw from margin calls was substantial relative to some funds' liquidity buffers.

**Chart 2:** **Margin calls were substantial and peaked with the Volatlity Index (VIX)**
Cumulative net margin flows




Sources: Big Eight proprietary data and Bloomberg Finance L.P.

Last observation: April 6, 2020

### Inability to issue US commercial paper

In March 2020, many US investors stopped purchasing commercial paper. As a result, some of the Big Eight lost access to this important funding source. This created strains on liquidity

[5] Private assets were a third draw on liquid assets of funds. However, in March 2020, these demands were mostly due to planned investments and not related to distress from privately owned assets.

management because it required US commercial paper issuers to replace maturing commercial paper with other funding sources (**Chart 3**).[6]

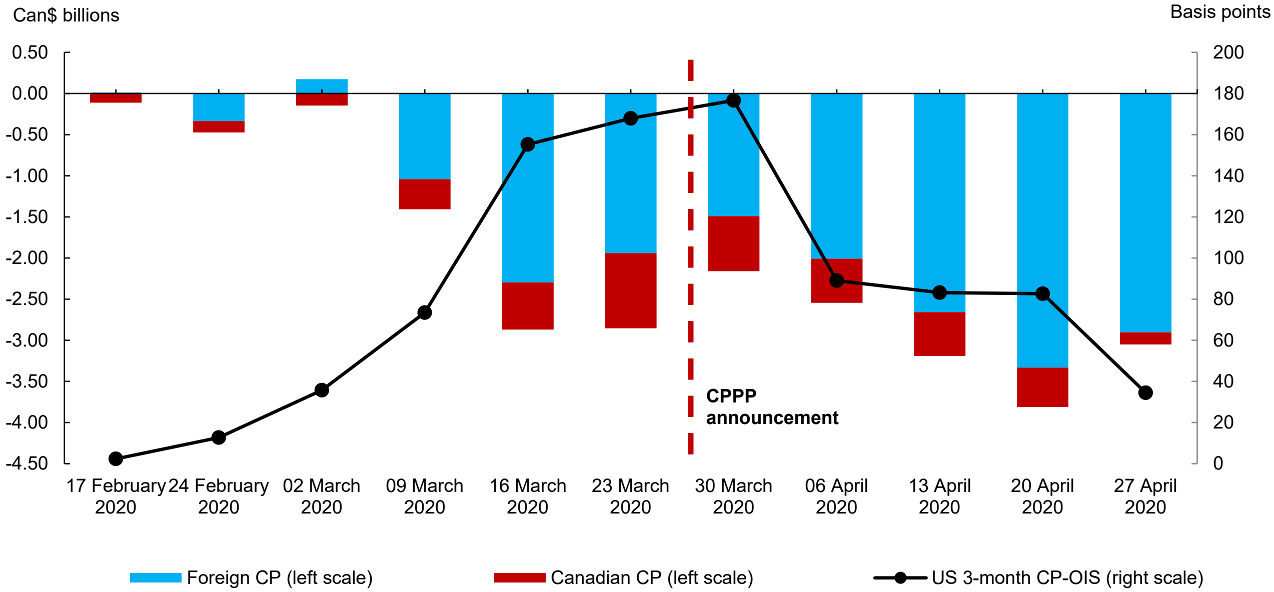
The liquidity outflow created by the inability to rollover US commercial paper was smaller than the outflow from margin calls. However, the US commercial paper disruption also caused uncertainty around the availability of other core funding markets for future funding. Interviews with the Big Eight indicate that some funds increased the size of their liquidity buffers as a result of this uncertainty.

The US commercial paper market reopened after the US Federal Reserve intervened with the Commercial Paper Funding Facility on March 17, 2020.[7] However, the Big Eight did not issue US commercial paper in large volumes in the weeks that followed. Findings from interviews suggest that some were able to raise cash in other markets at better terms, as we discuss in the next section, or were eventually able to issue longer term debt. In total, the Big Eight issued around $19 billion of long-term debt from March 2020 to the end of May 2020—greater than the decline in their US commercial paper issuance over the same time period.

[6] Most of the Big Eight's commercial paper program is denominated in US dollars.
[7] The Big Eight were not eligible for the US commercial paper facility. The Bank also announced a Commercial Paper Purchase Program on March 27, 2020, which targeted commercial paper issued in Canadian dollars.

**Chart 3: Big Eight issuance of US commercial paper (CP) dropped quickly**

Cumulative net changes of CP oustanding with CP spread




Note: CPPP refers to the Bank of Canada's Commercial Paper Purchase program. OIS is the US overnight indexed swap rate. The US 3-month commercial paper -OIS spread is a measure of funding costs in the commercial paper market. We based it on US non-financial commercial paper because US financial commercial paper data were not available. The Big Eight are the Canada Pension Plan Investment Board, Caisse de dépôt et placement du Québec, the Ontario Teachers' Pension Plan, the British Columbia Investment Management Corporation, the Public Sector Pension Investment Board, the Alberta Investment Management Corporation, the Ontario Municipal Employees Retirement System and the Healthcare of Ontario Pension Plan.

Sources: Big Eight proprietary data, Federal Reserve Economic Data and Bloomberg Finance L.P.

Last observation: April 27, 2020

## The Big Eight took three main actions to raise or secure liquidity

Amid high uncertainty about future market conditions, the Big Eight took three main actions to meet liquidity demands or to build up precautionary liquidity buffers.

### Withdrawing purchases or selling bankers' acceptances

Some of the Big Eight are large investors in BAs. Typically, they hold these securities to maturity then roll them into newly issued BAs. Some funds count BA holdings toward their liquidity buffers because BAs are normally highly liquid.

However, in February and March 2020, net purchases of BAs by the Big Eight slowed from around $4 billion per week to zero, while some funds sold BAs outright (**Chart 4**).[8] The combination of reduced BA purchases and sales from the Big Eight occurred at the same time that other asset managers sold a large amount of BAs. This led to a rapid deterioration of

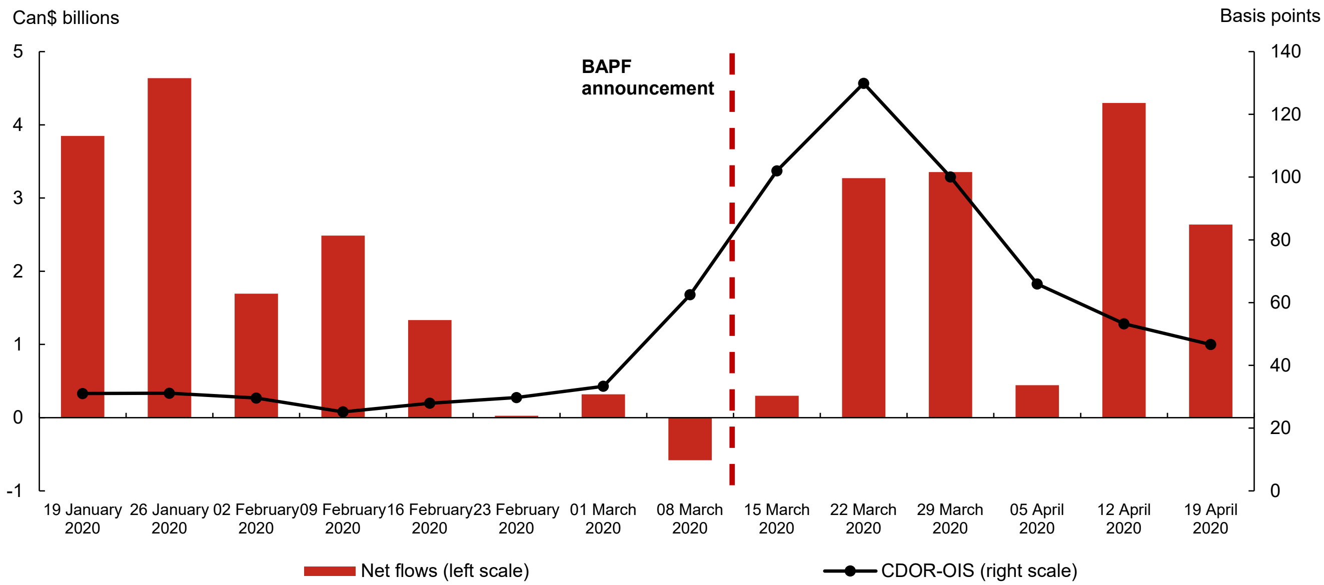
[8] Other money market securities held in some of the funds' liquidity buffers also experienced illiquidity and could not be sold: for example, bank deposit notes.

liquidity in the BA market.[9] In addition, reduced BA purchases by the Big Eight put pressure on banks, which use BAs as an important source of short-term funding.

The Big Eight's purchases of BAs returned to normal levels when the Bank intervened to support market functioning. The Bankers' Acceptance Purchase Facility (BAPF)—announced on March 13, 2020—allowed primary dealers to sell some of their accumulated BA inventories to the Bank.

**Chart 4: At the peak of the crisis, some pension funds stopped buying bankers' acceptances (BAs) and became net BA sellers**

BA net weekly buying flow




Note: BAPF is the Bank of Canada's Banker's Acceptance Purchase Facility; CDOR is Canadian Dollar Offered Rate; and OIS is the Overnight Indexed Swap rate. The spread between the CDOR and the OIS (CDOR-OIS) is a measure of funding costs in the BA market.

Sources: Big Eight proprietary data, Market Trade Reporting System 2.0, Bloomberg Finance L.P. and Bank of Canada calculations

Last observation: April 19, 2020

## Increasing long-term repos

Many of the Big Eight increased their use of long-term repos to reduce the risk of not being able to roll over shorter-term repos. Long-term repos increased by around $20 billion in March 2020, collateralized mainly by Canadian federal and provincial government bonds (**Chart 5**). This coincided with other large asset managers also seeking term repos, contributing to a significant increase in repo rates as dealers struggled to meet demand.

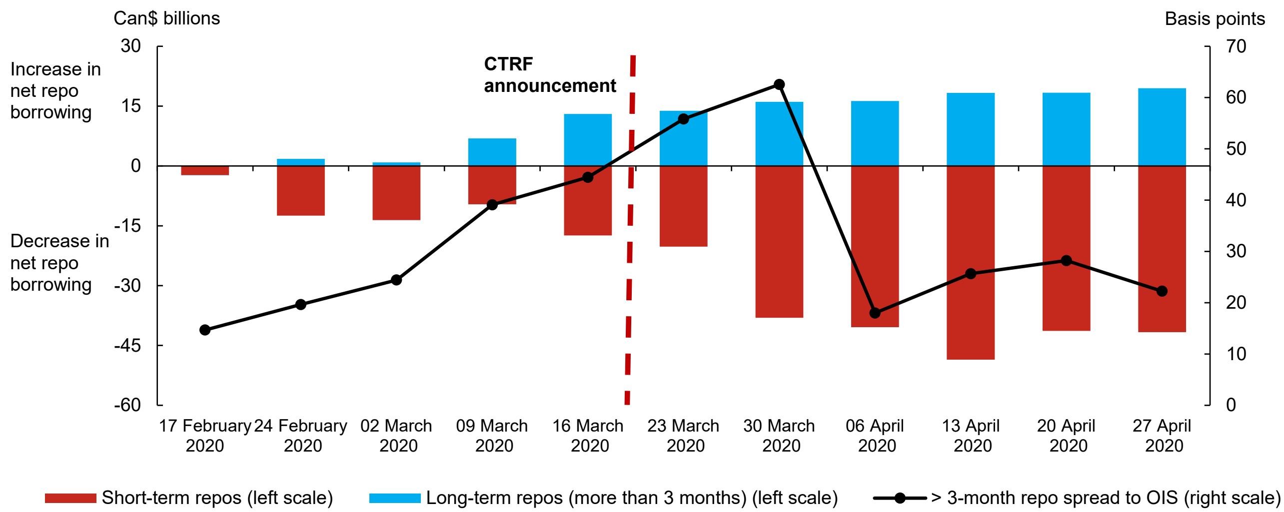
The Bank's interventions helped support the functioning of the repo market. On March 17, the Bank substantially expanded its term repo operations with primary dealers. In addition, the Bank announced the Contingent Term Repo Facility (CTRF) on March 20. The CTRF provided

[9] **Chart 4** shows the spread between the Canadian Dollar Offered Rate and the overnight index swap, a measure of funding costs in the BA market.

term repos to a broader set of market participants, which included the Big Eight.[10] Findings from the Big Eight interviews suggest that although usage of the CTRF was low, it helped to restore funds' confidence by providing backstop repo rates. This alleviated some of the need to build up precautionary liquidity.

**Chart 5: The Big Eight increased the use of term repurchase agreements (repos)**

Cumulative change in net repo borrowing (foreign and Canadian currency) by term




Note: CTRF is the Bank of Canada's Contingent Term Repo Facility. OIS is the Overnight Indexed Swap rate. The Big Eight are the Canada Pension Plan Investment Board, Caisse de dépôt et placement du Québec, the Ontario Teachers' Pension Plan, the British Columbia Investment Management Corporation, the Public Sector Pension Investment Board, the Alberta Investment Management Corporation, the Ontario Municipal Employees Retirement System and the Healthcare of Ontario Pension Plan.

Sources: Big Eight proprietary data, Market Trade Reporting System 2.0, Bloomberg Finance L.P. and Bank of Canada calculations

Last observation: April 27, 2020

## Using derivatives to generate cash against equity portfolios

At the height of market stress in mid-March 2020, many of the Big Eight sold equities to raise cash while simultaneously taking offsetting derivatives positions through total return swaps (**Chart 6**). Total return swaps require relatively small initial cash outlays, so the effect of the strategy is a cash inflow while maintaining the target allocation of assets to the equity market.

Of the three key actions considered, this strategy generated the most cash, totalling around $20 billion in March. Findings from interviews suggest that the strategy was popular because it allowed pension funds to raise cash using their large public equity portfolios at a time when domestic fixed-income repo rates were high. Interview findings also suggest that securities lending markets were another important source for funds to raise cash using equities in March 2020. In securities lending markets, funds can use equities directly as collateral, similar to a repo.

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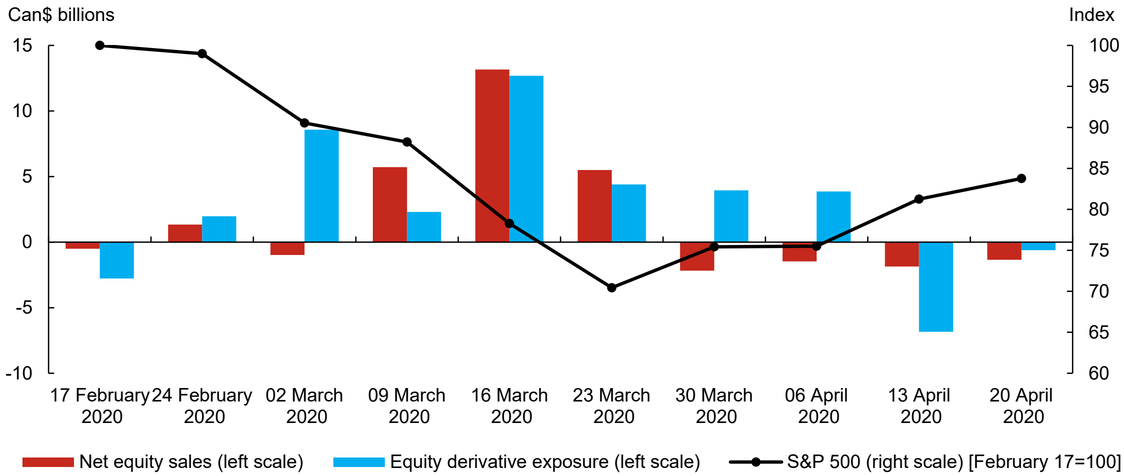
[10] The CTRF provided one-month repo against securities issued or guaranteed by the Government of Canada or Canadian provinces to market participants with significant activity in Canadian money markets or fixed-income markets. It was operational for one year.

Both securities lending and the combination of sales of equities and use of total return swaps for funding create an opportunity cost through their effect on fund leverage and internal risk limits. Since these actions increase leverage, they could limit opportunistic investments in risky assets for funds in certain cases: that is, if the funds need to decrease leverage over time or if they operate under fixed internal leverage and risk constraints.

**Chart 6: Pension funds used derivatives to offset equity sales**

Weekly equity sales and changes to derivative exposures




Note: S&P 500 is the Standard and Poors 500 index

Sources: Big Eight proprietary data and Bloomberg Finance L.P.

Last observation: April 20, 2020

## The Big Eight also took actions to reallocate risk

Previous work has suggested that pension funds may have a stabilizing effect on prices in the short term during a crisis. This occurs either through portfolio rebalancing, typically near month-end, or through opportunistic asset purchases (Bédard-Pagé et al. 2016). However, there was little empirical evidence of this available at the time. Our data now allows us to investigate these hypotheses by observing changes in the Big Eight's asset holdings.

We focus on two main actions in the period of most acute stress in March 2020:

- rebalancing of flows in their portfolios between equities and bonds, where the main rebalancing by the Big Eight took place
- opportunistic purchasing of Canadian fixed-income securities

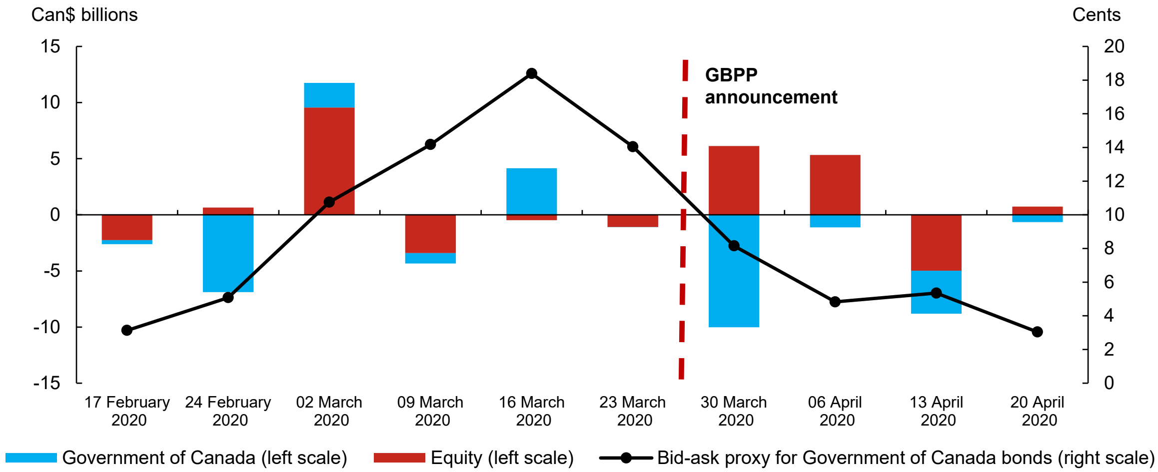
### Rebalancing portfolios

As expected, some of the Big Eight rebalanced their portfolios—mainly from bonds to equities. They did this to maintain target portfolio allocations, as equity prices had declined in February and March. Correspondingly, large sales of Government of Canada bonds occurred at the end of February and March, with purchases of equities and equity derivatives in the following weeks

(**Chart 7**).[11] These sales of Government of Canada bonds may have contributed to liquidity stress at the end of February when bid-ask spreads for Government of Canada were rising. Given the lack of liquidity and high degree of uncertainty in March, most of the Big Eight decided not to rebalance at that time. They instead waited until market conditions had normalized in the following weeks. The Bank's facilities that supported bond market liquidity, such as the Government of Canada Bond Purchase Program, helped to mitigate the lack of liquidity and enabled the eventual rebalancing.

**Chart 7: To rebalance, the Big Eight sold government bonds and then purchased equities**

Equity and Government of Canada bond flows




Note: GBPP is the Bank of Canada's Government of Canada's Bond Purchase Program. The Big Eight are the Canada Pension Plan Investment Board, Caisse de dépôt et placement du Québec, the Ontario Teachers' Pension Plan, the British Columbia Investment Management Corporation, the Public Sector Pension Investment Board, the Alberta Investment Management Corporation, the Ontario Municipal Employees Retirement System and the Healthcare of Ontario Pension Plan.

Sources: Big Eight proprietary data, Canadian Depository of Securities, Reuters DataScope and Bank of Canada calculations Last observation: April 20, 2020

## Buying in Canadian fixed income

The Big Eight purchased some Canadian provincial and corporate bonds opportunistically as spreads over Government of Canada bonds widened in early March 2020. However, the volume of those transactions was relatively small compared with total sales by other asset managers. At their highest (week of March 9), secondary market purchases by the Big Eight represented around 45 percent of asset manager sales (**Chart 8**). Moreover, pension funds stopped purchasing bonds in mid-March as broader Canadian bond markets became less liquid (Fontaine, Ford and Walton 2020).

Findings from interviews suggest that some of the Big Eight took other investment opportunities that are not captured in **Chart 8**, including primary market purchases of provincial bonds. However, out of prudence, they were reluctant to take on new large positions given

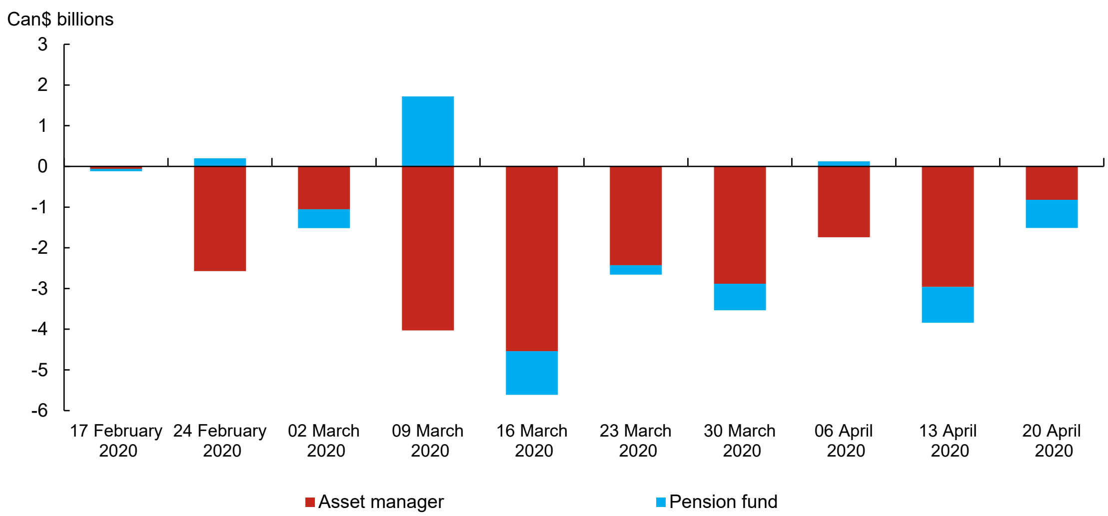
[11] We distinguish these equity purchases from equity sales discussed in the previous section. The purchases increased funds' risk exposure to equities because they were not neutralized with derivatives. Additionally, equity sales occurred in mid-March while portfolio rebalancing was at the end of February and March.

heightened uncertainties about macroeconomic factors and how long the liquidity stress would last. Findings from the interviews also suggest that the rapidity and magnitude of central bank interventions meant that opportunities to take advantage of depressed prices were short lived.

Overall, our findings suggest that the Big Eight took actions to build precautionary liquidity when they faced volatile market conditions and a high degree of uncertainty. They had the capacity to redeploy funds into risky assets and in support of market liquidity. However, they generally deemed that extra prudence was necessary to manage risk on behalf of their sponsors and clients.

**Chart 8: The Big Eight purchased provincial and corporate bonds in early March 2020**

Asset manager compared with pension flows for provincial and corporate bonds

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Source: Market Trade Reporting System 2.0 Last observation: April 20, 2020

## Conclusion

The crisis in March 2020 was an unprecedented macroeconomic shock. But it is also an opportunity:

- for policy-makers to understand the actions of market participants during a crisis
- for market participants to reflect on their risk frameworks and underlying assumptions about market liquidity

By better understanding how market participants react in crisis times, the Bank can improve its analysis of market functioning and potential financial system vulnerabilities. This can, in turn, inform future enhancements to central bank facilities for mitigating market-wide stress. To this end, the Bank has frequent and productive dialogue with the Big Eight. The data they provided for this study were valuable to better understand the March 2020 episode of strained liquidity in several core funding markets.

This study highlights that broader data gaps remain. Policy-makers would benefit from ongoing access to timely, comparable and granular data on asset holdings and leverage across a range of important market participants. This data would enhance our ability to estimate the potential total liquidity demand in core markets during crises and the types of collateral that could be used to seek that liquidity. It would also help support authorities' understanding of the robustness of current market arrangements and the underlying connections between different market participants.

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