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Abstract

This paper is an analysis of important considerations for policymakers seeking to establish a market support program (MSP). Our main purpose is to assist policymakers who have already made the decision to use an MSP in designing the most effective program possible. Our insights derive from 23 case studies the Yale Program on Financial Stability produced and existing literature on the topic.

By the onset of the Global Financial Crisis (GFC), market-based finance and traditional banking systems were significantly intertwined, and the panic in market-based finance threatened to spread quickly to both traditional banks and the real economy. In response, authorities in several advanced economies rolled out MSPs to ease the stress in wholesale-funding markets. In an earlier study, we surveyed 19 of these GFC-era programs along with two pre-GFC programs of similar design.

The GFC programs were just a prelude, however, as central banks established or revived a variety of MSPs during the early months of the COVID-19 crisis. Many countries in both advanced and emerging markets acted quickly to improve liquidity and restore confidence in critical funding markets, as well as restart the flow of credit to households and businesses.

In our review of these cases, we identified four major themes: (1) speed is important in the acute phase; (2) clear communication is a valuable policy tool in the acute phase, as announcement effects can be powerful; (3) combining MSPs with backup fiscal support can be a valuable tool; and (4) the use of a special purpose vehicle to house and manage the assets obtained through the program from the markets can be beneficial.

Keywords: market-based finance, market-maker, market support, wholesale funding

[1] This survey explores part of the Yale Program on Financial Stability (YPFS) selection of New Bagehot Project modules considering the responses to the COVID-19 crisis that pertain to market support programs. Cases are available from the *Journal of Financial Crises* at https://elischolar.library.yale.edu/journal-of-financial-crises/.

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Introductory Note: This survey is an analysis of important considerations for policymakers seeking to establish a market support program (MSP). It is based on insights derived from case studies of 23 specific MSPs the Yale Program on Financial Stability has completed and from the existing literature on the topic. Although this survey can help inform a decision about whether to establish an MSP, our main purpose is to assist policymakers who have already made that decision in designing the most effective program possible. In analyzing the programs that are the focus of this survey, we used a color-coded system to highlight certain particularly noteworthy design features.

Color	Meaning
BLUE – INTERESTING	A design feature that is interesting and that policymakers may want to consider. Typically, this determination is based on the observation that the design feature involves a unique and potentially promising way of addressing a challenge common to this type of program that may not be obvious. Less commonly, empirical evidence or a consensus will indicate that the design feature was effective in this context, in which case we will describe that evidence or consensus.
YELLOW – CAUTION INDICATED	A design feature that policymakers should exercise caution in considering. Typically, this determination is based on the observation that the designers of the feature later made significant changes with the intention of improving the program. Less commonly, empirical evidence or a consensus will indicate that the design feature was ineffective in this context, in which case we will describe that evidence or consensus.

This highlighting is not intended to be dispositive. The fact that a design feature is not highlighted or is highlighted yellow does not mean that it should not be considered or that it will never be effective under any circumstances. Similarly, the fact that a design feature is not highlighted or is highlighted blue does not mean that it should always be considered or will be effective under all circumstances. The highlighting is our subjective attempt to guide readers toward certain design features that (1) may not be obvious but are worth considering or (2) require caution.

Introduction

In the past few decades, activity in market-based finance[6] has steadily increased. The market-based finance system performs essentially the same functions as the traditional banking system, but with much lighter and less consistent regulation. By the onset of the Global Financial Crisis (GFC), market-based finance and traditional banking systems were significantly intertwined, and the panic in market-based finance threatened to spread quickly to both traditional banks and the real economy. In response, authorities in several advanced economies rolled out market support programs (MSPs) to ease the stress in wholesale-funding markets. In an earlier study, Rhee et al. (2020), we surveyed 19 of these GFC-era programs along with two pre-GFC programs of similar design.

The GFC programs were just a prelude, however, as central banks established or revived a variety of MSPs during the early months of the COVID-19 crisis. In March 2020, corporate spreads in advanced economies surged, and commercial paper (CP) markets and asset-backed securities (ABS) markets came to a halt. This "dash-for-cash" also disrupted the safest fixed-income markets of US Treasuries and euro area sovereign bonds (Cantú et al. 2021). Around the same period, in emerging markets, the pandemic brought a sudden stop to capital inflows, leading to sharp currency depreciation and further tightening of financial conditions (Cantú et al. 2021).

Many countries in both advanced and emerging markets acted quickly to improve liquidity and restore confidence in critical funding markets, as well as restart the flow of credit to households and businesses. Within a matter of weeks between March and April 2020, the Federal Reserve, Bank of England (BoE), Bank of Japan (BoJ), and European Central Bank (ECB) established numerous MSPs, many of which were similar to programs these jurisdictions had used in the GFC. Some countries, such as Canada, experimented with MSPs for the first time. The International Monetary Fund (IMF) reported that for the first time, at least 18 emerging-market economies' central banks adopted asset purchases targeting government or private sector bonds in local currency (IMF 2020).

The MSPs of the COVID-19 era built upon and expanded the GFC-era programs in several ways. Given these innovations, a timely update of our previous survey is warranted. This paper attempts to deliver by analyzing 23 COVID-19-era MSPs from nine jurisdictions—Canada (CA), the European Union (EU), Israel (IS), Japan (JN), South Korea (KR), Sweden (SW), Thailand (TH), the United Kingdom (UK), and the US. Figure 1 lists the 23 case studies and their respective authors. Figure 2 summarizes each program's key goals.

[6] "Market-based finance" is loosely defined as the system of markets, nonbank financial institutions, and infrastructure that provide financial services to support the economy, along with banks. Parallel terms include "shadow banking" and "nonbank financial intermediation."

Figure 1: YPFS Market Support Programs Case Studies

Case Title	Abbreviation	Reference
Canada: Bankers' Acceptance Purchase Facility	BAPF (CA)	(Runkel 2022a)
Canada: Commercial Paper Purchase Program	CPPP (CA)	(Engbith 2022a)
Canada: Corporate Bond Purchase Program	CBPP (CA)	(Nunn 2022a)
Canada: Government Bond Purchase Program	GBPP (CA)	(Runkel 2022b)
Canada: Mortgage Bond Purchase Program	CMBP (CA)	(Vergara 2022)
Canada: Provincial Bond Purchase Program	PBPP (CA)	(Leonard 2022a)
Canada: Provincial Money Market Purchase Program	PMMPP (CA)	(Engbith 2022b)
Eurozone: Pandemic Emergency Purchase Programme	PEPP (EU)	(Runkel 2022c)
Israel: Corporate Bond Purchase Program	CBPP (IS)	(Leonard 2022b)
Japan: Special Funds-Supplying Operations	SFSO (JN)	(Nunn 2022b)
South Korea: Corporate Liquidity Support Organization	Special SPV (KR)	(Engbith 2022c)
Sweden: Commercial Paper Purchases	CPP (SW)	(Mott 2022a)
Sweden: Corporate Bond Purchases	CBP (SW)	(Mott 2022b)
Thailand: Bond Stabilization Fund	BSF (TH)	(Runkel 2022d)
United Kingdom: Asset Purchase Facility	APF (UK)	(Kulam 2022a)
United Kingdom: COVID Corporate Financing Facility	CCFF (UK)	(Kulam 2022b)
United States: Commercial Paper Funding Facility II	CPFF II II (US)	(Engbith 2022d)
United States: Corporate Credit Facilities	CCFs (US)	(Leonard 2022c)
United States: Money Market Mutual Fund Liquidity Facility	MMLF (US)	(Mott and Dreyer 2022)
United States: Municipal Liquidity Facility	MLF (US)	(Kelly 2022b)
United States: Primary Dealer Credit Facility	PDCF (US)	(Mott 2022c)
United States: Paycheck Protection Program Liquidity Facility	PPPLF (US)	(Kelly 2022c)
United States: Term Asset-Backed Securities Loan Facility II	TALF II II (US)	(Engbith 2022e)

Source: Authors' analysis.

Figure 2: Targeted Markets and Other Goals for Covered MSPs

Purpose[a]	Commercial paper	Interbank	MBS/ABS[c]	Municipal bonds	Corporate bonds	Stocks
Liquidity	CPFF II (US); MMLF (US); CCFF (UK); CPP (SW); Special SPV (KR); CPPP (CA)	SFSO (JN); BAPF (CA)	PDCF (US); TALF II (US); CMBP (CA)	CPFF II (US); MLF (US); MMLF (US); PBPP (CA); PMMPP (CA); APF (UK); PEPP (EU)	CCFs (US); PDCF (US); CBPP (IS); CBPP (CA); GBPP (CA); Special SPV (KR); APF (UK); BSF (TH); CBP (SW)	PDCF (US)
Credit[b]	MMLF (US); CPP (SW); CPPP (CA)		TALF II (US)		PPPLF (US); SFSO (JN); CBPP (IS); BAPF (CA)	

(a) We look at the official press releases of the programs to discern the stated purpose of the programs. Any purposes added or changed by governors or other related officials are not reflected in this figure but in Key Design Decision No. 6, Communication.

(b) Includes credit to households and small and medium-sized enterprises (SMEs).

(c) MBS/ABS = mortgaged-backed securities/asset-backed securities

Source: Authors' analysis.

One interesting difference between the MSPs of the GFC and COVID-19 eras is that during the former, most financial institutions were in a weakened state and needed their own rescue programs. In the COVID-19 era, financial institutions—particularly the large banks—were in a much stronger position and, in many cases, served as conduits and force multipliers for the programs.

Another difference between the two eras was the broadening of goals during the COVID-19 crisis. The MSPs studied here, unlike the GFC-era programs, had a variety of goals that extended beyond the emergency-liquidity injections. Specifically, several of these programs included "credit support" as a key objective. The distinction between liquidity and credit support goals can be subtle, and policymakers must be clear with market participants (and with themselves) when designing MSPs with these distinctive goals.

To illustrate the challenge, it is helpful to think of financial crises and policy responses as having two phases, "acute" and "chronic." In the initial acute phase, the financial system has an obvious liquidity problem—runs on banks and freezes of short-term financing markets are easy to spot—but the underlying solvency of the financial system is difficult to judge in the heat of that moment. During this acute phase, policy responses need to be fast and emphasize direct liquidity support, either in the form of emergency lending or liability guarantees. To achieve these goals, policy should be targeted to influence the behavior of the suppliers of short-term credit rather than the troubled financial institutions or markets themselves.

In the later chronic phase, the immediate liquidity pressures have eased, but any underlying solvency problems remain. In the traditional banking sector, a chronic phase is often characterized by low capital levels at banks that hold back long-term lending. In economies where market-based finance plays a large role, these solvency concerns can manifest at many levels along the intermediation chain, with the same result of insufficient credit supply. A chronically weak financial sector is a drag on economic growth, and a main reason that downturns are deeper and recoveries take longer in recessions that follow financial crises (Jordà, Schularick, and Taylor 2013). During the chronic phase, policy should be targeted to influence the behavior of long-term credit suppliers, typically the financial institutions themselves. With the rise of market-based finance, those targeted financial institutions may be diverse and not limited to banks.

This staging into acute and chronic phases can apply both to full-blown financial crises like the GFC and to possible or incipient crises such as seen in the early stages of the COVID-19 crisis. During the GFC, almost all of the market support programs we analyzed were designed to meet the challenges of an acute phase and were properly targeted to affect the behavior of short-term creditors with direct liquidity support. The one chronic-phase MSP program we analyzed was the Term Asset-Backed Securities Loan Facility (TALF II) in the US, which the Fed launched six months after the failure of Lehman Brothers to enable the issuance of asset-backed securities.

The COVID-19 era was different. Even though all the MSPs covered in this survey were introduced during the acute phase of the crisis, the policymakers understood that the size of the real shock was large enough to threaten some long-term chronic weakness in the economy. Thus, some of the programs were designed with this chronic phase in mind and included incentives for long-term credit support. These design features, often introduced quickly alongside the liquidity support functions, later served as a model for more direct credit support programs outside the scope of this survey. For example, the Fed's Main Street Lending Program (MSLP), announced in early April 2020, is outside the scope of this survey because its primary purpose was not to address market malfunctions. Rather, the MSLP was meant to help facilitate access to credit so that small and medium-sized enterprises (SMEs) could better manage the period of dislocations related to the pandemic.

The addition of credit support goals to these programs raises questions about the distinction between MSPs and unconventional monetary policies such as quantitative easing (QE). For the purposes of this survey, we use the program motivation as the defining feature: in an MSP, a program's primary impetus is to restore the flow of credit by fixing a perceived malfunction in market functioning. This malfunction may be driven by balance sheet weaknesses (as in the GFC), highly elevated levels of uncertainty (as in the COVID-19 era), or just "plumbing" problems (as in concerns around the technical problems associated with the transition to the year 2000). In contrast, QE is a form of monetary policy, attempting to increase the flow of credit by changing the yield curve beyond the conventional target of the short-term risk-free rate; in QE, market malfunction is not assumed. For an MSP to justify its role in the chronic phase, the market malfunction must have the potential to persist beyond the acute phase.

In our review of these cases, we identified four major themes.

Speed is important in the acute phase. To implement programs quickly, a clear understanding of the central bank's authority for launching MSPs is crucial. As authorities use the gap between crises to revise a central bank's legal authorities, they should consider the implications of such revision in the central bank's ability to quickly respond to fight a financial crisis.

Clear communication is a valuable policy tool in the acute phase, as announcement effects can be powerful. The authorities may be tempted to add broader purposes that are unattainable or unrelated to the crisis at hand, to enhance their political viability. For example, saying bond purchases will save jobs is "unattainable"; saying purchases must be reviewed for their environmental impact is "unrelated." Such additions can slow implementation and lead to confused communications.

Combining MSPs with backup fiscal support can be a valuable tool. In the acute phase, such fiscal support can make the government commitment more credible and can have powerful effects without ever being drawn. In the chronic phase, fiscal support can allow for aggressive and tailored programs, giving the designers the flexibility of targeted credit subsidies. In the COVID-19 crisis, the financial markets and institutions bounced back fast enough that these credit support programs went largely unutilized. But we should not miss this opportunity to learn from the varied design features.

The use of a special purpose vehicle (SPV) to house and manage the assets obtained through the program from the markets can be beneficial for many reasons. SPVs are not just a gimmick to get around legal restrictions; instead, proper use of SPVs can streamline the management, transparency, and flexibility of individual programs. Given the need for speed emphasized in theme (1) above, planning specific SPV structures well before a crisis hits is useful.

As in the GFC, governments introduced various other emergency measures as part of a package with MSPs during the COVID-19 crisis. Regulatory forbearance can be an important part of that package, by easing liquidity or capital rules to enhance the effectiveness of an MSP or waiving lending or other restrictions that may be prohibitive.

The next section of this survey discusses each of the 21 Key Design Decisions in detail, highlighting cases where future designers should take note of both interesting ideas and cautionary lessons. Some of these Key Design Decisions did not appear in our earlier survey, usually because those features did not seem as important in the earlier cases. Following the discussion of Key Design Decisions, we conclude with some broad themes and connections to the (still small) academic literature on program evaluation.

Key Design Decisions

1. Purpose: What was the stated purpose of the program that the central bank or other authorities described in press releases or other materials?

Central banks that established COVID-19-era MSPs shared similar motivations. As during the GFC, they targeted the markets for CP, corporate bonds, repurchase agreements (repos), and ABS. Some jurisdictions expanded the markets in which central banks intervened. For example, the US announced new MSPs to intervene in corporate- and municipal-bond markets. Canada, announcing a wide array of MSPs for the first time, included provincial-government funding markets, markets acting as a benchmark for setting floating interest rates for its derivative markets, and corporate-bond markets.

In addition to stabilizing targeted markets, some MSPs further added the goal of facilitating credit provision to individuals and SMEs. This expanded mandate marked a consequential shift in MSP objectives, extending these programs from their acute-phase role during the GFC to include broader goals consistent with the (expected) chronic phase of the COVID-19 crisis. For example, US PDCF, PPPLF, and TALF II; Canada BAPF, CPPP, and CMBP; and Japan SFSO added objectives to support SMEs' funding markets. Some market support programs morphed into QE programs. Canada, the EU, Israel, and Thailand highlighted the aim of monetary policy transmission in their MSPs. Canada GBPP, in particular, subsequently shifted its focus to support the resumption of growth in output and employment as market conditions improved for government bonds. The IMF's Global Financial Stability Report in October 2020 noted that emerging-market economy central banks' MSPs tended to have narrower aims than those of the advanced economy central banks, which engaged in larger balance sheet expansions to alleviate market stress and boost output (IMF 2020).

2. Part of a Package: Did the authorities announce any other interventions at the same time as MSPs?

Central banks announced COVID-19 MSPs alongside many other emergency-liquidity and fiscal support programs. Figure 3 lists the programs announced within the two-week time frame before and after the announcement of each MSP. Aside from the policy interventions surveyed in Figure 3, one interesting initiative to note is that the Swedish government announced that the government would increase the limit of its guarantees of bonds and other debt issued by Swedish export companies the day after it announced its MSPs. In the US, the Fed introduced all MSPs within a period of a few weeks, contemporaneously with emergency-liquidity operations for banks and direct fiscal assistance for individuals, SMEs, and airlines. In other jurisdictions, the authorities launched support measures for individuals and SMEs and other efforts to deal with the pandemic itself.

Figure 3: Policy Interventions Announced around the Time of MSPs

Country	Program	Date announced	Emergency liquidity	Fiscal support for SMEs	Fiscal support for individuals	Fiscal support for specific industries	Macroprudential policies*		
							C	S	M
Canada	BAPF	March 13, 2020							
	CMBP	March 16, 2020							
	PMMPP	March 24, 2020							
	CPPP	March 27, 2020							
	GBPP	March 27, 2020							
	CBPP	April 15, 2020							
	PBPP	April 15, 2020							
EU	PEPP	March 18, 2020							
Israel	CBPP	July 6, 2020							
Japan	SFSO	March 16, 2020							
South Korea	Special SPV	April 22, 2020							
Sweden	CBP	March 19, 2020							
	CPP	March 19, 2020							
Thailand	BSF	March 22, 2020							
UK	CCFF	March 17, 2020							
	APF	March 19, 2020							
US	CPFF II	March 17, 2020							
	PDCF	March 17, 2020							
	MMLF	March 18, 2020							
	CCFs	March 23, 2020							
	TALF II	March 23, 2020							
	MLF	April 9, 2020							
	PPPLF	April 9, 2020							

Blue highlight = Program announced the same day, or within 14 days before or after, the MSP

*C = Changes in a preannounced countercyclical policy tool to ease financial conditions during a crisis; S = Changes in supervisory rules or guidance that ease capital, liquidity, or other requirements for financial businesses; M = Changes in market rules that seek to promote financial stability in a crisis.

Source: Authors' analysis.

Fiscal authorities also supported central bank actions, as discussed in more detail in Key Design Decision No. 10, Source(s) of Funding. Similarly, central banks indirectly supported fiscal expansion via MSPs, as discussed further in Key Design Decision No. 6, Communication.

3. Legal Authority: Which authority or law enabled the central bank or other authorities to launch the program? What are the interesting changes in ordinary and emergency authorities of the central banks under law?

As seen in the GFC and discussed in our previous survey, central banks used a mix of ordinary and emergency authorities to implement MSPs during the COVID-19 crisis. Post-GFC, some jurisdictions changed the central bank's authority to reflect concerns raised during the GFC experience. In particular, surveying the recent resurrection of MSPs in the US has clarified some questions relating to the interpretation of the Fed's emergency or crisis-fighting powers under Section 13(3) of the Federal Reserve Act (FRA). Figure 4 summarizes the central banks' authorities in launching the MSPs and some post-GFC changes in ordinary and emergency authorities for central banks relevant to COVID-19 era MSPs.

Figure 4: Central Banks' Legal Authority to Launch MSPs

Jurisdiction	Existing legal authority at program launch	Emergency or ordinary authority?	Post-GFC changes affecting COVID-19 response
Canada	Section 18 of the Bank of Canada Act	Ordinary	Broadened ordinary power, allowing the central bank to: (1) engage in outright purchases or sale transactions rather than buybacks only; and (2) remove the 380-day limit on the terms of its transactions.
European Union	Treaty on the Functioning of the European Union	Ordinary	N/A
Israel	Chapter 5, Section 36(2) of the Bank of Israel Law	Ordinary	N/A
Japan	Article 33 of the Bank of Japan Act	Ordinary	N/A
South Korea	Article 80 of the Bank of Korea Act	Emergency	For a swifter response in emergency situations, the act eliminated the requirement for monetary contraction to exist for the Bank of Korea to use its emergency power; under the revised law, the possibility of disruption in credit intermediation would suffice.
Sweden	Chapter 6, Article 5 of the Sveriges Riksbank Act	Ordinary	N/A
Thailand	Emergency Decree B.E. 2563 (2020)	Emergency	N/A
UK	Bank of England Act (APF); Financial Services Act 2021 (CCFF)	Ordinary (APF); Emergency (CCFF)	Pre-GFC, the BoE had broad authority to lend and purchase in the financial markets, but its authority did not specify how BoE ought to act in response to crisis conditions. Post-GFC, the law clarified that the BoE has the primary operational responsibility for financial crisis management while Her Majesty's Treasury has sole responsibility for any decision involving public funds.
US	Section 13(3) of the Federal Reserve Act	Emergency	Only broad-based support is possible for solvent institutions.

Source: Authors' analysis.

Governments often used existing legislation to commit taxpayer funds to emergency programs. In the US, the Coronavirus Aid, Relief, and Economic Security (CARES) Act, signed into law on March 27, 2020, expanded Treasury's resources to provide equity support for the CCFs, CPFF II, MLF, and TALF II. Other MSPs in the US received Treasury support through the Exchange Stabilization Fund (ESF) but not under the CARES Act. Details of these funding mechanisms are further discussed in Key Design Decision No. 10, Source(s) of Funding.

MSPs often face political headwinds, as they typically entail public support for private actors. Once a crisis has passed, those headwinds can lead legislatures to curtail rather than expand the central bank's crisis-fighting powers. For example, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (DFA) added restrictions to the Fed's emergency authority, which the Fed had to take into account when creating all of its COVID-19-era MSPs.

Section 13(3) of the Federal Reserve Act had long allowed the Fed "in unusual and exigent circumstances" to provide support to any market participant. Under the revised Section 13(3), any emergency Fed program must have "broad-based eligibility"; obtain prior approval from the Treasury secretary; and be available only for solvent institutions (FRA 1913b).

The Fed subsequently amended Regulation A, which implements the FRA, to conform with the DFA. Regulation A allows the Fed to rely on, among other evidence, written certifications of solvency and of inability to secure adequate credit accommodations from other sources by the recipients of the Fed's emergency assistance to satisfy the conditions in Section 13(3) (Board of Governors of the Federal Reserve System 2015). The Fed had interpreted Section 13(3)'s language about a lack of "adequate credit" to mean that the borrower could "consider economic or market conditions as compared to usual economic or market conditions, including the availability and price of credit," acknowledging that "lending may be available, but at prices or on conditions that are inconsistent with a normal, well-functioning market" (Federal Reserve Bank of Boston 2020).

However, the Fed interpreted Regulation A to be merely one way by which it can extend credit, rather than as describing additional requirements to satisfy before it can offer any discounts under Section 13(3). Consistent with this view, the Fed did not apply the penalty rate provision to its Secondary Market Corporate Credit Facility (SMCCF) purchases (Congressional Oversight Commission 2020b). Further detailed discussion of these issues can be found in Key Design Decision No. 15, Haircuts or Discounts, and Key Design Decision No. 11, Eligible Institution, respectively.

Some post-GFC analyses, including our first MSP paper, explain the Fed's Section 13(3) authority to mean that the Fed could use its emergency authority only to extend loans to participants in its MSPs, and not to directly purchase market instruments. However, an internal Fed legal memo from 2008 states that the Fed faces no such constraint. The legal memo was revealed in 2014 during a lawsuit brought by Starr International Company, Inc., on behalf of the shareholders of American International Group, Inc. (AIG) against the US government (Starr Int'l Co. v. United States 2017). According to the 2008 memo, the Fed Board "consistently has viewed the term 'discount' under section 13(3) as including a Reserve Bank extension of credit . . . as well as a purchase by a Reserve Bank of third-party notes" (Alvarez et al. 2008; Board of Governors of the Federal Reserve System 1958). This point is further clarified by Scott Alvarez, then general counsel of the Fed, in a YPFS interview (Kelly 2022a).

Central banks and governments responding to the COVID-19 crisis early on were able to avoid the political headwinds experienced during the GFC, given the unusually exogenous nature of the crisis. But political support waned in the US as market conditions eased. The Consolidated Appropriations Act of 2021 (signed into law on December 27, 2020) definitively closed the CARES Act MSPs and rescinded any funding of the TALF II, MLF, and CCFs that was not needed to meet existing commitments as of January 9, 2021. The act removed the Treasury's authority to use ESF funds to support an MSP that is "the same as" the MLF and CCFs;[7] it made an exception for the TALF II ("Consolidated Appropriations Act" 2021). How broadly the Treasury will interpret the "same as" language in the future remains an open question. Depending on the interpretation, if the Fed wants to create an MSP like the MLF or CCFs in the future, it may have to find other ways to secure the loans to its satisfaction, without relying on the Treasury or ESF, unless Congress passes new legislation saying otherwise. Although the Fed has constructed MSPs without Treasury's support in the past, during the COVID-19 crisis, the Treasury backing helped the Fed broaden the range of collateral it accepted and launch MSPs that it normally may not have had an appetite to launch.

Post-GFC, the UK clarified the BoE's emergency authority under the Financial Services Act of 2012. Pre-GFC, the BoE had broad authority to lend and purchase securities in financial markets, but its authority was ambiguous on the details. The Financial Services Act of 2012 and a 2017 memorandum of understanding among Her Majesty's Treasury (HMT), the BoE, and the Prudential Regulatory Authority stated that the BoE has the primary operational responsibility for financial crisis management, while HMT has sole responsibility for any decision involving public funds. The BoE and HMT collaborated on both the Asset Purchase Facility (APF) and the COVID Corporate Financing Facility (CCFF): the facilities were wholly owned by the HMT, while the BoE operationalized them. Therefore, any losses of the BoE were to be indemnified by HMT, as discussed further in Key Design Decision No. 10, Source(s) of Funding.

Some jurisdictions expanded the central bank's crisis-fighting authorities in the midst of the GFC. In Canada, paragraph 18(g) of the Bank of Canada Act gave the Bank of Canada (BoC) broad discretion to buy and sell securities in ordinary and crisis times[8] ("Bank of Canada Act" 1985). Prior to the GFC, the Bank of Canada Act limited the securities that the BoC could buy and sell in normal times to short-term (less than 180-day) credit endorsed, accepted, or issued by a bank ("Bank of Canada Act" 1985). In 2008, Parliament broadened the scope of this ordinary authority to allow the purchase or sale of any security issued by any person, other than equity interests. The 2008 revision also clarified that the BoC had this authority

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[7] The act also removed the Treasury's authority to use ESF funds to support a program that is "the same as" the MSLP, but we did not include this above as the survey excludes MSLP from the discussion of MSPs.

[8] Allowed the central bank to purchase any security (including equity) in a crisis, "if the Governor is of the opinion that there is a severe and unusual stress on a financial market or the financial system" ("Bank of Canada Act" 1985). This power has been in effect since 2001.

"for the purposes of conducting monetary policy or promoting the stability of the Canadian financial system" (Bank of Canada 2008). During the COVID-19 crisis, instead of invoking emergency authority, the BoC used its ordinary authority for the MSPs, as it did not use any programs to purchase equity interests. To date, the BoC has never taken action under the emergency authority.

Sweden's national legislature had been considering proposals to curtail its central bank's emergency authority when the COVID-19 crisis began. The proposals had not yet passed the legislature and thus did not affect the central bank's response during the COVID-19 crisis. Currently, the central bank may lend against collateral during its monetary policy operations; purchase, sell, and mediate[9] securities, foreign exchange, and obligations linked to such assets; and issue its own debt instruments to monetary policy counterparties (Andersson and Stenström 2021, 6; "Sveriges Riksbank Act" 2016). The national legislature criticized the lack of oversight of the central bank's activities, noting its high degree of independence relative to other central banks (Ministry of Finance 2019). In 2019, the national legislature proposed a revised law that would limit central bank purchases of non-sovereign assets to extraordinary circumstances and would restrict the range of corporate bonds and other private securities that are eligible for purchase by the central bank (Ministry of Finance 2019; Sveriges Riksbank 2020a). If passed, the new act would take effect in 2023 (Sveriges Riksbank 2021b).

4. Governance: What were the legally mandated reporting, auditing, and oversight for the programs?

This Key Design Decision covers legally mandated reporting, auditing, and other oversight of the MSPs. These directives are imposed as conditions to exercising central banks' authority for MSPs. Legislation responding to a crisis may also create additional, temporary responsibilities.

All programs we surveyed made regular reports to congressional committees, legislatures, or fiscal authorities on the programs' operations and usage. Although these reports were not always mandated, some central banks, such as those in Israel, Japan, and Sweden, chose to report out the information on the programs voluntarily. US authorities required the Fed's MSPs, on the other hand, to report to congressional committees on the usage of the programs, with additional reporting obligations imposed under the CARES Act for select programs. Canada and the UK required their central banks to regularly report MSP activities to fiscal authorities. Additionally, the Bank of Korea (BoK) was required to deliver assessment reports semiannually to the legislature. Key Design Decision No. 7, Disclosure, further details information about disclosure on program usage and operations.

The UK and Canada required audits of the programs' annual financial statements. Under the Bank of Canada Act 1985, for example, the BoC is mandated to release audited financial statements, and the minister of finance can appoint the auditors for the central bank; those

[9] Mediate means the central bank is acting as an intermediary or dealer for the securities market. Sweden has a large and developed securities market, so the central bank needs this intermediary or dealer authority to maintain rates in the securities market in line with monetary policy.

auditors report on the central bank's affairs to the minister. Some US programs with SPVs also released audited financial statements, but whether the audit was legally mandated is unclear.

5. Administration: How was the program run day to day?

Central banks took the lead in the daily operations of most market support programs. Some MSPs used industry participants to assist with the operations. Canada, the US, and Thailand hired private institutions to serve as asset managers, clearing banks, and advisors to help design their programs. As in GFC-era MSPs, this assistance was helpful for central banks as the private entities had existing relationships, infrastructure, and expertise that the central banks lacked.

South Korea used a slightly more complex structure in operating its program. A committee consisting of five members—the Korea Development Bank (KDB)[10] vice chairman, one private sector expert nominated by the KDB (with approval from other institutions), and one nomination each by the Ministry of Economy and Finance,[11] the Financial Services Commission,[12] and the BoK—oversaw the program's daily operations.

6. Communication: Any interesting communication strategies to note?

During the COVID-19 crisis, the announcement effect for MSPs was sometimes sufficient on its own to calm markets, even without any significant program usage to follow. Empirical evidence supports this conclusion for the CCFs, CPFF II, MLF, and TALF II in the US. The Swedish CBP, in its initial announcement, did not even communicate a starting date for corporate-bond purchases, instead stating that purchases would begin sometime during the period of March–December 2020. However, the announcement in March 2020 was sufficient to calm the markets (Hansson and Birging 2021).

Some programs later corrected miscommunications by the head of the central bank. Before the PEPP was announced, ECB President Christine Lagarde said that the Governing Council was "not here to close spreads" (Lagarde and de Guindos 2020). Yields on eurozone debt spiked after the comment, with the lowest-rated eurozone sovereigns seeing the largest spikes in volatility and yield (Organization for Economic Co-operation and Development 2007–2021; Reuters 2020). Lagarde later walked back the point, but a report to the European Parliament stated that it was "reasonable to think that the implementation of this program was, if not due to, at least brought forward because of President Lagarde's comment" (Blot, Creel, and Hubert 2020). Markets appeared to react positively to the announcement of the PEPP (Blot, Creel, and Hubert 2020).

In other instances, mixed messaging from the central bank attracted criticism. Some criticisms may be more concerning than others, especially if the mixed messaging implied

[10] A state bank through which the fiscal authority provided funding for the program.

[11] The fiscal authority.

[12] Supervisory authority.

that the central bank's actions were not independent but rather orchestrated by the government. The BoE's APF stated that its purpose was to improve market functioning of the gilt and corporate-bond markets. However, some public and private actors thought that the BoE's goal for the APF was to lower the cost of government borrowings, which could imply the BoE was engaged in monetary financing of the government. This belief was partly because the speed of HMT's issuance of government debt appeared to match the speed of the BoE's gilt purchases under the APF. BoE Governor Andrew Bailey has also noted that if the BoE had not intervened with asset purchases, the government would have struggled to fund itself in the short run. Later, Bailey rejected any accusations of the BoE financing the government, and BoE officials publicly clarified that the primary purpose of the APF was to support market functioning. Critics from the House of Lords still argued that the BoE did not sufficiently explain how the asset purchases served the BoE's mandate. The House of Lords cautioned that the BoE's ability to control inflation and maintain financial stability could be undermined if market participants believed that the BoE had engaged in monetary financing during the crisis.

In the US, the Fed, in the press release announcing the two CCF facilities, stated that their purpose was to "support credit to large employers," with a distinction between the Primary Market Corporate Credit Facility (PMCCF) provision of "new bond and loan issuance" and the SMCCF provision of "liquidity for outstanding corporate bonds" (Board of Governors of the Federal Reserve System 2020a). Fed officials, including Daleep Singh, executive vice president of the Federal Reserve Bank of New York, emphasized in speeches that by supporting "companies' access to funding, firms employing millions of Americans [were] in a better position to keep workers on payrolls" and cited statistics on the number of employees that public-bond-issuing companies had on payroll (Powell 2021; Singh 2020). Chair Jerome Powell further emphasized that purchasing corporate bonds allowed companies "to go out and finance themselves. They've been able to avoid big layoffs" (Select Subcommittee on the Coronavirus Crisis 2020). These comments attracted critics who noted that the program had aided companies and their investors but not workers. The House of Representatives Select Subcommittee on the Coronavirus found that of the 500 corporations whose bonds the Fed purchased on the secondary market, 140 had furloughed or laid off a combined 1 million workers, 383 had paid dividends, and 227 had been "accused of illegal conduct since 2017" (Select Subcommittee on the Coronavirus Crisis 2020).

In this example, we see how authorities were challenged by internal and external pressures to extend acute-phase designs to support goals typically associated with chronic phases. With programs based in whole or part on GFC-era designs, communication sometimes veered to suggest broader-based credit support goals. This communication challenge can interfere with otherwise powerful market-calming announcement effects.

7. Disclosure: What were the obligations and practices around disclosure of the usage and participants of the program? How detailed were the disclosures, who

could access the disclosed information, and was there a lag between usage and disclosure?

Central banks tended not to disclose lists of institutions participating in the MSPs during their operation, but they often did disclose aggregate transaction information with a lag. Figure 5 shows the disclosures and requirements in aggregate and transactional-level data.

Figure 5: Disclosure of Data on Program Operations and Usage

	Aggregate				Transaction-level			
	Mandated?	Exceeded mandate?	Released to public?	Notes	Mandated?	Exceeded mandate?	Released to public?	Notes
BAPF (CA)	Yes	No	Yes	N/A	No	Yes	Yes	8-month lag (after end date)
CBPP (CA)	Yes	No	Yes	N/A	No	Yes	Yes	1-month lag (after end date)
CMBP (CA)	Yes	No	Yes	N/A	No	Yes	Yes	No lag
CPPP (CA)	Yes	No	Yes	N/A	No	Yes	Yes	2-month lag (after end date)
GBPP (CA)	Yes	No	Yes	N/A	No	Yes	Yes	No lag
PBPP (CA)	Yes	No	Yes	N/A	No	Yes	Yes	1-month lag (after end date)
PMMPP (CA)	Yes	No	Yes	N/A	No	Yes	Yes	7-month lag (after end date)
PEPP (EU)	Yes	Yes	Yes	Reported more detailed info	No	No	N/A	N/A
CBPP (IS)	No	Yes	Yes	Reported more frequently	No	No	N/A	N/A
SFSO (JN)	No	Yes	Yes	Reported more frequently	No	No	N/A	N/A
Special SPV (SK)	Yes	No	Yes	N/A	No	No	N/A	N/A
CBP (SW)	No	Yes	Yes	All reporting was voluntary	No	No	N/A	Swedish law forbids the publication of transaction-level data
CPP (SW)	No	Yes	Yes	All reporting was voluntary	No	No	N/A	Swedish law forbid the publication of transaction-level data
BSF (TH)	Yes	No	Yes	N/A	No	No	N/A	N/A
APF (UK)	Yes	No	Yes	N/A	Yes	No	Yes	Mandated for gilt transactions only
CCFF (UK)	Yes	No	Yes	N/A	No	Yes	Yes	Published names of issuers and per-issuer aggregates of CP sold to the facility
CCFs (US)	Yes	Yes	Yes	Released identifying details	Yes	No	Yes	N/A
CPFF II (US)	Yes	Yes	Yes	Withheld identifying details	Yes	No	Yes	12-month lag (after end date)
MLF (US)	Yes	Yes	Yes	Released identifying details	Yes	No	Yes	N/A
MMLF (US)	Yes	Yes	Yes	Withheld identifying details	Yes	No	Yes	12-month lag (after end date)
PDCF (US)	Yes	Yes	Yes	Withheld identifying details	Yes	No	Yes	12-month lag (after end date)
PPPLF (US)	Yes	Yes	Yes	Released identifying details	Yes	No	Yes	N/A
TALF II (US)	Yes	Yes	Yes	Released identifying details	Yes	No	Yes	N/A

Source: Authors' analysis.

The BoC disclosed aggregate transaction data every week and participant-level data after each MSP had terminated. Although this transaction-level reporting was beyond the legal mandate of disclosure for the BoC, it was faithful to their extralegal commitment to the principle of transparency. The Bank of Israel (BoI) also voluntarily disclosed monthly transaction data for its program.

In our previous survey on the GFC-era MSPs, we highlighted stigma issues related to disclosure and the concern that new post-GFC mandates could exacerbate the stigma problem. The Dodd-Frank Act of 2010 required the Fed to provide Congress with a report including information on the transactions and expected cost to taxpayers within a week of the establishment of a Section 13(3) facility (Federal Reserve Bank of New York 2020b; Board of Governors of the Federal Reserve System 2020e). In making these required disclosures, the Fed sometimes withheld details that could identify specific institutions, since publicly disclosing this information could have "adversely" affected the program's participants by signaling an entity's financial distress (Board of Governors of the Federal Reserve System 2020d; GAO 2020). Instead, the Fed disclosed the names and identifying details of each participant in the facility one year following the effective date of termination, pursuant to Section 11(s) of the Federal Reserve Act (Board of Governors of the Federal Reserve System 2022a; Federal Reserve Bank of New York 2020b).

8. Use of SPV: Did the MSP use an SPV for operations that were separate from the central bank's balance sheet?

During the GFC, both the US and the UK utilized SPVs to administer some of their MSPs. A crisis-fighting innovation at the time, this practice spread more widely in the COVID-19 crisis to Japan, South Korea, and Thailand.

There are benefits to having an SPV, as we learned in the GFC-era MSPs:

(a) The Fed has viewed an SPV as a convenient structure providing management, accounting, and legal advantages when it is operating multiple MSPs in parallel (Bernanke et al. 2020; Kelly 2022a). Separate SPVs for each program allow the Fed to better tailor and manage each program to its goals, terms, timeline, and capital structure (Baxter 2009; Kelly 2022a).

(b) The SPV structure simplifies the reporting of income and the management of any sales of assets discounted by the facility. The Fed provided separate annual financial statements for the programs that were independently audited by an outside accounting firm. These statements provided greater detail and transparency than the Fed provided for facilities that did not use SPVs (Bernanke et al. 2020).

(c) The degree of corporate separation from both the Fed and other programs provides some protection from and for other entities in legal actions (Kelly 2022a).

(d) The SPVs are typically quick, easy, and inexpensive to set up. The Fed has viewed its creation of the structures as falling under the "incidental powers as shall be necessary to carry on the business of banking within the limitations" of the Federal

Reserve Act (Bernanke et al. 2020; FRA 1913.; Kelly 2022a).

This time around, in the US, the CCFs, CPFF II, MLF, and TALF II used SPVs. In South Korea, the SPV allowed for a complex funding structure amongst a state bank, the government, and the central bank. In the UK CCFF, HMT directed the BoE to create an SPV, separate from the central bank's balance sheet, for the BoE to conduct special market assistance operations. HMT was to indemnify the BoE for any losses of the BoE and the SPV stemming from the program. The fiscal authority in Thailand also committed to indemnify the central bank for any losses stemming from its MSP.

We note, however, as highlighted in the GFC-era survey, that setting up an SPV structure involving multiple parties, with no prior experience at the time of the crisis, did delay some MSPs during the GFC, affecting their efficacy. This can explain why South Korea assigned the KDB, a state bank with experience, to design the SPV.

9. Size: Did the program have an overall size limit when announced? Did it have an individual participation limit?

Overall Size of the Program

More programs during the COVID-19 crisis tended to be unlimited in size as compared to GFC-era MSPs. As with its GFC-era predecessor, the COVID-era Japanese SFSO had no overall size limit. Some GFC-era reiterations of MSPs in the US, such as the PDCF and MMLF, were again unlimited in size when revived in 2020. By contrast, some new programs in the US, such as the MLF and CCFs, and Canada's GBPP did have size limits. Notably, the PPPLF lent against only government-guaranteed PPP loans. The UK CCFF also did not have an overall size limit, but individual participants' primary issuances to the facility were limited according to their long-term credit ratings.

Some MSPs were essentially unlimited, as the central banks announced that the size of the program would match the market's needs. Canada's CMBP did not have an overall size limit but targeted purchases of up to 500 million Canadian dollars per week, although the bank retained the flexibility to adjust this target to reflect market conditions. Canada's PMMPP initially committed to purchasing up to 40% of each offering of directly issued provincial money market securities. Canada's CPPP and the US CPFF II set the maximum size of the facility to the aggregate amount of CP that each eligible institution could issue to the program.

In other instances where the size was limited, programs remained quite large. Sometimes the limitations were driven by the support the program received from its fiscal authority. In the US, the Fed set the overall size of the MLF, TALF II, and CCFs in proportion to the equity support each received from the Treasury.

Some programs were smaller in size, as in Sweden, South Korea, and Thailand. However, as noted in the GFC-era MSP survey, programs with the targeted purpose of "price discovery" can be successful with smaller sizes. Specifically, in Thailand, central bank staff had noted the dilemma between the public pressure to intervene in the corporate-debt market and the reluctancy of the central bank to lend directly to corporations. Therefore, the central bank designed the program to act as a signal to calm the market but not to perform lending, and ultimately there was no usage. This intention is reflected not only in the size of the program but also in the more onerous terms of the program compared to others.

Individual Participation Limits

Although some MSPs set individual participation limits, most did not. The US CCFs, CPFF II, and MLF had individual limits. For example, a municipal issuer could issue notes to the MLF up to a total of 20% of its recent annual revenues. Canada's PBPP also had a similar limit for a single issuer. The EU PEPP followed the proportions already assigned to each sovereign, calculated through total population and gross domestic product.

Japan's SFSO set a maximum for individual participation based on not only the amount of eligible collateral but also the financial institution's amount of loans outstanding to SMEs, in response to the COVID-19 crisis. Although this amount could not exceed the lesser of the value of the total eligible collateral posted for the loan under the program or JYP 100 billion, the BoJ removed this limit later to encourage even broader lending to SMEs. We find this structure interesting because it directly linked the program's credit support goals to the maximum participation level, making program design congruent with program goals.

The UK CCFF restricted individual participants' primary issuances to the facility based on their long-term credit ratings. However, the overall size of the facility was unlimited, as stated above.

10. Source(s) of Funding: Who funded the program? Who took the losses and in what order?

The majority of MSPs were funded solely through the expansion of the central bank's balance sheet, as was the case in Canada, the EU, the UK, and Sweden. However, in an important shift from GFC-era programs, fiscal authorities provided more support to central banks during the COVID-19 crisis. Figure 6 shows a summary of entities—other than the central bank—involved in the funding of the program.

Figure 6: MSPs with Fiscal or Other Support

Program	Fiscal support[a]	Other assets
BAPF (CA)	None	None
CBPP (CA)	Indemnification	None
CMBP (CA)	None	None
CPPP (CA)	Indemnification	None
GBPP (CA)	None	None
PBPP (CA)	Indemnification	None
PMMPP (CA)	Indemnification	None
PEPP (EU)	None	None
CBPP (IS)	None	None
SFSO (JN)	None	None
Special SPV (SK)	Equity investment	State bank[b]
CBP (SW)	None	None
CPP (SW)	None	None
BSF (TH)	Indemnification	None
APF (UK)	Indemnification	None
CCFF (UK)	Indemnification	None
CCFs (US)	Equity investment	None
CPFF II (US)	Equity investment	None
MLF (US)	Equity investment	None
MMLF (US)	Credit protection	None
PDCF (US)	None	None
PPPLF (US)	None	None
TALF II (US)	Equity investment	None

(a) Indemnification = indemnification by a fiscal authority; Equity investment = received equity investment from the relevant fiscal authority.

(b) The Korea Development Bank, a state bank, provided the SPV with up to 1 trillion Korean won (KRW) (10%) in subordinated loans and passed through the fiscal authority's KRW 1 trillion (10%) in equity capital, while the Bank of Korea committed to issuing up to KRW 8 trillion (80%) in senior loans.

Source: Authors' analysis.

The US TALF II, CPFF II, MLF, MMLF, and CCFs received support from the Treasury through either existing or newly allocated funds. The purpose of this support was to act as an equity tranche to absorb any losses. Regardless of some initial uncertainty around what this equity support meant, Treasury Secretary Steven Mnuchin confirmed in testimony that for "any facility that the Fed believes puts them at risk, I do put up capital, so by definition that capital is at risk, and we are fully prepared to take losses, in certain scenarios, on that capital" (Mnuchin 2020a; Wiggins and Feldberg 2020). He also clarified that "our intention is that we expect to take some losses on these facilities. That is our base-case scenario" (Committee on Banking 2020). In its regular reports to the Congress and Chair Powell's testimony, the Fed consistently interpreted Secretary Mnuchin's statement to mean that the Treasury would take the first-loss position for the programs (Board of Governors of the Federal Reserve System 2022b; Powell 2020).

The US MMLF had another interesting structure embedded in the support it received from the Treasury. Treasury charged the Federal Reserve Bank of Boston a facility fee associated with the use of credit protection through the Exchange Stabilization Fund (Office of Inspector General, US Department of the Treasury 2021; US Department of the Treasury 2020). The fee for each loan was an amount equal to 90% of the difference between the rate charged to the borrower on the MMLF loan and the primary credit rate at the time the loan was advanced. Had the facility experienced losses, the MMLF would have first drawn on the accumulated facility fees before drawing on the Treasury's credit support (Office of Inspector General, US Department of the Treasury 2021).

In South Korea, the BoK made it clear from the start that the fiscal authority's participation was to absorb any losses stemming from the program, while central bank funds were allocated to provide liquidity for the program (Ministry of Economy and Finance 2020).

The Thai BSF was funded by the central bank with 1 billion Thai baht (THB), but the fiscal authority promised indemnification of up to THB 40 billion for any losses. Any profits generated from the program also would flow to the fiscal authority. The original plan, which the authorities abandoned without explanation, was for the two public financial corporations (the Government Savings Bank and Government Pension Fund), unnamed insurance companies, and the Thai Bankers' Association, a professional association representing domestic banks, to fund the program.

The UK APF and Canadian PMMPP and PBPP also received indemnification from their fiscal authorities. Cavallino and De Fiore (2020) confirm that fiscal and monetary authorities set forth complementary responses because of the dramatic impact of the pandemic on the real economy. They note the US Treasury's support for the Fed's programs and the UK HMT's guaranteeing 100% of the CP purchased by the BoE through the CCFF. Several other governments guaranteed private nonfinancial sector loans and thus indirectly backed the central banks' lending operations.

11. Eligible Institutions: Who could participate in the program? Any additional conditions to participate?

For the GFC-era MSPs, many programs were limited to counterparties that had preexisting relationships with their central banks. The COVID-19 analogues of those programs tended to remain the same. However, central banks tended to expand beyond the usual lists of counterparties when establishing new programs.

The US TALF II and CPFF II had the same eligible institution criteria as their GFC-era predecessors. Subsequently, however, the Fed expanded CPFF II eligibility to enable municipalities to issue CP for the first time. This complemented the Fed's expansion of the

MMLF to accept a wider range of municipal instruments for secondary-market purchases. This expansion was intended to be faster than the alternative of creating a secondary-market facility for municipal-bond markets.

Some programs allowed participation only for financially sound institutions. As noted in Key Design Decision No. 3, Legal Authority, some US MSPs required participants to certify their solvency and their inability to acquire adequate credit from other sources. The UK CCFF also looked at the health of eligible issuers, requiring potential participants to provide a short-term investment-grade rating or other equivalent rating prior to the COVID-19 pandemic; the BoE decided this eligibility on a case-by-case basis. The Bank of Thailand (BoT) allowed only investment-grade or illiquid, but viable, Thai corporations (that had already secured at least 50% of the value of their maturing bonds from private parties) to issue new CP to the BSF.

12. Auction or Standing Facility: Was the program lending or purchasing through auction or standing facility?

Our previous GFC-era MSP survey discussed the usage of auctions as a way of minimizing stigma. Due possibly to the nature of the COVID-19 crisis having stemmed from the real economy, stigma was not a central concern in 2020. Standing facilities were thus more popular during the COVID-19 crisis. However, some jurisdictions used auctions so that central banks could fulfill their price discovery goals without distorting markets.

Four programs in Canada (the CBPP, GBPP, PBPP, and BAPF), the UK APF, and Sweden used auctions. The BoC was unclear about its rationale for using auctions for certain facilities and not for others. The UK APF followed the same format it used in its GFC-era iteration of the program. Sweden, on the other hand, provided a clear explanation of the benefits of using auctions to maintain market neutrality while better supporting market functioning. These justifications show the motivations for the auction format beyond just “avoiding stigma.”

When establishing the CBP, the Sveriges Riksbank (Riksbank), the Swedish central bank, pointed out that the small size, fragmentation, heterogeneity, limited liquidity, and lack of transparency in its corporate-bond market made it hard for the central bank to evaluate the purchased corporate bonds (Sveriges Riksbank 2020d). Therefore, the Riksbank decided to employ both auction and standing methods (which the central bank refers to as “bilateral”) in its purchases to maintain flexibility in its choice of bonds (Sveriges Riksbank 2020d; Sveriges Riksbank 2020e). The Riksbank performed its initial transactions through bilateral purchases, as this was the most common method used in Sweden’s corporate-bond market. The Riksbank stated that it used this method to establish its presence in the market and thereby gain capacity to influence pricing (Hansson and Birging 2021; Sveriges Riksbank 2020e). At a later stage, however, the Riksbank switched to auctions, as it expected the bid procedure to reduce any market distortions (Sveriges Riksbank 2020f). Similarly, in using only auctions for Sweden’s CPP, the Riksbank noted that auctions ensured that the purchases were favorable to the functionality of the CP market and thereby promoted monetary policy (Sveriges Riksbank 2020c).

13. Loan or Purchase: How did the central bank participate in the market?

As observed in our previous survey, liquidity was provided to a troubled funding market through either loans or purchases, including indirect purchases of assets. We also noted that that US facilities mostly took the form of indirect purchases or loans to purchase assets. Central banks use lending facilities in the hopes of reaching markets through the main participants in those markets, which are typically banks as seen in the MMLF, but have also included asset management firms and other nonbanks, as seen in the TALF II. In the US, the MMLF, PDCF, PPPLF, and TALF II used lending facilities.

Additionally, we found new programs such as the UK CCFF and South Korea Special SPV performing indirect purchases where they lent funds to an SPV that in turn purchased eligible assets, as discussed in more detail in the Key Design Decision No. 8, Use of SPV. Japan's SFSO, as in its previous iteration in the GFC, provided interest-free loans to eligible counterparties instead of directly purchasing eligible assets.

As cited in our previous survey, the loan-versus-purchase decision does not seem to have made a noticeable difference on the effectiveness of MSPs.

14. Eligible Collateral or Assets: What assets was the central bank willing to accept for the program?

The authorities set criteria for eligible collateral or assets depending on the program goals and their risk appetite. The COVID-19-era MSPs included expanded eligibility criteria by waiving certain restrictions to broaden their market reach. Some MSPs included terms more generous toward credit-rating downgrades. Central banks ventured into new markets they had not intervened in before the COVID-19 crisis. For example, the Fed intervened in corporate-bond and municipal-bond markets.

The EU PEPP explicitly included Greek sovereign debt in its eligible assets, even though those bonds did not meet credit-quality requirements. The ECB justified this decision by noting the pandemic's effects on Greek financial markets, the potential knock-on effects of a Greek default, and the ECB's increased ability to judge the situation because of its extraordinary involvement in the Greek economy (ECB 2020). Greece had been subject to "enhanced surveillance" by the ECB because of domestic financial crises in the early 2010s (ECB 2020).

The Swedish CPP lengthened the maturity of eligible CP during the operation of the program to match the change in the aim of the program from short-term to longer-term stabilization. Initially, the Riksbank accepted only CP with remaining maturity of three months or less, both because (1) the substantial majority of outstanding CP in Sweden was issued with a maturity of up to three months and (2) the central bank wanted to focus its support on Swedish companies that needed to refinance loans that fell due during the period of the program (Sveriges Riksbank 2020b). Later, as the Riksbank shifted the aim of the program to continue reducing refinancing risks for companies, it extended the maturities of eligible CP to six months (Sveriges Riksbank 2020b).

Many reiterations of GFC-era MSPs also started with an expanded list of eligible collateral or assets. For example, the COVID-19-era TALF II accepted static collateralized loan obligations (CLOs), which were previously ineligible under the GFC-era TALF. Spreads on these assets had initially tightened following the announcement of the TALF II but tightened further following the collateral expansion (Caviness and Sarkar 2020).

The MMLF initially accepted Treasuries, fully guaranteed agency securities, government-sponsored enterprise (GSE) securities, and both secured and unsecured CP as collateral—a much broader range of collateral than the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF), which accepted only highly rated ABCP during the GFC. On March 20, 2020, the MMLF further expanded eligibility to include municipal short-term debt and variable-rate demand notes, because of strains in short-term funding markets for municipalities, and negotiable certificates of deposit (CDs), after tax-exempt money market mutual funds saw large outflows that were likely contributing to the worsening conditions in short-term municipal-debt markets (President's Working Group on Financial Markets 2020).

Unlike the US MMLF and CPFF II programs, the EU, UK, and Swedish CP purchase programs allowed for CP issued only by nonfinancial corporations. This is interesting, considering that in Europe, while the vast majority of CP issuances are by banks and public authorities, the ECB and UK CP purchase programs did not include financial CP or CDs as eligible assets (Novick et al. 2020).

Some programs extended eligibility to non-investment-grade assets. This is particularly interesting in cases where the program introduced in the acute phase had a design that enabled it to extend into the chronic phase. The first program to do this, the US CPFF, initially accepted only highly rated commercial paper. It later revised the terms to include commercial paper issuers that were in the highest rating class as of March 17, 2020, but had subsequently been downgraded. It allowed the downgraded issuer to make a one-time sale to the CPFF II, with the goal of allowing them to roll over maturing CP while seeking alternative funding (Boyarchenko et al. 2021).The PMCCF similarly expanded to include downgraded corporate bonds, termed "fallen angels," and the SMCCF expanded to include sub-investment grade ETFs. Credit spreads for these bonds improved considerably after the announcement (S&P Global Market Intelligence 2020). The announcement also coincided with the passage of the CARES Act, which expanded the Treasury's committed equity investment in the CCFs from USD 20 billion to USD 75 billion (Board of Governors of the Federal Reserve System 2020b; Board of Governors of the Federal Reserve System 2020c). That the Fed was taking on higher risk for the fallen angels was taken into consideration in calculating the leverage ratio against the Treasury's committed equity investment.

The Canada CBPP also accepted bonds that satisfied the required credit ratings before April 15, 2020, even if they had been later downgraded below those levels to a certain degree, provided they retained at least one rating of BBB Low/BBB-/Baa3 or higher (Bank of Canada 2020a). Similarly, the BoK accepted bonds issued by issuers of a certain investment grade before April 22, 2020, even if they were downgraded to junk status after that date because of the COVID-19 crisis (Kwon 2022).

In contrast, none of the GFC-era MSP programs reviewed in our previous survey included an exception for fallen angels. They typically included features to protect the central bank in the event of a rating-agency downgrade. For example, the Fed's Money Market Investor Funding Facility and the BoE's Commercial Paper Facility closed further program access to any issuer that had been downgraded.

Although central banks tended to be more generous to downgrades during the COVID-19 crisis, some were more restrictive or included terms protecting the central bank in case of a downgrade. For example, the COVID-19-era US PDCF accepted only investment-grade instruments, while the GFC-era PDCF had accepted non-investment-grade securities (Yang 2020). However, other terms of the PDCF became more generous. Sweden's CBP immediately excluded further purchases if an issuer or its bonds were downgraded. Still, the central bank did not sell the bonds it already held from such downgraded issuers (Sveriges Riksbank 2021a).

15. Haircuts or Discounts (purchase price or loan amounts): Was the value for the accepted collateral or assets subject to markdowns?

In the previous survey, we observed that the loan amount or the purchase price set for MSPs during the GFC generally incorporated a haircut or discount on the value of underlying collateral or purchased assets. Some MSPs during the COVID-19 crisis did not impose such reductions, including Canada PMMPP, US MMLF (the analogue to the GFC-era AMLF), and US PPPLF. In the US CCFs, neither the primary- and secondary-market program offered discounts, although the primary-market program did impose a penalty rate of interest. Regulation A states that the Fed should charge penalty rates for extensions of credit. The Fed interpreted Regulation A as applying to primary-market purchases but not purchases on the secondary market (Congressional Oversight Commission 2020b). Sweden CBP had no preset discounts; but in bilateral purchases, prices were negotiated with the seller.

Many other programs looked to market conditions and market rates to determine markdowns. Some based any reductions on the riskiness of the collateral or assets, similar to standard practice during the GFC-era programs. The Sweden CPP's discounts reflected the maturity and credit ratings of the counterparties. The haircut was used as a minimum rate for participating in the auctions; this further ensured that the auctions functioned as a stabilizing measure for the CP market (Hansson and Birging 2021). The Canadian CPPP, and US TALF II and PDCF, also imposed haircuts and discounts based on the ratings of the asset or collateral. Japan's SFSO priced collateral using historical market-price fluctuations and the assets' residual maturity.

16. Interest Rates: Were any interest rates or premium rates imposed on the transactions?

Similar to those of the GFC-era's lending facilities, the COVID-era MSPs' interest rates reflected market rates from normal times plus a premium reflecting the risks of the underlying collateral. This allowed programs to be rendered unattractive as market functioning normalized.

For example, the interest rates on US TALF II loans were generally high relative to the historical coupon rates on ABS and CMBS and varied depending on the characteristics of the underlying collateral. The MLF also charged a primary rate plus a spread based on collateral type. The Fed explained that these rates complied with Regulation A's condition to charge a penalty rate, interpreting that to mean a rate that "is a premium to the market rate in normal circumstances" but "affords liquidity in unusual and exigent circumstances" (Federal Reserve Bank of New York 2020a).

Japan's SFSO uniquely stands out because it provided interest-free loans and effectively had the central bank compensate participating banks for making qualifying loans. Under the program, the BoJ made collateralized loans to creditworthy financial cooperatives and the Development Bank of Japan, which in turned used the funds to lend to SMEs. The BoJ promised to pay a positive 0.2% interest rate on a portion of a financial institution's account reserve balances with the central bank corresponding to the outstanding amount of loans made by it to SMEs (Category 1). It also promised to pay a 0.1% interest rate on a portion of a financial institution's account reserve balances with the central bank corresponding to the amount of its SFSO loans minus the amount in Category 1. This was at a time when the BoJ's policy rate was negative 0.1%. The BoJ also agreed to add twice the amount of an institution's lending from the SFSO to its macro add-on balances[13] (Bank of Japan 2020).

The US PMCCF did impose a penalty rate of interest. In Thailand, the BoT went further and set some more onerous terms, including imposing a premium rate above a base rate for calculating the purchase price. The base rate was equal to the maximum of the rate on its new bank loan and the rate on new bonds it issued on the market. The facility premium increased depending on the issuer's funding needs from 100 basis points (bps) for short-term debt equivalent to 30% of the issuer's funding needs to 200 bps for any amount exceeding 30% of the funding needs (Bank of Thailand 2020).

17. Fees: Did the program impose any fees for participating in the program?

Most of the non-US MSPs did not collect fees other than those associated with regular operational fees generally imposed in financial transactions. The UK CCFF and the US TALF II, CPFF II, and MLF imposed administrative and operational fees. The US PDCF did not impose any fees this time around, whereas the GFC-era PDCF had imposed frequency-based fees. The primary-market program of the US CCFs charged a 100-bp facility fee while the secondary-market program did not; this distinction was driven by an interpretation of Regulation A's penalty-rate condition as applying to primary-market but not secondary-market purchases.

18. Term (i.e., loan maturity): In a loan, what was the term?

In the US MMLF, the term for lending via the program matched the term of underlying collateral; this was consistent with the GFC-era analogue AMLF program. The COVID-19-era

[13] Macro add-on balances are the portion of financial institutions' account reserve balances with the central bank that carry a zero-interest rate and increasing them would proportionately decrease the amount of balances subject to a negative interest rate.

PPPLF also incorporated this feature. Some programs extended the maturity for the loans compared to their counterpart programs during the GFC. The US narrowed PDCF asset eligibility during the COVID-19 crisis but lengthened the term of the loans from overnight to 90 days. Japan's COVID-era SFSO limited the loan term to one year, although most loans ended up being three to six months. In contrast, the GFC-era SFSO provided one- to three-month loans (Bank of Japan 2021; Buchholtz 2020).

On the other hand, the COVID-19-era TALF II provided only three-year loans and did not extend terms to five years as did in the GFC-era TALF II, although eligible collateral included assets with a maturity of three years or more. We have not been able to determine why the COVID-19-era TALF II did not extend its loan terms to five years.

19. Other Restrictions on Eligible Participants: Were there any other restrictions and conditions for the participants?

Some jurisdictions imposed additional restrictions on institutions participating in COVID-19-era programs that they had not imposed during the GFC. The UK prohibited the nonfinancial corporations that participated in the CCFF program from paying dividends and capital distributions and restricted senior executive pay to possibly combat negative public opinion on the program. Such restrictions were more common in capital-injection programs, where the public was more likely to object to special treatment for aid recipients.

Several COVID-19-era MSPs required participants to use the proceeds of their programs for specific purposes.

For example, Thailand allowed participants to pay off only existing maturing bonds and prohibited them from engaging in stock buybacks, repaying other debt early, lending or paying dividends to shareholders, giving bonuses to board members or the firm's top two executives, or pledging assets as collateral for new loans. The BoT enforced these conditions by requiring participants to submit reports (Bank of Thailand 2020).

The Fed's MLF required participants to use the proceeds: (1) to help manage the cash flow impact of higher expenses and delayed or reduced tax revenues; (2) to pay interest or principal on outstanding debt; or (3) to purchase notes issued by, or otherwise to assist, political subdivisions and other governmental entities. The Fed and Treasury especially encouraged (3) as it was "logistically infeasible for the Fed to directly purchase notes from all U.S. municipalities" (Congressional Oversight Commission 2020a).

Some programs included other behavioral restrictions. For example, the BoK, to promote a certain level of employment for a set period, promised to encourage middle-market enterprises and large corporations issuing debt to the SPV to meet minimum employment thresholds. However, research did not reveal whether the thresholds were enforced.

The Swedish CBP subsequently added "sustainability" to its eligibility criteria and reported the aggregate carbon footprint of the central bank's bond holdings. The Sveriges Riksbank announced that it would purchase only assets from companies that complied with international standards and norms for sustainability (Sveriges Riksbank 2020f; Sveriges

Riksbank 2020h). It reasoned that this was to manage government funds prudently by reducing the financial risks that could follow from climate change or from companies failing to comply with international standards and norms as well as safeguarding long-term sustainable economic development (Sveriges Riksbank 2020g). It also wanted to uphold the state's core values, as it was concerned about reputational risks (Andersson and Stenström 2021).

Overall, we believe that authorities should tread lightly when using crisis interventions to advance noncrisis goals. The best argument for their usage is when the noncrisis goals are sufficiently popular that they can support the public opinion of the interventions and give them the necessary time to work. But, to the extent that these noncrisis goals are politically fraught or operationally challenging, the risk of damaging the crisis response, particularly during an acute phase, is significant.

20. Regulatory Relief: Did the program provide for any regulatory relief to enable easier access to the program or make participation in the program more attractive? Did the loan under the program, if applicable, receive any regulatory relief?

In the US, bank regulators excluded MMLF participations from regulatory-capital calculations. Industry participants argued that the absence of such specific capital relief in Europe for a similar purchase program resulted in lighter usage than for the US program, although European regulators did offer banks more general capital relief. US regulators also ruled that MMLF and PPPLF participation would not impact a bank's liquidity coverage ratio, which came into effect in 2014 as one of the post-GFC regulatory reforms in liquidity requirements for banks. The PPPLF set rules to neutralize any effect on a bank's leverage ratio.

Also, in the US, the Securities and Exchange Commission and bank regulators, through no-action letters, allowed banks and other fund sponsors to use the MMLF to purchase assets from affiliated money market funds (MMFs), providing relief from rules restricting such transactions. In Europe, which bans "sponsor support" for funds but allows MMF sponsors to transact with their affiliated MMFs in the ordinary course of business, the European Securities and Markets Authority issued a note clarifying the circumstances under which it would consider such transactions to be sponsor support (European Securities and Markets Authority 2020).

21. Program Duration: When did the program end?

Most programs went through multiple rounds of extension because of lingering effects and slow recovery from the ongoing COVID-19 crisis. Some programs set very early end dates that the authorities had to extend soon thereafter. An authority's decision to extend a program does not necessarily indicate that it had made a mistake when setting an early end date. However, authorities should ensure that they review program end dates and make any extension decisions without delay, as market conditions may have not improved in the initially expected period. Sweden originally scheduled its CPP to end May 31, 2020, but ultimately extended it four times to December 31, 2021. Other programs, like Canada's CPPP, CBPP, and PBPP, set end dates a year or more from their initial dates of operation. The BoI initially said that it would continue purchases under the CBPP until market conditions improved; it ceased purchasing assets on November 5, 2020.

In the US, as discussed in the Key Design Decision No. 10, Source(s) of Funding, certain MSPs were backed by USD 195 billion committed by the Treasury under the CARES Act. On November 19, 2020, Treasury Secretary Mnuchin sent a letter to Fed Chair Powell stating that he would not extend the four remaining lending facilities that used funds from the CARES Act after December 31, 2020. He asked the Fed to return the Treasury's unused funds for those facilities. On the same day, the Fed released a public response to Mnuchin stating it would "prefer that the full suite of emergency facilities established during the coronavirus pandemic continue to serve their important role as a backstop for our still-strained and vulnerable economy" (Mnuchin 2020b). The Fed's reaction seems warranted, as Treasury's decision was equivalent to forcing an early termination of a valuable option. The next day, though, Chair Powell confirmed the Fed would return the unused portions of the funds allocated to the CARES Act facilities as Mnuchin had requested (Powell 2020). The Consolidated Appropriations Act of 2021, signed into law on December 27, 2020, definitively closed the CARES Act Fed facilities and rescinded funds "not needed to meet the commitments, as of January 9, 2021, of the programs and facilities established" ("Consolidated Appropriations Act" 2021).

Conclusion

Nonbank financial intermediation continued to grow across the world in the decade between the GFC and the COVID-19 crisis. Although many MSPs in the US and UK during the COVID-19 crisis were near copies of analogous GFC MSPs, they tended to be broader in eligibility and more generous in other terms. Furthermore, several countries launched MSPs for the first time.

Armed with their experience during the GFC, the Fed and other central banks quickly launched a series of MSPs within a couple of weeks of the World Health Organization declaring the COVID-19 as a pandemic. The quick actions showed the value of a clear ex ante understanding of a central bank's authorities and a playbook already in place for launching MSPs.

The COVID-19-era MSPs also showed the benefits of using an SPV. Other countries joined the US in these using the structure: South Korea, Japan, , and Thailand. These vehicles provide clarity in program outcomes, ease of administration, and a clear balance sheet separation for the government.

Unlike the GFC, where the troubles started in the financial sector, the COVID-19 crisis started in the real economy. Central banks and fiscal authorities collaborated more than they had in the GFC. The aims of COVID-19-era MSPs were far-reaching, especially in the advanced economies. Some MSPs went beyond the liquidity support needed in the acute phase and morphed into broader credit support programs during the anticipated chronic phase. These credit support designs were often novel attempts by central banks to complement the conventional and unconventional monetary policies they were using to head off COVID-19-induced recessions.

As these are more recent programs, conclusive judgments about their efficacy are not yet possible. Furthermore, as noted in our previous survey, the efficacy of a single MSP will often be impossible to identify, since governments launch many other interventions around the same time. Nevertheless, the evidence to date suggests that COVID-19-era MSPs were effective at reducing market stress during the acute phase of the COVID-19 crisis. In several cases, the announcement of the program was itself effective in calming the markets, even when the ultimate usage of those same programs was minimal.

Analysts have identified evidence of announcement effects in Canada GBPP and CBPP, Sweden CBP, and multiple programs in the US (Fratto et al. 2021). BoC staff research finds that the announcement of the GBPP lowered Government of Canada bond yields by an average of 10 bps, most of which the BoC attributed to signaling (Arora et al. 2021). Similarly, although CBPP purchases were limited, a former BoC economist notes that the program reduced illiquidity in corporate bonds (Andolfatto, Nelson, and Kronick 2020; Bank of Canada 2020b). In Sweden, the Riksbank found that the corporate-debt market recovered shortly after the announcement in March 2020 of the bank's intent to purchase commercial paper in April and corporate bonds sometime between March and December 2020 (Hansson and Birging 2021). Boyarchenko, Kovner, and Shachar (2020) find that the CCFs positively impacted the US corporate-bond market through several channels: (1) the announcement of the facilities improved the outlook for the economy as a whole, reducing credit risk and therefore risk premia; (2) the Fed, acting as a buyer of last resort, increased dealers' willingness to trade corporate-debt securities and therefore improved liquidity in the market; and (3) the purchases and the presence of a backstop facility directly supported markets for eligible securities (Boyarchenko, Kovner, and Shachar 2020).

For the more ambitious chronic-phase goal of credit support, the relatively quick recovery of financial markets rendered most of these programs unnecessary, and thus their creative design features to be untested. Nevertheless, designers should make note of these features, debate their merits, and prepare for the next crisis, when such designs may indeed be necessary.

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