

November 2020

Treasury Bills Supply and Demand Dynamics and Issuance Recommendations

In light of unprecedented borrowing needs, Treasury has more than doubled the supply of T-bills over the past year amid a surge in demand for high-quality, short-term assets. T-bills currently represent approximately 25% of total Treasury debt outstanding, exceeding the historical average of 23%, and are at the highest proportion since 2009.

Please discuss the drivers of supply and demand across Treasury bills and other high-quality, short-dated investments (e.g., CP, repo, agency discount notes), and expectations for money market conditions going forward.

As outlined in the last two quarterly refunding announcements, Treasury has been gradually shifting its financing from bills to longer-dated tenors as a prudent means of managing its maturity profile. Please discuss considerations for Treasury as it evaluates the appropriate level of Treasury bills issuance for the medium- and long-term.

Executive Summary

Supply and demand landscape, and its implications

- Strong demand allowed Treasury to rapidly increase T-bills issuance (doubling the outstanding in ~3 months), following a typical recession pattern
- Money market funds (MMFs) have steadily displaced foreign investors, in terms of percentage ownership, over the past few years
- This trend accelerated in 2020 with MMFs now holding ~40% of T-bills outstanding, compared to ~15% a few years ago
- We expect the rotation from Prime to Government MMFs and the increased MMFs allocation to T-bills are both structural
- MMFs concentration also puts a higher floor on the size of T-bills outstanding, given challenges around negative yields
- Robust demand should provide substantial room for an increase in T-bills issuance despite the recent increase in outstanding, both nominal and as a percentage of marketable debt

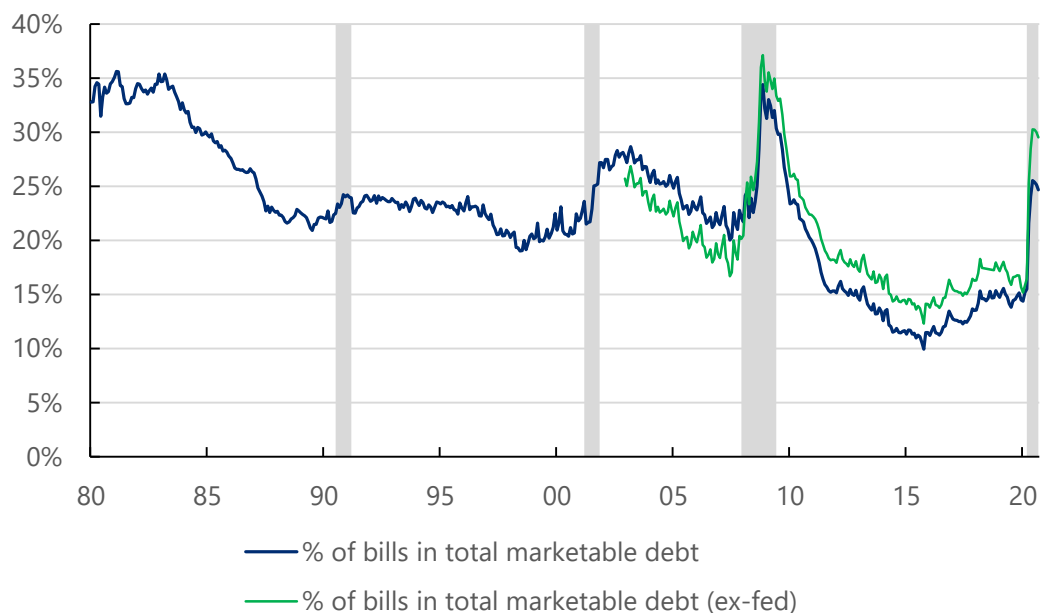
T-bills issuance policy recommendations

- Maintaining the share of T-bills in outstanding debt at levels modestly above its historical average may be appropriate for a time, as
 - T-bills can continue to act as an important channel for meeting unexpected funding needs, and
 - Adjustments to coupon issuance only gradually raise their net supply
- Over the longer term, T-bills outstanding can be lowered as a percentage of marketable debt, as Treasury moves to a more optimal debt profile
 - Lower T-bills share of outstanding would give Treasury 'space' in the event of future crises
 - Previous TBAC charges have highlighted the benefits of moving issuance into short- and intermediate-term coupons
 - T-bills outstanding averaged ~15% of marketable debt in several years leading up to Covid-19; while there is room to comfortably run T-bills at a higher percentage share of outstanding marketable debt, a return to 15-20% would allow T-bills to retain their efficacy as a shock absorber

Supply and demand drivers across T-bills and other short dated instruments

T-bills supply increased sharply in the 2020 recession, much like in previous ones

T-bills supply increased dramatically this year



Source: Federal Reserve, Haver

T-bills supply has been the dominant share of total supply in recessions

	'01 recession	'08 recession	'20 recession
T-bills outstanding %, pre-recession	20%	21%	15%
T-bills outstanding %, high	29%	34%	26%
Increase in T-bills outstanding, \$bn	334	1,066	2,515
Time to increase T-bills allocation	31 months	12 months	3 months
Increase in marketable debt outstanding, \$bn	286	1,358	2,987
Increase in T-bills, % of increase in marketable debt	117%	78%	84%
Date of T-bills reaching pre-recession level	Jun-07	Sep-10	?
Decline in T-bills outstanding, \$bn	86	215	
Time to get to pre-recession share	52 months	22 months	?

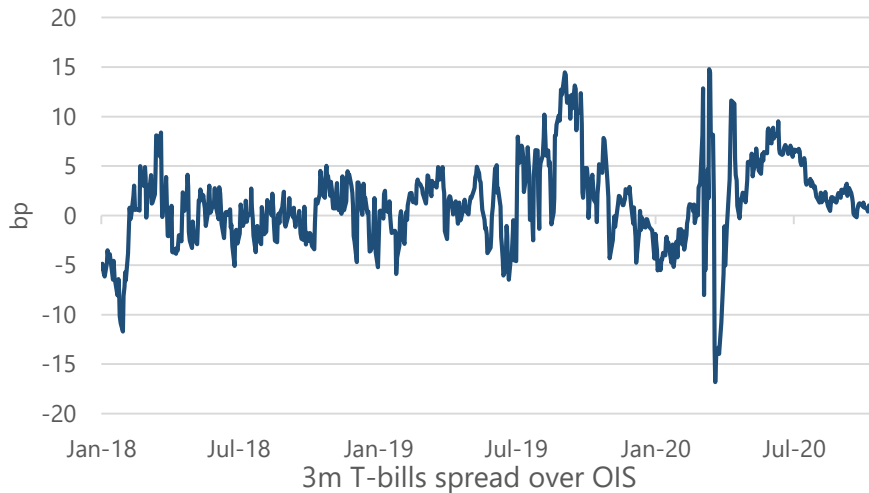
Source: Bloomberg, Calculations

Large supply

- T-bills functioned as shock absorbers to fund the financing needs related to Covid-19
 - Following the passage of the CARES act, T-bills outstanding increased by \$2.5trn - from \$2.5trn to \$5.1trn outstanding - in a span of 3 months
 - Over the same period, total marketable debt increased \$3trn, resulting in T-bills contributing 84% of the increased supply
 - This large role of T-bills is typical in recessions
 - T-bills were 78% of the net supply in the 2008 recession and 117% in the 2001 recession
- Subsequently, T-bills as % of outstanding decline to pre-recession levels. However, this typically takes years and is mostly driven by increased overall issuance rather than large decline in outright T-bills outstanding

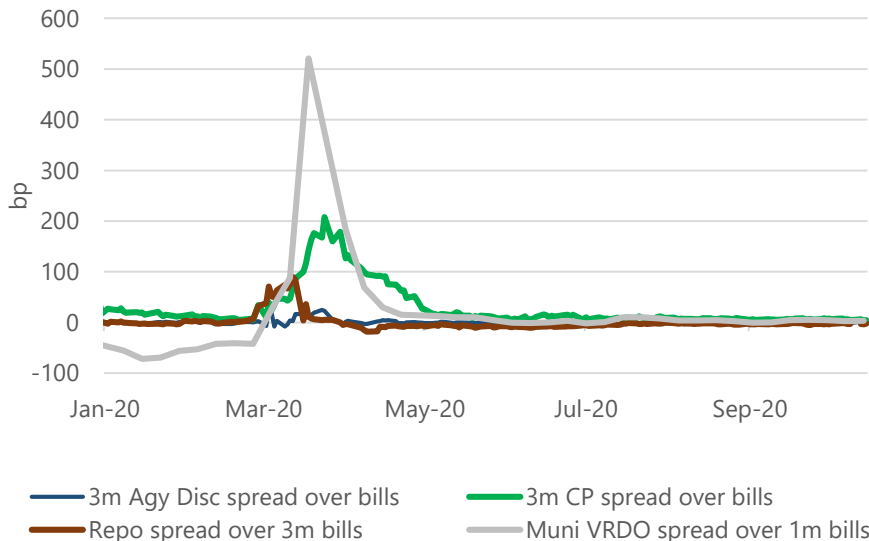
Strong demand has resulted in T-bills trading well despite the large supply

Despite \$2.5trn net supply, T-bills traded no cheaper than in the August 2019 growth scare



Source: Bloomberg

Rotation out of prime MMFs contributed to cheapening of short term alternatives relative to T-bills



Source: Bloomberg

T-bills have traded in range despite large supply shock...

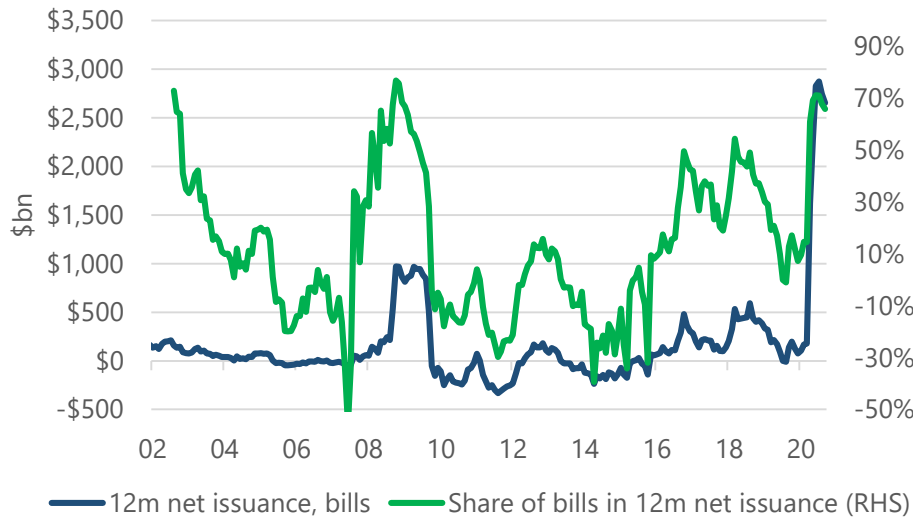
- In the initial flight to quality, T-bills traded ~15bp below OIS before cheapening to 10bp over OIS amid the large supply
- This range is fairly tight given the magnitude of supply. For instance, in late August 2019, T-bills traded 15bp cheap to OIS on a liquidity impacted growth scare, when net 12m net issuance was far smaller at ~\$130bn
- This reflects the balance between supply and demand factors
- Flight to quality in economic scares results in assets migrating to MMFs, coincidental with a rise in supply

...particularly with respect to short-term alternatives

- Other non-bill short term investments cheapened significantly in the March crisis with 3m CP, repo and Agencies discount notes trading 200bp, 80bp and 30bp above T-bills respectively
- This likely reflects broader investor preference for liquidity and is coincidental with investors rotating out of prime market funds into government ones

Strong demand from MMFs helped absorb increased T-bills supply

12m T-bills supply, as a percent of total issuance, is still below the '08 crisis

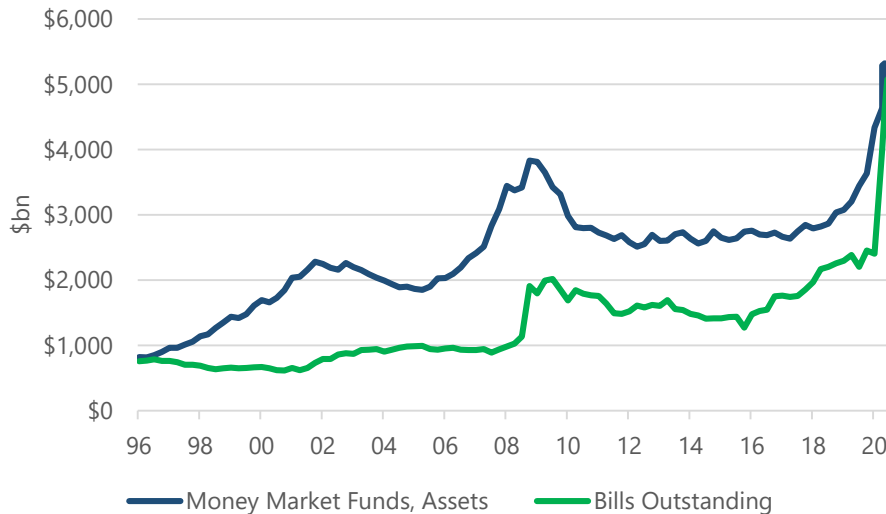


Source: Bloomberg

T-bills issuance, as % of total, in range

- Even as the notional amount of T-bills issuance was large, it was within historical ranges as a percent of total marketable issuance

MMF assets have increased alongside T-bills outstanding



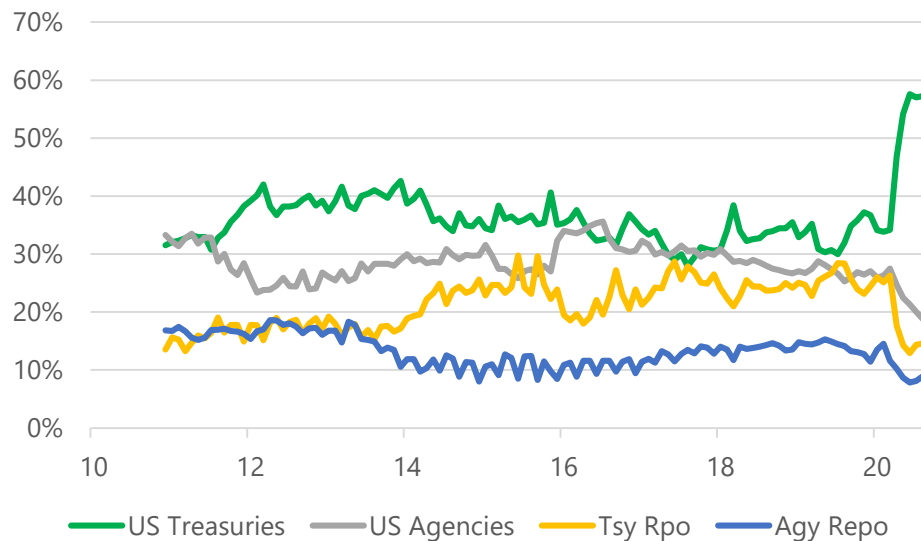
Source: Bloomberg, Macrobond

Robust demand allowed rapid increase in T-bills issuance

- Demand kept pace with this increased supply
- Of the ~\$2.5trn supply post Covid-19, MMFs absorbed \$1.5trn, of which \$1.2trn was by Government MMFs
- MMF assets have increased following an increase in reserves and a flight to quality
- This pattern is typical around recessions

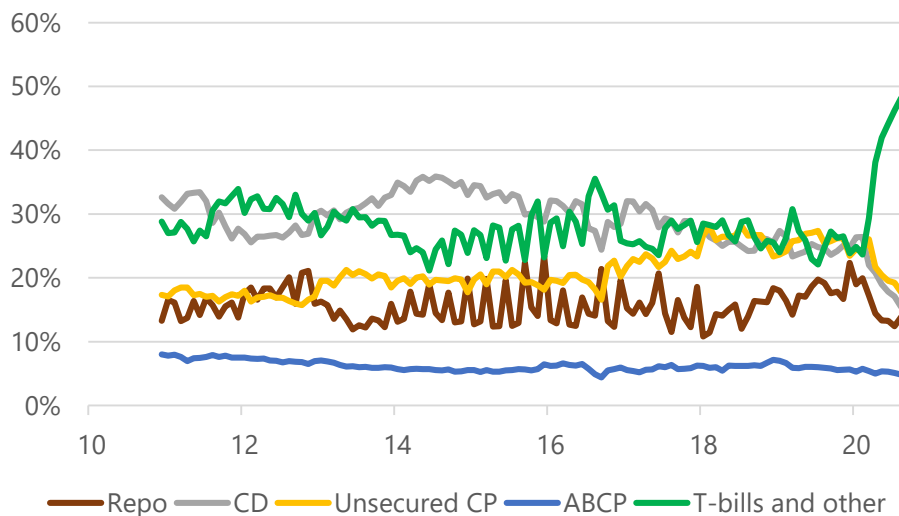
Both Government and prime MMFs have increased their allocation to T-bills

Government MMF's allocation to T-bills has increased to more than 50%



Source: NY Fed

Prime MMFs have done the same



Source: NY Fed

Greater allocation to T-bills from Government MMFs...

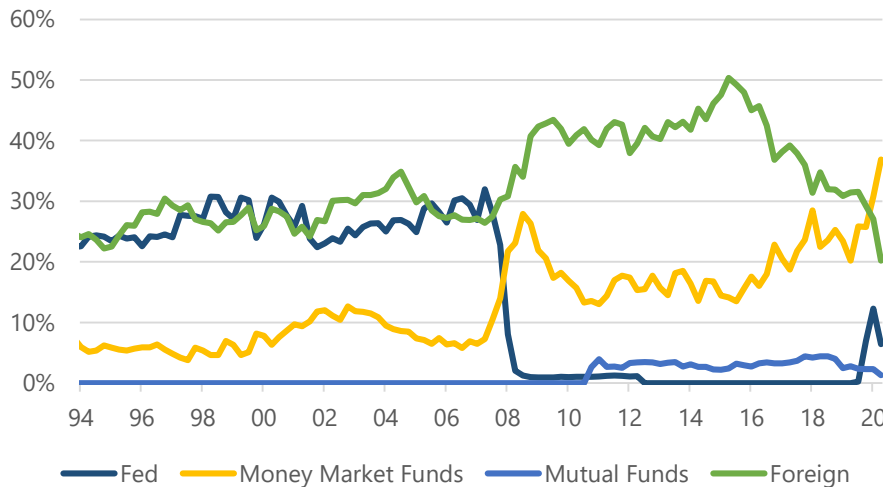
- Increased demand for T-bills from MMFs is due to increase in assets as well as an increase in allocation to T-bills
- Government MMF's allocation to T-bills has increased from 30-40% of assets to now well greater than 50%
 - Some of this allocation has been a rotation from repo and agency debt into T-bills as their spreads over T-bills have compressed

...and Prime MMFs too

- Allocation at prime funds has also shifted in favor of T-bills following the flight to quality event in March
- As prime funds seek stability in NAV and face redemption volatility, they have increased their liquidity buffers and allocated more to T-bills

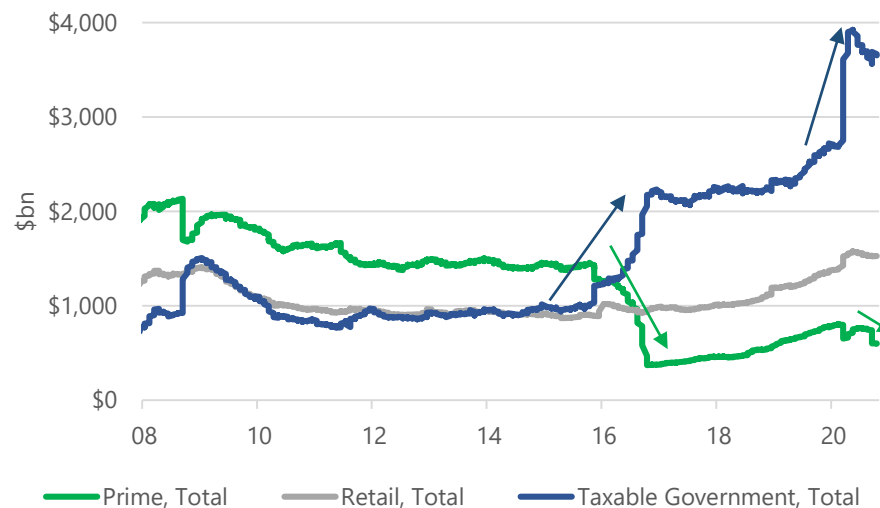
MMFs share of T-bills outstanding has eclipsed that of foreign investors

MMFs own ~40% of the T-bills universe, an increase from 15% a few years ago



Source: Federal Reserve, Macrobond

The increase in demand for T-bills was driven by a sharp increase in Government MMFs assets



Source: ICI

MMFs displaced foreign investors in the T-bills universe

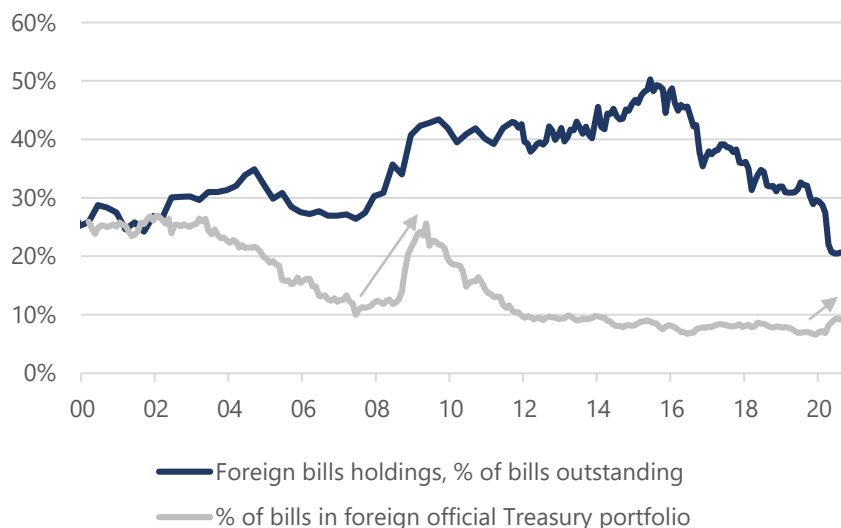
- As a share of the T-bills market, MMFs have steadily displaced foreign investors over the past few years. This trend accelerated this year
- MMFs now own ~40% of the T-bills outstanding, compared with ~15% pre MMF reform
- Foreign investors, on the other hand, now own 20% of outstanding compared with ~50% in 2015. Even as foreign official holdings have increased, they haven't kept pace with issuance
- The following factors have contributed to this trend
 - 2016 MMF reforms,
 - Slower pace of FX reserve accumulation, and
 - More recently, a lack of large increase in T-bills allocation in foreign official portfolios, unlike in previous flight to quality episodes

Some Prime MMF assets have rotated into more T-bills leaning Government funds

- Increasing role of MMFs in T-bills space is driven by a rotation out of prime MMFs into government MMFs
- 2016 MMF reform, which among other changes, sought stable NAV for retail and government MMFs but required institutional funds to have floating NAVs, contributed to this trend
- We believe this trend is likely to continue
- Prime MMF assets have declined significantly in 2008 and 2020 crises as investors sought safe-haven assets
- In August, ~\$130bn in prime MMF assets (12% of total prime MMF assets) converted to government funds

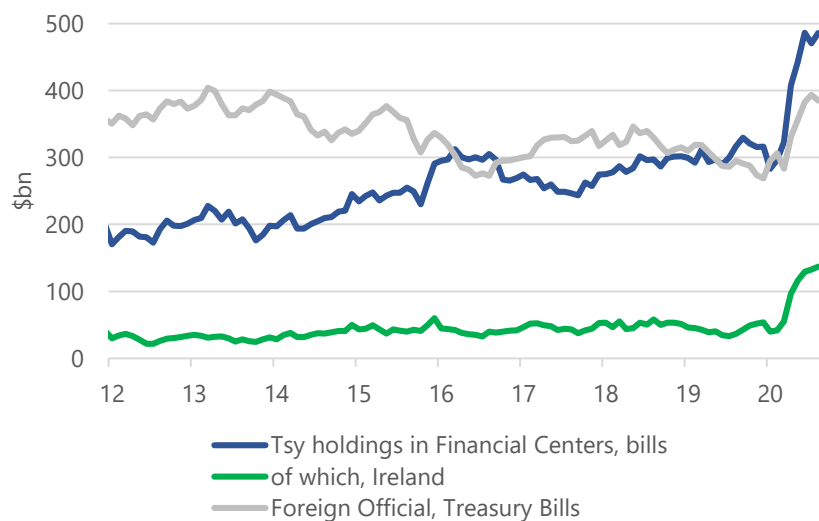
Foreign share of the T-bills outstanding has steadily declined

Foreign official demand led the way in '08 but foreign private demand drove foreign T-bills purchases in 2020



Source: Treasury, Bloomberg

Financial centers have driven recent foreign T-bills purchases



Note: Financial Centers include UK, Ireland, Belgium, Cayman Islands, Switzerland, Luxembourg and the Caribbean. Source: Treasury, Macrobond

Foreign demand now more driven by private investors

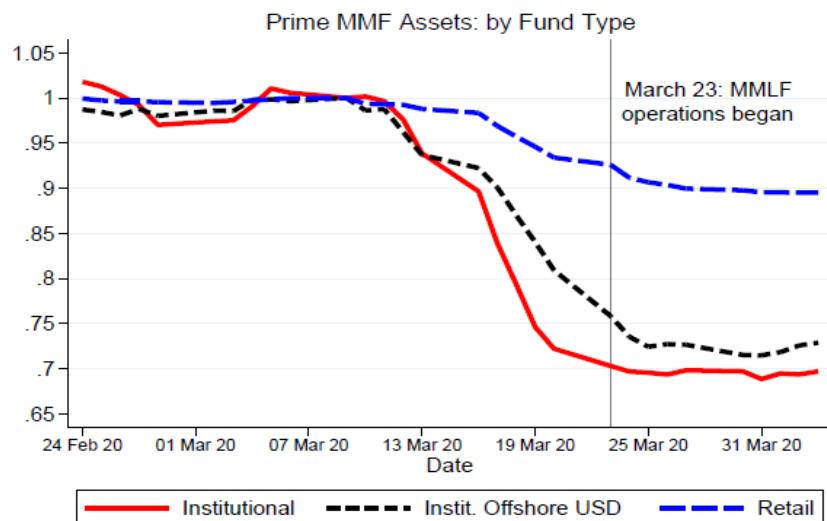
- In the '08 crisis, share of T-bills in foreign official Treasury portfolios increased from 12% to ~25%. This drove foreign T-bills holding to ~45% of T-bills outstanding, which steadily increased to 50% by 2015
- However, in the 2020 crisis, the share of T-bills in foreign official portfolios increased marginally from 7% to 9%
- Since February, even as T-bills outstanding increased by \$2.5trn, foreign holdings increased only \$310bn
- Of this \$310bn, financial centers (likely private investors) accounted for \$190bn, half of which was attributable to Ireland. The latter might have been driven by idiosyncratic factors

Foreign investors have increased their preference for coupon Treasuries

- In general, foreign private and official investor demand for T-bills has been falling, as a percent of total T-bills outstanding, over the past few years.
- This decline has outpaced the decline in total foreign holdings as percent of marketable debt outstanding
 - From 2015 to present, foreign Treasury holdings have declined from 50% to 35%
 - Over the same period, foreign T-bills holding have declined from 50% to 20%
 - This implies that their preference for coupon Treasuries has increased on a relative basis

Prime funds have increased preference for T-bills over CP/CD

Institutional prime fund assets dropped during March while retail prime funds were more stable

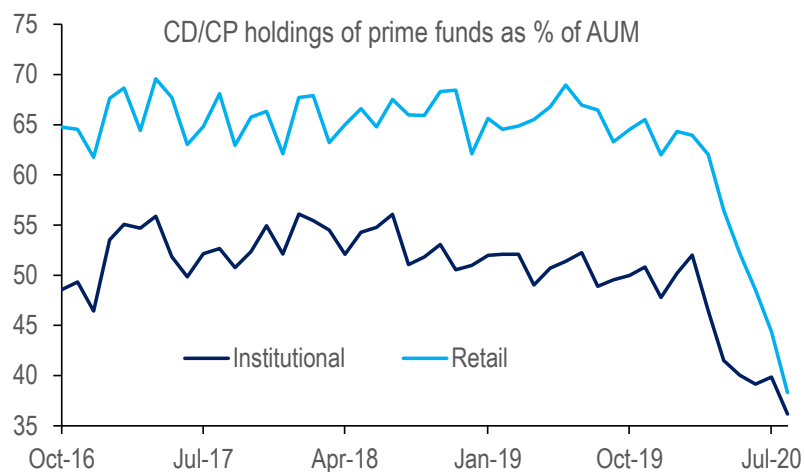


Source: Federal Reserve, [Runs and Interventions in the Time of COVID-19: Evidence from Money Funds](#)

Prime MMFs have increasingly preferred T-bills over alternatives...

- Prime MMF assets, especially institutional, declined in March
- While floating NAV regulations likely reduced the flight out of prime funds in March 2020, relative to the experience in 2008 and 2011, it didn't completely eliminate the redemption pressure on these funds
- Institutional investors likely redeemed because of unwillingness to be subject to redemption fees and gates in case the fund's liquidity buffer dipped below 30%

Since March both retail and institutional prime funds have reduced their CD/CP exposure



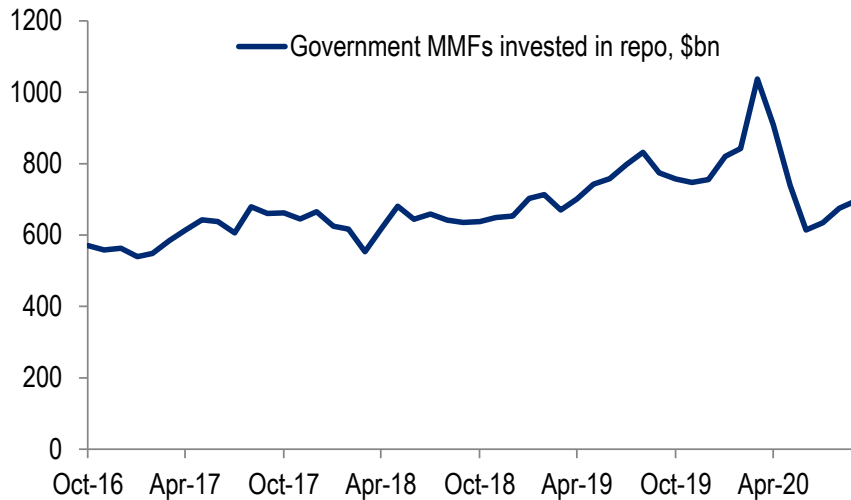
Source: Crane

...contributing to a decline in CP and CD outstanding

- Decline in prime MMFs assets coincides with a drop in commercial paper outstanding
- Since March, both retail and institutional prime funds have reduced their CD/CP holdings
- Financial CP/CD, non-financial CP, ABCP outstanding have declined to near 3y lows
- This should result in continued higher demand for T-bills from prime MMFs

Should T-bills supply decline, MMFs are likely to allocate into repo

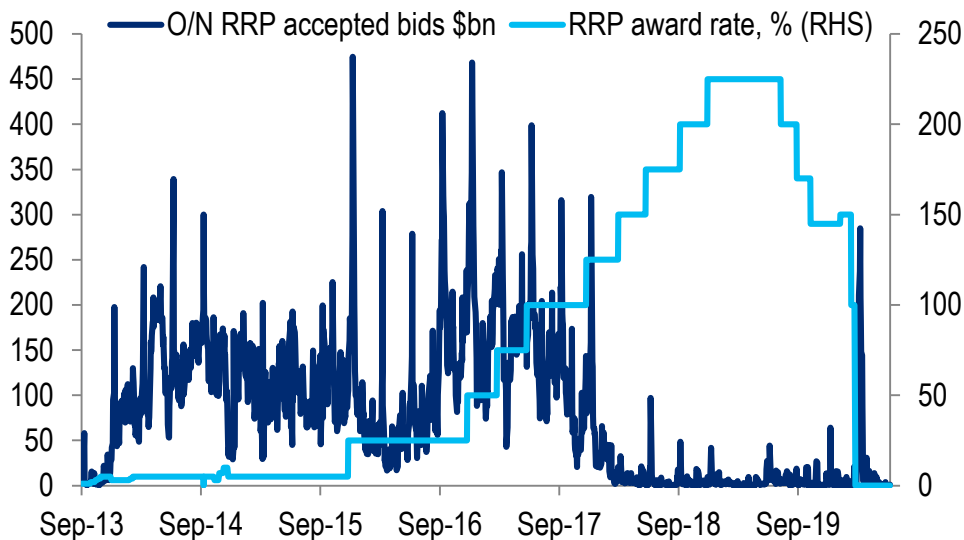
There is room for Government MMFs to invest more in the repo market



Source: Crane

- Since March, government MMFs have decreased their investments in the repo market. This is likely due to the large increase in T-bills issuance and a compression of repo spreads over T-bills
- MMFs have a new avenue to access the repo market via sponsored repo which they did not have at the previous ZLB
- Sponsored repo, which allows for netting of trades through a central clearing counterparty, has been a key reason that MMFs have been able to increase their investments in repos over the past few year, pre-2020 crisis
- Even given fund prospectus constraints and internal counterparty risk guidelines, there is room for government MMFs to increase investment in the repo market, both on a percentage of holdings basis and absolute dollar basis
- This might become necessary for MMFs if T-bills supply declines while MMF assets remain elevated. On margin, this makes MMFs more robust to a decline in T-bills supply

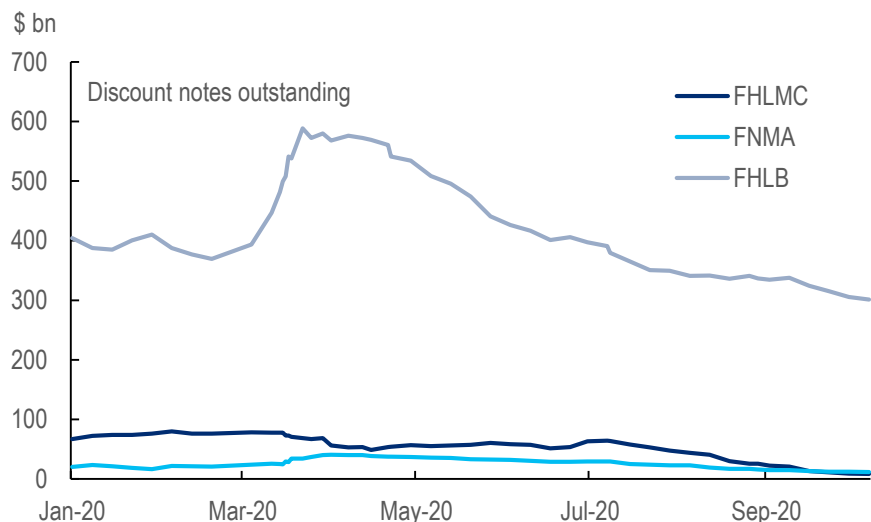
Usage of RRP quickly picked up after its introduction at the ZLB. Sponsored repo could drive MMF pickup in the future



Source: Bloomberg

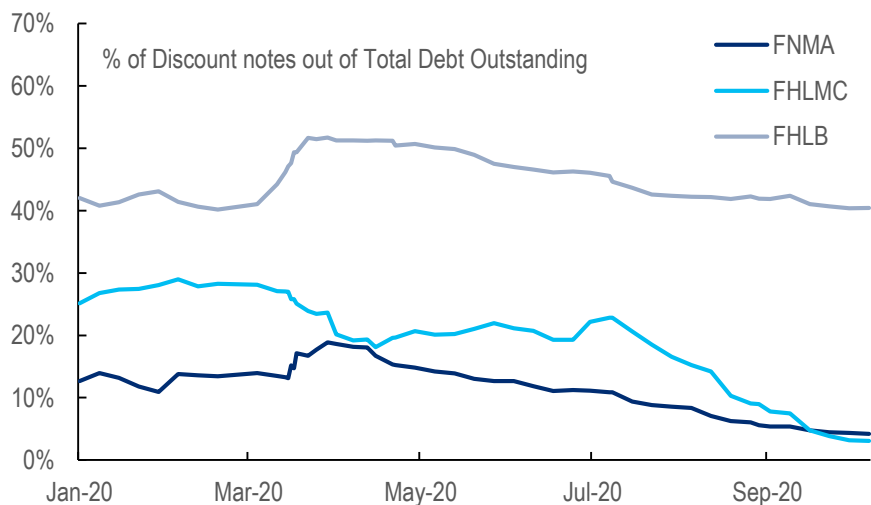
Agency discount notes supply is unlikely to increase

Outstanding agency discount notes have been decreasing since April



Source: FHLB, FNMA, FHLMC

Percentage of discount notes of total outstanding debt has declined as well

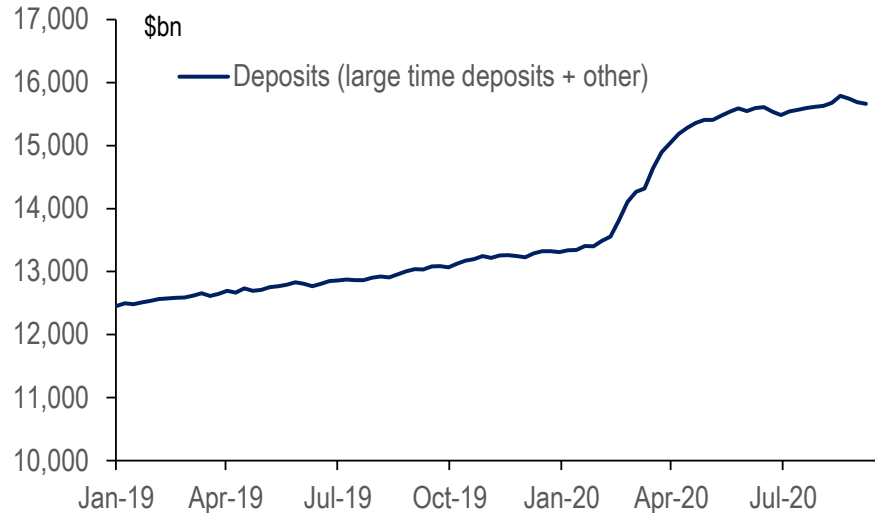


Source: FHLB, FNMA, FHLMC

- The largest issuer of discount notes has been the FHLBs who had ramped up issuance during March and April as they expected demand for advances. Since then they have decreased discount notes issuance given the decline in advances
- While FHLB discount notes issuance has declined, their outstanding as percentage of total GSE debt is now close to pre-covid levels (~40%)
- FNMA and FHLMC have not increased their discount notes issuance as they look to extend their debt and diversify from short-end SOFR FRNs
- Overall it does not appear that discount notes issuance will be increasing in the near-term

Trends in bank demand – a likely front-end backstop but they are extending out

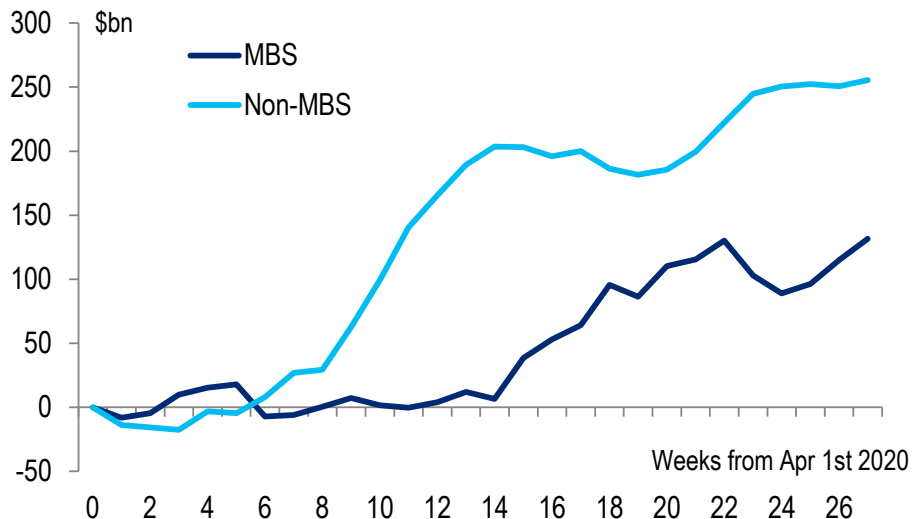
Deposits have increased on the back of the Fed's asset purchases



Source: Federal Reserve H8

- Deposit growth has increased at banks since March driven by reserve growth from the Fed's asset purchases
- It is likely to increase next year as QE continues and the TGA balance is eventually drawn down
- Since April, there has been an increase in demand for USTs, and MBS to a lesser extent, by bank portfolios
- Temporary SLR exclusion may drive front-end demand
 - On April 1st, the Fed announced that Treasuries and Reserves are excluded from SLR calculation for bank holdings companies until March 31st 2021. On May 15th, this rule was extended to include depository Institutions
- Auction allotment data show that banks are buying coupon Treasuries
- Demand may be driven from a Fed on hold for an extended period of time and a lack of loan growth

Since April first there has been an increasing preference for USTs (included in the Non-MBS category) over MBS at banks



Source: Federal Reserve H8

Policy implications of the changing supply-demand landscape for T-bills

Robust demand suggests that the market has capacity to digest an increase in T-bills issuance should a near term need arise

- MMFs have driven the robust demand for T-bills. As their assets have increased, they are now a greater share of the T-bills universe than foreign investors. MMFs are also allocating more of their portfolios to T-bills. Spread compression and regulatory factors have both played a role
- This robust demand has enabled greater flexibility in the issuance strategy for T-bills in the medium term. Even if MMF assets decline as the economy recovers, there is room for these funds to allocate more to T-bills
 - A 10% greater allocation to T-bills corresponds to new net demand of \$500bn all else equal
 - This is before taking into account that a new crisis is likely to spur an inflow into MMF assets
 - A \$1trn of new inflow into MMFs with a moderate increase in allocation to T-bills corresponds to net new demand of \$500-600bn
 - There is room for T-bills demand from other sources, especially if the front end of the Treasury curve remains flat with the Fed at ZLB for an extended period
- We therefore expect pricing implication of an unexpected increase in T-bills supply to be minimal

A substantial decline in T-bills supply is not desirable

- MMFs absorbed \$1.5trn of the \$2.5trn net T-bills issuance this year. This greater MMF participation has increased concentration risks
 - MMFs now own ~40% of the T-bills universe and foreign investors only 20%
 - The average 7d yield on an institutional prime fund is just 5bp and institutional government fund is 2bp
- As the Fed stays at zero lower bound, stable value Government MMFs face challenges should T-bills yields become negative for sustained periods
- Outside of repo, it is hard to envision a suitable short term investment alternative for ~\$2trn in T-bills holding at MMFs. Supply for Agency discount notes, CP and CD are at multi-year lows and is small relative to T-bills outstanding
- This effectively increases the level of T-bills, as percent of outstanding, that can be absorbed by the market without a significant price impact.
- A rapid decline in T-bills outstanding is likely to increase the possibility of negative rates amid financial stress and a Fed target range of 0-25bp

Appropriate level of T-bills issuance over medium and long term

What is the T-bills trajectory assuming no further fiscal stimulus?

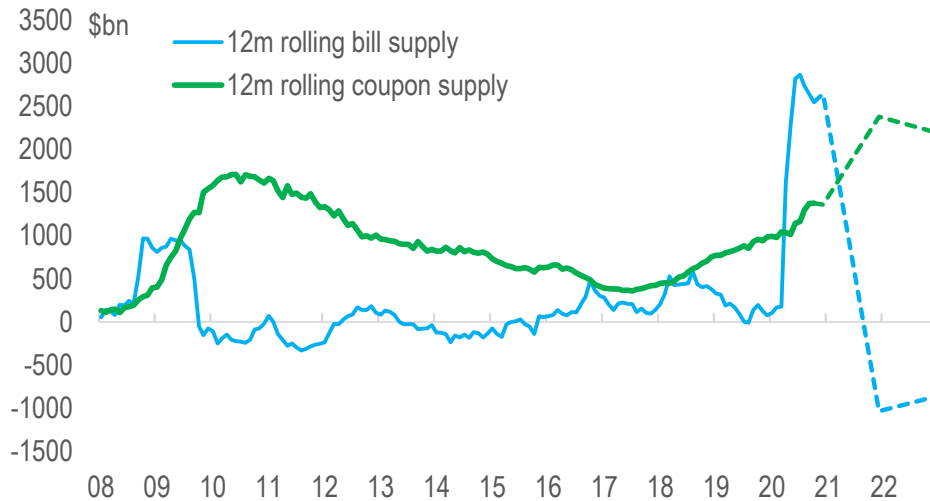
If there is no further fiscal stimulus, T-bills supply will naturally decline as a % of marketable debt

Fiscal Year	CBO		PPP		Total funding		Chg in net mrkt debt		Bills as % of total mrkt debt
	deficit	TGA	payout	needs	bills	coups			
FY2020	3132	1782	0	4014	2652	1362		25%	
FY2021	1810	800	521	1349	-1038	2387		18%	
FY2022	1336	800	0	1336	-870	2206		14%	

Assumptions: All numbers are in \$bn. Deficit assumptions are per the CBO. We assume the \$521bn of PPP is paid out in FY 2021. Source: Calculations, CBO

- There is considerable near-term uncertainty on two fronts:
 1. The timing and size of further fiscal stimulus
 2. The outlook for coupon auction sizes
- For purposes of scenario analysis, we assume:
 - Current coupon sizes are static (see Appendix)
 - Fed purchases continue at \$80b/month with no change in maturity composition
 - The TGA balance will be drawn down to \$800bn
 - \$521bn of PPP loans will be paid out in FY 2021

Notes and bond issuance has been increasing over the past few years



Source: Treasury, calculations

- Without further fiscal stimulus, T-bills outstanding, as a percent of total marketable debt, will decline to ~14% by the end of FY 2022
- Under this scenario, decline in the T-bills share of outstanding would be slightly slower than in '08
- A decline in the share of T-bills outstanding could give Treasury flexibility in the event of a future shock or the upcoming fiscal stimulus

How would potential stimulus impact the trajectory?

Further fiscal stimulus, without coupon increases, would lead to a slower decline in the share of T-bills outstanding

\$1.5tn fiscal package in 2021

Fiscal Year	CBO			Total funding needs	Chg in net mrkt debt		Bills as % of total mrkt debt
	deficit	TGA	PPP payout		bills	coups	
FY2020	3132	1782	0	4014	2652	1362	25%
FY2021	3310	800	521	2849	462	2387	24%
FY2022	1336	800	0	1336	-870	2206	19%

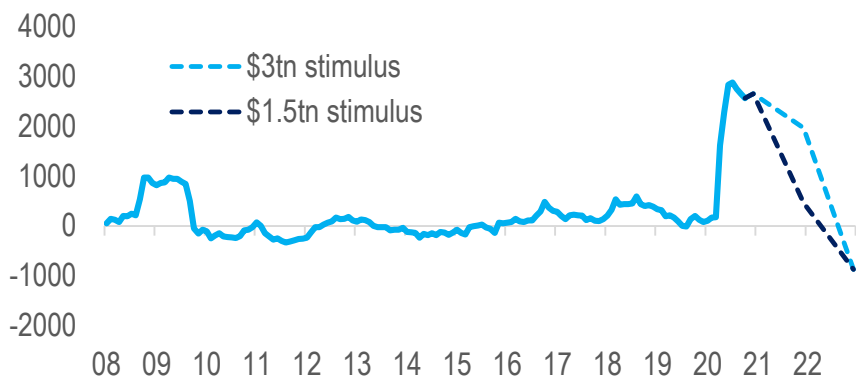
\$3tn fiscal package in 2021

Fiscal Year	CBO			Total funding needs	Chg in net mrkt debt		Bills as % of total mrkt debt
	deficit	TGA	PPP payout		bills	coups	
FY2020	3132	1782	0	4014	2652	1362	25%
FY2021	4810	800	521	4349	1962	2387	28%
FY2022	1336	800	0	1336	-870	2206	24%

Assumptions: All numbers are in \$bn. Deficit assumptions are per the CBO. We assume the \$521bn of PPP is paid out in FY 2021. Source: Calculations, CBO

- Further fiscal stimulus in 2021 would lead to increased T-bills supply in 2021
- Under the same assumptions, T-bills share would get to:
 - 19% by FY 2022 under a \$1.5tn package
 - 24% by FY 2022 under a \$3tn package
- Treasury has significant flexibility to fund stimulus either through T-bills or an increase in both T-bills and coupons
- The elevated level of the TGA balance provides Treasury further flexibility

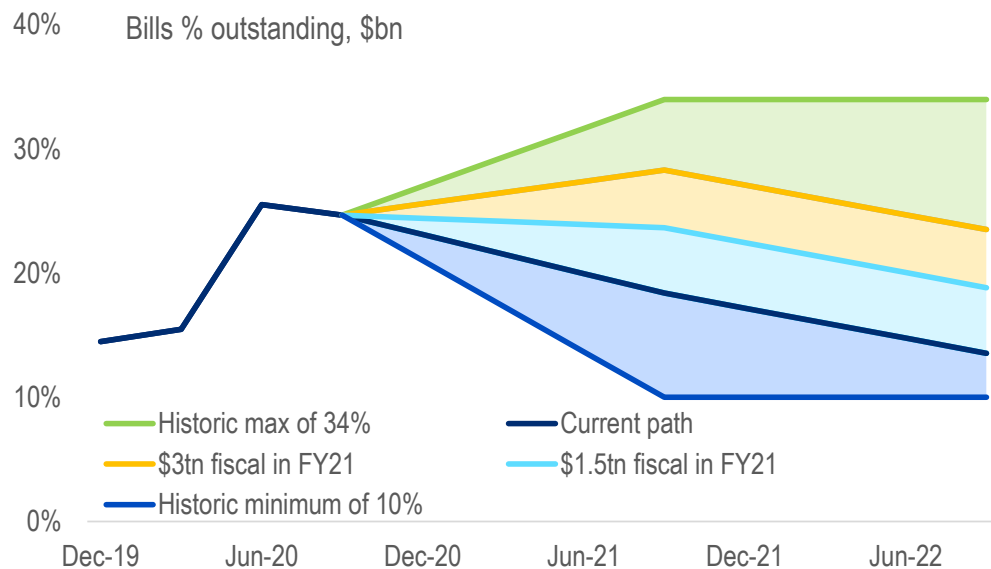
T-bills net supply is likely to decline in 2022



Source: Calculations

How does T-bills capacity compare to the historical maximum share?

Scenario analysis around historical ranges in the T-bills market



Source: Calculations

- We estimate T-bills outstanding across different fiscal packages including historical maximums and minimum levels
 - The top end of the historical range is 34% and the low range is 10%
 - We assume no further coupon hikes
- A return to 34% T-bills share of outstanding in the future would result in a large absolute level of T-bills
- We do expect some mitigating factors if funding needs required T-bills issuance to approach historic capacity:
 - Banks portfolios would likely provide a soft backstop on the yield level of T-bills. This would be especially true if the temporary exclusion from SLR was extended or made permanent
 - If issuance needs were driven by a flight to quality event, similar to March/April, then the Fed might be engaging in QE or other measures that could increase reserves in the system

Shock absorber capacity in FY21/22

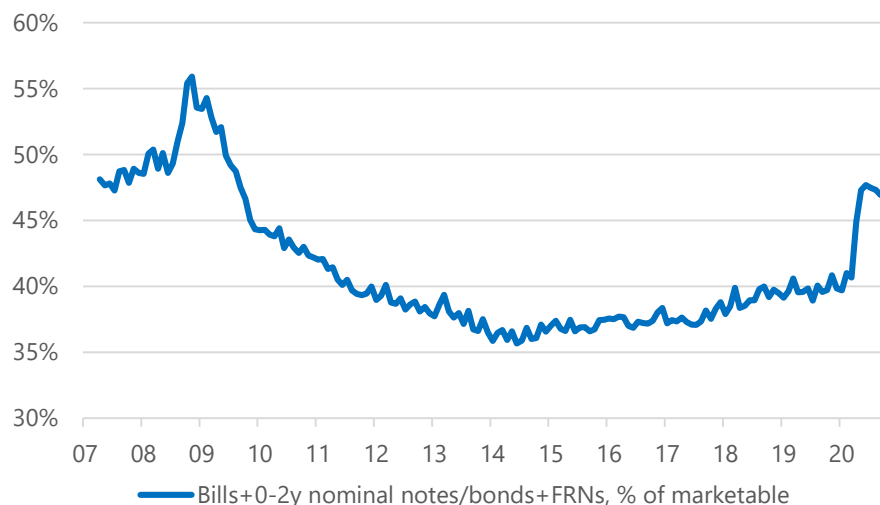
Bills outstanding, \$bn	Current path	\$1.5tn fiscal in FY21	\$3tn fiscal in FY21	Historic Max
FY21	3991	5491	6991	9129
FY22	3121	4621	6121	10250

Shock capacity, \$bn	Current path	\$1.5tn fiscal in FY21	\$3tn fiscal in FY21
FY21	5138	3638	2138
FY22	7129	5629	4129

Source: Calculations

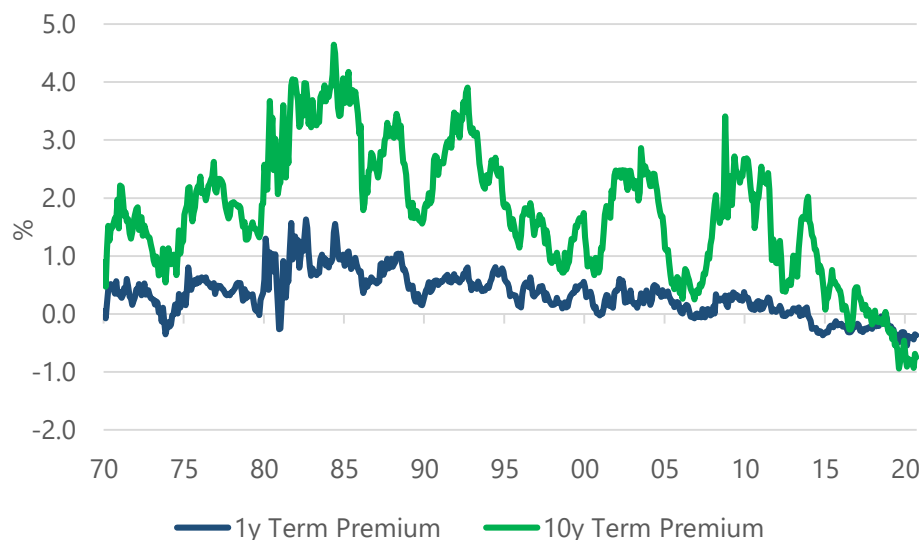
Considerations for evaluating optimal share of T-bills

Debt due over the next 2y, as a percentage of outstanding, is still well below levels from the '08 recession



Note: ex-TIPS, Source: Calculations

Long-end term premia has compressed relative to the front-end

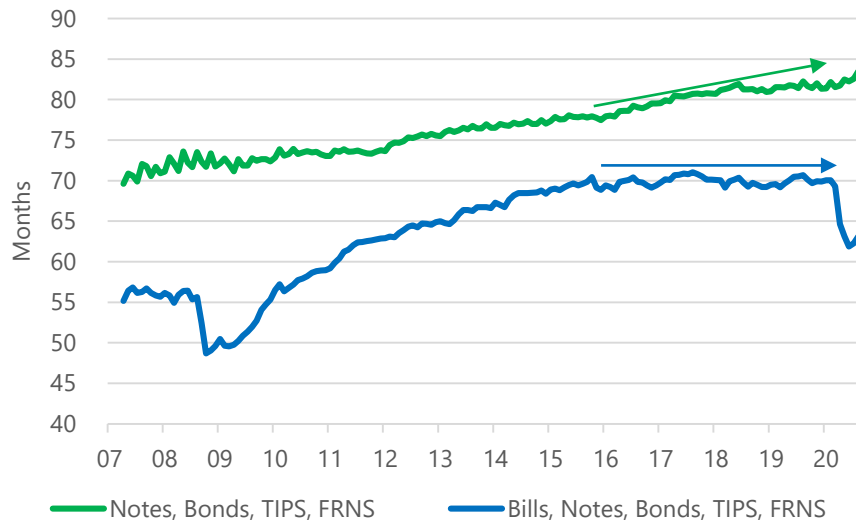


Source: Bloomberg

- A number of factors should be considered in determining the appropriate share of T-bills in outstanding debt
- Previous TBAC charges indicated that T-bills can be an attractive source of funding when fiscal risk is measured by variation in the budget deficit
- However, several considerations push against making the share of T-bills too high:
 - An unusually high level of T-bills (share or absolute) can raise operational challenges for Treasury
 - Many of the benefits of T-bills in the optimal debt structure can be achieved with floating rate notes, short- and intermediate-term coupon securities
 - Proximity to the ZLB reduces some of the correlation benefits from issuing T-bills
 - Low term premia make issuing coupon debt less expensive than otherwise
 - The increase in the SOMA portfolio has significantly increased the sensitivity of Treasury debt cost to short-term rates
- On balance, we believe that these considerations argue for managing T-bill share to 15-20%
 - This approach would prudently maintain capacity for shock absorption, while still operating in a regular and predictable manner

Longer term T-bills issuance strategy: Terming out the debt profile

Since 2015, Treasury has successfully increased the share of T-bills while maintaining WAM of marketable debt pre-Covid

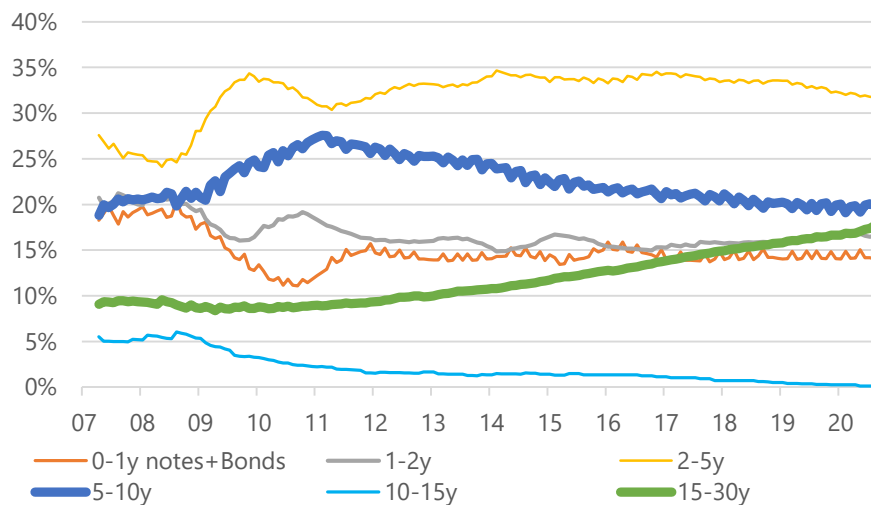


Source: Calculations

10% T-bills share was deemed too low in 2015

- In 2015 Q2 Quarterly Refunding statement, Treasury noted that *"The supply of bills outstanding as a percentage of the total Treasury portfolio is at a multi-decade low of approximately 11 percent... Treasury believes that it is prudent to increase the level of Treasury bills outstanding...should not be interpreted as changing Treasury's debt issuance strategy of extending the weighted average maturity of the debt."*
- Since then, Treasury successfully increased the T-bills share of outstanding to 15% pre-Covid, while maintaining weighted average maturity of marketable debt at ~70m
 - This was achieved through continued terming out of the notes and bonds universe
 - WAM of the non-bills universe increased from high70s to mid 80s months, while overall WAM remained steady at 70months

Within the nominal notes and bonds universe, the share of 5-10y sector has declined as 15-30y sector has increased



Note: ex-FRN and TIPS. Source: Calculations

Post Covid-19, room to continue terming out

- Once the near term uncertainties around Covid related funding needs are resolved, there is room for Treasury to continue terming out the debt profile
- This can be achieved via a combination of T-bills reverting to 15-20% of the marketable debt and further terming out of notes/bonds universe
- Within the nominal notes/bonds universe, the increase in share of the 15-30y sector has largely come at the expense of 5-10y sector
- Further terming out can be achieved through a issuance profile that favors 5-10y sector on the margin over 2-5y

Conclusions

- Treasury retains significant flexibility when it comes to T-bills issuance under various fiscal stimulus scenarios:
 - The market well absorbed the ~\$2.5tn T-bills issuance following the CARES act
 - There is ample room to increase T-bills issuance over the next few years due to any further fiscal shocks
 - The current level of the TGA provides flexibility around meeting near-term outflows while avoiding abrupt increases in issuance sizes
- On balance, allowing T-bills to run back down to 15-20% of marketable debt, in a regular and predictable manner, in favor of other short or intermediate instruments, would be prudent
 - Rollover risks remain low as the debt due over the next 2y remains well within historical ranges
 - The ancillary benefits of short issuance (T-bills vs 2-5y coupon debt) becomes less meaningful with compressed term premium and absolute yields
 - Operational considerations should be a factor
 - The increase in the SOMA portfolio has significantly increased the sensitivity of Treasury debt cost to short-term rates
- As indications of market appetite for T-bills and their use in a broader portfolio, Treasury could continue to monitor:
 - Valuation spreads: T-bills yields against matched maturity OIS and term GC
 - MMF assets and their product allocation
 - Cost/benefit between FRNs, a new SOFR FRN for example, and T-bills
 - Valuations and auction performance of coupons