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Interest Rates Research

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Money Markets Monthly Update

April 2020

PLEASE SEE ANALYST CERTIFICATIONS AND IMPORTANT DISCLOSURES STARTING AFTER PAGE 49.

Summary

- Extraordinary measures:
  - Reserve expansion and asset purchases
  - Liquidity programs – tepid demand
  - Credit programs – ready to launch

- Bill issuance and rate effects

- CP market conditions – mending?
  - We look for LOIS to fall to 45bp in June and 25bp in September
  - Prime money fund balance stabilization

Extraordinary measures

COVID 19: The Fed's evolving response

1. Initially, the Fed moved to increase liquidity sharply
    - By rapidly expanding the level of bank reserves through asset purchases and open market operations
        - And removing Treasuries and agency MBS securities that were clogging up bank and dealer balance sheets

2. Next, it re-constituted some of its 2008 liquidity programs
    - To direct liquidity into the CP market and money funds
    - These programs rely on banks and dealers to take liquidity from the Fed and re-distribute it through the broader economy

3. Its most recent operations have focussed on getting liquidity more directly to end-users
    - Including small businesses and municipalities

The Fed resumed large-scale asset purchases…

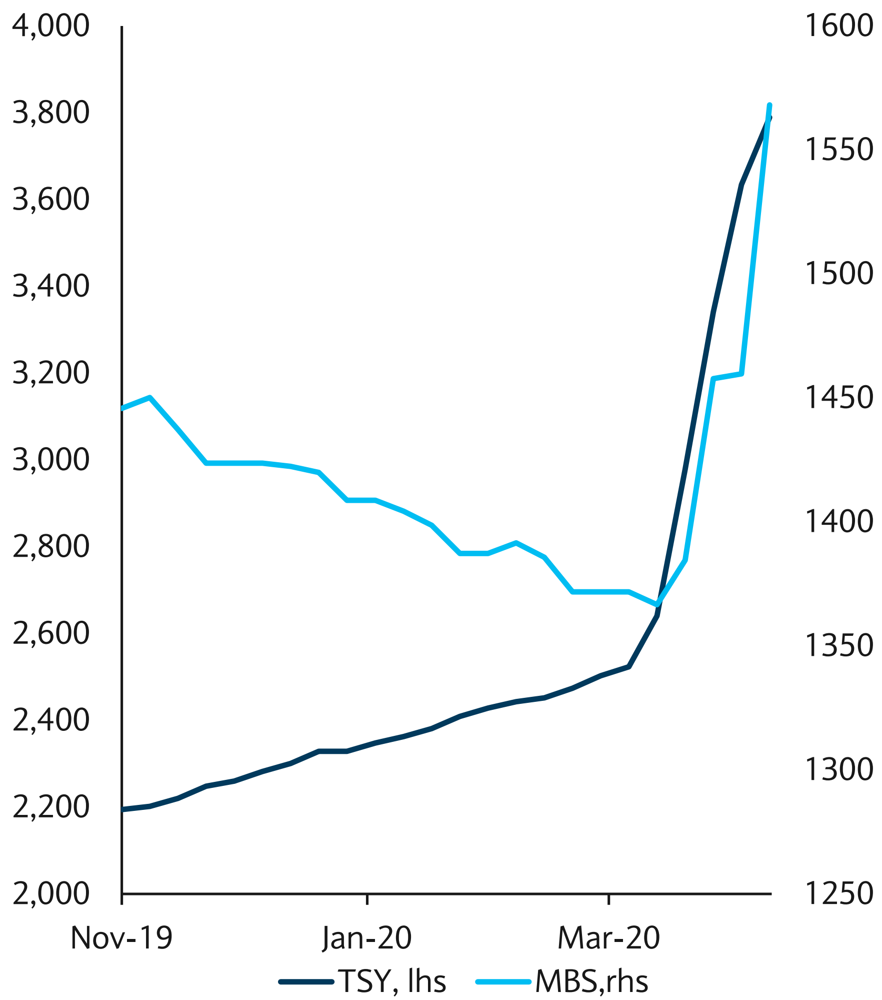
- The Fed shifted to open-ended purchases of Treasuries and agency MBS last month
    - It added CMBS to its purchases as well

- Since mid-March, the Fed has purchased over $1.3trn in Treasuries and more than $650bn in MBS[1/]

1/ As of April 15, the Fed held $5.7bn in CMBS

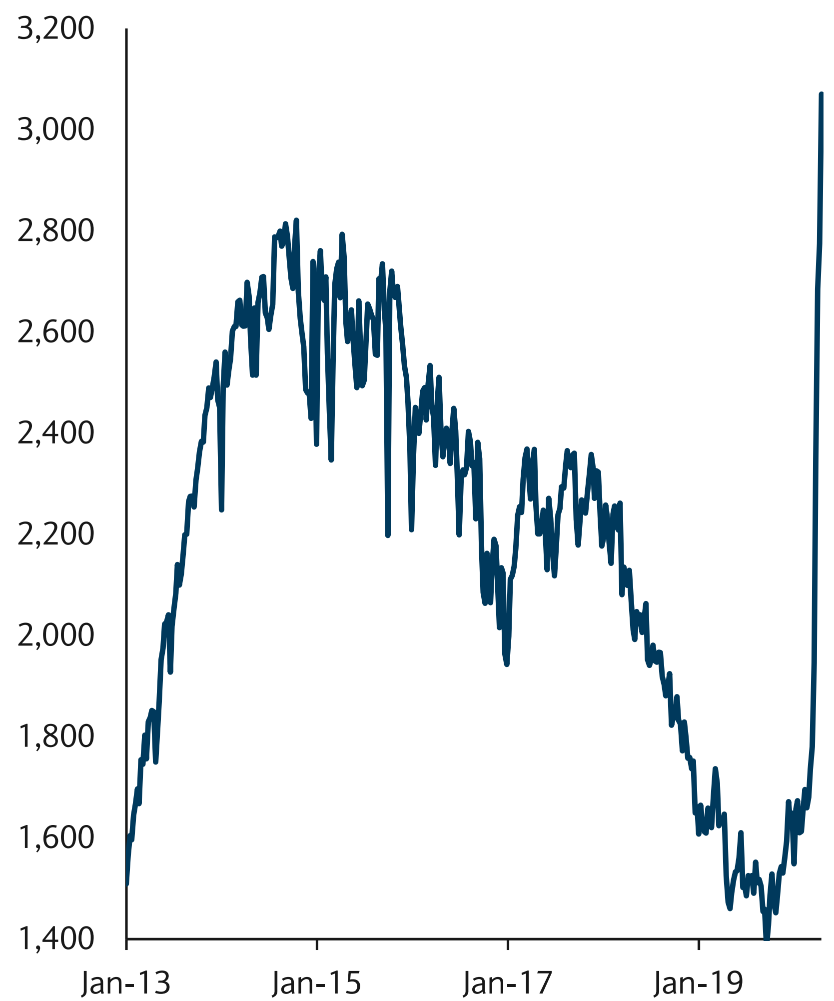
…and sharply increased the level of bank reserves

TSY and MBS holdings ($bn)



Source: Federal Reserve, Barclays Research

Bank reserves ($bn)



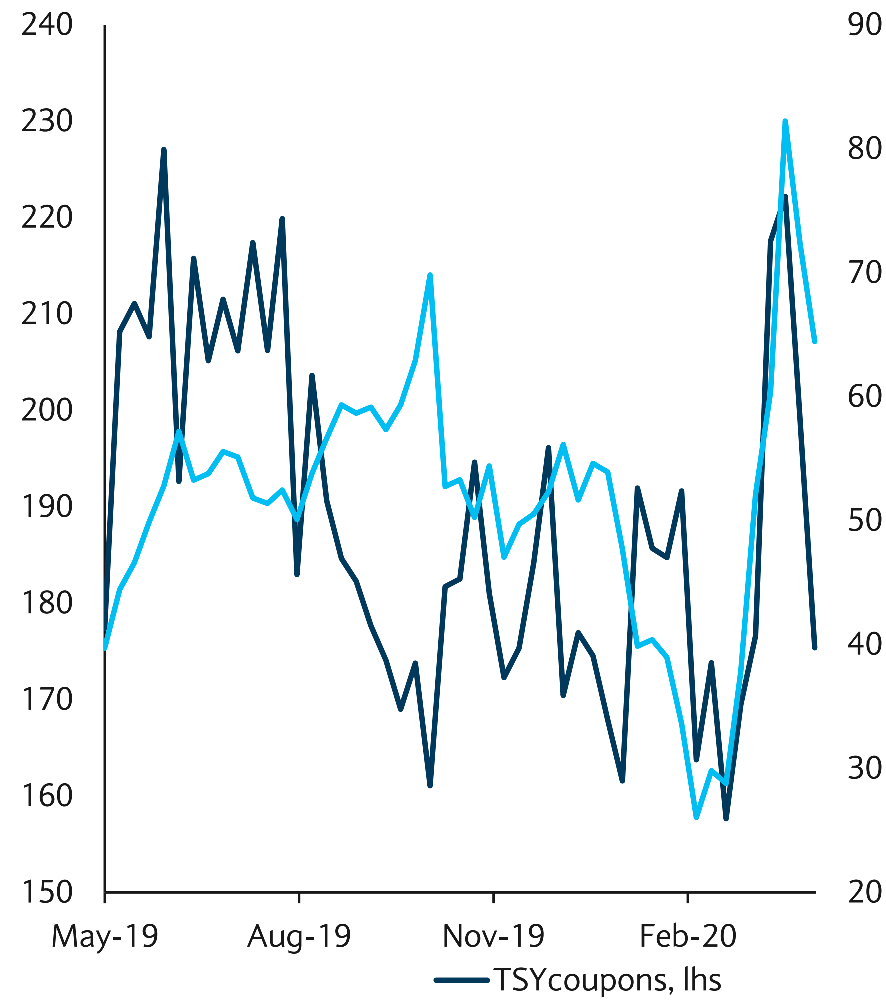
Source: Federal Reserve, Barclays Research

Fed purchases have relieved balance sheet pressure

- The Fed's asset purchases have helped reduce some of the crowding on dealer balance sheets
  - That was creating distortions in the Treasury and MBS markets

- This, in turn, has increased the ability of banks and dealers to make markets
  - *And improved overall market liquidity*

Dealer holdings ($bn)

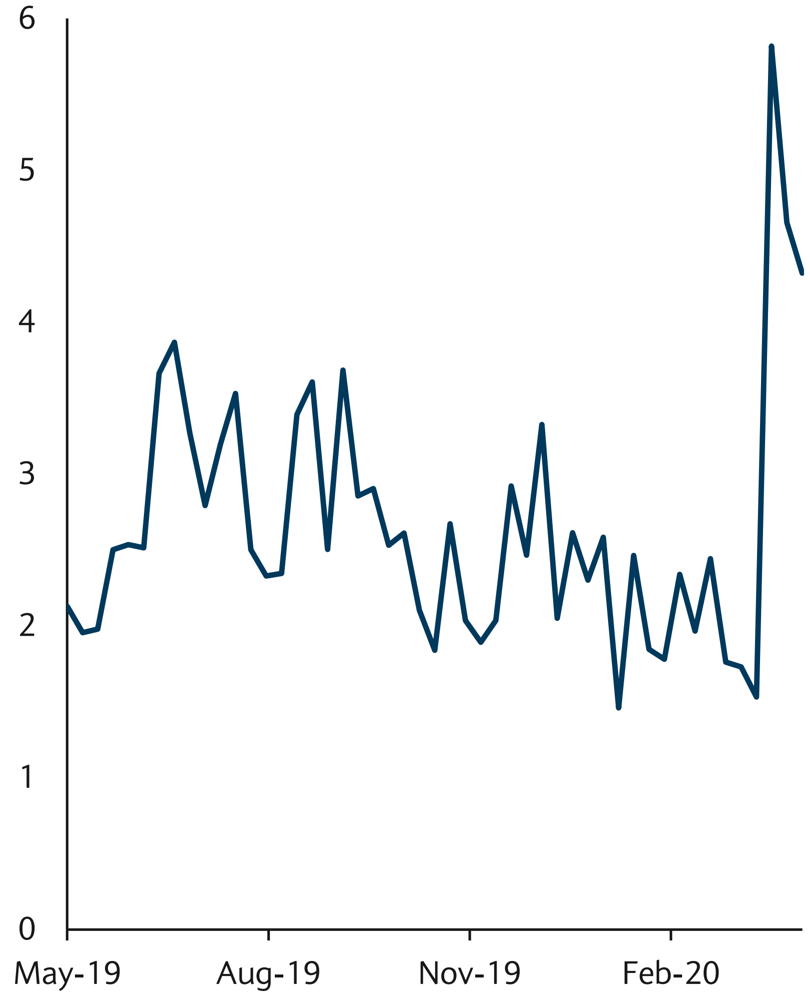


Source: Federal Reserve, Barclays Research

But it has also created some other dislocations…

- However, the rapid purchase pace has created other market dislocations
    - Some Treasury issues have become hard to source in the market
        - And the volume of fails – or incomplete deliveries – has increased

Dealer fails (% transactions)

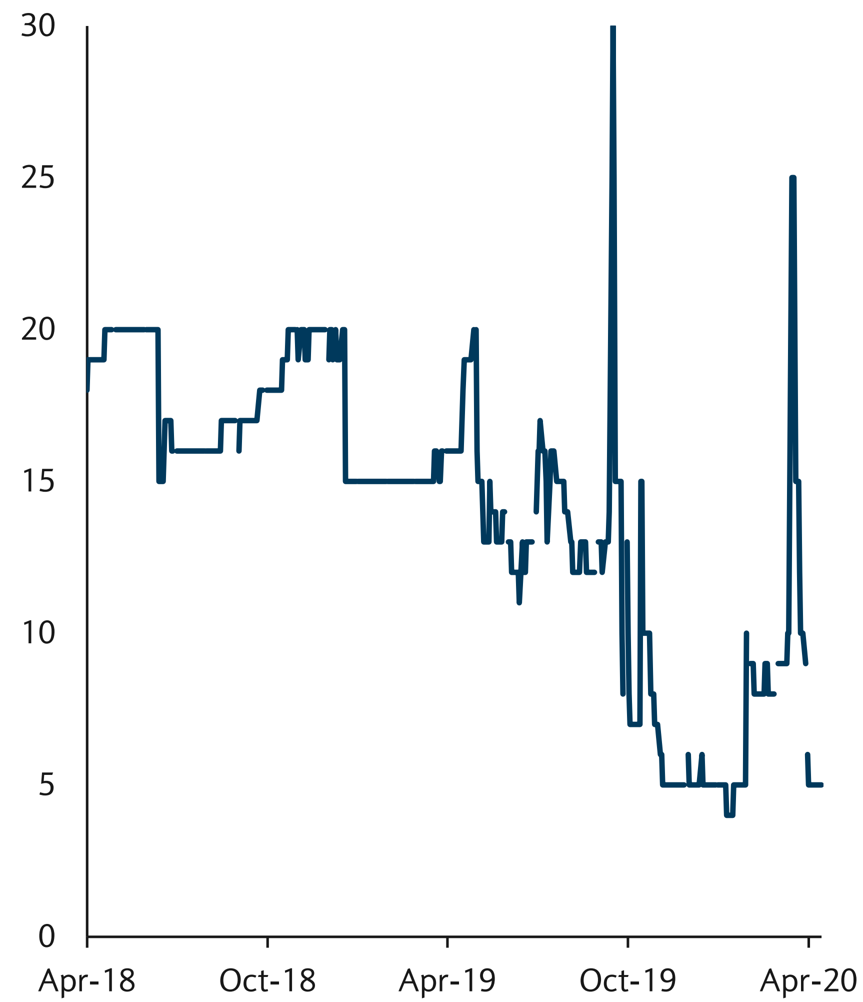


Source: Federal Reserve, Barclays Research

…and pushed the fed funds rate closer to its lower boundary

- The sharp expansion in bank reserves has pushed the funds rate to within 5bp of the bottom band
- As reserve balances increase, so will the pressure on the funds rate
  - And the Fed may need to adjust the RRP rate higher[1/]

Fed funds rate less bottom band (bp)

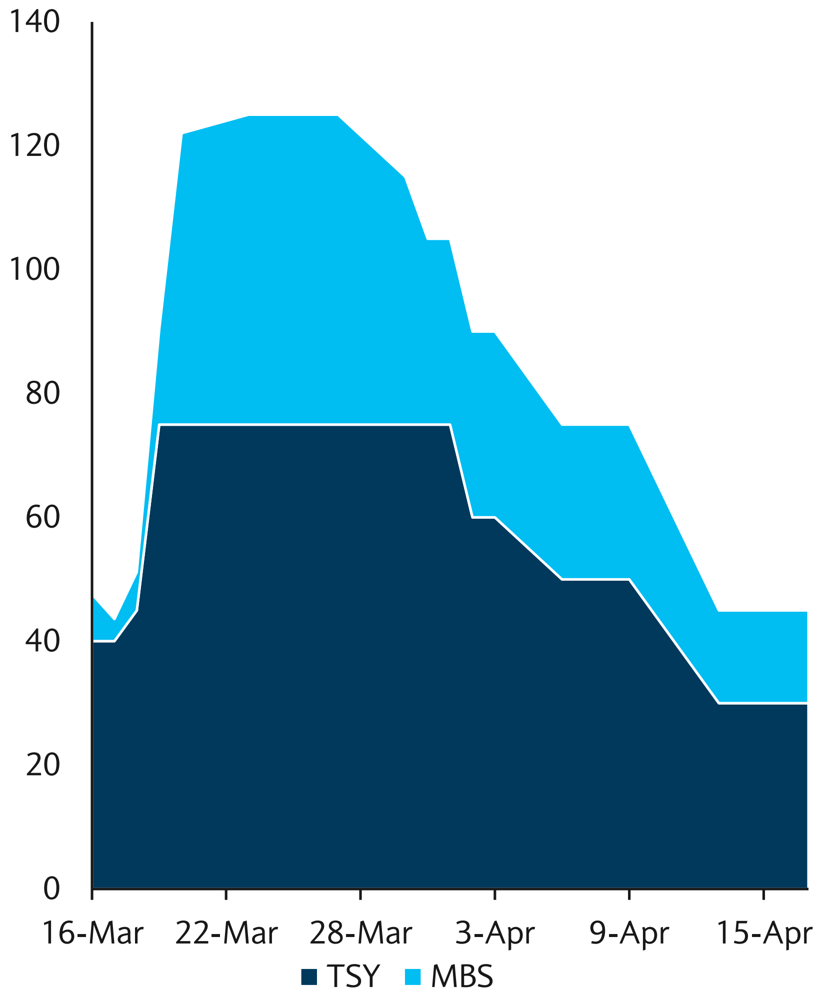


Note: Month-ends excluded. Source: Federal Reserve, Barclays Research

1/ See Adjusting the RRP rate, April 6, 2020

The Fed has begun to taper its purchases…

Daily asset purchase pace ($bn)



Source: Federal Reserve, Barclays Research

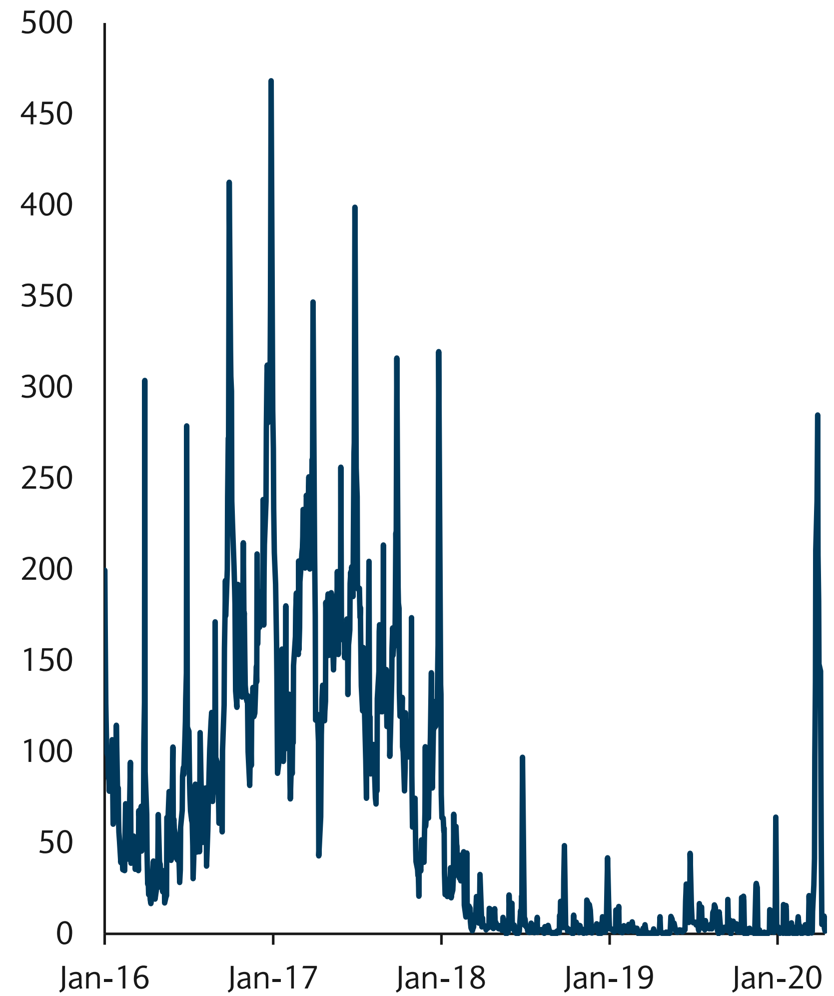
- Liquidity has improved in the Treasury and MBS markets
  - And the Fed has begun to slow its asset purchases
- *Could the Fed finish these 'liquidity' purchases by the end of May?*
  - *And shift to 'expansionary' or stimulus-driven purchases thereafter?*

Liquidity briefly started to puddle up in March

- RRP balances jumped as repo rates plunged to 0%
  - But as bill supply surged, repo rates moved off of zero
    - And RRP usage fell

- *Could RRP use swell once the Treasury starts to slow bill issuance?*
  - *As rising reserve balances push all overnight rates toward 0*

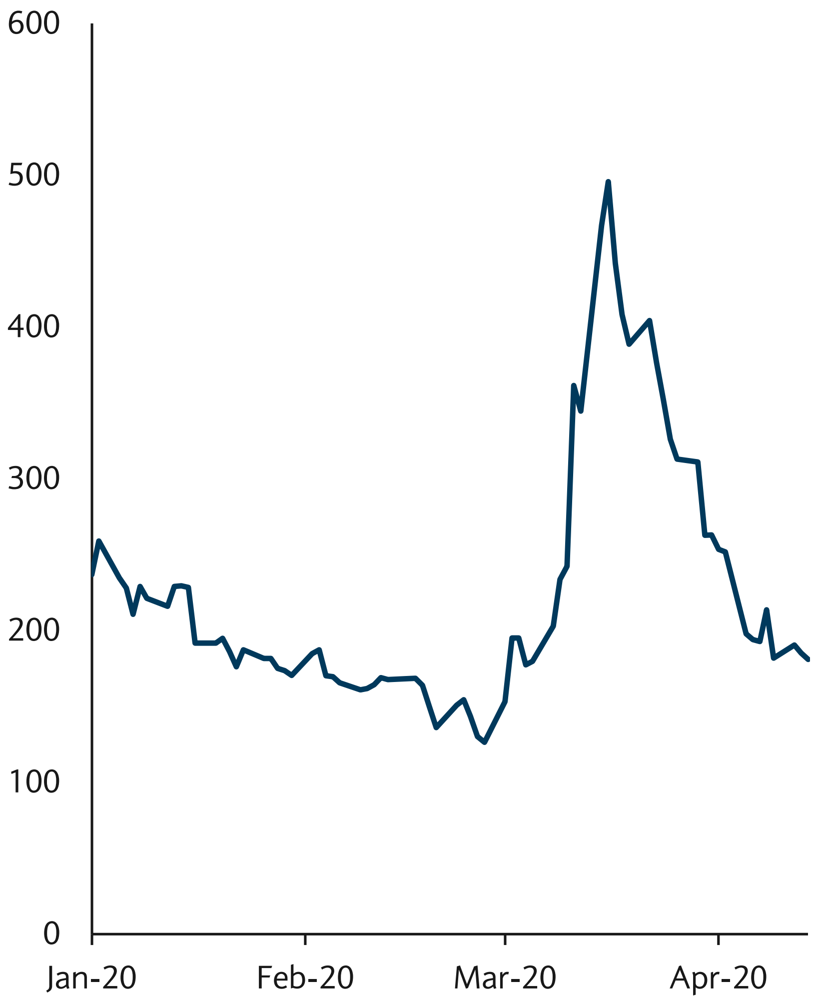
RRP balances ($bn)



Source: Federal Reserve, Barclays Research

The Fed will begin to scale back its open market operations

Open market operations ($bn)



Source: Federal Reserve, Barclays Research

- The Fed sharply increased its open market operations in order to bring repo rates down
  - Providing $500bn in regular 1m and 3m operations

- But as market liquidity has improved, funding rates have fallen below the Fed's open market operation rates
  - *And program demand has ebbed*[1/]

1/ The Fed has begun to scale back these operations by reducing their frequency.

Federal Reserve Liquidity Programs

Program	Rate (bp)	Operation Frequency	Term	Size	Counterparty	Collateral	Termination	Description
Central bank swap lines	OIS+25	Daily and weekly	1w or 84d	Depends on the central bank	Central banks	Local currency collateral and loans	None	Non-US banks can source $ funding from their local central bank, which in turn gets it from the Fed
Discount window	Primary credit rate (25bp)	Daily	o/n to 90d	Depends on how much collateral is pledged	Banks	a) Loans and investment grade securities b) No equities	None	Traditional lender of last resort program for banks
CP funding facility (CPFF)	a) 3m OIS +110 b) 10bp one time registration fee	Daily	3m	Issuer is limited to the maximum of its outstandings between March 2019-2020	A1/P1 issuers	None	17-Mar-21	a) Fed buys the issuer's CP and holds it to maturity; issuer receives cash b) Treasury is providing $10bn equity investment in the CPFF SPV for loss protection to the Fed
Primary dealer credit facility (PDCF)	25	Daily	o/n to 90d Prepayments allowed	Depends on how much acceptable collateral the dealer pledges	Primary dealers	IG corporate debt CP (A2/P2) Munis ABS, MBS Equities	At least 6m and possibly longer if conditions warrant	a) Dealers pledge illiquid collateral in return for cash b) Recourse loan (beyond collateral value) to the primary dealer
Money market liquidity facility (MMLF)	a) primary credit +100bp for assets from prime funds b) primary credit+25bp for assets from muni funds	Daily	Maturity matches the maturity of the pledged paper	Depends on how much acceptable collateral the bank pledges	Banks	a) Prime MMF assets Including A1/P1 CP and AB-CP, along with certain non-TSY/AGY repo	30-Sep-20	a) Banks buy prime fund assets, which they pledge to the Fed in return for cash that they give to the prime fund b) Non-recourse loan to banks, so these assets are excluded from the leverage and RWA capital ratios
FIMA Repo facility	IOER+25bp	as needed	overnight	Depends on how much acceptable collateral the central bank pledges	Central banks and monetary authorities	Treasuries only	at least 6m	Foreign central banks can repo Treasuries to the Fed in return for dollar funding

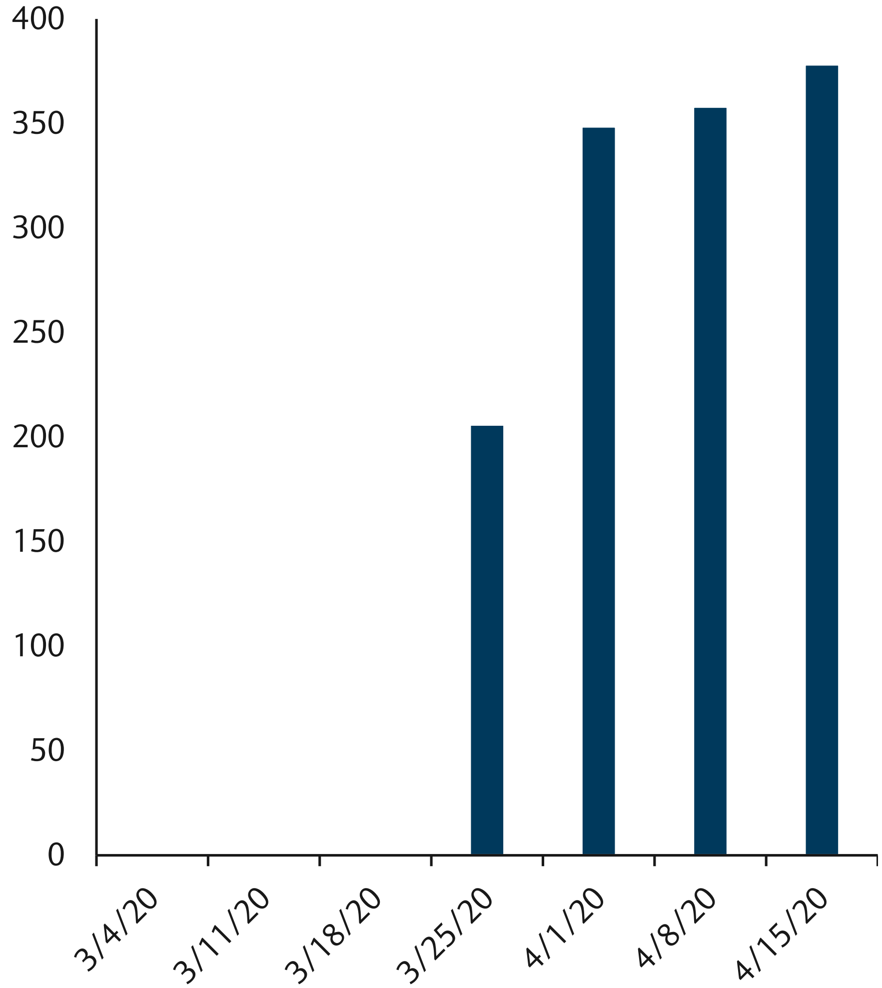
Re-constituting the 2008 programs

- In the past month, the Fed has re-constituted several liquidity programs from the financial crisis
- These have been modified from their 2008 versions:
    - Lending terms have been lengthened
        - The discount window provides 3m loans
        - There is no frequency limit on the CPFF
    - And the eligible collateral has been expanded
        - The PDCF accepts equities as collateral
- *But some programs appear to be more effective than others*[1/]

1/ Our sense is that the CB swap lines have been the most effective Fed liquidity program to date

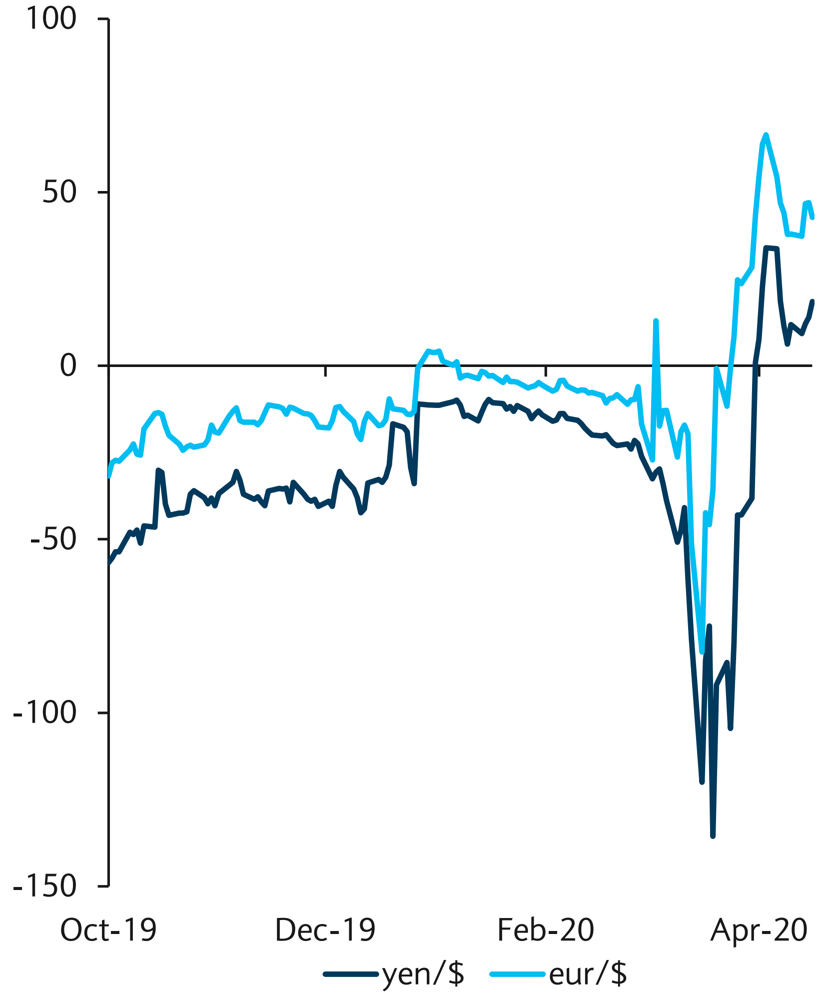
Central bank swap lines have loosened offshore funding

Balances ($bn)



Source: Federal Reserve, Barclays Research

3m cross-currency bases (bn)

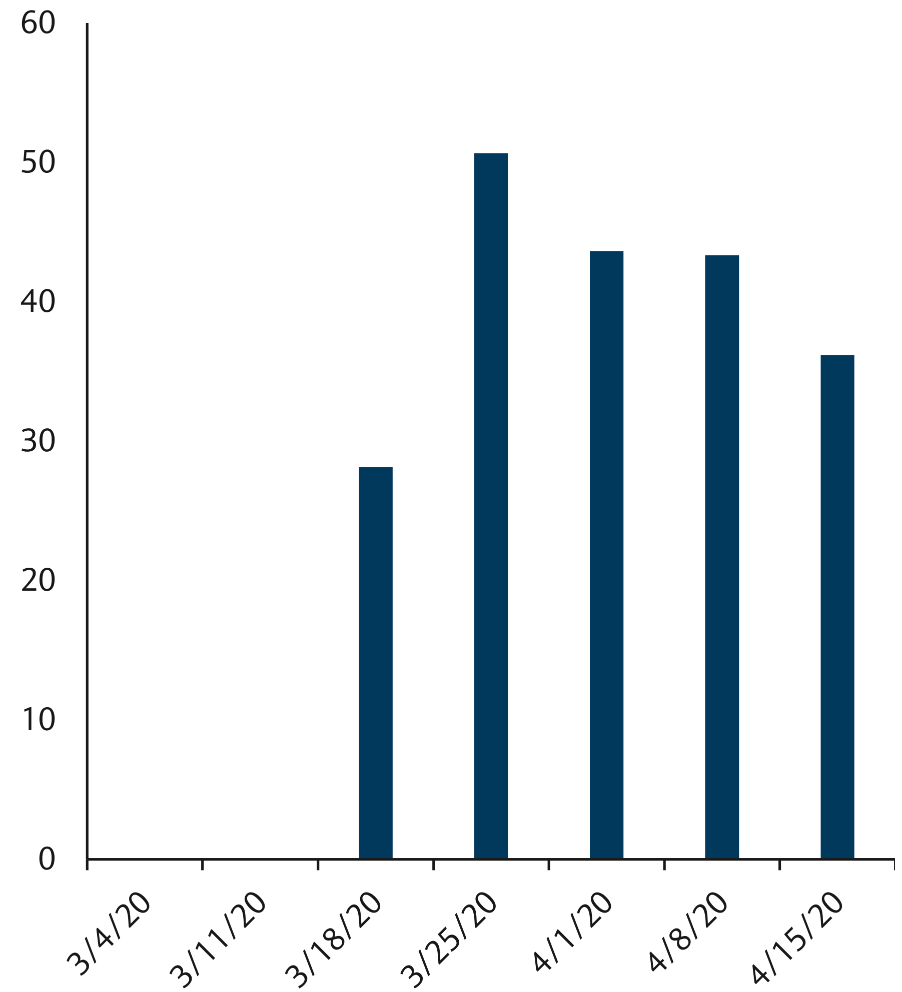


Source: Bloomberg, Barclays Research

Why isn't discount window borrowing heavier?

- The Fed lengthened discount window loans to 3m
  - And reduced the primary credit rate to 25bp
- But the program still accepts only investment grade collateral
  - And banks appear to have plenty of cheap financing from the market[1/]
- *However, they seem less willing to intermediate for clients*

Discount window borrowing ($bn)



1/ For example, non-interest bearing deposits. Term Treasury repo rates have fallen below 25bp.

Source: Federal Reserve, Barclays Research

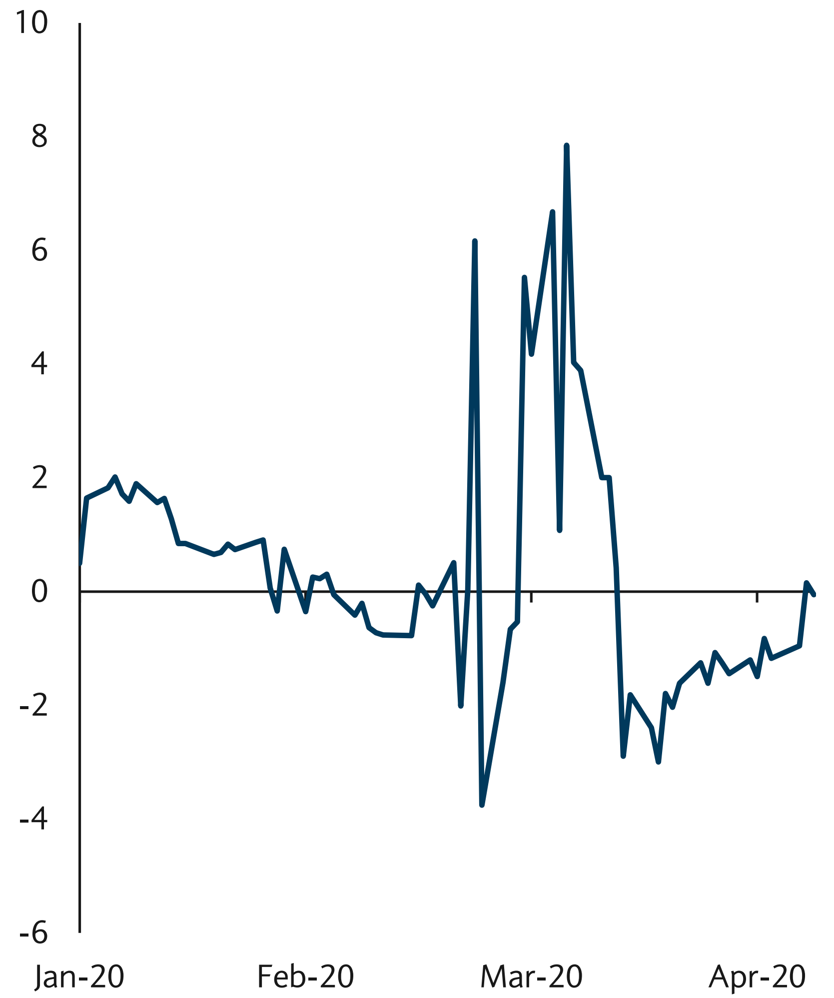
Rate or balance sheet?

- Is this a question of the rate – that is, are market rates cheaper than Fed-provided financing?
    - Term repo rates have fallen – although they are higher than the 25bp offered for the types of less liquid collateral eligible in the PDCF
- Or does it reflect balance sheet constraints on bank intermediaries?
    - Pledging customer collateral for cash in either program expands the banks' balance sheet
- *If this was only a rate issue, low discount window use would suggest that markets are amply re-liquefied*

Term SOFR rates have fallen

- Term SOFR rates have come down as the Fed's operations have significantly expanded liquidity
  - And balance sheet pressures have eased[1/]

3m term SOFR less OIS (bp)

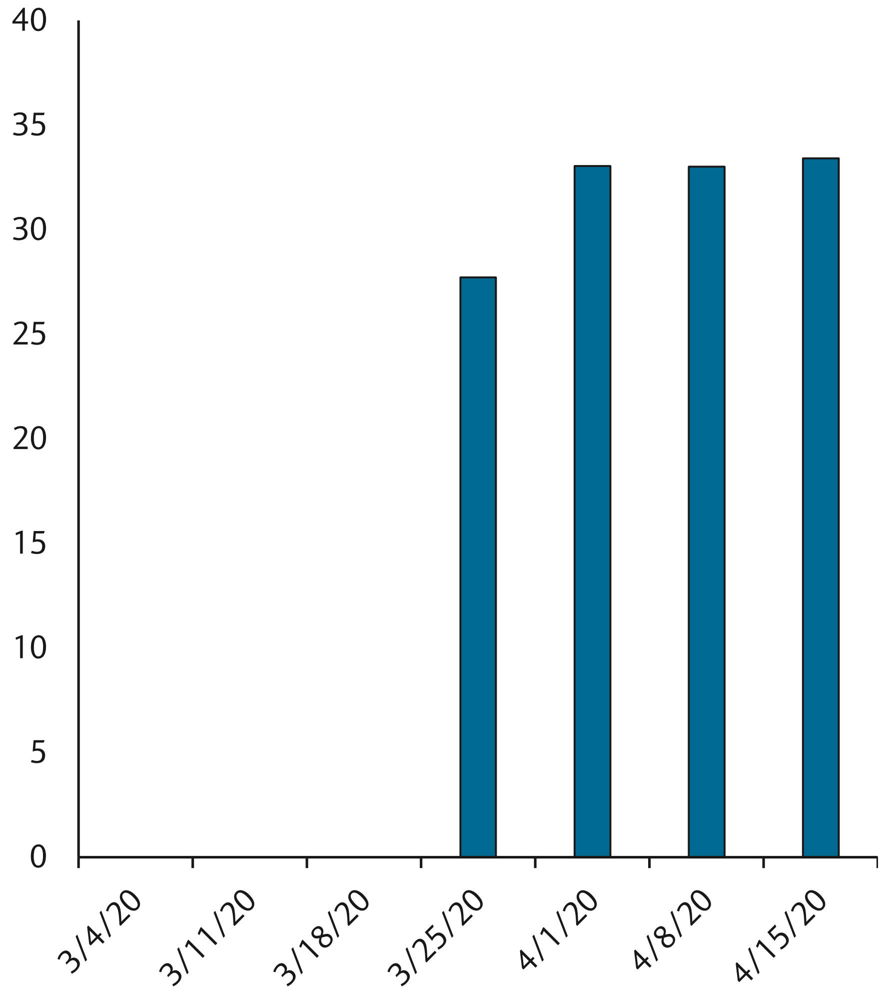


1/ Balance sheet costs typically add 15bp or more onto the term SOFR-OIS spread, depending on dealer balance sheet availability.

Source: Federal Reserve, Barclays Research

PDCF activity has also been light

PDCF balances ($bn)



Source: Federal Reserve, Barclays Research

- The PDCF program accepts a wide range of collateral
  - Dealers can pledge securities to the Fed for 3m cash at 25bp
- But, like the discount window, program use has been lighter than expected

Stigma?

- Could banks be reluctant to use the discount window – despite the Fed's encouragement?
  - The Term Auction Facility – an auction program for discount window loans created during the financial crisis – had more use than the discount window

- Post-crisis disclosure requirements may make banks leery of using any of the Fed's 13(3) liquidity facilities
  - By law, the Fed is required to publish detailed, transaction-level data on these programs a year after they end[1/]
    - Most of the Fed's 13(3) liquidity programs will stop accepting new loans at the end of September 2020
      - And their short-maturities mean the Fed may be publishing transactions data in early 2022

1/ See Liquidity Programs: How much will be disclosed and when?, April 2, 2020

Fed credit programs[1/]

- The Fed's most recent programs have focused on getting credit to small businesses and municipalities
  - These leverage funding provided by the Treasury through the CARES Act
  - And are the first time the Fed is lending to businesses and municipalities
    - Although several of the programs work through banks as "re-distributors" of loan financing

- Several of these programs have yet to be launched

1/ For more details on these programs see, Fed boosts its credit support to '11', with help of Treasury, April 9, 2020.

Federal Reserve Credit Programs (1)

Program	Term	Fees	Size	Counterparty	Collateral	Description
Main Street New Loan Facility (MSNLF)	4y loan	a) Eligible lender pays 100bp fee to the Fed on the principal amount of the loan (this can be passed to the borrower) b) The Fed will pay the lender a 25bp servicing fee on the amt of its participation	600bn	US banks and bank holding companies	a) Unsecured loans made to firms with less than 10,000 employees or $2.5bn in revenue; b) Loan maturities are 4y; c) Amortization of principal and interest deferred for 1y; d) Adjustable rate; SOFR +250-400bp; e) no prepayment fees; f) min size is $1mn; max size is the lesser of $25mn or an amount when added to existing debt does not exceed 4x 2019 EBITDA	Fed will provide funding to banks so that they can make small business loans
Main Street New Loan Facility (MSNLF) -- expanded facility	4y loan	see above	included in the $600bn	see above	a) same collateral and loan terms except the max loan size is the lesser of i) $150mn, ii) 30% of the borrower's existing debt and undrawn credit lines, and iii) the amount that when added to existing debt does not exceed 6x EBITDA	

Source: Federal Reserve, Barclays Research

Federal Reserve Credit Programs (2)

Program	Rate (bp)	Term	Fees	Size	Counterparty	Collateral	Description
Paycheck Protection Program Liquidity Facility (PPPLF)	35bp	a) Fed loan matches the maturity of the bank's PPP loan; b) PPP loans have a 0 risk weighting and no effect on the bank's leverage ratio; c) there is no haircut; the Fed will lend the bank the full amount of the PPP loan	none	350bn	a) US Banks and some non-bank lenders	Paycheck Protection Program loans guaranteed by the Small Business Administration	Fed will provide funding collateralized with PPP loans that are backstopped by the SBA
Term Asset-Backed Lending Facility (TALF)	2y Libor swap+100bp or 3y Libor swap+100bp1/	3y loan	a) 10bp administration fee b) Published collateral haircut schedule	100bn	All US companies with eligible ABS collateral	a) New ABS issued after March 23, except for legacy CMBS b) CLOs, CMBs have been added c) Credit exposures underlying the ABS must be originated all (or substantially) by US companies d) SBA pool certificates and development company participation certificates	a) US companies will be able to borrow 3y money from the Fed collateralized with newly issued ABS b) Loans provided are non-recourse to the borrower c) Treasury will make a $10bn equity investment in the TALF SPV

1/ Depending on the WAL of the underlying assets
Source: Federal Reserve, Barclays Research

Federal Reserve Credit Programs (3)

Program	Rate (bp)	Term	Fees	Size	Collateral	Description
Primary Market Corporate Credit Facility (PMCCF)	Fed will purchase paper from the issuer at a market rate	up to 4y	100bp facility fee	500bn	a) New issue corporate debt rated BBB-/Baa3 or higher; b) Lower rated debt (to BB-) is eligible if the borrower is subsequently downgraded; c) Syndicated loans are eligible; d) Maximum limit per issuer is 130% of the max debt outstanding between 3/22/2019 and 3/22/2020; e) the Fed will not buy more than 25% of the outstanding issue amount	a) The Fed will buy newly issued corp bond directly from the issuer b) Recourse to the issuer c) Treasury will make a $50bn equity investment in the PMCCF SPV
Secondary Market Corporate Credit Facility (SMCCF)	market price	up to 5y	none	a) 10% single name limit based on the max outstanding between 3/22/19-3/22/20 b) 20% of eligible ETFs' assets as of 3/22/20 c) the Fed will not buy than 1.5% of the issuer's debt across the PMCCF and the SMCCF	a) Investment grade corporate bonds with remaining maturities of less than 5y b) US listed ETFs with exposure to investment grade and high yield corporates	a) The Fed will buy eligible corporate bonds and ETFs from the secondary market b) Treasury will make a $25bn equity investment in the SMCCF SPV

Source: Federal Reserve, Barclays Research

Federal Reserve Credit Programs (4)

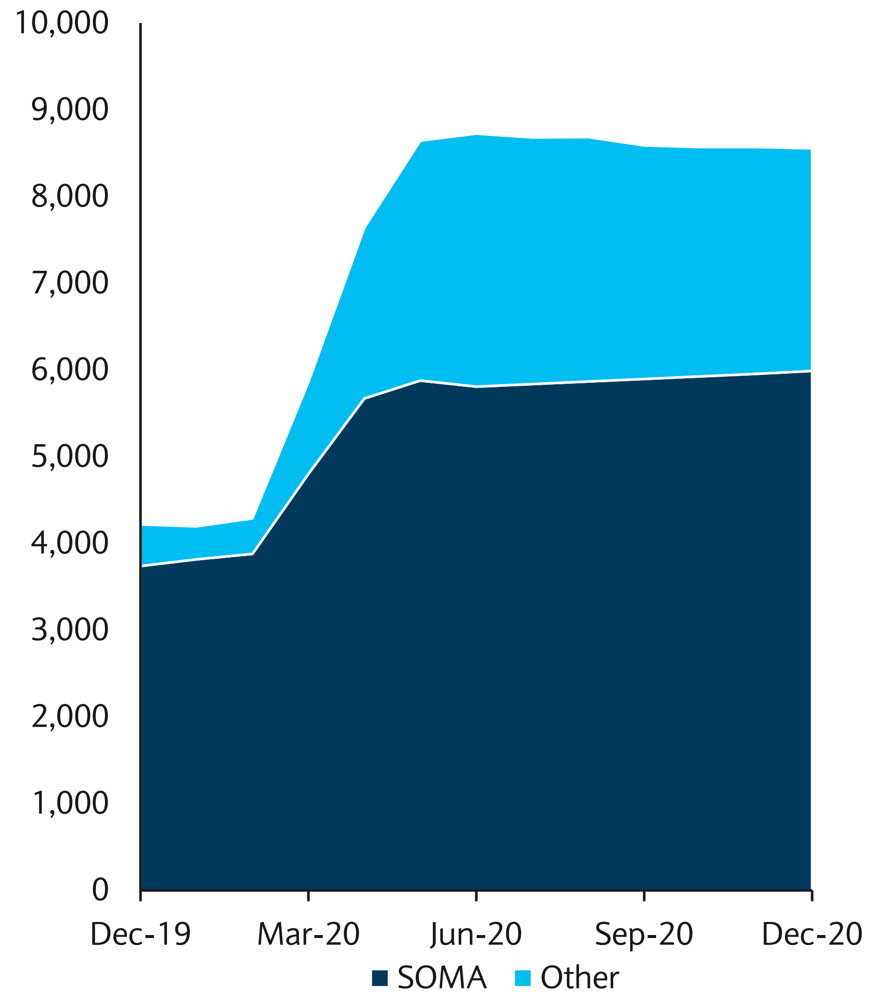
Program	Rate (bp)	Term	Fees	Size	Counterparty	Collateral	Description
Municipal Liquidity Facility	a) Fed will purchase paper from the issuer; b) Issuer's rating will determine the rate	up to 24m	10bp origination fee based on the principal amount	500bn	a)States, cities, and counties with 1m and 2m residents, respectively; b) size limit of counterparty set at 20% of general revenue from own sources and utility revenue from FY 2017	a) Tax anticipation notes, tax and revenue anticipation notes, and other short-term debt	a) Fed will buy short-term municipal debt from issuers b) the Treasury will provide a $35bn equity investment into the Municipal Liquidity Facility SPV

Source: Federal Reserve, Barclays Research

How big will the Fed's balance sheet get?

- It is difficult to predict how much demand the Fed will have for either its liquidity and credit programs
  - Our sense is that the liquidity programs are close to their maximums
- If we assume that all the credit programs are maxed out, the Fed's balance sheet could reach or exceed $9trn by fall

Federal Reserve assets ($bn)

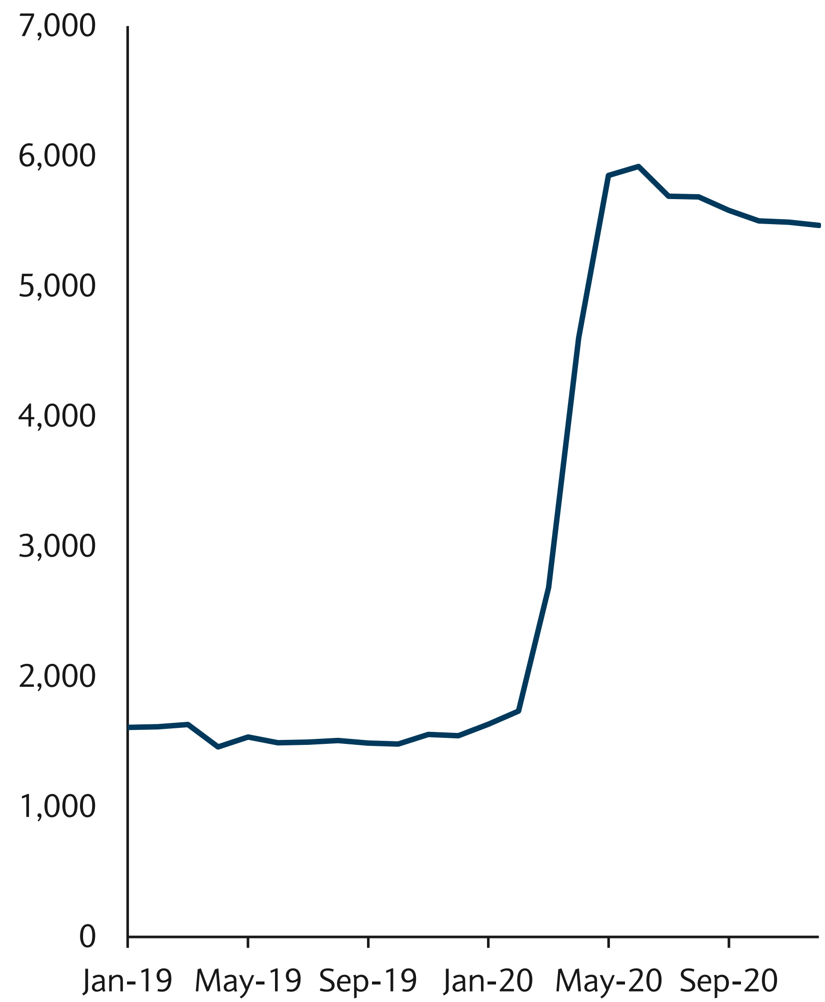


Note: Other includes liquidity programs like the MMLF and open market operations as well as credit programs such as the PMCCF and the TALF. Source: Federal Reserve, Barclays Research

How much bank reserves?

- Bank reserves could be between $5.5 and 6trn by the end of September
    - From less than $1.4trn a year-earlier when repo rates spiked
        - As of April 15, bank reserves were $3.1trn

Bank reserves ($bn)



Source: Federal Reserve, Barclays Research

Balance sheet pressure[1/]

- All these reserves will take up space on bank balance sheets
  - Choking out bank lending securities purchases

- The Fed has provided some balance sheet relief
  1. In exempting reserves and Treasuries from the supplemental leverage ratio calculation
  2. And exempting bank participation in the money market liquidity (MMLF) and paycheck protection program liquidity facility (PPPLF) from risk and leverage ratio capital assessments[2/]

    - *However, these efforts are meant more to prevent further economic harm than to put banks on the offensive, so that they can make more loans or buy more securities*

1/ For more details, see Bank regulatory relief, more defense than offense, April 15, 2020.
2/ The PPPLF was opened on April 16, 2020.

Bill issuance

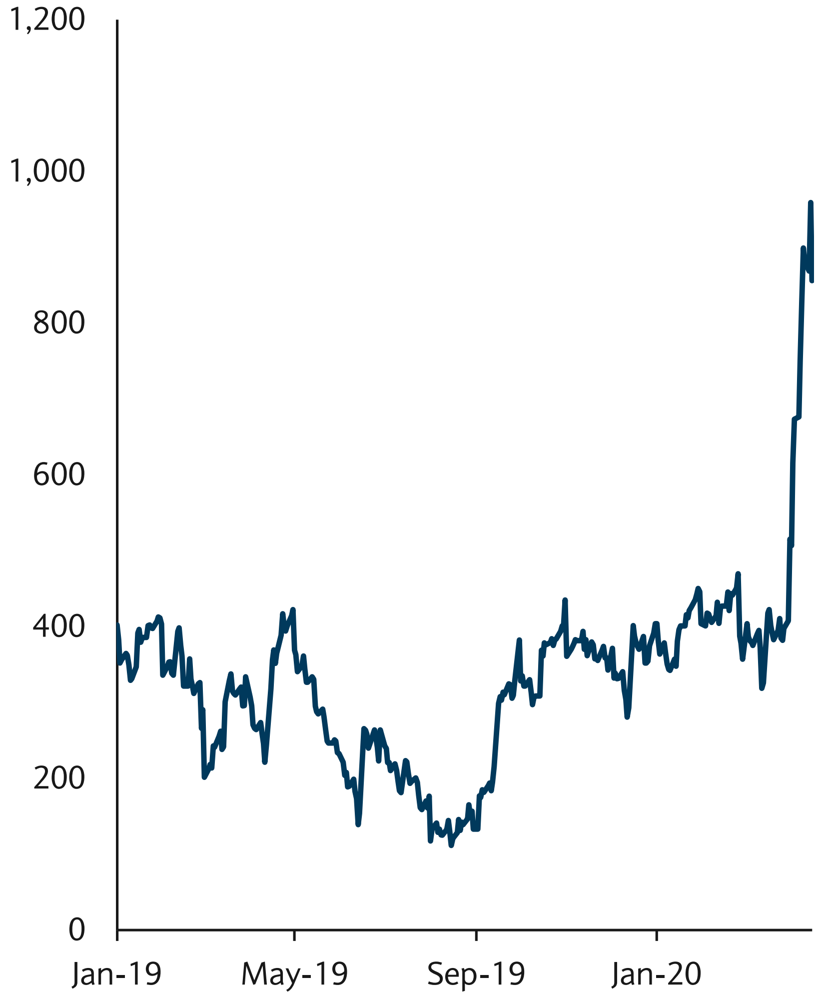
Massive bill issuance…

- To raise the cash necessary to finance parts of the CARES Act quickly, the Treasury has ramped up its bill issuance
  - This cash is needed to send out $350bn in checks to households and to finance the emergency spending required under the CARES Act
  - The Treasury also needs to cover its expenses from having postponed the April 15 tax due date until October

- *We expect the Treasury to need to issue $825bn in bills this quarter*

…has boosted the Treasury's cash balance

Treasury cash balance ($bn)



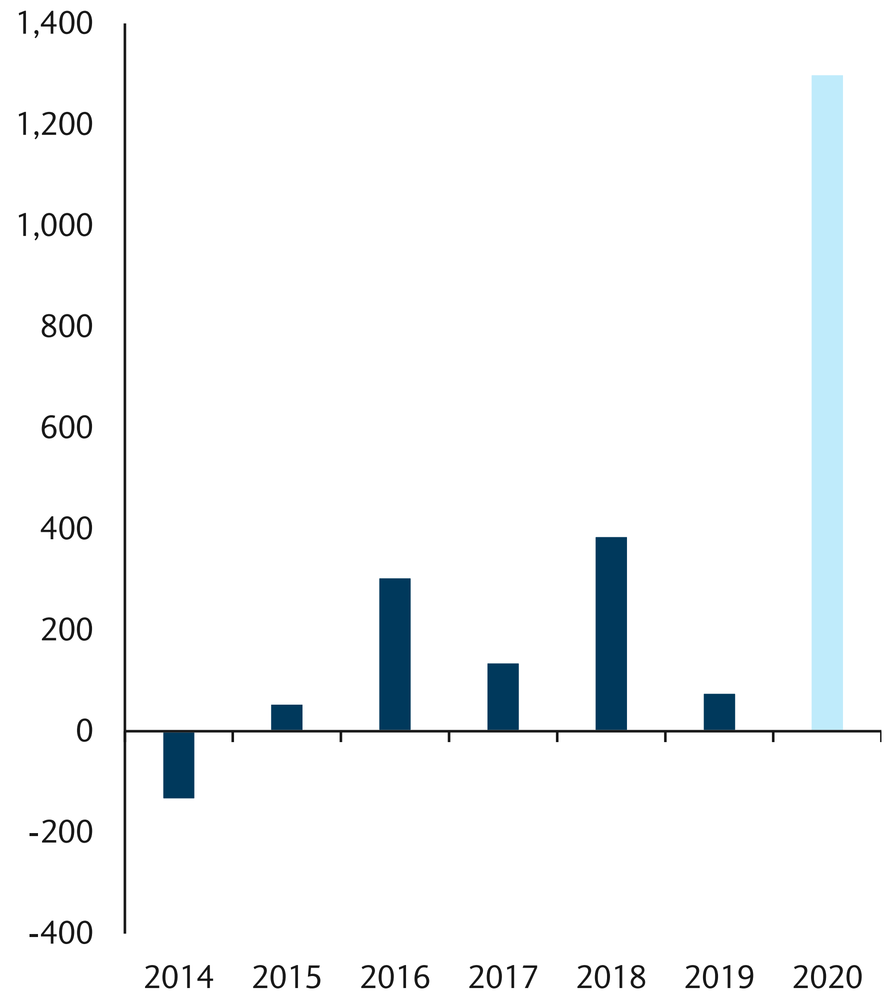
Source: US Treasury, Barclays Research

- The cash raised is initially piling up in the Treasury's account at the Fed
  - But this balance will quickly fall over the next few weeks

Rapid bill expansion…

- In the first three weeks of April, the Treasury has issued more bills than in most full years (nearly $900bn)
  - Most of this supply has been in cash management bills
    - With late spring and fall maturities
- We expect the Treasury to issue $1.3trn in bills this year
    - *Although issuance could be larger depending on future stimulus (Phase IV) packages*

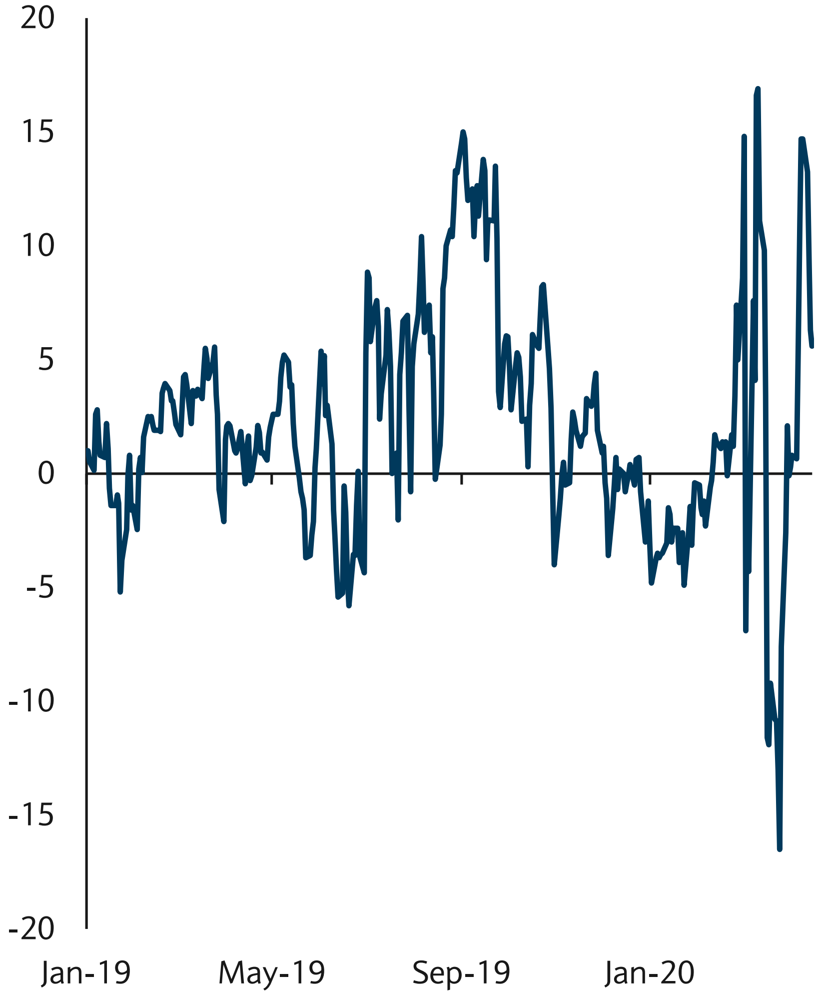
Annual bill issuance ($bn)



Source: US Treasury, Barclays Research

…has cheapened bill yields…

3m bills less OIS (bp)

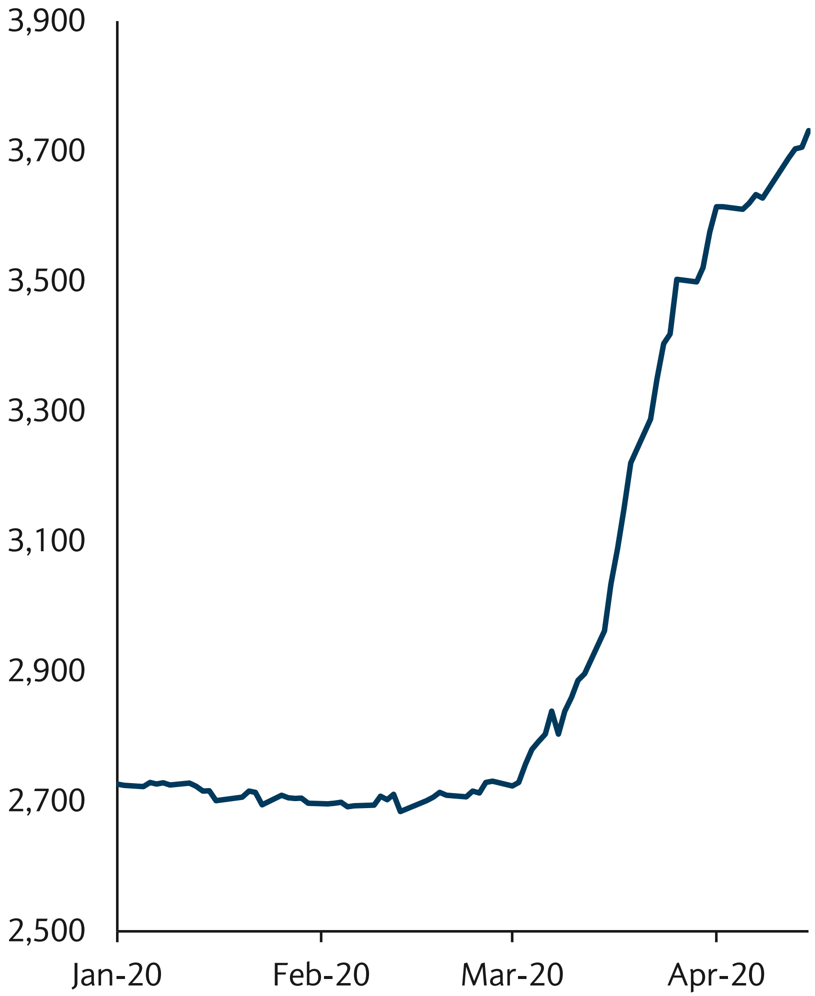


Source: Federal Reserve, Barclays Research

- Heavy bill issuance has already pushed yields up about 15bp
- *Continued heavy issuance could push bill yields 20bp above OIS by summer*

…although the effect has been muted by strong demand

Gov-only fund balances ($bn)

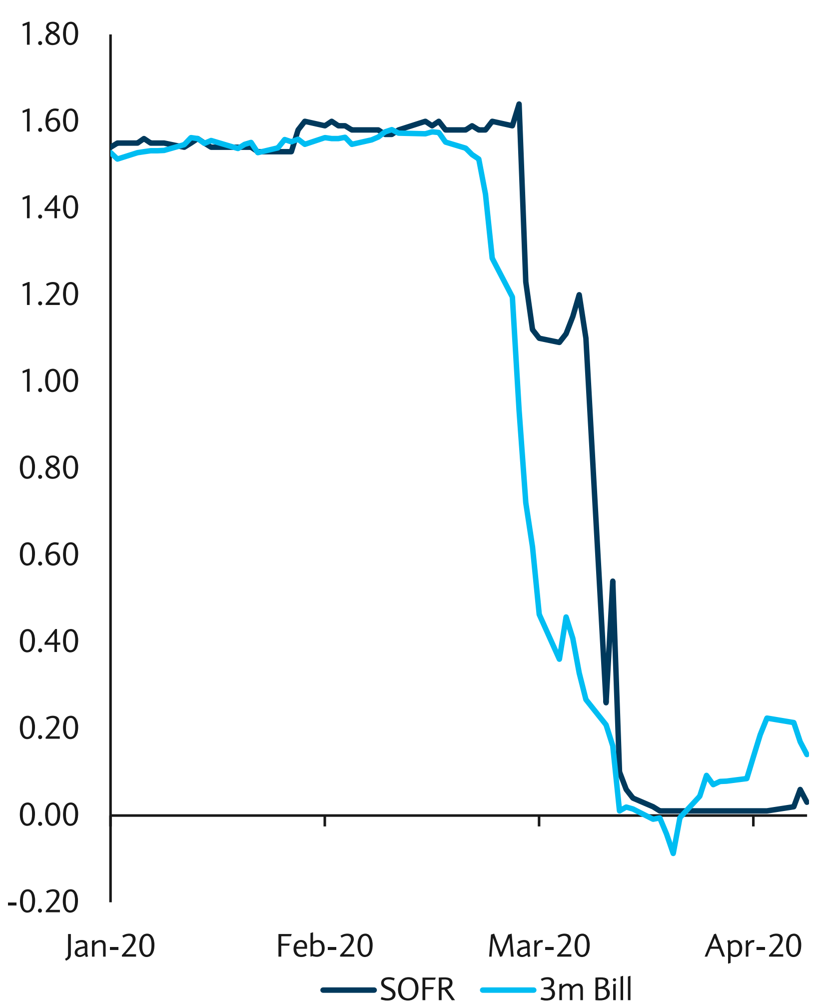


- A portion ($300-400bn) of this massive bill issuance has been absorbed by money funds
  - Money funds are experiencing very strong inflows
    - *Although these have started to slacken*

Source: Crane's Data, Barclays Research

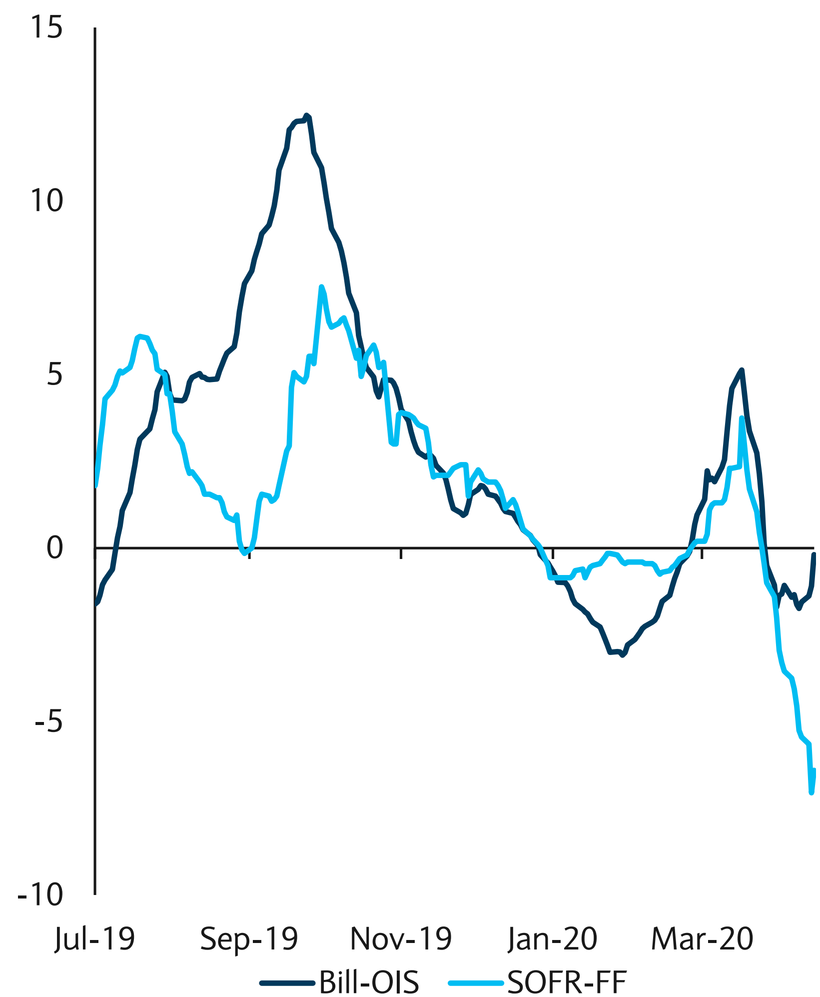
Higher bill yields will pull repo rates higher

3m bills and SOFR (%)



Source: Federal Reserve, Barclays Research

Repo and bill spreads (bp)

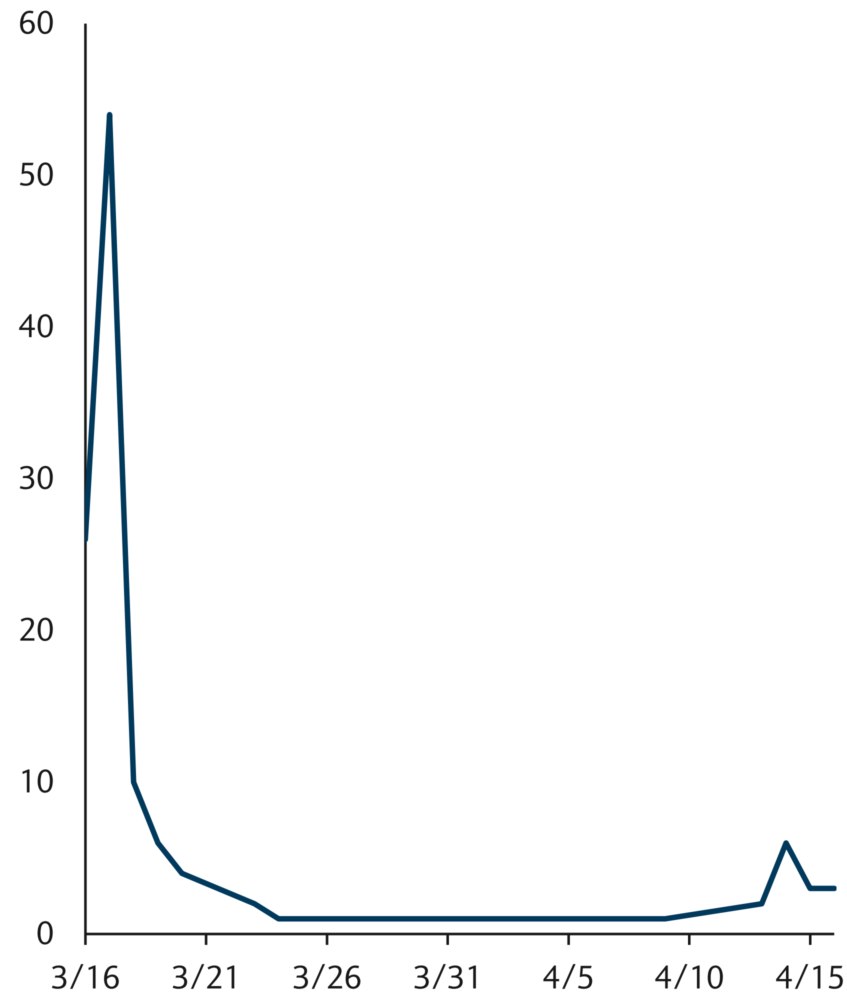


Note: 20d average. Source: Federal Reserve, Barclays Research

Overnight repo rates have crept higher

- As competition from higher-yielding bills picks up, repo rates have started to creep higher
  - The Fed's reserve expansion and asset purchases have dramatically improved repo market liquidity
    - Which was severely strained in mid-March

SOFR (bp)

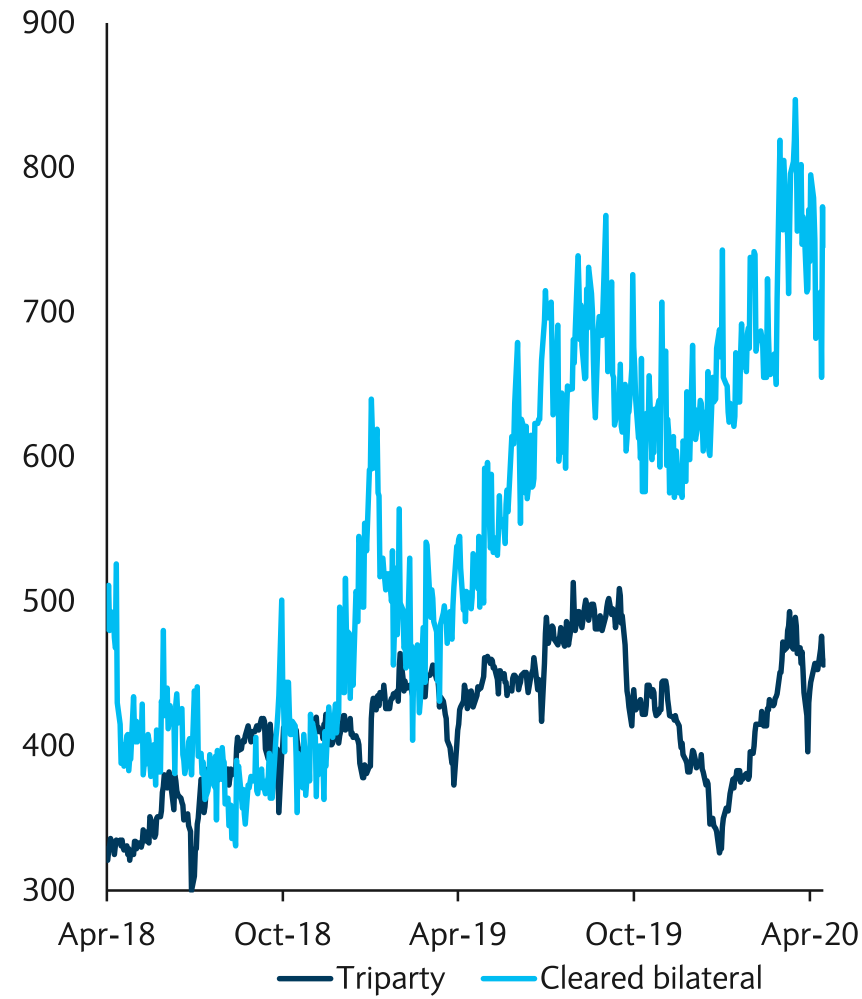


Source: Federal Reserve, Barclays Research

Repo volumes are rising

- SOFR volumes continue to rise
  - With the fastest growth in overnight cleared bilateral activity
    - Which accounts for about 60% of daily SOFR volume
- The growth in centrally cleared repo reflects the fact that banks and dealers remain balance sheet sensitive
- *Will changes to the SLR free up more overnight repo balance sheet?*

SOFR volumes ($bn)



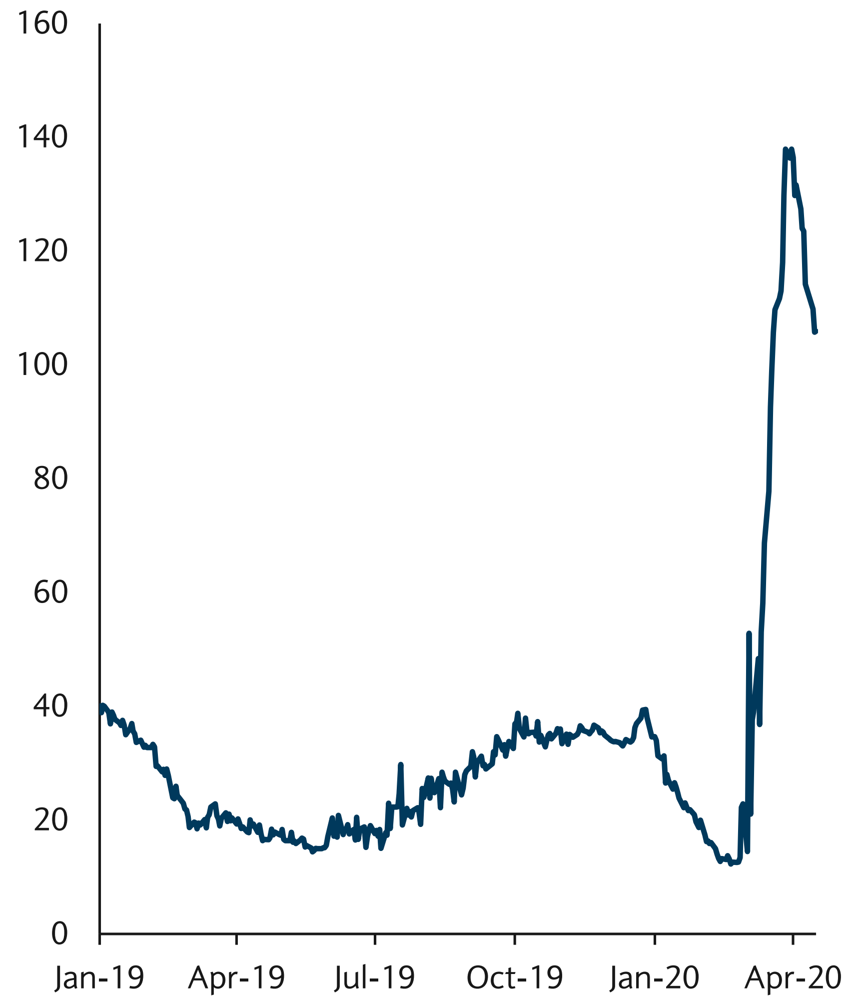
Source: Federal Reserve, Barclays Research

Commercial paper and LOIS

Commercial paper markets froze in March

- CP issuance froze in March as investors began to hoard liquidity
  - And balances started to flow out of prime funds and offshore money market funds
- Rates moved sharply higher as financial and non-financial issuers struggled to raise money
  - This stress was reflected in LOIS – which widened to over 100bp
    - And remains unusually high

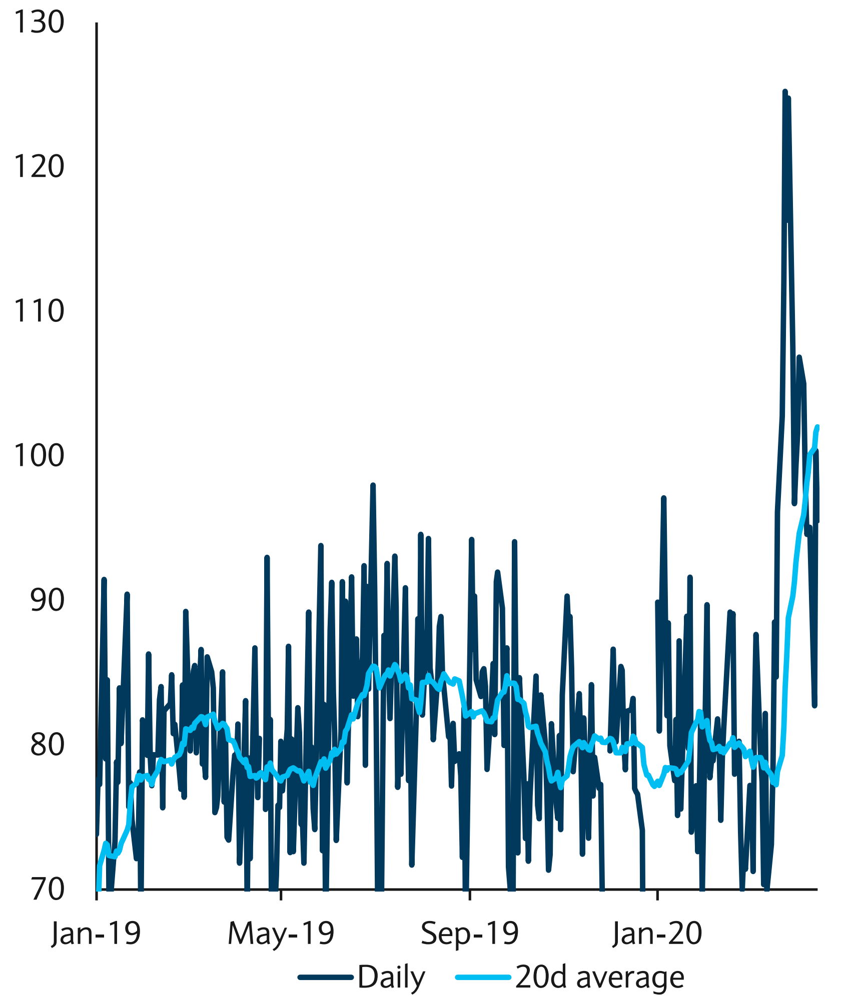
LOIS (bp)



Source: Bloomberg, Barclays Research

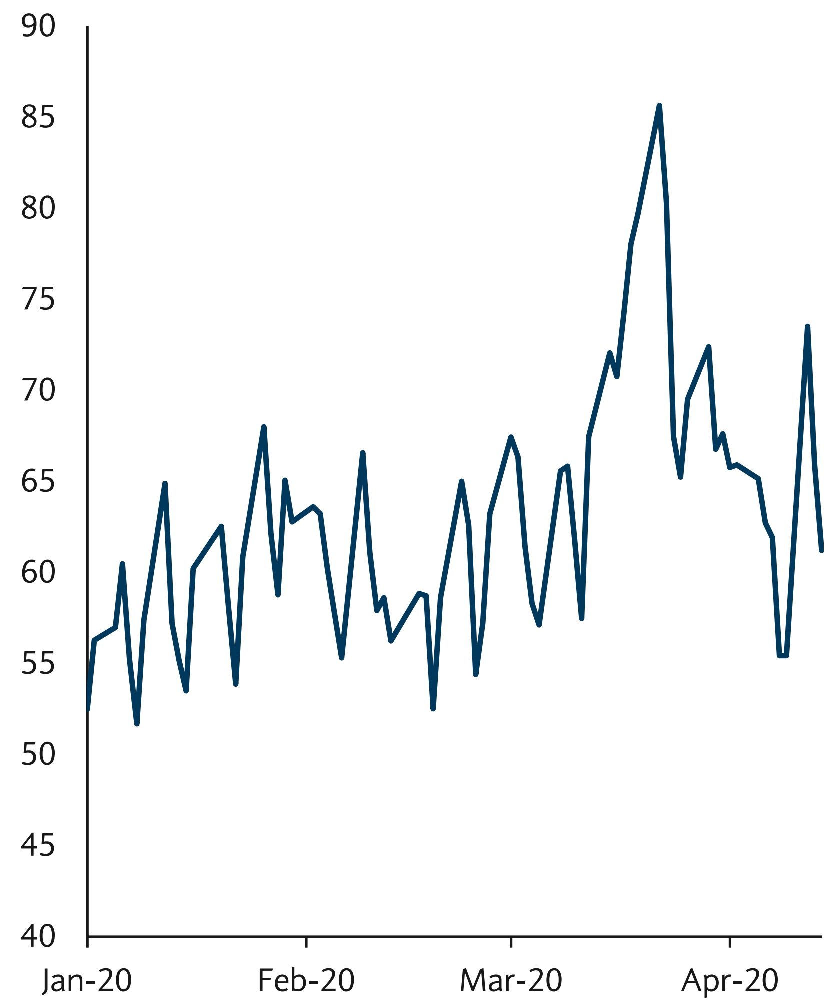
CP issuance rose, but maturities shortened…

Daily issuance ($bn)



Source: Federal Reserve, Barclays Research

Overnight to 4d maturity (% total)

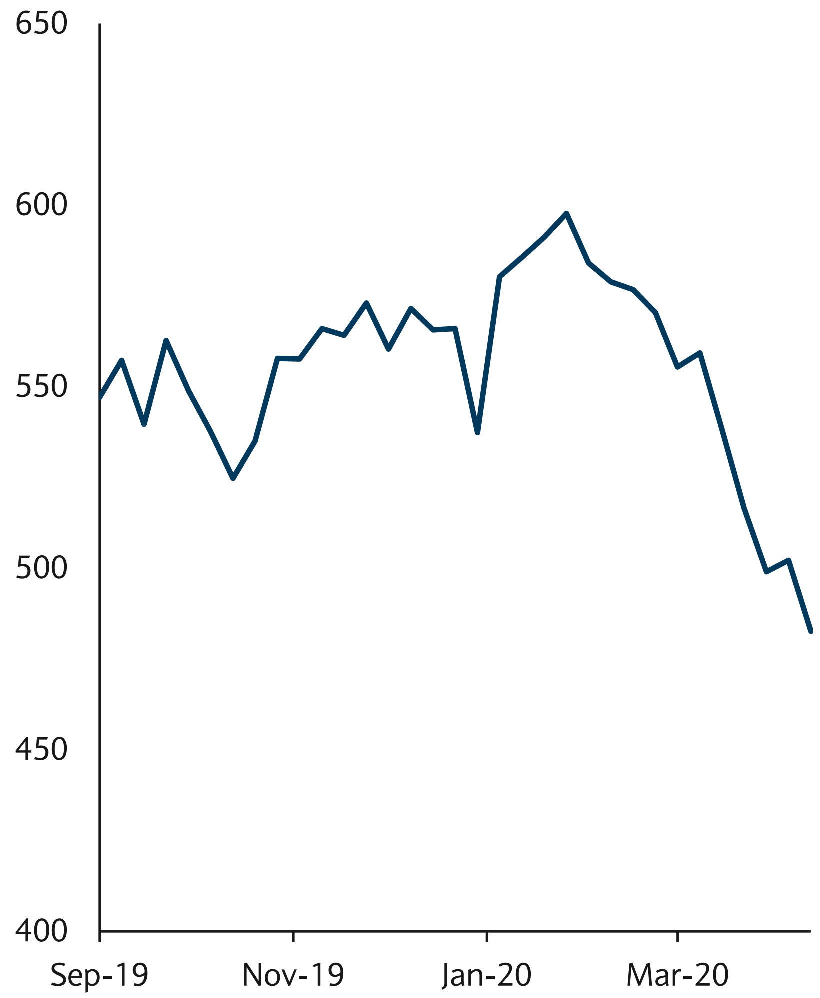


Source: Federal Reserve, Barclays Research

…and the market has shrunk

- As issuers struggled to raise term money, they shifted their borrowing to very short-maturities
  - Daily issuance picked up, but borrowers had more paper to roll each day
- Some issuers decided not to roll their paper
  - And sought other financing
- As a result, outstanding CP volumes are shrinking

Financial CP outstanding ($bn)



Source: Federal Reserve, Barclays Research

Fed reaction

- The Fed moved quickly to address the seizing up in the CP market
  - Using tools created during the financial crisis, when the market remained frozen for two months[1/]
- The CPFF allows issuers to raise money by selling CP directly to the Fed
  - The program rate is OIS+110bp, plus a 10bp registration fee
- The MMLF enables banks and dealers to buy assets from money funds using funding provided by the Fed
  - The program allows money funds to sell their less liquid holdings in return for cash that they can use to meet redemptions
    - It prevents asset fire sales

1/ AB-CP markets were frozen for much longer, however.

CPFF: Will it work?

- *Will the CPFF work to free up CP markets – and, by extension, LOIS?*

- We expect program demand from banks will be light
  - Banks seem to have plenty of access to financing
    - Whether from the discount window or offshore through the cross-currency basis market and the central bank swap lines
    - Market rates are 1.00-1.15% and, thus, not much more expensive than the Fed's CPFF rate (including the fee)[1/]

- Unlike 2008, we expect most of the demand for the CPFF to come from large non-financial companies[2/]
  - Seeking to raise working capital to finance payrolls and operations as the economy is shut down

1/ The registration fee applies to the maximum amount of CP the issuer had outstanding between March 2019 and March 2020.
2/ Outstanding balances on April 15 – its second day – were just under $1bn.

CPFF: Indirect effects

- We think the CPFF will have two indirect effects on LOIS

1. It sets the maximum rate for 3m unsecured bank CP (at ~1.17%, excluding the fee)

2. Early users of the program will be able to lock in funding for 3m
    - And will have less need to roll short-maturity paper
    - As their issuance goes down, we expect other borrowers to be able to come into the market
        - And issue at lower rates

Our sense is that program use will decline sharply when the first 3m paper issued into the program starts to roll off in June

LOIS decline

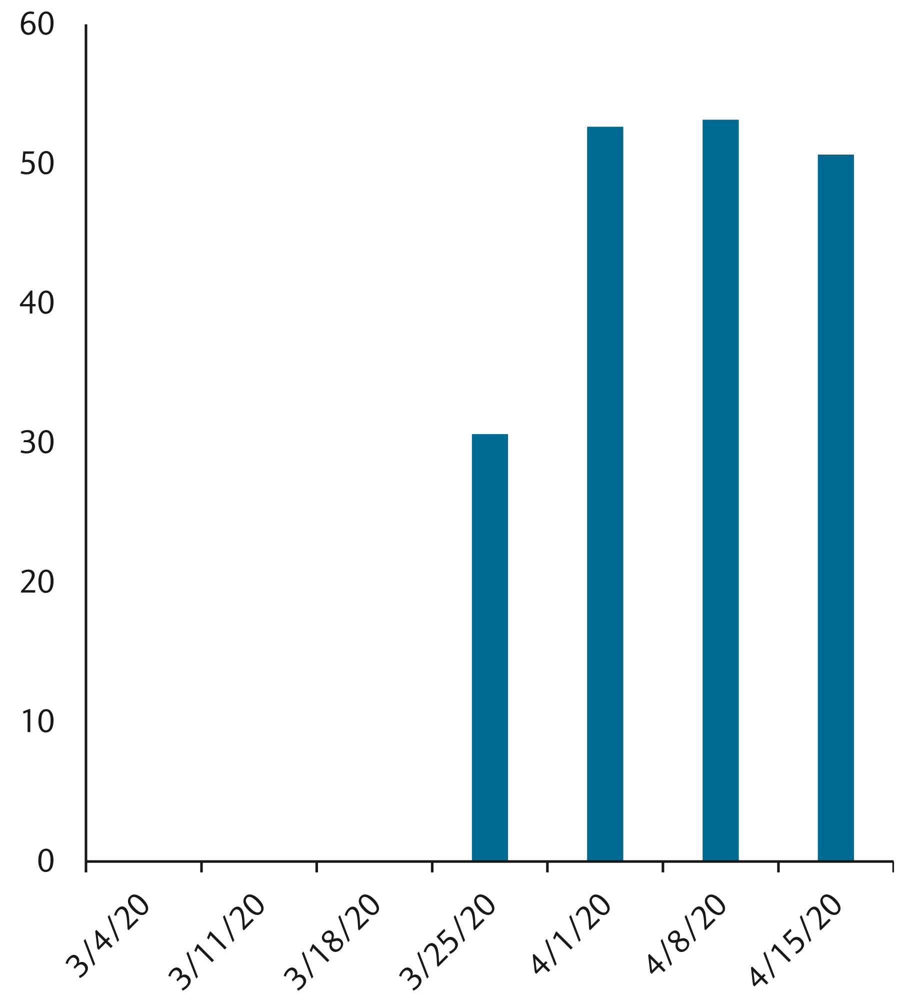
- CP markets seem to be mending
  - More issuance at longer maturities
  - And rates are coming down

- We look for LOIS to fall to 45bp at the end of June
  - And 25bp at the end of September

MMLF use is light

- The MMLF program allows money funds to sell assets to banks, which use them as collateral for cash loans from the Fed
    - The cash is then passed to the money fund
- Program use has been relatively light
    - *And is expected to fall as no new assets are added to the program and existing holdings mature*

MMLF balances ($bn)

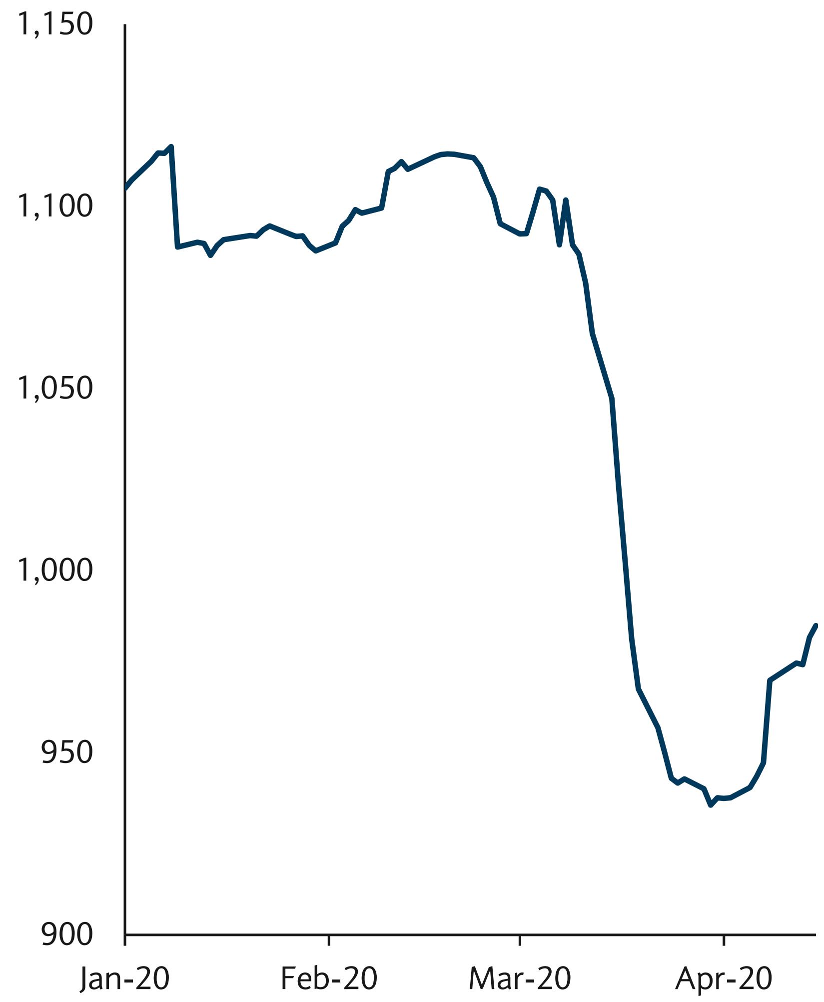


Source: Federal Reserve, Barclays Research

Prime fund balances are stabilizing

- MMLF balances are low because prime fund balances have stabilized
  - Funds have less need to sell assets to raise liquidity to meet redemptions

Prime fund balances ($bn)



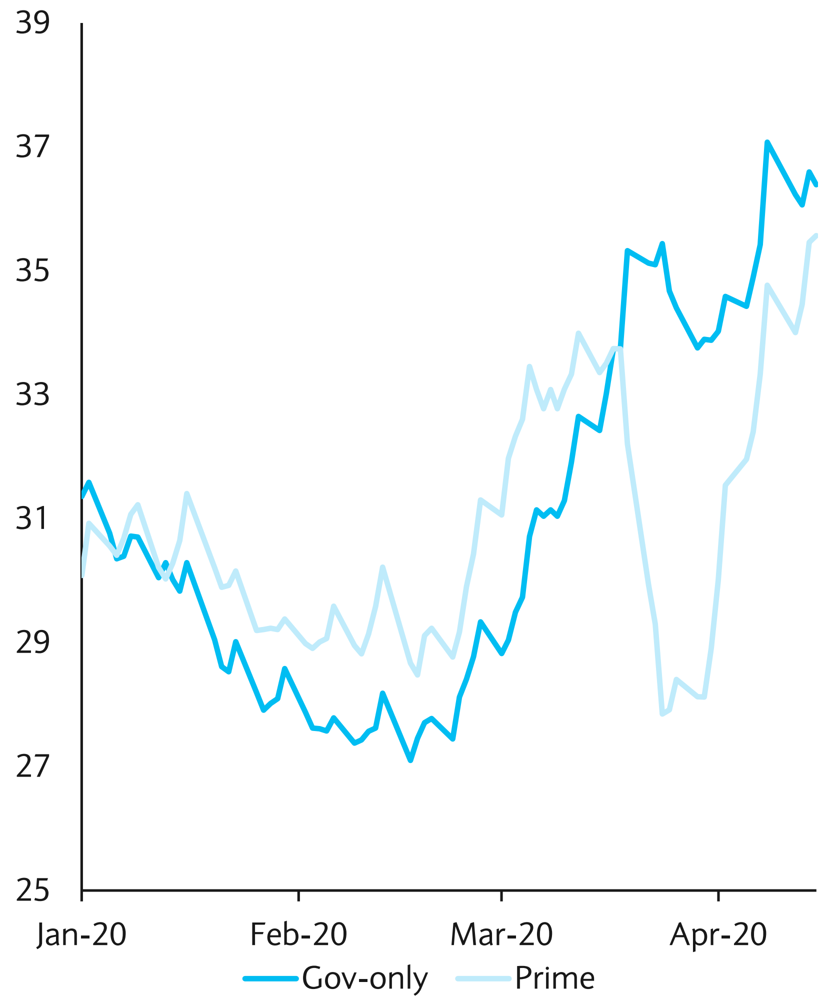
Source: Crane's Data, Barclays Research

But what will prime fund portfolios look like?

- After the seizing up of the CP market, will money funds resume buying paper?
  - Or will they limit their purchases to only <3m CP?

- Portfolio WAMs have moved higher in recent weeks

Money fund WAMs (d)



Source: Crane's Data, Barclays Research

Terming out

- Given the flatness of the money market curve, we expect money funds (both prime and gov-only) to lengthen their portfolio WAMs
  - To over 50d

- And given the availability of bills, we expect these portfolios to become heavily skewed toward Treasuries

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