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A Review of the Bank of Canada's Market Operations Related to COVID-19

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Abstract

The economic lockdowns that began in March 2020 in response to the COVID-19 pandemic led to an unparalleled level of financial market disruption. Investors sought liquidity by selling financial assets and drawing down loans and credit lines. The speed, scale and one-way nature of these transactions caused an almost complete breakdown of market functioning. In response, the Bank of Canada launched 10 extraordinary programs, 9 of which had never been used before, to restore market functioning. As market conditions improved, 9 of the 10 programs were wound down. One, the Government of Canada Bond Purchase Program, was continued and transitioned into a monetary policy tool. In general, most of the programs were well designed and effectively executed—an impressive achievement given the circumstances under which they were conceived, developed and deployed. The extreme level of uncertainty and the magnitude of the downside risks to economic and financial activity warranted an aggressive response. Going forward, however, several areas exist where program design and implementation could be changed if these programs ever need to be used again. Overall, the design and implementation recommendations for future interventions focus on the need to ensure the programs are appropriately structured, in terms of both size and duration, for the financial and economic circumstances. Given the speed with which the outlook can change, program parameters must be flexible, and the Bank must be nimble in making the necessary adjustments.

Topics: Coronavirus disease (COVID-19); Financial markets; Financial stability
JEL codes: D47, E41, E5, G01, G14, G21, G23, H12

Overview

The economic lockdowns that began in March 2020 in response to the COVID-19 pandemic set off an unparalleled level of financial market disruption. A dash for cash led all manner of investors to seek liquidity by selling financial assets and drawing down loans and credit lines. The speed, scale and one-way nature of these transactions caused an almost complete breakdown of market functioning in most major jurisdictions. In response, the Bank of Canada intervened aggressively across a range of financial markets, as did the central banks of most other advanced economies. The Bank launched 10 extraordinary programs, 9 of which had never been used before, to restore market functioning. The 10 programs are:

- the Bankers' Acceptance Purchase Facility (BAPF)
- incremental Government of Canada treasury bill purchases (TBILL)
- the Provincial Money Market Purchase Program (PMMP)
- the Commercial Paper Purchase Program (CPPP)
- the Government of Canada Bond Purchase Program (GBPP)
- the Canada Mortgage Bond Purchase Program (CMBP)
- the Provincial Bond Purchase Program (PBPP)
- the Corporate Bond Purchase Program (CBPP)
- the extended term repo facility (ETRF)
- the Contingent Term Repo Facility (CTRF)

As market conditions improved, 9 of the 10 programs were wound down. One, the GBPP, was continued and transitioned to serve a monetary policy function. This program was ultimately discontinued in April 2022.

In general, most of the programs were well designed and effectively executed. This is particularly remarkable given the circumstances under which they were conceived, developed and deployed. The programs were appropriately targeted and generally well received by market participants. They were all associated with a significant improvement in market functioning.[1]

These aggressive interventions were warranted given the extreme level of uncertainty and the magnitude of the downside risks to economic activity and the financial system. Going forward,

[1] A full quantitative assessment of the impact of all the programs is beyond the scope of this paper. However, both qualitative observations and market commentary suggest that the programs had (to varying degrees) positive impacts on market conditions. In some cases, this may have simply been the announcement effect, while in others it was a more direct impact of actual purchases (BAPF, GBPP, ETRF). It is also important to acknowledge that Canadian financial markets benefited from the programs launched by other central banks (most notably those of the Federal Reserve).

however, several areas exist where program design and implementation could be changed should these programs ever be needed again.

Key recommendations focus on two areas. The first is to provide increased clarity about a program's objectives when it is being launched. This entails identifying what market failure must be addressed, how the program will improve the situation, and under what conditions the program will be stopped. While most programs provided sufficient clarity beforehand, a few—notably the GBPP, the ETRF, the PBPP and the CMBP—had sufficiently vague objectives that they likely continued to operate longer than strictly necessary (i.e., after the underlying objective had been accomplished).

The second broad recommendation is to ensure that every program has sufficient flexibility to be able to be wound down when appropriate. While many of the Bank's market functioning programs were structured to wind down automatically once conditions improved, some—notably the GBPP, the PBPP and the CMBP—relied on the Bank's judgment and internal forecasts rather than on observable market conditions. As a result, these programs may have run longer and grown larger than was necessary.

The GBPP raised an unusual challenge as it transitioned from a market functioning program into a monetary policy tool. The initial program parameters were appropriate to support market functioning, but the transition to a monetary policy tool provided an opportunity to re-evaluate the program's structure and make suitable changes. Monetary policy tools rely far more on the Bank's internal forecasts than on observable market conditions (policy programs cannot readily be designed to automatically wind down when conditions improve). The inherent uncertainty around forecasts suggests that a more graduated and flexible approach to program size might be preferable for monetary policy programs.

Context and the policy response

The COVID-19 pandemic that began in March 2020 and the associated large-scale economic lockdowns caused an immediate dash for cash as both businesses and households looked for sufficient liquidity to survive the extended period of uncertainty. This led to a sharp increase in the demand for loans (and the drawing down of existing lines of credit) and one-way transactions in securities markets as participants sold any financial asset they could to move into cash. The scale and one-way nature of these flows caused extreme disruption in financial markets—many core funding markets (including that for Government of Canada securities and short-term commercial bank funding) almost completely seized. The speed, breadth and depth of the global financial market turmoil were unparalleled. To prevent a near-total market shutdown and a far worse economic outcome, central banks intervened in a range of markets on a historically large scale. The Bank of Canada was no exception, rolling out its 10 programs within a period of roughly one month.

This paper reviews the programs the Bank launched to address the pandemic-related market stresses. Programs covered three broad areas: money market purchase facilities, bond purchase facilities and term funding facilities. **Table 1** outlines the details of the various facilities.

Table 2: Targeted markets

Program name	Objective	Pricing mechanism	Start date	Initial size	Peak usage	Termination date
Bankers' Acceptance Purchase Facility	To support the continuous functioning of financial markets	Competitive reverse auction—penalty pricing at overnight index swap (OIS) rate plus 20 basis points (bps)	March 23, 2020	No pre-set maximum for the aggregate program size	Holdings peaked at approximately $39 billion on April 8, 2020.	Usage fell to $0 on May 4, 2020. The Bank of Canada announced on June 3, 2020, that the program would continue until the end of October 2020. Actual termination date was October 26, 2020.
Incremental Government of Canada treasury bill purchases	To support a liquid and well-functioning market for short-term Government of Canada (GoC) borrowing (though this was never stated publicly)	Non-competitive purchases at auction	April 21, 2020	Purchases increased from the typical 25% of each auction to a maximum of 40% No pre-set maximum for the aggregate program size	Holdings peaked at $140 billion on July 29, 2020.	The Bank returned to a more normal participation rate of 20% in July 2020 and to 10% in September 2020. All purchases ended November 24, 2020.
Provincial Money Market Purchase Program	To support a liquid and well-functioning market for short-term provincial borrowing	Non-competitive purchases at auction	March 24, 2020	40% of each offering of directly issued provincial money market securities No pre-set maximum for the aggregate program size	Holdings peaked at $7.6 billion on June 24, 2020. Holdings fell to $0 by November 10, 2021.	Participation declined to 20% in July 2020 and to 10% in September 2020. The program ended November 24, 2020.
Commercial Paper Purchase Program	To support the flow of credit to the economy by alleviating strains in commercial paper markets	Penalty pricing at variable spreads—typically around OIS plus 130 bps or OIS plus 160 bps	April 2, 2020, for a period of 12 months	No pre-set maximum for the aggregate program size	Holdings peaked at $3 billion on April 29, 2020. Holdings fell to $0 by July 29, 2020.	Program ended April 2, 2021.

Program name	Objective	Pricing mechanism	Start date	Initial size	Peak usage	Termination date
Government of Canada Bond Purchase Program	Initially, to address strains in the GoC bond market and to enhance the effectiveness of other actions taken to support core funding markets As of June 2020, to provide additional monetary policy stimulus	At market prices based on competitive reverse auctions	March 27, 2020	Initial target size of a minimum of $5 billion in purchases per week No pre-set maximum for the aggregate program size	Holdings peaked at about $300 billion in November 2021. Total GoC holdings peaked at about $435 billion in December 2021.	Began to reduce purchase sizes in October 2020. Stopped net new purchases in October 2021. The Bank stopped all purchases in April 2022.
Canada Mortgage Bond Purchase Program	To support the Canada Mortgage Bond market and the ability of financial institutions to finance mortgage lending to homeowners	Fixed-price twice-weekly tenders—bid price set by the Bank based on market conditions	March 17, 2020	No pre-set maximum for the aggregate program size	Holdings were $9 billion when the program ended.	The program ended on October 26, 2020.
Provincial Bond Purchase Program	To support the liquidity and efficiency of provincial government funding markets by purchasing bonds through a tender process in the secondary market (supplements the Provincial Money Market Purchase Program)	Market pricing—objective was to purchase at the bid side of the market	May 7, 2020, for a period of 12 months	$50 billion	Holdings were $19 billion when the program ended.	The program ended on May 6, 2021.
Corporate Bond Purchase Program	To support the liquidity and proper functioning of the corporate debt market by purchasing bonds through a tender	Backstop pricing—target price was slightly cheaper than the estimated	May 26, 2020, with a stated duration of 12 months	$10 billion	Holdings peaked at $218 million in March 2021.	The program ended on March 25, 2021.

Program name	Objective	Pricing mechanism	Start date	Initial size	Peak usage	Termination date
	process in the secondary market	bid side of current market				
Extended term repo facility	To support commercial bank funding conditions	Competitive tender process—minimum bid rate set to target for the overnight rate	March 12, 2020: initial announcement March 18, 2020: list of eligible securities expanded March 20, 2020: frequency increased to biweekly March 23, 2020: Eligible securities expanded to include bankers' acceptances and bearer deposit notes April 21, 2020: terms extended to 24 months	No pre-set maximum for the aggregate program size	Holdings peaked at approximately $210 billion in June 2020.	The program was suspended on May 10, 2021.
Contingent Term Repo Facility	To counter any severe market-wide liquidity stresses and support the stability of the Canadian financial system	Penalty pricing set at OIS plus a minimum spread of 35 bps	April 6, 2020, for a period of 12 months	No pre-set maximum for the aggregate program size	No usage (small test trades only)	The program was suspended on April 6, 2021.

Source: Bank of Canada

Two programs stand out for their scope, the extent of their usage, and the economic and financial impact they had: the ETRF and the GBPP. Both programs also evolved over time and deserve a more detailed explanation.

Extended term repo facility

As highlighted earlier, one of the immediate consequences of the economic shutdown associated with the COVID-19 pandemic was an unprecedented dash for cash—households, firms and investors not only sold financial assets but also drew down committed lines of credit to the full extent possible (fearing that these credit lines would be cut in the future). This sharp and sudden drawdown of committed credit lines left commercial banks with a tremendous amount of funding to be done at the exact time that their access to funding markets was essentially shut down.

In response, the Bank extended its term repo facility. Specifically, the Bank added 6-month and 12-month repos to the regular 1- and 3-month operations and increased the size of the operations. The eligible securities initially remained restricted to securities issued, or guaranteed, by the Government of Canada or a provincial government. As the scale of the funding requirements and the collateral constraints the banking system faced became apparent, however, the Bank quickly enlarged the program. The changes included holding more frequent operations of larger sizes with longer terms to maturity and a greatly expanded list of eligible securities. Notably, the list of eligible securities was increased to include covered bonds, bankers' acceptances and bearer deposit notes that were issued by the pledging institution (own-name securities). The Bank had used a similar facility during the 2008–09 global financial crisis, referred to as term purchase and resale agreements (PRA) transactions. Term PRA usage, however, was much smaller and peaked at roughly $37 billion in January 2009.

Uptake of the ETRF by the banking system was large and rapid. By June 2020 (less than three months after the program's launch) use of the ETRF had peaked at just over $210 billion and term repos were the largest asset held on the Bank's balance sheet. As funding conditions improved, usage of the facility declined; by late June 2020, the stock of term repos outstanding had begun to shrink. As well, the Bank tightened some of the terms of the ETRF. Effective June 2020, the frequency of the operations was reduced from twice per week to once per week, and bankers' acceptances and bearer deposit notes were excluded from the list of eligible securities. The Bank further modified the ETRF in October 2020, changing the frequency of operations back to biweekly and narrowing the pool of eligible securities to include only securities directly issued or explicitly guaranteed by the Government of Canada or a Canadian province (the pre-crisis policy). With improving funding conditions and reduced eligible securities, usage declined sharply.

Given the minimal uptake by June 2020 and the relatively short terms to maturity of the operations, the size of the program declined rapidly. By May 2021, the stock of term repos

outstanding had fallen by almost 85% and stood at just under $35 billion. By June 2022, it had fallen to less than $1 billion.

The program was suspended in May 2021.

Government of Canada Bond Purchase Program

The liquidation of financial assets that took place in March 2020 also led to severe dislocations in the government bond market. This is very unusual, as government bonds are typically a "flight-to-safety" asset and see an increase in demand and trading activity during periods of extreme uncertainty. However, this was not the case initially in March 2020. Government bond markets across the world (including the US Treasury market) became extremely illiquid. Notwithstanding expectations for decreases in policy rates, bond yields moved higher as risk premiums increased sharply.[2]

A liquid and well-functioning government bond market is necessary for both the proper functioning of the broader financial system and the effective implementation of monetary policy. Therefore, the Bank moved quickly to try to improve conditions in the Government of Canada bond market. The initial response was to expand the government's existing bond buyback program. On March 12, 2020, the Bank announced that, as fiscal agent, it would begin to conduct buybacks, on both a cash and a switch basis, across all benchmark maturity sectors.[3] This was intended to add market liquidity and to support price discovery, particularly for off-the-run issues. These buybacks were being conducted on behalf of the federal government, so there was no impact on the Bank's balance sheet.

As it became clear that the scale of these operations was not sufficient to address the dislocations in the Government of Canada bond market, the Bank replaced the fiscal agent buyback program with a secondary market bond purchase program—the GBPP. This was announced on March 27, 2020, with the effective start date being April 1, 2020. The stated objective of this program was to address strains in the Government of Canada bond market and to enhance the effectiveness of all other actions the Bank had taken. Given the scale of the market dislocations and the importance of restoring liquidity, the size of the program was set at a minimum of $5 billion per week. This was materially larger than the fiscal agent buybacks the GBPP replaced.[4] The Bank also announced that, while the program would be adjusted as conditions warranted, it would continue until the economic recovery was well underway.

By the end of the second quarter of 2020, conditions in the Government of Canada bond market had improved dramatically. Flows had become much more balanced (rather than the one-way selling that dominated in late March and early April), yields moved closer to their fundamental values, and the various measures of market liquidity had returned to more normal

[2] Fleming and Ruela (2020) discuss the liquidity breakdown in the US Treasury market during March 2020.

[3] Prior to this announcement, buybacks had been conducted only quarterly on a switch basis in the 30-year sector.

[4] Four switches of $500 million each were conducted between March 19, 2020, and March 20, 2020.

(pre-pandemic) levels.[5] The GBPP was no longer needed from a market functioning perspective. The Bank acknowledged this improvement in market conditions at the time of the June 2020 interest rate decision and announced that the focus of the GBPP would shift from market functioning to monetary policy. The GBPP moved to become a quantitative easing program. Specifically, the Bank said its "…focus will shift to supporting the resumption of growth in output and employment," and the Bank committed to maintaining purchases until "the economic recovery is well underway" (Bank of Canada 2020a). The size of the program remained at $5 billion per week.

As economic conditions improved, the Bank gradually reduced the weekly level of purchases. The target amount was reduced to $4 billion in October 2020, to $3 billion in April 2021 and to $2 billion in July 2021.[6] The Bank ended quantitative easing in October 2021, reducing purchases to a level that was sufficient to replace maturing bonds. In April 2022, the Bank stopped all purchases of government bonds and began a program of quantitative tightening.

Intervention principles

As outlined in Engert, Selody and Wilkins (2008), central bank interventions should be conducted only when there is an identifiable market failure and when significant financial instability can be avoided or lessened without unduly distorting the pricing of credit and liquidity risks. While these criteria were aimed at interventions intended to support market functioning or financial stability, they can be broadly adapted for interventions to support monetary policy objectives as well.

Engert, Selody and Wilkins (2008) identify five principles that should guide the use and design of central bank intervention programs. Such programs should:

- target market failures that are of system-wide importance
- be designed to be well-suited to the problem
- be graduated and commensurate with the severity of the problem
- be efficient and non-distortionary
- mitigate moral hazard

I use these principles to evaluate the design and implementation of the various pandemic-related facilities that were introduced. While the central bank is not a profit-maximizing entity, this review will also consider—and look to mitigate, where possible—any excessive financial risks to the Bank that could arise from the interventions.

[5] For example, the yield on short-term Government of Canada bonds had traded as wide as 30 basis points above the equivalent overnight index swap yield at the peak of the market stress in March 2020. This spread returned to its long-term average of roughly zero by July 2020.

[6] The initial reduction from $5 billion to $4 billion was characterized as a recalibration. While the gross amount of purchases was reduced, the average term of purchases was extended such that the net duration purchased each week did not change.

The program assessment must be done in the context of the pandemic. In particular, two key considerations need to be kept in mind.

The first is a structural change in Canadian financial markets. Asset managers and other non-bank financial institutions (NBFIs) have grown significantly since 2008. The increase in the relative size of these entities combined with regulatory changes to the banking sector meant that the traditional market makers (bank-owned primary dealers) were less able or willing to provide the amount of liquidity demanded by the NBFI sector.[7]

The second consideration is circumstantial. The scale, severity and global nature of the pandemic shock are unique among financial crises. Governments across the world moved to shut down much of the discretionary economic activity in an effort to limit public health consequences. The impact on financial markets of this sudden stop in economic activity required a large and rapid policy response. The fast pace needed for the policy response made designing and governing the facilities challenging. Ideally, the design of each facility would have benefited from broad internal consultation and discussion and an appropriate challenge function. In practice, the need to roll out facilities extremely quickly, combined with the fact that most staff and senior management were working remotely, meant that decisions were taken relatively quickly and often by a small group of people.

Assessment

In this section, I evaluate the programs listed in **Table 1** against the five principles outlined above.

1. Target market failures that are of system-wide importance

Each of the programs was designed to address severe stresses in specific markets (**Table 2**).

Table 2: Targeted markets

Targeted market	Program
Government of Canada debt market	Government of Canada Bond Purchase Program Incremental Government of Canada treasury bill purchases
Mortgage funding	Canada Mortgage Bond Purchase Program
Provincial debt markets	Provincial Money Market Purchase Program Provincial Bond Purchase Program
Corporate debt markets	Commercial Paper Purchase Program Corporate Bond Purchase Program
Commercial bank funding markets	Bankers' Acceptance Purchase Facility

[7] In the United Kingdom, European Union and United States, the size of the sovereign bond market has recently exceeded the assets of the bank-owned dealers who intermediate these markets. This suggests capacity limitations for dealer intermediation (Hauser 2021; Duffie 2020).

Targeted market	Program
	Extended term repo facility
Non-bank financial institution funding	Contingent Term Repo Facility

Given the heightened demand for liquidity from all sectors of the economy and the near-total breakdown in market functioning, I assume that each of the 10 facilities, at least initially, targeted a market failure of systemic importance that could have had severe macroeconomic consequences. Both issuers and investors rely on these markets to raise cash and provide collateral. Maintaining sufficient market liquidity in these markets during times of significant stress is critical to preventing broad spillovers into the real economy.

2. Be designed to be well-suited to the problem

There are two aspects to this principle. The first is whether the programs were effective in alleviating the stresses in their target markets. While a full examination of the impact of every pandemic-era program is beyond the scope of this review, evidence, both empirical and anecdotal, does show that the facilities were effective at improving market functioning.[8] Liquidity improved materially in both primary and secondary government, provincial and corporate markets. Credit spreads across all assets involved in purchase programs tightened significantly, generally returning to (or close to) their pre-pandemic levels by the third quarter of 2020. In this regard, the programs were effective at addressing the problem of severe market dislocations across almost all key funding markets.[9]

The second aspect of this principle concerns the degree of clarity around the objectives of each program: Did the Bank, in its internal and external communications, clearly identify what market failures or stresses each program was intended to address and how programs would achieve these objectives? Best practice is to document the objectives, targeted channels and beneficiaries of each program. In this regard, the assessment is more mixed (**Table 3**).

Table 3: Program objectives

Program	Stated objective	Evaluation
Bankers' Acceptance Purchase	The objective was broadly defined as supporting the continuous functioning of financial markets. The bankers' acceptances	The objective could have been more narrowly focused. Communications could have specified that the objective was to support

[8] Anecdotal evidence is based on primary dealer and commercial bank treasurer commentary, the Financial System Survey (Bank of Canada 2020b and Bank of Canada 2021), and the observations made by Bank trading staff. Empirical evidence includes Arora et al. (2020); Arora et al. (2021); Cimon and Walton (2022); and Fontaine, Ford and Walton (2020). Fernandes and Mueller (2023) provide a quantitative summary of how the various programs impacted the targeted funding markets. Boyarchenko et al. (2020), O'Hara and Zhou (2021) and Gilchrist et al. (2020) provide further evidence of the effectiveness of Federal Reserve facilities in the US market.

[9] Canadian markets also benefited from the positive spillover effects from other jurisdictions, particularly from the Federal Reserve's credit easing programs. Commercial paper and corporate bond market conditions had improved materially by the time the CPPP and the CBPP were launched.

Program	Stated objective	Evaluation
Facility	(BA) market was identified as one of Canada's core funding markets and a key source of financing for small and medium-sized enterprises.	the efficient functioning of the BA market and thereby support funding activity for small and medium-sized corporate borrowers.
Incremental Government of Canada treasury bill purchases	No specific objective was announced. The implied purpose was to support continued liquidity and the efficient functioning of the federal government's treasury bill program.	Communications could have been clearer that this program was intended to restore and support market functioning. The fact that it was announced as part of an interest rate decision press release could have led to its being interpreted as a monetary policy action.
Provincial Money Market Purchase Program	The program was designed to support a liquid and well-functioning market for short-term provincial borrowing.	The objective was well-defined and specific.
Commercial Paper Purchase Program	The objective was to support the flow of credit to the economy by alleviating strains in Canada's commercial paper markets.	The objective was well-defined and specific.
Government of Canada Bond Purchase Program	The initial objective was to address strains in the Government of Canada bond market and to enhance the effectiveness of other actions taken to support core funding markets. The duration of the program, however, was tied to economic conditions. The program was formally shifted to a monetary policy objective in June 2020 and was referred to as quantitative easing in July 2020. At this point the objective changed to lowering borrowing rates for households and businesses. The program's duration was still tied to the same economic criteria.	Communications about this program created some confusion. Initially, the program was targeted at improving market functioning, but the duration was tied to an economic outcome. As a result, whether the objective was simply market functioning or also monetary policy was unclear. Furthermore, the parameters and conditionality of the program did not change once the objective formally shifted to quantitative easing. Clearer communication up front and at the time of the shift to monetary policy support would have helped alleviate any confusion.
Canada Mortgage Bond Purchase Program	This was announced as a proactive measure to support the Canada Mortgage Bond (CMB) market. Operations would continue for as long as market conditions warranted.	Communications could have provided increased clarity about why the program was being introduced. The "proactive" language was not clear. Why was a proactive step necessary? The Bank could have specifically identified what stresses were evident in the CMB market.
Provincial Bond Purchase Program	The objective was to maintain well-functioning provincial funding markets in the face of significant demands for funding as governments implemented their emergency measures.	The objective was well-defined and specific.
Corporate Bond Purchase Program	This program was to support the liquidity and proper functioning of the corporate debt market. A liquid and efficient market for Canadian-dollar corporate bonds	The objective was well-defined and specific.

Program	Stated objective	Evaluation
	allowed companies to continue to obtain necessary longer-dated financing to support their operations, ultimately aiding the Canadian economy. It also strengthened the pass-through of monetary policy actions to borrowers.	
Extended term repo facility	The objective was to proactively support interbank funding markets.	Communications could have provided increased clarity about why the program was being introduced. The "proactive" language was not clear. The objective did not give a clear sense of why the program was needed or provide details about what stresses were visible in interbank funding markets.
Contingent Term Repo Facility	The objective was to counter any severe market-wide liquidity stresses and support the stability of the Canadian financial system.	The objective was well defined and specific.

In general, most of the various programs' objectives were reasonably well defined. As detailed in **Table 3**, however, the objectives for five of the programs (BAPF, CMBP, TBILL, ETRF and GBPP) could have been clearer. This is particularly important because two of these five (ETRF and GBPP) were the largest and most impactful programs launched. Increased clarity as to what market stresses were being targeted, why they were important, and which channels the programs would use to help would have provided greater clarity to both the public and markets. This would also have helped provide information about circumstances under which the programs would be wound down.

3. Be graduated and commensurate with the severity of the problem

The scale of any intervention should align with the severity of the problem. The program needs to be sufficiently large to meet its objectives. However, the central bank faces risks from intervening too early, too aggressively or for too long. Specifically, these risks include:

- overshooting the Bank's objectives—providing too much support and raising asset prices beyond fundamental valuations
- creating a moral hazard by having the market come to rely on central bank interventions
- increasing the Bank's operational risk
- creating the potential for negative confidence effects if the Bank is seen as overreacting
- significantly increasing the Bank's financial risk

Given the large scale and rapid pace of the pandemic-related shock to financial markets, the Bank deemed it appropriate to put less emphasis on gradualism and to be aggressive at the

early stages of intervention but also to have the option of scaling down programs when conditions warranted. Gradualism is, however, an important consideration for all but the most sudden and severe shocks.

Table 4 provides a brief assessment of both the initial and the ongoing scale of each program.

Table 4: Assessment of program size and scale

Program	Size and scale	Assessment
Bankers' Acceptance Purchase Facility	The maximum size of the operation was set at $15 billion in the first week, $20 billion in the second and third weeks, and $10 billion a week thereafter. Given penalty pricing, the actual usage fell sharply after that, reaching $0 in the seventh week.	Well-designed. Sufficient scale when market was stressed, but program was downsized as conditions improved.
Incremental Government of Canada treasury bill purchases	Bank of Canada participation increased from 25% to 40% initially. Then it decreased to 20% in July 2020, 10% in September 2020, 7% in February 2021, 5% in March 2021 and 0% in April 2021.	Well-designed. Initial scale was necessary to deal with massive increase in treasury bill issuance and associated market stresses. Reduced as market funding improved.
Provincial Money Market Purchase Program	Initial participation was at 40% of each operation. This was reduced to 20% in July 2020 and 10% in September 2020. The program ended in November 2020.	Well-designed. Initial scale was necessary to deal with massive increase in provincial funding requirements and heightened concern around provincial credit quality (health care costs).
Commercial Paper Purchase Program	The initial size was not capped; rather, participation was constrained by penalty pricing and individual issuer limits.	Difficult to assess. By the time the program got started, market conditions had improved sufficiently that usage was relatively small.
Government of Canada Bond Purchase Program	The program started at a minimum of $5 billion per week when it was targeted at market functioning. It remained at $5 billion a week as it transitioned to quantitative easing. The program was then scaled back as economic conditions improved.	Appropriate initial size given severe market dislocations. Once market functioning improved and program shifted to monetary policy objective, the program parameters and design could have been reviewed.
Canada Mortgage Bond Purchase Program	The initial size was up to $500 million per week. Purchases fell to about $300 million in June 2020 and then ranged between $100 million and $200 million per week until the program halted in October 2020.	Appropriate initial size to deal with spike in risk aversion and potential need to increase issuance. However, market conditions normalized by May 2020. Program size could have been reviewed and potentially adjusted lower at that point.
Provincial Bond Purchase Program	The program was announced for a fixed duration of one year and a maximum size of $50 billion. Actual weekly purchases varied depending on market conditions. Initial weekly purchases ranged between $500 million and $900 million then fell to between $250 million and $400 million in August 2020. Usage fell to about $100 million in March 2021.	Appropriate initial size to deal with spike in risk aversion and lack of primary and secondary market activity. Conditions normalized by August 2020, however. Term of program could have been reviewed and potentially shortened at that point.

Program	Size and scale	Assessment
Corporate Bond Purchase Program	The program was announced for a fixed duration of one year and a maximum size of $10 billion. Actual weekly purchases varied depending on market conditions. Given the back-stop nature of the pricing, uptake was very low. Peak usage was about $30 million per week in June 2020.	Difficult to assess. By the time the program got started, the combination of penalty pricing and improved market conditions meant that usage was relatively small.
Extended term repo facility	The Bank's existing term repo facility was expanded as market conditions warranted. The first step was to increase the terms (include 6 and 12 months) and size. Subsequent adjustments included larger operations (up to $9 billion per operation), increased frequency (twice a week), longer terms (up to 2 years), and an expanded pool of eligible securities (ultimately including own-name securities). As conditions improved, terms were tightened beginning in June 2020. The program was suspended in October 2020.	The scale was appropriate for the market conditions. The modalities of the program were adjusted over time to reflect the scale of commercial bank funding needs and market access. While most changes were appropriate for the conditions, the range of eligible securities may have been widened too much (own-name bearer deposit notes), particularly given that no penalty pricing was associated with lower-quality securities. The relaxation of terms was, however, reversed relatively quickly as conditions improved.
Contingent Term Repo Facility	There was no formal limit on the facility's size. Actual usage was constrained by penalty pricing. The program was announced with a fixed duration of one year.	Difficult to assess. By the time the program was activated, market conditions had improved sufficiently that there was no usage.

The programs were generally launched with an aggressive scale. Given the nature of the shock, the degree of economic uncertainty and, likely, the context that central banks may have been too slow to react to prior crises (and too quick to scale back stimulus), this was appropriate. A key factor, however, was the ability to scale down the programs sufficiently quickly once they were no longer needed. For those market functioning programs that had penalty pricing (BAPF, CPPP, CBPP and CTRF) this happened naturally as conditions improved. For others, the Bank either was constrained by pre-committed timelines (for example, a minimum one-year duration for the PBPP) or may have been reluctant to scale back the size of the programs for other reasons, such as fear of causing market dislocation or concerns about economic impact (CMBP and GBPP).[10] In particular, adjustments to the structure, pace and scale of the GBPP could have been considered as it transitioned from market functioning to monetary policy.

Overall, the programs could have benefited from increased flexibility. In the future, the scale and scope should be tied to market conditions where possible (through penalty pricing), and fixed time commitments should be avoided (or at least made relatively short with the option to extend). For the GBPP, the initial rapid pace of purchases was necessary to address market functioning, but improving market conditions and the shift to a monetary policy objective

[10] While the CTRF had a fixed duration of one year, the combination of improved market conditions and penalty pricing meant that (outside of test transactions), the [program/facility?] was never used.

provided an opportunity to revisit both the structure and the scale of the program. In terms of structure, the Bank could have considered shifting from a flow target to a maximum stock target; for scale, the question was whether $5 billion a week was still appropriate given improved market conditions.

4. Be efficient and non-distortionary

Interventions should be conducted at market-determined prices to minimize distortions. This is best accomplished through an auction mechanism. Auctions generally result in more efficient pricing and can also reduce any stigma associated with participating in the operation. For programs targeted at improving market functioning, the central bank should consider reserve (or penalty) pricing so that the minimum bid rate is unattractive under normal market conditions. This helps to ensure that use of the various facilities naturally winds down as conditions improve. **Table 5** outlines the pricing mechanisms for the 10 facilities.

Table 5: Pricing mechanisms

Program	Pricing mechanism	Penalty pricing	Participation
Bankers' Acceptance Purchase Facility	Reverse auction	Yes	Primary dealers
Incremental Government of Canada treasury bill purchases	Non-competitive bid at auction	No	Direct from issuer
Provincial Money Market Purchase Program	Non-competitive bid at auction	No	Direct from issuer
Commercial Paper Purchase Program	Fixed rate spread to overnight index swap	Yes	Direct from issuer
Government of Canada Bond Purchase Program	Reverse auction	No	Primary dealers
Canada Mortgage Bond Purchase Program	Fixed price bid	No	Primary dealers
Provincial	Tender offer	No	Primary dealers

Program	Pricing mechanism	Penalty pricing	Participation
Bond Purchase Program			
Corporate Bond Purchase Program	Tender offer	Yes	Primary dealers and asset managers
Extended term repo facility	Auction	No	Primary dealers
Contingent Term Repo Facility	Bilateral standing facility	Yes	Market participants with significant activity in Canadian-dollar fixed-income or money markets

Five of the programs under review were conducted using an auction mechanism. The others did not use auction mechanisms generally because of specific market characteristics that would have made auctions operationally difficult. For example, the very large potential universe of securities eligible for the PBPP, CBPP and CPPP would have made constructing an auction extremely difficult. The process of primary dealers tendering securities to the Bank and the Bank using a pricing algorithm to select securities to purchase was far more operationally efficient. For the CTRF, the bilateral nature of the transactions likewise made an auction process inappropriate. For the CMBP, systems constraints made the use of a reverse auction process difficult.

The broad use of an auction mechanism in conducting these five programs was appropriate. However, only four of the programs were structured with penalty pricing—that is, pricing that is attractive during times of stress but uneconomical as market functioning returns to normal. This structure has several benefits, including reducing moral hazard, disincentivizing the use of the facilities as conditions improve, and reducing financial risks to the Bank. The BAPF, CPPP and CBPP all had penalty pricing. To varying degrees, these programs saw their peak usage from April to June 2020. As conditions improved, usage fell to essentially zero by August 2020. After this, the programs served as a backstop. Apart from test transactions, the CTRF was never actually drawn upon; it served only as a backstop.

Penalty pricing was not appropriate for some of the remaining programs. The GBPP, once it transitioned to a monetary policy tool, had to be conducted at market prices to have its desired effect on longer-term interest rates. The money market programs (TBILL and PMMP) had pricing based on average (TBILL) or highest (PMMP) accepted yields at auction. To structure these with penalty prices would have been operationally complex. And, given the very short-term nature of the assets purchased, the financial and moral hazard risks were relatively low.

The PBPP and CMBP were medium-sized programs with peak usage of about $19 billion and $10 billion, respectively. They continued to be active and purchase assets well past the point that the functioning of high-quality credit markets had significantly improved. Both programs could have benefited from more punitive pricing, with a discount applied to either actual market prices (e.g., purchasing slightly cheaper than the indicative bid levels) or relative to historical averages (e.g., capping the bid price at pre-pandemic spreads plus a buffer). This would have facilitated an earlier exit from the programs.

The ETRF could also have benefited from more punitive pricing, particularly for lower-quality securities.

A final point with regard to the efficiency of the programs concerns their operational design and implementation. Specifically, were there legislative constraints, systems and operational limitations, or staffing issues that impeded the effective implementation of these programs? **Table 6** summarizes any constraints the Bank faced in implementing the various programs.

Table 6: Program constraints

Program	Operational and systems limitations	Legal constraints	Skill set
Bankers' Acceptance Purchase Facility	None	Program had to be posted in the *Canada Gazette*	Sufficient internal expertise existed
Incremental Government of Canada treasury bill purchases	None. Standard non-competitive auction bid	None	Sufficient internal expertise existed
Provincial Money Market Purchase Program	None. Non-competitive bid at high yield at auction	None	Sufficient internal expertise existed
Commercial Paper Purchase Program	Significant. Operation was outsourced	None	Internal expertise was lacking
Government of Canada Bond Purchase Program	Initial moderate system limitations in the front, middle and back office. Gaps have been addressed.	None	Sufficient internal expertise existed
Canada Mortgage Bond Purchase	Moderate systems and operational constraints meant operations were	None	Sufficient internal expertise existed

Program	Operational and systems limitations	Legal constraints	Skill set
Program	conducted at fixed price via Bloomberg terminal.		
Provincial Bond Purchase Program	Significant. Operation was outsourced.	None	Internal expertise was lacking
Corporate Bond Purchase Program	Significant. Operation was outsourced.	None	Internal expertise was lacking
Extended term repo facility	None	None	Sufficient internal expertise existed
Contingent Term Repo Facility	None	Participants needed to complete an application and sign the Bank of Canada's legal agreement	Sufficient internal expertise existed

As **Table 6** shows, the Bank faced differing degrees of constraints in rolling out the various programs. Some, such as treasury bill purchases, PMMP, BAPF and the ETRF, were relatively straightforward to implement. The GBPP faced some initial system constraints, although those were subsequently addressed. Any future government bond purchases will face no system limitations. The most significant limitations were for the credit easing programs—PBPP, CBPP and CPPP. These raised significant systems issues and also posed challenges with the degree of internal expertise available to source and price securities. These problems were addressed through outsourcing the programs. Given the cost of making the necessary system changes, the challenges with developing and keeping the necessary level of staff expertise, and the (likely) infrequent need for such programs in the future, outsourcing will probably continue to be the preferred means of implementing credit easing.

5. Mitigate moral hazard

Market interventions should be designed to minimize moral hazard. However, the measures put in place to reduce this risk should not be so severe as to unnecessarily impede the effectiveness of the intervention. A balance must be found between achieving the objectives of the intervention and mitigating the effects of moral hazard.

A key means of reducing the risk of moral hazard is to intervene only during times of extreme stress and to stop once market functioning has sufficiently recovered. Stopping a program can be done either through penalty pricing (so that the program becomes unattractive once conditions improve) or by a decision of the central bank (when it judges conditions have sufficiently improved). Penalty pricing is the preferred option because program usage

automatically declines as conditions improve, but it is not always feasible. For programs that will be conducted at market prices, the Bank should, before implementation, establish and communicate a well-defined set of criteria that would trigger exit. Where penalty pricing is not possible, the Bank should consider launching programs with a relatively short initial duration (for example, three months), after which an active decision to either extend the facility or wind it down must be taken.

This analysis of moral hazard focuses on the credit easing programs (**Table 7**). While it is feasible that sovereign government debt purchases could raise moral hazard issues by encouraging the issuance of debt beyond the level that the private market would absorb at a given price, in this review, government borrowing and spending decisions are taken as given.

Table 7: Moral hazard

Program	Evaluation	Recommendations for future programs
Bankers' Acceptance Purchase Facility	The penalty pricing was sufficient to reduce usage to zero as soon as market conditions normalized (one month after the program started).	None
Provincial Money Market Purchase Program	Pricing was set at market rates (the highest accepted yield at auction). No incentive existed for provinces to reduce usage as conditions improved. The Bank of Canada reduced the size of operations as it judged conditions improved. Some borrowers may have become overly reliant on the incremental funding.	Establish clear criteria, either pricing or other auction statistics (coverage, tail, etc.) *ex ante* to determine when exit from the program will occur. Ensure that participants (including issuers) are aware of these criteria. Set an initial duration, after which the program must be either extended or wound down.
Commercial Paper Purchase Program	Pricing was set at a penalty rate. Because of improving market conditions and this relatively punitive pricing, this program saw relatively little usage.	Set a shorter initial time commitment (3 months rather than 12).
Canada Mortgage Bond Purchase Program	Pricing was set at market rates. Purchases continued well after market conditions had improved. Possibly both the issuer and market participants came to expect regular purchases would continue.	Consider backstop pricing (slightly below market bid rate). Establish clear criteria *ex ante* to determine when exit from the program will occur. Ensure that participants (including issuers) are aware of these criteria. Set a relatively short initial duration, after which the program must either be extended or wound down.
Provincial Bond Purchase Program	Pricing was set at market rates. Purchases continued well after market conditions had improved. Possibly both the issuer and market participants came to expect regular purchases to be ongoing.	Consider backstop pricing (slightly below market bid rate). Set a relatively short initial duration, after which the program must either be extended or wound down. Consider *ex ante* conditions to scale back the size of the purchases.
Corporate Bond Purchase Program	Pricing was set at a penalty rate. Because of improving market conditions and this relatively punitive pricing, this program saw relatively little usage.	Set a shorter initial time commitment (3 months rather than 12).

Program	Evaluation	Recommendations for future programs
Extended term repo facility	Pricing was set at market rates, with a minimum bid rate equal to the target for the overnight rate. As the range of eligible securities expanded, however, this pricing provided below-market (cheaper) financing.	Pricing at target for the overnight rate is appropriate for Government of Canada and provincial debt. As the range of eligible securities is expanded to lower-quality assets, pricing should become more punitive. This is particularly true for own-name securities.
Contingent Term Repo Facility	Market conditions had improved by the time the facility was launched. Penalty pricing was such that the facility was never used.	Set shorter initial time commitment (3 months rather than 12).

Programs that were structured with penalty pricing raised few, if any, moral hazard issues. These programs were used during stressful periods, but as market conditions improved, usage declined sharply. The only suggestion for these cases is to shorten the initial time commitment.

In contrast, the programs that used market pricing and relied on the Bank's judgment about when to scale back or stop operations faced more significant moral hazard issues. In some cases, an initial commitment to (overly long) durations of the programs may have impeded the Bank's ability to scale the programs back. In other cases, the Bank's desire to avoid the perception of premature exit may have caused it to delay stopping the programs.

In general, any future programs that are conducted at market pricing should include a description of the market conditions under which the program would be wound down (or under which pricing would be reverted to a backstop level). These conditions should ideally be quantitative and measurable and should be communicated when the program is launched. While including a minimum duration may be desirable as a means of providing more certainty to participants, that duration should be relatively short initially, and the Bank should be able to extend it if market conditions warrant.

The ETRF raised a significant moral hazard issue—providing below-market funding for securities that the commercial banks could create themselves through the issuance of bearer deposit notes (and which offered no incremental credit protection to the Bank). This risk can be mitigated in the future by expanding the range of eligible securities only during periods of extreme stress and using penalty pricing to ensure that participants use the broader range of eligible securities only as a last resort.

In general, there is also a risk that the asset purchase programs could give rise to an expectation that the central bank will be quick to play the role of market maker of last resort whenever market conditions deteriorate.[11] Central bank asset purchases are an extremely powerful tool to improve market functioning, and they are an important backstop when the private sector provision of market liquidity freezes. But they need to remain a backstop—used only during

[11] See Sibert and Buiter (2002).

the most severe periods of stress and then carefully designed to wind down automatically as conditions improve.

General conclusions and recommendations

In general, the programs related to the Bank's response to the COVID-19 pandemic were well designed and executed. This is particularly true given the circumstances under which they were designed, developed, and deployed. The programs targeted markets of system-wide importance, they were generally well received by the full range of market participants (investors, banks and primary dealers), and they were all associated with a significant improvement in market functioning.

The extreme level of uncertainty and the magnitude of the downside risks to economic and financial activity warranted an aggressive response. In particular, the Bank put aside the principal of gradualism, moving aggressively in terms of both the speed of deployment and the size of the interventions. Going forward, however, several areas exist where program design and implementation could be changed should these programs ever be used again.

Overall, the design and implementation recommendations focus on the need to ensure the programs are appropriately structured, in terms of both size and duration, for the financial and economic circumstances. Given the speed with which the outlook can change, program parameters must be flexible, and the Bank needs to be nimble in making the necessary adjustments.

Specific design recommendations are as follows:

- **Provide an increased level of clarity about when and under what circumstances the Bank would intervene to support market functioning.**
    - While it would be impossible (and unhelpful) for the Bank to provide specific intervention parameters or thresholds, the Bank should communicate clearly that it will intervene only in times of severe market disruptions in systemically important markets.
    - Central bank interventions for market functioning are backstops and not a regularly available source of liquidity during times of modest stress.
- **At the time a program is launched, clearly define its objectives and the measures that will be used to determine when those objectives have been met.** If a program shifts its objective, carefully assess whether the parameters need to be adjusted.
    - The distinction between programs designed to improve market functioning and those intended to provide monetary policy stimulus must be made clear.
    - The GBPP was initially deployed as a market functioning program. As it shifted to a monetary policy tool, there could have been a review of policy parameters and program structure.
    - In general, market functioning programs should front-load activity. A high initial volume of transactions is necessary to repair market functioning. This is

not necessarily the case for monetary policy, where the effect tends to build over time.

- Asset purchase programs designed for monetary policy objectives could target a maximum stock rather than a flow.
- Some market functioning programs, notably the CMBP and the PBPP, continued to purchase sizeable amounts of securities well past the time that market conditions had normalized. This risked giving rise to a market perception that they were forms of quantitative easing.

- **Reduce reliance on fixed-term horizons for programs and make the duration more state contingent.** If it is desirable to communicate a minimum time horizon for confidence effects, it should be relatively short (e.g., three to six months) with the ability to extend if market conditions warrant.
    - The programs that used penalty pricing (BAPF, CPPP, CBPP and CTRF) wound down earlier or saw lower uptake than those that relied on the Bank's judgment about duration. These penalty-pricing programs successfully addressed the market functioning issues and then ceased to be utilized.
    - Programs whose durations were tied to the Bank's judgment on market conditions tended to run on after market conditions had normalized (in particular, the PMMP, PBPP and CMBP).
        - The use of Bank judgment on market conditions as a determination of program duration should be minimized. Quantitative, observable thresholds should be established and communicated before programs are implemented. Thresholds can be identified in terms of pricing (spreads returning to some pre-crisis level) or activity (transaction volume).
- **For monetary policy (quantitative easing) programs, tie the state contingency to observable (or forecastable) economic indicators.**
    - Even as a market functioning tool, the GBPP's duration was tied to a vague macroeconomic outcome—to continue large-scale asset purchases until the economic recovery is well underway.
    - While this ambiguity did not raise issues early in the program (when it was clear the outcome was far into the future), as economic circumstances improved, it may have led to confusion among market participants about the ultimate timing and magnitude of the program.
    - Tying the duration of a future quantitative easing program to either an initial maximum size or an observable (or forecastable) indicator would help market expectations about the program's size adapt more dynamically to changing circumstances. It would also help the Bank to be nimble in making changes to its programs.
        - Examples of indicators could include the actual or forecasted core inflation rate, the output gap and labour market conditions.

        - The effective use of forecasted indicators depends on the Bank being able to accurately (or at least without bias) forecast those key economic indicators.

- **Take a more punitive approach to the relaxation of the range of eligible securities for repo operations**
    - While relaxing eligibility standards may be necessary to achieve policy objectives, pricing should be adjusted to ensure that lower-quality securities are not funded at inappropriate rates. This generally involves punitive pricing that is acceptable in times of crisis but that quickly becomes uneconomic as conditions improve.
        - In the case of the ETRF, punitive pricing would have helped ensure that own-name securities, if accepted at all, were used only if the institution truly faced a funding squeeze and had no other eligible securities.
    - The Bank may also wish to include more binding concentration limits on private sector securities if pricing alone is seen as insufficient.
- **Continue to outsource programs that require significant expertise that does not naturally reside in the Bank (credit easing).**
    - Given the extremely infrequent nature of credit market operations and the specialized skill set needed to conduct such operations, it does not make sense for the Bank to permanently staff for such programs.[12]
    - The Bank should continue to rely on outsourcing such programs in the future.
    - Implementation can be simplified by creating an on "off-the-shelf" mandate based on the pandemic facilities (with appropriate adjustments).

[12] While credit easing was contemplated during the 2008–09 global financial crisis, the COVID-19 pandemic is the only time the Bank has purchased provincial and private sector debt.

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