



# BIS Bulletin

No 15

US dollar funding markets during the Covid-19 crisis – the international dimension

Egemen Eren, Andreas Schrimpf and Vladyslav Sushko

12 May 2020

BIS Bulletins are written by staff members of the Bank for International Settlements, and from time to time by other economists, and are published by the Bank. The papers are on subjects of topical interest and are technical in character. The views expressed in them are those of their authors and not necessarily the views of the BIS. The authors are grateful to Alan Villegas and Amanda Liu for excellent analysis and research assistance, and to Louisa Wagner for administrative support.

The editor of the BIS Bulletin series is Hyun Song Shin.

This publication is available on the BIS website ([www.bis.org](http://www.bis.org)).

© *Bank for International Settlements 2020. All rights reserved. Brief excerpts may be reproduced or translated provided the source is stated.*

ISSN: 2708-0420 (online)

ISBN: 978-92-9197-382-7 (online)

## US dollar funding markets during the Covid-19 crisis – the international dimension

### *Key takeaways*

- *Dislocations in domestic US dollar money markets reverberated globally. Non-US banks lost a substantial part of funding from money market funds and had to borrow at shorter maturities.*
- *Nevertheless, the severity of dollar funding strains varied substantially across banks, and eased for banks from jurisdictions with standing swap lines with the Federal Reserve.*
- *The impact of policy measures to quell the stress was felt unevenly across different funding markets. The divergence between key rates resulted in an unusual divergence of funding cost metrics, with some indicating a “dollar glut” while others a “dollar shortage”.*

Dislocations in core US dollar funding markets in March and April 2020 reverberated through the balance sheets of global banks. One important catalyst was the stress in the markets for commercial paper (CP) and certificates of deposits (CDs), debt instruments issued by banks to source funding from non-bank investors such as money market funds (MMFs). Non-US banks lacking access to insured retail dollar deposits are particularly dependent on this type of funding to finance dollar assets. Hence, during the earlier phases of the crisis, non-US banks were especially hit by the decline in both the volumes and maturities of CP/CD funding, when prime MMFs withdrew as marginal buyers of CP/CD after facing large outflows (see Eren, Schrimpf, and Sushko (2020)). Disruptions in these core funding markets spilled over globally, contributing to wide swings in “offshore” US dollar funding costs, as indicated, for instance, by the cross-currency basis.

A number of policy measures helped to stabilise short-term dollar funding markets, but markets for different instruments normalised at different speeds. This opened up a wedge in funding conditions across key market segments. For example, funding stresses quickly eased for banks in jurisdictions with standing swap lines with the Federal Reserve. In such cases, dollar liquidity operations in March allowed the banks to access dollar funding cheaply and easily. This was also reflected in the diverging funding costs paid by these banks in CP/CD markets, which were lower compared with others (without such access or banks that benefited from the expanded dollar liquidity operations only later, in April).

This Bulletin focuses on the developments in FX swap markets and the divergence in key US dollar funding rates during the Covid-19 crisis. In a companion Bulletin, Eren, Schrimpf, and Sushko (2020) describe the money market fund turmoil that acted as the key transmitter of the funding shock. This article, by contrast, focuses primarily on the pull-back of funding from non-US banks and the associated international spillover effects. It shows that key dollar funding rates – which usually track each other closely – diverged markedly during this episode, and that the funding costs for market participants reliant on MMF funding varied greatly between banks, even for institutions of comparable creditworthiness.

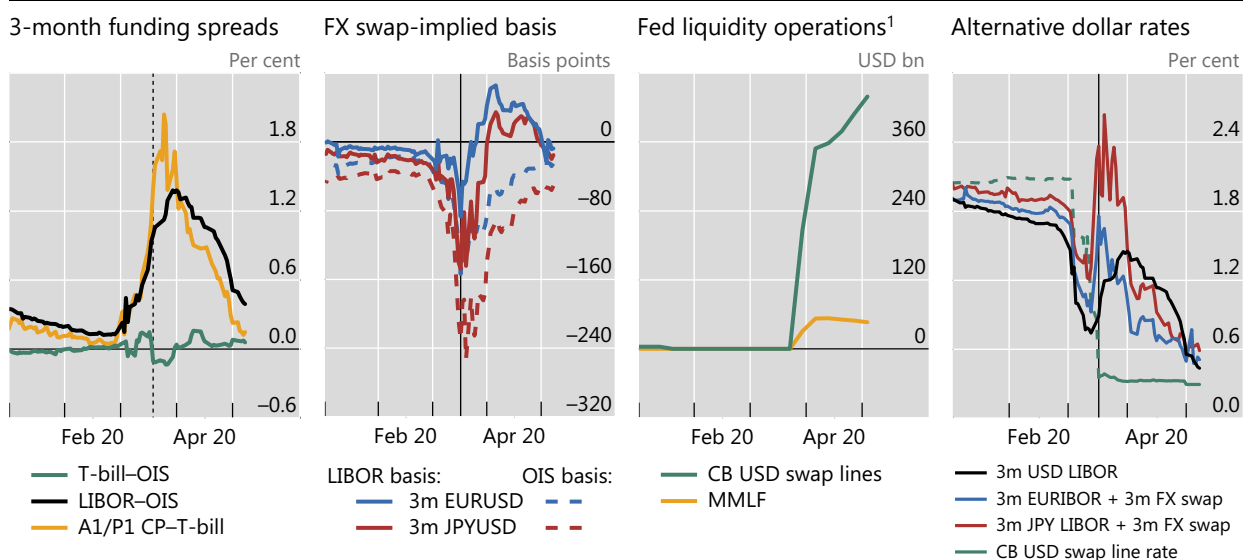
## Funding strains hit FX swap markets

Non-US banks were impacted disproportionately by the large outflows from prime MMFs during the Covid-19 crisis and the associated stress in unsecured funding markets (Graph 1, first panel). These banks are some of the heaviest issuers of unsecured short-term paper (eg three-month CP and CDs) in US money markets due to their lack of a stable dollar retail deposit base. As during the Great Financial Crisis (GFC), MMFs constituted the main dollar lenders to non-US banks (Baba, McCauley and Ramaswamy (2009), Aldasoro, Ehlers and Eren (2019)).

As in past periods of strains in US dollar funding liquidity, the FX swap market, which serves as an important alternative funding source, came under pressure.<sup>1</sup> FX swaps link money markets in different currencies, allowing banks to raise dollars in cross-currency funding markets. The so-called cross-currency basis can emerge if the interest differential implicit in FX swaps (as captured by the differential between the spot and forward exchange rate) deviates from the differential in the money market rates in the two currencies. A non-negligible cross-currency basis for dollar currency pairs means that the dollar is at a premium (or a discount) in FX swaps vis-à-vis the other currency. For instance, a negative basis indicates that it is more expensive to borrow dollars via FX swaps than in cash markets.

US dollar money market and FX swap-implied rates and select Fed operations

Graph 1



The dashed vertical line in the first panel indicates 18 March 2020 (the establishment of the Fed Money Market Mutual Fund Liquidity Facility, MMLF); the solid vertical line in the second and fourth panels indicates 16 March 2020 (Monday following the announcement of expanded US dollar liquidity swap lines).

<sup>1</sup> Outstanding amount of central bank USD swap lines or money market mutual fund liquidity facility; Wednesday observations.

Sources: Board of Governors of the Federal Reserve System; Bloomberg; JPMorgan Chase; authors' calculations.

At the height of the funding squeeze in mid-March, FX swap spreads indicated a scramble for US dollars, reminiscent of the situation during the GFC and the euro area debt crisis. The cost of US dollar funding via three-month FX swaps against euro and Japanese yen collateral exceeded USD LIBOR by a respective 85 bp and 150 bp (Graph 1, second panel). The situation was even more extreme for some other currencies, in particular where the central bank had no swap line with the Fed at the time. A notable example is the Korean won.

<sup>1</sup> See Avdjiev, Eren and McGuire (2020) for an analysis of dollar funding costs through the lens of FX swap markets during the Covid-19 crisis.

As part of an unscheduled announcement on Sunday 15 March, the Fed made important changes to its swap lines with its five main central bank counterparties (Canada, the euro area, Japan, Switzerland and the United Kingdom). These consisted of a cost reduction (from 50 bp to 25 bp over USD overnight indexed swap (OIS) rates) and weekly dollar offerings via longer-term, 84-day (ie three-month), dollar swaps (in addition to the pre-existing seven-day operations, which now take place daily). On 19 March, the Fed further announced the expansion of the swap line network to nine additional central banks, which have since been offering US dollar liquidity in ad hoc operations since the end of March.

US dollar auctions by foreign central banks saw immediate and widespread take-up, especially by Japanese and European banks, which took advantage of the cheap pricing to replenish their dollar funding. This favourable access to dollar funding meant that an important set of participants in the global financial system did not have to shed US dollar assets at fire-sale prices.<sup>2</sup> By early May, the Fed's central bank swap lines, with \$448 billion taken up, have been the most utilised of all the Fed's funding and credit facilities (Graph 1, third panel).<sup>3</sup> The Money Market Mutual Fund Liquidity Facility (MMLF) and the Commercial Paper Funding Facility (CPFF), both aimed at repairing CP/CD markets, saw respective take-ups of only \$50.66 billion (after peaking at \$53.15bn in early April) and \$3.37 billion.

### A tale of two cross-currency bases

A highly unusual price configuration for dollar funding then emerged once the strains in the FX swap market eased, thanks to the above-mentioned US dollar auctions by the central banks. FX swap markets signalled simultaneously a US dollar premium and a discount, depending on which set of money markets instruments were used to source the foreign currency to swap for the dollars, and which set of money market instruments were used to place the US dollars. Specifically, the cross-currency basis based on risk-free (OIS) rates narrowed noticeably, but still indicated a dollar funding premium in FX swaps, as compared with money markets. By contrast, bases calculated based on unsecured rates (LIBOR) turned positive, indicating cheaper access to dollars via FX swaps than in money markets (Graph 1, second panel).

The anomaly emerged because the divergence between unsecured and risk-free dollar interest rates due to market stress did not recede even as FX swap spreads narrowed substantially after the central bank swap line facility was activated. In normal times, unsecured funding rates, say in CP/CD markets, represent marginal funding costs for banks. Hence, in a normal environment, FX swap pricing is more closely aligned with unsecured funding rates (see the narrower currency basis in January and February, Graph 1, second panel), than it is with risk-free rates (see the wider currency basis in January and February, Graph 1, second panel).<sup>4</sup> But, in March, as a number of banks turned to central bank swap lines for dollar funding, priced at USD OIS + 25bp (Graph 1, fourth panel), OIS rates began exerting a greater influence on FX swap pricing, reflecting the option of turning to central bank liquidity facilities rather than to interbank borrowing.

At the same time, non-US banks without access to central bank facilities were more likely to face funding costs closer to unsecured funding rates (eg LIBOR), which remained elevated because the impairments in dollar CP and CD markets persisted well into April (Graph 1, first panel). Hence, something

<sup>2</sup> Also see Bahaj and Reis (2020), who show that central bank swap lines during the Covid-19 crisis were more effective in currencies with a higher take-up in USD operations by the respective central bank.

<sup>3</sup> Via the MMLF, the Fed extends loans to dealers to purchase eligible assets from MMFs, priced at 100 bp over the discount window rate (25 bp) for lending against CP collateral. Via the CPFF, which became operational only from April 14, the Fed directly purchases three-month CP from issuers. The pricing for the CPFF is OIS + 110 bp for A1-rated and OIS + 200 bp for A2-rated CP. Thus both facilities are priced at a considerably higher rate than the central bank swap lines. A key difference is that the Fed and the US government are insulated from any credit risk in the dollar liquidity operations with other central banks.

<sup>4</sup> The OIS rate is conceptually an amalgam of expectations of the evolution of an overnight rate (and hence the direction of monetary policy) plus a term premium. For example, a USD OIS rate is the fixed rate paid in exchange for receiving the effective federal funds rate over the term of the contract. Due to collateralisation and because counterparties in an OIS do not exchange principal, there is essentially no credit risk embedded in the rate. As such, there is no dispersion across banks in the rate paid or received in an OIS contract.

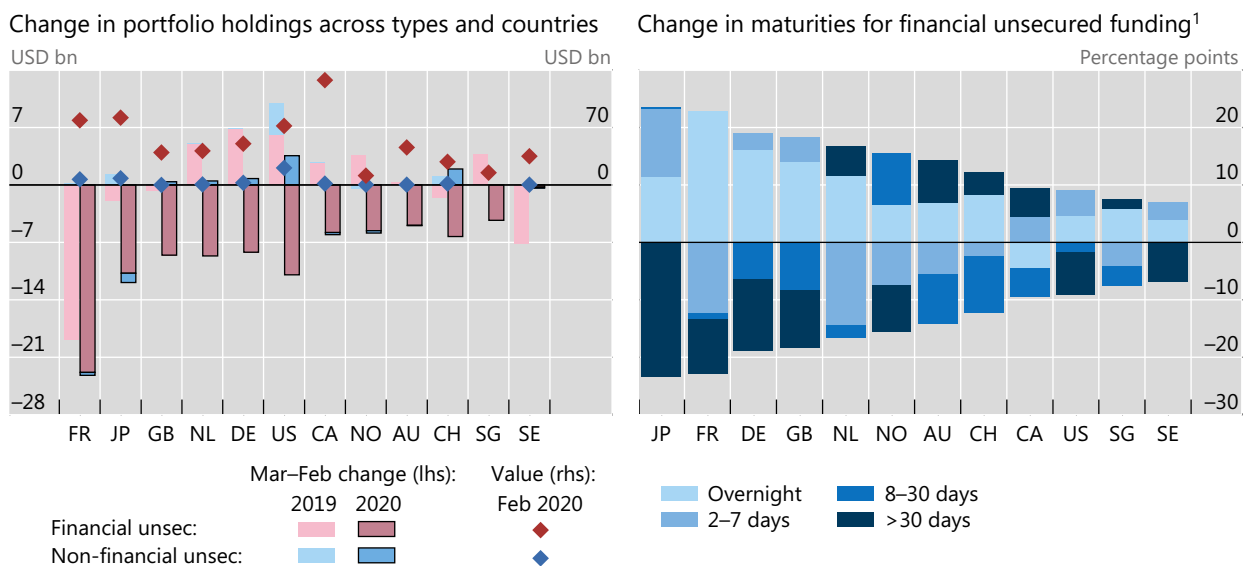
like a tug of war emerged between OIS rates and the IBORs as to which type of interest rate would anchor FX swap pricing. Dragged down by the cheap outside funding option for banks via central bank swap lines, the cost of dollar funding via FX swaps thus narrowed substantially relative to what IBOR rate differentials alone would imply.

Given this unusual situation, in which FX bases calculated using LIBOR changed their signs from negative to positive, some banks found it economical to adjust their funding patterns. The pricing of FX swaps implied that raising three-month funding in, say, euro unsecured markets at EURIBOR and then swapping into US dollars (paying the FX swap spread) had become cheaper than funding directly at the elevated US dollar LIBOR.<sup>5</sup> Some market participants report taking advantage of the positive LIBOR basis by borrowing euros unsecured, swapping them into US dollars and lending at rates close to USD LIBOR. Such “arbitrage” would lead to upward pressure on EURIBOR and downward pressure on dollar LIBOR, which indeed was the case in the later stages of this episode. International cross-currency arbitrage thus helped to alleviate the stress in core US dollar funding markets and helped to reduce CP/CD rates in April (Graph 1, first panel). This may support the idea of the Fed’s swap lines as an effective tool in keep strains in offshore dollar markets from blocking the transmission of its domestic monetary policy, as argued by McCauley and Schenk (2020).

## Counterparty and maturity shifts in prime money market fund portfolios

March vs February 2020

Graph 2



Financial unsec = unsecured instruments issued by financial institutions (CP, CD, time deposits etc); Non-financial unsec = unsecured instruments issued by non-financial institutions (mostly CP).

<sup>1</sup> For each maturity, difference between the share (percentage of new originations) in March 2020 minus the share in February 2020.

Sources: Crane Data; authors’ calculations.

## Redemptions from MMFs and funding for non-US banks

Some of the channels via which the US money market turmoil disrupted the unsecured funding for banks in CP/CD markets can be gleaned from granular MMF holdings data (see also Eren, Schimpf and Sushko (2020)). Outflows from US prime funds led to a sharp pullback from lending in general, including lending

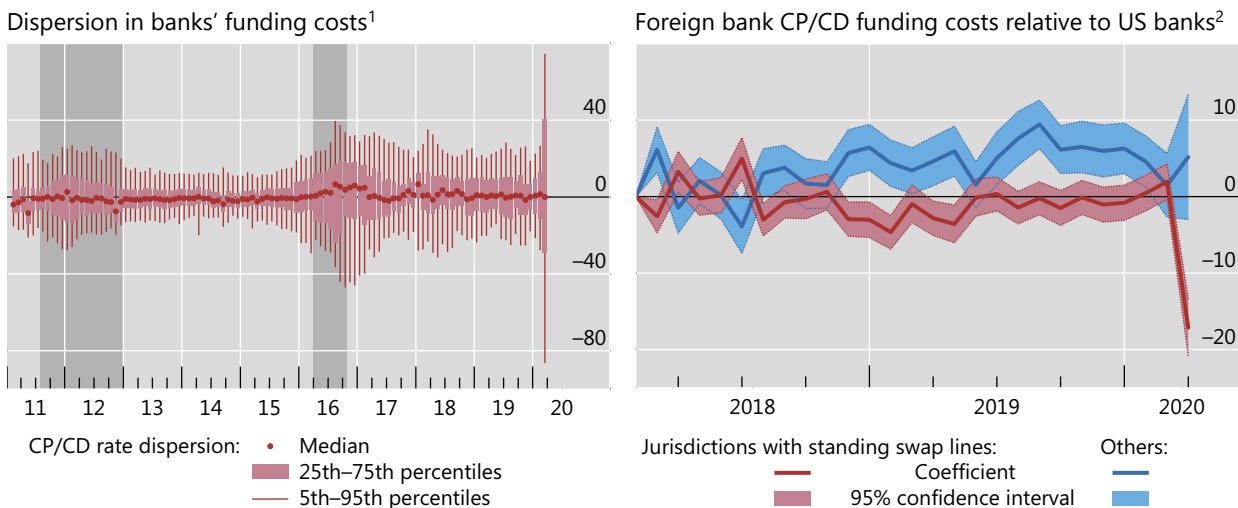
<sup>5</sup> In the fourth panel of Graph 1, this is depicted by the blue (EURUSD) and red (JPYUSD) lines compared with the black line; and the difference between each pair is the LIBOR basis shown in the second panel.

to non-US institutions (Graph 2, left-hand panel). At the same time, even when funding was not lost overall, it became increasingly concentrated at shorter maturities, raising rollover risk. For some banking systems, this meant an increase of more than 20 percentage points in overnight or weekly funding at the expense of longer-term funding between February and March (Graph 2, right-hand panel). The evaporation of term funding liquidity in core US dollar money markets in turn pushed a number of non-US institutions towards raising dollars via three-month FX swaps, thus widening the cross-currency basis, as described above.

## Funding cost divergence and a discount for central bank swap line access

In basis points

Graph 3



The shaded areas in the left-hand panel indicate August 2011–December 2012 (euro area sovereign debt crisis) and April–October 2016 (MMF reform adjustment phase).

<sup>1</sup> Based on 311,172 CP/CD contracts of MMFs with 76 US and non-US banks between January 2011 and March 2020 (month-end data). Plotted are residuals from the regression of the CP/CD rate on four maturity bucket dummies (ON, 2–7d, 8–30d, >30d), contract size, issuer fixed effects and date fixed effects. <sup>2</sup> Using 85,429 CP/CD contracts of MMFs with 14 US banks, 39 non-US banks headquartered in jurisdictions with standing swap lines with the Federal Reserve (CA, CH, euro area, GB, JP) and 23 non-US banks without standing swap lines, between January 2018 and March 2020 (month-end data). The coefficients are based on the regression of the CP/CD rate on four maturity bucket dummies (ON, 2–7d, 8–30d, >30d), contract size, issuer×fund interaction fixed effects, date fixed effects and an interaction of each date fixed effect with a dummy for headquarter in one of five standing swap line countries.

Sources: Crane data; authors' calculations.

At the same time, borrowing costs did not rise uniformly across institutions – a common feature of episodes of funding strains, especially in US dollar markets (Rime, Schrimpf and Syrstad (2017)). In fact, the dispersion in CP/CD rates across banks jumped to levels exceeding anything observed over the past decade (Graph 3, left-hand panel), as investors became more discriminating about a bank's dollar funding options and overall balance sheet strength. Notably, banks headquartered in one of the five jurisdictions with Federal Reserve central bank swap lines paid considerably less for funding, even compared with US banks (Graph 3, right-hand panel). A key reason may have been investor awareness of their ability to source dollars via central bank swap lines, the cost of which had been cut on 15 March (see above).

The expansion of the Fed's swap line network to nine additional central banks, announced on 19 March, also improved the funding situation of banks headquartered in these countries. But not immediately, because the majority of dollar liquidity auctions by these new swap line member central banks only started to take place in early April. Hence, the dispersion in funding costs for non-US banks in core US dollar money markets very much reflected the differences in the options they had in terms of access to dollar funding – direct onshore, versus FX swaps, versus central bank swap lines (as illustrated for the case of EURUSD and JPYUSD in Graph 1, fourth panel).

## Discussion

The deterioration in global dollar funding conditions during the height of the Covid-19 crisis was a reminder of global banks' reliance on short-term unsecured funding in US money markets. Just as during the GFC, MMFs pulled back as holders of short-term paper issued by non-US banks, exposing the roll-over risk posed by this form of funding in episodes of stress. Hence, the events in March showed that the 2016 reforms did not extinguish completely the MMF redemption channel in exacerbating bank funding stresses (see also Eren, Schrimpf and Sushko (2020)).<sup>6</sup>

At the same time, the speed of the subsequent recovery in funding conditions for banks headquartered in jurisdictions with easy and cheap access to dollars through standing swap lines with the Fed highlights the effectiveness of central bank swap line facilities. These facilities helped to counter some of the forces that hampered the transmission of the Fed's monetary policy stimulus both domestically and internationally. The rapid take-up of central bank dollar liquidity facilities also reflected the stigma-free access, as banks did not have to worry about any possible negative signalling from tapping central bank liquidity. This is good news as it further suggests that banks have not been a major source of vulnerabilities during the Covid-19 crisis, in contrast to the case during the GFC.

## References

Aldasoro, I, T Ehlers and E Eren (2019): "Global banks, dollar funding, and regulation", *BIS Working Papers*, no 708.

Avdjiev, S, E Eren and P McGuire (2020): "Dollar funding costs during the Covid-19 crisis through the lens of the FX swap market", *BIS Bulletin*, no 1.

Baba, N, R McCauley and S Ramaswamy (2009): "US dollar money market funds and non-US banks", *BIS Quarterly Review*, March, pp 65–81.

Bahaj, S and R Reis (2020): "Central bank swap lines during the Covid-19 pandemic", in *Covid Economics, Vetted and real-time papers*, Issue 2, 8 April, CEPR.

Eren, E, A Schrimpf and V Sushko (2020): "US dollar funding markets during the Covid-19 crisis – the money market fund turmoil", *BIS Bulletin*, no 14.

McCauley, R and C Schenk (2020): "Central bank swaps then and now: swaps and dollar liquidity in the 1960s", *BIS Working Papers*, no 851.

Rime, D, A Schrimpf and O Syrstad (2017): "Segmented money markets and covered interest parity arbitrage", *BIS Working Papers*, no 651.

<sup>6</sup> The reform addressed some of the lessons learned during the GFC, when the Reserve Primary Fund was forced to reduce its NAV to below \$1 due to massive losses, triggering a panic among investors. The reform required prime funds to switch from a stable to a floating NAV calculation and introduced redemption gates and fees at a fund's discretion should its weekly liquid assets (a combination of government securities and other assets maturing within a week) fall below 30%.



## Previous issues in this series

No 14 12 May 2020	US dollar funding markets during the Covid-19 crisis – the money market fund turmoil	Egemen Eren, Andreas Schrimpf and Vladyslav Sushko
No 13 11 May 2020	The CCP-bank nexus in the time of Covid-19	Wenqian Huang and Előd Takáts
No 12 7 May 2020	Effects of Covid-19 on the banking sector: the market’s assessment	Iñaki Aldasoro, Ingo Fender, Bryan Hardy and Nikola Tarashev
No 11 5 May 2020	Releasing bank buffers to cushion the crisis – a quantitative assessment	Ulf Lewrick, Christian Schmieder, Jhuvesh Sobrun and Előd Takáts
No 10 28 April 2020	Covid-19 and corporate sector liquidity	Ryan Banerjee, Anamaria Illes, Enisse Kharroubi and José-Maria Serena
No 9 24 April 2020	Buffering Covid-19 losses – the role of prudential policy	Mathias Drehmann, Marc Farag, Nikola Tarashev and Kostas Tsatsaronis
No 8 21 April 2020	Identifying regions at risk with Google Trends: the impact of Covid-19 on US labour markets	Sebastian Doerr and Leonardo Gambacorta
No 7 17 April 2020	Macroeconomic effects of Covid-19: an early review	Frederic Boissay and Phurichai Rungcharoenkitkul
No 6 14 April 2020	The recent distress in corporate bond markets: cues from ETFs	Sirio Aramonte and Fernando Avalos
No 5 7 April 2020	Emerging market economy exchange rates and local currency bond markets amid the Covid-19 pandemic	Boris Hofmann, Ilhyock Shim and Hyun Song Shin
No 4 6 April 2020	The macroeconomic spillover effects of the pandemic on the global economy	Emanuel Kohlscheen, Benoit Mojon and Daniel Rees
No 3 3 April 2020	Covid-19, cash, and the future of payments	Raphael Auer, Giulio Cornelli and Jon Frost
No 2 2 April 2020	Leverage and margin spirals in fixed income markets during the Covid-19 crisis	Andreas Schrimpf, Hyun Song Shin and Vladyslav Sushko
No 1 1 April 2020	Dollar funding costs during the Covid-19 crisis through the lens of the FX swap market	Stefan Avdjiev, Egemen Eren and Patrick McGuire

All issues are available on our website [www.bis.org](http://www.bis.org).