

Treasury Market Functioning

Treasury market liquidity has, at times, been strained during recent episodes of broader market stress. What lessons have been learned in recent years regarding Treasury market structure and vulnerabilities in the non-bank financial sector, and what efforts should be considered to improve market functioning and reduce the need for public sector interventions during future episodes of heightened uncertainty?

May 2021

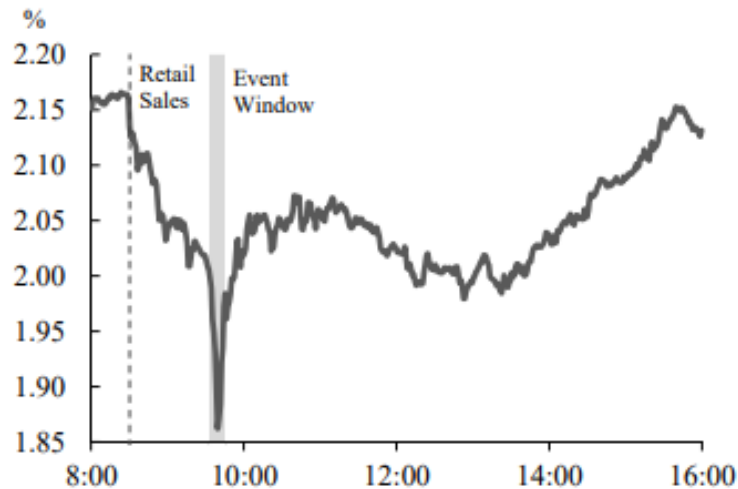
Agenda

- Events with notable shifts in UST liquidity
 - Flash Rally (October 2014)
 - Repo Spike (September 2019)
 - COVID-19 Crisis (March 2020)
 - February 25th, 2021
- What considerations do these events raise?
- What efforts could be made to improve market functioning in light of these considerations?

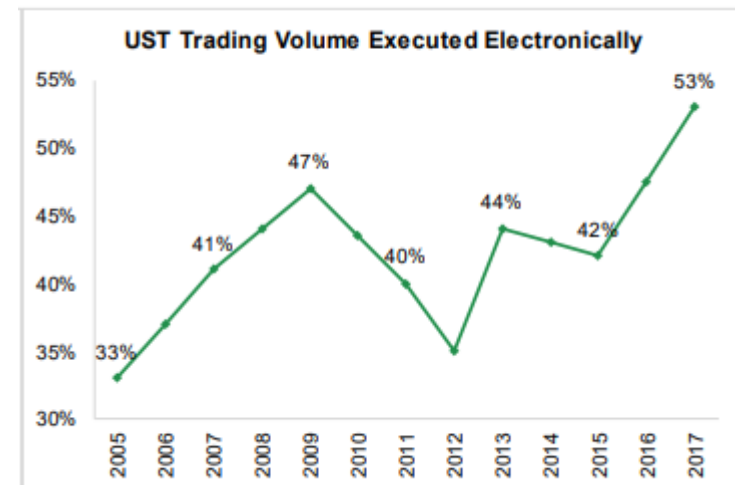
Stress in the Treasury markets: flash rally

- Over the past decade the Treasury secondary market has experienced four notable disruptions worth discussing: flash rally (October 2014), repo spike (September 2019), COVID-19 crisis (Spring 2020), and a liquidity breakdown following the 7yr auction Feb 25th, 2021.
- **Flash rally (October 2014):** On October 15th 2014 the 10y Treasury yields experienced a 37bp intraday trading range and loss of liquidity, despite the lack of an obvious trigger in the form of data or significant policy announcements. This, combined with the increase in electronic trading of UST, raised questions about the increased role of PTFs (Proprietary Trading Firms) in the UST market.
- Normalization happened without official sector intervention.

On Oct 15th 2014 the 10y UST yield collapsed intraday



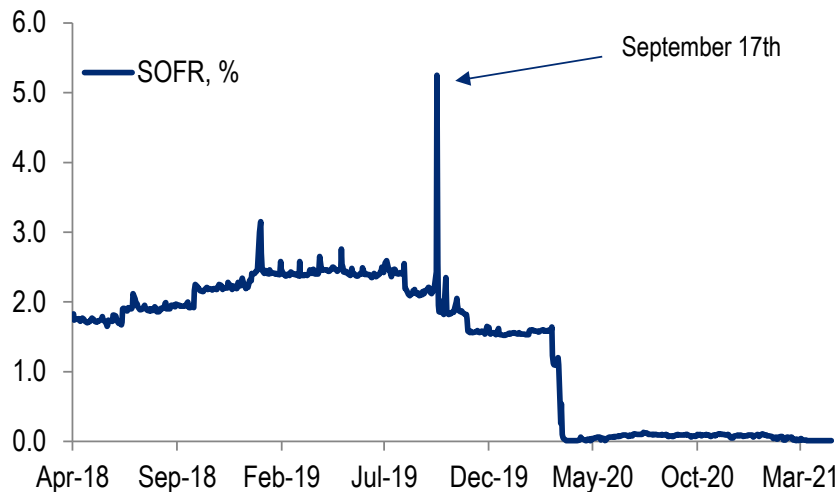
Electronic trading as a share of volume



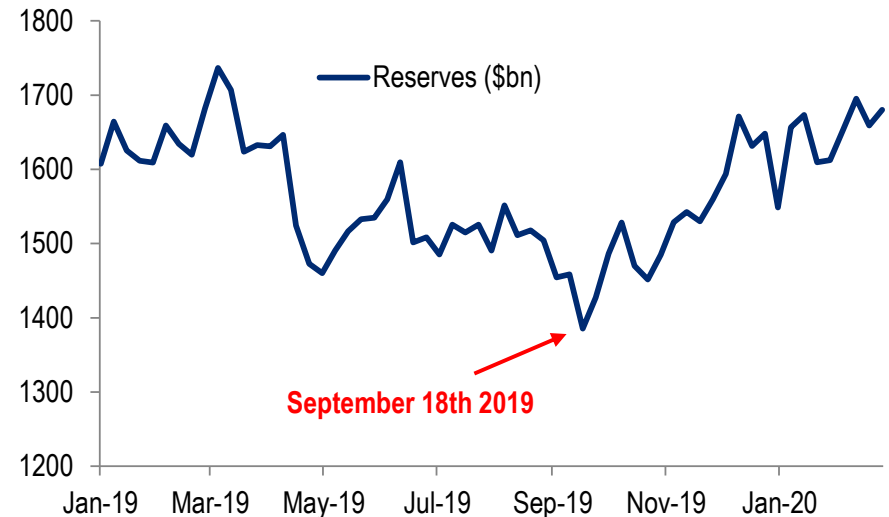
Stress in the Treasury markets: repo spike

- **Repo spike (September 2019):** On September 17th overnight Treasury repo rates spiked materially. That week there was a large drop in reserves due to corporate tax payments and settlement of UST issuance, coinciding with declining reserves due to the Fed's balance sheet normalization.
- It is important to note that this stress event originated as a funding crisis, due to scarcity of reserves. While this flowed through to UST cash liquidity, that was a response to funding volatility rather than a stress event driven by secondary market liquidity in UST.
- Through a combination of term and overnight repo operations, as well as technical adjustments to IOER and ON RRP, the Fed helped facilitate a return to normal market functioning.

Overnight repo rates spiked in 2019...



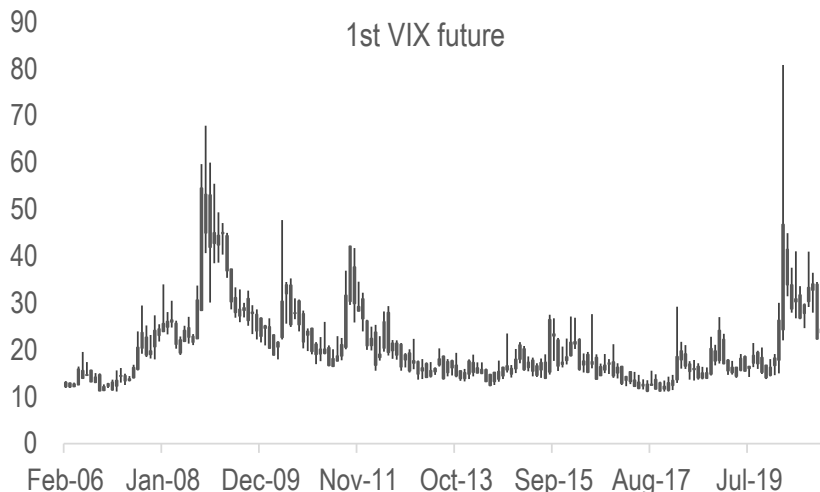
...as reserves shrunk



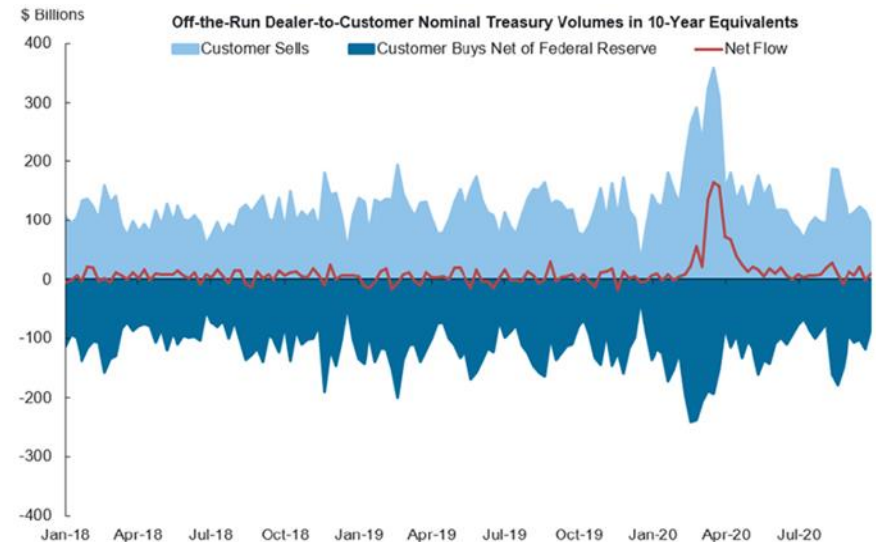
Stress in the Treasury Markets: COVID-19

- **COVID-19 pandemic:** The pandemic caused sweeping disruption and unprecedented uncertainty globally culminating in a series of business and government lockdowns in March 2020:
 - Increased economic uncertainty drove market volatility higher, widened credit spreads, and led to a rapid downdraft in equity markets. Volatility across financial instruments spiked, reducing risk tolerance, raising cash requirements in margin and, in some cases, forcing sales.
 - End users: Non-financial corporates tapped capital markets, demand for US dollars increased materially, prime money market funds (MMFs) experienced significant outflows, some open-ended funds experienced redemptions, and significant sales of USTs to fund the dash for cash.
 - Intermediators: Increased volatility and unprecedented scale and speed of market moves challenged risk intermediation. Regulatory constraints and operational challenges reduced flexibility in balance sheet and risk tolerance. Bid offer widened sharply, liquidity premium spiked in cash and futures, and market functioning was materially impaired.
 - Fed response was historic in scope and scale and restored functioning in the Treasury market and beyond.

VIX futures well surpassed '08 crisis levels



Weekly Treasury volumes net of Fed purchases, 10-year equivalents



Source: Bloomberg. Lorie Logan, "Treasury Market Liquidity and Early Lessons from the Pandemic Shock", 10-23-2020.

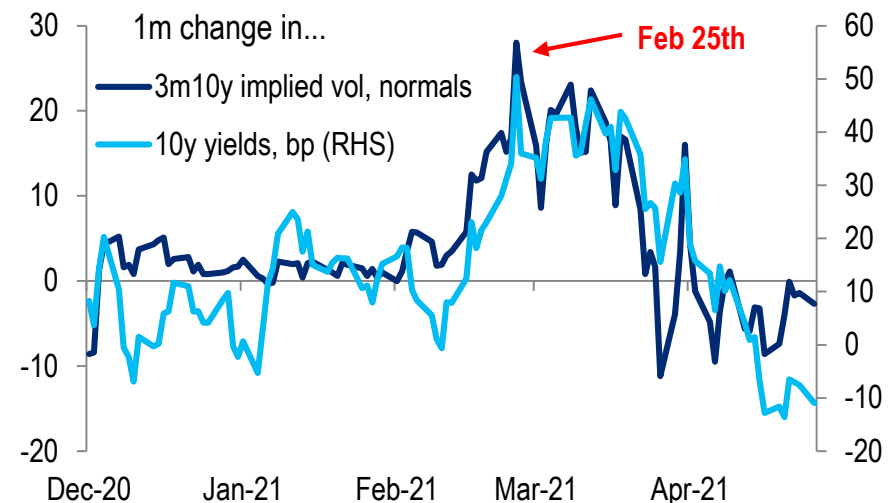
Stress in the Treasury Market: February 25th, 2021

- February 25th 2021:** the 20y bond had a significant liquidity event:
 - The 20y bond cheapened against the curve intraday. The 10s20s30s fly moved higher by ~15bp before normalizing back by the end of the 26th.
 - Liquidity had declined following a weak 7y auction at 1pm which tailed by almost 4.5bp (~3 standard deviation event).
 - The 20y point had been cheapening against the curve entering the 25th on the back of a relatively weak 20y auction on the 17th (tailed by over 2bp).
 - Market conditions trended towards normalization without intervention in the following days.
- Liquidity had begun deteriorating in early February as the Treasury curve bear steepened on the back of expectations for a stronger economic reopening and the \$1.9tn fiscal stimulus package:
 - 1m10y implied volatilities increased by ~30 normal vols from Jan ME to Feb 25th.
 - The market priced in a more accelerated rate hiking cycle: on Feb 25th expectations reached ~3 rate hikes by YE23 up from only 1.4 on January ME.

On the 25th 20y USTs cheapened up dramatically on an intraday basis following the weak 7y auction



Implied vol and yields moved higher into February



Source: Bloomberg; Note: The RHS chart reports rolling 1m changes

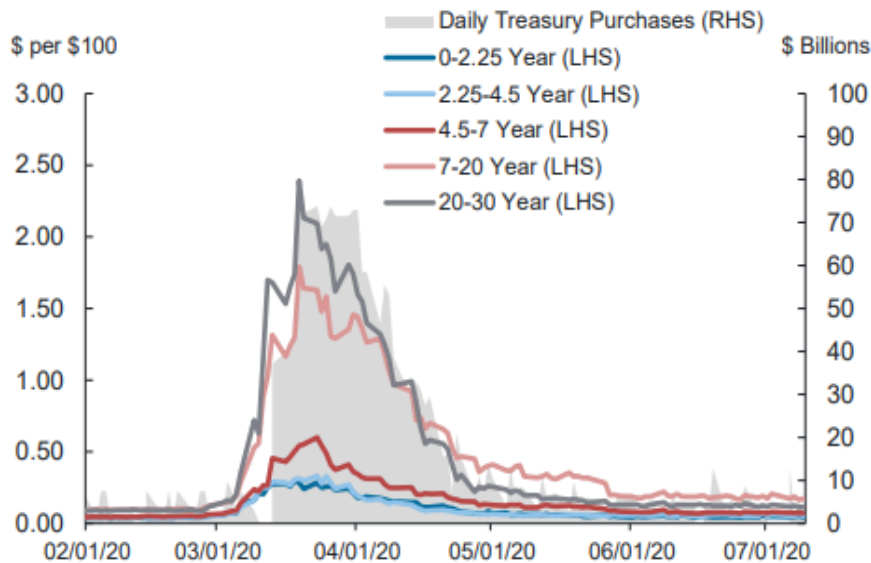
What considerations do these episodes raise?

- Liquidity within the UST complex can vary; on the runs tend to retain liquidity better
- Treasuries can be used as a source of cash in a time of stress, when other assets are less liquid
- Opportunistic players provide a valuable source of demand through cash/futures or broader relative value arbitrage, but quick exits can be disruptive.
- Intermediation has not kept pace with the scale of increase in the outstanding UST debt supply.
- While some episodes were naturally resolved, others required intervention from the official sector.
- Not all events have clear and easily anticipated triggers. Therefore tools to navigate volatility may be more valuable than tools that aim to fully prevent it.

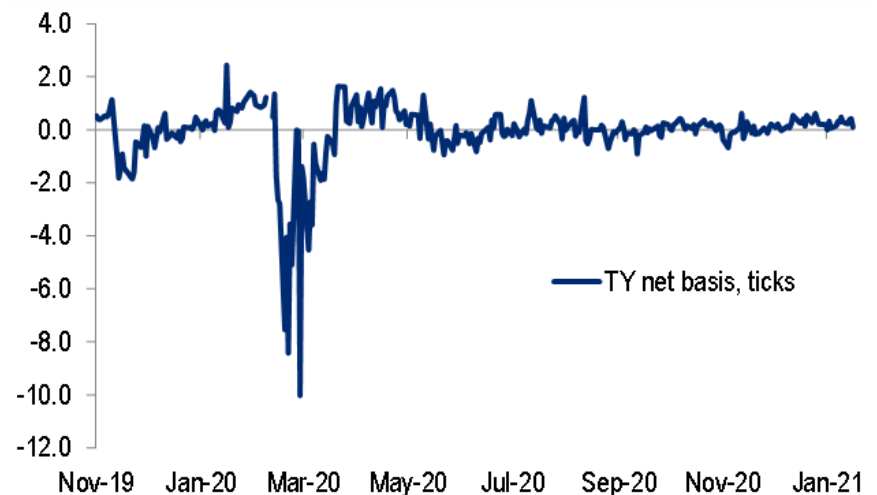
Liquidity within the UST complex can vary in times of stress

- Treasuries are frequently a source of safety in flight to quality episodes.
- In flight-to-quality episodes basis risk increases between off-the-run/on-the-run Treasuries and cash/futures.
 - For example in March 2020 investor demand was focused almost exclusively on on-the-run USTs and Treasury futures, both of which saw significant premiums to off-the-run securities.
 - Both on-the-run USTs and Treasury futures maintained better liquidity and volumes than off-the-run securities.

Treasury bid-ask spreads widened materially in March



Treasury futures premium increased over cash bonds in March 2020

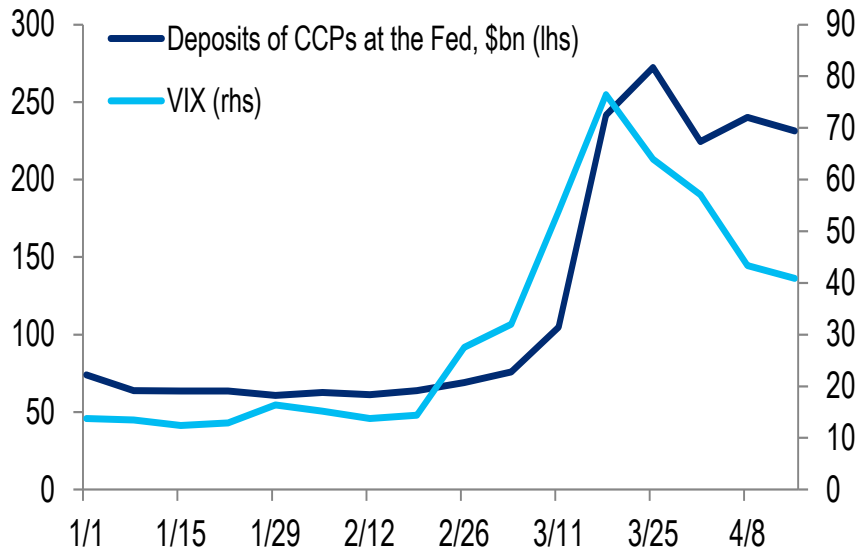


Source: Lorie Logan, "Treasury Market Liquidity and Early Lessons from the Pandemic Shock", 10-23-2020. Bloomberg

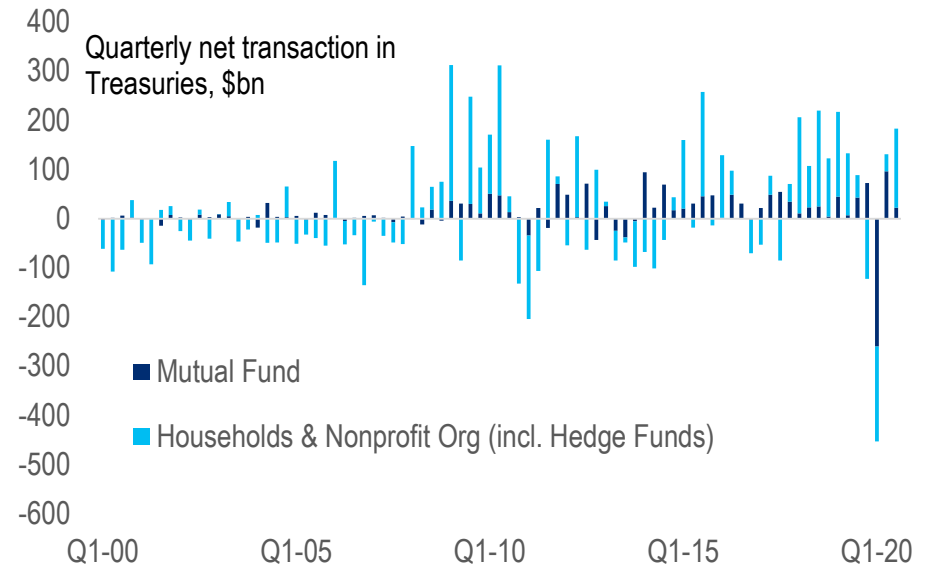
Treasuries can be a source of liquidity in a dash for cash

- Asset managers rely on treasuries for their unmatched liquidity especially in periods which require cash raises to offset increasing redemptions.
 - Liquidity challenges in other asset classes can drive selling in USTs.
- Foreign official accounts typically rely on USTs to store dollar holdings and assist in currency defense.
- Investors turn to the Treasury market to raise cash.
 - Margin requirements increased in March 2020; while not exclusively due to the increase in volatility, CCP deposits at the Fed increased by ~\$200bn.
 - Investors sourced duration in futures while selling off-the-run USTs to raise cash to meet redemptions.

Higher vol drove CCP IM requirements higher



There was significant domestic selling by mutual funds

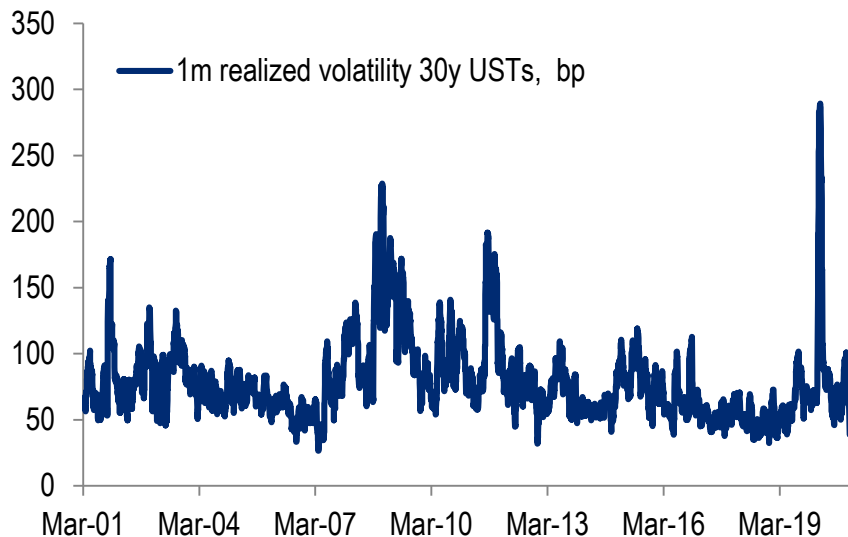


Source: Fed's H.4.1 and Z1 release.

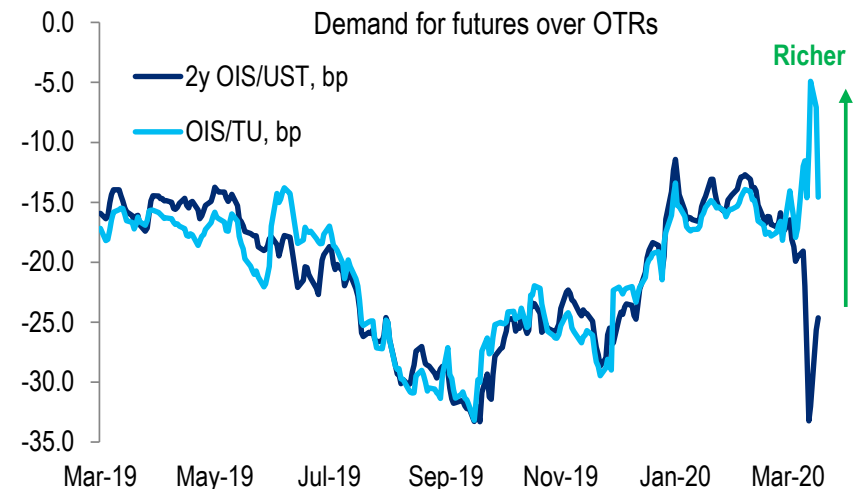
Leveraged trading can contribute to pro-cyclical risks

- Many opportunistic investors sell Treasury futures and buy off-the-run Treasuries to monetize the any presence of richness in futures and cheapness in off-the-runs.
 - This can serve to improve UST pricing and reduce cost to the taxpayer in normal markets.
 - Typically trades are highly levered, so sudden unwinds can be disruptive to market functioning.
- Variation margin can be a challenge when volatility of the basis rises.
 - Hedge funds typically hold the futures leg of the trade with one Futures Commission Merchant (FCM) while the financing of the bond leg is split amongst multiple dealers to optimize balance sheet pricing/availability. This creates cash flow timing issues as the CME is paid on trade date while VM for the bond leg of the trade comes in on T+1.
- Increased volatility can lead to increased IM requirements driving stop outs as evidenced by March 2020
 - TU and TY IM increased by 50% and US and WN IM requirements were doubled by mid-March 2020

UST volatility, especially at the long-end of the curve, drove the CME to increase IM requirements last year



TU futures richened materially against 2y USTs in March 2020

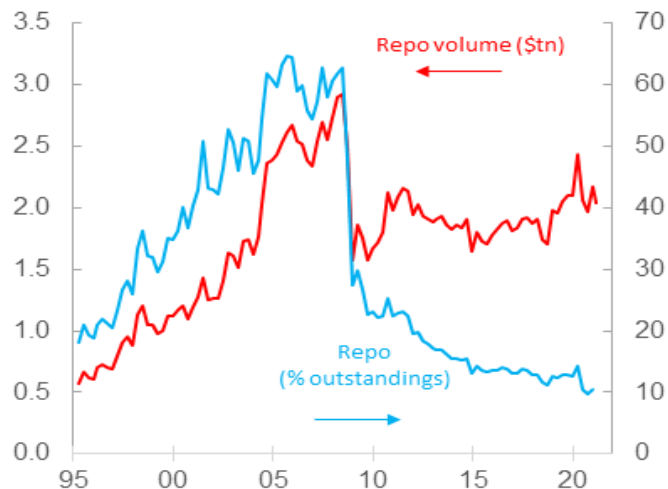


Source: Bloomberg

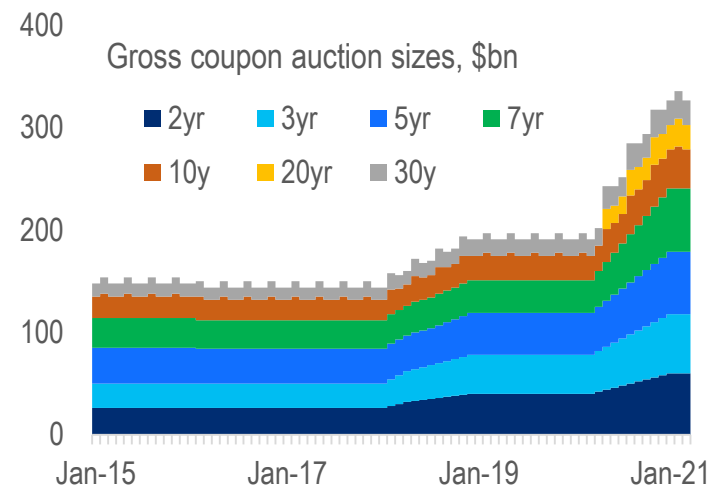
Role of intermediation amid evolving market structure

- Role of risk intermediaries became critical for market functioning, though March 2020 shows they have been unable to scale to the size of the market need without a shift in pricing:
 - Unprecedented volatility and a shifting market environment made it challenging for banks to quickly reallocate capital and balance sheet.
 - Strengthened risk controls for approval processes for large trades, shifts in risk limits, real time liquidity calculations make it hard for dealers to adapt and scale up in real time.
 - Regulatory ratios were often cited as a constraint for risk and balance sheet flexibility in March 2020.
- PTFs, which are primarily made up of high frequency trading firms, tend to pull back from the Treasury market during stress as seen during October 2014 and March 2020.
 - A decline in PTF liquidity, whether a reduction in size (as in October 2014) or a reduction in bid offer or participation at all, can contribute to lower order book depth and wider b/o.
- These factors can be increasingly relevant as the UST universe grows in absolute terms and relative to repo availability.

Repo availability has fallen relative to...



...the increase in coupon supply

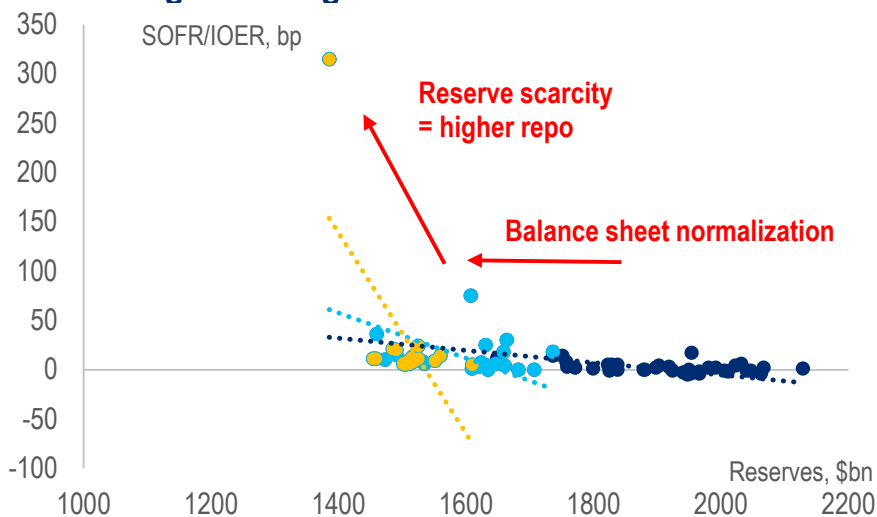


Fed tools can provided key support to market functioning

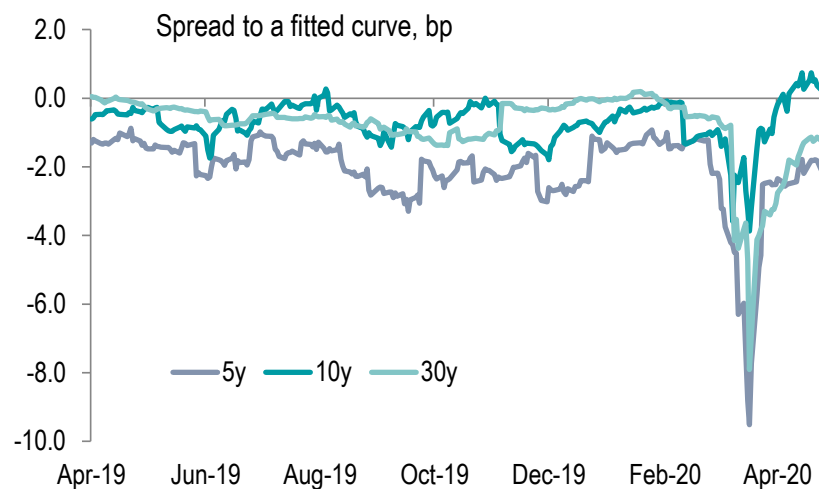
- At each FOMC meeting the FOMC authorizes and directs the Open Market Desk at the NY Fed to execute transactions in SOMA to fulfil policy goals. For example we highlight current goals to:
 - Undertake open market operations to maintain Fed effective in a specified target range (currently 0-0.25%).
 - Sustain smooth functioning of UST and MBS markets by increasing SOMA holdings of these securities.

Fed program	Target group	The programs were around during...			
		Flash rally	Repo spike	COVID crisis	20y liquidity stress
Asset purchases	UST holders	Yes	Normalization	Yes	Yes
FIMA Repo Facility	Central banks	No	No	Yes	Yes
Central bank swap lines	Central banks	Yes	Yes	Yes	Yes
Daily o/n repo operations	Primary dealers	No	No	Yes	Yes
Primary Dealer Credit Facility (PDCF)	Primary dealers	No	No	Yes	Yes
Money Market Mutual Fund Liquidity Facility (MMLF)	MMFs/Muni	No	No	Yes	Yes
Commercial Paper Funding Facility (CPFF)	Corporates/Muni	No	No	Yes	Yes
Main Street Lending Programs	Corporates	No	No	Yes	No
Municipal Liquidity Facility (MLF)	State/local	No	No	Yes	No
Paycheck Protection Program Liquidity Facility (PPPLF)	Banks	No	No	Yes	Yes
Primary Market Corporate Credit Facility (PMCCF)	Corporates	No	No	Yes	No
Secondary Market Corporate Credit Facility (PMCCF)	Corporates	No	No	Yes	No
Term Asset-Backed Securities Loan Facility (TALF)	Consumers/Corporates	No	No	Yes	No

Overnight funding rates are a function of reserves



Dislocations across the Treasury curve normalized following the Fed's UST purchases in March 2020



Source: Bloomberg; NY Fed; Internal calculations

What have we learned from these historic episodes?

- Emphasis should be placed on gathering and analyzing both public and non-public data.
- How should market participants and regulators balance the response to rare events?
 - Many market structure changes could impact the normal operating environment for USTs, structurally changing regular way market participation in primary and secondary markets
 - It is therefore critical for the official sector to incorporate structural impact to both normal and stressed market environments when considering various responses
 - Improvements with low permanent cost should clearly be made
- Tools to navigate volatility may be more valuable than tools that aim to fully prevent it

A standing repo facility

Proposal






- Offer US government and agency financing under pre-established arrangements in stress times
 - Include both independent and bank-affiliated dealers; careful consideration could be given to broader eligibility
 - Financing rates will be slightly above market rates, haircuts will be at market levels

Pros

- Help ease bank-affiliated dealers' unwillingness to lend and allow dealers to confidently meet the surge in demand for liquidity under stress
 - Reduce the intensity of the dash-for-cash by investors, as financing of USTs would be assured, albeit at penalty rates.
- Encourage more dealers to provide intermediation in competition with the current dominant dealers, all of which are affiliates of G-SIBs, which would help to reduce the considerable concentration of activity.

Cons

- Potential political resistance for a new facility which intervenes in funding markets.
- Introduces potential moral hazard concerns arise that dealers might take on excessive leverage and maintain inappropriately small liquidity buffers.
 - Can be addressed through prudential regulation- would need to be tailored to the independent dealers.
 - Price would need to balance BAU use by banks and avoid over reliance.
- Dealer balance sheet limits might erode the ability to tap this facility in times of stress

Would this proposal`					
Have helped in...				Have eliminated the need for official action?	Likely impact market structure in normal times?
The Flash Rally?	Repo spike?	The COVID crisis?	Feb 25, 2021?		
			?		

Green check: Would have helped materially; Question Mark: Impact uncertain; Salmon X: Unlikely to have helped; Red X: Would not have helped.

A standing buyback or purchase facility

Proposal






- Offer US government bond switch opportunities or straight buy backs under pre-established arrangements in stress times
 - Include both independent and bank-affiliated dealers; careful consideration could be given to broader eligibility
 - Switch rates should be slightly above market rates

Pros

- Help to normalize liquidity performance across the UST complex in times of stress.
- Buybacks give the Treasury an additional tool to manage the Treasury cash balance.
- Enable intermediaries to confidently meet the surge in demand for more liquid parts of the UST complex, albeit at penalty rates.
- Could possibly help reduce overall buying costs.
- Encourage more dealers to provide intermediation in competition with the current dominant dealers, all of which are affiliates of G-SIBs.
 - Reduce the considerable concentration of activity

Cons

- Challenging to structure; hard to anticipate and predefine the market need and, therefore, the set up.
- Questions around co-existence with traditional Fed actions like asset purchases.

Would this proposal`					
Have helped in...				Have eliminated the need for official action?	Likely impact market structure in normal times?
The Flash Rally?	Repo spike?	The COVID crisis?	Feb 25, 2021?		
					

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Targeted bank regulatory changes (mainly on SLR)

Proposal






- Make SLR changes permanent
 - Propose to exclude reserves from SLR permanently, but not USTs
 - Logic being reserve balances at central bank are riskless, while USTs pose interest rate risk
 - Fed needs to review if an increase in minimum SLR requirement is needed with the exclusions
 - Note the exclusion of UST and reserves from SLR calculation lapsed at the end of Q1 2021
- Do not propose to lower the minimum SLR, as it will reduce bank safety and soundness
 - Replace some of the higher static buffers with a countercyclical component, to support market liquidity in stress times
- Pursue commensurate exemptions for the T1 leverage ratio to help custody banks as they are not SLR constrained.

Pros

- Improves facilitation in repo and UST cash during stress times, as this would contribute to increase balance sheet flexibility.
- Recognizes substitutability between reserves and USTs.

Cons

- While temporary exemption facilitated market digestion of supply increases due to COVID fiscal stimulus, it would not have fully prevented the March liquidity stress in isolation.

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Mandated Central Clearing

Proposal

- Mandate central clearing, for either cash UST market or Repo market

Cash Market: Pros

- Increase confidence in capitalization of CCP members; concentrates counterparty risk, though this is not considered a material hurdle in cash trading
- CCP can improve market structure to prevent settlement failures in stress times
- Potentially improve financial stability by improving transparency

Cash Market: Cons

- Counterparty risk is limited in the UST market and was not the primary issue driving the March volatility
- Could impair market access for customers unable to accept mutualization of risk
- CCP margin requirements can be pro-cyclical during stress.
- Increased cost might cause more thinly capitalized players to stop participating in UST market

Repo Market: Pros

- Concentrates counterparty exposure with CCPs
- Increases netting benefits, effectively freeing up balance sheet
- Potentially improve financial stability by improving transparency

Repo Market: Cons

- Counterparty risk was not the primary issue driving the March volatility.
- Could impair market access for customers unable to accept mutualization of risk.
- CCP margin requirements can be pro-cyclical during stress.

Would this proposal`					
Have helped in...				Have eliminated the need for official action?	Likely impact market structure in normal times?
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✘	✘	✘	✘	✘	✔

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All-to-All Trading

Proposal

- Encourage the further development “all-to-all” trading platforms, to facilitate asset managers and asset owners to trade with one another more directly. “All-to-all” trading participation is considered to be predicated on mandatory central clearing.

Pros

- May reduce reliance on primary dealers
- May reduce costs for end users

Cons

- Take up of all-to-all platforms has struggled thus far, suggesting interest level is not high enough to be pursued.
- All-to-all platforms could cut into the volume of CLOBs
 - Can cause the erosion of primary venue liquidity, which happened in the FX markets
- Off-the-run USTs are less frequently traded but account for 95% of the market, but current all-to-all platforms have focused on on-the-run USTs, indicating the value of intermediation in off the runs (primary contributors to the March volatility).

Would this proposal`					
Have helped in...				Have eliminated the need for official action?	Likely impact market structure in normal times?
The Flash Rally?	Repo spike?	The COVID crisis?	Feb 25, 2021?		

Green check: Would have helped materially; Question Mark: Impact uncertain; Salmon X: Unlikely to have helped; Red X: Would not have helped.

Improve data collection and disclosure & enhance transparency

Proposal

- Gather greater disclosure of financial conditions and activities of non bank financial institutions (NBFIs)
- Collect data for bilateral uncleared repo in the dealer-to-customer market
- Reconsider the scope of reporting requirements
- Review the pros and cons in advance of any change (timing or size) to TRACE dissemination

Pros

- Allow regulators to better monitor leverage and funding risks in the nonbank financial sector
- Increased transparency on financial conditions of NBFIs could also increase participation in the UST market, and improve confidence in central clearing

Cons

- Infrastructure build is burdensome, and cost may outweigh benefits
- Pricing nuances such as liquidity levels, especially in off-the-run securities, may not be captured
- Regular re-calibration may be necessary to ensure information is increasing transparency without impairing the market's ability to recycle risk
- Real time TRACE dissemination would expose inventory to the market, and likely lessen intermediary capacity, which is especially challenging in times of illiquidity.

Would this proposal					
Have helped in...				Have eliminated the need for official action?	Likely impact market structure in normal times?
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✘	✘	✘	✘	✘	?

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Conclusions

- While post financial crisis regulation strengthened bank capitalization and balance sheets, it has contributed to intermediation headwinds for primary dealers. Significant market volatility and higher margin calls worsened the stress for intermediaries and investors alike.
- While the unwind of levered bond basis or RV trades likely exacerbate market moves in times of stress, in normal market environments they serve to reduce cost to the taxpayer.
 - Separation of futures clearing and cash repo for package trades increases liquidity costs of carrying positions, exacerbated in times of stress.
- The speed and adaptability of the Fed response, when necessary, is powerful. In the COVID-19 crisis, it drove a sharp recovery.
 - The impact of the SLR exemption, while not instantaneously impactful, was meaningful in the market's ability to digest the sharp increase in supply.
- When considering proposed solutions, it is critical to consider the impact to both normal and stressed market operating environments.
- Mechanisms that introduce counter cyclical forces could benefit the market in times of stress without material disadvantage to the normal operating environment.
 - The most promising policy proposals include the SLR exemption and the standing repo facility.