

**FOR
INFORMATION**

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October 22, 2020

To: Members of the Executive Board

From: The Secretary

Subject: **Revised Global Financial Stability Report—October 2020—Chapters 2, 3, 4 and 5**

Board Action:

Executive Directors' **information**

Publication:

It would be appreciated if Directors could ensure that the attached final press version of Chapters 2, 3, 4, and 5 of the *Global Financial Stability Report* is treated as **Confidential** until the document is released at **9:00 a.m. on Friday, October 23, 2020, Washington D.C. time.**

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A GREATER SET OF POLICY OPTIONS TO RESTORE STABILITY

Chapter 2 at a Glance

- To mitigate stress in local bond and currency markets, many emerging market central banks used foreign exchange (FX) interventions and, for the first time, asset purchases.
- This *Global Financial Stability Report* (GFSR) presents a novel *local stress index* (LSI) to measure the stress in local bond and currency markets.
- Asset purchase programs (APPs) helped lower government bond yields, did not lead to FX depreciation, and eventually reduced market stress. Asset purchases may have a role to play going forward, but ongoing evaluation of the risks is also needed.
- Strategies to address debt distress in frontier markets need to consider the impact of the expected treatment of different creditors in future debt restructurings on investor perception of risk.

The pandemic has hit emerging and frontier market economies hard, but the policy response has been equally strong. Policymakers have taken steps to soften the hit to economic activity, ease financial conditions, and reduce stress in domestic markets. For the first time, many emerging market central banks have launched asset purchase programs to support the smooth functioning of financial markets and the overall economy. Asset purchases have been effective in reducing bond yields and have not contributed to currency depreciation, but they appear to have taken longer to reduce broader domestic bond market stress. This chapter examines the effectiveness of these unconventional policy measures and concludes that asset purchases with credible monetary policy frameworks and good governance may be a useful addition to the policy toolkit of central banks in emerging and frontier market economies, although a careful ongoing evaluation of associated risks is needed, especially for open-ended programs. In frontier market economies, the policy focus has been on addressing the effect of the pandemic while dealing with high debt. This chapter examines the potential impact on investor perception of sovereign risk as a result of the expected treatment of different classes of creditors in future debt restructurings.

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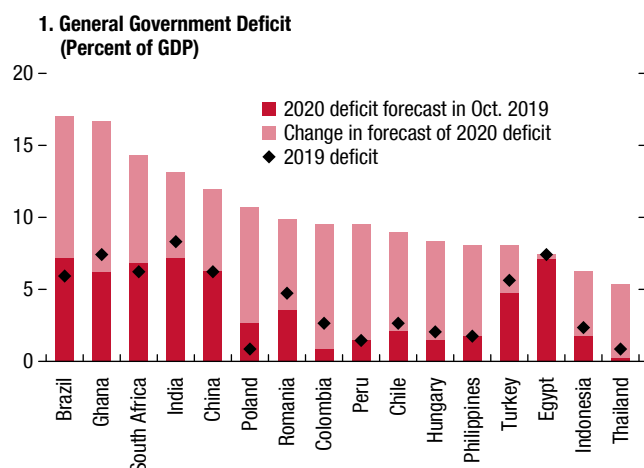
The Global Pandemic Has Required Bold Action

Emerging market economies have responded forcefully to the coronavirus disease (COVID-19) crisis. As a result of the sudden and unprecedented shock to economic activity, most governments have increased spending for emergency measures and transfers (Figure 2.1, panel 1). Over 90 percent of central banks have cut policy rates since March—some to all-time lows—and many have taken measures to provide liquidity to the banking system (Figure 2.1, panels 2 and 3). As a result of these measures and buoyant global risk appetite, financial conditions have eased considerably (see Chapter 1).

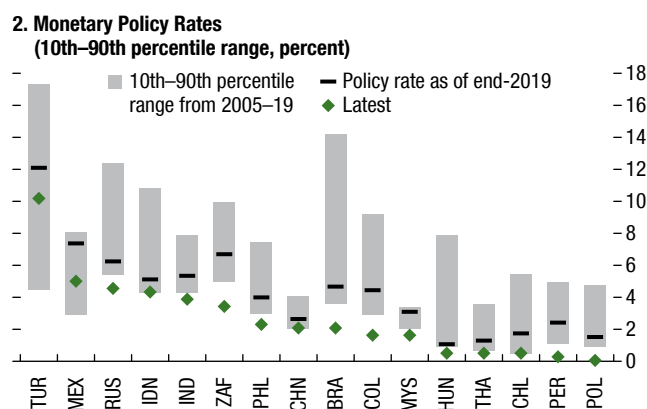
This chapter discusses the historic policy responses of emerging market policymakers to the global pandemic and the financial stability implications of those policies. The “FX Intervention by Emerging Market Central Banks” section considers the use and effectiveness of FX interventions during the peak of the crisis and reviews central bank asset purchases—a new policy tool for emerging market economies—including an examination of their effectiveness and lessons to evaluate their risks in the two sections that follow. “The Role of the Official Sector in Frontier Market Economy Debt Restructuring” section discusses many frontier market economies’ loss of market access because of COVID-19 and the potential impact of different classes of creditors on debt restructurings and on investor perception of sovereign risk. Building on the findings of the chapter, the final section

Figure 2.1. Emerging Market Policy Response to the COVID-19 Pandemic

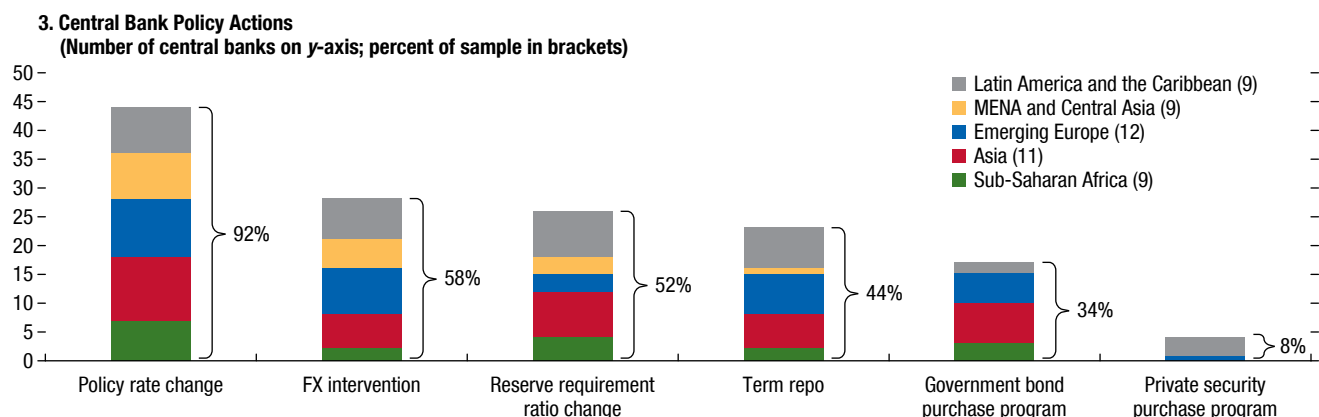
The need for emergency spending and the hit to revenues from the sharp economic shock of the COVID-19 crisis increased budget deficits ...



... and most central banks have aggressively cut rates, some to all-time lows.



In addition to rate cuts, central banks have responded forcefully to the COVID-19 crisis with an array of measures to boost market liquidity and stabilize economic and financial conditions.



Sources: Bloomberg Finance L.P.; IMF, World Economic Outlook database; national authorities; and IMF staff calculations.

Note: In panel 3, countries are counted only once per action (for example, multiple policy rate cuts are counted once). The sample comprises 50 central banks and does not include any advanced economies. The sample is defined in Online Annex 2.1 and is quantified by region in parentheses. Data labels in panel 2 use International Organization for Standardization (ISO) country codes. FX = foreign exchange; MENA = Middle East and North Africa.

offers policy recommendations. The apparent absence to date of capital flow management measures during the COVID-19 crisis and China's policy challenges in maintaining supportive financial conditions are briefly examined as well (Online Annex Boxes 2.1 and 2.2).

FX Intervention by Emerging Market Central Banks

FX interventions, including in some cases through forward contracts, were widespread at the height of the crisis in March, as policymakers sought to insulate their

economies from external movements in the pricing of risk. While many countries intervened, surpassing recent stress episodes in absolute size (Figure 2.2, panel 1), the use of reserves (as a share of total international reserves) was about two-thirds the magnitude observed during the global financial crisis for the median country (Figure 2.2, panel 2). The limited and short-lived use of reserves can potentially be attributed to a relatively short duration of the stress episode due to a quick turnaround in global risk sentiment, which has also likely reduced the need for the capital flow management measures (see Online Annex Box 2.2).

IMF staff analysis shows that global factors, including Federal Reserve rate cuts and global risk appetite (proxied by the Chicago Board Options Exchange Volatility Index [VIX]¹), played a significant role in driving currency surprises² during the COVID-19 sell-off (Figure 2.2, panel 3). Domestic policy rate cuts and FX interventions, on the other hand, had a relatively insignificant impact. This contrasts with the 2015 sell-off, which was more specific to emerging markets and not driven by exogenous global shocks, and during which emerging market currencies were significantly affected by domestic FX interventions and policy rate cuts (Figure 2.2, panel 4).

The New Game in Town: Central Bank Asset Purchases

During the COVID-19 crisis, for the first time on a broad basis, at least 18 emerging market central banks adopted unconventional policies through the use of asset purchase programs³ targeting government or private sector bonds in local currency. In several cases the purchases were sterilized, which alleviated downward pressure on exchange rates. The scope and motivation of these programs varied across economies (see Table 2.1 and Figure 2.3, panel 1), and the objectives were often multifaceted, but a view toward the available conventional monetary policy space allows for the identification of three broad groups:

- Central banks with *policy rates well above zero* tended to use asset purchase programs as a tool to improve bond market functioning (India, Philippines, South Africa) and provide liquidity to the financial sector. In some cases, central banks may have seen nominal policy rates below a certain level as counterpro-

ductive, primarily because of fears over portfolio outflows and ineffective policy transmission.

- Central banks with *policy rates closer to their lower bound* (Chile, Hungary, Poland) have partially sought to use asset purchase programs for somewhat similar reasons as advanced economies, to ease financial conditions, provide additional monetary stimulus, and exert greater influence on longer maturity bond yields. It is worth noting that in most cases market functioning and liquidity objectives were prominently featured.
- Some central banks explicitly stated that one of their objectives was to temporarily *ease government financing pressure* in the face of the once-in-a-generation global pandemic (Ghana, Guatemala, Indonesia, and the Philippines through its repurchase agreement).

Central bank purchases of government securities played an important role in some domestic bond markets during the acute phase of the sell-off. Beginning in February 2020 (Figure 2.3, panel 2), almost all economies faced sizable local currency bond outflows. Central bank asset purchases varied substantially in size, but in most cases they helped the domestic investor base absorb much of the outflow pressure and deal with the government's increased financing needs. For example, in Poland between the end of February and June the central bank purchased more than 2 percent of GDP in government bonds in the secondary market compared with outflows of 0.7 percent of GDP, alongside an increase in net domestic issuance of 4.4 percent of GDP. In some countries that did not launch asset purchase programs, debt management offices limited the local bond supply to avoid further deterioration of already stressed local bond markets. Instead, they relied on alternative sources of financing (for example, the use of cash buffers in Brazil, increased external issuance in Mexico, and pension funds in some Latin American countries) or back-loaded issuance to the second half of the year.

Local Market Stress Is Greater in Bonds than in Currencies

This GFSR introduces a novel market conditions index designed to assess the level of stress in local bond and currency markets. The *local stress index* (LSI) summarizes conditions into an indicator that can help guide central bank decisions regarding the need for interventions to support local market functioning. Unlike financial conditions indices, which can loosen or

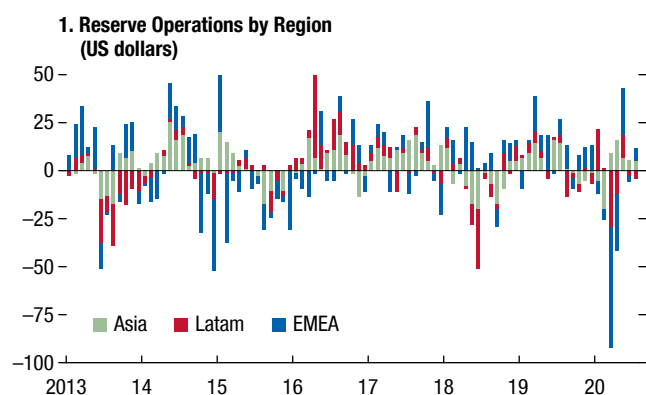
¹Other policy variables, such as announcements by the Federal Reserve of additional purchases, credit facilities, and swap lines, must have also affected emerging market currencies indirectly, but a significant part of that impact should be reflected through global risk appetite.

²The results are broadly consistent even when simple currency changes are considered. For more details, see Online Annex 2.1. All annexes are available at www.imf.org/en/Publications/GFSR.

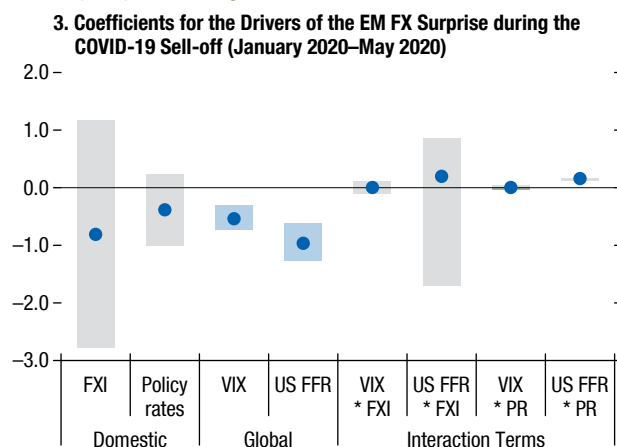
³For the purpose of this GFSR, an APP is the expansion of the central bank balance sheet via purchases of various type of securities. APPs include quantitative easing programs that aim to ease financial conditions and provide monetary stimulus, more limited programs that aim to improve market functioning, and purchases in primary markets that aim to assist with government financing requirements. Some countries in the sample set up new purchase programs (for example, Chile and Hungary); others adjusted their existing open market operations (for example, Malaysia and Turkey).

Figure 2.2. FX Interventions and Reserve Operations

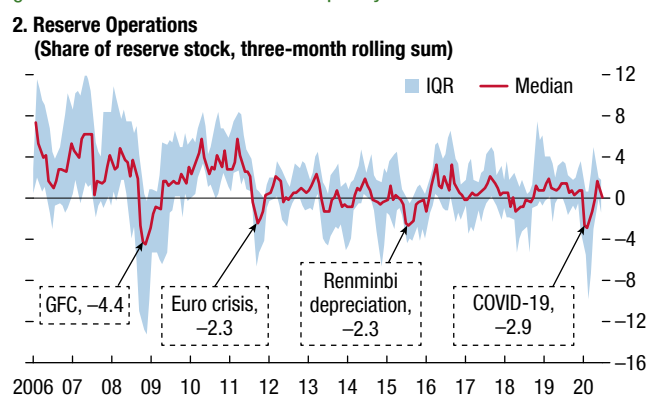
Reserve operations were substantial and widespread in dollar terms ...



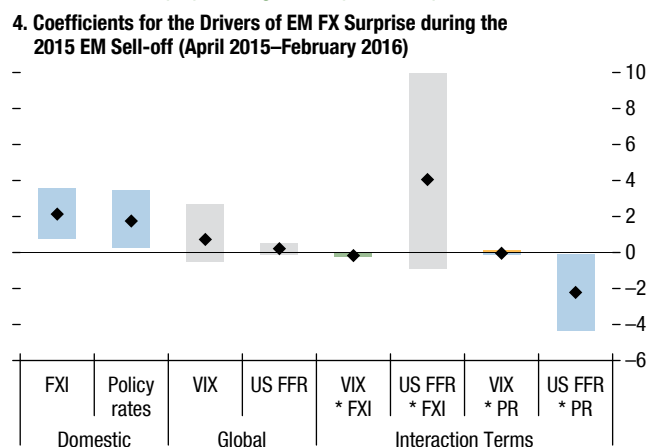
Global factors played a significant role in driving emerging market currency surprises during the COVID-19 sell-off ...



... though as a share of reserves they never reached the level of the global financial crisis and receded quickly.



... in sharp contrast to the 2015 emerging market sell-off, when domestic factors played a significantly more important role.



Sources: Data set from Adler and others (forthcoming); Bloomberg Finance L.P.; Haver Analytics; International Institute of Finance; and IMF staff calculations.

Note: In panel 1, data exclude China. In panels 1 and 2, data are as of end-August 2020. Data from May onwards include estimates for operations only in the spot market, while data for April and earlier include estimates for operations in spot as well as derivatives markets. Operations in derivatives markets do not represent a drag on the reserve stock but are included in the calculations to estimate the size of the intervention. These estimates do not adjust for foreign exchange bond sales/purchases, so they may represent a partial picture in a few cases (for example, Mexico). In panels 3 and 4, the sample consists of 14 emerging markets with panel data at monthly frequency (see Online Annex 2.1 for more details). The dependent variable is the forecast error between the spot currency value and the value forecast by the previous month's forward contracts. A positive value implies that the currency appreciated versus market expectations, assuming parity holds. In reality, the forward values might vary from spot for an extended period of time, but the changes in this metric will still highlight currency pressures, albeit only partially. The results hold broadly true even if the dependent variable is taken as foreign exchange appreciation. Foreign exchange intervention (FXI) is calculated as valuation-adjusted changes in reserves and the intervention as taken in the derivative markets. A positive value means active intervention. Country fixed effects are included. Coefficient estimates are shown with two standard error confidence intervals. In panels 3 and 4, blue bars are the statistically significant coefficients, while gray bars are not statistically significant. EM = emerging market; EMEA = Europe, Middle East, and Africa; FFR = Federal funds rate (effective); GFC = global financial crisis; IQR = interquartile range; Latam = Latin America; PR = policy rate; VIX = Chicago Board Options Exchange Volatility Index.

Table 2.1. Asset Purchase Programs in Response to COVID-19 in Emerging Market Economies

Country	Primary Objectives	Asset Type	Target or Limit Size (local currency unless specified)	Market	Total Purchases (percent of GDP)	Program Duration (observed or explicit)	Significant Announcement Dates	General Government 2020 Deficit (percent of GDP)	Government Debt (percent of GDP)
Colombia	Provide liquidity to the financial sector	Government, private sector bonds	10 tn private, up to 4 tn government	Secondary	1.1	Mar.–Apr.	Mar. 23	–9.5	68.2
Chile	Facilitate monetary policy transmission, ease financial conditions	Bank, central bank, and government bonds*	\$16 bn	Secondary	2.9*	Mar.–present	Mar. 16, Mar. 31, Jun. 16, Aug. 12	–8.7	32.8
Croatia	Stabilize domestic bond market	Government bonds	Not specified	Secondary	4.9	Mar.–Jun.	Mar. 13	–8.1	87.7
Ghana	Finance budget deficit	Government bonds	5.5 bn (up to 10 bn)	Primary	1.4	May	May 15	–16.4	76.7
Guatemala	Finance budget deficit	Government bonds	11 bn	Both	1.9	Apr.–Aug.	Apr. 8	–5.6	32.2
Hungary	Facilitate monetary policy transmission at longer maturities, provide financial sector liquidity	Government, mortgage bonds (MBs)	No upper limit, but technical revision after 1 tn in government, 300 bn in MBs	Both (only MBs in primary)	1.4	May–present	Apr. 7, Apr. 28, Jul. 21, Aug. 25	–8.3	77.4
India	Stabilize domestic bond market	Government bonds	Not specified	Secondary	1.0	Mar.–present	Mar. 18	–13.1	89.3
Indonesia	Stabilize domestic bond market, provide liquidity to the financial sector, finance budget deficit	Government bonds	Initially not specified, with direct “burden sharing” of 397.6 tn later announced	Both	3.8**	Mar.–present	Mar. 31, Jul. 7	–6.3	38.5
Malaysia	Provide liquidity to financial sector	Government bonds	Not specified	Secondary	0.6	Mar.–Jun.	Mar. 25	–6.5	67.6
Philippines	Provide liquidity to financial sector, stabilize bond market, finance budget deficit (repurchase agreement)	Government bonds, including repurchase agreement	Secondary market purchases not specified, repurchase amount limited to about 850 bn	Both	4.3 (7.3)***	Mar.–present	Mar. 23, Apr. 10, Oct. 2	–8.1	48.9
Poland	Strengthen monetary policy transmission at longer maturities, stabilize domestic bond market, provide liquidity to financial sector	Government, SOE bonds	Not specified	Secondary	4.6	Mar.–present	Mar. 17, Apr. 8	–10.5	60.0
Romania	Provide liquidity to financial sector	Government bonds	Not specified	Secondary	0.5	Mar.–present	Mar. 20	–9.6	44.8
South Africa	Stabilize domestic bond market	Government bonds	Not specified	Secondary	0.7	Mar.–present	Mar. 25	–14.0	78.8
Thailand	Stabilize domestic bond market	Government, central bank bonds	Not specified	Secondary	1.0	Mar.–Apr.	Mar. 19, Mar. 22	–5.2	50.4
Turkey	Provide liquidity to financial sector, strengthen monetary policy transmission mechanism, secure credit conditions	Government bonds	Not specified, but OMO portfolio limited to 10 percent of balance sheet	Secondary	1.6	Mar.–present	Mar. 31	–7.9	41.7

Sources: Local media; national authorities; and IMF staff estimates.

Note: Total purchase amounts are estimates of March through latest available as of publication process (late September). Program dates are not exhaustive, but generally reflect a significant program announcement or first purchase date. Poland includes purchases of bonds from the State Development Bank (BGK) and State Development Fund (PFR). For Chile, only assets purchased under the Special Asset (June) and Bank Bond (March) Purchase Programs that were in direct response to the COVID-19 crisis were included, and not the Nov. 2019 central bank debt buyback program through which the central bank bought back about 1.2% of GDP of its own debt in 2020. Bank of Thailand also authorized a Corporate Stabilization Fund for short-term financing not included here. Papua New Guinea, Jamaica, Sri Lanka, and the Central African Economic and Monetary Community (through the Bank of Central African States) are not included in the table but announced asset purchases of various forms. Brazil outlined plans to purchase corporate bonds in June, but had yet to do so. The BSP (Philippines) opened its purchase window in March prior to written public announcement in April. bn = billion; OMO = open market operations; tn = trillion.

*Chile's central bank did not gain the legal ability to purchase government bonds until August 12.

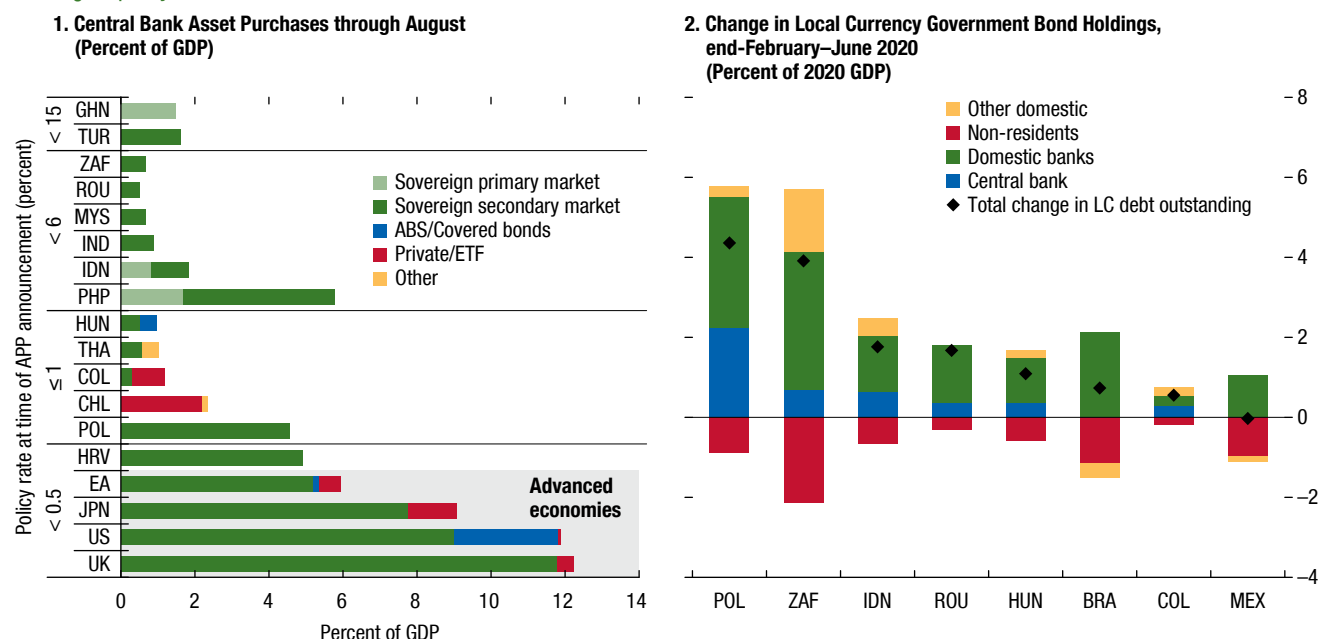
**Indonesia includes staff estimates of secondary market purchases, primary market purchases prior to July, and the full 397.6 tn July burden sharing agreement, though only about 60 percent of the agreed purchases had been completed through mid-September.

***Philippines includes staff estimates of secondary market purchases and the three-month repurchase agreement of 540 bn (3.0% of GDP) with the central government added in parentheses, and the BSP closed out a previous 300 bn repurchase agreement in September.

Figure 2.3. Central Bank Asset Purchases in Emerging Markets

Asset purchase programs in emerging markets differ in scope, size, and duration from those in advanced economies and are often used with higher policy rates.

Central bank purchases helped offset portfolio outflows during the crisis period in some economies.



Sources: Bloomberg Finance L.P.; Haver Analytics; national sources; World Bank; and IMF staff calculations.

Note: Data in panel 1 and panel 2 may in some cases have different sourcing related to definitional and availability reasons. Asset purchases in Hungary did not begin until May. In panel 1, sovereign purchases for Poland include those from the state development bank (BGK) and the state development fund (PFR), which are excluded in panel 2. Purchases for Chile include only those under Special Asset (June) and Bank Bond (March) Purchase Programs. Primary market purchases for the Philippines refer to the 300 bn (~1.6% of GDP) repurchase agreement in April 2020, which was repaid in September. In panel 1, Indonesia primary market purchases include only the share of the burden sharing agreement completed through August, not the entirety of the 397.6 trillion plan. In panel 2, total change for South Africa differs slightly from aggregated holdings as it includes Treasury bills separately. Data are not adjusted for inflation-linked bonds. Indonesia central bank holdings are defined as net of monetary operations. Data labels use International Organization for Standardization (ISO) country codes. ABS = asset-backed securities; APP = asset purchase program; ETF = exchange-traded fund.

tighten as a result of changes in policy rates or external spreads—as a reflection of the cost of funding—the LSI focuses on local market liquidity and stress indicators (such as bid-offer spreads, realized volatility, and other risk premium measures).⁴

The level of stress in local markets during the COVID-19 sell-off, as measured by the LSI, was comparable to that of the global financial crisis, but the period of stress was considerably shorter. In aggregate (Figure 2.4, panel 1), the level of stress was well above that of previous episodes, such as the 2013 taper tantrum and 2014–15 stress episodes. However, markets have been normalizing much faster than during previous episodes (Figure 2.4, panel 2).

A large part of the increase (and subsequent partial reduction) in stress in local bond markets originated from

developments in the global financial markets. In line with past episodes of sharp tightening in global financial conditions, the spillovers in FX markets emanating from the United States and the European Union rose sharply (Figure 2.4, panel 3) as currencies played their role as shock absorbers.⁵ However, unlike what happened during past tightening episodes, the spillovers to local bond markets were more pronounced (Figure 2.4, panel 4). Most emerging markets have seen a large increase in non-resident participation in their local bond markets since the global financial crisis, which may have exacerbated increased volatility spillovers during the recent sell-off.

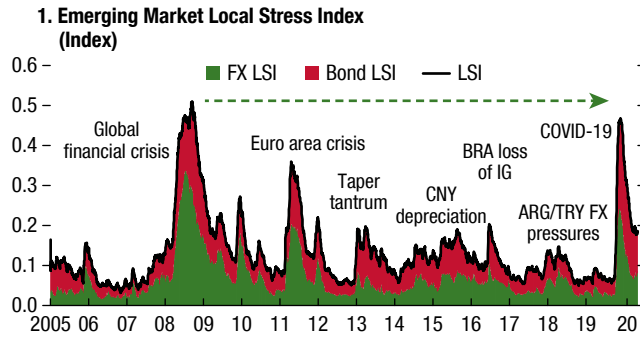
The stress in FX markets was lower than during 2008–09, with less noticeable demand for dollar liquidity.

⁵Spillover indices in Figure 2.4, panel 1, are calculated using the approach in Diebold and Yilmaz (2012), in which time-varying spillovers are constructed using rolling generalized forecast error decompositions. The index is the contribution from a shock to market X to the overall variability in any other market Y.

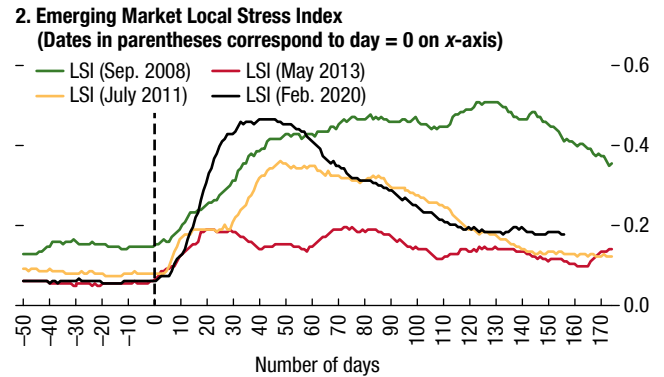
⁴For details, see Online Annex 2.1, available at www.imf.org/en/Publications/GFSR.

Figure 2.4. Stress in Local Currency Bond and FX Markets

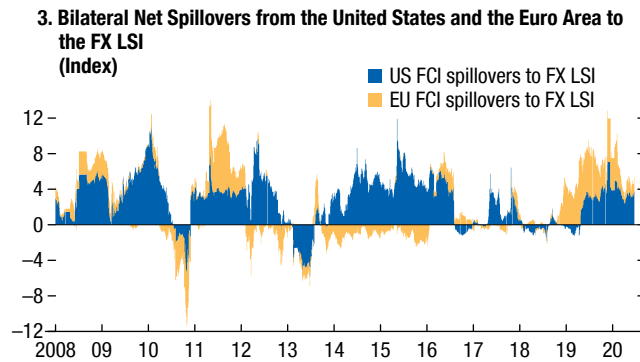
The COVID-19 shock led to significant market dysfunction comparable to that of the 2008 global financial crisis.



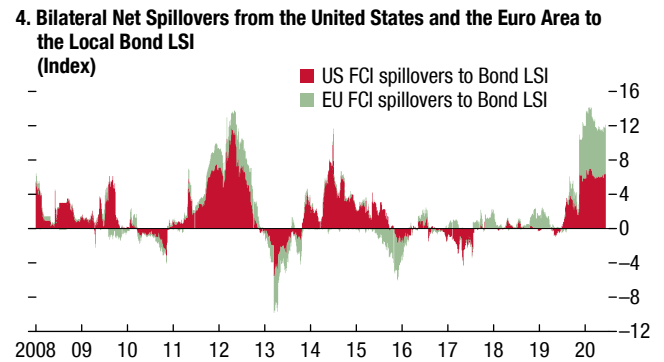
Stress dissipated faster than in previous episodes but remains elevated.



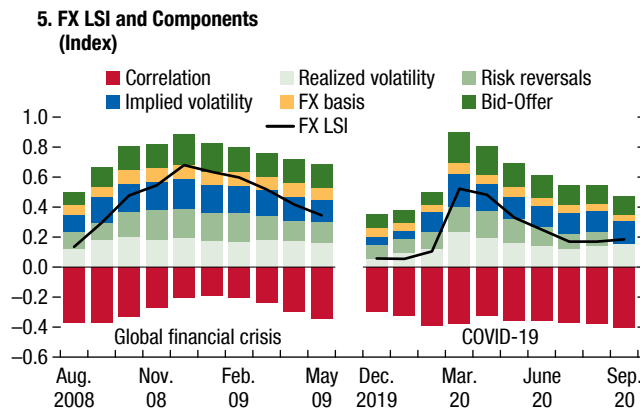
The spillovers of tightening US/EU financial conditions to emerging market currencies were of the same magnitude as in the past ...



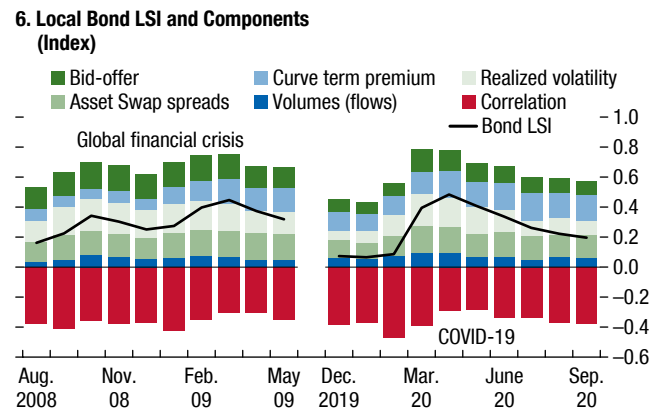
... while the spillover to emerging market bond market conditions is far more pronounced now than in the past.



Policy actions in FX markets normalized conditions quickly, but ...



... local bond markets have remained more dysfunctional, triggering asset purchase programs.



Sources: Bloomberg Finance L.P.; and IMF staff calculations.

Note: The local stress index (LSI) is calculated from the country LSIs of 16 countries. For more information see Online Annex 2.1. FCI = financial conditions index; FX = foreign exchange; GFC = global financial crisis.

For example, increases in measures such as risk reversals, which indicate the level of hedging demand for a sharp depreciation against the dollar, have been more muted.⁶ In addition, the wider cross-currency basis—a measure of dollar funding liquidity stress (Figure 2.4, panel 5)—was more short-lived. These developments were likely a result of:

- The rapid establishment of central bank swap line facilities and bond repo facilities for foreign central banks by the Federal Reserve and the European Central Bank.⁷
- Structural shifts in the operation of FX markets since the global financial crisis (Schrimpf and Sushko 2019),⁸ including increased turnover in emerging market currencies and electronic trading and a larger set of market-making institutions.

Unlike FX markets, local bond markets became more stressed and triggered policy responses in the form of asset purchase programs. A notable aspect is the increase in the risk premiums of long-end government bonds relative to short-end bonds and onshore swap rates (Figure 2.4, panel 6). Despite the positive impact of asset purchase programs on market conditions (see next subsection), stress levels have been more elevated, likely as a result of:

- High local bond supply risks that weigh on yields through risk premiums.
- Weak foreign flows to local bond markets, which had a negative impact on liquidity.
- Relatively limited depth of local currency government bond markets. Unlike FX markets, local bonds are still traded largely domestically, and market depth has not matched higher foreign participation, which could induce volatility (see Chapter 3 of the April 2020 GFSR). In countries with a shallower domestic investor base (see “Looking Ahead: Trade-offs of Asset Purchase Programs” section), domestic banks are the sole liquidity providers in times of stress.

⁶In fact, during the early stages of the shock in February, the depreciation pressures in emerging markets were more acute against the euro, likely because of unwinding of euro-funded carry trades relative to high-yield currencies, such as the Russian ruble and the Mexican peso.

⁷The IMF flexible credit lines for Chile and Peru in the second quarter of 2020, and the renewal of the flexible credit line for Colombia, also boosted confidence and provided insurance against downside risks.

⁸Another structural shift worth noting is the shift toward more flexible exchange rate regimes since the 2008 global financial crisis (for example, in Russia).

Domestic Asset Purchases Eventually Helped Reduce Market Stress

The announcement of asset purchase programs in the second half of March did not have an immediate impact on local stress indices, given that global financial conditions were very tight and market conditions were hampered by illiquidity, strong risk aversion, and fiscal concerns (Figure 2.5, panel 1).⁹ However, as external conditions started to improve in April and countries stepped up implementation of asset purchase programs, country-level local stress indices showed some improvement and differentiation.¹⁰ A large part of the improvement was seen in market liquidity measures, such as bid-offer spreads and a reduction in intraday volatility. Yet term premiums in some local bond markets remain elevated as investors are facing bond supply risks over a longer horizon given the uncertainty of pandemic-related government financing requirements.

Evaluating the effectiveness of asset purchase programs with respect to their stated goal of improving market conditions is complex, and more work is needed. Asset purchase programs helped reduce market stress, eventually, and several factors contributed to this reduction. The size of announced asset purchase programs in emerging markets has been small overall (except in Chile, Indonesia, the Philippines, and Poland) and short-lived, as is evident in the slow-down of asset purchases since May for most countries (Figure 2.5, panel 2). In addition, announcements and implementations of asset purchase programs can affect market conditions differently, and the lack of local currency bond inflows had a negative impact on market liquidity, especially in markets with a large foreign presence. The introduction of asset purchase programs at the height of the crisis is likely to have served as a useful circuit breaker, preventing further escalation of stress. Purchases of government bonds and other assets signaled that emerging market central banks were ready to stand as buyer of last resort (Arslan, Drehmann, and Hofmann 2020). Moreover, the empirical analysis presented in the following section suggests that asset

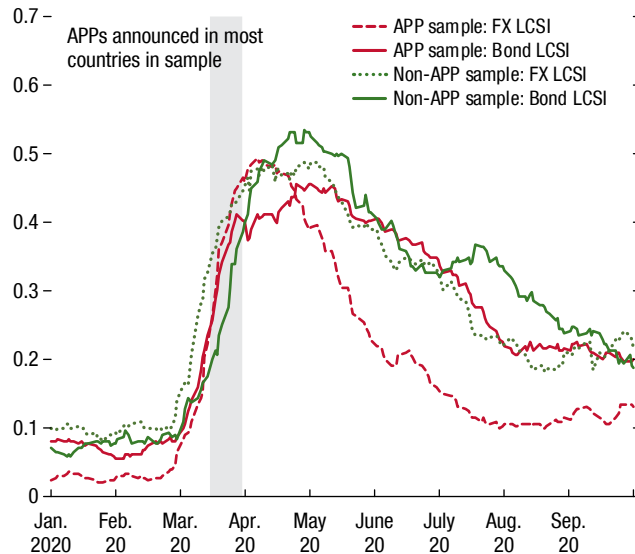
⁹This is in line with developments in the United States, where the Federal Reserve’s March 15 announcement of additional US Treasury purchases did not relieve market stress.

¹⁰Figure 2.5, panel 1, aggregates countries that have different characteristics, which could be the main driver of the results rather than APPs. Online Annex 2.1 presents event studies around the asset purchase announcements that show country-level developments.

Figure 2.5. Bond Stress and Asset Purchase Programs in Emerging Market Economies

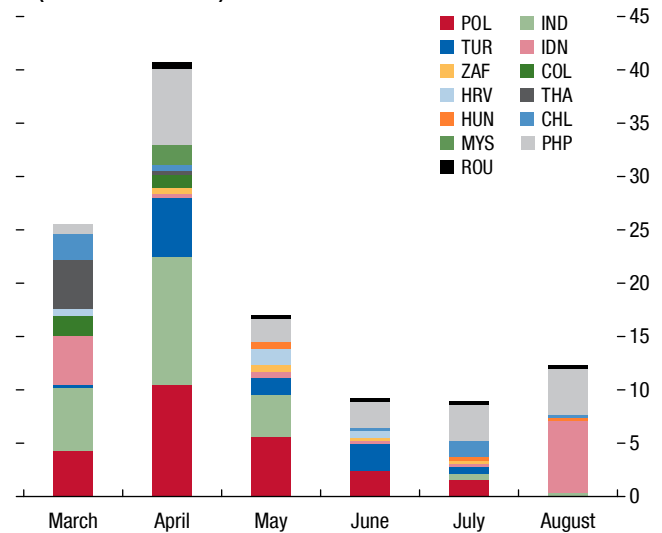
Stress has eased somewhat faster for countries with asset purchase programs than for those that do not have them.

1. Local Stress Indices: APP versus Non-APP Economies



Emerging market asset purchases rose significantly in March and April but moderated thereafter.

2. Asset Purchases by Major EM Central Banks (Billions of US dollars)



Sources: Bloomberg Finance L.P.; Haver Analytics; JPMorgan Chase and Co.; national authorities; and IMF calculations.

Note: Non-APP economies are Brazil, Chile, China, Mexico, Peru, and Russia. In panel 2, Indonesia uses change in gross holdings as proxy for asset purchases. Monthly purchases are IMF staff estimates otherwise. Data labels in panel 2 use International Organization for Standardization (ISO) country codes. APP = asset purchase program; EM = emerging market; FX = foreign exchange; LCSI = local currency stress index.

purchase program announcements had a positive impact on yields on the announcement date and several days beyond, even after controlling for external factors. Nevertheless, large-scale APPs, especially when open-ended, carry risks and may negate their initial effectiveness.

Domestic Asset Purchases Lowered Bond Yields and Had Little Effect on Currencies

Event studies show that asset purchase program announcements¹¹ had a significant immediate impact on asset prices and helped turn sentiment around.¹² Financial conditions were tightening going into the announcements but were inflected following the announcements, with a corresponding sharp reduction in government bond yields (Figure 2.6, panel 1) and term premiums (Figure 2.6, panel 2), but with

relatively limited impact on currencies (Figure 2.6, panel 3). The reaction seen in intraday data for selected countries—to control for the effect of global and exogenous factors on end-of-day levels—shows a similar trend, with declining government bond yields but relatively less impact on currencies (Figure 2.6, panel 4; Arslan, Drehmann, and Hofmann 2020).

This section discusses empirical analysis of the effect of domestic asset purchase program announcements on local currency government bond yields.¹³ The model controls for policy rate cuts by emerging market central banks and global factors, such as the VIX and the VIX rate of change and asset purchase program announcements by the Federal Reserve. The analysis uses daily data from 13 emerging market economies from January to mid-May 2020 and controls for unobserved country-specific factors using country fixed effects (see Online Annex 2.1). The analysis is based on the local projections method (Jordà 2005; Teulings and Zubanov 2014), which capture the full dynamics of sovereign bond yields in the aftermath of

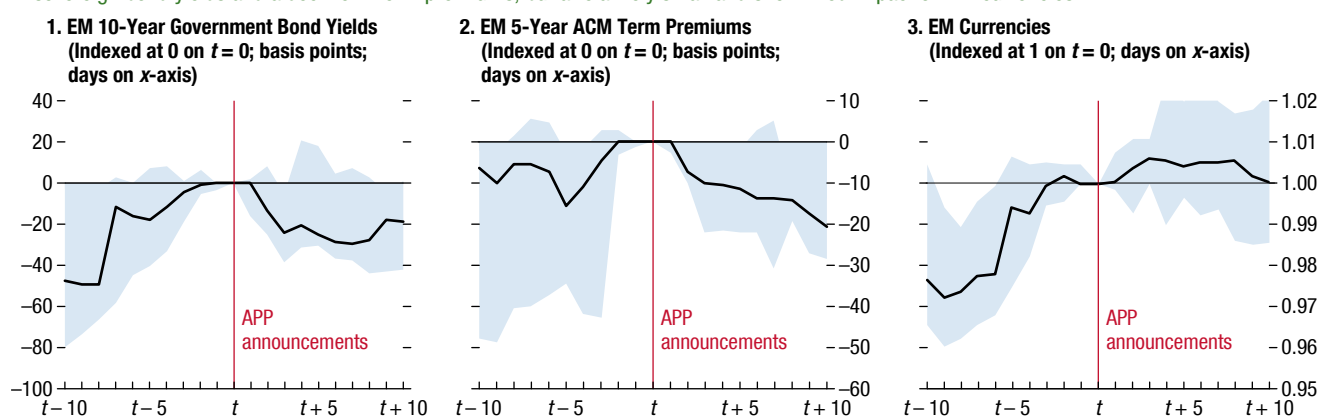
¹¹The size of the announced programs may also have influenced the market reaction, although it is not considered (in line with the literature) given the lack of consistency across announcements and divergent market expectations.

¹²Results in this section draw upon Drakopoulos and others (forthcoming).

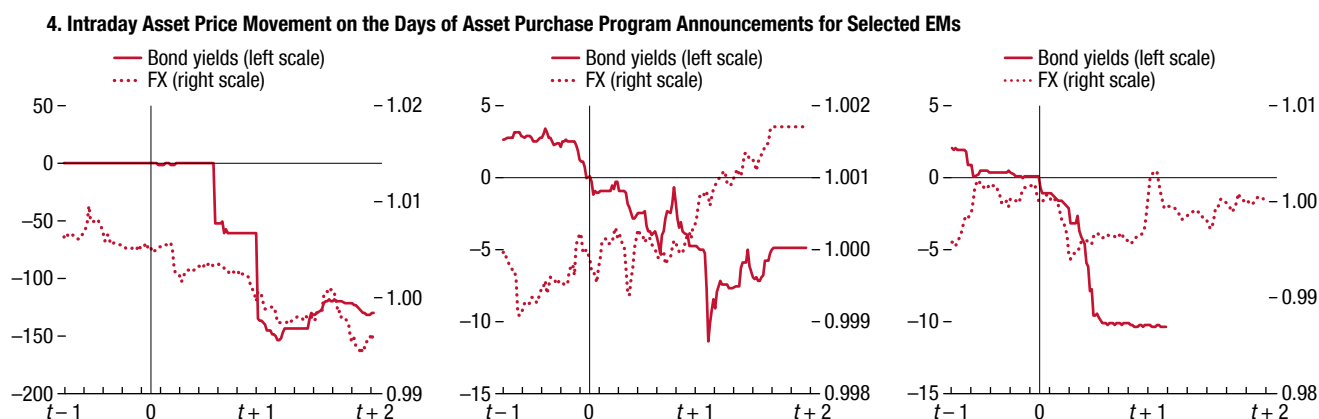
¹³Drakopoulos and others (forthcoming) discusses also the effect of APPs on equity markets.

Figure 2.6. Market Reaction to Domestic Asset Purchase Program Announcements

Event studies around emerging market asset purchase program announcements show a significant change following the event, including a decline in sovereign bond yields and a decline in term premiums, but a relatively small and short-lived impact on EM currencies.



Intraday price reaction showed a similar trend, with government yields reacting very sharply, but relatively limited impact on emerging market currencies.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; BNP Paribas; national authorities; and IMF staff calculations.

Note: In panel 2, term premium calculations are based on the methodology detailed in Adrian, Crump, and Moench (2013). In panels 3 and 4, a declining trend in the foreign exchange lines implies an appreciation of the local currency versus the US dollar. In panels 1–3, the black line denotes the median across our sample, while the blue range highlights the interquartile range across the events. The sample comprises Chile, Colombia, Hungary, India, Indonesia, Malaysia, the Philippines, Poland, South Africa, and Turkey (across a total of 16 dates). ACM = Adrian, Crump, and Moench (2013); APP = asset purchase program; EM = emerging market; FX = foreign exchange.

the announcements by central banks.¹⁴ The dependent variable is the cumulative change in bond yields, and the main variable of interest is the indicator for the dates of asset purchase program announcements (Figure 2.7). A challenge in this analysis is to isolate the impact of asset purchase program announcements on bond yields from the effect of policy rate cuts and announcements by the Federal Reserve around the same time. To that end, two empirical specifications

are presented to account for the direct effect of the additional asset purchase announcement by the Federal Reserve (Figure 2.7, panels 1, 3, and 5) and the VIX as a proxy for global risk appetite (Figure 2.7, panels 2, 4, and 6). Both specifications control for domestic policy rates.

Both specifications find that emerging market central bank asset purchase program announcements reduce long-end bond yields in a significant and persistent way (Figure 2.7, panels 1 and 2), even controlling for the Federal Reserve asset purchase program announcement (Figure 2.7, panel 1) or the change in global risk appetite (Figure 2.7, panel 2). The size

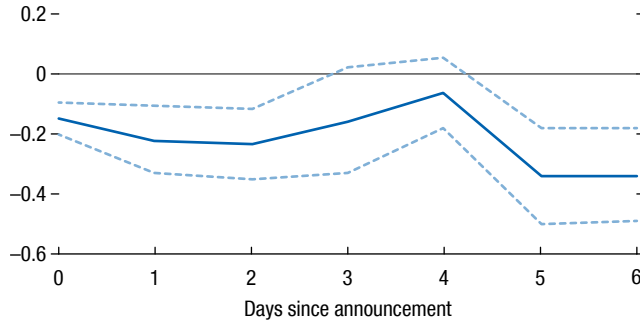
¹⁴Some evaluations of the effectiveness of asset purchases by the Federal Reserve use the surprise announcement of 10-year equivalents on term premiums, but such an approach is beyond the scope of the analysis here.

Figure 2.7. Asset Purchase Program Announcements and Sovereign Bond Yields

Panels 1, 3, and 5 show the impulse response functions to APP announcements by emerging market central banks, controlling for Federal Reserve actions and emerging market rate cuts.

Specification 1: Effect of Variable X on Bond Yields

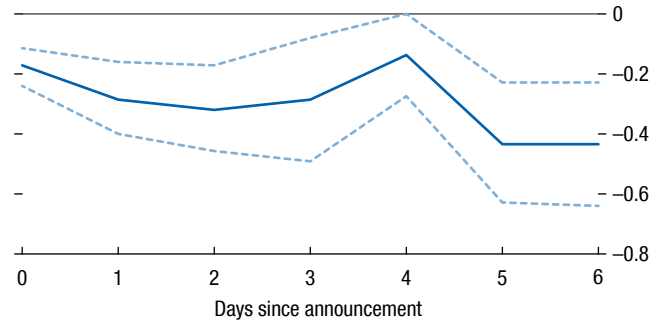
**1. X = Domestic APP Announcements
(Percentage point change in yield)**



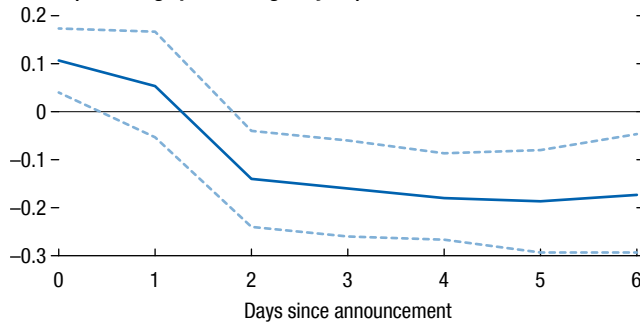
Panels 2, 4, and 6 show the impulse response functions of APP announcements by emerging market central banks, controlling for the VIX as a proxy for global risk appetite and emerging market rate cuts.

Specification 2: Effect of Variable Y on Bond Yields

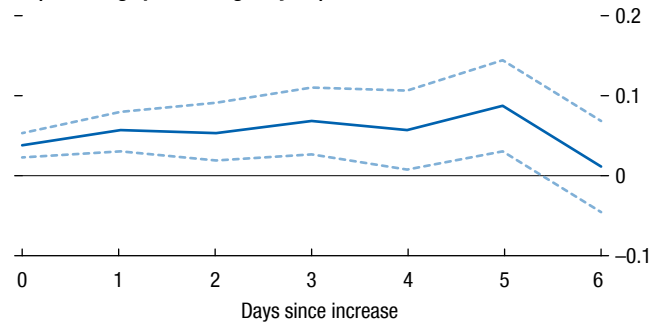
**2. Y = Domestic APP Announcements
(Percentage point change in yield)**



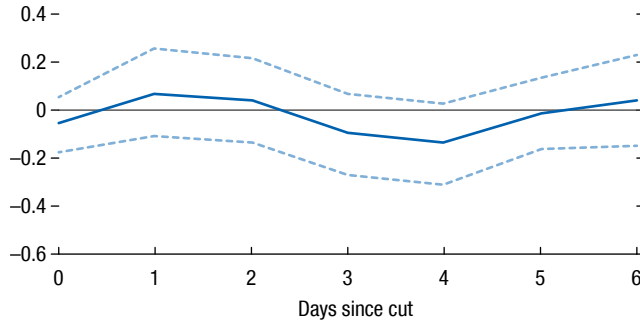
**3. X = Federal Reserve Quantitative Easing Announcement
(Percentage point change in yield)**



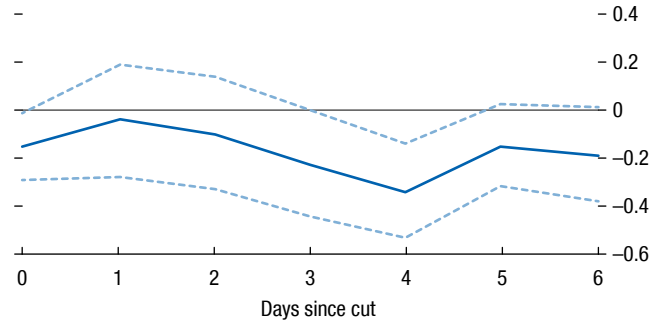
**4. Y = Ten Point VIX Increase
(Percentage point change in yield)**



**5. X = 1 Percentage Point Domestic Policy Rate Cut
(Percentage point change in yield)**



**6. Y = 1 Percentage Point Domestic Policy Rate Cut
(Percentage point change in yield)**

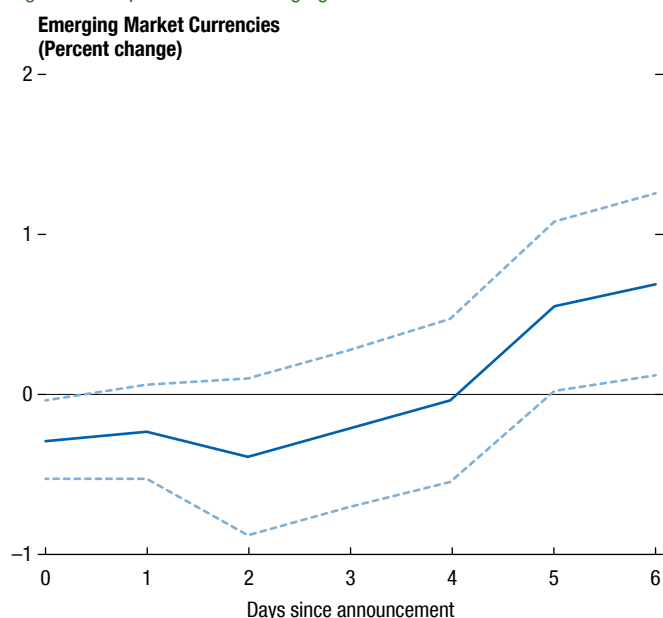


Source: IMF staff calculations.

Note: Results are based on the local projections method (Jordà 2005; Teulings and Zubanov 2014) using panel data from 13 emerging markets at daily frequency from the beginning of January to mid-May 2020. The dependent variable is the cumulative change (in percentage points) in local currency sovereign bond yields. The first specification controls for the APP announcement by the Federal Reserve and domestic rate cuts (panels 1, 3, and 5). The second specification controls for the Chicago Board Options Exchange Volatility Index (VIX) and domestic rate cuts (panels 2, 4, and 6). Country fixed effects are included in both specifications. Coefficient estimates are reported with one standard error confidence interval. The x-axes represent the number of trading days following each episode. See Online Annex 2.1 for more details. APP = asset purchase program; VIX = Chicago Board Options Exchange Volatility Index.

Figure 2.8. Asset Purchase Program Announcements and Domestic Currencies

Announcements of asset purchase programs did not lead to a significant depreciation of emerging market currencies.



Source: IMF staff calculations.

Note: Results are based on the local projections method (Jordà 2005; Teulings and Zubanov 2014) using panel data from 13 emerging markets at daily frequency from the beginning of January to mid-May 2020. The dependent variable is the cumulative change (in percent) in the value of domestic currencies vis-à-vis the US dollar. The specification controls for the asset purchase program (APP) announcement by the Federal Reserve and domestic rate cuts, as well as country fixed effects. Coefficient estimates are reported with a one standard error confidence interval. The x-axis shows the number of trading days following each episode. See Online Annex 2.1 for more details.

of the impact of domestic asset purchase program announcements on yields ranges from 20 to 60 basis points and is statistically significant within one standard error confidence interval. The size of the effect is in the range of Arslan, Drehmann, and Hofmann (2020) and Hartley and Rebucci (2020). By contrast, in both specifications, domestic rate cuts do not appear to have a significant effect on yields, controlling for other factors, such as asset purchase programs¹⁵ (Figure 2.7, panels 5 and 6).

The improvement in external conditions also had a significant and persistent impact on lowering long-end yields. Both the Federal Reserve asset purchase program announcement on March 23 (Figure 2.7, panel 3) and the improvement in global risk appetite

¹⁵This might also reflect that the rate cuts were already priced in or that risk premiums remained high.

(Figure 2.7, panel 4) had a positive effect on decreasing yields, reflecting the sensitivity of domestic bond yields to global factors (April 2020 GFSR). This is also consistent with the finding by Beirne, Renzhi, and Sugandi (2020) of evidence of spillovers to emerging market bond yields from quantitative easing by central banks in advanced economies (see Chapter 1). The magnitudes of the effect of the asset purchase program announcements by emerging market central banks and the Federal Reserve are broadly similar.

Announcements of asset purchase programs did not lead to a significant depreciation of emerging market currencies (Figure 2.8), in line with intraday event studies (Figure 2.6, panel 4). This may reflect the relatively small size of the programs and the fact that the purchases were sterilized in many cases. Furthermore, the restoration of stability and the decisive actions taken by advanced and emerging market central banks may have also contributed to investor confidence and reversal of the earlier considerable FX sell-off.

Looking Ahead: Trade-offs of Asset Purchase Programs

The experience with emerging market asset purchase programs has been largely positive so far, though further expansion of duration or size could create risks and thus warrant an ongoing evaluation of risks. APPs had a catalyzing effect on lowering local currency government bond yields without indications of immediate risks to financial stability. In some cases, purchases may have intermediated an orderly exit of investors from local currency bond markets, but this was likely done in the interest of preserving investor confidence and avoiding more costly and widespread market disruptions. Central bank communication and benign market perception in terms of the scope, timing, and temporary nature of these programs were essential in containing perceived risks of fiscal dominance that would likely have led to higher bond yields and weaker currencies.

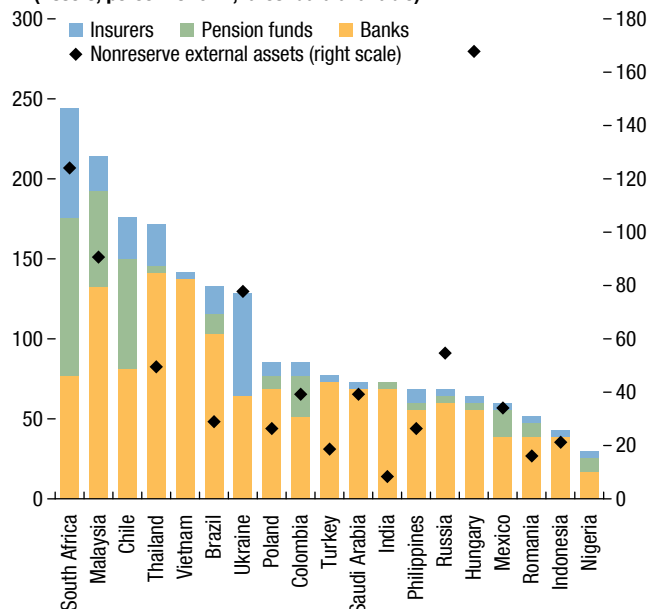
Beyond the pandemic, this positive experience may motivate more emerging market central banks to consider unconventional monetary policy as a key additional part of their policy toolkit, especially where conventional policy space becomes limited.¹⁶

¹⁶For a deeper discussion of the use of unconventional monetary policy in emerging market economies see Hofman and Kamber (forthcoming).

Figure 2.9. Considerations for Asset Purchase Programs

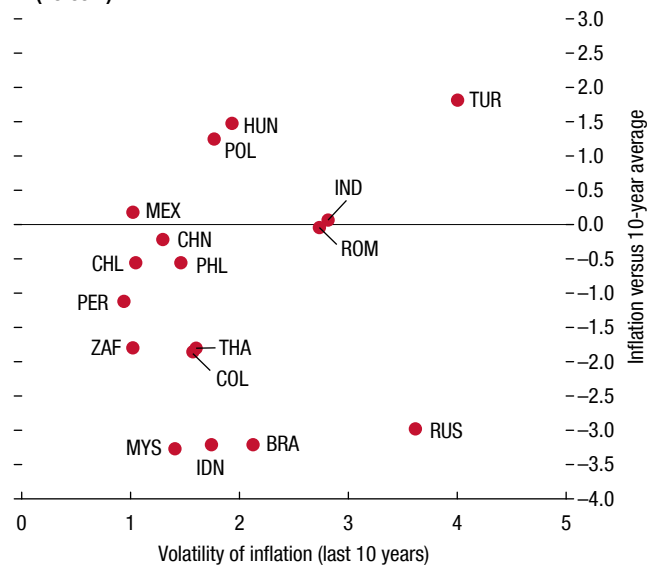
The depth of the domestic investor base and its ability to repatriate foreign assets may affect the need for APPs.

1. Domestic Institutional Investor Base
(Assets, percent of GDP, latest data available)



Credible monetary policy frameworks and sound governance are prerequisites for APPs.

2. Inflation: Volatility versus Deviation from Trend
(Percent)



Sources: Bloomberg Finance L.P.; Haver Analytics; World Bank; and IMF staff calculations.

Note: In panel 1, data are as of latest vintage available, though gaps exist for select countries and series. Data labels in panel 2 use International Organization for Standardization (ISO) country codes. APPs = asset purchase programs.

APPs may be suitable for countries constrained by their own effective lower bound, with inflation expectations steady, where the concern over capital outflows and FX depreciation is low or where the domestic absorption capacity of new bond supply is limited (Figure 2.9, panel 1). The goal of an APP in such cases is to exert control over the medium- to long-end of the yield curve (even when policy rates remain substantially above zero) to lower government financing costs and to temporarily ease pressure on domestic investors when there is increased issuance or foreign investor outflows. There are important caveats when it comes to this goal, however. Longer-term yields play a less central role in most emerging market economies than they do in advanced economies. Similarly, the fragilities behind higher short-term rates are likely to limit the scope for attempts to lower longer-term yields.

Policymakers should consider both the benefits and potential significant costs of APPs with respect to monetary policy and financial stability. If large-scale APPs are used beyond the current pandemic-related extraordinary situation, the following risks could arise,

especially for open-ended programs (see Figure 2.9, panel 2, for select country characteristics to take into consideration while deploying APPs, and Hofman and Kamber, forthcoming):

- ***Institutional and central bank credibility may be weakened.*** Credible monetary policy frameworks and sound governance are prerequisites for effective unconventional policy actions such as APPs. Early evidence suggests that APPs by central banks with higher institutional quality tended to have a greater reduction of their bond local stress index, introduced earlier in this chapter. Increased balance sheet exposure to long-term debt may raise concerns about the central bank's ability to raise interest rates when conditions warrant or to achieve price stability.
- ***Asset purchases may invite concerns about fiscal dominance.*** When central banks become buyers of last resort, with large-scale and open-ended APPs in economies with weak monetary and fiscal policy frameworks, it can lead to fiscal dominance, resulting in higher risk premiums and steeper government bond yield curves.

- ***APPs may intensify capital outflow pressure, especially in countries with weaker fundamentals.*** Expectations of large-scale APPs may put downward pressure on long-term yields and foreign exchange rates, putting capital flows at risk, especially during risk-off periods, when emerging market assets are seen as risky. Investors may decide to rebalance their portfolios more decisively if APPs result in an excessive gap between domestic and peer-group risk premiums.
- ***The lasting presence of central banks as buyers in the local currency bond market may distort market dynamics.*** APPs can end up substantially increasing the role of the central bank as a market maker, impairing the price discovery process, especially in primary markets,¹⁷ and the development of the financial market. Considerations should also be given to the effect of APPs on collateral availability in the banking system and its impact on the policy rate transmission (Singh and Goel 2019) as well as possible overvaluation of assets.

The motivation, effectiveness, and associated risks of APPs vary considerably from country to country and depend on additional considerations, such as the structure and liquidity of capital markets, availability of high-quality domestic assets, extent of foreign investor participation, and level of development of the financial sector (Hofman and Kamber, forthcoming). Focused use of APPs as part of the crisis toolkit of emerging and frontier market economy central banks with credible monetary policy frameworks and good governance has a role to play. But continuing evaluation is needed as more data become available on the effectiveness of unconventional monetary policy in emerging markets, especially for open-ended programs.

The Role of the Official Sector in Frontier Market Economy Debt Restructuring

Frontier market economies¹⁸ entered the pandemic in a vulnerable position, with a number of countries

¹⁷In markets that lack financial depth and where the government has large crisis-related short-term financing needs, there may be scope for the central bank to provide, under conditions, temporary support directly to the primary market to assist with the absorption of large issuance.

¹⁸Frontier economies comprise 43 countries, defined in Online Annex 2.1, the bulk of which are part of JP Morgan's Next Generation Markets Index.

already deemed to be at a high risk of debt distress (see the October 2019 GFSR) and with relatively little policy space compared with major emerging market economies. The postcrisis period of easy global financial conditions allowed frontier market economies to raise unprecedented amounts of capital in private markets (Figure 2.10, panel 1), all the while increasing their rollover risk. Markets reflected these concerns, as bond spreads rose to their highest level since the global financial crisis during the initial stages of the market sell-off, but spreads have since erased a significant amount of the widening (Figure 2.10, panel 2).

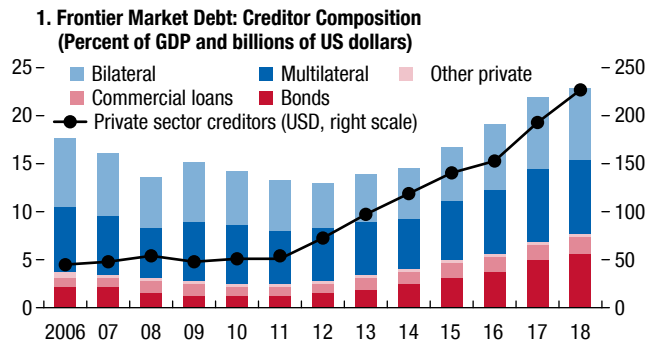
To help alleviate the strains facing frontier economies, the Group of Twenty (G20) announced the Debt Service Suspension Initiative (DSSI) to temporarily ease the financing constraints of the poorest countries by freeing up scarce money that they can use to mitigate the human and economic impact of the COVID-19 crisis. While some countries have already begun to participate in the initiative, some have been reluctant, in part because of fears of loss of market access (see also Chapter 1).

Markets, however, are not pricing in a significant risk from DSSI participation, despite concerns about possible negative actions by the credit rating agencies. On average, spreads of countries eligible for the DSSI have outperformed those of other frontier countries, even excluding countries eligible for the DSSI that do not intend to participate (Figure 2.10, panel 3). This outperformance could be a result of investor expectations that the initiative can allow these countries to better weather the outcome of the pandemic. For now, the initiative is providing relief primarily through a moratorium on bilateral debt, whereas private sector groups have begun assessing potential ways to assist. Even though the DSSI helps free up scarce money to mitigate the human and economic impact of COVID-19, once the impact of the pandemic becomes clearer, official sector relief may prove insufficient for some countries. Overall, bilateral creditors represent about one-third of debt payments owed by countries eligible for the DSSI over the next few years (Figure 2.10, panel 4). For many countries, private sector debt represents a much larger proportion of their external debt (Figure 2.10, panel 5).

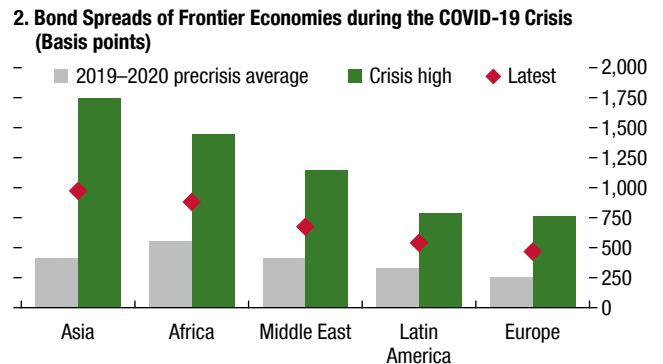
For some countries, to achieve a necessary debt reduction, it is impractical for only the official sector to proactively alleviate the debt burden. Putting off debt relief by private sector creditors may eventually

Figure 2.10. Frontier Economies Have a Challenging Road Ahead

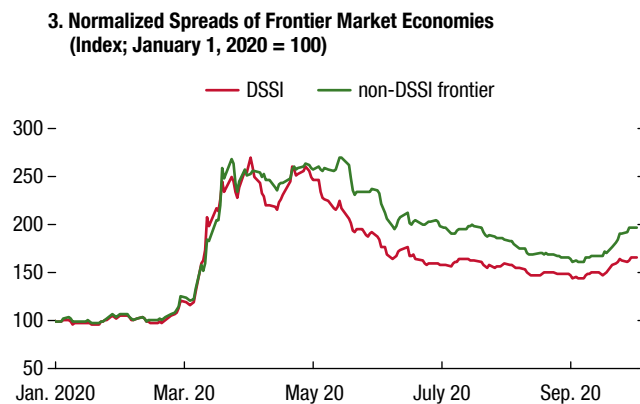
Frontier economies have become more dependent on private sector debt in recent years.



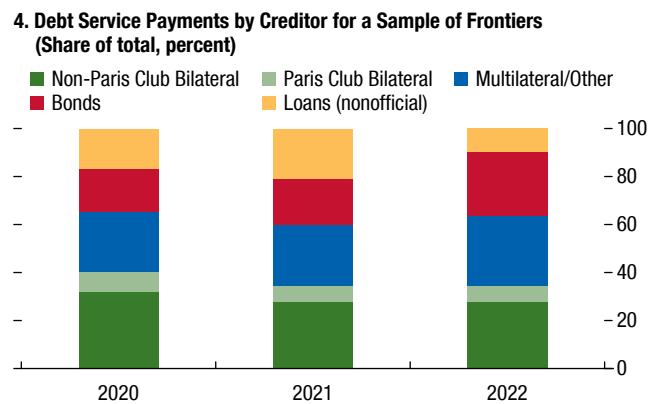
Market conditions have deteriorated substantially since the onset of the COVID-19 crisis.



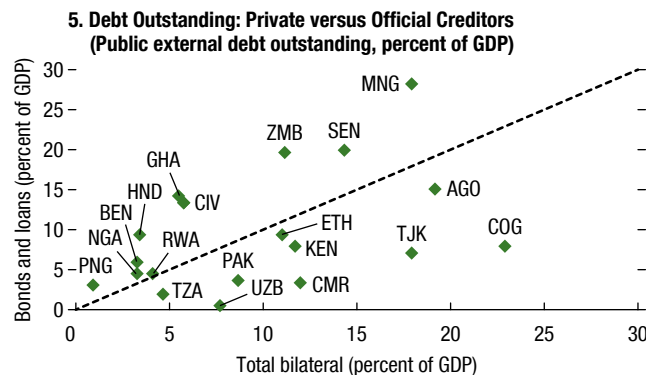
Countries eligible for the Debt Service Suspension Initiative have outperformed somewhat since April.



Bilateral creditors, primarily non-Paris Club creditors, represent about a third of debt payments over the next few years ...



... but for several countries, private creditor debt is significant.



Sources: Bloomberg Finance L.P.; Bond Radar; JPMorgan Chase and Co; World Bank; and IMF staff estimates.

Note: Panel 1 refers to public and publicly guaranteed debt. Panel 4 comprises a sample of 22 frontier economies that are DSSI-eligible. The broad frontier universe comprises 43 countries defined in Online Annex 2.1. Panel 5 uses data from the World Bank as of 2018. Data labels in panel 5 use International Organization for Standardization (ISO) country codes. DSSI = Debt Service Suspension Initiative; Latam = Latin America.

call for a larger debt write-down, which could disproportionately affect private sector debt. Markets appear to perceive already that, in a default situation, they would be forced to take a larger haircut than bilateral creditors would.

Why this would drive higher spreads can be demonstrated in a hypothetical example. If a country requires a given overall debt reduction to make its debt sustainable, but one class of creditors is treated as senior, other creditors would need to take a greater burden (Figure 2.11, panel 1). Panel 2 of Figure 2.11 demonstrates the impact that different levels of senior debt would have on a bond's spreads at given levels of expected probability of default.¹⁹ A country whose debt is entirely “junior,” or private sector, would have a much lower spread than one for which half of the debt is considered senior. This spread impact increases as the credit quality decreases (higher expected default probability). A model for sovereign bond spreads shows that investors do expect a larger haircut than bilateral creditors.²⁰ The results of the model are consistent with investors expecting that bilateral creditors would take a 30 percent haircut in the case of a country that requires an overall 40 percent haircut. This analysis does not consider differences among groups of bilateral creditors or whether the impact is less or more for Paris Club creditors. Considering that bilateral loans are often extended at concessional levels, or at times when countries are not able to consistently borrow from private markets, it is not surprising that they would be expected to receive more favorable treatment in a restructuring scenario.

Policies for Recovery and Resilience

Unprecedented policy measures put in place by advanced and emerging market policymakers after the onset of the COVID-19 pandemic averted the worst outcome and helped stabilize domestic financial conditions. Emerging market central banks actively used available and new tools to soften the blow from

the spike in global risk aversion and intervened to smooth excess volatility of domestic currencies and contain the spillovers of tighter global financial conditions to domestic financial conditions. Appropriate use of FX intervention, macroprudential policies, and capital flow management measures in the face of shocks, such as the global pandemic, can contribute to financial stability and enhance monetary policy autonomy.

This chapter finds that global factors played a more important role in driving currencies than FX intervention did, probably because of the global nature of the shock. The short-lived FX intervention is consistent with using the currency as a key shock absorber when other vulnerabilities are in check. Countries with shallow FX markets may experience macroeconomic destabilization after such shocks, and FX interventions to lean against market illiquidity to mute excessive volatility can be appropriate (IMF 2020a).

Most notably, many emerging and frontier market central banks for the first time embarked on APPs to ensure the smooth functioning of bond markets and provide accommodation in an environment of very low policy rates. The apparent success in helping reduce bond yields without risking financial stability so far prompts the question of whether APPs should be part of the emerging and frontier market policy toolkit in the future.

For *central banks with APPs in progress*, transparency and clear communication²¹ are crucial to minimize risks to their credibility—especially in countries with weaker institutional frameworks. In most cases, APPs should be limited in time and scale and should be linked to clear objectives. This chapter's findings suggest that APPs can be helpful, but that they are not a panacea to improve market conditions. They appear to be more effective when used jointly as part of a broader macroeconomic policy package.

Central banks considering APPs for the first time or seeking to restart them should design programs that aim to affect segments of the yield curve that are an effective pricing benchmark to maximize transmission to the real economy. Purchases should preferably be made in secondary markets, as purchases in the primary market or at below market rates can disrupt the price

¹⁹This stylized exercise assumes a 10-year bond with an 8 percent coupon.

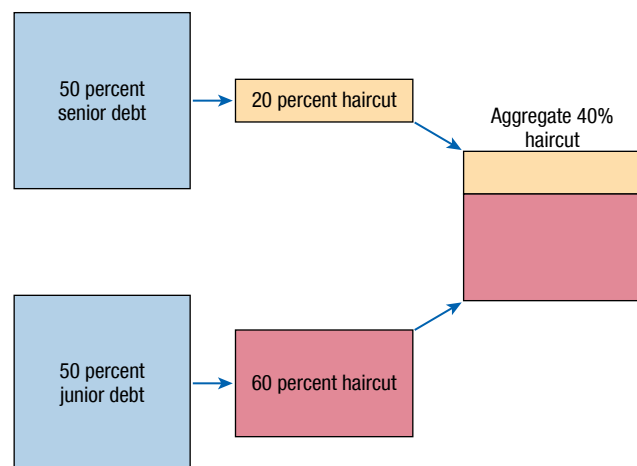
²⁰This is based on a variant of the emerging market hard currency bond valuation model introduced in the October 2019 GFSR. The domestic fundamentals include expectations for growth and inflation, current account balance, external debt, net issuance of foreign currency government debt, and foreign currency reserves. External factors include global risk-appetite and growth expectations. The model was modified to also include the share of bilateral and multilateral debt.

²¹Communication and transparency regarding the cost of sterilization can also be crucial, especially in cases where central bank purchases are done below market rates. Large sterilization costs can increase concerns about central bank losses and monetary policy independence.

Figure 2.11. Large Shares of Senior Creditors Could Lead to Higher Spreads

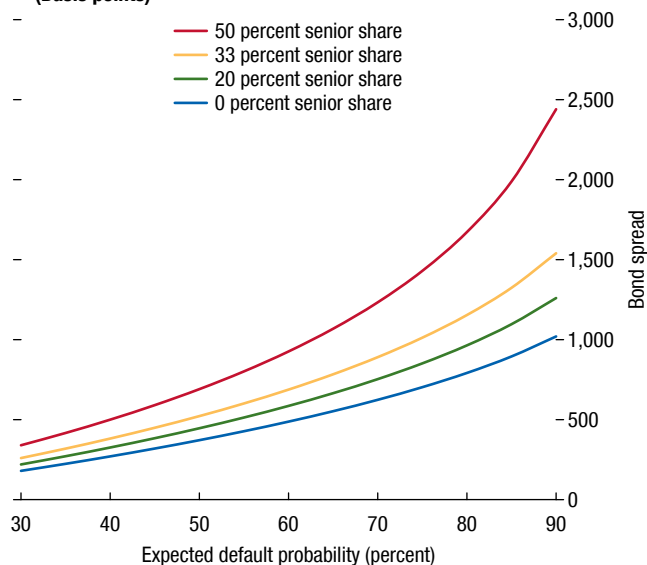
If one class of creditors receives smaller haircuts, other creditors need to bear a greater burden.

1. Stylized Example of Issuer Requiring a Total 40 Percent Haircut with Debt Evenly Split



Investors pricing a larger required haircut in case of default could meaningfully impact spreads.

2. Bond Spread under Different Recovery Assumptions and Expectations of Default (Basis points)



Source: IMF staff calculations.

Note: Panel 2 assumes a bond with an 8 percent coupon and 10-year maturity. It assumes that an overall debt reduction of 40 percent is required, with senior debt holders accepting only a 20 percent haircut.

discovery process and invite fiscal dominance. APPs should take into consideration the efficacy of the portfolio balance channel and whether investors have the ability to allocate their investments in other domestic assets, such as corporate or covered bonds. In the absence of such domestic alternatives, both foreign and domestic investors might choose to exit their country position altogether, which could increase the sensitivity of the exchange rate to APP policies. The resultant currency depreciation in countries with large currency mismatches in private sector balance sheets could at least partly offset the stimulatory effect of APP policies by tightening overall financial conditions. The experience of advanced economy central banks with exit strategy plans may also be important for emerging market central banks to consider, particularly when the size of the program is meaningful.

APPs should be designed so as not to become barriers to the development of domestic capital markets or the growth of a stable and diversified local investor base. In countries with relatively small bond markets, large and prolonged APPs could end up substantially increasing the role of the central bank as a market

maker in bond markets, impairing the price discovery process and financial market development. Specific measures for further local market development include (1) developing efficient money market frameworks; (2) strengthening primary market practices to enhance transparency and predictability of issuance; (3) bolstering market liquidity, including the use of repo facilities for local dealers in times of stress; and (4) developing a robust market infrastructure, including local clearing and settlement and other services (as detailed in IMF 2020b). For countries with adequate preparation in terms of legal barriers and market infrastructure, authorities should work toward enabling settlement and clearance of local currency debt in international capital markets so that domestic markets can benefit from access to wider liquidity pools.

Frontier market economies with unsustainable debt dynamics, limited market access, and high external financing requirements should preemptively and cooperatively seek debt resolution with their creditors. Countries that maintain market access at reasonable rates should decrease rollover risks as part of their debt management strategy.

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LIQUIDITY STRAINS CUSHIONED BY A POWERFUL SET OF POLICIES

Chapter 3 at a Glance

- In the Group of Seven (G7) economies, nonfinancial corporate borrowing surged in March and during the second quarter of 2020, benefiting from unprecedented policy support as a consequence of the coronavirus disease (COVID-19) crisis.
- Credit supply conditions across the G7 were generally favorable during the second quarter, yet the buoyancy of the bond market in the United States stood in sharp contrast to tighter loan market lending standards in that country.
- Among listed firms, those vulnerable to liquidity shocks suffered relatively more financial stress in the early stages of the COVID-19 crisis, and residual signs of strain remained as of the end of June.
- Premature withdrawal of policy support could jeopardize the success achieved so far in broadly meeting the nonfinancial corporate sector's liquidity and funding needs.

The COVID-19 pandemic has adversely affected non-financial corporate sector cash flows, generating liquidity and solvency pressures. In the G7 economies—Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States—corporate borrowing surged in March and into the second quarter of 2020, thanks to credit line drawdowns and unprecedented policy support. This allowed firms to build cash buffers to cope with a period of reduced cash flow and high uncertainty. In the United States, the bond market has been buoyant since the end of March, but credit supply conditions for bank loans and the syndicated loan market have tightened. In other G7 economies, credit supply conditions eased somewhat across markets during the second quarter. Among listed firms, entities with weaker solvency or liquidity positions before the onset of COVID-19, as well as smaller firms, suffered relatively more financial stress in some economies in the early stages of the crisis. However, residual signs of strain remained as of the end of June, when the stock market underperformance of French, UK, and US firms with pre-COVID-19 liquidity vulnerabilities ranged between 4 and 10 percentage points. Policy interventions, especially those directly targeting the

corporate sector, had a beneficial effect overall. Looking ahead, premature withdrawal of policy support could jeopardize the success achieved so far in broadly meeting the nonfinancial corporate sector's funding needs.

Introduction

The COVID-19 pandemic has triggered a deep global economic crisis. Closures and restrictions imposed by governments to contain the spread of the virus, as well as social distancing, have severely disrupted business activity and clouded the economic outlook amid heightened uncertainty. Corporate cash flows have been heavily impaired in many industries, with adverse implications for corporate liquidity and solvency.

In the major advanced economies, severe disruptions to corporate funding markets became apparent amid a sharp tightening of financial conditions early in the year following the onset of the COVID-19 crisis, as corporate bond funds, loan funds, and prime money market funds faced large outflows. This led to a collapse in the issuance of nonfinancial corporate bonds, syndicated loans, and commercial paper, and to a jump in corporate spreads. Many firms turned to their existing credit lines to secure funds in a “dash for cash.”

In response, policymakers in these economies quickly announced a wide range of powerful policy measures to support markets and address corporate

The authors of this chapter are Andrea Deghi, Ken Zhi Gan, Tom Piontek, Dulani Seneviratne, Tomohiro Tsuruga, and Jérôme Vandenbussche (team leader), with contributions from Germán Villegas Bauer, under the guidance of Fabio Natalucci and Mahvash Qureshi. Jeremy Stein served as an expert advisor.

funding needs (see Online Box 3.1 for a brief description of the key measures and their timing). Some of these measures were unprecedented; one example is the new Federal Reserve facilities to support corporate credit. The combination of these fiscal, monetary, and financial policy measures helped normalize financial conditions during the second quarter, as discussed in the June 2020 *Global Financial Stability Report* (GFSR) *Update* and Chapter 1 of this current report. However, corporate spreads remain wider than at the beginning of the year, especially in the high-yield segment, pointing to remaining concerns about default risk.¹

The degree of eventual economic scarring from the COVID-19 crisis will depend a great deal on how well the financial system—supported to an exceptionally large extent by policies to date—is able to meet the corporate sector’s demand for liquidity during the crisis. This means preventing still-solvent firms facing liquidity strains from turning into insolvent entities or being forced to significantly curtail their activities.²

Against this backdrop, this chapter assesses whether corporate liquidity needs were met for listed firms in the G7 economies during the first few months of the crisis (from the beginning of February to the end of June).³ Given the rise in corporate sector leverage in several G7 economies during the period preceding COVID-19, as documented in recent issues of the GFSR, the chapter also examines the impact of high corporate indebtedness on firms’ financial stress during the crisis. While the COVID-19 crisis has severely hurt a very large number of unlisted small and medium-sized enterprises, which traditionally face difficulties accessing external financing, lack of recent publicly available data for these firms prevents a thorough analysis of their funding situation during the pandemic.⁴

¹As of September 10, 2020, US investment-grade (high-yield) credit spreads had widened 33 basis points (125 basis points) since the beginning of the year. In Europe, investment-grade (high-yield) spreads had widened 9 basis points (101 basis points) on a net basis. Yet with US government bond yields having fallen significantly during the crisis, junk bond yields were at, or close to, record lows.

²Several studies on the global financial crisis have documented reductions in credit supply’s adverse consequences on employment, investment, and total factor productivity growth (Duchin, Ozbas, and Sensoy 2010; Chodorow-Reich 2014; Duval, Hong, and Timmer 2020).

³The focus on G7 economies is dictated by these economies’ global systemic relevance and their relatively better data availability.

⁴Chapter 1 of this report discusses a model-based analysis of the impact of the COVID-19 crisis on small and medium-sized enterprises, building on work by Gourinchas and others (forthcoming).

The chapter seeks to address four broad sets of issues. First, it analyzes the impact of the COVID-19 crisis on aggregate credit volumes in several segments of the corporate debt market as well as the effects of the subsequent policy response on the debt financing choices of large firms. Second, it discusses the evolution of aggregate conditions in credit markets and seeks to quantify the credit supply shocks in these markets. Third, it examines the extent to which ease of access to external finance, or liquidity position, had an impact on firm-level financial performance in the early stages of the crisis, potentially signaling the presence of tighter credit conditions.⁵ Acknowledging that such an analysis is a very challenging task, the chapter turns to an examination of the effect of key policy announcements and tries to gauge the impact of various types of policy responses on the supply of corporate credit during the containment phase of the pandemic.⁶

The chapter finds that drawdowns of existing credit lines and unprecedented policy support helped maintain the flow of credit to firms, and that corporate borrowing surged in March and the second quarter of 2020. As a result, firms managed to build cash buffers to cope with a period of reduced cash flow and high uncertainty. Since the end of March, the bond market has been buoyant in the United States, but credit supply conditions for bank loans and syndicated loans have tightened. In Japan, bank lending standards have eased, but bond market supply conditions have tightened somewhat despite a solid year-on-year increase in issuance. In other G7 economies, credit supply conditions have evolved in a more homogeneous manner across markets, with somewhat easier conditions prevailing, on average, during the second quarter. Among listed firms, entities with weaker solvency or liquidity positions before COVID-19, as well as smaller firms, suffered relatively more financial stress in some economies during the early stages of the crisis, and residual signs of strain remained as of the end of June. Policy interventions, especially those directly targeting the corporate sector,

⁵The chapter does not aim to project liquidity gaps at the firm level (see Banerjee and others 2020); rather, it aims to provide a quantification of the challenges firms face in accessing debt financing during the containment phase of the COVID-19 crisis. Similarly, the chapter does not aim to provide an account of differences in performance across industries but controls for the heterogeneous effect of the crisis across industries in the empirical analysis.

⁶Data sources and variables used in this chapter are described in Online Annex 3.1. All annexes are available at www.imf.org/en/Publications/GFSR.

had a beneficial effect, on average. These findings can help inform ongoing discussions about the appropriate level of policy support as the global economy moves toward the recovery phase. While trade-offs with other policy objectives need to be considered, especially in a context of limited fiscal space, premature withdrawal of policy support could jeopardize the success achieved so far in broadly meeting the nonfinancial corporate sector's funding needs.

A Surge in Debt Financing and Cash Balances

This section discusses the provision of credit to firms in key segments of the corporate credit market during the containment phase of the crisis. Loans represent the major source of corporate debt funding in the G7 economies, ranging from 58 percent in the United States to 90 percent in Germany, according to the latest available financial accounts data. The remainder is composed of debt securities. In terms of issuance by large firms, the ratio of syndicated loans (which are mostly held by banks post syndication if they are investment grade and by nonbanks if they are non-investment grade) to bonds ranges from two to three.⁷

Despite a period of acute financial stress early in the year, outstanding amounts of bank credit to firms grew significantly in March and in the second quarter in all seven economies analyzed (Figure 3.1, panel 1). On a year-over-year basis, the rate of bank credit growth during the first half of the year was clearly above trend.⁸ Part of this dynamic is clearly attributable to sizable credit line drawdowns, especially in the United States (Figure 3.1, panel 2). Listed firms' drawdowns increased more than 40 percent, on average, compared with the first half of 2019. The increase was particularly spectacular in the United States, where net drawdowns at the end of March doubled, representing an increase of \$250 billion, which is of the same order of magnitude as the increase in commercial and industrial loans by domestic banks over the same period.⁹ Panel 3 of Figure 3.1 shows that these drawdowns were

concentrated in March, with a peak on the last day of the month. Presumably, this reflects firms' desire to secure funds while they were still in compliance with their maintenance covenants and because they expected a sharp deterioration in cash flow during the second quarter. Gross drawdowns in the United States subsided at the beginning of April, resulting in a decline in utilization rates—that is, the share of credit line commitments used. The same reduction can be observed in Canada; drawdown activity in Japan, however, continued during the second quarter, resulting in a utilization rate of 60 percent. Nevertheless, utilization rates across the seven economies remained well below 50 percent, on average, at the end of June, suggesting that liquidity insurance remained significant, at least in the aggregate.¹⁰ Bank credit developments during the second quarter also reflected the implementation of government programs (notably, off-budget credit guarantees) that transferred part—sometimes all—of the credit risk to the sovereign, as well as government-sponsored loans with a significant grant component. These direct support programs to corporate funding represented between 2.6 and 34 percent of GDP as of June 12 (Figure 3.1, panel 4). They complemented other on-budget fiscal measures that directly supported corporate cash flows and solvency, for example, through grants, employment support programs, and reductions in tax liabilities.¹¹ As of early July, committed amounts appear to have been significantly smaller than announced amounts in European economies (Anderson, Papadia, and Véron 2020).

Syndicated loan issuance during the first half of the year was somewhat more heterogeneous across economies. It was generally stronger than in 2019 in Europe and Japan, but weaker in the United States and Canada, especially during the second quarter. This appears to have been driven by a surge in investment-grade loan issuance in Europe and Japan (Figure 3.2, panel 1) and a drop in leveraged loan issuance outside of Germany and Italy (Figure 3.2, panel 2).¹² The weak recovery in the leveraged loan markets was to a large extent due

⁷Syndicated loans include both term loans and credit lines.

⁸Before the pandemic, the volume of nonfinancial corporate bank loans was on a declining trend in Italy.

⁹Acharya and Steffen (2020) and Kapan and Moinu (2020) discuss credit line drawdowns in the United States in early 2020. In contrast to the experience of the global financial crisis described in Ivashina and Scharfstein (2010), the increase in credit line drawdowns was related to immediate liquidity demand rather than concerns about the health of the US banking sector.

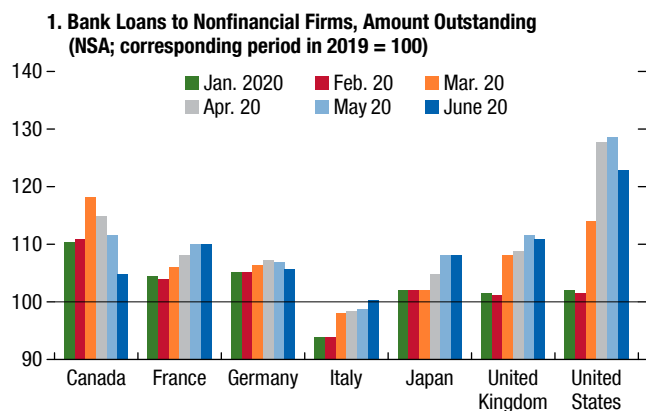
¹⁰Of course, there is substantial heterogeneity across firms and sectors. In the United States, the utilization rate was significantly above average in wholesale and retail trade at the end of June.

¹¹See the IMF's Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic, <https://www.imf.org/en/Topics/imf-and-covid19/Fiscal-Policies-Database-in-Response-to-COVID-19>.

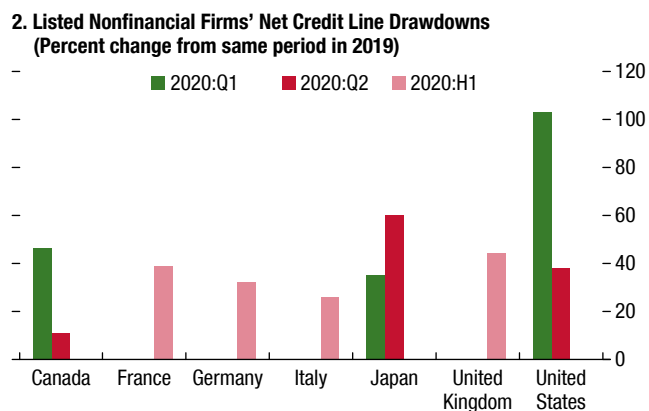
¹²It should be noted that the euro area leveraged loan market is significantly smaller than the US market.

Figure 3.1. Bank Lending to Nonfinancial Firms and Government Liquidity Support

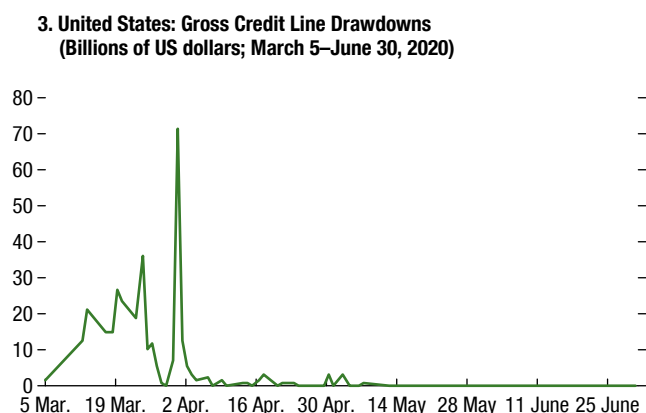
Corporate bank lending grew rapidly from March onward ...



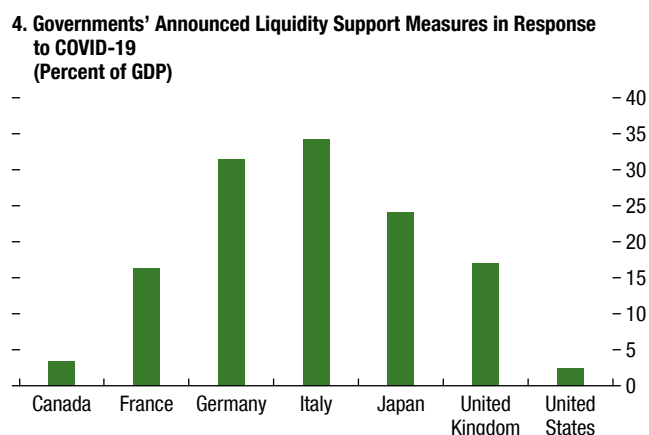
... driven in part by credit line drawdowns ...



... especially in the United States in March.



Liquidity support to firms by government was huge, especially in Europe and Japan.



Sources: Federal Reserve; Haver Analytics; IMF, Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic (June 2020); S&P Capital IQ; S&P Leveraged Commentary & Data; and IMF staff calculations.

Note: Panel 2 is based on data available as of August 25, 2020. Half-yearly data are used instead of quarterly data for European economies because of scant quarterly reporting (when first half data are not available, but first quarter data are, the latter are used). Panel 4 shows liquidity support (including equity injections, loans, asset purchases or debt assumption, guarantees, and quasi-fiscal operations) per country as a percent of GDP. Amounts do not include above-the-line fiscal measures, such as the US Paycheck Protection Program, which amounts to about 3 percent of US GDP. NSA = not seasonally adjusted.

to subdued demand from the traditional investor base. Collateralized loan obligation (CLO) new issuance has been slow to restart.¹³ While activity picked up modestly from March levels, new CLO supply ran at half of last year's pace, while still accounting for more than 70 percent of new leveraged loan demand (Figure 3.2, panel 3). CLO investors were concerned about the wave

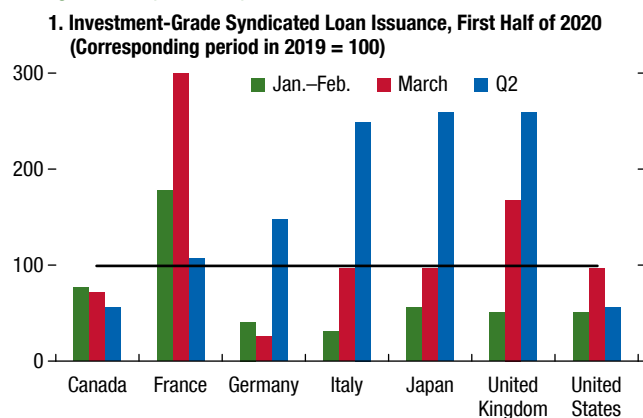
of downgrades and defaults (Figure 3.2, panel 4), which may affect lower-rated tranches.

Corporate bond markets in the first quarter were generally more resilient despite coming under intense pressure in mid-March. Policy responses by central banks announced in the second half of March, especially facilities aimed at directly supporting corporate bond markets, appear to have boosted activity in these markets and contributed to a reversal in corporate bond fund flows (including exchange-traded funds). During the second quarter, investment-grade issuance surged to levels twice as large as those in 2019

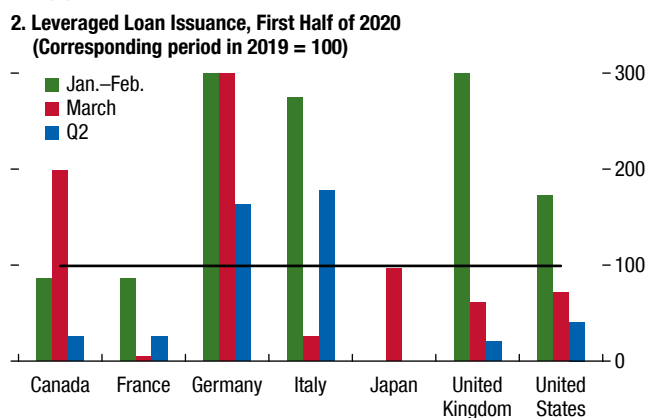
¹³A collateralized loan obligation is a structured finance product collateralized predominantly by broadly syndicated leveraged loans. See Chapter 2 of the April 2020 GFSR for a discussion of risky corporate credit markets.

Figure 3.2. Developments in Syndicated Loan Markets

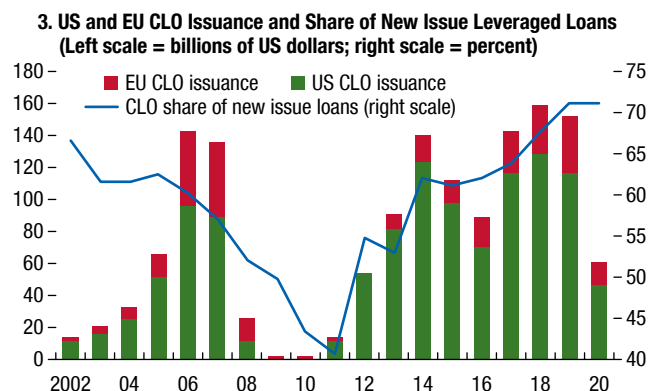
During the second quarter, investment-grade loan issuance was much stronger in Europe and Japan than in North America ...



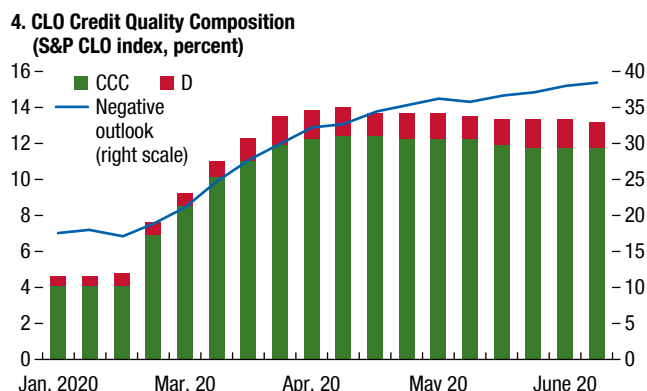
... whereas activity in the leveraged loan market generally dropped sharply.



Weaker investor demand suppressed new leveraged loan issuance, such as from slower CLO formation ...



... as underlying asset quality deteriorated.



Sources: Dealogic; S&P Capital IQ; S&P Global Ratings; S&P Leveraged Commentary & Data; and IMF staff calculations.

Note: For panel 3, 2020 data are annualized through end-June 2020. Data for individual European countries are not available, so the European Union aggregate is shown. CLO = collateralized loan obligation; EU = European Union.

in France, Germany, the United Kingdom, and the United States (Figure 3.3, panel 1). The response of the high-yield segment was somewhat more muted outside the United States, probably reflecting its relative underdevelopment and the focus of central banks' purchases on the investment-grade segment. For its part, the United States saw high-yield issuance during the second quarter more than double compared with that in 2019 (Figure 3.3, panel 2).

The characteristics of new debt in the high-yield bond market reveal a shift toward higher quality. In G7 economies, nearly 60 percent of high-yield new issues during the first half of the year were BB rated, and more than 30 percent of the bonds were secured, the highest levels for the past 15 years at least

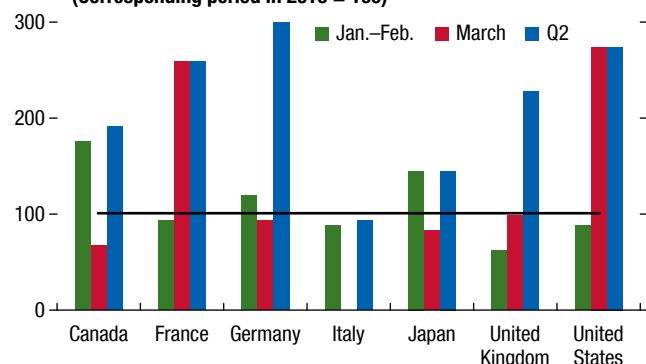
(Figure 3.3, panel 3). By use of proceeds, more than 80 percent of year-to-date supply was for refinancing existing debt as lower yields and strong investor demand encouraged a range of issuers to tap into the market to repay credit lines, or for short-term expenses such as working capital (Figure 3.3, panel 4). Issuances motivated by acquisition and dividends or share repurchases, however, were at their lowest in a decade.

Developments in bond and syndicated loan issuance suggest that, for firms with access to these markets, the bond market clearly was the preferred source of debt financing in the United States, but perhaps not in the other G7 economies. This hypothesis is confirmed by a granular investigation of the

Figure 3.3. Corporate Bond and Commercial Paper Issuance

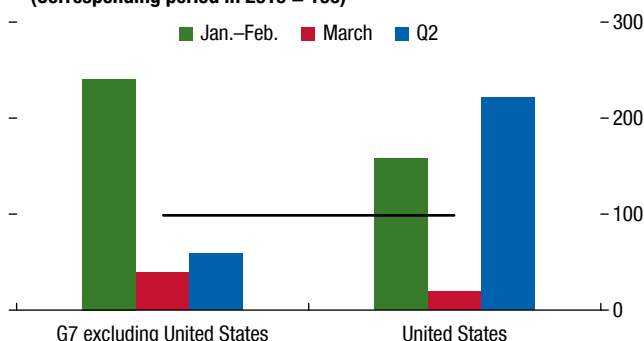
Unlike for syndicated loans, bond issuance was buoyant during the second quarter in the investment-grade segment ...

1. Investment Grade Bond Issuance, First Half of 2020
(Corresponding period in 2019 = 100)



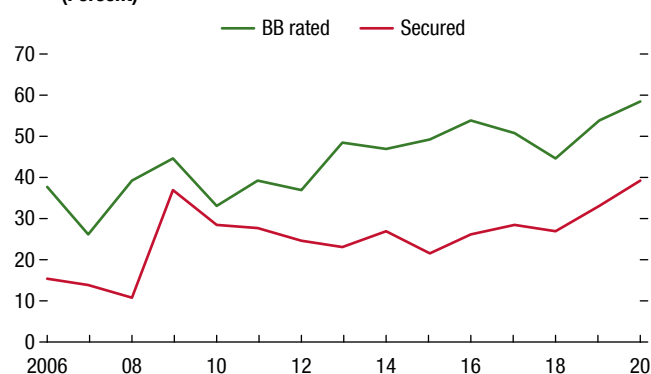
... as well as in the high-yield segment in the United States.

2. High-Yield Bond Issuance, First Half of 2020
(Corresponding period in 2019 = 100)



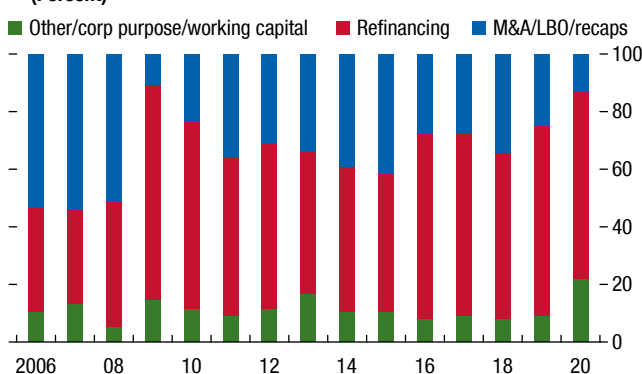
High-yield bond supply shifted to higher quality with more security and stronger ratings.

3. Group of Seven High-Yield Bond Supply by Security and Rating
(Percent)



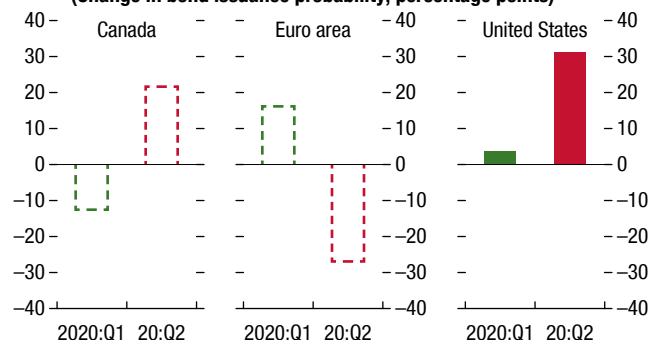
The majority of high-yield bond supply was used for refinancing and for other purposes, such as repayment of credit lines.

4. Group of Seven High-Yield Bond Issuance by Use of Proceeds
(Percent)



The bond market was clearly more attractive to US firms during the second quarter ...

5. Change in Relative Attractiveness of Bond versus Loan Issuance during the First Half of 2020
(Change in bond issuance probability, percentage points)



... both in the investment-grade and the high-yield segments.

6. United States: Change in Relative Attractiveness of Bond versus Loan Issuance
(Change in bond issuance probability, percentage points)

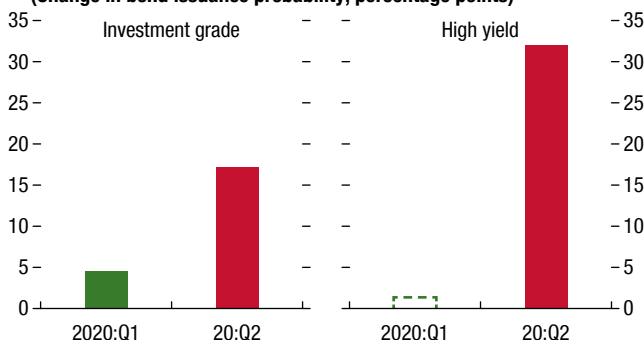
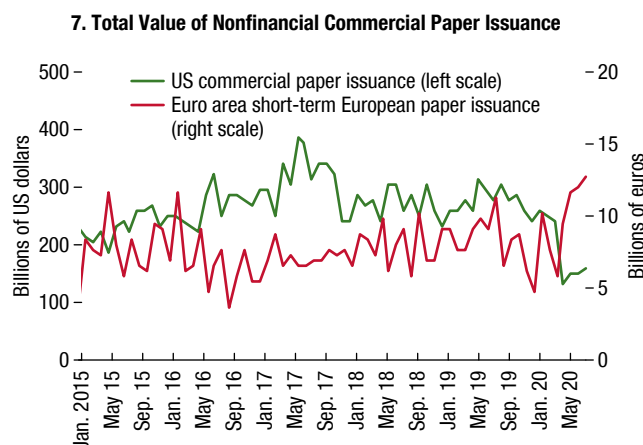
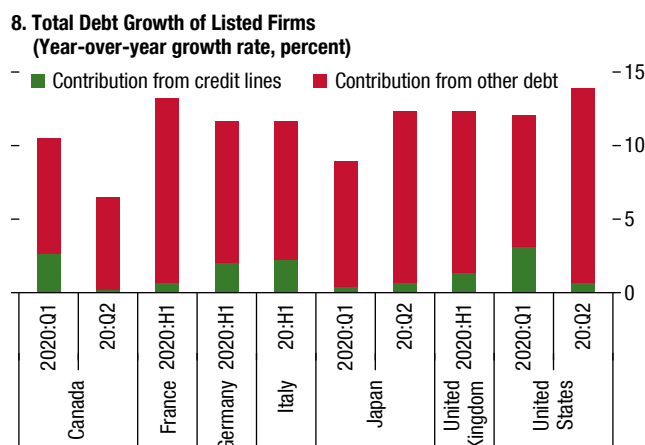


Figure 3.3. Corporate Bond and Commercial Paper Issuance (*continued*)

Volumes in the commercial paper market had opposite dynamics in the United States and the euro area.



Nonfinancial corporate debt growth was strong overall.



Sources: Federal Reserve; Haver Analytics; S&P Capital IQ; S&P Leveraged Commentary & Data; and IMF staff calculations.

Note: For panels 3 and 4, 2020 data are through end-June. Euro area refers to three euro area economies (France, Germany, Italy). Panels 5 and 6 show the change in the probability of issuing a bond (versus a loan) for a nonfinancial firm with characteristics equal to the sample mean during the first and second quarters of 2020 compared with before the COVID-19 crisis. Colored bars indicate significance at the 1 percent level. Empty bars indicate lack of statistical significance. See Online Annex 3.2 for methodological details. Panel 8 is based on data available as of August 25, 2020. Data as of the first half of the year are used for European Group of Seven economies to account for semiannual reporting of most firms (when first half data are not available, but first quarter data are, the latter are used). LBO = leveraged buyout; M&A = mergers and acquisitions.

debt financing choice of these firms. Controlling for a large set of firm characteristics and macro-financial variables, the analysis documents a shift toward bond financing in the United States but not in other jurisdictions (Figure 3.3, panel 5).¹⁴ This finding suggests that the Federal Reserve's March 23 announcement of its new corporate credit facilities had a stimulative impact on domestic bond markets.^{15,16} That the choice between bond versus loan financing was not affected in other jurisdictions likely partially reflects the presence of central bank corporate bond purchase programs predating the pandemic in these economies (except in Canada).¹⁷ A more detailed analysis for

the United States confirms that the shift toward the bond market happened in both the investment-grade and high-yield segments, with the shift in the former already visible in the first quarter, in line with record investment-grade issuance levels in March (Figure 3.3, panel 6).¹⁸ These shifts in corporate financing choice during the first half of the year also varied, depending on firm characteristics such as leverage and investment opportunities, as discussed in Online Box 3.2.

In contrast to the bond market, volumes in the commercial paper market in the United States have not recovered since their sharp drop in March, when investors shifted funds from prime to government money market funds (Figure 3.3, panel 7), despite the reintroduction of the Federal Reserve's Commercial Paper Funding Facility on March 17 and inflows resuming into prime funds, especially from institu-

¹⁴See Online Annex 3.2 for methodological details.

¹⁵Thus, a key driver of the shift toward bond financing in the United States appears to be related to policy rather than to the weakness of banks' balance sheets, as was the case at the time of the global financial crisis (Adrian, Colla, and Shin 2013; Becker and Ivashina 2014). The Federal Reserve corporate credit facilities cover the primary bond and loan markets as well as the secondary bond market. As of August 31, no purchases had been made on the primary markets.

¹⁶The evidence for the US market is consistent with the findings of Acharya and Steffen (2020).

¹⁷The Bank of Canada announced its first corporate bond purchase program on April 15, 2020.

¹⁸One factor contributing to the large volume of high-yield bond issuance in the United States in the second quarter was the announcement on April 9, 2020, by the Federal Reserve that the scope of its new corporate credit facilities would be extended to high-yield exchange-traded funds and bonds and loans from firms that lost their investment-grade status after March 22, 2020.

tional investors. It appears that the fall in bond market yields has tempted firms to reduce their refinancing risk and substitute commercial paper with longer-term debt.¹⁹ By contrast, commercial paper issuance in the euro area, supported by the European Central Bank's expansion of its commercial paper purchases through the Asset Purchase Programme and the Pandemic Emergency Purchase Programme, rebounded quickly from the March trough and hit a record high in June. Incentives to substitute commercial paper with longer-term bonds were weaker in the euro area, because the yield differential remained more stable than in the United States.²⁰

All in all, the year-over-year growth rate of total debt of listed firms was strong, generally exceeding 10 percent, with notable contributions from credit line drawdowns in Canada and the United States during the first quarter (Figure 3.3, panel 8).

Evidence suggests that this additional borrowing was used mostly to build cash reserves to cope with the uncertainty and the expected reduction in cash flow triggered by the pandemic shock. In contrast to Europe, all listed firms in Canada, Japan, and the United States are required to report quarterly, and their cash flow statements for the first quarter reveal an accumulation of cash and short-term investments of about 0.5 percent of assets in Japan and about 1.5 percent of assets in Canada and the United States. This behavior contrasts sharply with that observed a year earlier and during the peak of the global financial crisis in the fourth quarter of 2008, when no cash accumulation took place (Figure 3.4, panel 1). The change in cash levels can be attributed mostly to an increase in financing in Canada, a reduction in investment in Japan, and a combination of both in the United States relative to 2019. During the second quarter, listed Japanese and US firms built their cash buffers further, whereas listed Canadian firms reduced them somewhat. The accumulation of cash is also visible from nonfinancial corporate deposit data, which reveal

a further large expansion during the second quarter, especially in France and the United Kingdom (Figure 3.4, panel 2).

Shifts in Aggregate Credit Supply Conditions

The large increase in borrowing (net of withdrawals from existing credit lines) in March and the second quarter of 2020 was associated with credit spreads that widened sharply in March and subsequently slowly declined (as discussed in the June 2020 GFSR *Update* and Chapter 1 of this report). A key reason for the wider spreads is obviously the sharp deterioration in corporate fundamentals and concerns about default risk in all seven economies (Figure 3.5, panel 1), but a tightening in credit supply may also have played a role.

To assess how much of the widening in spreads can be attributed to adverse credit supply conditions, this section looks at evidence available in different segments of credit markets. For the commercial bank loan market, useful information is obtained from central banks' quarterly surveys of bank lending officers, which measure officers' perception of the strength of credit demand and of the evolution of their banks' lending standards.²¹ For the European and US primary syndicated loan markets, an empirical analysis to disentangle credit supply from demand factors is conducted by making use of publicly available transaction-level issuance data. Specifically, the analysis relies on empirical estimation of a supply and demand system of equations that includes variables capturing lender and borrower characteristics and covers the mid- to late 2000s through the second quarter of 2020.²² The value of the credit supply shock in each quarter is obtained by computing the time-varying "residual term" of the credit supply equation. For the secondary corporate bond market, a measure of investor risk appetite—the so-called excess bond premium

¹⁹Li and others (2020) suggest that liquidity rules introduced at the time of the 2016 money market fund reform may not have achieved the goal of making the system immune to runs. See also the discussion in Eren, Schrimpf, and Sushko (2020).

²⁰The Bank of Canada and the Bank of England also introduced commercial paper purchase programs, whereas the Bank of Japan stepped up its existing program. These countries are not shown on the chart for lack of data.

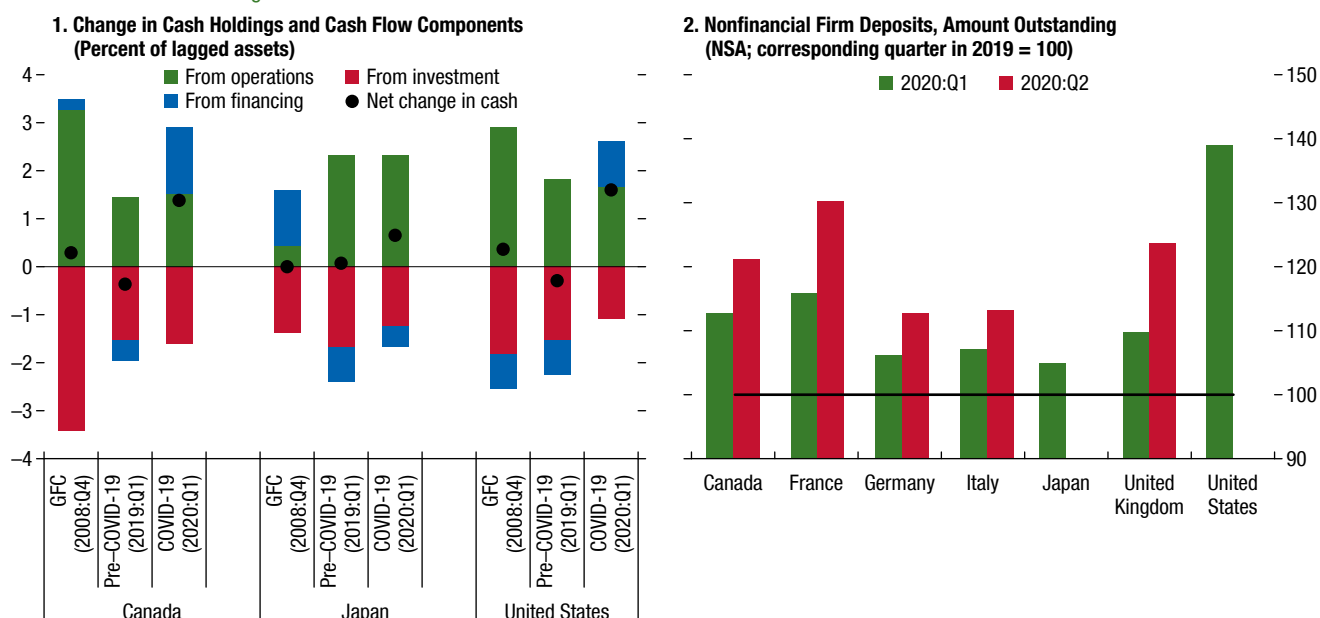
²¹An important caveat in interpreting results of bank lending officers' surveys is that they do not always clearly distinguish between changes in default risk and changes in credit supply in the definition of lending standards.

²²The analysis addresses endogeneity concerns by using an identification-through-heteroscedasticity methodology (Rigobon 2003). See Online Annex 3.3 for details.

Figure 3.4. Change in Corporate Cash-to-Assets Ratio and Corporate Bank Deposits

Nonfinancial firms accumulated more cash during the first quarter of 2020 than during the same period of 2019, mostly because of increased external financing in Canada and the United States ...

... and this precautionary behavior continued during the second quarter.



Sources: Bank of Japan; Federal Reserve Board; Haver Analytics; S&P Capital IQ; and IMF staff calculations.

Note: Panel 1 shows the listed nonfinancial firms' quarterly net change in cash as well as the contributions from the three cash flow components. European countries are not shown because of insufficient data for the first quarter. Panel 2 shows the amount of nonfinancial firms' deposits outstanding in the first and second quarters of 2020 compared with the corresponding quarter of 2019. Data for the second quarter are not available for Japan and the United States. GFC = global financial crisis; NSA = not seasonally adjusted.

proposed by Gilchrist and Zakrajšek (2012)—is constructed to gauge shifts in supply.^{23,24}

Survey-based evidence indicates that the commercial bank loan market in the United States was an outlier across countries in the second quarter. Credit demand fell and lending standards tightened sharply, while the evolution was generally muted or the opposite in the

other G7 economies.²⁵ In particular, a large loosening of credit conditions was observed in Japan and the United Kingdom (Figure 3.5, panel 2).²⁶ This stands in sharp contrast to the experience during the global financial crisis, when surveys indicate that banks tightened lending standards consistently across the board. The situation in the current crisis is likely related to the fact that banks' indicators of funding stress spiked only briefly in late March before normalizing thanks

²³This measure is constructed in two steps using detailed information on many individual corporate bonds for the period from the mid-2000s (or the first quarter of 2011 for the euro area) through the second quarter of 2020. First, for each bond, a spread to a synthetic risk-free rate that considers information on the duration of the bond is computed. Such a spread is more accurate than the more commonly used "naïve" spreads, whose construction ignores bond duration. Second, the spread is purged of its credit risk component to obtain the excess bond premium, which can therefore be interpreted as an indicator of bond investor risk appetite. See Online Annex 3.4 for methodological details. The series for the United States is from the Federal Reserve Board.

²⁴The three euro area economies (France, Germany, Italy) are analyzed as a group to improve sample size, and Canada is not included in the analysis for data availability reasons.

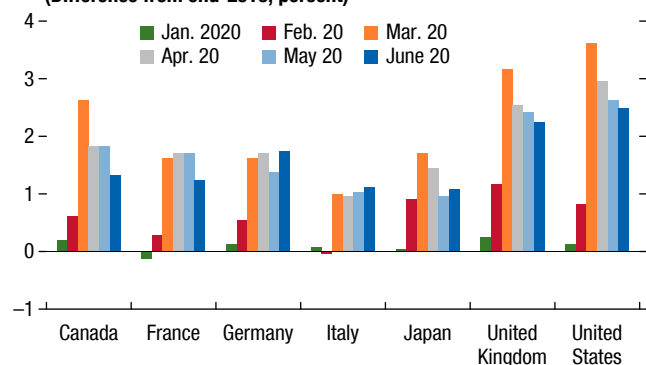
²⁵The evolution of the index for the United States indicates only that the tightening of lending standards was widespread, not that it was intense. However, the text describing the survey results makes it clear that lending standards were tight and explains that "banks, on balance, reported that their lending standards across all loan categories are currently at the tighter end of the range of standards between 2005 and the present" (Board of Governors of the Federal Reserve System 2020).

²⁶In the United Kingdom, the survey question refers to the "availability of credit" rather than to lending standards per se. The two notions are different in the presence of government loan guarantees, which may explain part of the difference between the United Kingdom and the euro area economies.

Figure 3.5. Evolution of Credit Supply Conditions

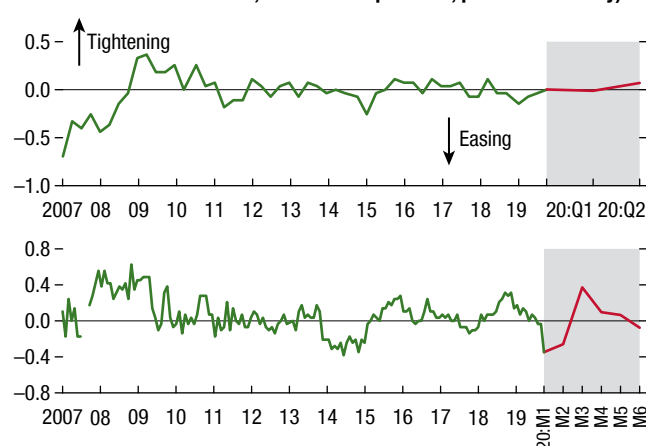
As the risk of default increased ...

1. One-Year Expected Default Frequency of Nonfinancial Firms Rated between Baa1 and B3 at the End of 2019, End of Period, 75th Percentile (Difference from end-2019, percent)



In the United States, credit conditions tightened somewhat in the syndicated loan market, but eased in the bond market after a period of tension in March.

3. Credit Supply Conditions in the United States (Top: syndicated loan market, spread residual, percent—quarterly; bottom: bond market, excess bond premium, percent—monthly)



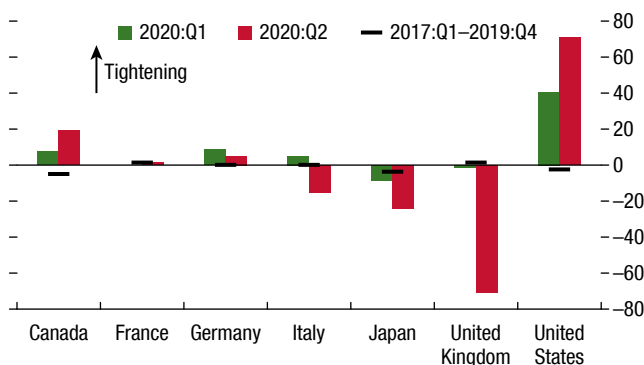
to the speed of policy support to financial markets and the economy, as well as to the effect of government programs to support lending to businesses (Bank of England 2020; European Central Bank 2020).²⁷

Turning to supply conditions in the syndicated loan and bond markets, the divergence across the two markets during the second quarter in the United States is striking. The top part of Figure 3.5, panel 3, shows the time series of the credit supply shock in the

²⁷The total amount of credit line drawdowns could also be a factor explaining the tightening of lending standards in the United States because it reduced the amount of bank capital available for new lending (Kapan and Minoiu 2020).

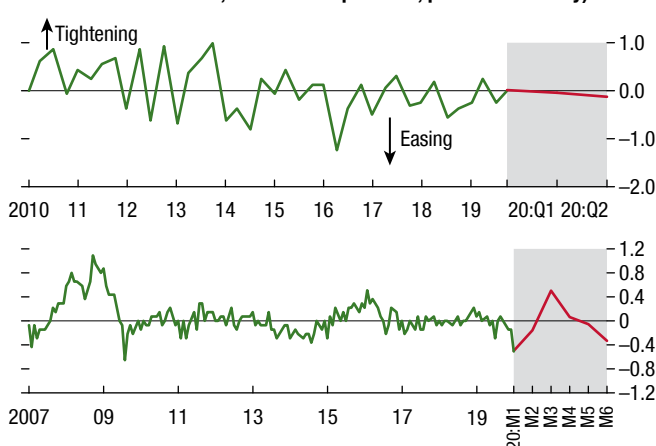
... bank lending standards tightened in the United States but eased in Japan and the United Kingdom.

2. Change in Bank Lending Standards (Index; see note for details)



In the United Kingdom, credit conditions also eased in the bond market after the stress in March, while conditions in the syndicated loan market remained neutral.

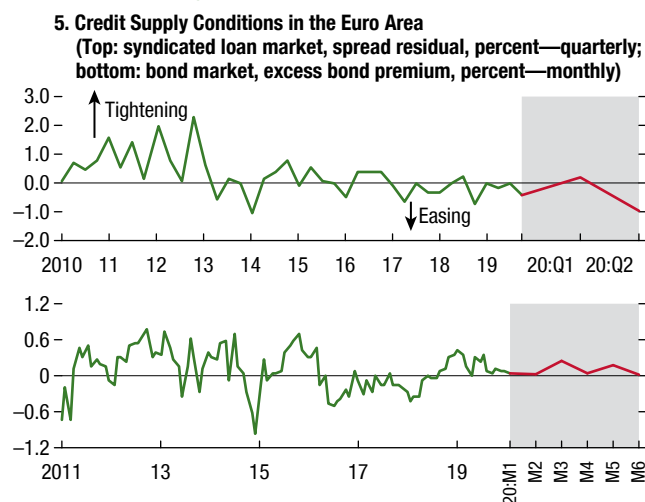
4. Credit Supply Conditions in the United Kingdom (Top: syndicated loan market, spread residual, percent—quarterly; bottom: bond market, excess bond premium, percent—monthly)



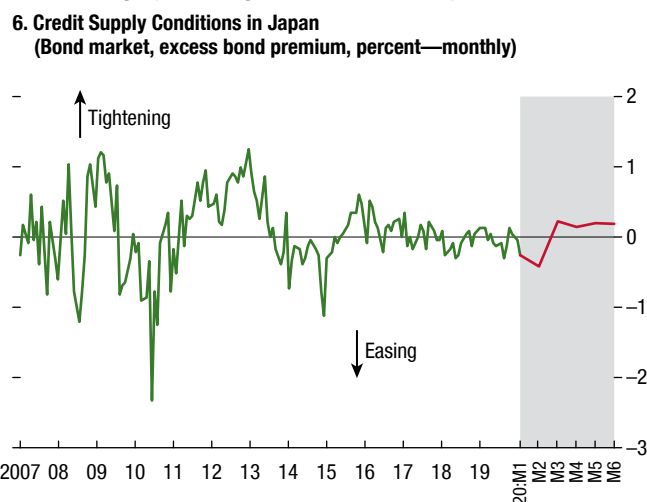
syndicated loan market. Credit conditions were neutral in the first quarter, on average, and tightened during the second quarter, bringing the market into a tight position, though not as tight as in the aftermath of the global financial crisis. By contrast, the bottom part of the same panel, which shows supply conditions in the secondary bond market, reveals that a large part of the March tightening was undone during the second quarter. Aside from the stimulative effect of the introduction of the Federal Reserve corporate credit facilities mentioned previously, two supply-side considerations may explain the buoyancy of the US bond market. First, with short-term rates near zero and Treasury

Figure 3.5. Evolution of Credit Supply Conditions (*continued*)

In the euro area, credit conditions eased in the syndicated loan market and remained broadly neutral in the bond market.



In Japan, conditions in the bond market tightened in March and remained slightly on the tight side in the second quarter.



Sources: Bank of Japan; Bloomberg Finance L.P.; Dealogic; Federal Reserve Board; Haver Analytics; Moody's Analytics; Refinitiv Datastream, Eikon; S&P Market Intelligence; and IMF staff calculations.

Note: Panel 1 shows the change in the 75th percentile of the one-year end-of-period expected default frequency of nonfinancial firms rated between Baa1 and B3 (lower medium grade to highly speculative grade) at the end of 2019 in each Group of Seven country between the end of 2019 and each of the first six months of 2020. Panel 2 shows the quarter-on-quarter change in bank lending standards from the bank lending survey conducted by respective central bank; change is shown in the form of an index ranging from -100 to 100. Canada, euro area economies, and the United Kingdom report a balance of opinions weighted by asset size with a base value of 0; Japan reports a balance of opinion weighted by the level of easing or tightening; the United States reports an unweighted balance of opinion in two categories by firm size (large versus small); and the figure shows the simple average of the two. See Online Annexes 3.3 and 3.4 for methodological details on the construction of the series shown in panels 3–6. Credit conditions in Canada and in the Japanese syndicated loan market could not be computed because of insufficient data. M = month.

purchases by the Federal Reserve bringing down term premiums, investors' search for yield pushed them toward yield-providing assets, especially those within the perimeter of central bank support. Second, expectations of no rise in the policy rate for several years reduced investors' incentives to get exposure to floating rates. As syndicated loan rates are floating and bond rates are fixed, some investors may find bonds relatively more attractive in the current environment. A separate analysis for investment-grade syndicated loans and leveraged loans indicates that conditions moved from easy to tight during the second quarter in both segments.²⁸

The dynamics of credit conditions in the United Kingdom's bond market mirrored those in the United States, but no tightening was observed in the syndicated loan market, on average (Figure 3.5, panel 4).

²⁸Loan covenant quality in North America appears to have continued to weaken during the first quarter, reaching its all-time worst level (according to Moody's)—to the benefit of borrowers who would need that flexibility during the crisis (Moody's Investors Service 2020).

A yield curve that shifted toward zero, as in the United States, may also have contributed to making the corporate bond market attractive to investors. In the euro area, where key policy rates remained unchanged around zero, bond market conditions continued to be broadly neutral, on average, during the first half of the year, but a clear loosening of conditions took place in the loan market during the second quarter (Figure 3.5, panel 5). In Japan, the March bond market tightening persisted through the end of June, but overall risk aversion was within the normal range observed over the past decade (Figure 3.5, panel 6).

All in all, the recent evolution of the excess bond premium suggests that conditions in bond markets were generally favorable during the second quarter, especially in the United Kingdom and the United States. In the United States, however, bank lending standards were tight, and the bank loan market was a clear outlier compared with the other G7 economies, where the change in lending standards ranged from a small tightening to a large easing. These differences

across economies and markets likely reflect the relative strengths of the different policy responses targeting the two markets, in particular the scope of government-sponsored loan guarantee programs as well as investors' search for yield in an environment of ultra-low interest rates and shifting expectations about future policy rates.²⁹

Greater Financial Stress Initially for Some Vulnerable Firms

Beyond aggregate indicators, changes in credit conditions are also likely to be visible through their differential impact on firms with different characteristics, as some firms may be more vulnerable to aggregate funding liquidity shocks than others. First, firms that generally have more restricted access to credit markets—for example, because of their relatively smaller size—may be more exposed to a deterioration in risk appetite than the rest of the corporate sector.³⁰ Second, firms with a worse liquidity position because of a lower stock of cash or higher short-term debt that needs to be rolled over are more sensitive to a tightening of credit conditions. In addition, firms with higher leverage may also suffer more during episodes of financial stress.

A comparison between the stock market performance of firms most vulnerable to funding shocks and that of other, less vulnerable firms can therefore be a useful complement to the aggregate analysis presented earlier in the chapter to better understand the behavior of lenders with respect to credit to firms. In what follows, the analysis focuses on vulnerabilities to funding liquidity shocks measured at the end of 2019 along three dimensions: (1) small size (low total assets), (2) low cash and short-term financial investments relative to industry peers (as a share of total assets), and (3) high short-term debt net of cash and short-term financial investments (as a share of total assets).³¹ The

analysis examines the effect of these three vulnerabilities over and above the effect of leverage-related vulnerabilities, which clearly amplified the effect of the negative cash flow shock related to COVID-19 in five of the seven economies (Figure 3.6, panels 1 and 2).³²

Evidence of *relatively* greater financial stress measured by cumulative abnormal returns—that is, the cumulative difference between the actual returns and the returns predicted by a simple one-factor asset pricing model—is pervasive for relatively smaller firms. Their underperformance during February–March in Germany, Japan, the United Kingdom, and the United States was close to, or greater than, 10 percentage points (Figure 3.6, panel 2). Furthermore, firms that entered the COVID-19 crisis with relatively high liquidity vulnerabilities also experienced relatively greater financial stress than those with higher liquidity buffers in some economies during late February and March. Panel 3 of Figure 3.6 shows the cumulative abnormal returns of two groups of US firms: those with low and high relative cash. While the stock market performance of the two groups is indistinguishable until late February, a wedge in favor of the latter group appears at that time and becomes wider during the second half of March. A more formal econometric investigation, which controls for a number of firm characteristics (including the industrial sector) at the end of 2019, as well as the expected size of the pandemic-related revenue shock, confirms that visual impression: firms with relatively less cash suffered more financial stress in the United Kingdom and the United States, and those with a relatively higher level of short-term debt (net of cash) suffered more in France, the United Kingdom, and the United States (Figure 3.6, panel 4).³³ In these five cases, the underperformance of firms with liquidity vulnerabilities between early February and end-March was about 5 percentage points.

Policies that Helped Relieve Funding Stress

Precise measurement of the effects of policy announcements and actions in the context of the COVID-19 crisis is an extremely challenging task.

²⁹It is plausible that, in each country, the structure of the financial sector (for example, market-based versus bank-based) played a role in the choice of policy instruments and calibration of the policy response across different markets, which in turn may explain the relative dynamics of supply conditions in the various markets.

³⁰See Holmstrom and Tirole (1997) for a theoretical discussion. Duchin, Ozbas, and Sensoy (2010) and Hadlock and Pierce (2010) discuss various financial constraint indicators commonly used in the empirical corporate finance literature.

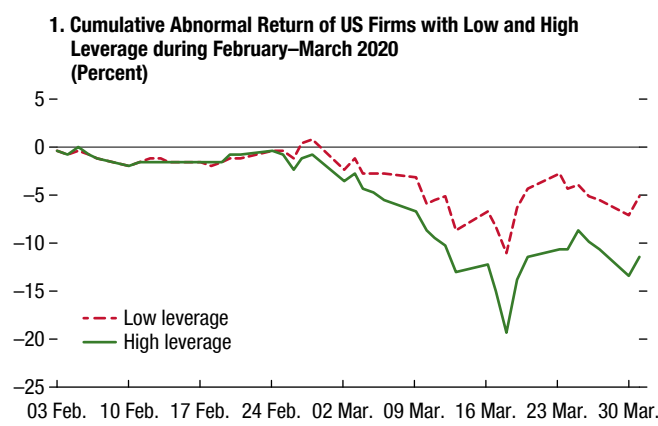
³¹A high level of short-term debt net of cash exposes a firm to rollover risk. A low level of cash reduces a firm's room to maneuver in case credit conditions tighten (see, for example, Joseph and others 2020).

³²See Online Annex 3.5 for methodological details. For size, relative cash, and liquidity gap (leverage), a firm is deemed vulnerable if it belongs to the weakest tercile (half) of the distribution of the characteristic at the end of 2019.

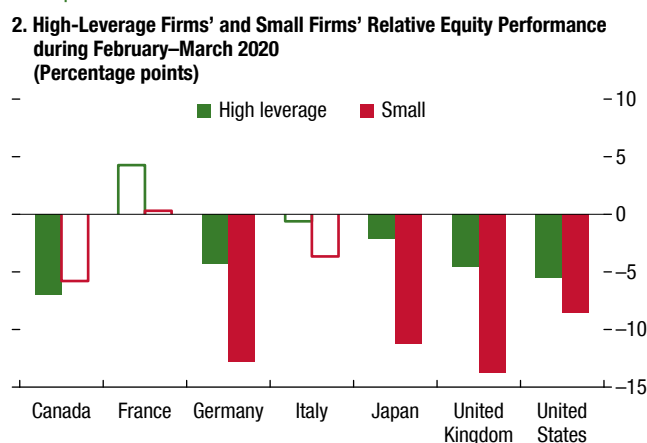
³³The finding for the United Kingdom echoes that of Joseph and others (2020).

Figure 3.6. Firm-Level Stock Market Performance

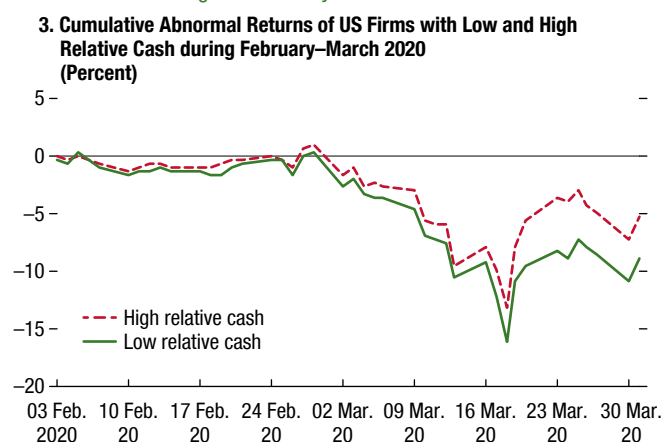
High-leverage firms suffered more financial stress during late February and March in the United States ...



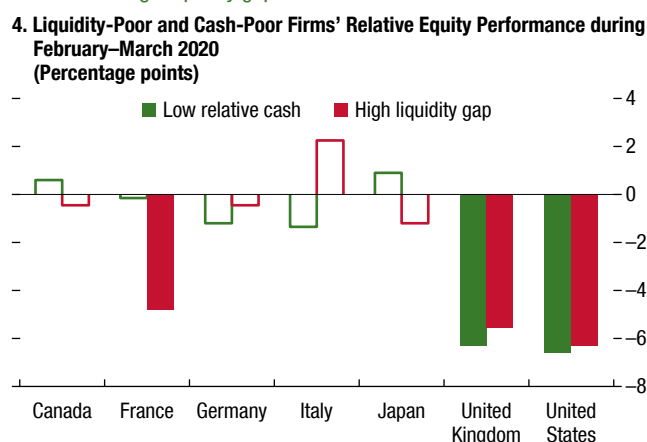
... and in four other Group of Seven economies, and small firms underperformed in four economies.



US firms with less cash than their industry peers suffered more financial stress during late February and March ...



... as did UK firms with relatively less cash and French, UK, and US firms with a high liquidity gap.



Sources: Refinitiv Datastream; S&P Capital IQ; and IMF staff calculations.

Note: Firm characteristics are as of the end of the fourth quarter of 2019. Leverage in panels 1 and 2 is defined as the debt-to-asset ratio. A high-leverage (low-leverage) firm is one in the top (bottom) half of the leverage distribution. In panels 2 and 4, equity performance is based on cumulative abnormal returns during February 3–March 31, 2020, and firm-level characteristics are controlled for. “Relative cash” is defined as in Joseph and others (2020), and a low-relative-cash (high-relative-cash) firm is one in the lowest (highest) tercile of the relative cash distribution. “Small” is defined as being in the lowest tercile of the distribution of total assets. “Liquidity gap” is defined as total short-term financing minus cash and short-term investments as a ratio of total assets. A high-liquidity-gap firm is one in the highest tercile of the distribution. Solid colored bars indicate statistical significance at the 5 percent level. Empty bars indicate lack of statistical significance at conventional levels. See Online Annex 3.5 for methodological details.

A variety of policy measures—monetary, fiscal, and financial—were announced over a short period of time, sometimes on the same day, making it difficult to isolate their effects. Important details of announced policy packages were sometimes released with a lag, and policy measures announced on different days could have had strong complementarities. Furthermore, because many of the economic policy measures announced early on in the crisis were concurrent with negative news about the progression of the pandemic and its effect on the real economy and financial markets—as

well as with the announcement of containment policy measures imposing restrictions on economic activity—assessment of their impact is extremely difficult.³⁴ In the face of these challenges, and with full acknowledgment of the associated limitations, this chapter follows

³⁴For example, the March 12 announcement by the Federal Reserve Bank of New York of new large repo operations coincided with one of the worst declines in US stock market history. The announcement, however, was a surprise and took place in the middle of the trading day, at a time when the intraday decline was already very large.

two simple approaches to try to gauge the impact of key policy announcements on corporate funding liquidity stress. First, it examines the effect of policy announcements on the *relative* stock market performance of the most vulnerable firms over a horizon of two trading days, taking into account the negative impact of global financial market volatility during days when it was extreme.^{35,36} Second, it assesses the overall impact of the policy response by extending the window of the analysis (to the end of June) of the *relative* stock market performance of the groups of vulnerable firms that have underperformed during February–March, as identified in the previous section. In both cases, several firm characteristics are controlled for.³⁷ As in the previous section, the relative performance of firms most vulnerable to adverse funding liquidity shocks (controlling for solvency and other firm characteristics) is interpreted as a symptom of changing credit supply conditions. The focus on those firms does not suggest that policies explicitly targeted them but that policies to support the economy (and credit provision in particular) may benefit them relatively more.

Policy announcements appear to have had a positive effect on the relative stock market performance of smaller firms (relative to larger firms) as well as on those with high leverage (relative to those with low leverage). Pooling all 85 announcement days in the sample, this effect amounts to about 0.3 percentage point of overperformance a day over two days for smaller firms and about 0.1 percentage point a day over two days for high-leverage firms. By contrast, no significant effect can be found for firms with liquidity vulnerabilities (Figure 3.7, panel 1). Given the small number of announcement days, identifying significant effects at the country level is challenging. Yet the data suggest a positive effect for small firms in Canada and for small firms and high-leverage firms in Japan.

It is plausible that some types of vulnerable firms were more affected by certain types of policy announcements than others. Some policies, such as government guarantees or purchases of corporate securities by central banks, have a *direct* impact on corporate funding and solvency, whereas others, such

as macroprudential measures or changes in financial sector regulation, have only an *indirect* impact. Comparing announcement days when at least one policy with a *direct* impact was announced with those when policies with only an *indirect* impact were announced, it appears that policies with a *direct* impact benefited firms with liquidity vulnerabilities relatively more.³⁸ The effect amounts to 0.2 percentage point of overperformance a day over two days for liquidity-poor firms and to 0.13 percentage point a day over two days for cash-poor firms (Figure 3.7, panel 2). No difference across types of policies is observed for high-leverage firms and small firms.³⁹

The analysis of the stock market performance of vulnerable firms through the end of June confirms that stress at smaller firms had generally disappeared by then—except in the United Kingdom, where it remained significant—while strains in high-leverage firms remained in Germany and Japan (Figure 3.7, panel 3). Stress at firms with liquidity vulnerabilities, however, persisted in France, the United Kingdom, and the United States (Figure 3.7, panel 4), echoing findings from the aggregate analysis of the loan markets in the US economy.

Conclusion and Policy Considerations

The tightening of credit conditions that took place across G7 economies in March as the COVID-19 pandemic gathered momentum was quelled to a very large extent thanks to an unprecedented set of powerful

³⁸When estimated separately, the effect of measures with an indirect impact is not statistically significant. It is plausible that such measures, including changes in financial sector regulation or macroprudential policy, take longer to have an effect on financing conditions for nonfinancial firms than measures with a direct impact. Among measures with a direct impact, the announcements of on-budget fiscal measures supporting firm solvency appear to have been the most powerful: excluding announcement days when such measures were announced, the difference between the effect of measures with a direct impact and those with an indirect impact loses significance. Among the other four types of measures with a direct impact, corporate asset purchase programs appear to have been relatively more powerful.

³⁹While it is very plausible that major policy announcements in the United States had positive spillover effects on other G7 economies, spillover analysis is impeded by the occasional concurrence of major announcements in the United States with those in the other countries. Focusing on days when an announcement was made in the United States only, no evidence can be found that the announcement had a positive effect on the relative performance of vulnerable firms in other G7 economies. Spillovers to emerging markets are discussed in Chapter 2 of this report.

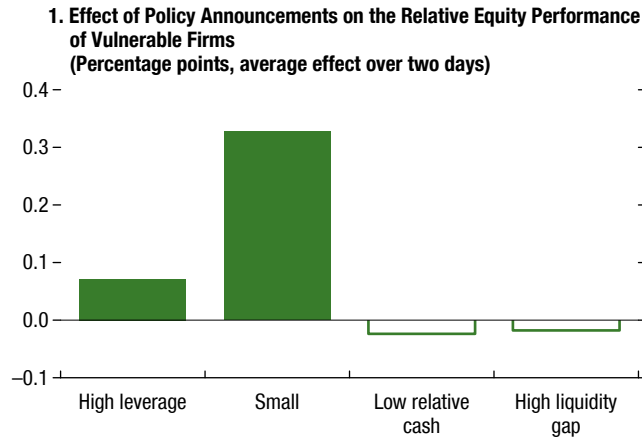
³⁵The analysis does not try to assess whether program eligibility mattered for firms' financial performance.

³⁶Global financial market volatility is defined as extreme when the Chicago Board Options Exchange Volatility Index (VIX) is above the 80th percentile of its distribution during February–June 2020.

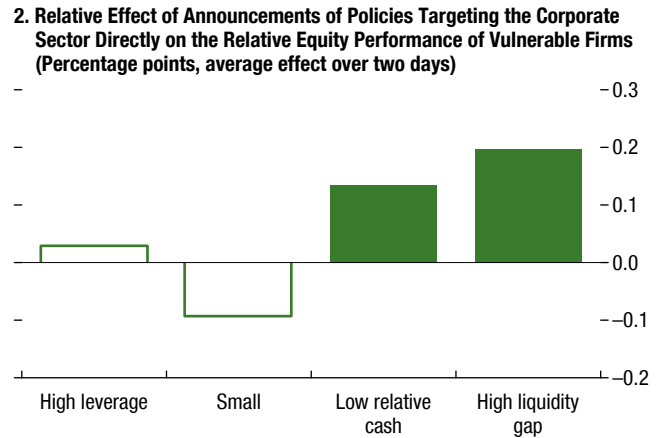
³⁷See Online Annex 3.6 for methodological details.

Figure 3.7. The Effect of Policies on Vulnerable Firms

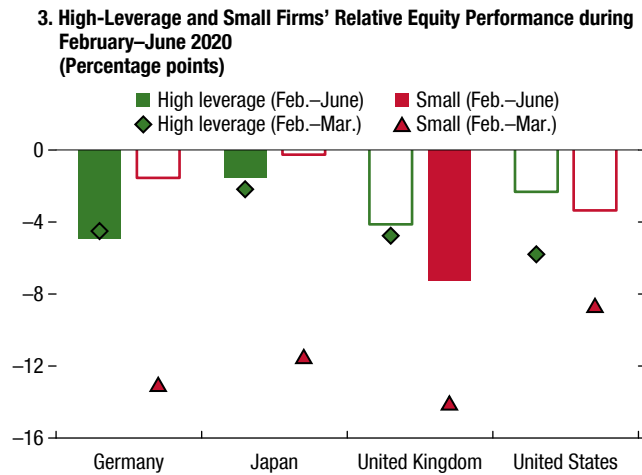
Policy announcements helped relieve financial stress on average in small firms and high-leverage firms ...



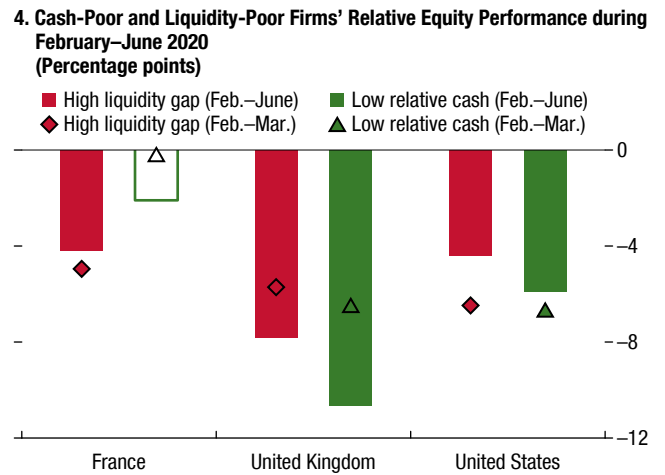
... and policies targeting the corporate sector directly had a stronger effect on cash-poor and liquidity-poor firms than policies with an indirect impact.



The relative performance of small firms improved during the second quarter ...



... but strains remained for liquidity-poor and cash-poor firms at the end of June.



Sources: IMF, COVID Policy Tracker; press releases and press reports; Refinitiv Datastream; S&P Capital IQ; Yale Program on Financial Stability; and IMF staff calculations.

Note: In panels 1 and 2, the effect of policy announcements is calculated net of the effect of extreme volatility, and equity performance is based on cumulative abnormal returns on the day of the policy announcement and the following day. Leverage is defined as the debt-to-asset ratio. A high-leverage (low-leverage) firm is one in the top (bottom) half of the leverage distribution. "Relative cash" is defined as in Joseph and others (2020), and a low-relative-cash (high-relative-cash) firm is one in the lowest (highest) tercile of the relative cash distribution. "Small" is defined as being in the lowest tercile of the distribution of total assets. "Liquidity gap" is defined as total short-term financing minus cash and short-term investments as a ratio of total assets. A high-liquidity-gap firm is one in the highest tercile of the distribution. In panels 3 and 4, equity performance is based on cumulative abnormal returns during February 3–June 30, 2020. Solid colored bars indicate statistical significance at the 5 percent level. Empty bars indicate lack of statistical significance at conventional levels. See Online Annex 3.6 for methodological details.

policy interventions. Despite the deterioration in its solvency, the nonfinancial corporate sector, as a whole, was generally able to obtain the funding it needed to continue operating during the second quarter.⁴⁰ Yet signs of tighter credit conditions also surfaced during the second quarter in some segments of the credit market or did not fully dissipate for some types of firms with a viable business model but vulnerable to adverse liquidity shocks. In particular, while US bond markets have been buoyant, bank-dependent firms, as well as those with pre-COVID-19 liquidity vulnerabilities, continue to face a more difficult environment. Firms with pre-COVID-19 liquidity vulnerabilities in the United Kingdom also appear to have been left behind, despite overall favorable credit conditions. An interesting topic for future analysis would be further exploration of the reasons for the cross-country differences in the evolution of credit supply conditions documented in the chapter.

While most G7 central banks have already signaled their intention to leave their pandemic-related facilities in place for the foreseeable future, it may be increasingly difficult for governments to maintain the same level of fiscal support because of fiscal space concerns or other political economy considerations. The latest bank lending survey of the euro area suggests that tighter bank lending standards may be around the corner, as government guarantee programs are set to end soon (European Central Bank 2020). Yet the evidence analyzed in this chapter suggests that it is the policies supporting firms directly that have had the most beneficial effect on firms with liquidity vulnerabilities. Policies also appear to have cushioned financial

strains in smaller firms. It is thus critical to carefully calibrate any withdrawal of fiscal policy support to funding markets.

Beyond the calibration of funding and liquidity support by fiscal and monetary policymakers, a key issue for financial stability in the near to medium term will be the deterioration in corporate solvency as a result of the pandemic-induced decline in profitability and increased corporate indebtedness. This deterioration will have a severe impact on banks' asset quality and capital adequacy (see Chapter 4), which in turn could limit the credit supply to firms over the next several quarters.

Chapter 1 of this report provides a policy road map to navigate the gradual reopening and the recovery phases of the COVID-19 crisis (see Table 1.2 in that chapter) and discusses policy trade-offs relevant to corporate funding issues documented in this chapter, including the impact on fiscal space and sovereign contingent liabilities as well as the risk of capital misallocation. Once the recovery is well entrenched, the experience of the COVID-19 shock on corporate funding markets must also be examined to determine the reasons for the fragility they experienced in March. The regulation of nonbank financial institutions must be revisited and mechanisms to enhance their resilience to large liquidity shocks devised, as discussed in recent GFSRs.

The evidence provided in this chapter also indicates that liquidity and leverage-related vulnerabilities have amplified the impact of the COVID-19 shock. The experience of the current crisis, therefore, is a reminder to supervisory authorities to continue to monitor corporate vulnerabilities closely and offers an opportunity for them to consider the benefits of macroprudential policy tools for the nonfinancial corporate sector (IMF 2020).

⁴⁰Because of lack of firm-level data for unlisted small and medium-sized enterprises in 2020, the analysis could not establish the degree to which this conclusion carries over to those firms.

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COVID-19 CHALLENGES AND POLICY RESPONSES

Chapter 4 at a Glance

- The coronavirus disease (COVID-19) crisis may pose challenges to the capital of banks, even though they entered the crisis with higher capital ratios than before the global financial crisis and despite the large policy interventions aimed at containing the economic fallout from the current crisis.
- Forward-looking simulations based on a new global stress test tool show that in a baseline scenario consistent with the October 2020 *World Economic Outlook* (WEO) bank capital falls sharply but recovers quickly, while an adverse scenario suggests sustained damage to average capital ratios.
- In the adverse scenario, a weak tail of banks, corresponding to 8.3 percent of banking system assets, would fail to meet minimum regulatory requirements, and the capital shortfall relative to broad statutory regulatory thresholds reaches \$220 billion.
- In absence of the bank-specific mitigation policies already implemented, the weak tail of banks would reach 14 percent of banking system assets, and the global capital shortfall would be \$420 billion.
- Bank-specific mitigation policies would help reduce financial stability risks if the crisis recedes promptly but may pose risks to banks' capital adequacy if the crisis proves to be longer lasting.

Will Banks Remain Adequately Capitalized?

Banks entered the current COVID-19 crisis with higher levels of capital than before the global financial crisis, and policymakers have quickly deployed an array of policies to support economic activity and the ability of banks to lend. However, the sheer size of the shock and the likely increase in defaults from firms and households may pose challenges to banks' profitability and capital positions. A forward-looking simulation of the trajectory of capital ratios in a sample of about 350 banks from 29 jurisdictions, accounting for 73 percent of global banking assets, shows that such ratios would decline as a result of the COVID-19 crisis, but remain, on average, comfortably above regulatory minimums. However, there is heterogeneity across and within regions, and a weak tail of banks, accounting for 8.3 percent of banking assets in the

sample, might fail to meet minimum regulatory capital requirements in an adverse scenario. Government loan guarantees and other bank-specific policies that adjust the calculation of capital ratios help relieve the decline of reported capital ratios and reduce the incidence of bank capital shortfalls. In considering the duration of these and other measures, policymakers should pay attention to the intertemporal trade-off they pose, as policies that reduce the financial stability risks of a transitory shock may increase vulnerabilities related to banks' loss-absorbing capacity and overall indebtedness if the crisis proves to be persistent. Policies aimed at limiting capital distributions and ensuring adequate funding for deposit guarantee programs, as well as contingency plans that lay out how to respond to possible pressures, would help deal with the consequences of a potentially adverse scenario.

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Introduction

In many respects, the COVID-19 crisis presents the largest shock that banks have experienced since the Great Depression (see the October 2020 WEO). Authorities have adopted unprecedented policy measures to blunt the impact of this shock. Governments have introduced substantial fiscal support to

households and businesses (see the October 2020 *Fiscal Monitor*), monetary policy rates have been cut worldwide, and many central banks have implemented large asset purchase programs to support markets and to maintain the credit flow to the real economy (see the April 2020 *Global Financial Stability Report* [GFSR]).

Importantly, policymakers have taken steps to avoid the procyclical credit crunch that was evident during the global financial crisis, encouraging banks to use the flexibility embedded in the global regulatory framework to deal with the temporary consequences of the COVID-19 shock and thus stifle negative feedback loops that could amplify the impact of the crisis. Following a decade during which banks aggressively built their capital positions, standard setting bodies have issued guidance to support national authorities in their policy response to the pandemic. Policymakers have released capital buffers to sustain the flow of credit to households and firms. Banks have also been allowed, for loans whose deterioration is attributed to the shock, to defer the recognition of bad debts and the reporting of loan loss provisions and to waive the increase in risk-asset weightings and the deduction of provision charges from capital. Banks have also been compelled (by regulation or strong administrative guidance) to cancel capital distributions.

Despite the large negative impact of the pandemic on the global economy during recent quarters, banking systems have so far been able to weather these economic difficulties, due in part to aggressive policy support. Following an initial plunge, bank equity prices have partially recovered. While banks' assessment of borrower credit quality has naturally deteriorated, bank credit expanded in March as corporate borrowers drew on committed credit lines and has since remained stable. Nonetheless, credit conditions have remained tight. Despite significantly increased loan loss provisions in virtually all systems, most banks continue to report positive earnings, and capital positions have declined only modestly over the initial quarters of the crisis.

This chapter addresses two central questions.

- How prepared are banks to withstand continued challenging economic conditions in the coming years?
- How much would bank-specific regulatory policies recently implemented help them face these scenarios?

The chapter also discusses policy options to deal with the potential challenges that banks could face in the baseline and adverse scenarios, and highlights the intertemporal trade-off that arises from targeted policies that encourage banks to use the flexibility embedded in the regulatory regime to sustain the flow of credit to borrowers facing liquidity problems in response to a transitory shock.

Initial Impact of COVID-19 on the Global Banking Industry

After spending the past decade building capital and liquidity buffers following the regulatory reforms put in place after the global financial crisis, banks came into the COVID-19 crisis in much better shape than they did before previous crises (Figure 4.1, panel 1). However, bank profitability was already challenged in many jurisdictions amid the prolonged period of low interest rates and low term spreads in recent years (Figure 4.1, panel 2). This low-interest-rate environment is likely to persist for several years, as policymakers have engaged in further expansive monetary policies to support the flow of credit to the real economy (see the April 2020 GFSR).

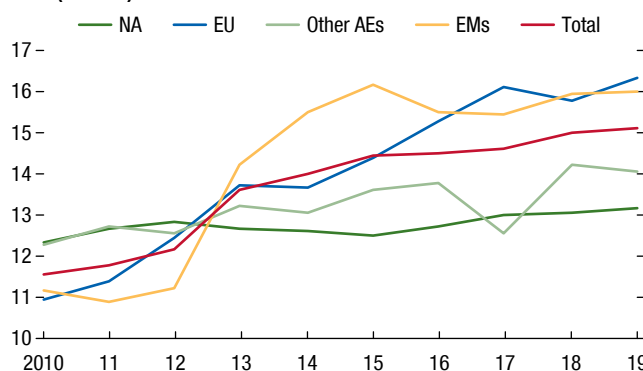
Despite the stronger initial position of banks and the aggressive response of policymakers, the initial stage of the COVID-19 crisis has confronted banks with significant challenges. The initial contractionary shock triggered a scramble for liquidity. In the United States, corporate borrowers aggressively drew on committed credit lines, causing a sudden increase in loans that drove down bank capital ratios.¹ Since then, bank credit in the United States and Europe has remained largely flat. Crucial elements of financial system plumbing (for example, repo and US Treasury markets) encountered liquidity challenges, as did emerging market banks in US funding markets, and financial markets were severely stressed for several weeks. Increased loan loss provisioning—particularly among US banks, for which the onset of the crisis coincided with

¹Risk weights for undrawn credit lines are in the range of 20–50 percent, whereas those for drawn credit lines are 100 percent. Therefore, the large drawdown of committed credit lines has an immediate material impact on risk-weighted assets, the denominator of bank capital ratios.

Figure 4.1. Historical Context: Magnitude of the Current Crisis and the Ex Ante Position of Banks

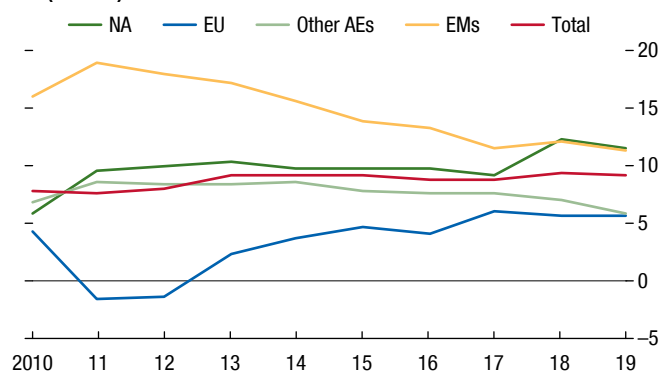
Banks, particularly in Europe and in emerging market economies, massively improved their capital positions in the last decade ...

**1. Average Tier 1 Ratio, by Region
(Percent)**



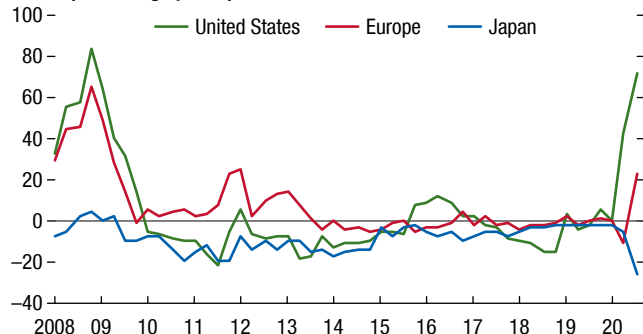
... despite low profitability challenging capital accretion in some regions.

**2. Average Return on Equity, by Region
(Percent)**



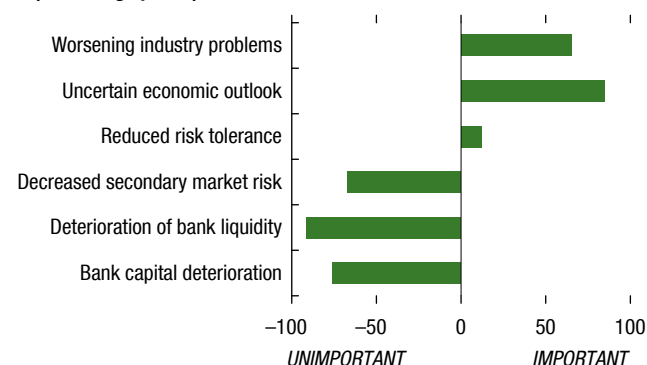
Bank lending standards tightened sharply—to near the 2008 peak in the United States.

**3. Bank Lending Standards: Net Tightness
(Percentage points)**



Banks attribute tightening to deteriorating borrower conditions, not to capital or liquidity constraints.

**4. Causes of Bank Credit Tightening
(Percentage points)**



Source: Haver Analytics.

Note: Bank lending standards for Europe are based on the European Central Bank's one-quarter forward expectations, while both the U.S. and Japan are based on the most recent quarter. Other AEs = other advanced economies, including Japan, Australia, Hong Kong SAR, and Singapore; EMs = emerging markets; EU = Europe, including the United Kingdom and continental Europe; NA = North America, including United States and Canada.

a transition to “expected credit loss” accounting standards—weighed on bank financial results in the first quarter of 2020.² In the second quarter,

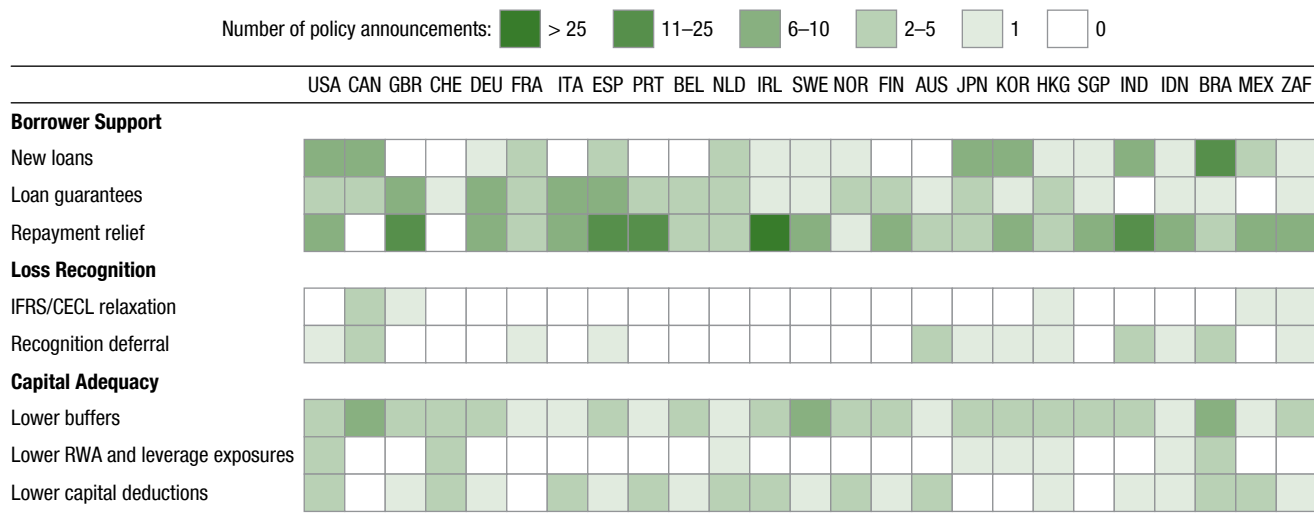
²The transition to expected credit losses in the United States became effective on January 1, 2020, and virtually all US banks chose to book large provisions for “transitional” increases in loan loss reserves. In one extreme example, Citi took a \$4.2 billion current expected credit losses transitional charge, more than half of the \$7 billion total 2020 first-quarter loan loss provision. The Federal Reserve promulgated a regulation allowing banks to defer transition-related provisions, but most large banks chose to retain the transition charges recognized on January 1. However, US

financial market stress subsided, but most banks took sharply higher loan loss provisions and tightened lending standards as the economic outlook continued to deteriorate (Figure 4.1, panel 3), with

bank regulations mitigate the impact of this transition charge on bank capital. Before the COVID-19 outbreak, the Federal Reserve announced a rule allowing banks to phase in the impact of current expected credit losses transition provisions over three years. During the first quarter of 2020, the regulator lengthened the phase-in path to zero capital charges over two years, followed by a three-year phase-in path.

Figure 4.2. Mitigation Policies Announced since February 1, 2020, by Category and Jurisdiction

Among the wide range of policy responses to the COVID-19 shock and slowdown, this chapter focuses on three that relate most directly.



Sources: Financial Stability Board; KBW; Yale School of Management; and IMF staff estimates.

Note: The intensity of the colors in the figure denotes only the number of measures announced but has no bearing on the absolute or relative economic magnitude of those policies. For instance, a single large policy announcement in one jurisdiction could surpass in economic relevance many announcements by a different jurisdiction. The figure includes policy announcements up to July 10, 2020. Austria, Denmark, Greece, and Luxembourg are not included in the analysis due to incomplete data. See Online Annex 4.1, www.imf.org/en/Publications/GFSR, for an explanation of the data and methodology on which this policy taxonomy is based. The row labeled “Lower buffers” also includes public announcements by authorities explicitly encouraging banks to use the flexibility embedded in the regulatory framework to use the capital conservation buffer to support lending, although these statements do not entail a formal change in the rulebook. Data labels use International Organization for Standardization (ISO) country codes. CECL = current expected credit loss; IFRS = International Financial Reporting Standards; RWA = risk-weighted assets.

loan officers in the United States reporting the tightest credit standards since 2005.

As improved liquidity conditions relieved borrowers’ appetite for precautionary borrowing, the first-quarter spurt of loan growth slowed or reversed for most banks. This relieved risk-weighted asset pressure on capital ratios (Figure 4.1, panel 4). During the second quarter of 2020, some major banks (particularly in the United States) also reported large capital-market-driven gains.

The Reactions of Financial Sector Authorities to the COVID-19 Crisis

Governments around the world have responded to the economic disruption of the COVID-19 crisis with policies of unprecedented scope and magnitude to support the real economy, prevent permanent damage to the balance sheets of firms and households, and maintain the flow of credit to the real economy. These policies extend from broad macroeconomic policies to specific measures that directly address bank balance sheet management (Figure 4.2).

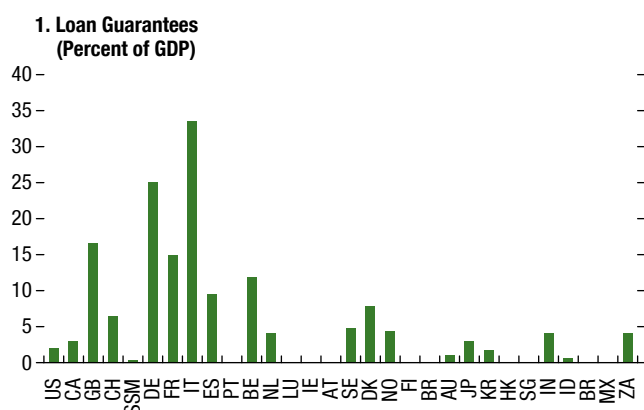
This chapter focuses specifically on the impact of government loan guarantee programs and capital adequacy policies that can be directly quantified (henceforth, “bank-specific” policies). Other policies have an indirect effect on banks’ capital adequacy. For example, fiscal stimulus and monetary policy indirectly support banks’ financial results through macroeconomic channels. Policies to support bank funding could affect bank capital by lowering costs and allowing banks to sustain their level of activity. Policies intended to support borrowers’ repayment ability, including repayment moratoria, may reduce banks’ need to set aside provisions for loan losses—and thus bolster capital—by lowering the probability that a borrower will enter default (probability of default). Nonetheless, some of these policies may also simply postpone loss recognition.

Within the risk-based capital framework, the policies analyzed in this chapter can alter the capital space through three channels.

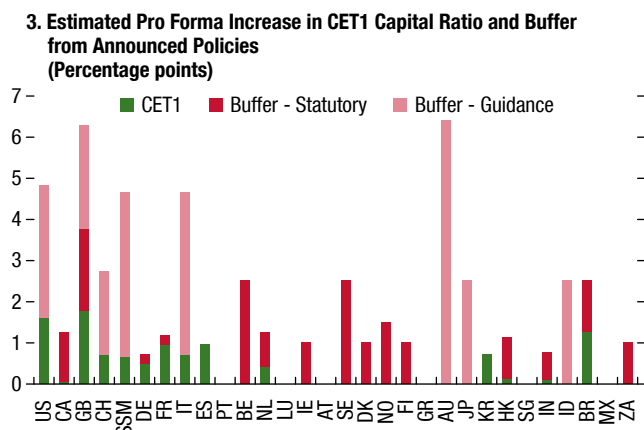
- **Increasing capital levels:** This has been promoted mainly through restrictions (often “voluntary” guidance) on distribution of profits through dividends and share buybacks. Most of these come with specific end dates (typically not later than the end of 2020).

Figure 4.3. Magnitude of Announced Mitigation Policies

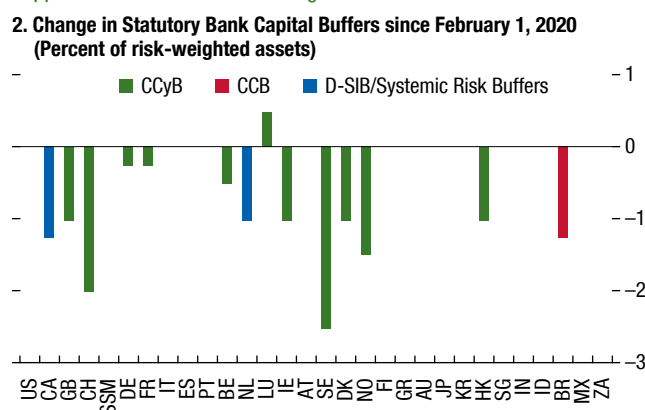
The magnitude of loan guarantees varies widely across countries.



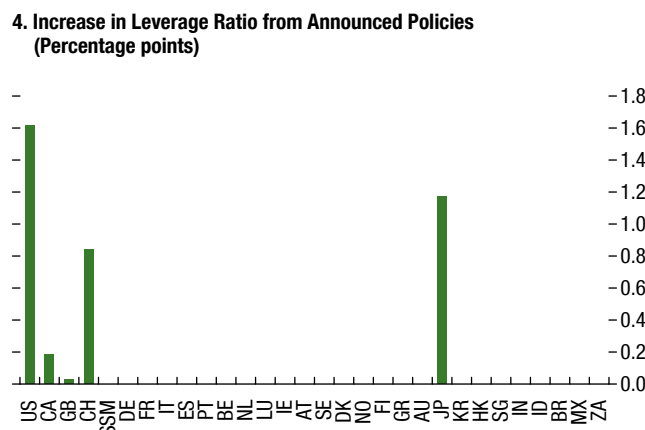
Some jurisdictions have also taken steps to improve reported capital ratios or lower required capital buffers.



Many jurisdictions have relaxed statutory capital buffer requirements to support banks' credit underwriting.



A few countries highly sensitive to capital market depth have also taken steps to improve leverage ratios.



Sources: Bloomberg Finance L.P.; Financial Stability Board; IMF (2020b); KBW; SNL Financial; Yale School of Management; and IMF staff estimates.

Note: Figures include the 29 countries captured in the bank stress test, plus data on the SSM as a supervisory jurisdiction. "Loan guarantees" is based on the announced programs, not actual take-up of guaranteed loans. Loan guarantee data are not captured for Austria, Finland, Greece, Hong Kong SAR, Ireland, Luxembourg, and Portugal. D-SIB surcharges are not captured as a separate buffer in several jurisdictions, mainly because D-SIB requirements are often expressed in terms of the overall CET1 ratio. Countries are identified by two-digit International Organization for Standardization (ISO) code and indicate policies pronounced by the European Central Bank and the European Banking Authority. Figures for individual European countries indicate local policies distinct from those announced by European authorities. CCB = capital conservation buffer; CET1 = common equity Tier 1; CCyB = countercyclical capital buffer; D-SIB = domestic systemically important bank; SSM = Single Supervisory Mechanism.

Policymakers have issued such guidance for the large European banks and for all banks in Brazil, Italy, Spain, Switzerland, the United Kingdom, and other countries. Government loan guarantees can also boost capital levels by reducing the loss that a bank experiences when a borrower defaults and the need to set aside loan loss provisions for this event (loss given default).

- **Lowering risk-weighted assets or "leverage exposure"—the capital ratio denominators:** National regulators have typically waived risk-asset weights for loans covered by government guarantees (Figure 4.3,

panel 1).³ In some instances, policymakers have also reduced risk weights on banks' exposures to targeted borrowers, often small businesses, to encourage credit to this segment. A few countries—Japan, the United Kingdom, and the United States—have exempted central bank reserves, and the latter

³This is distinct from the effect of government guarantees on the borrowers' "point-in-time" probability of default resulting from improved access to funding—which is captured in the analysis of the corporate sector—and from their effect on the "loss given default," previously discussed and quantified in the next section.

two have exempted holdings of government bond holdings, from banks' leverage exposure measures (the denominator of the leverage ratio). These policies are intended to facilitate large asset purchase programs and to encourage banks to continue to intermediate in government bond markets.

- **Releasing some capital buffers:** In many jurisdictions, policymakers have increased banks' overall space between reported and regulatory capital levels by releasing the countercyclical capital buffer that is designed to be used during downturns (Figure 4.3, panel 2). In some instances, policymakers have formally released required capital buffers, effecting a reduction in *statutory* capital buffers. In other cases, policymakers have publicly reminded banks that some buffers—typically the capital conservation buffer of 2.5 percent of total capital aimed at preventing banks from breaching the minimum regulatory capital adequacy ratio—could be used to support lending and be gradually rebuilt through retained earnings as conditions improve. This chapter characterizes the latter as reductions in the “*guidance* buffer” that determines de facto minimum capital levels.

These policies combined are estimated to have already improved banks' reported common equity Tier 1 (CET1) ratios and, either by statute or by guidance releasing some capital buffer requirements, regulators have further expanded the capital space between banks' current positions and broad regulatory capital levels (Figure 4.3, panel 3).⁴ In addition, although this section focuses on the CET1 capital position because that is the binding constraint for most banking systems where bank market-making activity is not large, policymakers in a few jurisdictions (Japan, Switzerland, United States) have also eased constraints on banks' leverage ratios, typically by excluding government bonds, central bank reserves, or other low-risk assets from the leverage exposure denominator (Figure 4.3, panel 4).

Bank Capital Ratios in the Wake of COVID-19 and the Role of Policies

This chapter assesses the consequences of the COVID-19 crisis for the future capital ratios of global

⁴Capital requirements that include all statutory buffers (but exclude recent statutory reductions) are defined in this chapter as “statutory broad capital requirements.” Capital requirements that exclude buffers released by recent informal guidance statements are defined as “guidance capital requirements.”

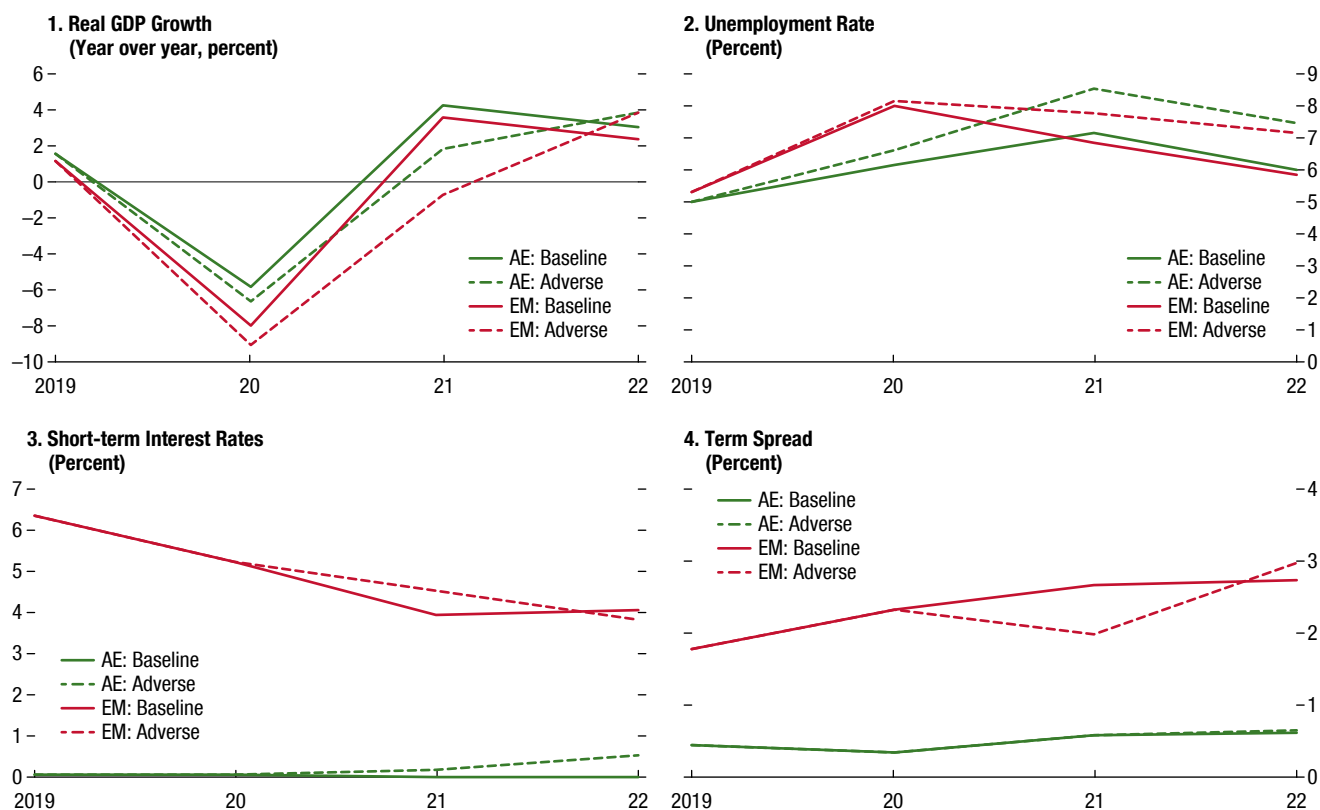
banking systems in a forward-looking manner using the latest baseline projection of the economic outlook and the adverse scenario outlined in the October 2020 WEO (Figure 4.4). These two scenarios provide a broad assessment of the potential paths of the pandemic; however, given the unprecedented nature of the shock, uncertainty remains.

These macro scenarios implicitly incorporate the effects of broad macroeconomic and monetary policy interventions, including interest rate cuts, unconventional monetary policies, fiscal measures, social safety net packages, and other policies that support the real economy. By improving the liquidity of borrowers, these policies indirectly affect the condition of banks. However, the consequences of bank-specific policies for the distribution of banks' capital may not be fully captured in macro aggregates. The chapter also assumes that the accounting impact of bank-specific policies on bank balance sheets is not fully captured in macro trajectories.

The assessment relies on a recently developed global stress test (see Online Annex 4.1) that uses publicly available data on the financial statements of about 350 banks in 29 major banking systems—accounting for 73 percent of global banking sector assets—to estimate how key components of banks' financial statements react to macroeconomic variables.⁵ The future paths of these variables are embedded in the scenarios used to conduct a forward-looking simulation of the evolution of the profitability and capital position of each of the banks in the sample, which is then aggregated across different regions and across global systemically important banks.

The stress test exercise relies on publicly available data. While this allows for a global assessment of the prospective health of the banking system, it comes at the cost of lower data granularity and higher reliance on statistical methods than in supervisory stress tests. This narrows the types of policies that can be analyzed in this context and also requires several assumptions to map the impact of those policies to

⁵Online Annex 4.1 is available at www.imf.org/en/Publications/GFSR. The jurisdictions included are Australia, Austria, Belgium, Brazil, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong SAR, India, Indonesia, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, The Netherlands, Norway, Portugal, Singapore, South Africa, Spain, Sweden, Switzerland, the United Kingdom, and the United States. In each jurisdiction, the largest banks covering up to 80 percent of banking assets are included. Therefore, the simulation does not include the consequences of the scenarios for the solvency of small banks.

Figure 4.4. Scenarios for Stress Test Simulation

Source: IMF, October 2020 *World Economic Outlook*.

Note: Median across sample countries in each group. AE = advanced economy; EM = emerging market.

banks' financial statements.⁶ The base model is augmented by a satellite model that explicitly considers the contribution of corporate and consumer risk to banks' loan loss provisions and is used to estimate the impact of government guarantees (see Box 4.1).⁷

⁶Given the lower granularity of the data, the global stress test also relies more heavily on econometric methods than standard supervisory stress tests and is simpler than models that would typically be used by authorities. It is a stand-alone solvency stress test that does not consider interaction with other risks, such as liquidity and contagion risks or macro-feedback effects, such as between the banking sector and the sovereign, which might amplify the impact of initial shocks, nor does it take into consideration spillovers across interconnected banking systems. Also, the exercise does not allow for behavioral responses by banks that may change their balance sheets. The model also assumes that bank balance sheets remain static during the simulation period, which does not allow banks to reach lower levels of capital by deleveraging (see Online Annex 4.1).

⁷The COVID-19 crisis has had a heterogeneous impact across sectors beyond nonfinancial corporations and households. For instance, the transportation and entertainment industries have suffered disproportionately from the social distancing measures implemented to mitigate the spread of the disease. For this reason, it would be desirable to incorporate further sectoral disaggregation in the analysis, but more granular decompositions of banks loan portfolios are typically available only for a small subset of banks.

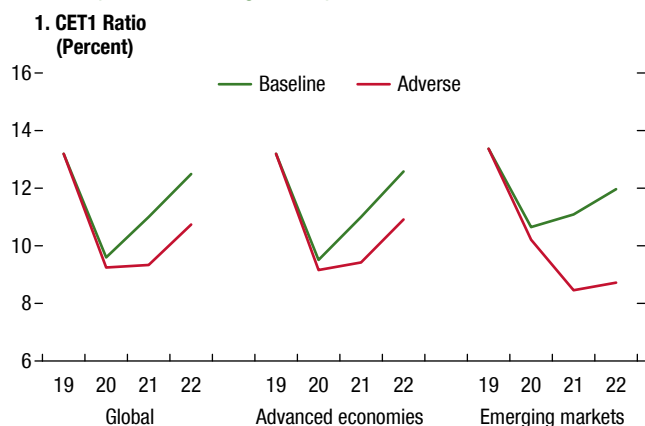
Consequences of COVID-19 for Bank Capital before Bank-Specific Mitigation

The consequences of each scenario for banking systems' future capital ratios are first simulated without adjusting for how the bank-specific mitigation policies discussed earlier alter the recognition of provisions, calculation of risk-weighted assets, or flexibility in using existing capital buffers.

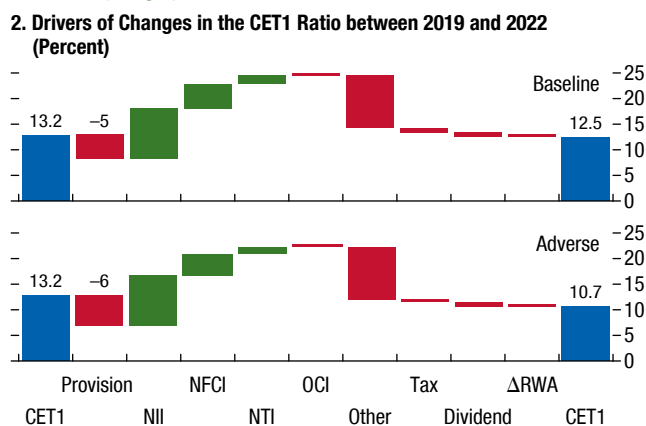
The results of the stress test show a significant decline in CET1 of the global banking system, reaching minimum levels of 9.6 percent in the baseline scenario and 9.3 percent in the adverse scenario—a drop of 3.6 percentage points and 3.9 percentage points, respectively, below the CET1 level in 2019. The trajectory of aggregate CET1 recovery also varies importantly across scenarios. In the baseline scenario, CET1 steadily recovers after reaching a trough in 2020, but is still 0.7 percentage points below its initial level at the end of the simulation in 2022. In contrast, the capital position decline is much more persistent in the adverse scenario, with CET1 levels remaining 2.4 percentage points below their initial levels by 2022 (Figure 4.5, panel 1).

Figure 4.5. Bank Solvency under COVID-19 without Policy Mitigation

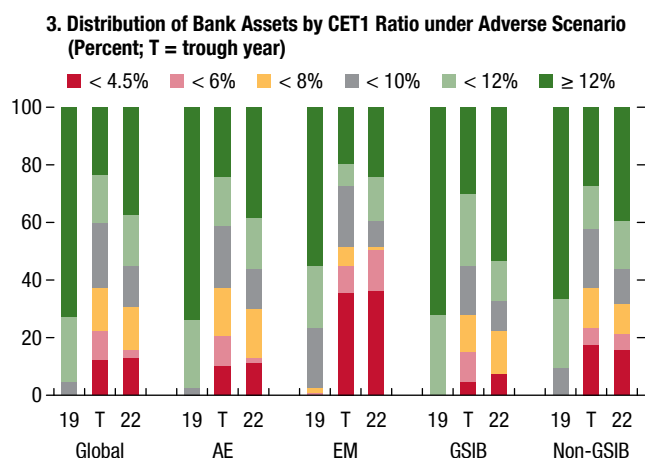
Banks' capital ratios fall significantly ...



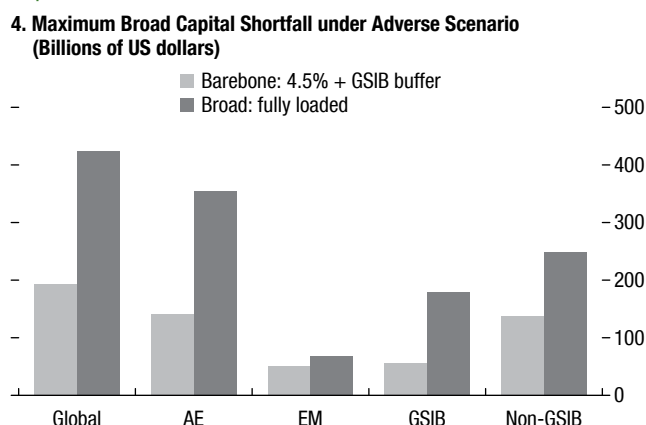
... driven by large provision costs.



Near fifteen percent of the global banking system will fall below 4.5% CET1 ratio.



The maximum capital shortfall against a broad statutory capital requirement could reach over \$400 billion.



Sources: Haver Analytics; SNL Financial; and IMF staff estimates.

Note: In panel 2, green and red bars denote increases and decreases in capital, respectively. AE = advanced economies, which comprise euro area, low-rate AEs, North Atlantic, and other AEs; CET1 = common equity Tier 1; EM = emerging markets; GSIB = global systemically important bank; NFI = net fee and commission income; NII = net interest income; NTI = net trading income; OCI = other comprehensive income; Other = several financial accounts, including operating expenses and non-operating items; RWA = risk-weighted assets.

The decline in the CET1 ratio over the simulation horizon stems mainly from an increase in loan loss provisions (Figure 4.5, panel 2). In the baseline scenario, higher loan loss provision expenses contribute to a 5 percentage point decline in CET1, whereas in the adverse scenario their contribution is 6 percentage points. This is directly related to the different trajectories of economic activity in the two scenarios, where the rebound projected in the baseline scenario for 2021 results in lower provisioning expenses. In contrast, the increase in risk-weighted assets plays only a minor role in driving the changes in CET1.

The sizes of the aggregate decline and the contribution of different components vary across regions. The maximum decline in CET1 in the baseline scenario is much larger in advanced economies (Figure 4.5, panel 1). The situation reverses, however, in the adverse scenario, where advanced economies see a maximum decline in CET1 of about 4.0 percentage points, compared with 4.9 percentage points for emerging markets. This difference is a result mainly of higher provision costs in emerging markets due to the relative economic underperformance of this

group of countries in the adverse scenario and the varying sensitivity of banks in these economies to macro-financial conditions.

The trajectory of aggregate capital ratios masks significant heterogeneity across banks. Even at their trough, and in the adverse scenario, more than half of the banks in the sample (by assets) have CET1 ratios above 10 percent—much higher than the minimum requirement of 4.5 percent. But banks accounting for 13 percent of assets in the sample fall below 4.5 percent in the adverse scenario, with an additional 3 percent of assets below 6 percent (Figure 4.5, panel 3). The weak tail of banks—defined as those with CET1 ratio below 4.5 percent plus their GSIB buffer—amounts to 14 percent by assets. In the baseline scenario, the weak tail is 5 percent.

In the adverse scenario, there is also heterogeneity across regions and between global systemically important banks and other banks. Global systemically important banks fare better than the average bank, in part because of their stronger initial capital ratios resulting from their mandatory systemic buffers. However, 8 percent of these banks' assets end the simulation period with capital ratios below 4.5 percent. Among non-global systemically important banks, 16 percent of bank assets fail to maintain a 4.5 percent CET1 ratio. Banks from emerging markets are the most severely affected, with almost 40 percent of total banking assets ending the simulation period with CET1 ratios below 4.5 percent. Banks from advanced economies fare better, although there is still a 12 percent of banks' assets below 4.5 percent by 2022.

Across regions and types of banks, the main difference between banks that fail to meet regulatory minimums and the rest of banks is the initial level of CET1. Banks that fall below 4.5 percent CET1 ratio plus GSIB buffer during the simulation period are mainly distinguished by their lower initial capital levels—about 0.8 percentage point below those that maintain their ratios above regulatory minimum levels. Also, banks with a high propensity to fall below minimum capital standards generate meaningfully lower returns than peers that maintain adequate capital throughout adverse conditions.

The importance of the weak tail of banks can also be assessed by estimating the capital shortfall, which is the difference between simulated CET1 ratios and those set by regulation. The shortfall is measured

against two benchmarks: the regulatory minimum for CET1—corresponding to a ratio of 4.5 percent plus the bank-specific capital surcharge for each global systemically important bank—and a broad regulatory threshold that also includes the current statutory levels of the capital conservation buffer and the countercyclical buffer in place as of June 2020.⁸ The first threshold defines a “barebones capital shortfall” with respect to a level of capital at which supervisory action would take place. The second threshold defines a “broad capital shortfall” relative to a capital ratio that includes the statutory buffers currently in effect.⁹ Banks facing a shortfall relative to this broad statutory threshold have the capital space to provide credit by using remaining statutory buffers as envisioned by the international regulatory framework, particularly where regulators have issued guidance announcements making those buffers available. However, they may feel less willing to expand lending activity for precautionary reasons or because of market pressure.

The two measures of capital shortfall in the adverse scenario show important variation across groups of banks (Figure 4.5, panel 4). At the global level, the barebones capital shortfall is about \$200 billion, and the broad capital shortfall reaches about \$420 billion (0.6 percent of sample banking assets). In both cases, global systemically important banks capture an important part of the shortfall, which is largely explained by the size of these institutions. The differences across regions are driven by differences in the size of their banking systems, with the level of capital shortfalls being much larger for advanced economies. When considering the broad measure, the global shortfall represents 0.8 percent of the GDP of countries where at least one bank has a capital shortfall. Across those countries, the average broad shortfall is 1.1 percent of GDP.

⁸For large US banks this includes the stressed capital ratio levels recently defined by the Federal Reserve instead of the countercyclical capital buffer and the capital conservation buffer. While many jurisdictions have recently released the countercyclical capital buffer, the buffer is above zero in a few. The calculation does not include the effect of “guidance” statements regarding banks' ability to use remaining statutory buffers.

⁹The calculation assumes that countercyclical capital buffers will remain at current levels—0 percent in almost all countries—and does not assume that this buffer will revert to a pre-pandemic or “normalized” level that is difficult to determine a priori.

Effect of Bank-Specific Policies on Capital Ratios

As discussed, authorities have implemented policies aimed at giving banks flexibility to maintain the flow of credit to the real economy. These policies, which include government loan guarantees and capital adequacy policies, affect the need to set aside provisions and the way in which capital ratios are computed and should therefore also improve measured bank capital ratios over the next three years.

The mitigating impact of some of these policies can be quantified in the stress testing exercise as follows:

- Government guarantees:** The impact of government guarantees on banks' provisions is captured by their impact on banks' expected losses. These losses are the product of banks' exposure to firms, the probability of default of those firms, and the loss experienced by banks when firms default. Government guarantees can be understood as reducing the latter term—known as the “loss given default”—because, under these conditions, the guarantee would be executed. Because of lack of data on the extent to which banks originate guaranteed loans, all banks in a country are assumed to benefit equally from the guarantee in a proportion equal to the ratio of government guarantees to total corporate loans. Because announced guarantee programs apply mostly to new loans, this assumption likely overestimates their initial impact. It is also assumed that guarantees are used to the full extent of announced amounts (full uptake).¹⁰ In the model, a lower uptake of government guarantees would lead to a proportional increase in provision expenses and therefore a proportionally lower impact of the policy on loan loss provision expenses.
- Capital adequacy policies:** The three categories of capital adequacy policies are quantified from the estimated impact of each announced policy on each bank. For example, the effect of canceling dividends is quantified from stress test model forecasts. The release of capital buffers is estimated by multiplying the percentage reduction by forecast risk-weighted assets. Changes to the calculation of risk-weighted assets similarly apply to the announced change to the relevant exposure class. In a very few instances, bank-specific policies are

applied on a bank-specific basis.¹¹ These increments are integrated into each bank's balance sheet positions at the end of each period.

In quantifying the impact of these policies, it is assumed that they are maintained over the three-year horizon of the scenario, unless an explicit expiration date was mentioned when the policy was announced. Although this assumption avoids speculating about the timing of withdrawal of some of these policies, it may be too benign, especially in the baseline scenario, in which authorities might decide to withdraw them as the economy recovers during the latter part of the simulation window.

Bank-specific mitigation policies improve average capital ratios across countries and scenarios. In the adverse scenario, the CET1 ratio for advanced economies is about 110 basis points higher at the end of the simulation when both government loan guarantees and capital adequacy policies are considered. In the simulations, the improvement in capital ratios is a result largely of the decline in provision expenses because of government loan guarantees; capital adequacy policies explain about a third of the overall improvement in CET1 at the end of the simulation period in advanced economies (Figure 4.6, panels 1 and 2). In the sample of emerging market economies, capital adequacy policies do not play a meaningful role, as these policies are largely absent in this sample. Given the estimated impact of loan guarantees, the final uptake of these policies—the extent to which the announced guarantee programs are used—could be an important driver of the final solvency position of the banking system. As discussed, an ultimate uptake of half the announced amount would reduce the mitigating effect of the policy roughly by half.

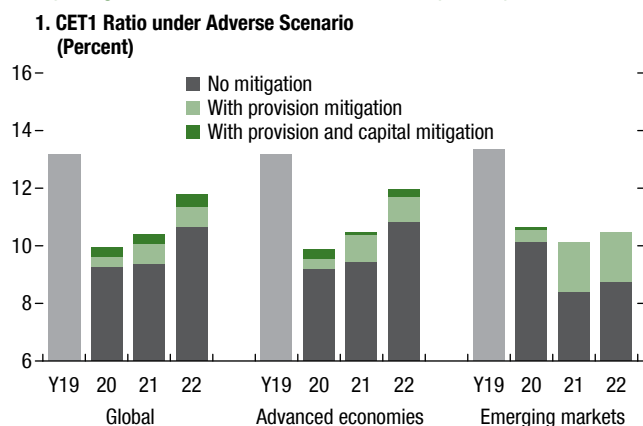
Government loan guarantees and capital mitigation policies reduce the share of bank assets with CET1 ratios below 4.5 percent in the adverse scenario from 13 percent without mitigation policies to 8 percent when those policies are in place (Figure 4.6, panel 3, compared with Figure 4.5, panel 3). Among global systemically important banks, these policies reduce the share of assets with CET1 below 4.5 percent from 8 percent to 3 percent. This decline is also important for non-global systemically important banks, going

¹⁰Many of these programs were announced only a few months ago, so the extent to which the guarantees will be used by banks to originate loans is still unclear.

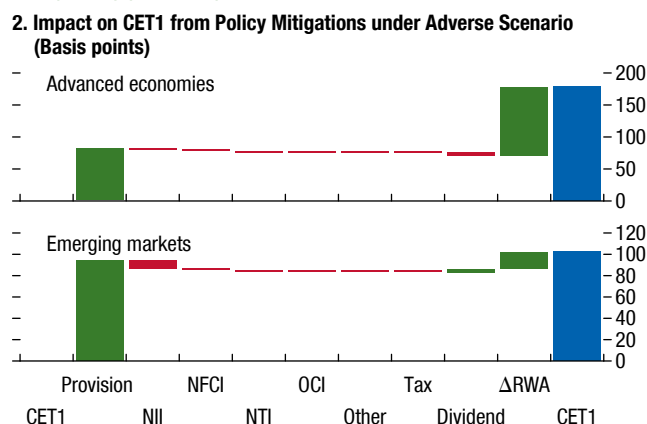
¹¹Online Annex 4.1 describes the estimation of policy mitigation effects in greater detail.

Figure 4.6. Bank Solvency under COVID-19 with Policy Mitigation

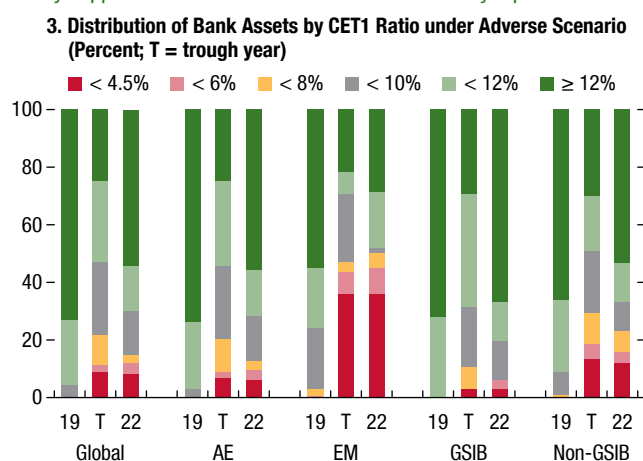
Policy mitigations would cushion some of the capital depletion ...



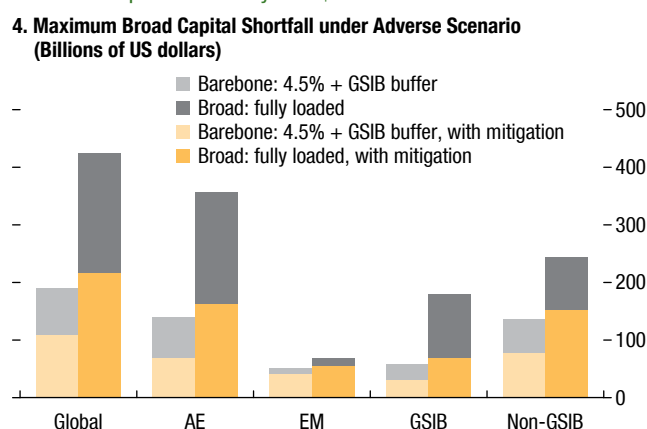
... especially provision policies.



Policy support would reduce the weak tail of banks by 5 percent ...



... and the capital shortfall by over \$200 billion.



Source: Haver Analytics.

Note: Provision mitigation policies include guarantees only. Estimation of the impact of capital mitigation is explained in Online Annex 4.1. AE = advanced economies; CET1 = common equity Tier 1; EM = emerging markets; GSIB = global systemically important bank; NFI = net fee and commission income; NII = net interest income; NTI = net trading income; OCI = other comprehensive income; Other = several financial accounts, including trading and investment income, operating expenses, and non-operating items; RWA = risk-weighted assets.

from 16 percent to 12 percent. In advanced economies, the policies analyzed shrink this segment of banks from 12 percent to 6 percent, and in emerging markets, the consideration of these policies in the simulation has only a small effect on the troubled tail of banks. Overall, the weak tail of banks, whose CET1 ratio fall below 4.5 percent plus GSIB buffers, declines from 14 percent to 8.3 percent of bank assets.

The mitigating role of bank-specific policies also maps into lower barebones and broad capital shortfalls (Figure 4.6, panel 4), with an especially remarkable decline for global systemically important banks. Across banks, the broad capital shortfall is about \$220 billion, half of which corresponds to the barebones shortfall.

In economies where banks with shortfalls are headquartered, the broad shortfall represents about 0.4 percent of their combined GDP, and, across countries, the average shortfall is about 0.7 percent of GDP. In terms of the initial CET1 ratios of those banks that experience a shortfall during the simulation, in the adverse scenario the global shortfall reaches 6.5 percent and the average is 7.7 percent. All in all, the bank-specific policies quantified in this chapter mitigate the impact of the adverse scenario on bank capital ratios, but the impact is still sizable, and a share of global systemically important bank assets would still be part of the weak tail of banks, even when maximizing the impact of these policies on capital ratios. The capital shortfall

relative to a minimum capital standard that treats all guidance statements as reducing capital buffers is lower—about \$110 billion, or about 0.2 percent of global GDP. However, reduction of capital levels to the extent of these informal capital releases would likely be unsustainable.

Some policies that are more challenging to quantify would also lead to an improvement in bank capital ratios. Most important, several countries have provided guidance on loan classification, provisioning, and disclosure, and have revised the automatic reclassification for restructured loans. Others have gone further and changed the criteria for the reclassification of loans or frozen those classifications. The effects of these policies on loan loss provisions, in principle, are captured through GDP effects of continued credit flow. However, the changes in reclassification criteria for credit also spare it from increased risk-asset weighting. Because the quantity of loans that would have been reclassified in the absence of these measures cannot be quantified in advance and is generally not reported, the stress test model cannot capture the risk-weighted asset savings associated with these policies.

Overall, while the bank-specific policies quantified in this section help improve banks' capital ratios over the simulation period, the main contribution of the broad policy packages implemented by authorities likely comes from the support they provide to the macroeconomy. This is because the increase in loan loss provision expenses in response to the macroeconomic scenario is the main driver of the simulated decline in capital ratios, even after accounting for the bank-specific mitigation policies. A more adverse macroeconomic scenario, as would be the case in the absence of the broad support measures implemented, would have likely resulted in significantly lower capital ratios. Although counterfactual forecasts for the trajectory of the global economy in the absence of broad support policies are not available, the important difference in simulated capital ratios between the baseline and adverse scenarios suggests how broad macroeconomic support has likely helped banks' capital adequacy.

The policies discussed in this section support the solvency of banks, but they also pose intertemporal trade-offs that could become relevant in the future. Delaying provision expenses because of temporary liquidity shocks to borrowers can help prevent borrowers' liquidity challenges from immediately turning into

insolvency, thus reducing lending procyclicality and supporting banks' profitability and solvency. Similarly, the use of capital buffers creates lending space to support the real economy. Hence, these policies can help bridge the impact of the COVID-19 shock and reduce the chances that a transitory shock will have permanent consequences for financial stability and the global economy. However, if the pandemic and the containment measures last longer than initially expected, ultimately affecting the solvency of borrowers despite the mitigating role of these policies, banks will need larger future provisions and will have lower buffers against future shocks, including from a meaningful second wave of the virus. Maintenance of generous guarantee programs over an extended period of time could also jeopardize fiscal solvency if defaults eventually materialize and could lead to further bank losses related to their sovereign exposures. Furthermore, given the unusual degree of uncertainty around the depth and duration of the COVID-19 recession, a severely adverse scenario with stronger consequences for the banking sector cannot be ruled out.

Summary and Policy Discussion

COVID-19 has had important consequences for the global banking sector and will pose further challenges. Should a quick rebound in economic activity not materialize, corporate and household solvency problems will likely deteriorate further and collateral values may decline, resulting in greater credit losses and posing challenges for banks globally. These challenges could interact with other, more structural challenges, such as the low profitability observed in some regions in an environment of persistently low interest rates and term spreads, a scenario that has become increasingly likely in the wake of the pandemic.

The simulations presented in this chapter show that, on aggregate, the banking systems analyzed would remain solvent in coming years, although there is heterogeneity across and within regions. The aggregate solvency is partly due to the buffers accumulated as a result of the regulatory reforms introduced after the global financial crisis. In fact, banks analyzed in this chapter had a median CET1 ratio of 11.9 in 2007, compared with 16.2 percent in 2019. This improvement in the initial solvency conditions carries over to the minimum CET1 ratios achieved in response to the COVID-19 crisis.

Nonetheless, while aggregate capital ratios remain above regulatory minimums, at a global level and within regions there is a weak tail of banks that could see their solvency challenged. The size of this tail depends largely on the depth and persistence of the crisis, becoming sizable across almost all regions and groups of banks in an adverse scenario with a persistent decline in economic activity. Some global systemically important banks are also part of this weak tail, which could have broader repercussions for financial stability in an adverse scenario.

Policies adopted by governments, central banks, and bank regulators have helped ease banks' challenges amid the COVID-19 crisis. Direct support to borrowers (both firms and households)—and liquidity provision to key markets, banks, and other financial intermediaries—have had a marked effect on bank capital ratios through the resultant improvement in macroeconomic conditions. On top of this support, government loan guarantees and capital adequacy policies have provided a second line of defense that has eased and will likely continue to ease pressures, as shown in the quantitative forward-looking analysis of this chapter.

The majority of regulatory responses taken so far are consistent with the core standards implemented after the global financial crisis and with internationally agreed guiding principles. National authorities have taken capital and liquidity measures using the flexibility embedded in the prudential framework to help support lending to the real economy. Authorities have clarified the usability of capital and liquidity buffers, encouraged banks to use these buffers to absorb losses and sustain credit, and restricted capital distributions to preserve capital. However, in several cases, regulatory easing was achieved by lowering minimum requirements below Basel framework levels. Such deviations risk undermining the credibility of the internationally agreed standards, could contribute to market segmentation, and may increase the risks to bank safety and soundness. Standard setting bodies (like the Basel Committee) and national authorities have also encouraged banks to work constructively and prudently with borrowers and have issued guidance on how to treat restructured loans and public and private moratoria for prudential asset classification and provision. Nonetheless, some measures that run contrary to these recommendations have been observed, such as the freezing of asset classification status and provisioning requirements. These measures

affect the reliability of financial statements and capital ratios, and risk undermining the confidence in the banking system. Moreover, they may lead to lending to insolvent borrowers while not recognizing loan losses, which may not only jeopardize the financial soundness of banks but also the recovery as credit is diverted from productive uses.

Looking ahead, the benefits of these policies in easing banks' capital constraints and maintaining the flow of credit to the real economy should be carefully balanced against their potential medium-term risks to financial stability. Although using the flexibility embedded in the prudential framework in accordance with recommendations made by standard setters could help reduce procyclicality and negative feedback loops in response to temporary liquidity shocks, relaxing loan classification and provisioning rules undermines transparency and data reliability as financial statements and prudential ratios may no longer adequately reflect the true strength of banks. A decline in the quality of information could lead to a loss of confidence in the banking system, with adverse implications for stability. It is thus important that some of these measures be carefully phased out as the economy recovers, especially in the baseline scenario. It is also essential that, in any scenario, banks promptly recognize losses for borrowers that become insolvent as evidence of impairment becomes available. More broadly, phasing out government support, including government guarantees, too quickly would lead to lasting damage to the economy, but phasing it out too late could risk damaging public finances or unduly keeping insolvent borrowers afloat.

Despite the mitigating effect of government policies, in the adverse scenario simulated in this chapter, there is a weak tail of banks that fail (or nearly fail) to meet minimum regulatory requirements. This finding highlights the usefulness of forward-looking stress tests to assess the health of banking systems and to guide prospective policy responses to the current crisis. When conducted by regulators or supervisors, this type of assessment would rely on more granular data than used in this global exercise, and thus would provide additional richness.

Once the assessment is done, however, what should authorities do about banks that could become troubled? The answer to this question should take into consideration country-specific circumstances. Acting now to strengthen the financial safety net, including deposit guarantee programs, resolution regimes, and

central bank liquidity facilities, is key. Capital preservation measures will help, including temporarily limiting the distribution of dividends, as some countries have already done. For countries that allowed banks to draw down capital buffers, the stress test results will help guide the timing and pace at which these exceptional measures can be unwound. Supervisors could use this information to reassess forward-looking capital plans and take measures aimed at preserving and supporting

plans to rebuild capital gradually for the most vulnerable entities to ensure confidence, avoid procyclicality, and preserve financial stability.¹² Preparing contingency plans that detail how the authorities will respond to possible future pressures is critical to support effective policy responses if the adverse scenario materializes.

¹²For a broader discussion of the banking regulatory and supervisory actions to deal with COVID-19, see IMF (2020a).

Box 4.1. The Role of Corporate and Consumer Risk in the Evolution of Banks' Loan Loss Provisions

The COVID-19 crisis is likely to impact the credit risk of both firms and households. Households and firms may have different effects on bank provisioning and capital, according to the severity of the shock and the composition of the lending portfolios. Disentangling the impact of these two sources of credit risk is important to evaluate the policy response to the crisis as both the magnitude and type of support measures differ across these two sectors.

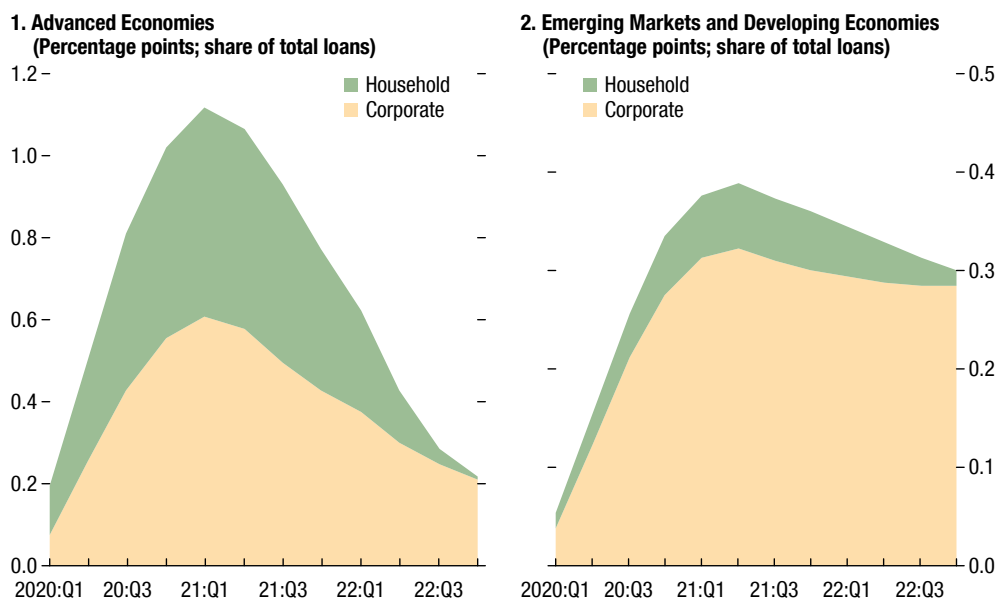
A satellite model of loan loss provisions that considers the mix of bank loans across corporate (firms) and consumer (households) loans was developed to complement the core global stress test model. This model relies on the local projection method to decompose bank loan loss provisions into a component related to household risk (captured by the unemployment rate or changes in house prices) and another related to corporate loans risk (captured by a measure of the probability of default of the corporate sector). It provides a starting point for a more nuanced discussion of the implications of bank business models for future financial performance and for tackling the impact of mitigation policies that target specific sectors (see Online Annex 4.1 for additional details).

This box has been prepared by Nicola Pierri and Tomohiro Tsuruga.

A forward-looking simulation of the evolution of loan loss provisions (as a share of total loans) in the baseline scenario of the *World Economic Outlook* and the share of them explained by corporate and consumer risk shows that the crisis generates a strong but gradual response that peaks during the first half of 2021 (Figure 4.1.1). At its peak, the increase in the loan loss provision ratio is about 1 percentage point in advanced economies and about 0.4 percentage point in emerging market economies.

Most of the increase is due to heightened corporate risk, although households play a significant role in advanced economies because of their larger share on advanced economy banks' portfolios. These results show that the level and composition of total provisions depends on the mix of bank loan portfolios and on the relative size of the shocks to firms and households. The analysis highlights the importance of considering the loan mix for the assessment of the impact of the crisis and the analysis of policy responses. In the chapter, these insights are carried to the global stress testing model to assess the impact of policies that affect a specific sector, such as the government loan guarantees that tend to be focused on corporate loans. If data were available, this type of analysis could also be used to further disaggregate the impact of the crisis on different productive sectors.

Figure 4.1.1. Additional Quarterly Provisioning
(As share of loans)



Sources: Fitch Connect; S&P Global Market Intelligence; and IMF staff estimates.

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FIRMS' ENVIRONMENTAL PERFORMANCE AND THE COVID-19 CRISIS

Chapter 5 at a Glance

- Tighter financial constraints and weaker economic conditions can act as a drag on firms' environmental performance.
- The coronavirus disease (COVID-19) crisis could substantially reduce firms' green investments, reversing gains in their environmental performance made in past years.
- Climate policies and green investment packages are therefore warranted to support a green recovery and the transition to a low-carbon economy.
- Policies aimed at fostering sustainable finance such as better disclosure standards and product standardization could further help mobilize green investments and alleviate firms' financial constraints.

The shutdown in economic activity as a result of the COVID-19 crisis has resulted in a temporary decline in global carbon emissions, but the long-term impact of the pandemic on the transition to a low-carbon economy remains uncertain. While the economic fallout from the crisis may constrain firms' ability to invest in green projects, thus slowing down the transition, the COVID-19 crisis could also induce a structural shift in consumer and investor preferences toward environmentally friendly products, providing an opportunity to introduce mitigation policies that help diversify away from fossil fuel production. Looking back at previous episodes of financial and economic stress, this chapter finds that tighter financial constraints and adverse economic conditions are generally detrimental to firms' environmental performance, reducing green investments, and setting back their progress by several years. This suggests that the COVID-19 crisis could potentially slow down the transition to a low-carbon economy. In light of the urgent need to reduce global greenhouse gas emissions, it also underlines the importance of climate policies and green investment packages to support a green recovery and the energy transition. Policies aimed at fostering sustainable finance, such as improved transparency and standardization, could further help mobilize green investments and alleviate firms' financial constraints.

The authors of this chapter are Zhi Ken Gan, Pierpaolo Grippa, Pierre Guérin, Oksana Khadarina, Samuel Mann, Felix Suntheim (team lead), and Yizhi Xu, with contributions from Alan Feng, Germán Villegas Bauer, and Julia Xueliang Wang, under the guidance of Fabio Natalucci, Mahvash Qureshi, and Jérôme Vandenbussche. Harrison Hong served as an expert advisor.

Introduction

The shutdown in economic activity as a result of the COVID-19 crisis resulted in a sharp decline in global carbon emissions (Figure 5.1, panel 1).¹ Daily emissions in early April 2020 fell by about 17 percent compared with 2019 levels, though most of this decline has reversed since then as economic activity has picked up across countries. Such a reversal in emissions is in line with what turned out to be only a temporary decline in the price of carbon emission allowances in March 2020 (Figure 5.1, panel 2). Overall, recent studies forecast a temporary reduction in emissions of about 4 to 7 percent in 2020, far from the large and sustained decrease in emissions required under the Paris Agreement to limit the increase in global temperature to well below 2°C (Le Quéré and others 2020).²

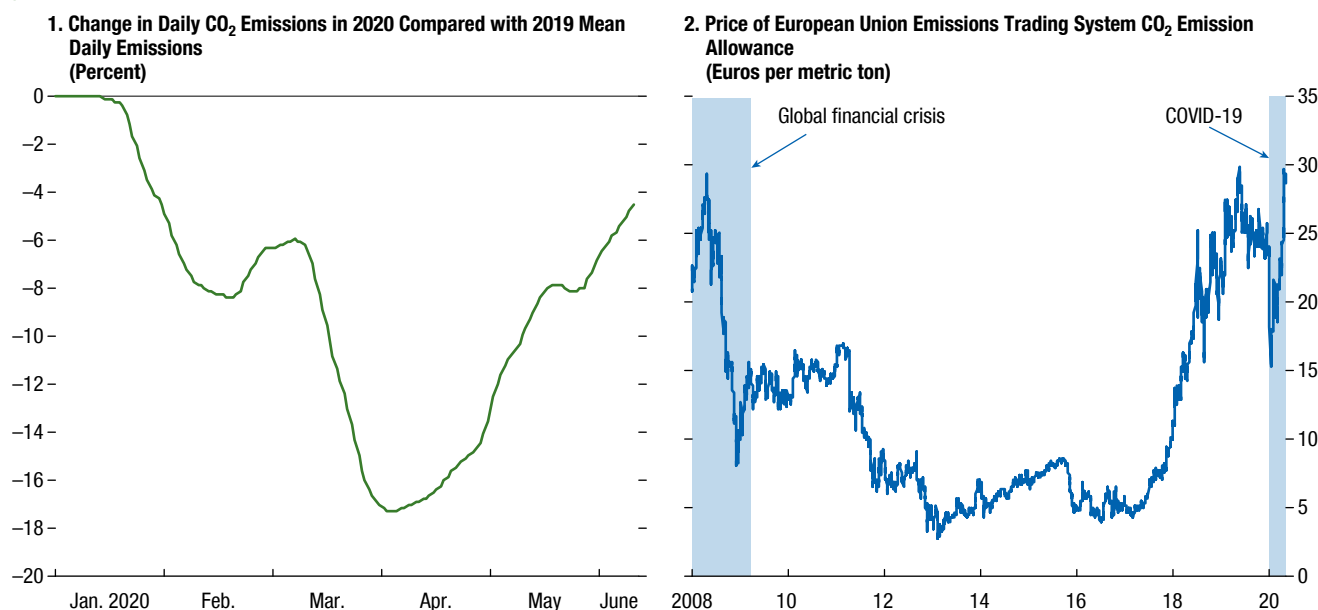
There is also a possibility that the transition to a low-carbon economy could be delayed should the economic scarring from the pandemic crisis run deep, inducing economic agents and policymakers to sideline or postpone environmental objectives. Heightened economic uncertainty, a sharp drop in energy prices, and corporate balance sheet vulnerabilities may result in a reduction in investments and research in long-horizon, capital-intensive green

¹In the short term, there is an almost one-to-one relationship between economic growth and emissions (Hale and Leduc 2020).

²The UN Environment Programme (2019) estimates that emissions need to decline by 2.7 percent annually in order to reach the 2°C goal by 2030.

Figure 5.1. The Energy Transition during the COVID-19 Crisis

Carbon emissions declined rapidly as COVID-19 became a global pandemic ...



Sources: Global Carbon Project; Refinitiv Datastream; and IMF staff calculations.

Note: Panel 1 shows the reduction in daily CO₂ emissions in 2020 compared with 2019 mean levels. Panel 2 shows the price of futures contracts on carbon emission allowances traded on the Intercontinental Exchange. The European Union Emissions Trading System was subject to several changes in regulation over the sample period that may have affected the price level.

projects. In addition, subsidies or economic rescue packages aimed at softening the impact of the crisis may slow the transition—for example, by supporting firms or activities not compatible with long-term climate mitigation goals.

At the same time, the current crisis could also present an opportunity to accelerate the transition to a low-carbon economy by inducing structural shifts in consumer and investor preferences toward environmentally friendly products in the event economic agents change their beliefs about the likelihood of other catastrophic events, such as those linked to climate change.³ In the corporate sector, for example, climate change has become an increasingly important topic since the onset of the pandemic, as is evident from firms' earnings calls transcripts (see Box 5.1). More generally, an increased awareness of the benefits of long-term disaster prevention could facilitate

³Survey evidence suggests that voters have become more worried about other global threats, such as climate change, after experiencing the COVID-19 pandemic (Geman 2020).

... but, unlike during the global financial crisis, the decline has been short-lived, with a rebound in emissions.

implementation of green policy measures such as carbon taxes.⁴

Against this backdrop, this chapter aims to address the following two key questions: (1) How has the COVID-19 crisis affected green financing so far? (2) What can be learned from past economic crises about the likely behavior of the corporate sector in the near and medium terms with respect to the greening of the economy?

The COVID-19 Crisis and Financing the Energy Transition

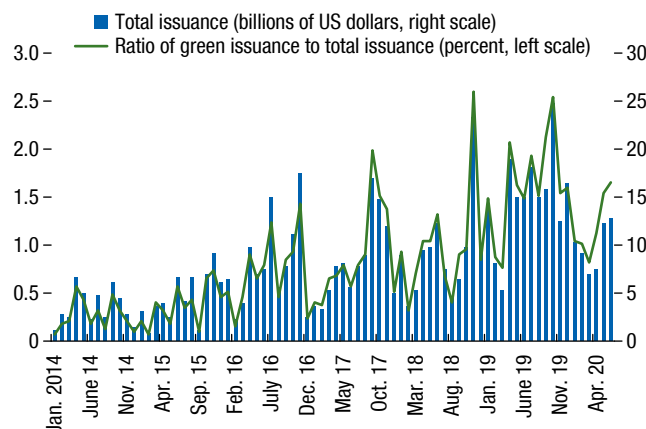
The COVID-19 crisis has not led to a sustained decline in green financing so far. Issuance of green corporate bonds, which has trended up over the past decade, declined in March 2020 in the midst of the financial market turmoil, but it has picked up since,

⁴Calls for implementing “green recovery” packages in the aftermath of the COVID-19 crisis have come from different quarters, including the private sector in some cases. For example, in June 2020 more than 100 global investors called for a green European Union recovery plan. The EU coronavirus recovery package earmarks about 37 percent of the funds for climate protection.

Figure 5.2. The COVID-19 Crisis and Green Investments

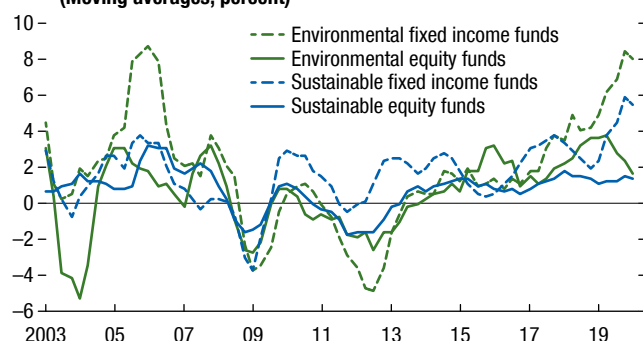
Green bond issuance dropped in the first quarter of 2020 before picking up again beginning in April 2020.

1. Green Corporate Bond to Total Corporate Bond Issuance and Total Green Corporate Bond Issuance, January 2014–June 2020



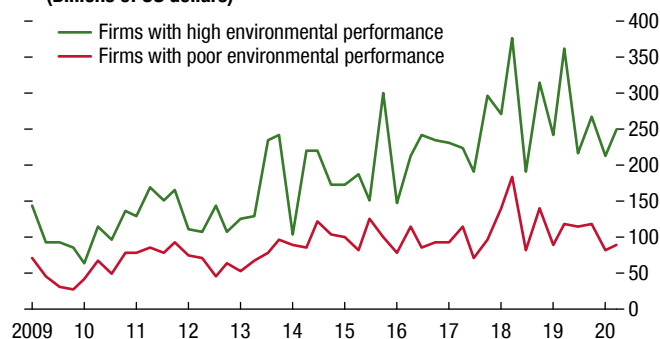
Flows into sustainable and environmental equity funds slowed in the first quarter of 2020 but remained positive.

3. Sustainable and Environmental Fund Flows as a Share of Fund Size, 2003:Q1–2020:Q1 (Moving averages; percent)



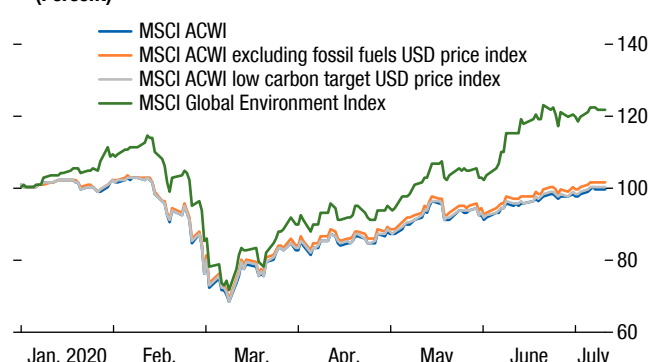
Bank lending has shifted to green firms over the past decade.

2. Total Amount of Syndicated Loans to Firms with Environmental Scores Higher than Median and Firms with Environmental Scores Lower than Median, 2009:Q1–2020:Q1 (Billions of US dollars)



Equity indices with a focus on environmental issues performed at least as well as the overall market.

4. Cumulative Returns of Green and Conventional Equity Market Indices (Percent)



Sources: Bloomberg Finance L.P.; Dealogic; Morningstar; Refinitiv Datastream; and IMF staff calculations.

Note: Panel 1 shows global green corporate bond issues. Panel 3 shows quarterly flows into sustainable or environmental fixed-income or equity funds. MSCI ACWI = Morgan Stanley Capital International All Country World Index.

with the share of green bonds in total corporate bond issuance returning to 2019 levels (Figure 5.2, panel 1). In the syndicated loan market, loans to firms with an above-median score in environmental performance have increased over the past decade compared with loans to firms with a below-median score.⁵ Lending to both

types of firms dropped slightly in the first quarter of 2020 (Figure 5.2, panel 2).

Investment funds with a focus on sustainable or environmental investments have continued to attract investors throughout the crisis, especially fixed-income funds, with only a small drop in aggregate inflows in

⁵Firm-level environmental, social, and governance data come with several caveats. First, the data cover only publicly listed firms, so the results do not necessarily carry over to the entire economy, which includes unlisted small- and medium-sized enterprises. Second, there is a lack of standardization and transparency across data providers, so environmental scores from different providers

may capture different features of environmental performance. Third, as some scores are self-reported by firms, accuracy may vary across the sample. See Online Annex 5.1 for a description of the variables used in this chapter. All annexes are available at www.imf.org/en/Publications/GFSR.

some asset classes (Figure 5.2, panel 3).⁶ A possible driver of the good performance of sustainable and environmental funds may have been the relatively high returns that green investments have experienced during this crisis in general (Figure 5.2, panel 4).

Overall, the impact of the COVID-19 crisis on the financing of green investments so far seems to have been modest and short-lived. However, given the severity and possible persistence of the shock—in terms of output decline, the extent of potential scarring, and the heightened economic uncertainty—there could be significant strains on corporate balance sheets. It is therefore challenging to forecast whether such trends will continue and ultimately what the overall impact of the crisis will be on firms' environmental performance and on their ability to contribute to global climate change mitigation efforts. In view of this concern, the analysis in the next section examines firms' environmental performance during previous episodes of financial and economic stress to draw possible implications for the current episode.

Lessons from Past Economic Crises for Firms' Environmental Performance during the COVID-19 Crisis

Existing research focusing on the United States suggests that the environmental, social, and governance (ESG) performance of financially constrained firms—that is, firms that face difficulties in raising external capital—is generally weaker relative to unconstrained firms (Hong, Kubik, and Scheinkman 2012).⁷ Therefore, a deterioration in financial or economic conditions that results in a tightening of firms' financial

constraints is likely to reduce their ability to invest in green projects and cut greenhouse gas emissions.

Extending this analysis to a global sample and specifically analyzing firms' environmental performance shows that tighter financial constraints are indeed associated with worse environmental performance (Figure 5.3, panel 1). Proxying firms' financial constraints by firm size (logarithm of total assets), rating status, interest coverage ratio, ability to pay dividends, and the commonly used Kaplan-Zingales index, the environmental performance of financially constrained firms is in each case significantly weaker than that of unconstrained firms. Specifically, environmental performance falls by 10 points when firm size drops from the median to the 25th percentile of the firm size distribution. When a firm does not pay dividends or when it is not rated, its environmental score is 4 points and 3 points lower, respectively, than the score of dividend-paying and rated firms. The environmental score is 1 point lower when an aggregate measure of financial constraints (the Kaplan-Zingales index) is above the median of the sample distribution. Similar results are obtained when considering firms' carbon intensity instead of their environmental performance.

A key channel through which financial constraints can affect firms' environmental performance is a decline in investments in green technologies. Constrained firms may postpone or reduce such investments if they do not directly contribute to revenue generation. Moreover, financially constrained firms may face difficulties in borrowing against future profits to invest in research and development, consequently postponing investments in intangibles that could potentially improve their environmental performance. Regression analyses support these hypotheses and suggest that financially constrained firms are less likely to make investments that reduce future environmental risks, such as treatment of emissions or installation of cleaner technologies (Figure 5.3, panel 2). For example, the probability that a firm will make an environmental investment falls by 6 percentage points when firm size drops from the median to the 25th percentile of the firm size distribution.

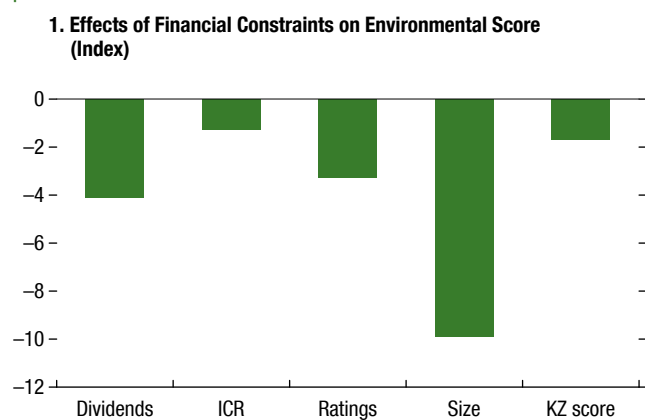
These results have important implications in the current COVID-19 context. An adverse macro-financial shock that increases uncertainty and amplifies firms' financial constraints is likely to affect firms' environmental performance and has the potential to significantly impede their ability to invest in

⁶Sustainable funds explicitly indicate all kinds of sustainability; impact; and environmental, social, and governance (ESG) strategies in their prospectus. Environmental funds invest in environmentally oriented industries. See the October 2019 *Global Financial Stability Report* for a discussion of sustainable finance and financial stability.

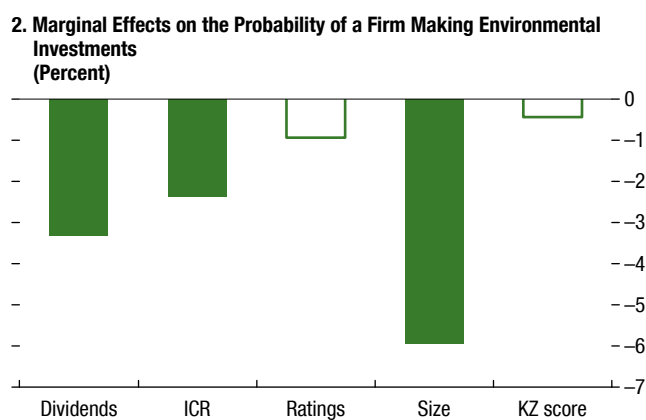
⁷Because financial constraints are not directly observable, different proxies are used in the literature (see Online Annex 5.2): firm size (large firms are expected to be less financially constrained than small firms), rating status (firms with a rating may have easier access to capital markets than those without), the interest coverage ratio (defined as earnings before interest and taxes divided by interest expenses, reflecting a firm's debt repayment capacity with higher values indicating less financially constrained firms), the ability to pay dividends, and the Kaplan-Zingales index (an aggregate measure of financial constraints).

Figure 5.3. Financial Constraints, Financial Stress, and Environmental Performance

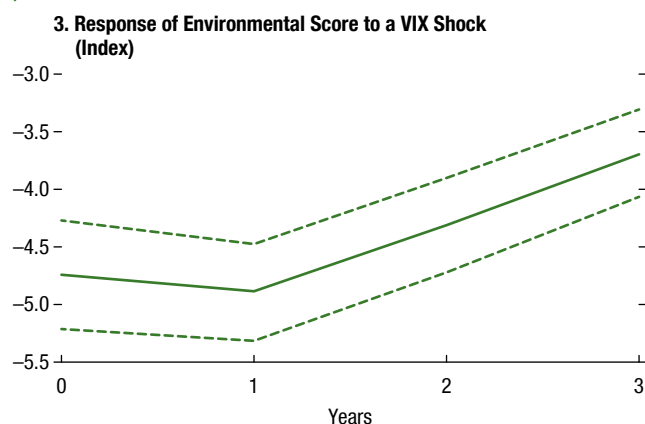
Financially constrained firms have weaker environmental performance ...



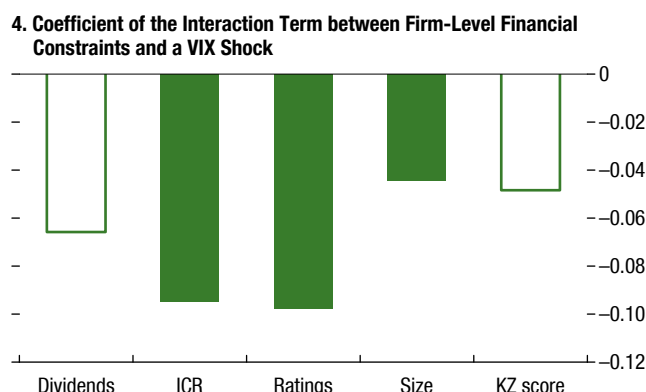
... and are less likely to make environmental investments.



Severe financial stress leads to poorer corporate environmental performance ...



... and the effects of financial stress are stronger for financially constrained firms.



Sources: Refinitiv Datastream; Standard & Poor's; and IMF staff calculations.

Note: "Dividends" refers to firms that do not pay dividends, "ICR" to firms with earnings below interest expenses, "Ratings" to firms that do not have a rating from Standard & Poor's, "Size" to the log of total assets (the sign of this variable is reversed so that higher values indicate smaller firms), and "KZ score" to firms above the median of the Kaplan-Zingales index score distribution (more financially constrained firms have higher KZ scores). Panel 1 shows regression estimates of environmental scores on financial constraints. Regressions include firm-level controls as well as industry, country, and time fixed effects. Firm-level controls are the log of total assets and earnings, except when using "Size" as a measure of financial constraint, when only earnings are used as a firm-level control. Panel 2 shows the marginal effects of a given financial constraint measure on the probability of a firm making an environmental investment. The probit models include the same control variables and fixed effects as in panel 1. In panel 3, $t = 0$ is the year of the shock. The Chicago Board Options Exchange Volatility Index (VIX) shock is the average value of the VIX over the calendar year. The solid line denotes the response to a 16.3 point increase in the VIX (corresponding to the difference in the average value of the VIX in 2020, using data up to July 31, 2020, relative to the average value in 2019). The dashed lines denote 90 percent confidence intervals. Responses are obtained with the local projection approach from firm-level panel regressions that include firm-level controls, country-specific output gaps, the price of oil, and country and industry fixed effects. Panel 4 shows interaction terms at a one-step horizon between the VIX shocks and the lagged firm-level financial constraint variables. The same control variables as in panel 3 are used. In panels 1, 2, and 4, solid bars indicate significance at the 10 percent level. ICR = interest coverage ratio.

green projects. To quantify the extent of the impact, two types of shocks are analyzed here: (1) a global financial stress shock (proxied by the Chicago Board Options Exchange Volatility Index [VIX]) and (2) a real economic activity shock capturing a sudden drop in domestic output.⁸

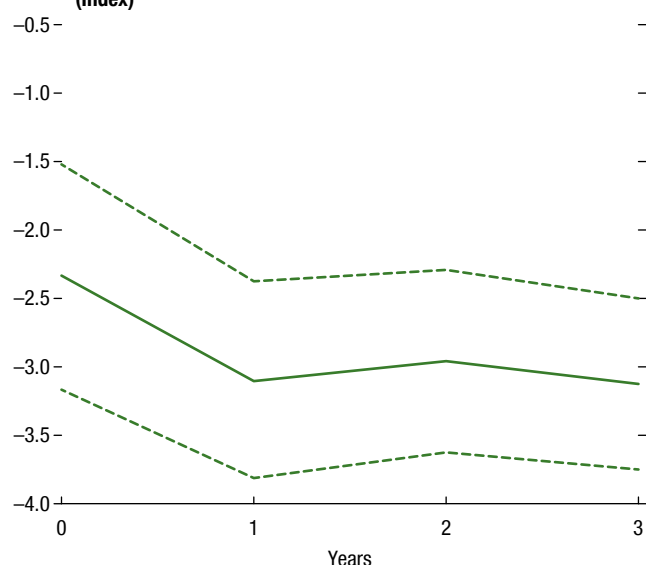
⁸See Online Annex 5.3.

The analysis shows that a sudden jump in the VIX, comparable to the average level that prevailed in the first half of 2020 during the COVID-19 pandemic, would lead to a persistent drop in firms' environmental performance by up to 5 points, with the pre-shock performance level not attained for at least three years after the shock (Figure 5.3, panel 3). Absent policy actions and behavioral changes, this would imply that

Figure 5.4. Economic Shocks and Environmental Performance

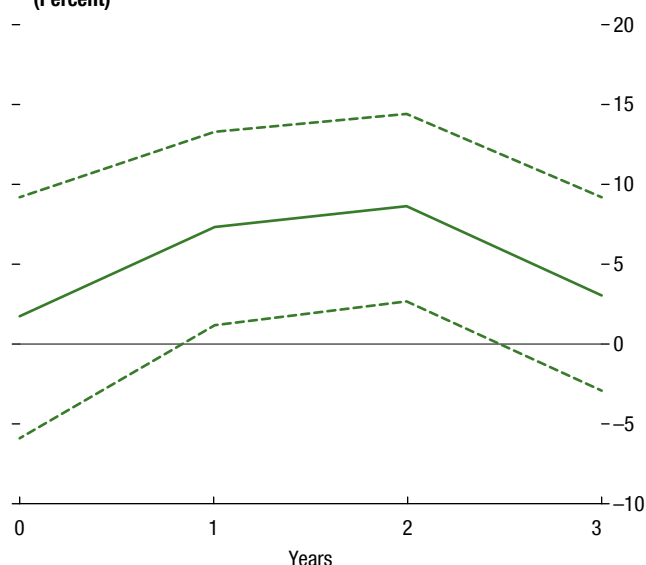
Contractionary economic shocks lead to lower corporate environmental performance ...

1. Response of Environmental Score (y-axis) over Time (x-axis) to a Fall in the Output Gap (Index)



... and carbon intensity deteriorates following contractionary economic shocks.

2. Response of the Logarithm of Total CO₂ Emissions Relative to Revenues (y-axis) over Time (x-axis) to a Fall in the Output Gap (Percent)



Sources: Refinitiv Datastream; and IMF staff calculations.

Note: In panels 1 and 2, the real economic activity shock is scaled as a 10 percentage point drop in the output gap. The regression includes firm-level controls (log of total assets, earnings, and a dividend dummy variable), the price of oil (log West Texas Intermediate), the Chicago Board Options Exchange Volatility Index, and country and sector fixed effects. Dashed lines represent 90 percent confidence interval.

average corporate environmental performance would return to the levels that were last observed in 2006. Moreover, the adverse effect of global financial shocks on environmental performance is magnified when firms are financially constrained (Figure 5.3, panel 4). For example, for firms with an interest coverage ratio below 1 or for unrated firms in 2019, the global financial stress shock observed thus far in 2020 is estimated to lower environmental performance by 2 additional points, compared to firms with an interest coverage ratio above 1 or rated firms.⁹

A large decline in the output gap (10 percentage points, about 50 percent larger than that observed in the Group of Seven [G7] economies during the global financial crisis), would lead to a 3 point

decline in firms' environmental performance in the medium term (Figure 5.4, panel 1).¹⁰ Similarly, firms' carbon intensity—captured by their total carbon emissions relative to revenue—could increase by up to 8.5 percent in the medium term after such a decline in the output gap (Figure 5.4, panel 2), even though the initial response of carbon intensity to economic shocks may be small because of the cyclical dynamics of carbon dioxide emissions observed during recessions (Figure 5.1, panel 1; Hale and Leduc 2020).

In addition to direct global financial and economic shocks, changes in oil prices could also impact corporate environmental performance by affecting

⁹These economic effects are calculated by multiplying the interaction term by a 16.3 point increase in the VIX (corresponding to the difference in the average value of the VIX in 2020, using data up to July 31, 2020, relative to the average value in 2019).

¹⁰Other more global measures of economic activity shocks such as the forecast error for the current-year global GDP growth relative to the *World Economic Outlook* projection, or the global economic activity shock from Baumeister and Hamilton (2019) also lead to a fall in corporate environmental performance in the medium term.

firms' incentives and their financial constraints. The onset of the COVID-19 crisis was accompanied by a steep decline in the international price of oil.¹¹ The effect of such a decline in oil prices on firms' environmental performance is, however, ambiguous. On the one hand, it may relax firms' financial constraints and reduce the incentives for businesses to improve their energy efficiency and shift away from fossil fuels, including by hindering the development of clean energy sources by making investments in new projects less profitable.¹² On the other hand, low oil prices could benefit the energy transition by hurting the profitability of the oil sector and leading to lower investments in the fossil fuel sector and a decline in production, thereby making it easier for clean energy firms to compete.

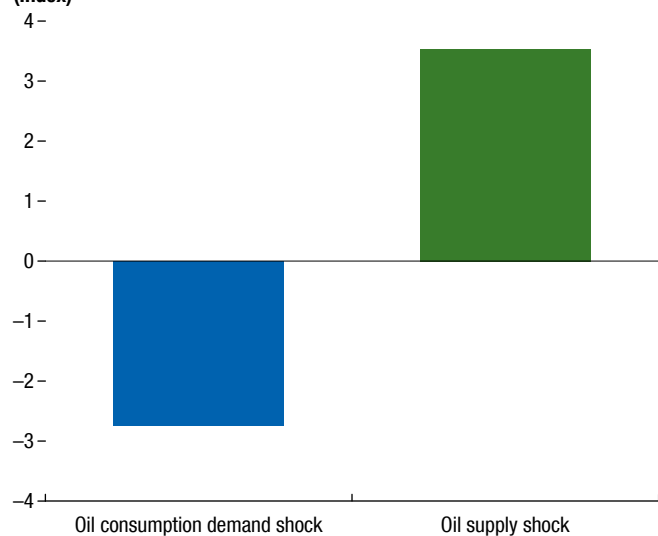
In principle, the effect of an oil price shock on environmental performance is likely to depend on the underlying source of the shock—that is, whether it is a demand- or supply-driven shock. A negative global demand shock associated with a decline in economic activity that reduces the demand for oil could be associated with lower corporate environmental performance as investments into cleaner energy sources are delayed because of already tight financial conditions for firms. Conversely, a drop in oil prices due to an oil supply shock could trigger an increase in global economic activity (Baumeister and Hamilton 2019), easing firms' financial constraints and allowing them to improve their environmental performance.

Econometric analysis suggests that the source of the oil price fluctuation is indeed key to understanding firms' environmental response to a shock. Historically, when oil prices have fallen due to demand-side factors, environmental corporate performance has been weaker. By contrast, when oil prices have declined due to an oil supply shock, environmental performance of firms has improved (Figure 5.5). To the extent that the COVID-19-induced oil price shock is largely a

Figure 5.5. Oil Market Shocks and Environmental Performance

Lower oil prices due to demand factors are associated with lower corporate environmental performance.

Response of Environmental Scores to Oil Market Shocks that Lower the Real Price of Oil across all Industries (Index)



Sources: Refinitiv Datastream; and IMF staff calculations.

Note: The oil market shocks are obtained from Baumeister and Hamilton (2019). All shocks are unit shocks that lead to a fall in the real price of oil. Responses at a two-year horizon are represented. Controls in the regression are the log of total assets, earnings, a dividend dummy variable, country-specific output gaps, the Chicago Board Options Exchange Volatility Index, and the price of oil (log West Texas Intermediate). The regressions include country and sector fixed effects. Solid bars indicate significance at the 10 percent level.

demand-driven shock, firms' environmental performance is thus likely to suffer.¹³

Overall, these results indicate that tighter financial constraints are associated with weaker corporate environmental performance. Adverse global financial and output shocks that increase uncertainty and amplify firms' financial constraints weigh significantly on their environmental performance. Furthermore, a reduction in oil prices against the backdrop of a decline in global economic activity is unlikely in itself to lift corporate environmental performance. Thus, absent strong supportive policy actions, tighter financial constraints and weaker economic activity related to the COVID-19 crisis are likely to act as a drag on firms' environmental performance in the future.

¹¹Global energy demand declined by 3.8 percent in the first quarter of 2020. The demand for oil, coal, and to a lesser extent gas and nuclear energy is projected to decline substantially by the end of 2020 (IEA 2020).

¹²Acemoglu and others (2019) discuss the long-term effects of the shale gas boom, which reduces carbon dioxide emissions from coal in the short term, while increasing aggregate production and directing energy innovation to shift away from clean energy to fossil fuels.

¹³Difficulties to reach an agreement among the OPEC+ coalition also contributed to the collapse in oil prices in early 2020, but a decomposition of the oil price shock in March and April 2020 suggests that it was largely driven by demand-side factors. See Online Annex 5.3.

Conclusions and Policy Recommendations

The COVID-19 crisis has resulted in a temporary decline in global carbon emissions, but its long-term impact is uncertain. On the one hand, the crisis may increase awareness of catastrophic risks and bring about a major shift in consumer preferences, corporate actions, and investor behavior. On the other hand, the historical evidence presented in this chapter suggests that there is a real possibility that, barring public interventions, investment by firms to improve their environmental performance may decline in this time of macro-financial stress.

To achieve the reduction in emissions needed to keep global warming below 2°C, an increase in green

investments, in combination with steadily rising carbon prices, is critical (October 2020 *World Economic Outlook*; October 2019 *Fiscal Monitor*). Public policies and green recovery packages are important to offset the potential deterioration in firms' environmental performance resulting from the crisis (see the October 2020 *Fiscal Monitor*).

In addition, to alleviate firms' financial constraints and to aid green investment, it will be key to put in place policies that support the sustainable finance sector, such as better disclosure standards, development of green taxonomies, and product standardization (see the October 2019 *Global Financial Stability Report*).

Box 5.1. Climate Index Based on Firms' Earnings Calls

To measure how firms' exposure to and awareness of climate change have evolved over time, a firm-level climate index was constructed for this chapter based on quarterly earnings call transcripts using a climate change dictionary built from four climate change glossaries.¹ To construct the index, earnings call transcripts from 4,109 firms located in 46 countries are used.

Panel 1 of Figure 5.1.1 shows the share of earnings call transcripts that mention specific phrases related to climate change, such as “climate change,” “CO₂,”

This box was prepared by Alan Feng and Germán Villegas Bauer.

¹Following a similar approach as Engle and others (2020), the glossaries are obtained from the British Broadcasting Corporation, the Intergovernmental Panel on Climate Change, the United Nations, and the US Environmental Protection Agency. See Online Annex 5.4 for a list of all terms. All annexes are available at www.imf.org/en/Publications/GFSR.

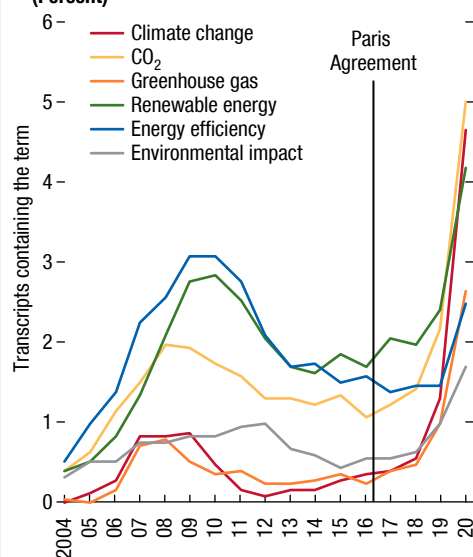
or “emissions.” A sharp increase in discussions involving climate change topics is observed in 2020, coinciding with the COVID-19 pandemic. This could, for example, be the result of the COVID-19 crisis increasing firms' focus on catastrophic events and long-term risks.

The *climate change discussion index* is then constructed for each firm by assigning a value of 1 to each earnings call transcripts that contains a phrase included in the dictionary. Panel 2 shows the average of the index over time. It is noteworthy that in the earnings calls of energy sector firms, mentions of climate-change-related terms spiked after the Paris Agreement in 2016, highlighting the importance of policy risk for this sector. The increase in discussions involving climate change over the past few years is consistent across countries (Online Annex 5.4).

Figure 5.1.1. Climate Index

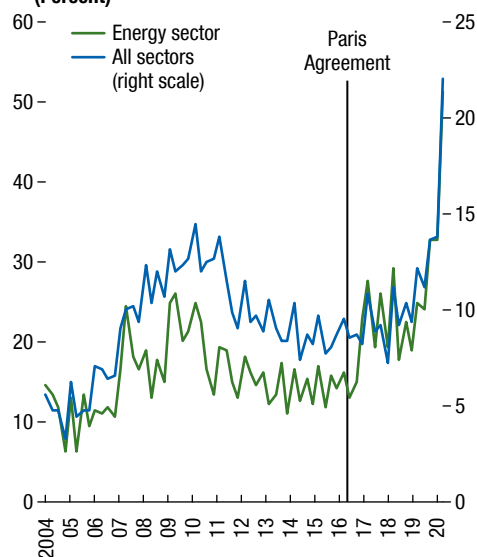
Climate change discussions have increased during the COVID-19 crisis.

1. Annual Share of Earnings Call Transcripts Containing Specific Climate-Change-Risk-Related Terms (Percent)



After the Paris Agreement, firms in sectors exposed to transition risk became more aware of climate risks—or opportunities.

2. Quarterly Share of Firms with Climate Discussions, All Sectors and Energy Sector (Percent)



Sources: FactSet; and IMF staff calculations.

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