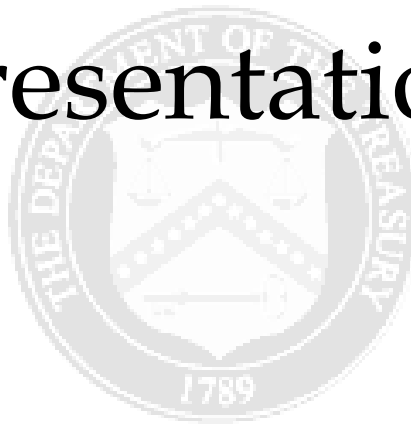


Treasury Presentation to TBAC



Office of Debt Management



Fiscal Year 2021 Q4 Report

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Section I: Executive Summary



Highlights of Treasury's November 2021 Quarterly Refunding Presentation to the Treasury Borrowing Advisory Committee (TBAC)

Receipts and Outlays for FY2021

- Overall receipts totaled \$4.046 trillion, reflecting an increase of \$626 billion (18%) compared to the prior fiscal year. Non-withheld and SECA taxes were \$225 billion (33%) higher reflecting generally higher income and a rebounding economy. Corporate taxes were \$156 billion (59%) higher due to higher corporate profits. Adjusted withheld and FICA taxes were up \$257 billion (11%) due to improved COVID-19 condition in FY2021 and the end of the deferral of certain employer taxes through the end of December 2020. Half of these deferred taxes are due by January 3, 2022, and the remaining half by the end of calendar year 2022. Adjusted Federal Reserve earnings were \$20 billion (25%) higher reflecting lower interest rates that reduce the Fed's interest expenses and higher System Open Market Account (SOMA) holdings that increase interest income. Partially offsetting the overall gains to receipts, adjusted individual refunds were \$41 billion (17%) higher, but close to the 2019 level. This refund season was exhibiting a different pattern from last year due to tax season timing changes and other factors. FY2021 total receipts were 18.1% of GDP, compared to 16.3% for the same period last year.
- Overall outlays were \$6.818 trillion, reflecting an increase of \$266 billion (4%) compared to the prior fiscal year. Department of Treasury outlays were \$482 billion (42%) higher due to greater Economic Impact Payments of \$301 billion (103%), Coronavirus Relief Fund payments to state, territorial, local, and tribal governments, and rental assistance payments of \$132 billion (75%), tax credits of \$51 billion (38%), and interest on the public debt of \$40 billion (8%). This was offset by higher repayments associated with the Federal Reserve's credit lending facilities of \$31 billion (-98%). Department of Agriculture outlays were \$51 billion (28%) higher as relief payments for COVID-19 pandemic related legislation programs have picked up this year. Department of Labor outlays were lower by \$73 billion (-15%) due to the reduction in unemployment and expanded benefits attributable to the COVID-19 pandemic. Small Business Administration outlays were lower by \$255 billion (-44%), mainly due to the higher levels of Paycheck Protection Program loans originated in FY2020 versus this year. The subsidy or budget outlay was recorded when loans are originated, which was in advance of when loan forgiveness was paid. Health and Human Services spending was lower by \$37 billion (-2%) mainly due to the COVID-19 effects seen last year and somewhat offset by increases in Medicaid. FY2021 total outlays were 30.5% of GDP, compared to 31.3% for the same period last year.

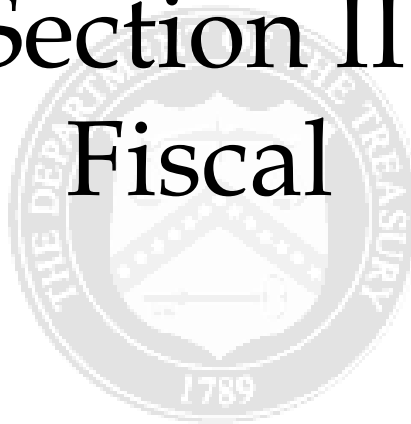
Projected Net Marketable Borrowing

- Treasury's Office of Fiscal Projections (OFP) currently forecasts a net privately-held marketable borrowing need of \$1,015 billion for Q1 FY2022, with an end-of-December cash balance of \$650 billion. For Q2 FY2022, OFP forecasts a net privately-held marketable borrowing need of \$476 billion and assuming an end-of-March cash balance of \$650 billion. These borrowing estimates are based upon current law and do not include any assumptions for the impact of additional legislation that may be passed. The end-of-December and end-of-March cash balances assume enactment of a debt limit suspension or increase.

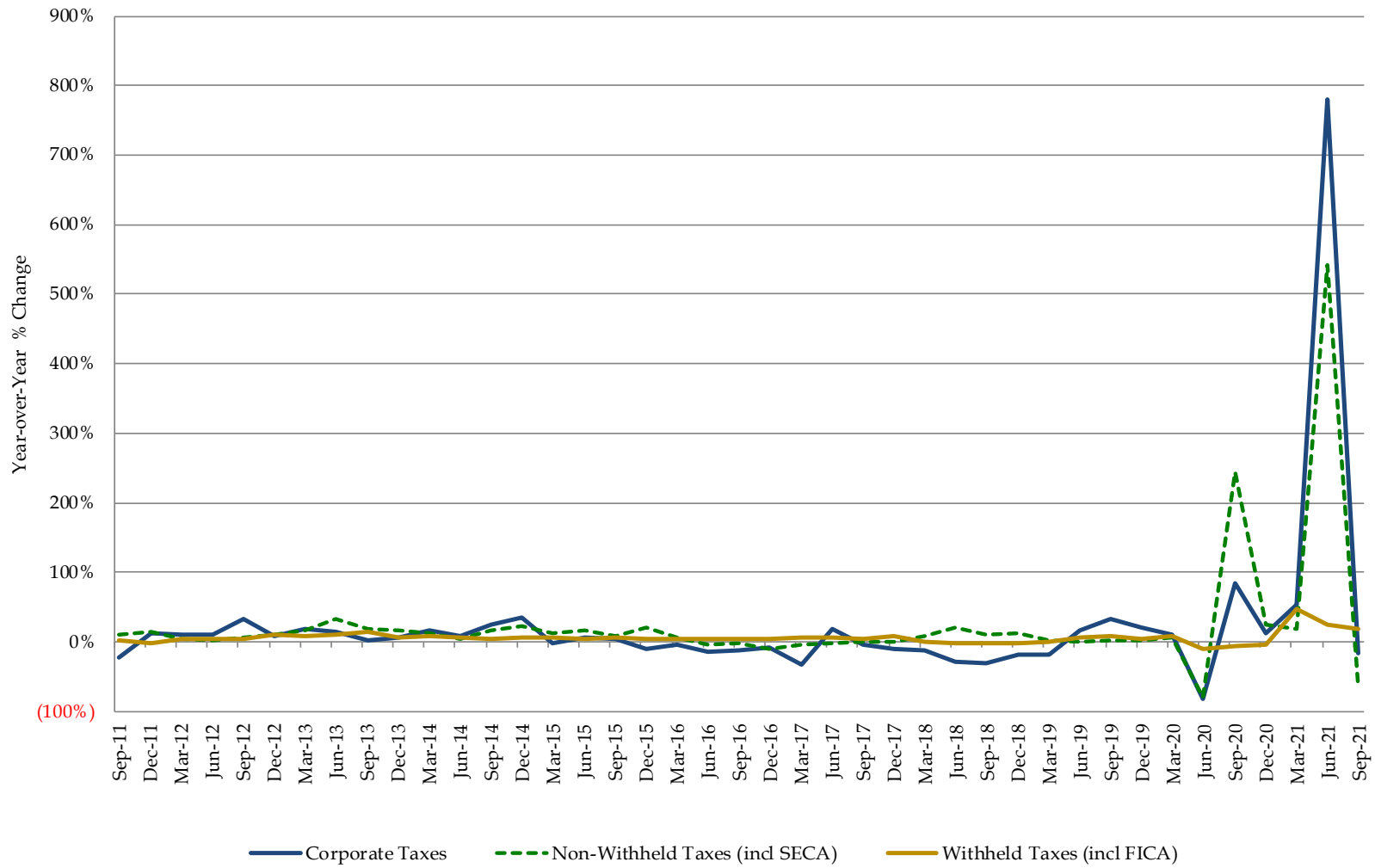
Demand for Treasury Securities

- Bid-to-cover ratios for all securities were within historical ranges over the last quarter.
- Foreign demand remained stable.

Section II: Fiscal

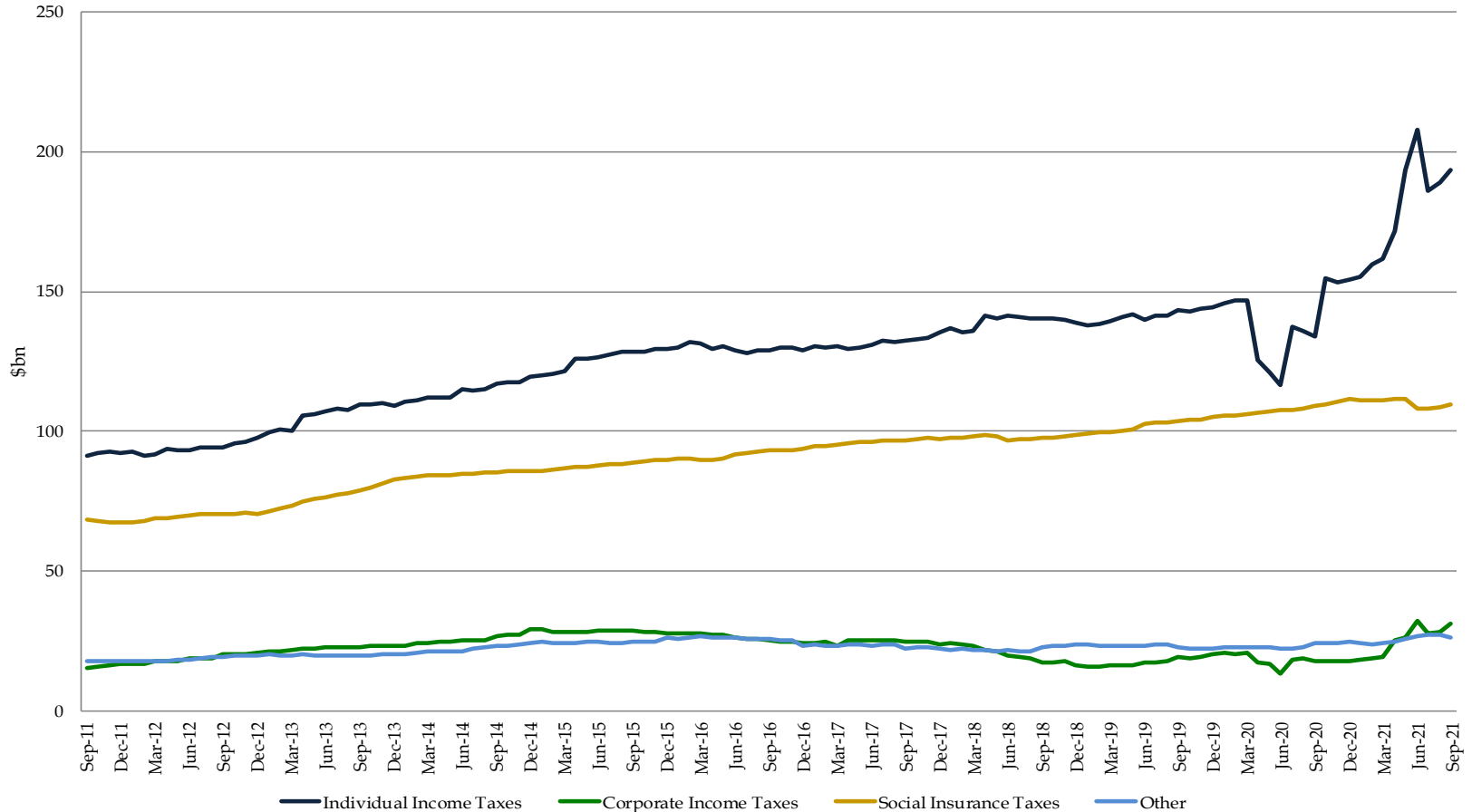


Quarterly Tax Receipts



Quarterly tax receipts for Q4 FY2020 reflect the adjustment of April and June 2020 tax deadlines to July 15th, 2020.
Source: United States Department of the Treasury

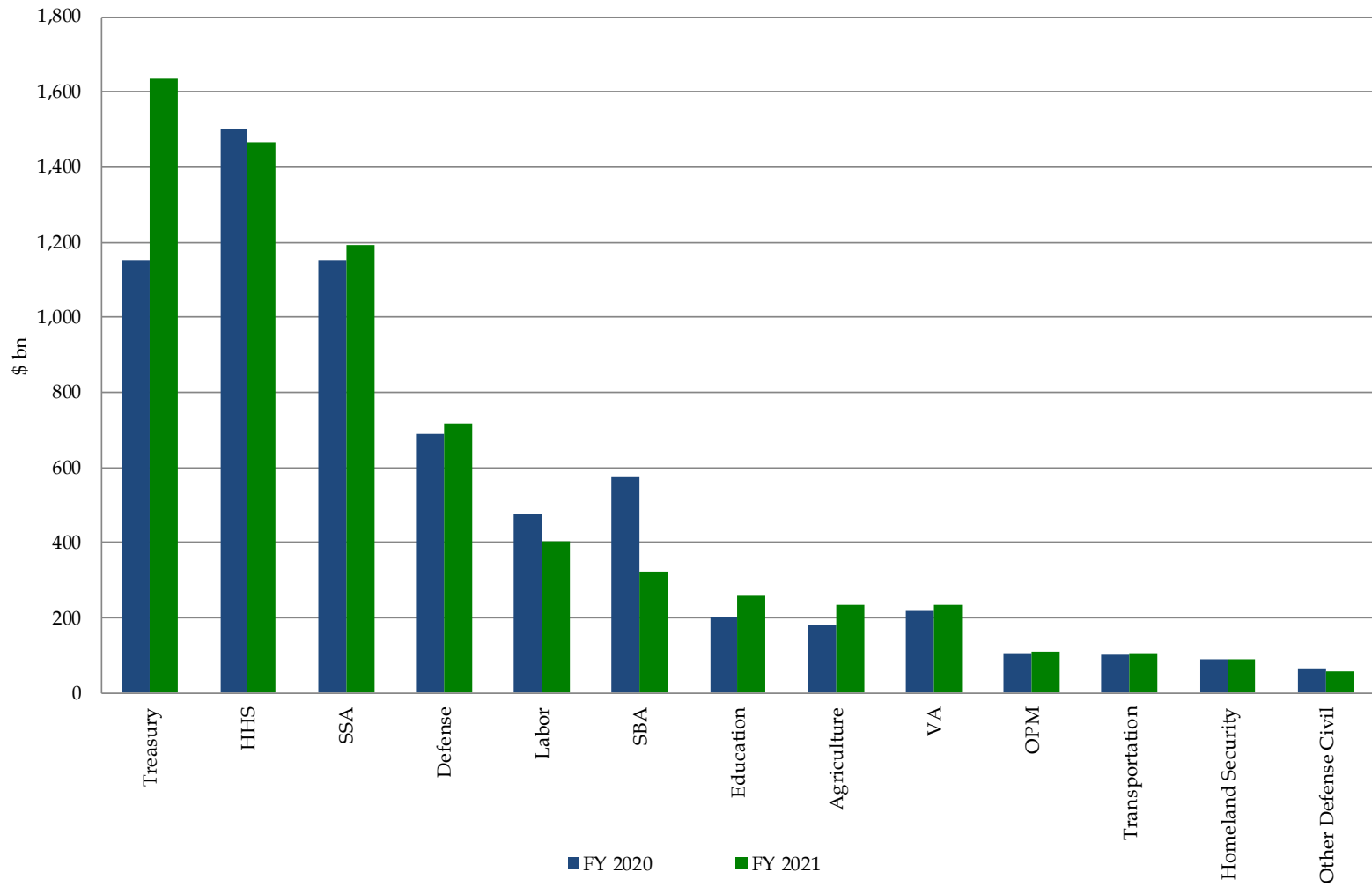
Monthly Receipt Levels (12-Month Moving Average)



Quarterly tax receipts for Q4 FY2020 reflect the adjustment of April and June 2020 tax deadlines to July 15th, 2020. Individual Income Taxes include withheld and non-withheld. Social Insurance Taxes include FICA, SECA, RRTA, UTF deposits, FUTA and RUIA. Other includes excise taxes, estate and gift taxes, customs duties and miscellaneous receipts.

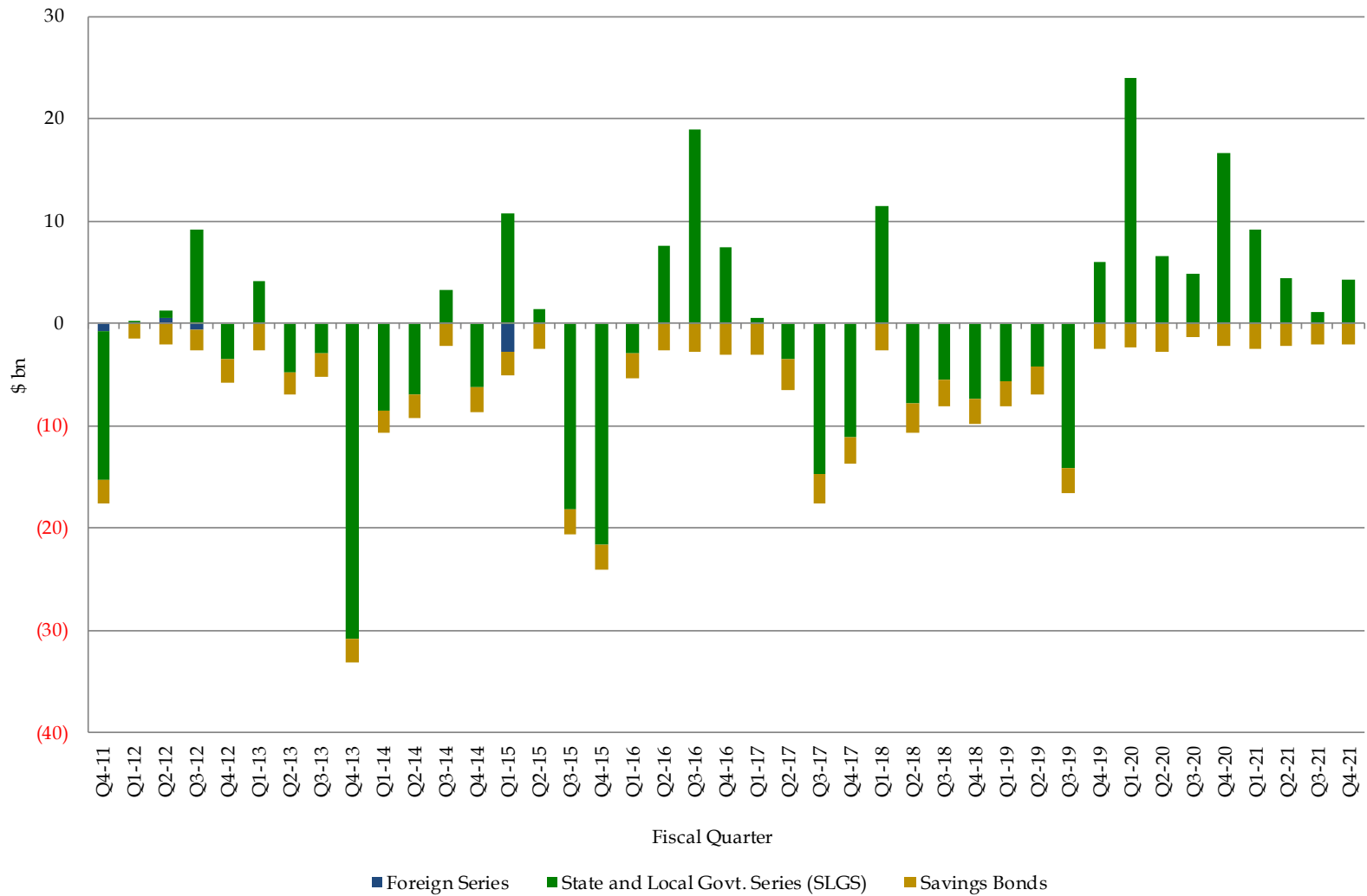
Source: United States Department of the Treasury

Largest Outlays



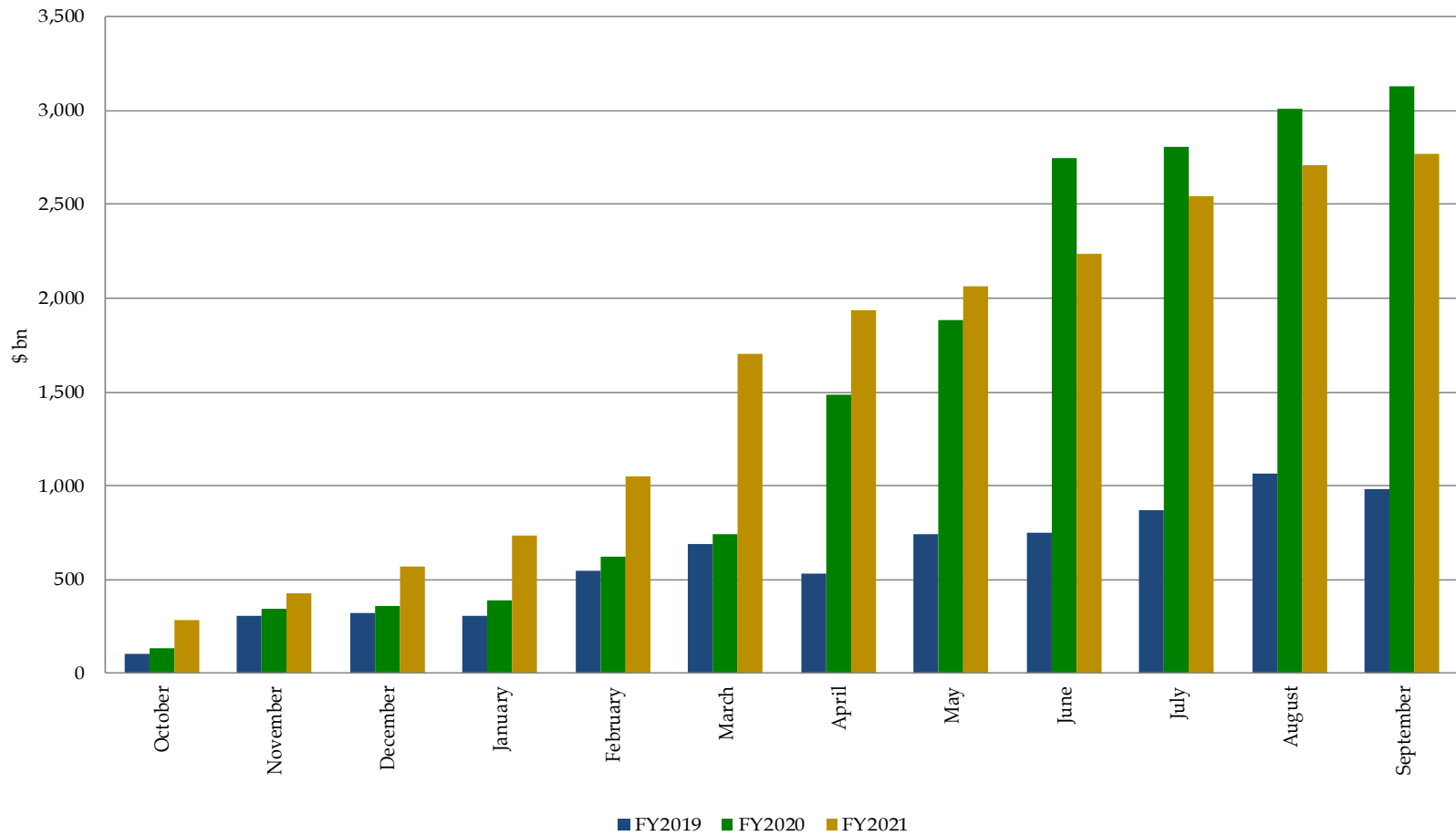
Source: United States Department of the Treasury

Treasury Net Nonmarketable Borrowing



Source: United States Department of the Treasury

Cumulative Budget Deficits by Fiscal Year



Source: United States Department of the Treasury

FY 2022-2024 Deficits and Privately-Held Net Marketable Borrowing Estimates, in \$ billions**

	Primary Dealers ¹	CBO ²	OMB ³
FY2022 Deficit Estimate	1,350	1,153	1,660
FY2023 Deficit Estimate	1,200	789	1,316
FY2024 Deficit Estimate	1,000	753	1,331
FY2022 Deficit Estimate Interquartile Range	1,299-1,613		
FY2023 Deficit Estimate Interquartile Range	973-1,275		
FY2024 Deficit Estimate Interquartile Range	923-1,200		
FY2022 Privately-Held Net Marketable Borrowing Estimate	1,805	1,380*	1,921*
FY2023 Privately-Held Net Marketable Borrowing Estimate	1,129	764	1,363
FY2024 Privately-Held Net Marketable Borrowing Estimate	1,075	803	1,350
FY2022 Privately-Held Net Marketable Borrowing Interquartile Range	1,638-2,000		
FY2023 Privately-Held Net Marketable Borrowing Interquartile Range	1,025-1,313		
FY2024 Privately-Held Net Marketable Borrowing Interquartile Range	948-1,198		
Estimates as of:	Oct-21	Jul-21	Aug-21

¹ Point estimates represent the medians from the primary dealer survey in Oct. 2021.

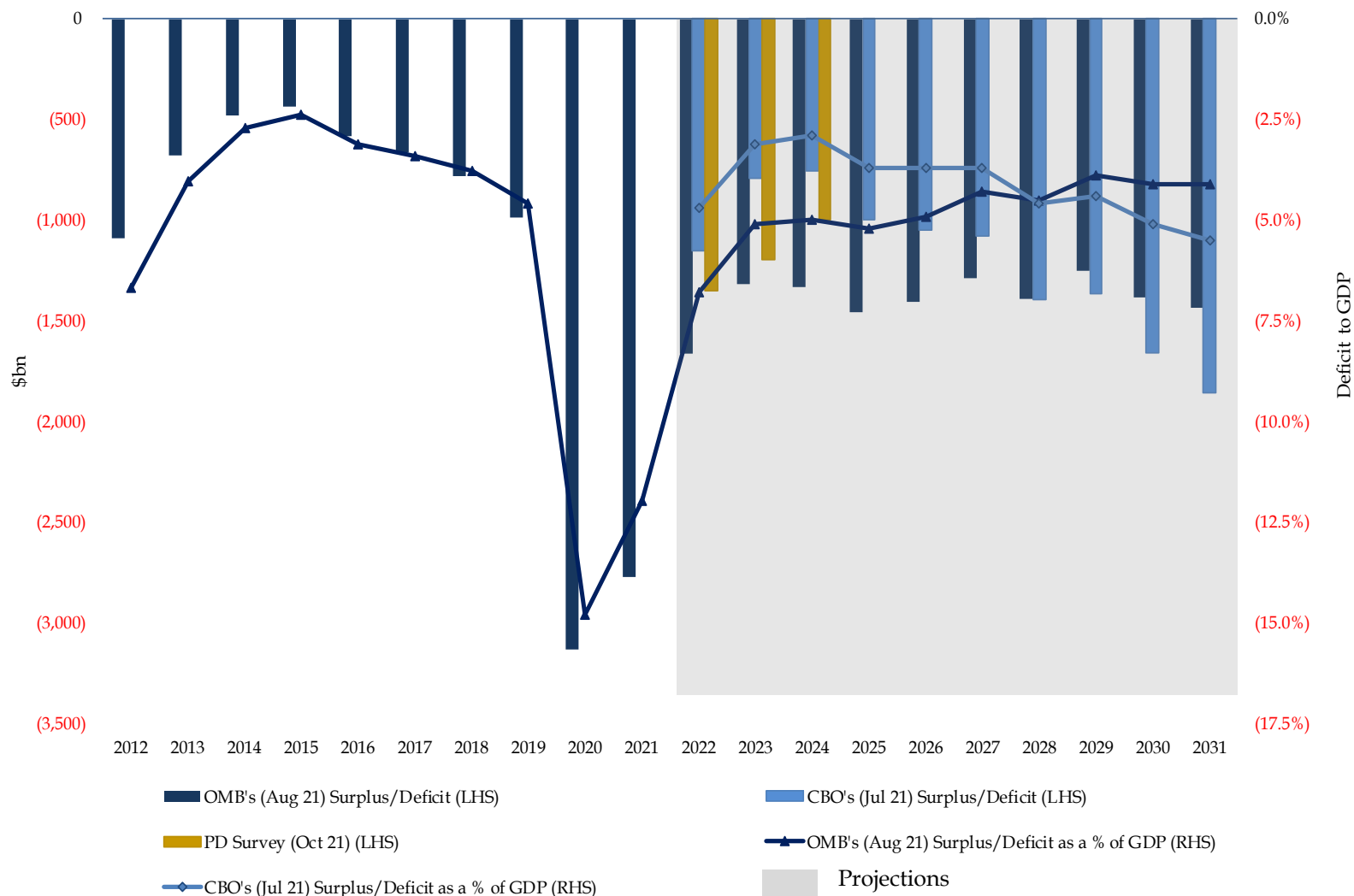
² CBO projections are using estimates are from Table 1 of “An Update to The Budget and Economic Outlook: 2021 to 2031,” July 2021.

³ OMB projections are using estimates are from Table S-1 of “Mid-Session Review Budget of The U.S. Government Fiscal Year 2022,” August 2021.

*FY2022 net borrowing estimates from both OMB and CBO assume that the cash balance remains constant at the end of FY2021 levels. The end of FY2021 cash balance was \$215 billion, which is below levels that Treasury believes would be consistent with its prudent cash balance policy.

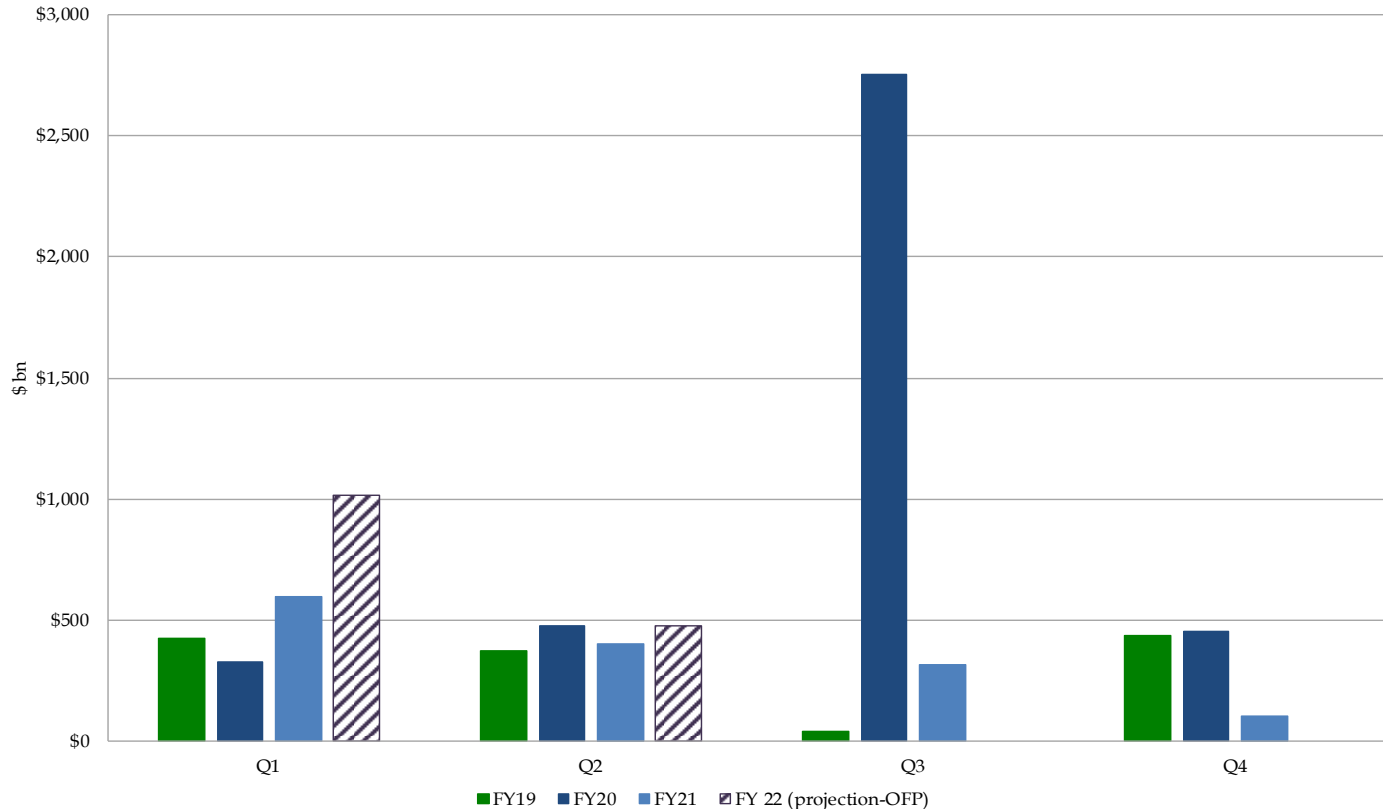
**Privately-held marketable borrowing excludes rollovers (auction “add-ons”) of Treasury securities held in the Federal Reserve’s System Open Market Account (SOMA) but includes financing required due to SOMA redemptions. Secondary market purchases of Treasury securities by SOMA do not directly change net privately-held marketable borrowing but, all else equal, when the securities mature and assuming the Fed does not redeem any maturing securities, would increase the amount of cash raised for a given privately-held auction size by increasing the SOMA “add-on” amount.

Budget Surplus/Deficit*



*OMB's projections are from OMB's Table S-1 of "Mid-Session Review Budget of The U.S. Government Fiscal Year 2021," Aug. 2021. CBO's deficit projections are using estimates from CBO's Table 1 of "An Update to The Budget and Economic Outlook: 2021 to 2031," July 2021.

Privately-Held Net Marketable Borrowing Outlook*



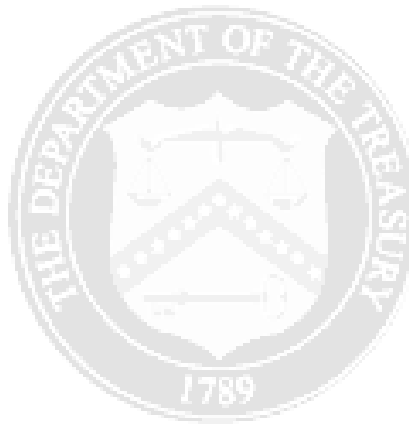
*Privately-held marketable borrowing excludes rollovers (auction “add-ons”) of Treasury securities held in the Federal Reserve’s System Open Market Account (SOMA) but includes financing required due to SOMA redemptions. Secondary market purchases of Treasury securities by SOMA do not directly change net privately-held marketable borrowing but, all else equal, when the securities mature and assuming the Fed does not redeem any maturing securities, would increase the amount of cash raised for a given privately-held auction size by increasing the SOMA “add-on” amount. These borrowing estimates are based upon current law and do not include any assumptions for the impact of additional legislation that may be passed. The end-of-December and end-of-March cash balances assume enactment of a debt limit suspension or increase.

Section III: Financing



Assumptions for Financing Section (pages 16 to 19)

- Portfolio and SOMA holdings as of 09/30/2021.
- Estimates assume private announced issuance sizes and patterns remain constant for nominal coupons, TIPS, and FRNs given changes made before the November 2021 refunding, while using total bills outstanding of ~\$3.71 trillion.
- The principal on the TIPS securities was accreted to each projection date based on market ZCIS levels as of 09/30/2020.
- No attempt was made to account for future financing needs.



Sources of Privately-Held Financing in FY21 Q4*

July - September 2021	
Net Bill Issuance	(561)
Net Coupon Issuance	664
Subtotal: Net Marketable Borrowing	103
Ending Cash Balance	215
Beginning Cash Balance	852
Subtotal: Change in Cash Balance	(637)
Net Implied Funding for FY 2021 Q4**	740

Security	July - September 2021 Bill Issuance			Fiscal Year-to-Date Bill Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
4-Week	415	505	(90)	1,735	1,785	(50)
8-Week	430	505	(75)	1,870	1,905	(35)
13-Week	723	798	(75)	2,874	2,910	(36)
26-Week	687	723	(36)	2,721	2,709	12
52-Week	102	102	0	442	323	119
CMBs						
6-Week	230	470	(240)	1,545	1,725	(180)
15-Week	0	0	0	500	890	(390)
17-Week	400	445	(45)	1,645	1,670	(25)
22-Week	0	90	(90)	600	1,330	(730)
39-Week	0	0	0	0	90	(90)
CMBs	180	90	90	180	90	90
Bill Subtotal	3,167	3,728	(561)	13,932	15,337	(1,405)

Security	July - September 2021 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
2-Year FRN	80	55	25	314	222	92
2-Year	180	91	89	708	276	432
3-Year	174	70	104	684	247	437
5-Year	183	85	98	720	329	391
7-Year	186	77	109	726	311	415
10-Year	117	32	85	465	141	324
20-Year	75	0	75	298	0	298
30-Year	75	3	72	299	9	290
5-Year TIPS	0	0	0	66	41	25
10-Year TIPS	30	32	(2)	83	70	13
30-Year TIPS	8	0	8	17	0	17
Coupon Subtotal	1,108	444	664	4,380	1,645	2,735

Total	4,275	4,172	103	18,312	16,982	1,330
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*Privately-held marketable borrowing excludes rollovers (auction “add-ons”) of Treasury securities held in the Federal Reserve’s System Open Market Account (SOMA) but includes financing required due to SOMA redemptions. Secondary market purchases of Treasury securities by SOMA do not directly change net privately-held marketable borrowing but, all else equal, when the securities mature and assuming the Fed does not redeem any maturing securities, would increase the amount of cash raised for a given privately-held auction size by increasing the SOMA “add-on” amount.

**By adjusting the change in cash balance, Treasury arrives at the net implied funding number.

Sources of Privately-Held Financing in FY22 Q1*

October - December 2021	
Assuming Constant Coupon Issuance Sizes**	
Treasury Announced Net Marketable Borrowing***	1,015
Net Coupon Issuance	678
Implied Change in Bills	337

Security	October - December 2021 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
	Gross	Maturing^	Net	Gross	Maturing	Net
2-Year FRN	80	55	25	80	55	25
2-Year	180	99	81	180	99	81
3-Year	174	76	98	174	76	98
5-Year	183	85	98	183	85	98
7-Year	186	78	108	186	78	108
10-Year	117	40	77	117	40	77
20-Year	75	0	75	75	0	75
30-Year	75	9	66	75	9	66
5-Year TIPS	35	0	35	35	0	35
10-Year TIPS	14	0	14	14	0	14
30-Year TIPS	0	0	0	0	0	0
Coupon Subtotal	1,119	441	678	1,119	441	678

* Privately-held marketable borrowing excludes rollovers (auction “add-ons”) of Treasury securities held in the Federal Reserve’s System Open Market Account (SOMA) but includes financing required due to SOMA redemptions. Secondary market purchases of Treasury securities by SOMA do not directly change net privately-held marketable borrowing but, all else equal, when the securities mature and assuming the Fed does not redeem any maturing securities, would increase the amount of cash raised for a given privately-held auction size by increasing the SOMA “add-on” amount.

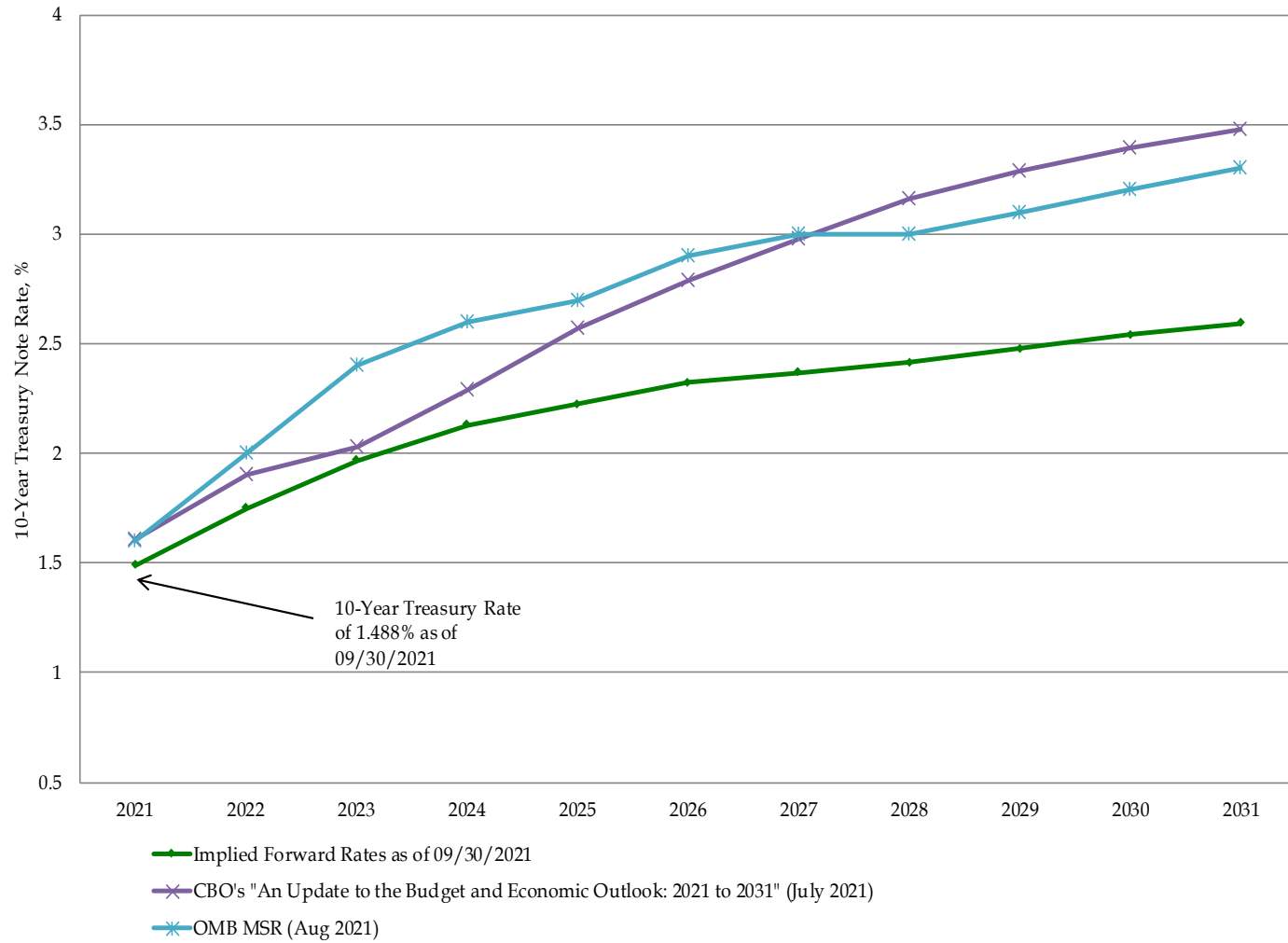
** Keeping announced issuance sizes and patterns constant for nominal coupons, TIPS, and FRNs based on changes made before the November 2021 refunding.

*** Assumes an end-of-December 2021 cash balance of \$650 billion versus a beginning-of-October 2021 cash balance of \$215 billion.

Financing Estimates released by the Treasury can be found here: <http://www.treasury.gov/resource-center/data-chart-center/quarterly-refunding/Pages/Latest.aspx>

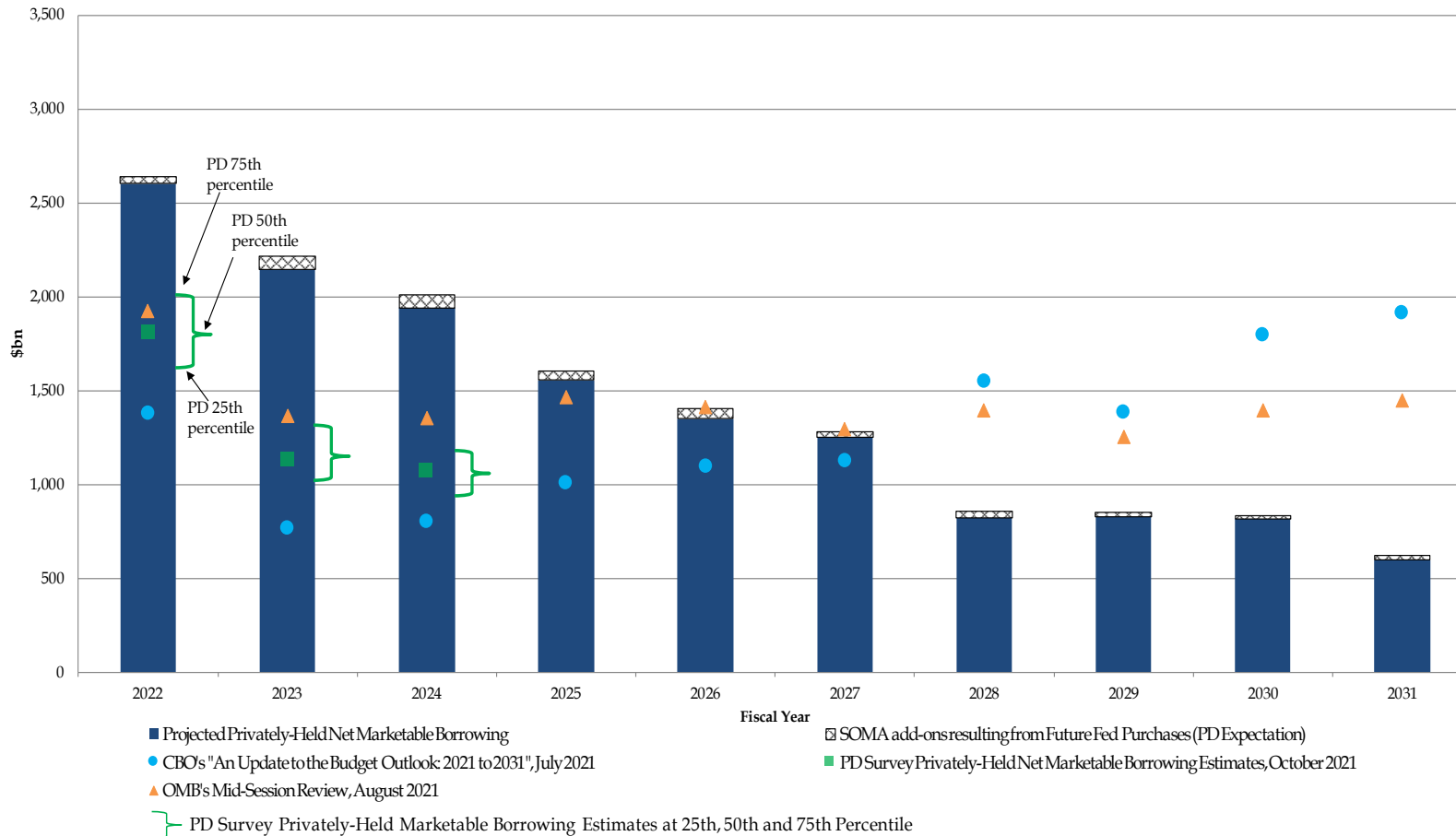
^ Maturing amounts could change based on future Federal Reserve purchases.

Interest Rate Assumptions: 10-Year Treasury Note



Projected Privately-Held Net Marketable Borrowing

Assuming Private Coupon Issuance & Total Bills Outstanding Remain Constant as of 09/30/2021*



*Treasury's latest primary dealer survey median/interquartile range estimates can be found on page 11. OMB's borrowing projections are from Table S-1 of "Mid-Session Review Budget of the U.S. Government Fiscal Year 2022," August 2021. CBO's borrowing projections are using estimates from Table 1 of CBO's "An Update to The Budget and Economic Outlook: 2021 to 2031," July 2021. FY2022 net borrowing estimates from both OMB and CBO assume that the cash balance remains constant at the end of FY2021 levels. The end of FY2021 cash balance was \$215 billion, which is below levels that Treasury believes would be consistent with its prudent cash balance policy.

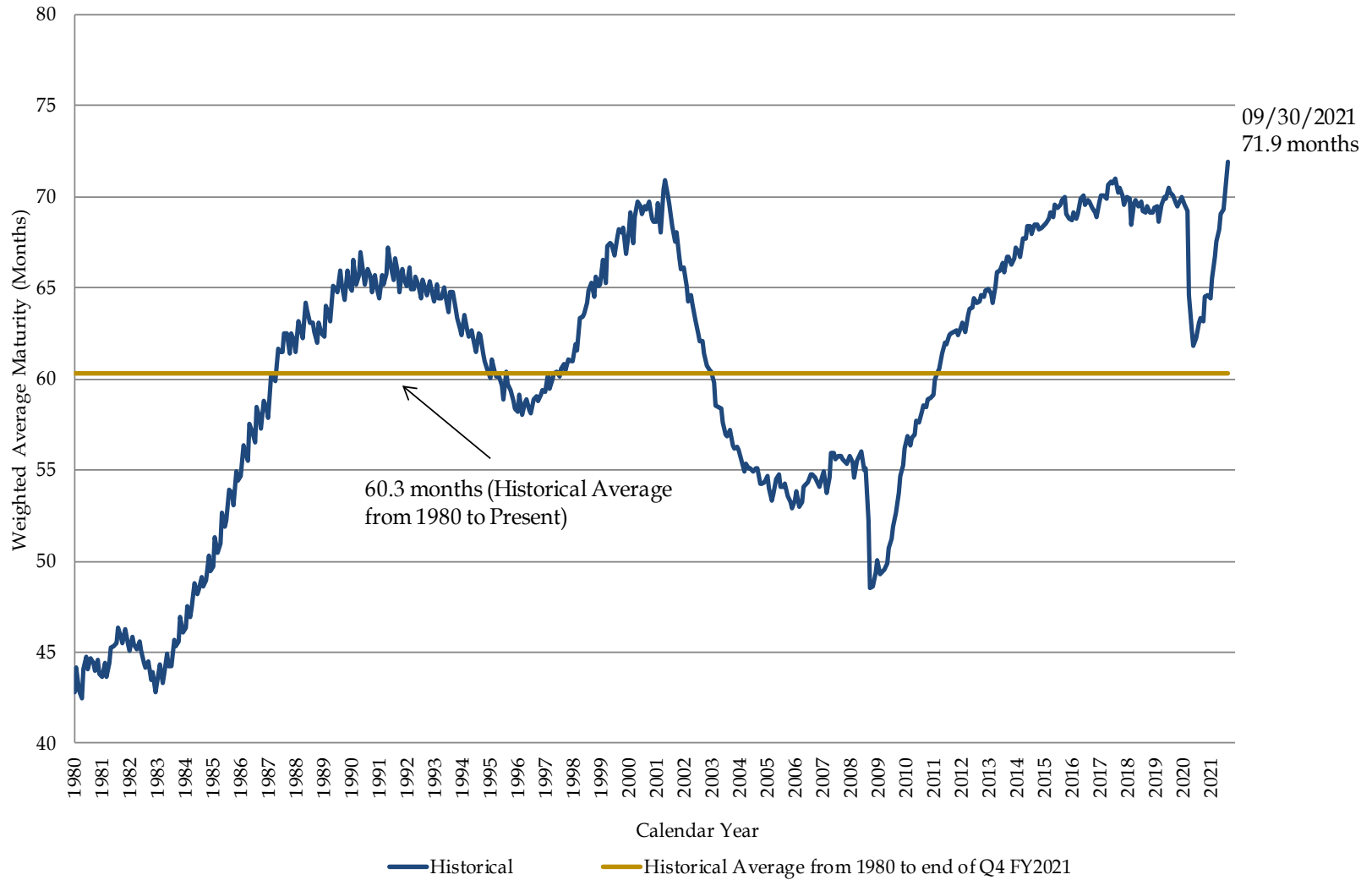
Future Fed purchases are derived from the Fed's September 2021 Primary Dealer Survey median results with maturity bucket weights based on current operations and pro-rata across securities within each maturity bucket. <https://www.newyorkfed.org/medialibrary/media/markets/survey/2021/sep-2021-spd-results.pdf>

Privately-held marketable borrowing excludes rollovers (auction "add-ons") of Treasury securities held in the Federal Reserve's System Open Market Account (SOMA) but includes financing required due to SOMA redemptions. No adjustments are made for open-market outright purchases.

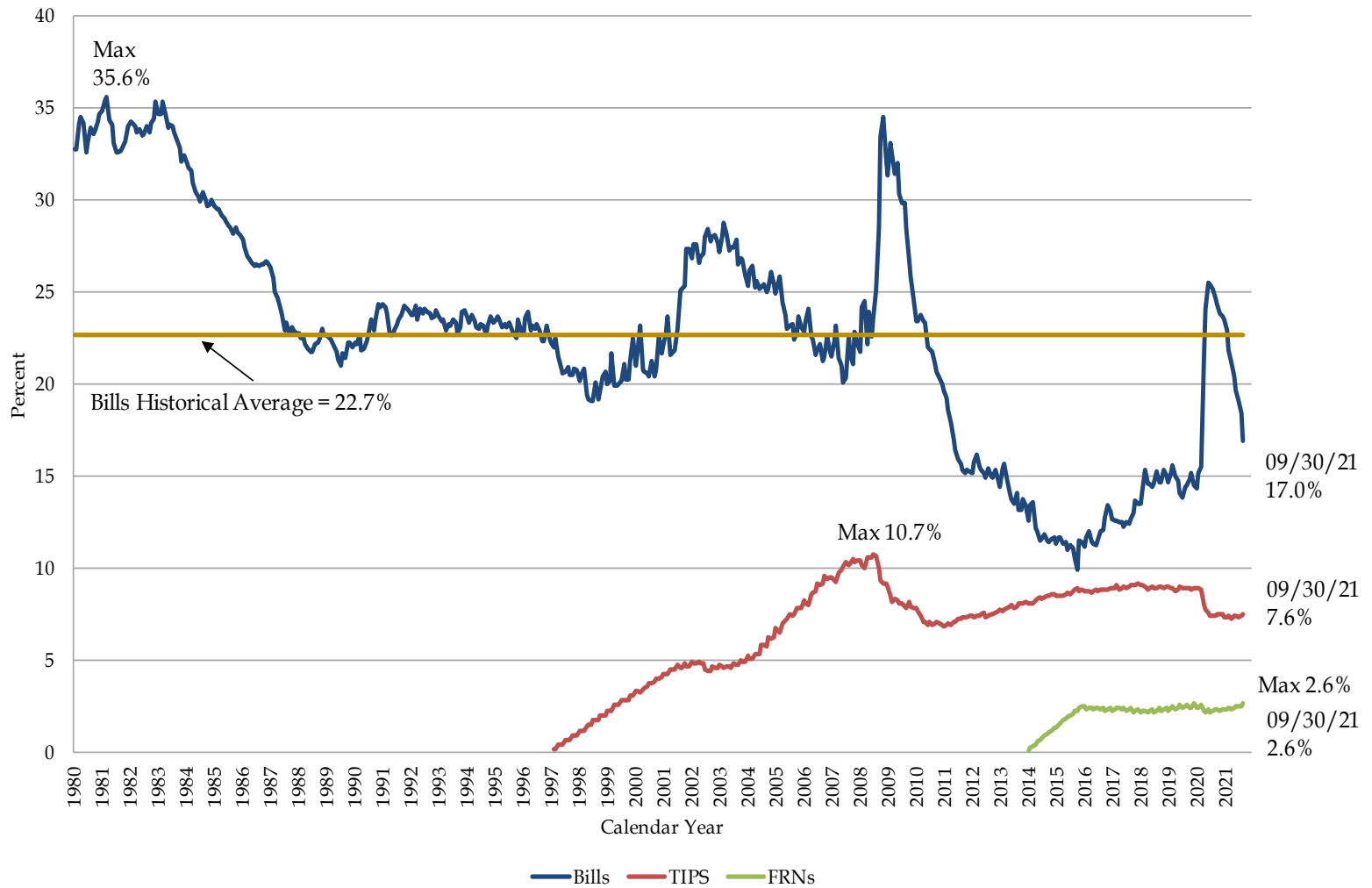
Section IV: Portfolio Metrics



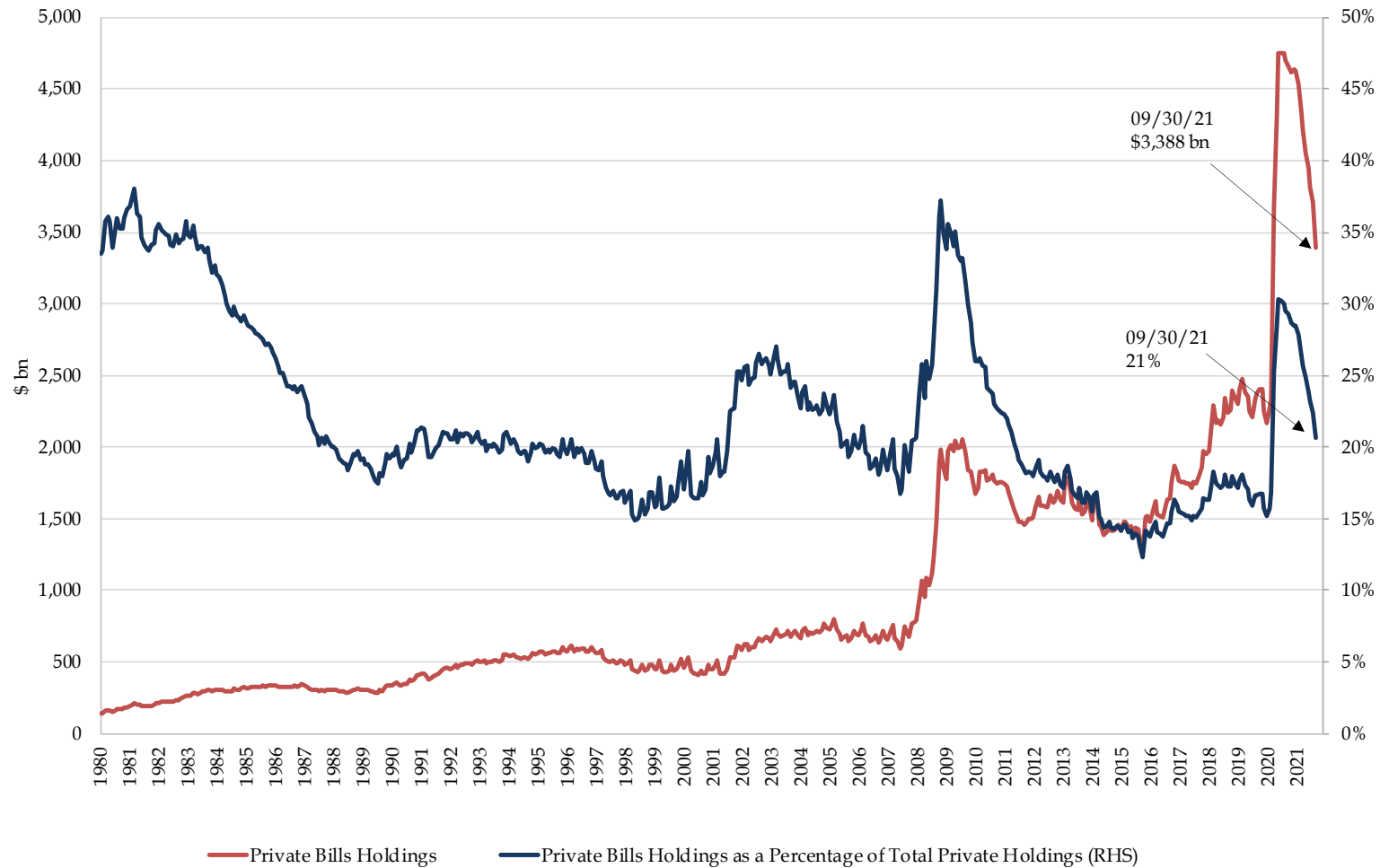
Historical Weighted Average Maturity of Marketable Debt Outstanding



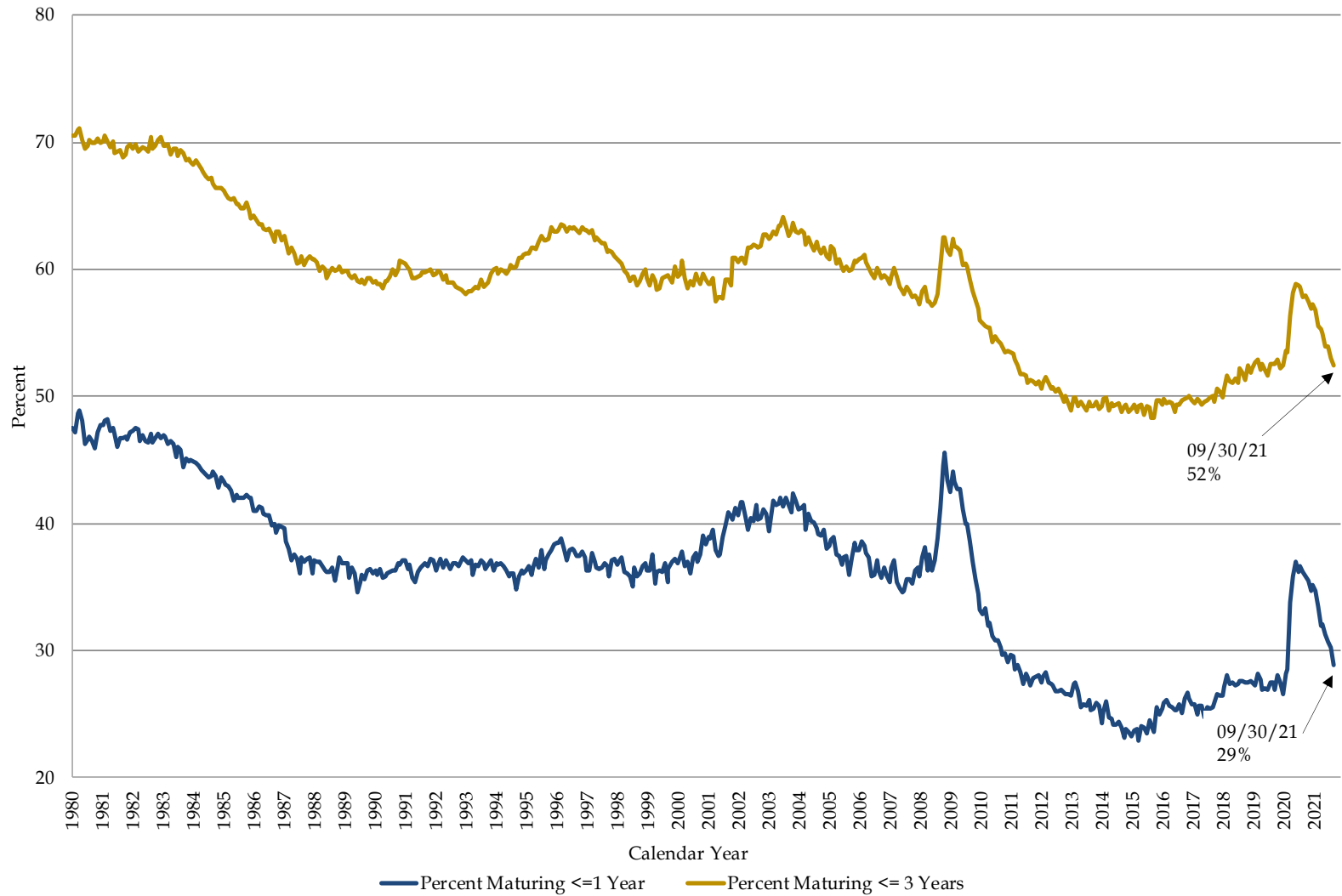
Bills, TIPS & FRNs Outstanding as a Percent of Marketable Debt Outstanding



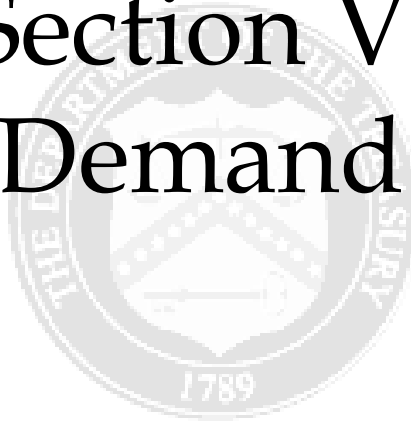
Private Bills Holdings as a Percentage of Total Private Holdings



Treasury Maturity Profile History



Section V: Demand



Summary Statistics for Fiscal Year 2021 Q4 Auctions

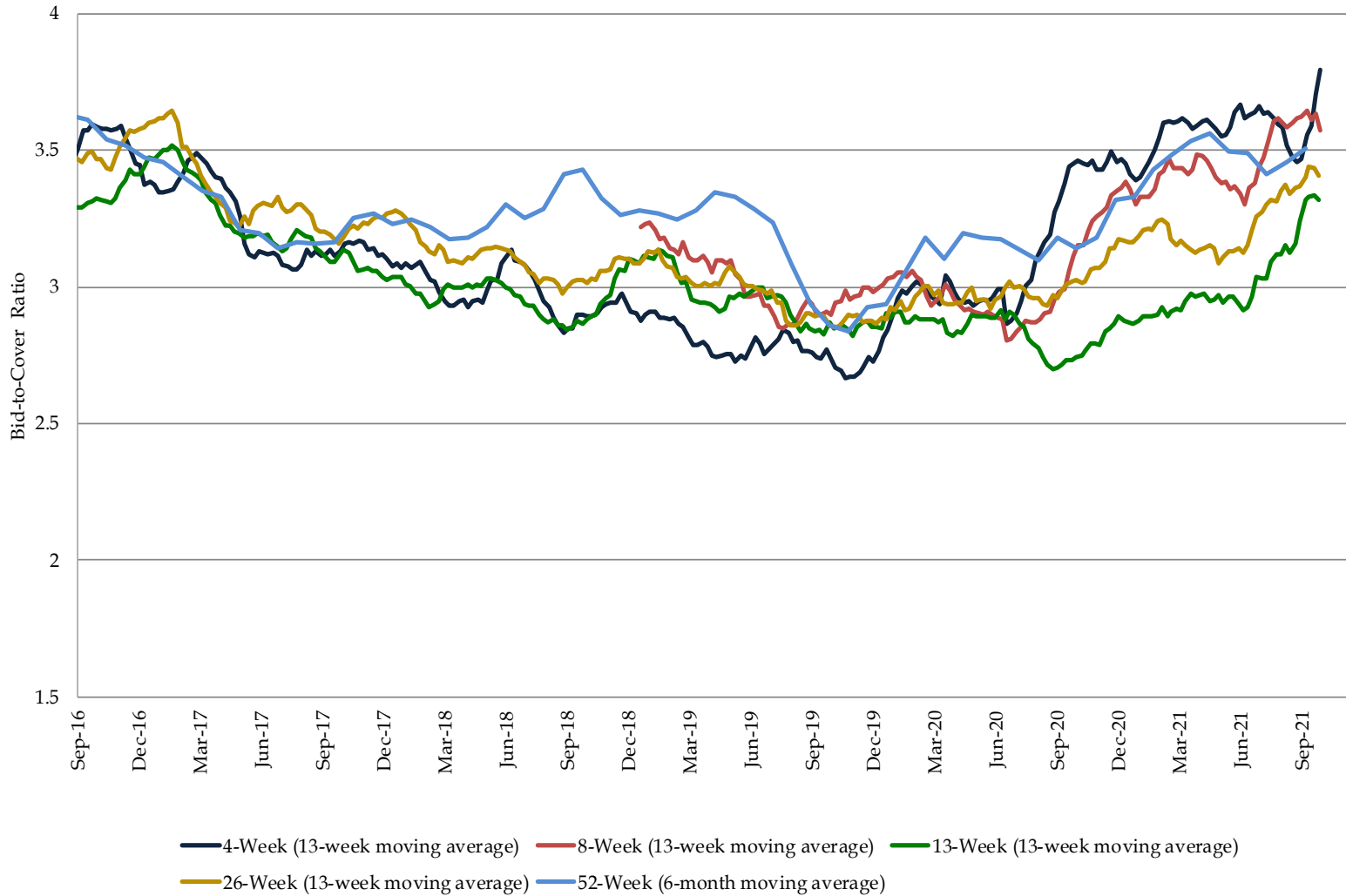
Security Type	Term	Stop Out Rate (%)*	Bid-to-Cover Ratio*	Competitive Awards (\$bn)	% Primary Dealer*	% Direct*	% Indirect*	Non-Competitive Awards (\$bn)	SOMA "Add-Ons" (\$bn)	10-Year Equivalent (\$bn)**
Bill	4-Week	0.045	3.6	415.1	52.8	9.1	38.1	9.92	40.3	3.9
Bill	8-Week	0.051	3.7	450.9	48.2	8.0	43.8	4.10	47.0	8.4
Bill	13-Week	0.048	3.3	657.2	40.4	6.6	53.0	8.79	81.3	20.3
Bill	26-Week	0.050	3.4	625.3	40.1	5.2	54.7	7.76	77.2	38.5
Bill	52-Week	0.077	3.6	100.4	46.1	6.6	47.2	1.58	11.4	12.4
CMB	6-Week	0.043	4.0	189.9	45.9	10.9	43.2	0.10	0.0	2.4
CMB	17-Week	0.047	4.0	395.0	46.1	7.1	46.8	0.02	0.0	14.0
CMB	Other	0.054	3.0	180.0	56.0	9.7	34.2	0.05	0.0	2.2
Coupon	2-Year	0.255	2.5	179.5	25.7	21.4	52.9	0.50	20.5	43.4
Coupon	3-Year	0.446	2.5	173.9	26.4	18.6	55.1	0.13	41.6	70.5
Coupon	5-Year	0.844	2.4	182.8	23.1	18.5	58.4	0.15	20.9	108.4
Coupon	7-Year	1.179	2.3	186.0	20.4	19.7	59.8	0.05	21.2	151.1
Coupon	10-Year	1.349	2.5	117.0	13.6	15.7	70.8	0.03	28.6	148.0
Coupon	20-Year	1.845	2.4	75.0	18.9	18.8	62.2	0.00	8.6	149.2
Coupon	30-Year	1.986	2.3	75.0	17.9	18.4	63.7	0.01	18.6	228.5
TIPS	10-Year	-0.980	2.5	30.0	13.6	15.7	70.8	0.04	1.7	34.2
TIPS	30-Year	-0.292	2.3	8.0	12.7	12.4	74.9	0.01	1.0	27.9
FRN	2-Year	0.027	3.0	79.9	33.0	0.8	66.2	0.05	2.7	0.0

Total Bills	0.049	3.5	3,013.8	45.4	7.4	47.2	32.30	257.2	102.0
Total Coupons	0.952	2.4	989.1	21.8	18.9	59.2	0.87	159.9	899.1
Total TIPS	-0.835	2.5	38.0	13.4	15.0	71.6	0.05	2.7	62.2
Total FRN	0.027	3.0	79.9	33.0	0.8	66.2	0.05	2.7	0.0

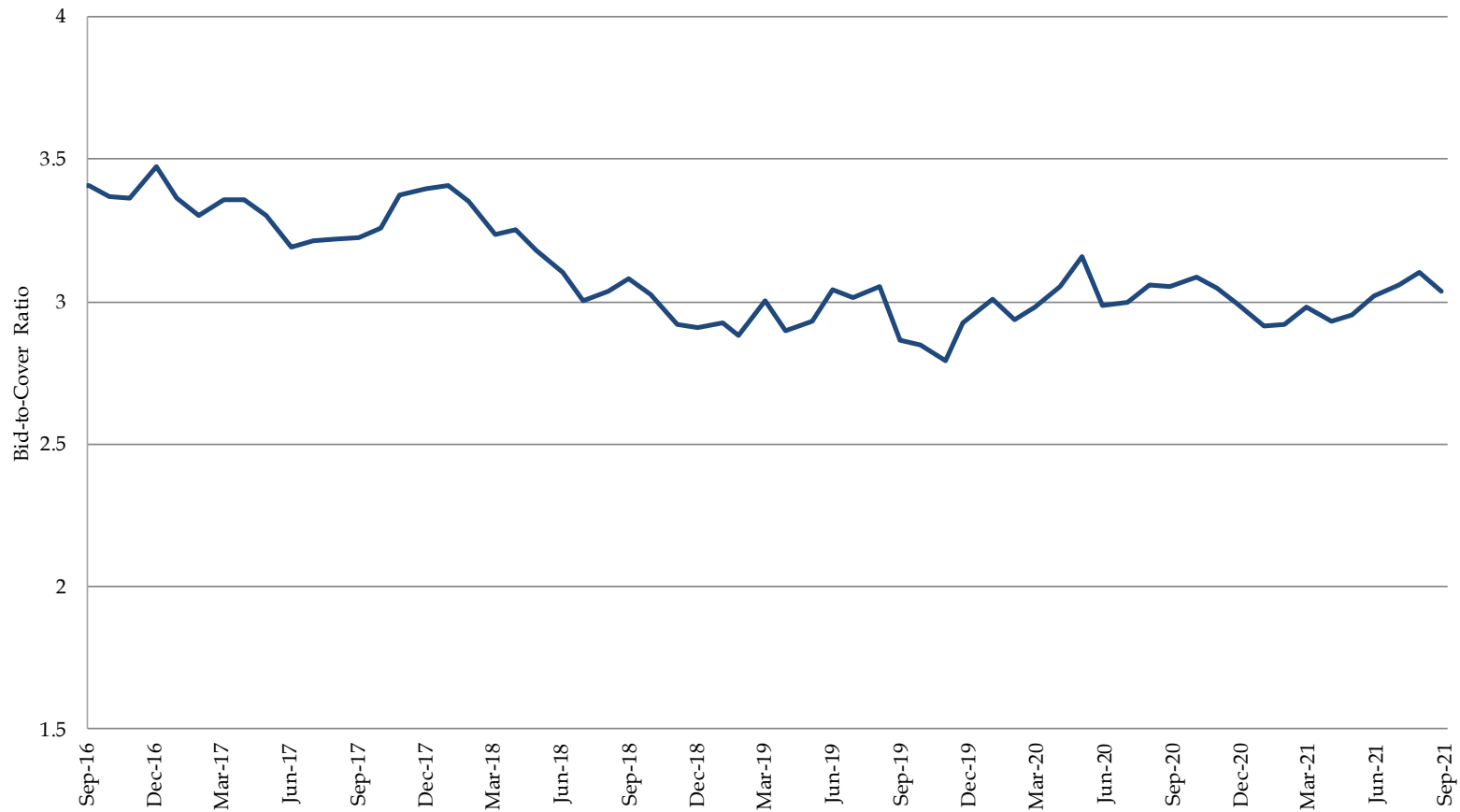
*Weighted averages of Competitive Awards. FRNs are reported on discount margin basis.

**Approximated using prices at settlement and includes both Competitive and Non-Competitive Awards. For TIPS 10-year equivalent, a constant auction BEI is used as the inflation assumption.

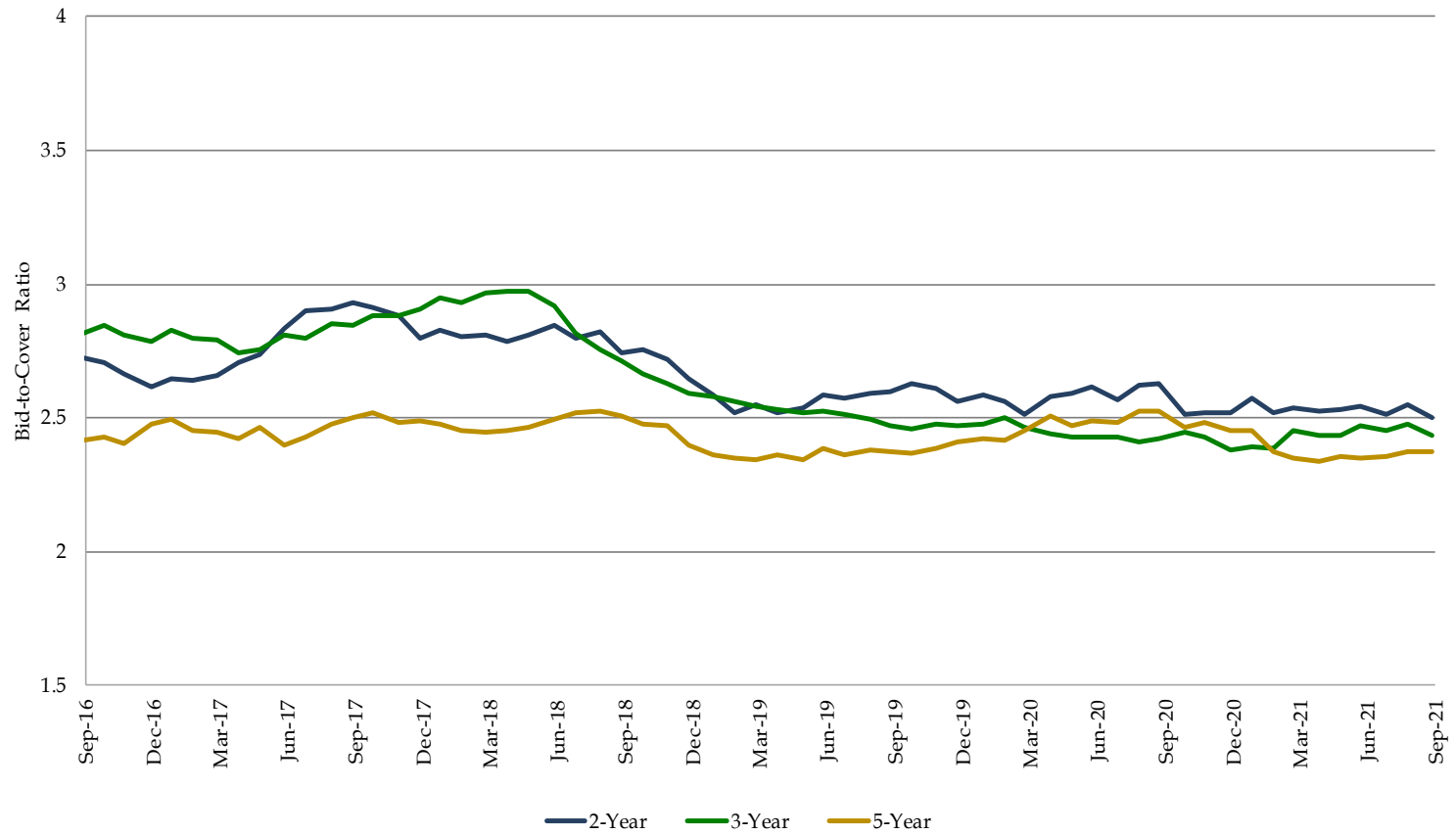
Bid-to-Cover Ratios for Treasury Bills



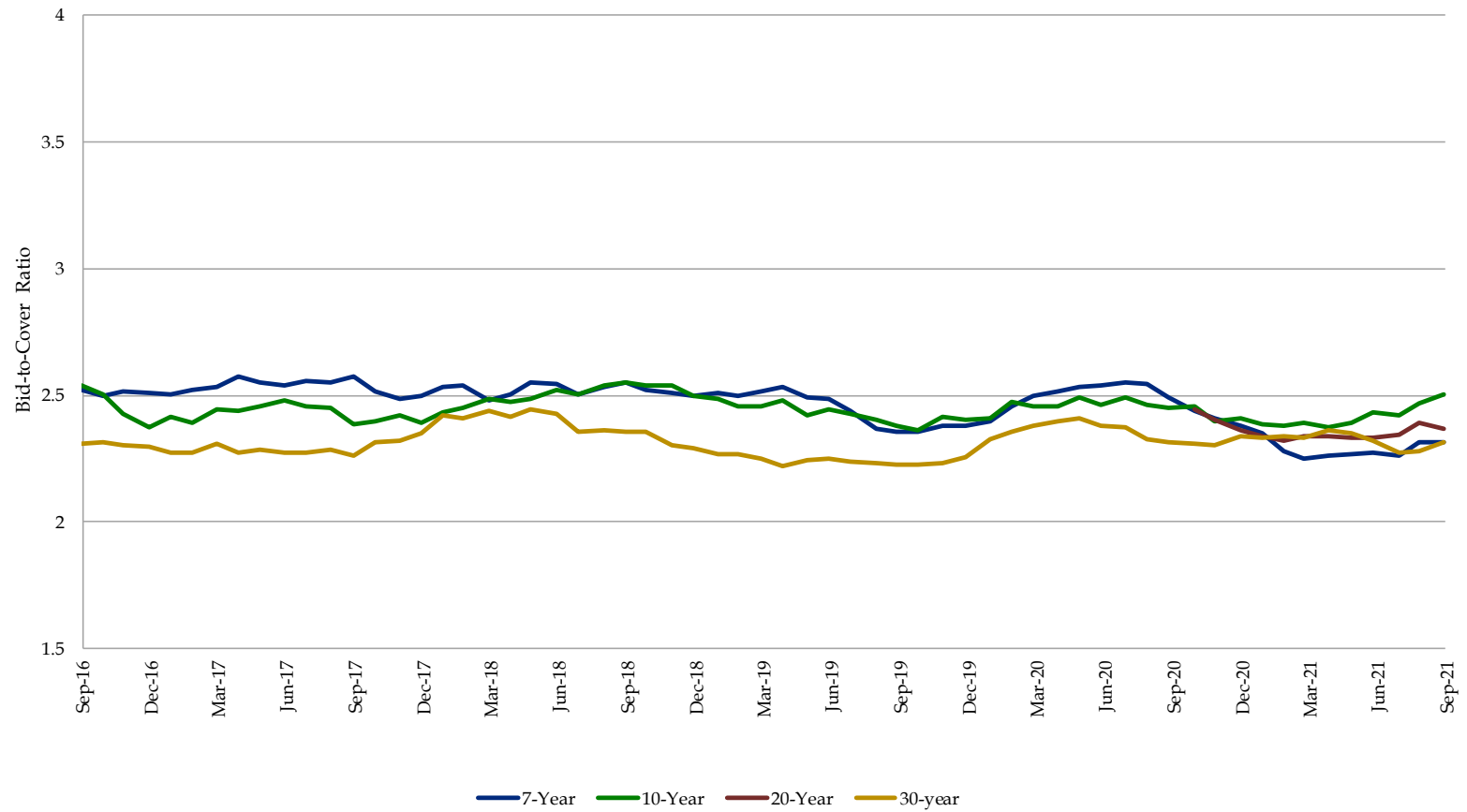
Bid-to-Cover Ratios for FRNs (6-Month Moving Average)



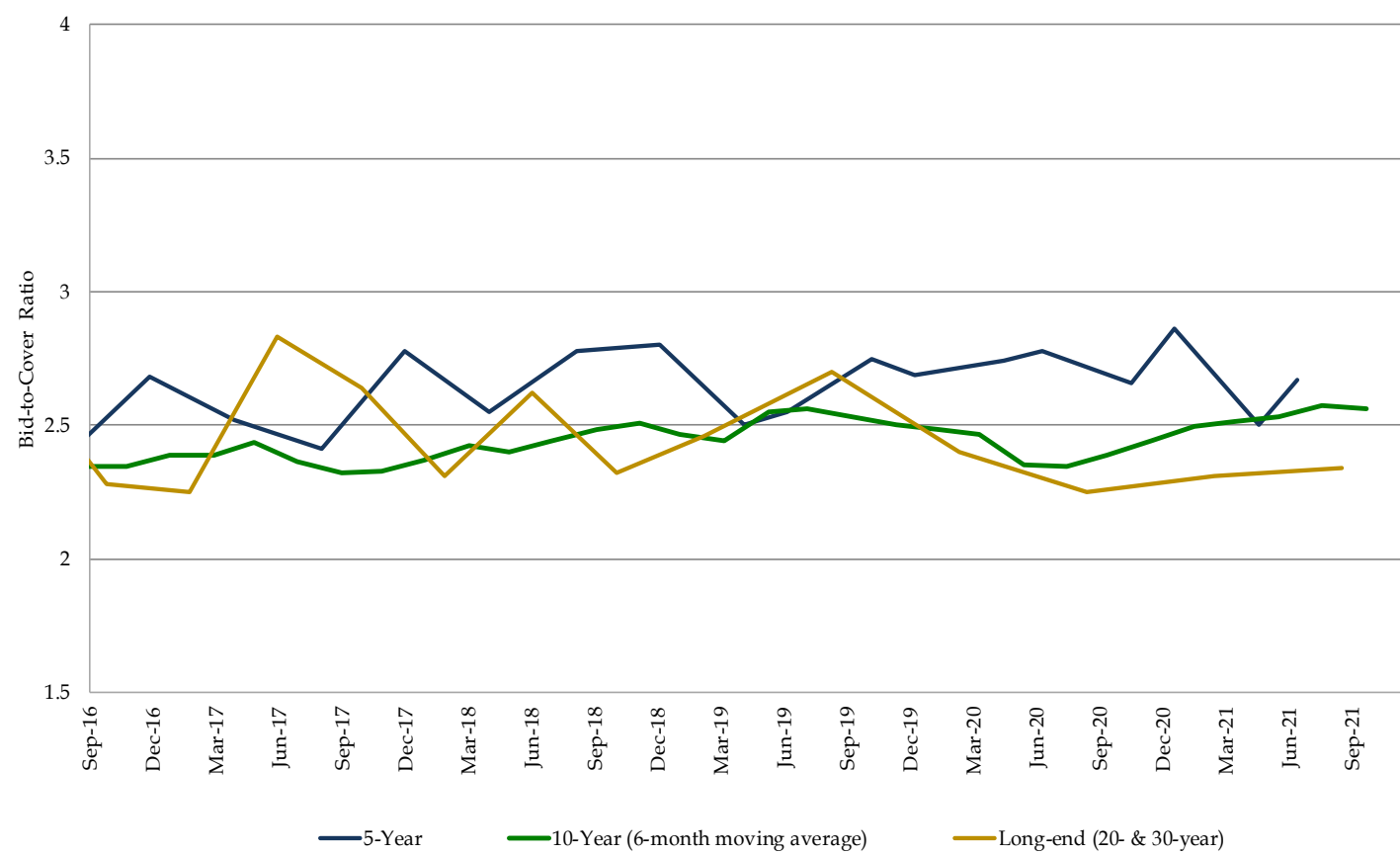
Bid-to-Cover Ratios for 2-, 3-, and 5-Year Nominal Securities (6-Month Moving Average)



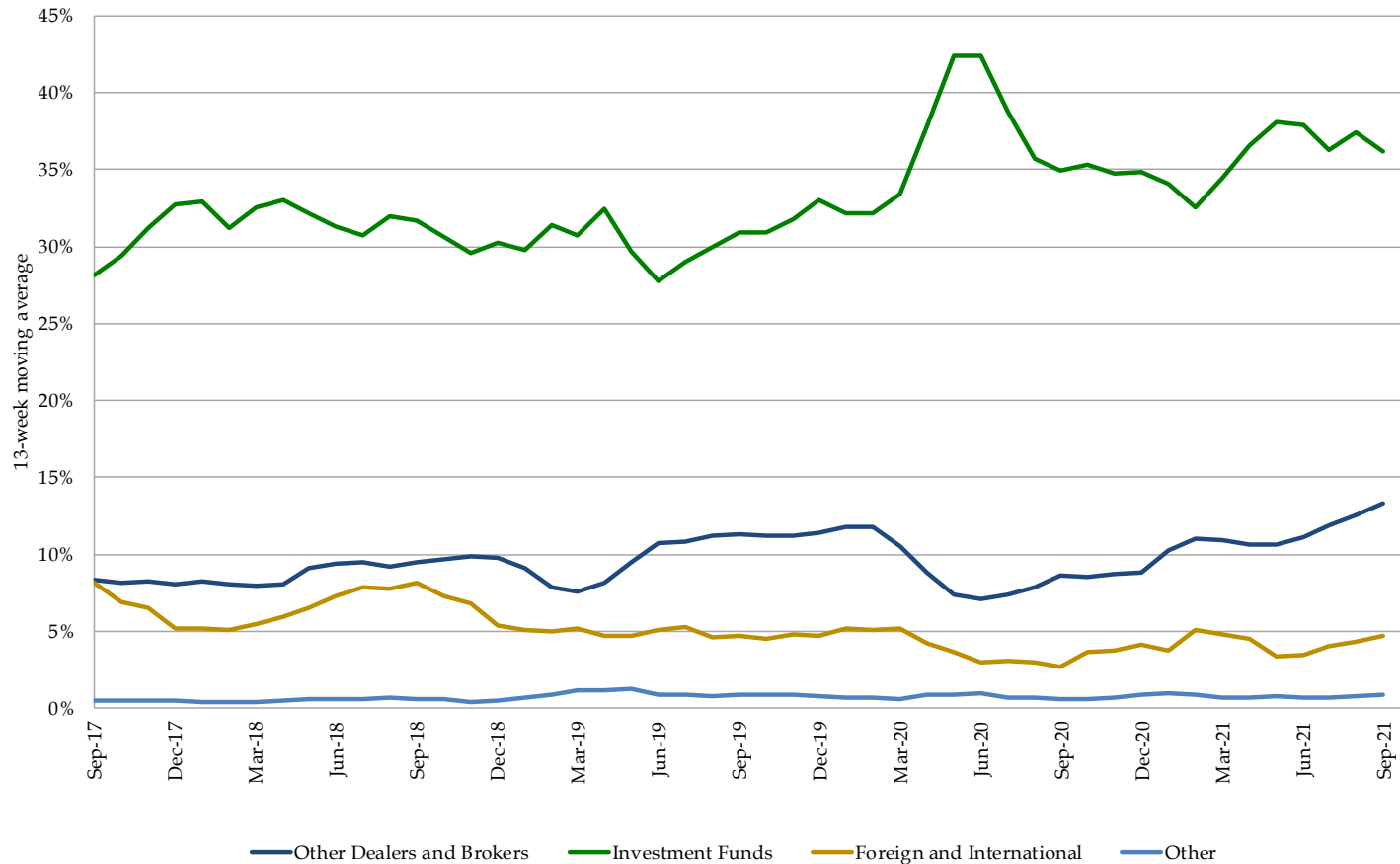
Bid-to-Cover Ratios for 7-, 10-, 20-, and 30-Year Nominal Securities (6-Month Moving Average)



Bid-to-Cover Ratios for TIPS

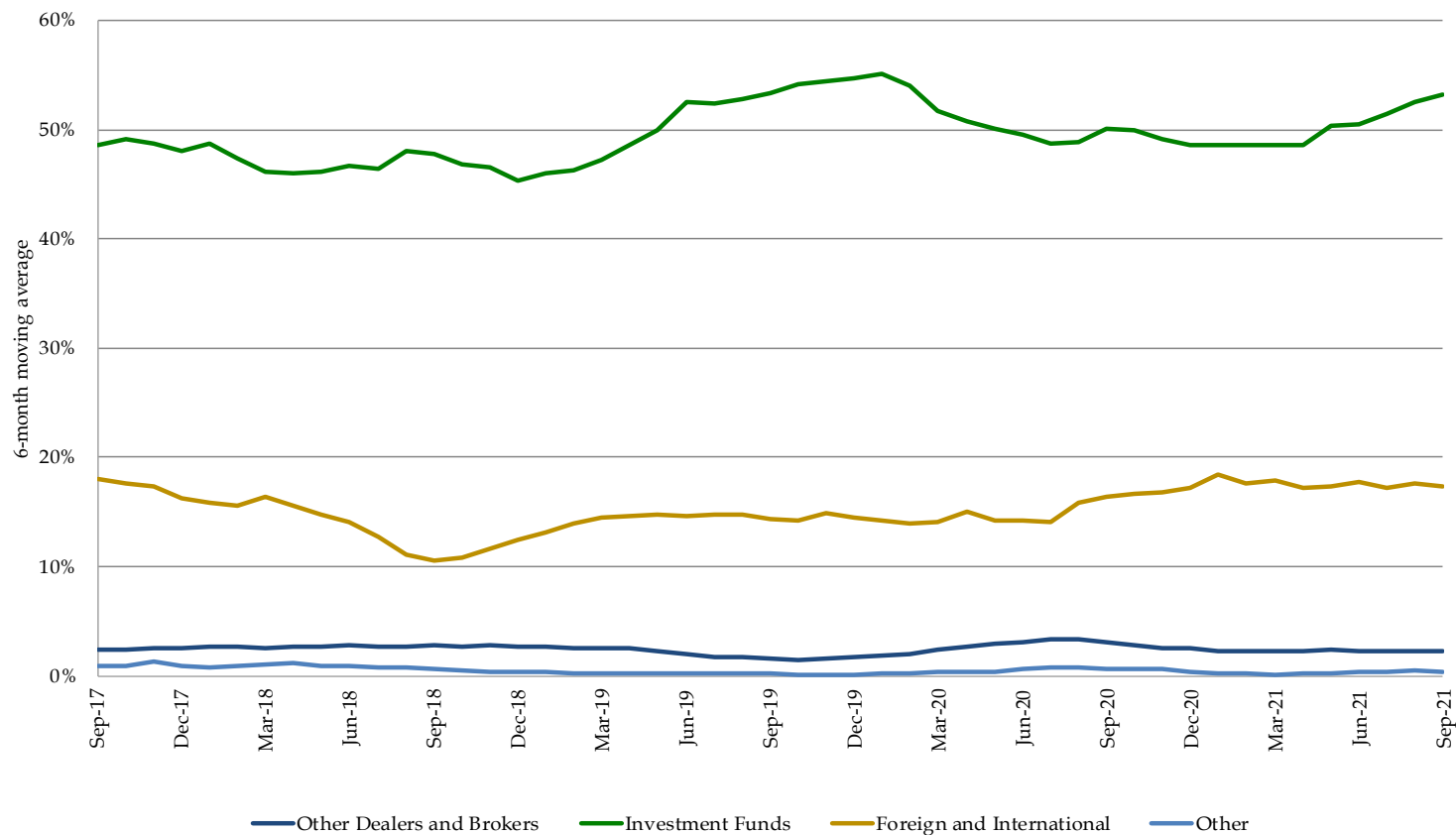


Percent Awarded in Bill Auctions by Investor Class (13-Week Moving Average)



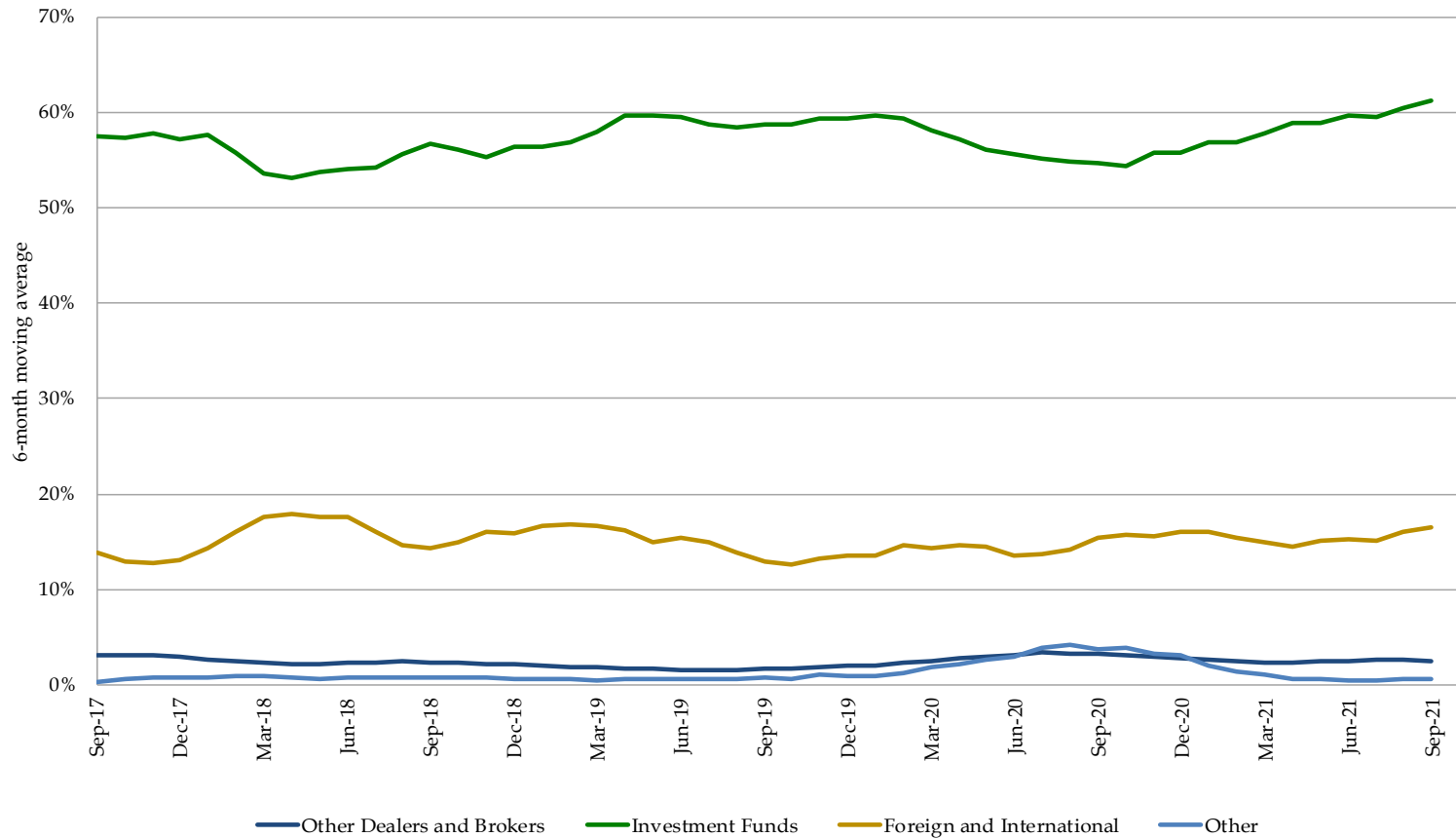
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

Percent Awarded in 2-, 3-, and 5-Year Nominal Security Auctions by Investor Class (6-Month Moving Average)



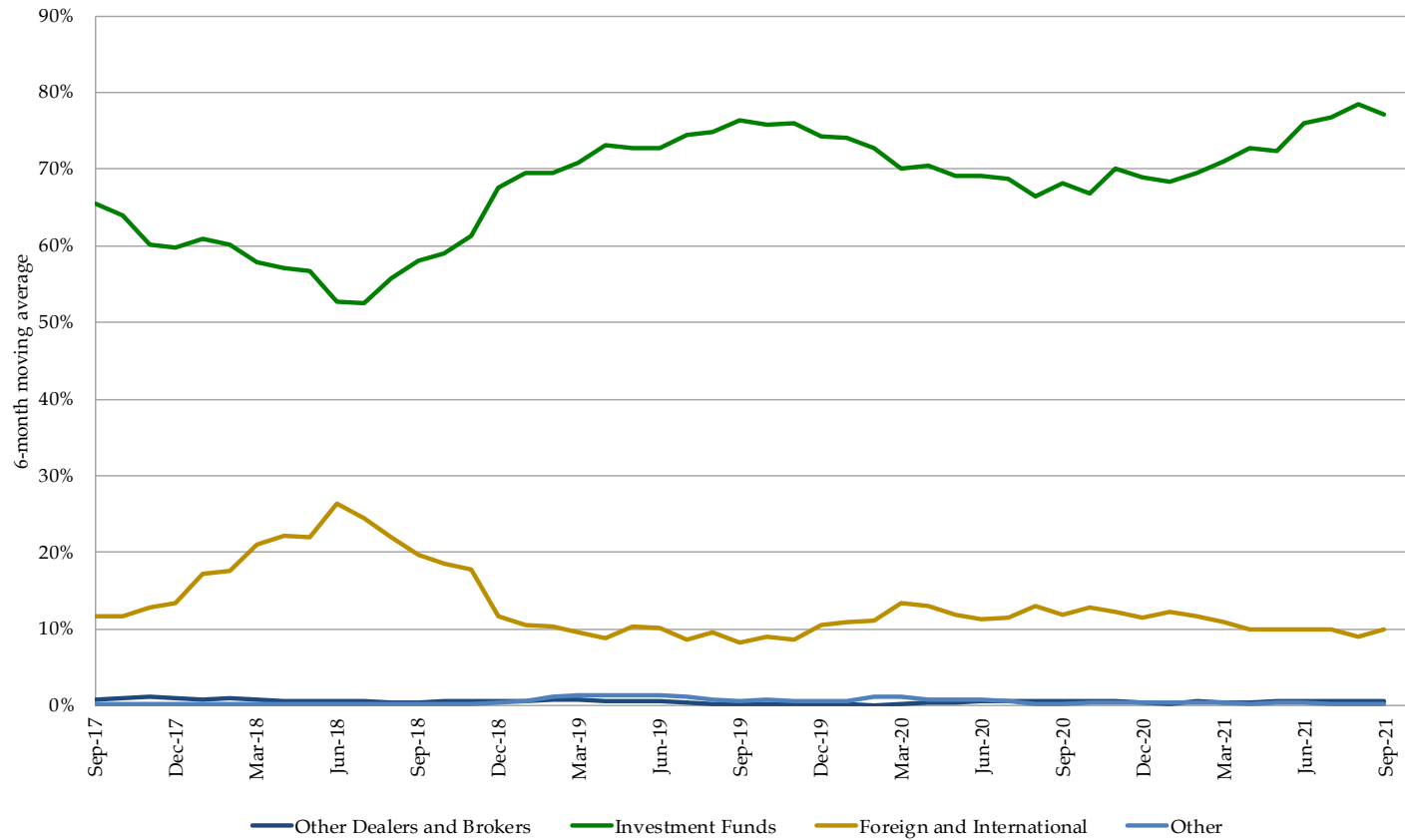
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

Percent Awarded in 7-, 10-, 20-, 30-Year Nominal Security Auctions by Investor Class (6-Month Moving Average)



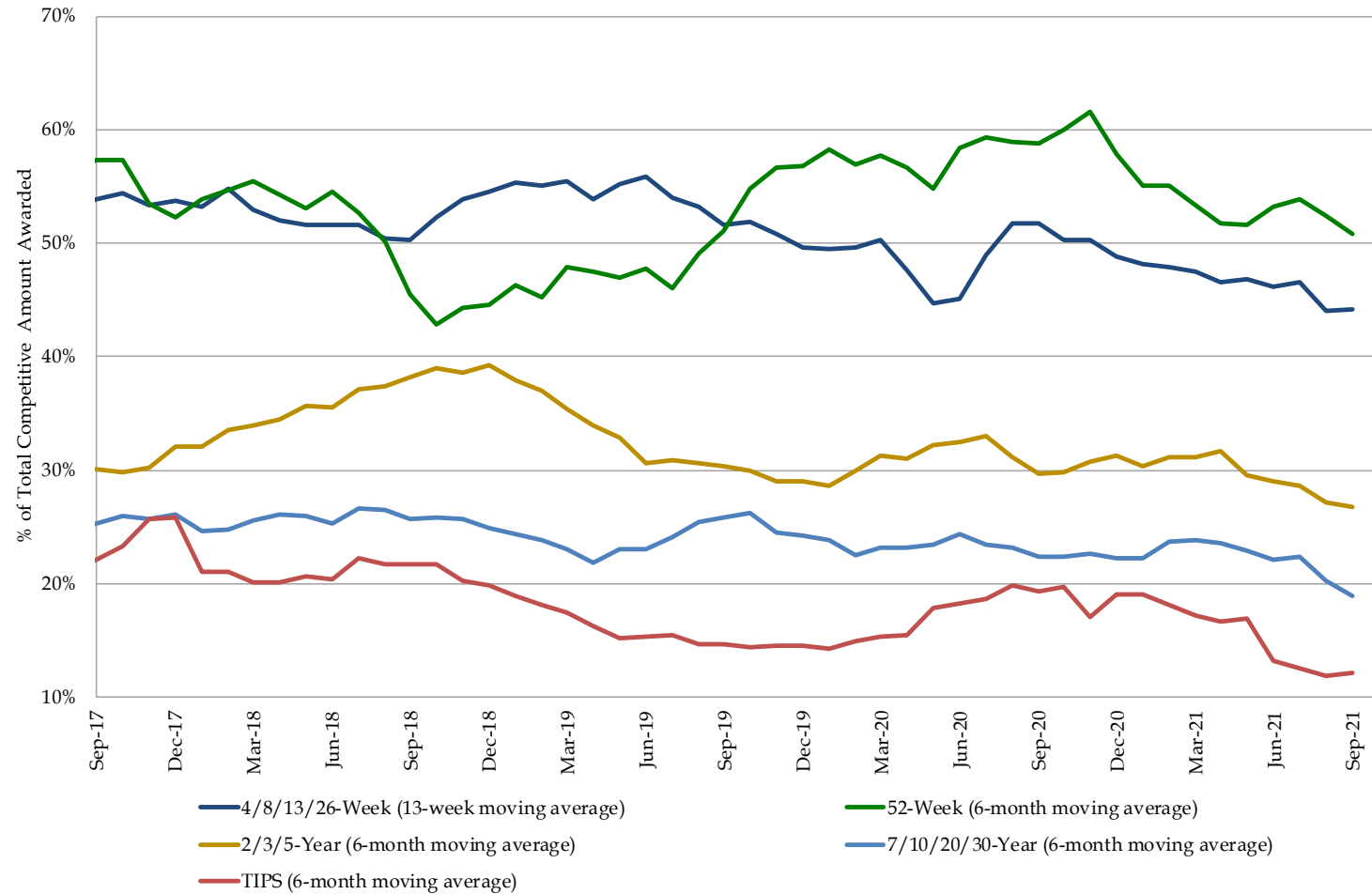
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

Percent Awarded in TIPS Auctions by Investor Class (6-Month Moving Average)



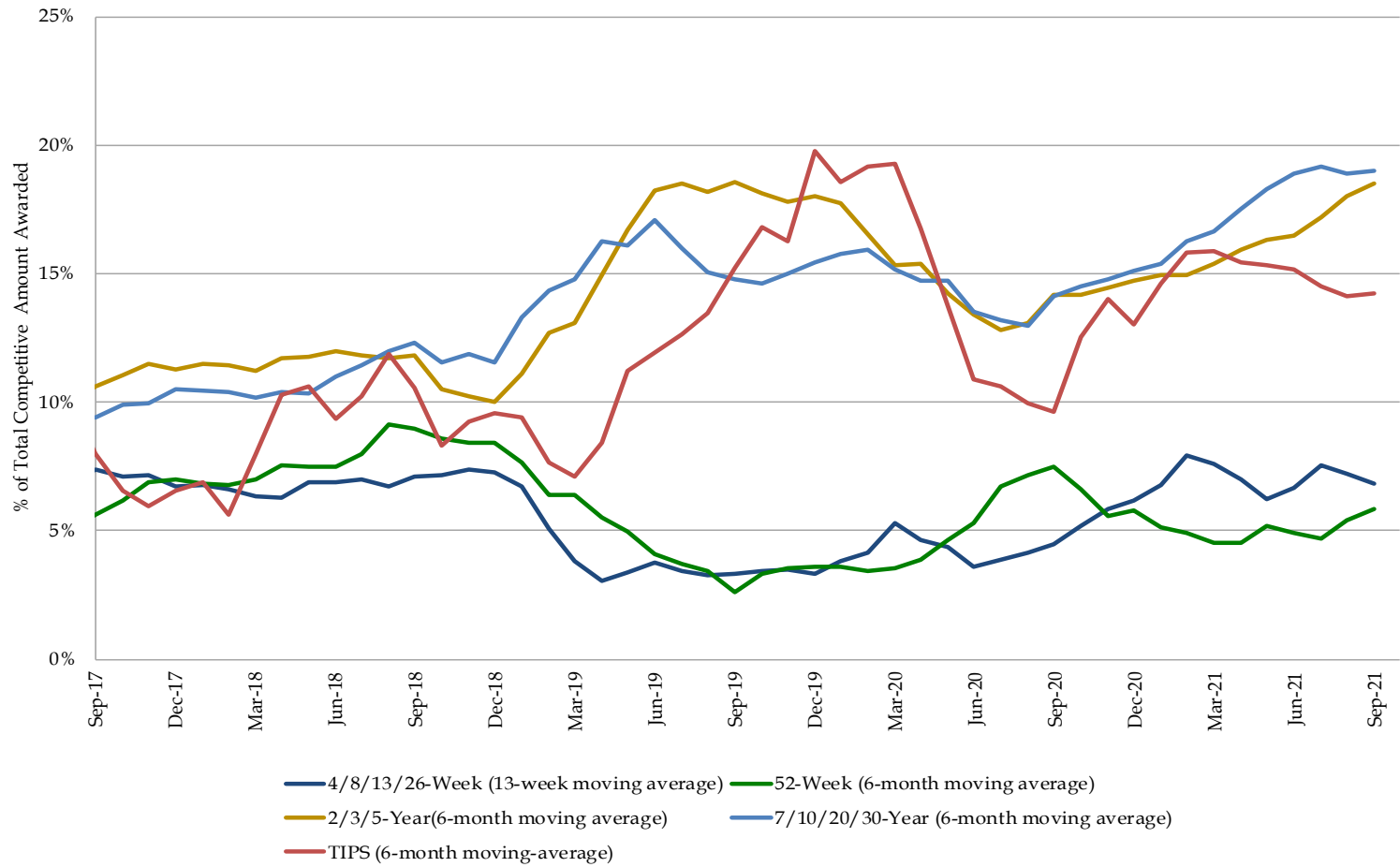
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

Primary Dealer Awards at Auction



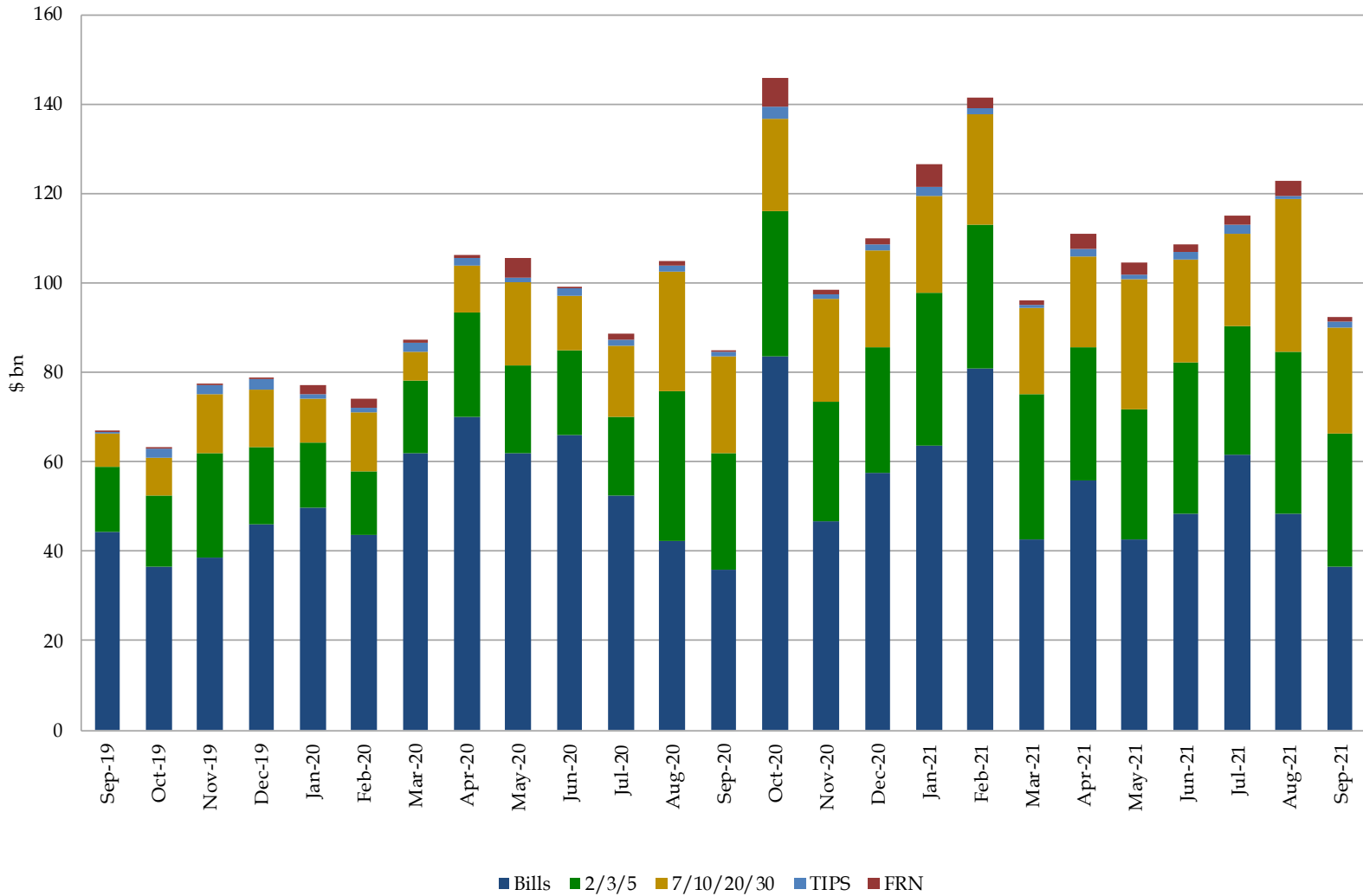
Competitive Amount Awarded excludes SOMA add-ons.

Direct Bidder Awards at Auction



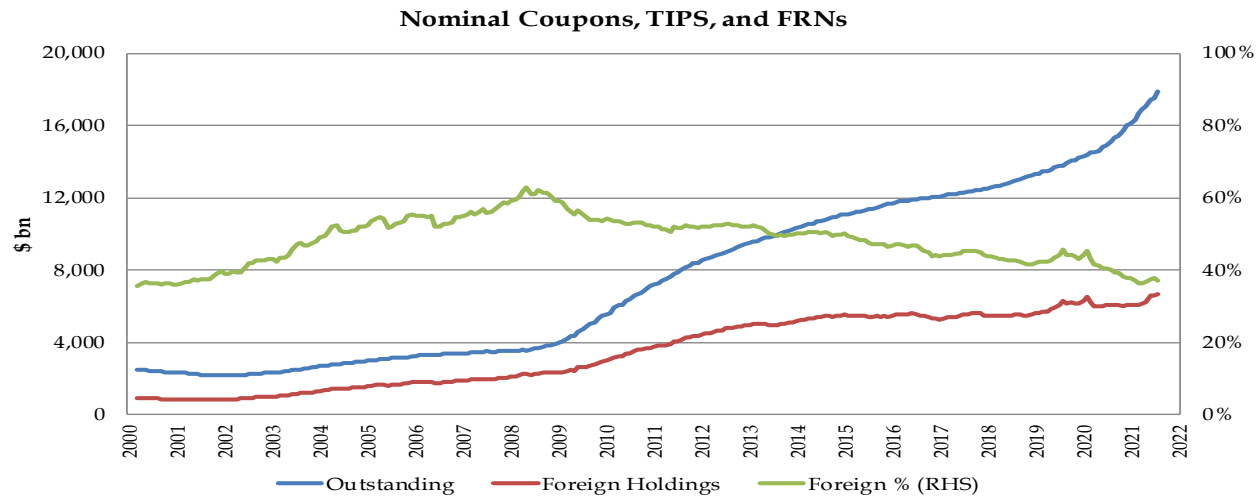
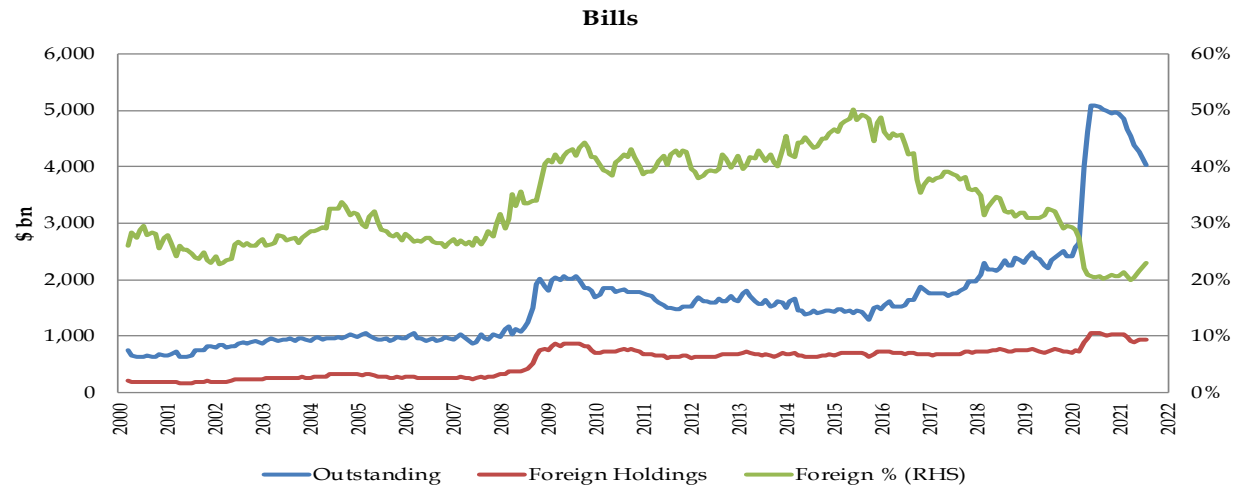
Competitive Amount Awarded excludes SOMA add-ons.

Total Foreign Awards of Treasuries at Auction, \$ billions



Foreign includes both private sector and official institutions.

Total Foreign Holdings



Source: Treasury International Capital (TIC) System as of August 2021.

For more information on foreign participation data, including more details about the TIC data shown here, please refer to Treasury Presentation to TBAC “Brief Overview of Key Data Sources on Foreign Participation in the U.S. Treasury Securities Market” at the Treasury February 2019 Refunding.

Appendix

The seal of the U.S. Department of the Treasury is faintly visible in the background. It is a circular emblem with the words "THE DEPARTMENT OF THE TREASURY" around the top and "1789" at the bottom. The center features a shield with a chevron, stars, and a sword.

**Projected Privately-Held Net Marketable Borrowing
Assuming Private Coupon Issuance & Total Bills Outstanding
Remain Constant as of 9/30/2021***

Fiscal Year	Bills	2/3/5	7/10/20/30	TIPS	FRN	Historical/Projected Net Borrowing Capacity
2017	155	(66)	378	51	(0)	519
2018	438	197	493	45	23	1,196
2019	137	498	534	51	59	1,280
2020	2,652	538	724	46	55	4,014
2021	(1,315)	1,260	1,328	55	92	1,420
2022	0	1,082	1,384	59	80	2,605
2023	0	874	1,227	41	6	2,148
2024	0	561	1,317	64	0	1,942
2025	0	254	1,303	(2)	0	1,556
2026	0	32	1,307	11	0	1,351
2027	0	0	1,246	7	0	1,253
2028	0	0	832	(10)	0	823
2029	0	0	836	(6)	0	830
2030	0	0	807	10	0	817
2031	0	0	605	(6)	0	598

Projections reflect only SOMA rollovers at auction of principal payments of Treasury securities. No adjustments are made for open-market outright purchases and subsequent rollovers.

*Privately-held marketable borrowing excludes rollovers (auction “add-ons”) of Treasury securities held in the Federal Reserve’s System Open Market Account (SOMA) but includes financing required due to SOMA redemptions.

Bills										
Issue	Settle Date	Stop Out Rate (%)	Bid-to-Cover Ratio	Competitive Awards (\$bn)	% Primary Dealer	% Direct	% Indirect	Non-Competitive Awards (\$bn)	SOMA "Add Ons" (\$bn)	10-Year Equivalent (\$bn)*
4-Week	7/6/2021	0.050	3.46	39.2	49.8	21.8	28.4	0.8	3.2	0.4
4-Week	7/13/2021	0.050	3.37	39.3	58.0	8.1	33.9	0.7	3.3	0.4
4-Week	7/20/2021	0.045	3.73	39.2	40.3	5.5	54.3	0.8	2.9	0.4
4-Week	7/27/2021	0.045	3.41	39.4	62.1	9.1	28.9	0.6	3.4	0.4
4-Week	8/3/2021	0.045	3.45	39.3	43.3	9.5	47.2	0.7	3.4	0.4
4-Week	8/10/2021	0.040	3.34	39.3	54.0	5.8	40.1	0.7	3.5	0.4
4-Week	8/17/2021	0.045	3.30	39.3	50.4	6.6	43.0	0.7	3.0	0.4
4-Week	8/24/2021	0.040	3.46	34.4	51.4	5.7	42.8	0.6	3.6	0.3
4-Week	8/31/2021	0.035	3.83	29.3	49.5	9.0	41.5	0.7	3.3	0.3
4-Week	9/7/2021	0.035	3.85	24.3	48.5	8.2	43.3	0.7	3.1	0.2
4-Week	9/14/2021	0.060	4.29	19.3	52.9	9.7	37.5	0.7	2.2	0.2
4-Week	9/21/2021	0.055	3.96	14.3	71.2	10.2	18.6	0.7	2.2	0.1
4-Week	9/28/2021	0.050	4.74	9.2	71.3	7.5	21.3	0.8	1.8	0.1
4-Week	10/5/2021	0.045	4.59	9.2	83.0	11.5	5.5	0.8	1.7	0.1
8-Week	7/6/2021	0.045	4.46	39.7	34.6	16.8	48.6	0.3	3.2	0.7
8-Week	7/13/2021	0.045	4.15	39.8	36.5	6.3	57.2	0.2	3.3	0.7
8-Week	7/20/2021	0.050	3.65	34.8	54.3	7.6	38.2	0.2	2.5	0.6
8-Week	7/27/2021	0.045	4.17	34.8	59.1	10.6	30.3	0.2	3.0	0.6
8-Week	8/3/2021	0.045	3.52	34.8	55.4	9.6	35.0	0.2	2.9	0.6
8-Week	8/10/2021	0.050	3.42	34.8	61.9	8.8	29.3	0.2	3.0	0.6
8-Week	8/17/2021	0.055	3.23	34.8	50.9	11.8	37.3	0.2	2.6	0.6
8-Week	8/24/2021	0.055	3.61	29.7	39.3	2.6	58.1	0.3	3.1	0.5
8-Week	8/31/2021	0.060	3.45	29.7	47.2	7.1	45.8	0.3	3.3	0.6
8-Week	9/7/2021	0.065	3.02	29.7	64.1	5.9	30.0	0.3	3.7	0.6
8-Week	9/14/2021	0.065	3.21	28.8	52.5	8.6	38.9	1.2	3.3	0.6
8-Week	9/21/2021	0.055	3.45	29.7	43.7	7.6	48.6	0.3	4.4	0.6
8-Week	9/28/2021	0.035	3.90	24.9	30.7	2.0	67.3	0.1	4.4	0.5
8-Week	10/5/2021	0.040	3.71	24.8	42.0	1.6	56.4	0.2	4.4	0.5

*Approximated using prices at settlement and includes both competitive and non-competitive awards.

Bills (cont.)										
Issue	Settle Date	Stop Out Rate (%)	Bid-to-Cover Ratio	Competitive Awards (\$bn)	% Primary Dealer	% Direct	% Indirect	Non-Competitive Awards (\$bn)	SOMA "Add Ons" (\$bn)	10-Year Equivalent (\$bn)*
13-Week	7/8/2021	0.050	2.92	56.4	45.1	17.7	37.2	0.6	7.2	1.7
13-Week	7/15/2021	0.050	3.05	53.3	58.2	6.0	35.7	0.7	6.6	1.7
13-Week	7/22/2021	0.050	3.44	53.2	49.0	7.9	43.1	0.8	7.2	1.7
13-Week	7/29/2021	0.050	3.37	53.3	33.7	4.7	61.6	0.7	6.7	1.7
13-Week	8/5/2021	0.050	3.03	53.3	44.5	6.7	48.8	0.7	7.6	1.7
13-Week	8/12/2021	0.050	3.16	53.2	40.0	5.5	54.5	0.8	6.1	1.7
13-Week	8/19/2021	0.070	2.59	50.2	43.4	7.9	48.7	0.8	7.1	1.5
13-Week	8/26/2021	0.055	3.30	50.2	28.1	5.5	66.4	0.8	5.6	1.5
13-Week	9/2/2021	0.045	3.78	50.3	30.7	3.9	65.4	0.7	7.4	1.6
13-Week	9/9/2021	0.045	3.84	50.4	36.1	5.3	58.6	0.6	5.1	1.5
13-Week	9/16/2021	0.040	3.55	47.3	39.2	5.6	55.2	0.7	5.3	1.4
13-Week	9/23/2021	0.035	3.74	44.4	29.5	2.9	67.6	0.6	2.0	1.3
13-Week	9/30/2021	0.035	3.36	41.6	44.4	4.9	50.7	0.4	7.2	1.3
26-Week	7/8/2021	0.050	3.59	53.6	33.2	6.3	60.5	0.4	6.9	3.3
26-Week	7/15/2021	0.050	3.74	50.3	32.8	3.0	64.2	0.7	6.2	3.1
26-Week	7/22/2021	0.050	3.50	50.5	48.1	7.7	44.2	0.5	6.8	3.2
26-Week	7/29/2021	0.050	3.18	50.4	49.5	5.2	45.4	0.6	6.4	3.1
26-Week	8/5/2021	0.055	3.25	50.4	35.7	4.5	59.8	0.6	7.2	3.2
26-Week	8/12/2021	0.050	3.59	50.4	36.0	4.1	59.9	0.6	5.8	3.1
26-Week	8/19/2021	0.050	2.87	47.3	45.5	4.6	49.9	0.7	6.7	2.9
26-Week	8/26/2021	0.050	3.02	47.3	41.9	6.8	51.3	0.7	5.3	2.8
26-Week	9/2/2021	0.055	3.16	47.4	46.3	3.9	49.7	0.6	7.0	3.0
26-Week	9/9/2021	0.050	3.79	47.5	31.7	4.8	63.5	0.5	4.8	2.9
26-Week	9/16/2021	0.050	3.78	44.4	36.4	3.7	59.9	0.6	5.0	2.7
26-Week	9/23/2021	0.045	3.62	44.3	39.7	6.8	53.4	0.7	2.0	2.5
26-Week	9/30/2021	0.050	3.24	41.4	46.1	6.1	47.7	0.6	7.2	2.7

*Approximated using prices at settlement and includes both competitive and non-competitive awards.

Bills (cont.)										
Issue	Settle Date	Stop Out Rate (%)	Bid-to-Cover Ratio	Competitive Awards (\$bn)	% Primary Dealer	% Direct	% Indirect	Non-Competitive Awards (\$bn)	SOMA "Add Ons" (\$bn)	10-Year Equivalent (\$bn)*
52-Week	7/15/2021	0.075	3.46	33.8	49.6	6.7	43.6	0.2	4.2	4.2
52-Week	8/12/2021	0.080	3.62	33.8	43.5	7.8	48.7	0.2	3.8	4.2
52-Week	9/9/2021	0.075	3.75	32.8	45.2	5.4	49.4	1.2	3.4	4.0
6-Week	7/8/2021	0.045	3.70	40.0	31.0	19.1	49.9	0.0	0.0	0.5
6-Week	7/15/2021	0.045	3.89	35.0	44.9	5.4	49.7	0.0	0.0	0.4
6-Week	7/22/2021	0.045	3.97	35.0	54.2	9.6	36.3	0.0	0.0	0.4
6-Week	7/29/2021	0.040	4.41	20.0	59.3	11.2	29.5	0.0	0.0	0.3
6-Week	8/5/2021	0.040	4.35	20.0	38.8	9.7	51.5	0.0	0.0	0.3
6-Week	8/12/2021	0.040	4.00	20.0	48.7	10.2	41.2	0.0	0.0	0.3
6-Week	8/19/2021	0.040	4.24	20.0	54.3	7.6	38.2	0.0	0.0	0.2
17-Week	7/13/2021	0.050	3.81	35.0	45.7	7.2	47.2	0.0	0.0	1.2
17-Week	7/20/2021	0.050	4.00	30.0	37.8	7.4	54.9	0.0	0.0	1.1
17-Week	7/27/2021	0.050	4.18	30.0	53.0	7.2	39.8	0.0	0.0	1.1
17-Week	8/3/2021	0.050	3.50	30.0	52.7	8.3	39.0	0.0	0.0	1.1
17-Week	8/10/2021	0.050	4.11	30.0	44.8	4.0	51.2	0.0	0.0	1.1
17-Week	8/17/2021	0.045	4.45	30.0	29.0	2.7	68.3	0.0	0.0	1.1
17-Week	8/24/2021	0.045	3.93	30.0	44.2	6.2	49.6	0.0	0.0	1.0
17-Week	8/31/2021	0.050	3.88	30.0	47.0	6.2	46.9	0.0	0.0	1.1
17-Week	9/7/2021	0.045	4.99	30.0	34.4	3.5	62.1	0.0	0.0	1.1
17-Week	9/14/2021	0.045	4.38	30.0	44.5	7.6	47.9	0.0	0.0	1.1
17-Week	9/21/2021	0.045	4.35	30.0	42.3	11.6	46.1	0.0	0.0	1.1
17-Week	9/28/2021	0.035	3.37	30.0	51.5	9.9	38.6	0.0	0.0	1.1
17-Week	10/5/2021	0.050	2.92	30.0	72.9	10.7	16.4	0.0	0.0	1.1
CMB	8/19/2021	0.065	2.72	50.0	41.6	4.4	54.1	0.0	0.0	0.8
CMB	8/26/2021	0.060	2.87	40.0	57.8	8.7	33.6	0.0	0.0	0.8
CMB	9/2/2021	0.040	2.88	45.0	65.4	12.2	22.4	0.0	0.0	0.3
CMB	9/9/2021	0.050	3.39	45.0	61.2	14.1	24.7	0.0	0.0	0.3

*Approximated using prices at settlement and includes both competitive and non-competitive awards.

Nominal Coupons										
Issue	Settle Date	Stop Out Rate (%)*	Bid-to-Cover Ratio	Competitive Awards (\$bn)	% Primary Dealer	% Direct	% Indirect	Non-Competitive Awards (\$bn)	SOMA "Add Ons" (\$bn)	10-Year Equivalent (\$bn)**
2-Year	8/2/2021	0.213	2.47	59.7	26.0	21.3	52.8	0.3	5.7	14.5
2-Year	8/31/2021	0.242	2.65	59.9	18.3	21.2	60.5	0.1	7.5	14.4
2-Year	9/30/2021	0.310	2.28	59.9	33.0	21.7	45.3	0.1	7.2	14.5
3-Year	7/15/2021	0.426	2.41	58.0	28.6	18.3	53.2	0.0	9.5	22.2
3-Year	8/16/2021	0.465	2.54	58.0	26.2	18.4	55.4	0.0	25.9	27.8
3-Year	9/15/2021	0.447	2.45	58.0	24.4	19.0	56.7	0.0	6.2	20.5
5-Year	8/2/2021	0.710	2.36	60.9	24.2	17.7	58.1	0.1	5.8	36.3
5-Year	8/31/2021	0.831	2.35	61.0	19.8	17.5	62.7	0.0	7.7	36.0
5-Year	9/30/2021	0.990	2.37	61.0	25.5	20.2	54.3	0.0	7.3	36.1
7-Year	8/2/2021	1.050	2.23	62.0	22.2	19.4	58.4	0.0	5.9	50.7
7-Year	8/31/2021	1.155	2.34	62.0	20.1	18.9	61.1	0.0	7.8	50.2
7-Year	9/30/2021	1.332	2.24	62.0	19.0	20.9	60.1	0.0	7.5	50.2
10-Year	7/15/2021	1.371	2.39	38.0	19.0	17.5	63.5	0.0	6.3	44.2
10-Year	8/16/2021	1.340	2.65	41.0	9.6	13.1	77.2	0.0	18.3	61.8
10-Year	9/15/2021	1.338	2.59	38.0	12.3	16.6	71.1	0.0	4.0	42.0
20-Year	8/2/2021	1.890	2.33	24.0	20.9	18.9	60.2	0.0	2.3	46.5
20-Year	8/31/2021	1.850	2.44	27.0	19.0	18.7	62.3	0.0	3.4	54.3
20-Year	9/30/2021	1.795	2.36	24.0	16.9	18.9	64.2	0.0	2.9	48.4
30-Year	7/15/2021	2.000	2.19	24.0	22.3	16.6	61.1	0.0	4.0	66.8
30-Year	8/16/2021	2.040	2.21	27.0	18.3	21.0	60.7	0.0	12.0	97.5
30-Year	9/15/2021	1.910	2.49	24.0	13.1	17.2	69.7	0.0	2.6	64.2
2-Year FRN	8/2/2021	0.029	3.04	28.0	27.0	1.1	71.9	0.0	2.7	0.0
2-Year FRN	8/27/2021	0.026	3.17	26.0	29.6	1.3	69.0	0.0	0.0	0.0
2-Year FRN	9/24/2021	0.026	2.84	26.0	42.7	0.0	57.3	0.0	0.0	0.0

TIPS										
Issue	Settle Date	Stop Out Rate (%)	Bid-to-Cover Ratio	Competitive Awards (\$bn)	% Primary Dealer	% Direct	% Indirect	Non-Competitive Awards (\$bn)	SOMA "Add Ons" (\$bn)	10-Year Equivalent (\$bn)**
10-Year TIPS	7/30/2021	(1.016)	2.50	16.0	14.3	15.5	70.1	0.0	0.0	17.6
10-Year TIPS	9/30/2021	(0.939)	2.55	14.0	12.7	15.8	71.5	0.0	1.7	16.6
30-Year TIPS	8/31/2021	(0.292)	2.34	8.0	12.7	12.4	74.9	0.0	1.0	27.9

*FRNs are reported on discount margin basis.

**Approximated using prices at settlement and includes both competitive and non-competitive awards.
For TIPS 10-Year equivalent, a constant auction BEI is used as the inflation assumption.

Primary Dealer Discussion Topic: 17-Week Cash Management Bill (CMB)

- ▶ Most primary dealers suggested that Treasury consider promoting the regular 17-week CMB to benchmark status:
 - ▶ Typical arguments in favor included: 1) that a 17-week bill would enable Treasury to moderate the scale of future increases to auction sizes for existing bill benchmarks and 2) that the regular 17-week CMB has attracted robust investor demand to-date, which would be expected to persist.
 - ▶ Those opposed generally argued that anticipated bill supply could reasonably be achieved with existing benchmarks over the near- to medium-term.
- ▶ How large could existing benchmark bill auction sizes become without resulting in significant yield deviations from fair value? The median primary dealer response was (in \$ billions):

	<i>Max Auction Size Without Causing Significant Yield Deviation from Fair Value</i>				
	<u>1-Month</u>	<u>2-Month</u>	<u>3-Month</u>	<u>6-Month</u>	<u>1-Year</u>
Median Primary Dealer Response	77.5	70	65	60	40

- ▶ The median primary dealer response implies that (in \$ billions):

	<u>1-Month</u>	<u>2-Month</u>	<u>3-Month</u>	<u>6-Month</u>	<u>1-Year</u>
Implied Funding Capacity	310 (77.5 x 4)	560 (70 x 8)	845 (65 x 13)	1,560 (60 x 26)	520 (40 x 13)
Max Privately-Held Bill Funding Capacity via Existing Benchmarks	3,795				
Current SOMA Portfolio Holdings	326				
<i>Total Implied Bill Funding Capacity via Existing Benchmarks</i>	4,121				

- ▶ For context, aggregate bill supply totaled \$3,714 billion at the end of FY2021.

November 2021

TIPS Supply

Since January 2021, Treasury has gradually increased TIPS issuance in order to stabilize the percent of TIPS to total marketable debt outstanding and, at the August quarterly refunding, announced expectations for total gross issuance of TIPS to increase by \$15 to \$20 billion in CY2021. Please discuss what Treasury should consider for TIPS issuance in CY2022, in the context of the committee's views on the appropriate level of TIPS supply in the medium and long-term.

Executive summary

Valuation considerations

- Ex-post direct cost estimates conclude that the TIPS program has benefited Treasury relative to nominal securities.
- Ex-ante estimates are more ambiguous. Treasury has regularly issued TIPS at breakeven inflation rates below survey based measures of longer-term inflation expectations. However, models that adjust for the relative illiquidity of TIPS suggest that inflation risk premiums are positive, and more recently have risen.
- Some of the factors contributing to higher risk premiums, such as Fed's tolerance for above target inflation, are likely to persist.

Demand-side considerations

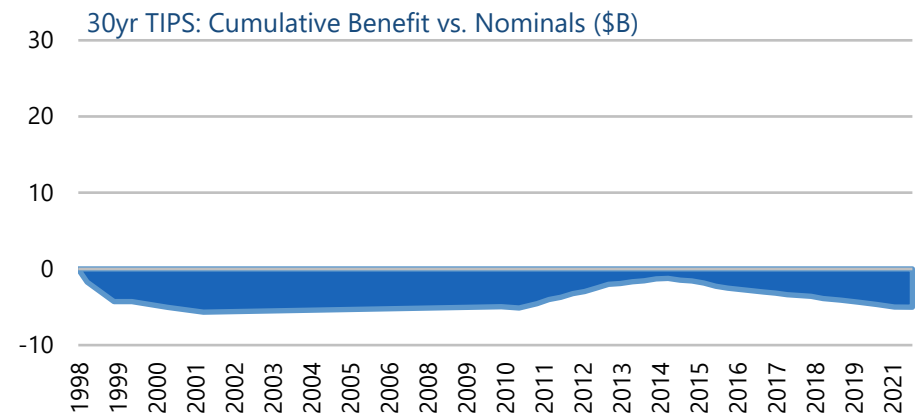
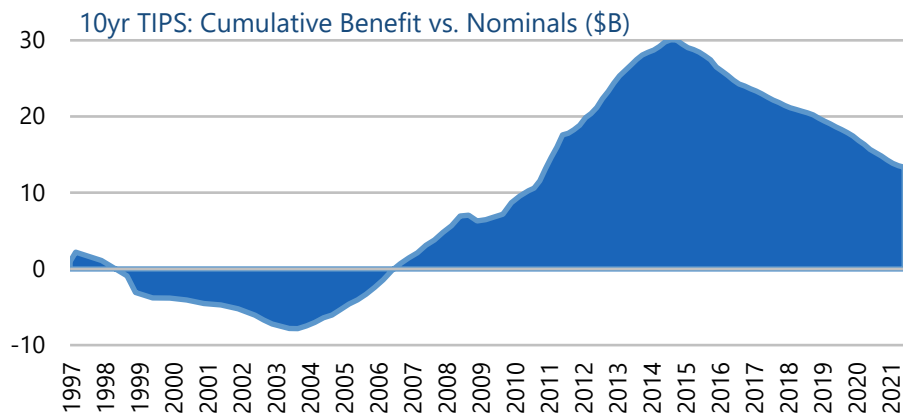
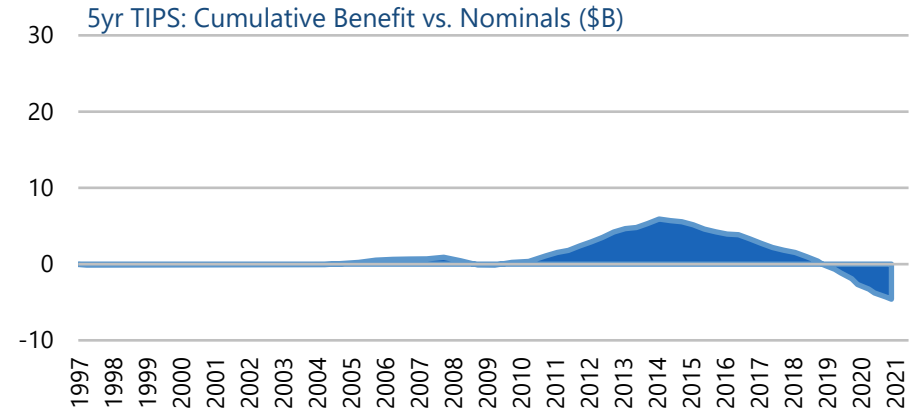
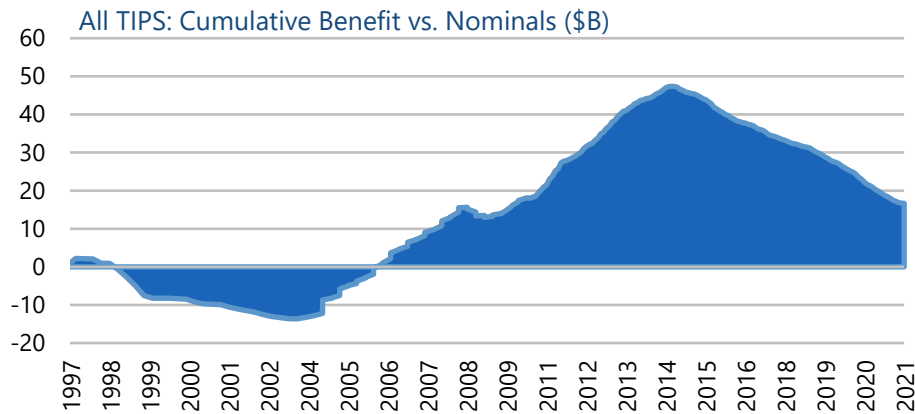
- Domestic investment fund demand has been steady and increasing in the past two years. The growth of Target Date Funds is potentially a growing source of TIPS demand.
- TIPS concentration within foreign portfolios is likely to continue mirroring Treasury issuance patterns, supporting increased TIPS issuance.

Post-pandemic, the TIPS share of Treasury debt outstanding has fallen. Treasury should gradually return the TIPS share towards the pre-pandemic range.

- Longer term target of 8-9% for TIPS as a share of treasuries outstanding signals a continued commitment to the TIPS program. It also allows for some cushion as TIPS share can drop following recessions.
- Post-pandemic, TIPS share declined to 7.5%, but a steady increase of \$10 to \$20bn per year starting in 2022 could return the TIPS share towards 8% by the end of 2024 and would be in line with a regular and predictable issuance pattern.
- We recommend that gross issuance increases be tilted toward the 5yr and 10yr tenors, given consistent liquidity and demand.

Ex-post, TIPS have benefited Treasury relative to nominal securities

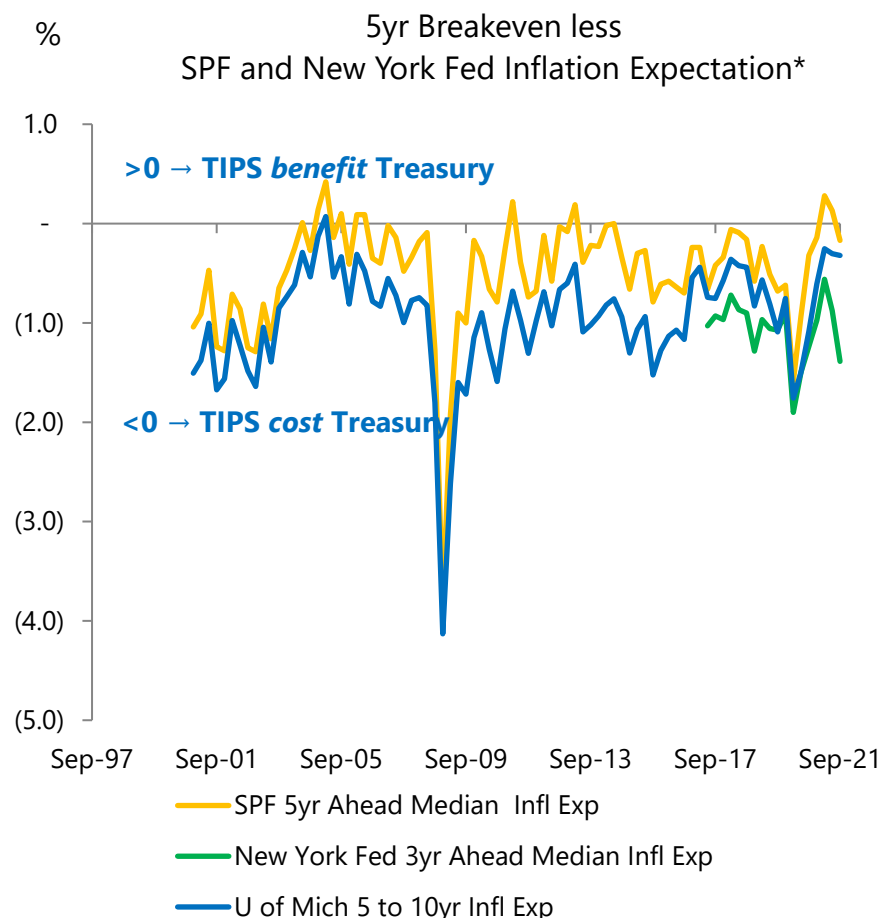
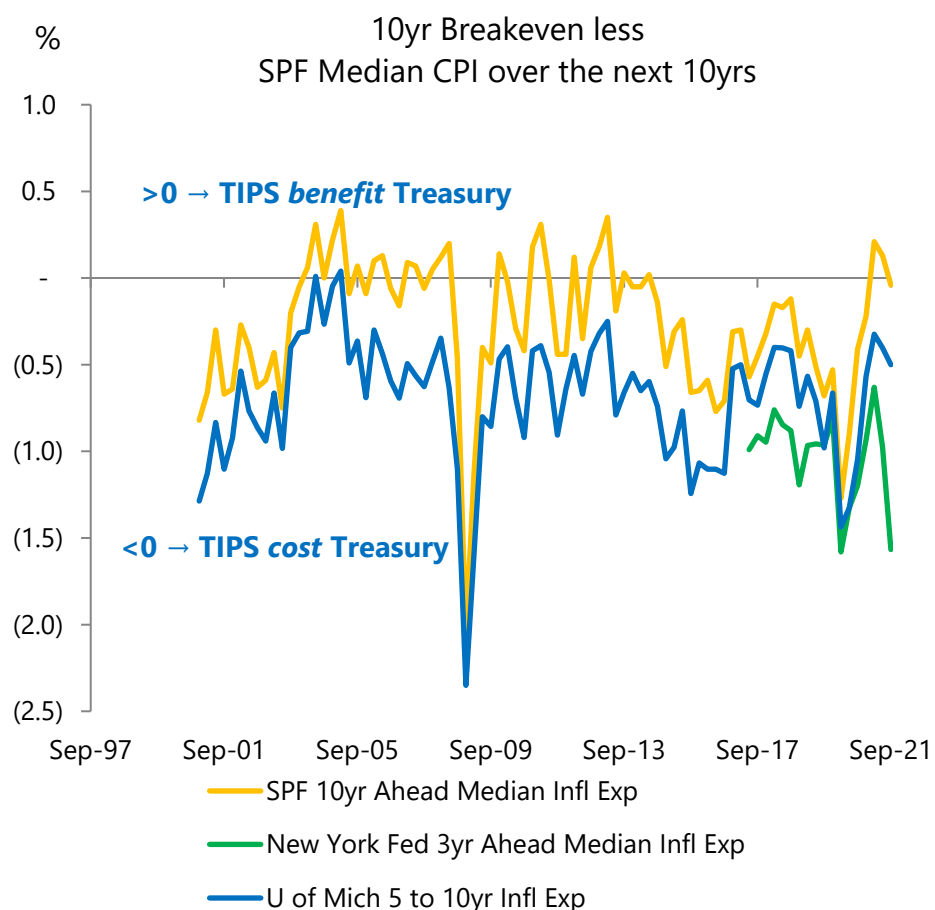
- Based on debt payments to date, the TIPS program has saved Treasury an estimated \$17bn relative to nominal issuance, indicating that Treasury has captured inflation risk premium over time.



Sources: Treasury, TBAC Calculations. As of September 2021

Ex-ante estimates of the program's costs are more ambiguous

- Based on various surveys of professional forecasters' and consumers' inflation expectations, Treasury has regularly issued TIPS at a *higher* ex-ante cost than nominal securities. However, consumer surveys can be biased indicators of inflation expectations.*



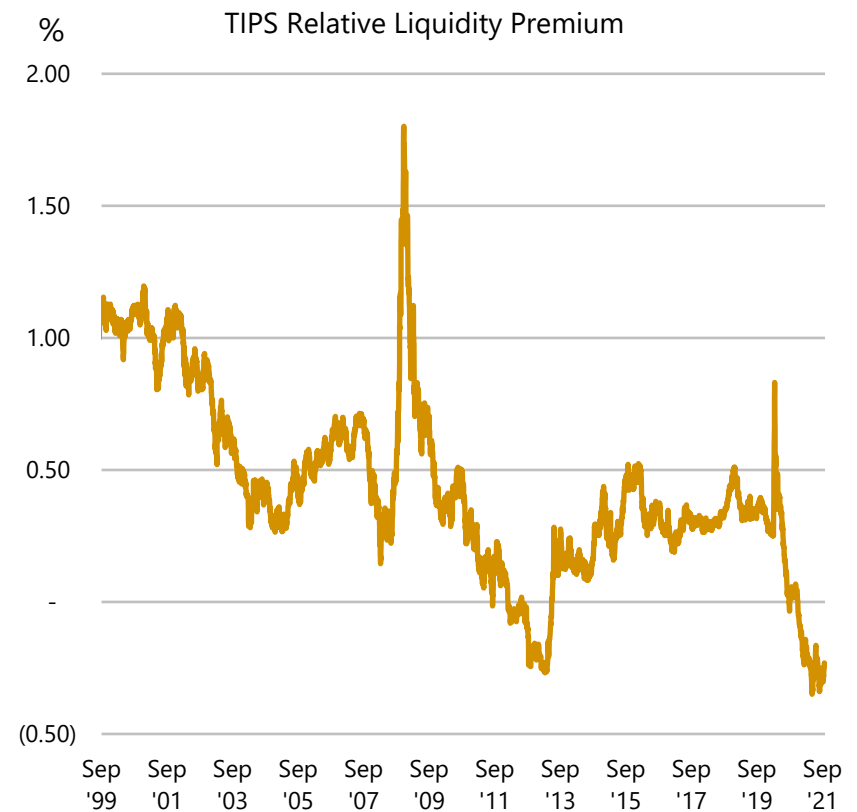
Sources: Philadelphia Federal Reserve Bank, Federal Reserve Bank of New York, University of Michigan, Haver

As of September 2021

*For example see: Malmendier et al, *Exposure to Grocery Prices and Inflation Expectations*, Journal of Political Economy, Volume 129, Number 5, May 2021.

Model based measures of TIPS inflation risk and liquidity premiums support a continued commitment to the program

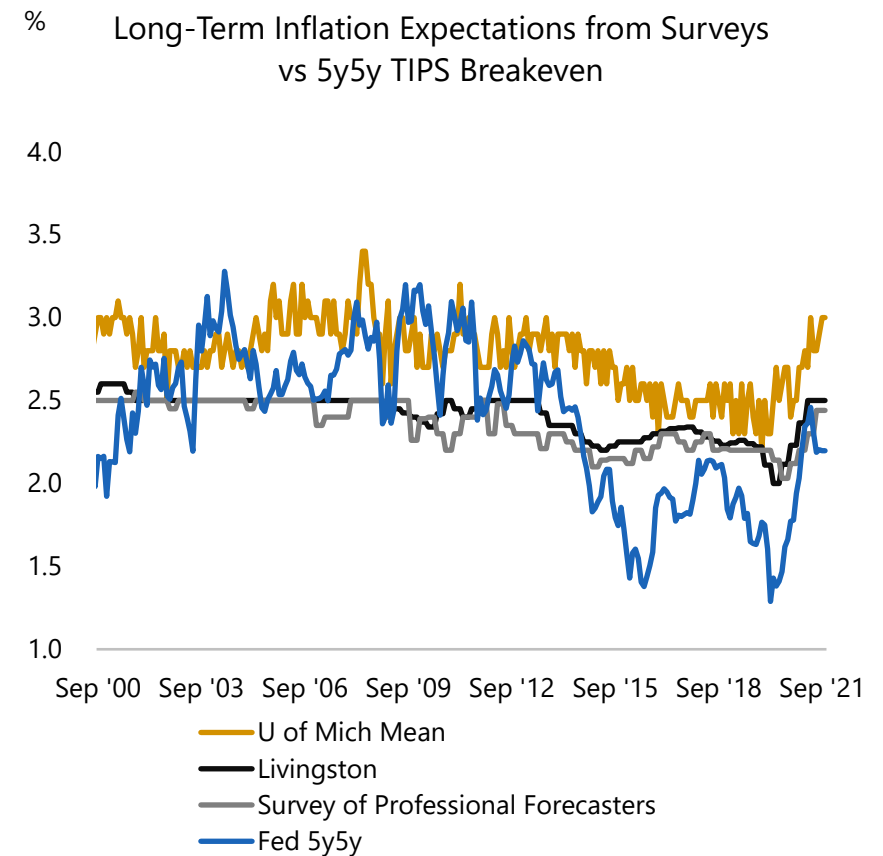
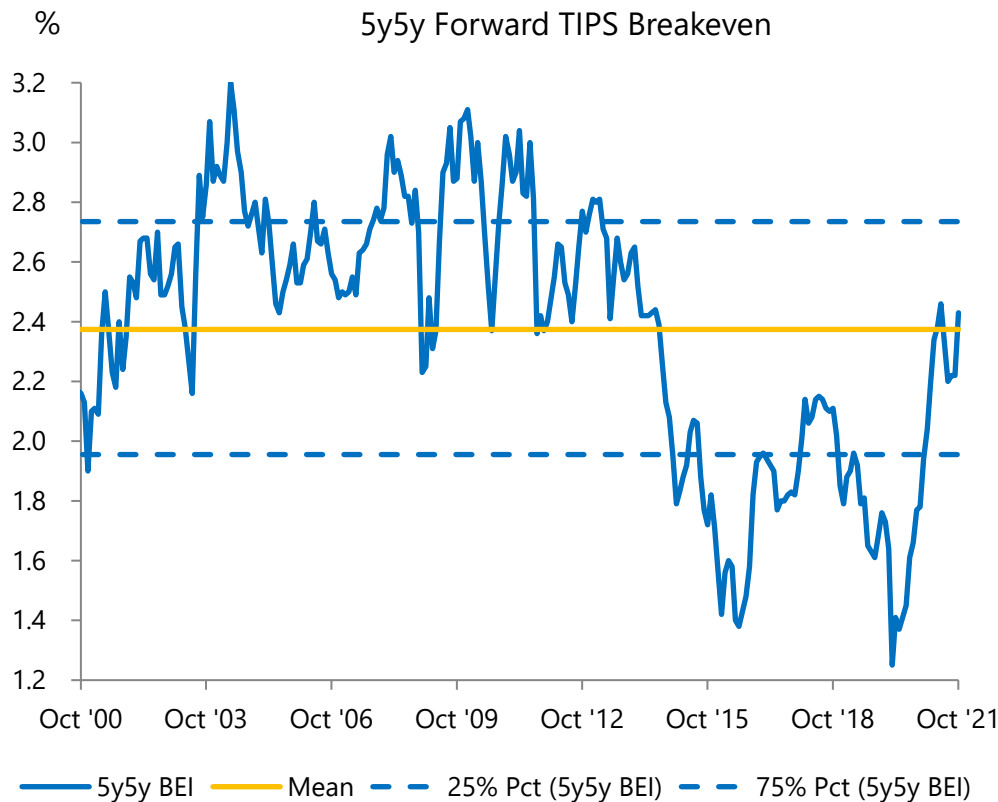
- A Federal Reserve Board Staff model estimates that inflation risk premiums have historically been positive. While they had declined over time, they have increased more recently and are just above zero. The TIPS liquidity discount to nominal Treasury securities has also recently declined.



Sources: D'Amico, Kim, and Wei (2018), "Tips from TIPS: The Informational Content of Treasury Inflation-Protected Security Prices," updated by Kim, Walsh, and Wei (2019), FEDS notes, "Tips from TIPS: Update and Discussions.". As of September 2021

Recently TIPS breakevens have risen back to the middle of their historical range

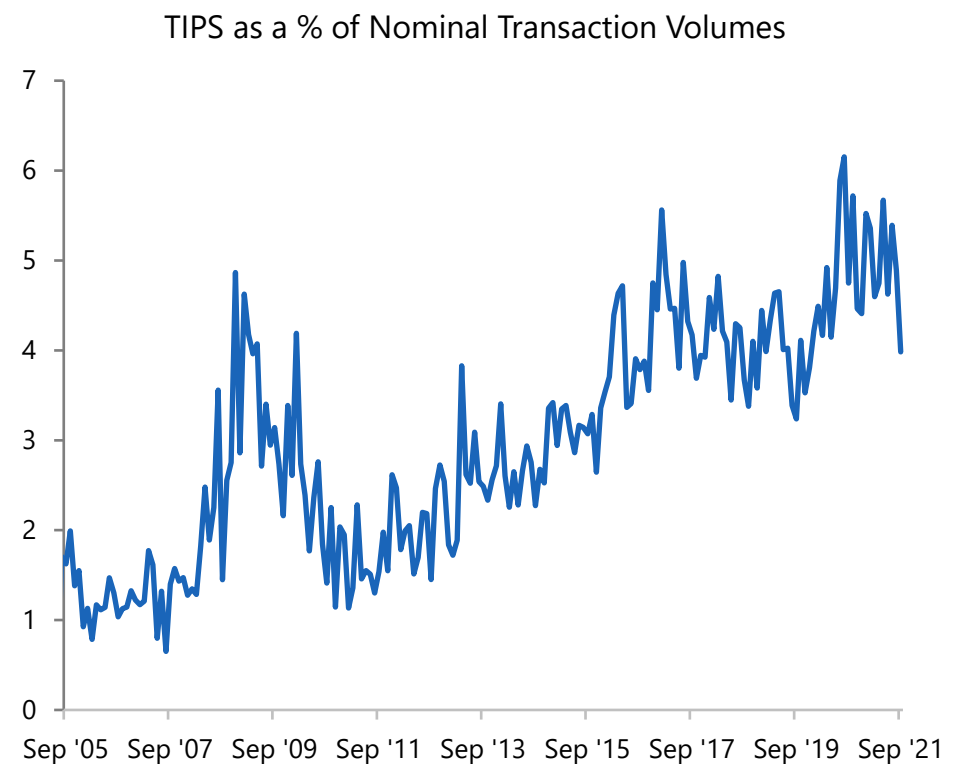
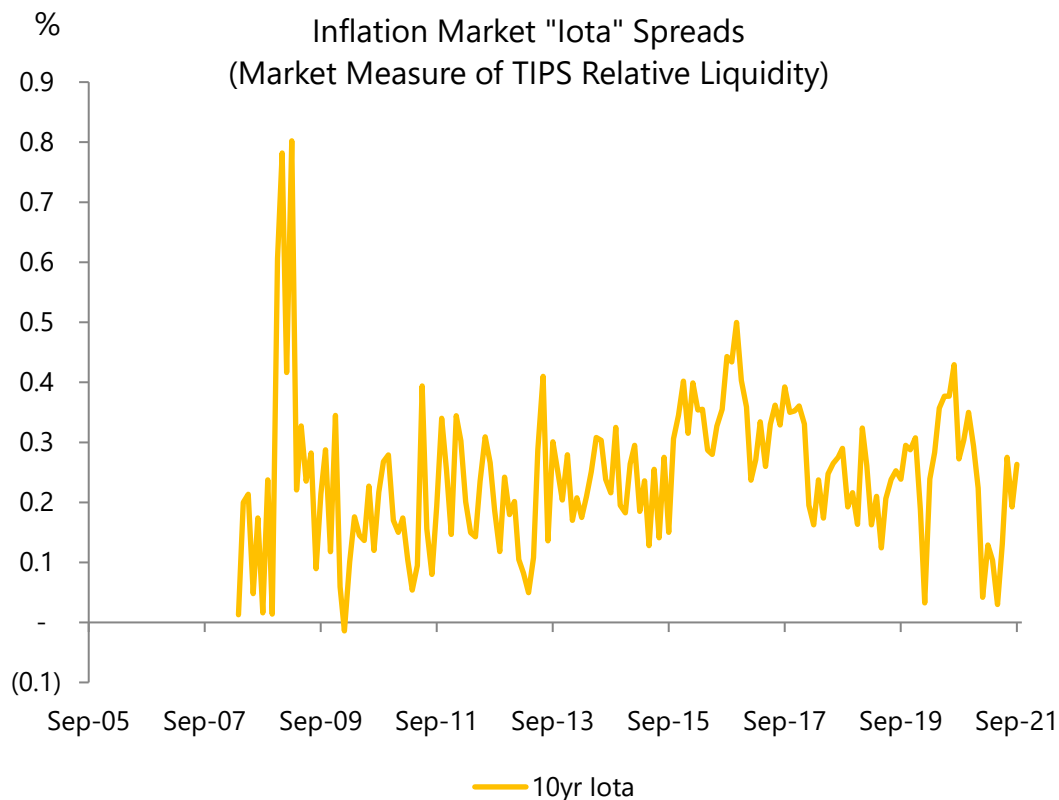
- In 2014, the 5y5y forward TIPS breakeven inflation rate declined by roughly 70bps, but it has more recently moved back to the middle of its historical range. This has happened amid rising survey-based measures of longer-term inflation expectations.



Sources: Philadelphia Federal Reserve Bank, University of Michigan, Haver.
As of October 2021

Market based measures of TIPS liquidity have been relatively steady, while volumes have steadily improved

- Inflation “iota” spreads – a market-based measure of TIPS relative liquidity – suggest that TIPS liquidity has been relatively steady since the 2008 financial crisis, and has remained within a roughly 20-30bp range.
- TIPS transactions have generally increased as a percentage of nominal transactions, although more recently have moderated somewhat.
- In the past, Federal Reserve asset programs have had only a limited discernable impact on these measures.

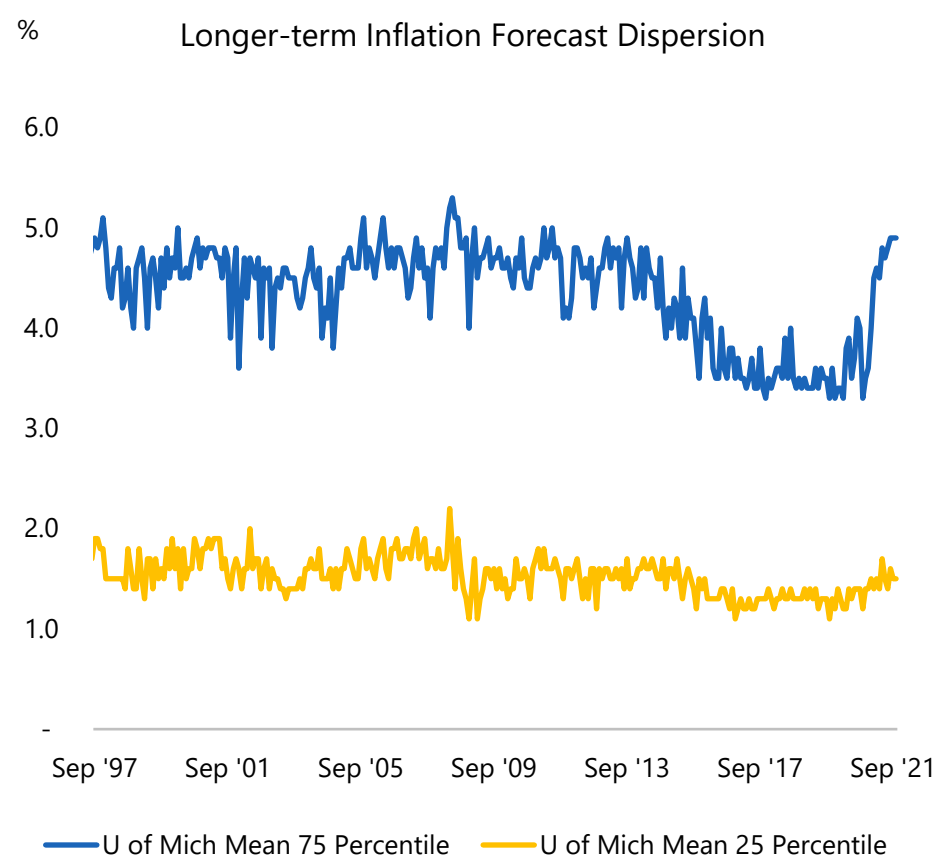
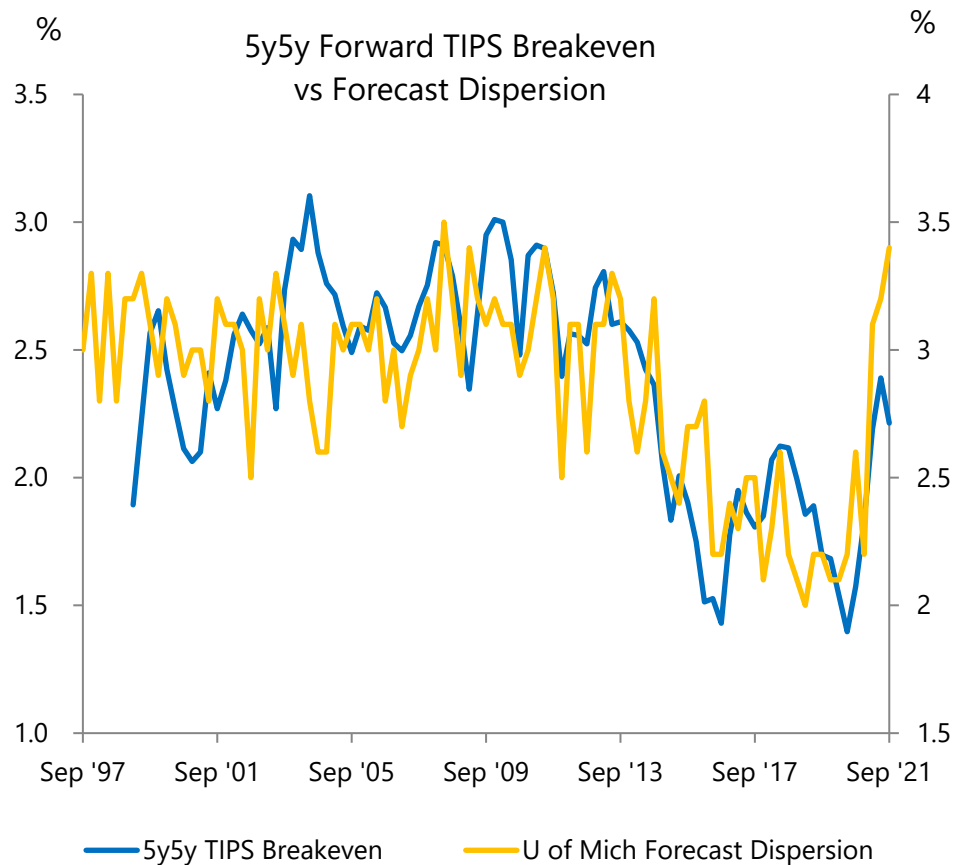


*Inflation iota spreads are defined as the spread between zero coupon inflation swaps, and constant maturity TIPS breakeven inflation rates calculated from a par yield curve.

Source: Bloomberg, Haver, Federal Reserve Bank of New York. As of September 2021

Inflation risk premiums have risen in the current uncertain environment

- Inflation forecast dispersion, a measure of inflation risks, has increased along with TIPS breakevens. According to the University of Michigan survey the 75th percentile expectation has risen over 1ppt.



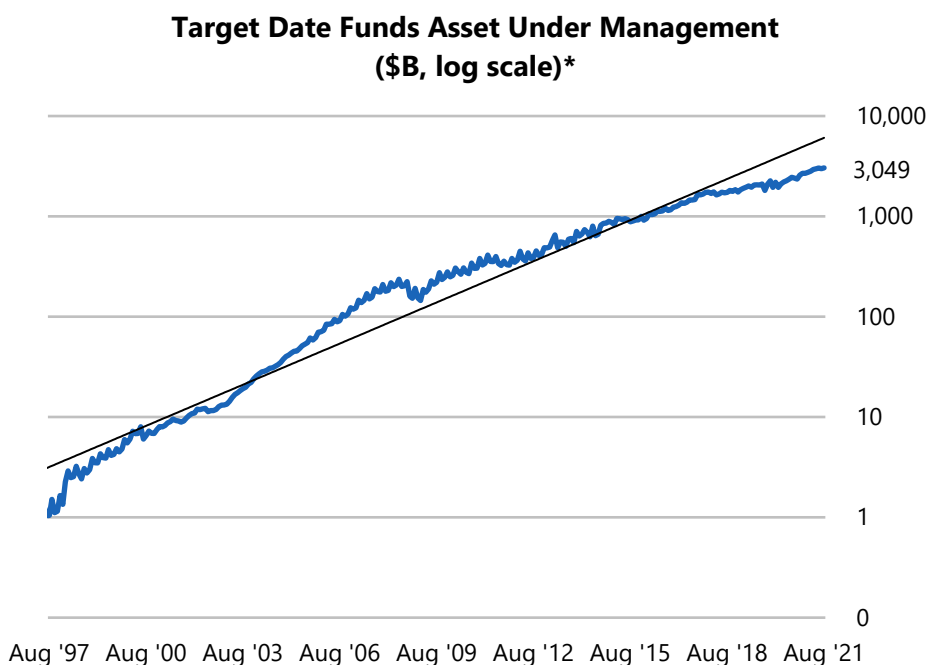
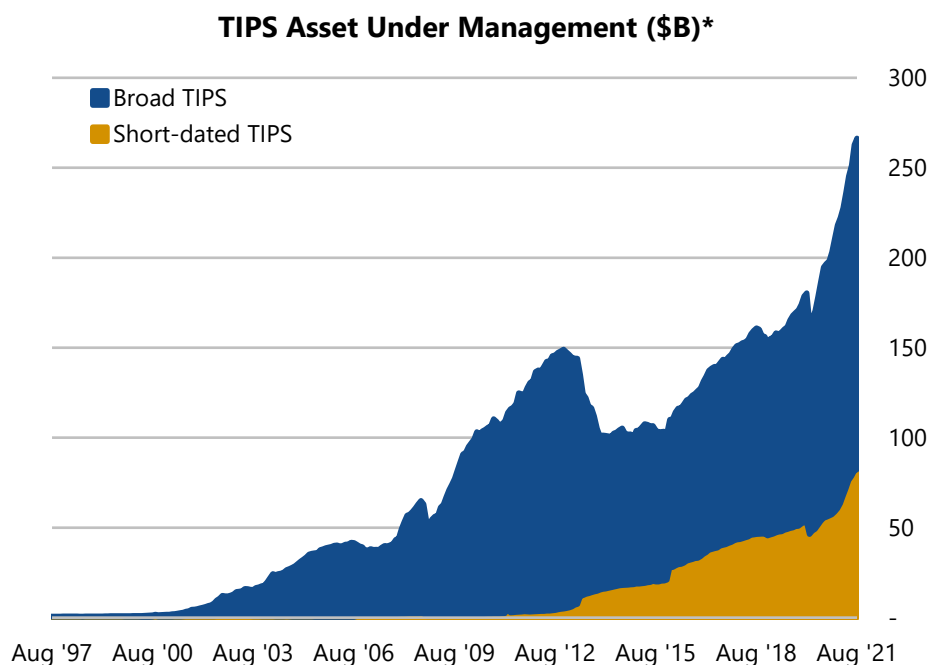
Sources: University of Michigan, Board of Governors, Haver
As of September 2021

...And some of the factors that have contributed to the increase are likely to persist

- Recent changes to the Fed's monetary policy strategy and the central bank's tolerance for above target inflation argue for persistently higher inflation risk premiums.
- The recent period of elevated realized inflation has likely buoyed investors' perceptions of upside inflation risks. Although we expect realized inflation to moderate, the Fed's new-found inflation tolerance suggest that average realized inflation in the next several years is still likely to be higher than what was realized before the pandemic.
- Additional fiscal policy expansion should also support growth, inflation and inflation expectations. Trends toward supply chain diversification and greater environmental protection policies should also support prices, although manufacturing innovation could offset the price effects of these trends over time.

Demand considerations – strong domestic investment fund demand

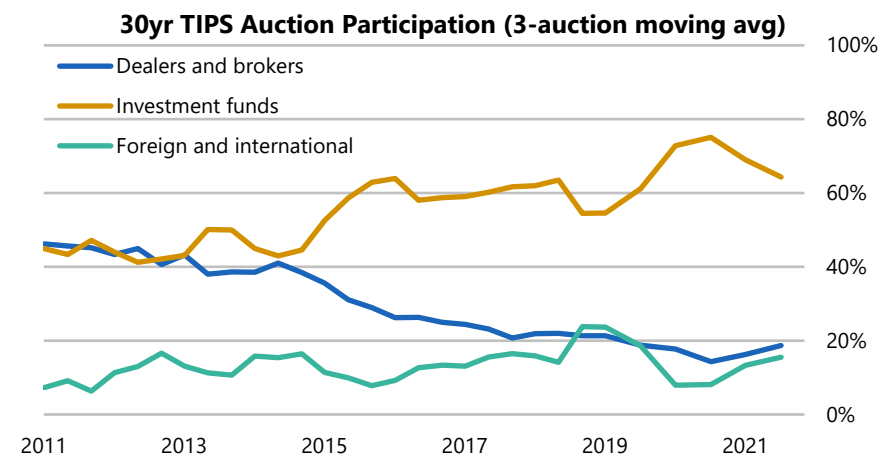
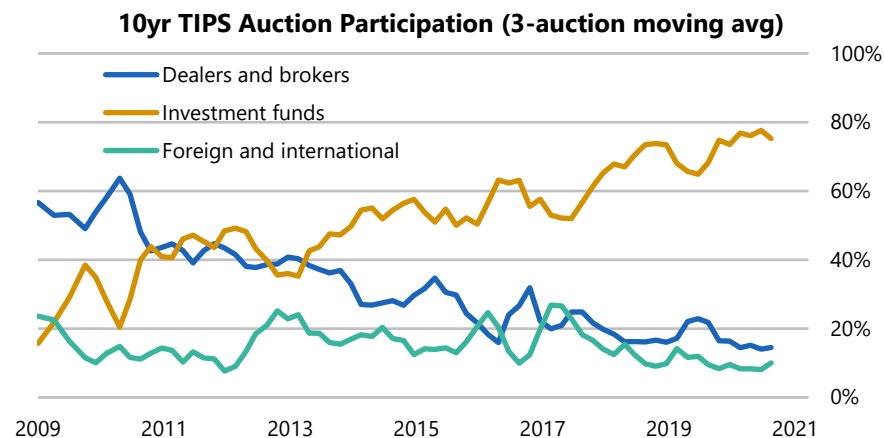
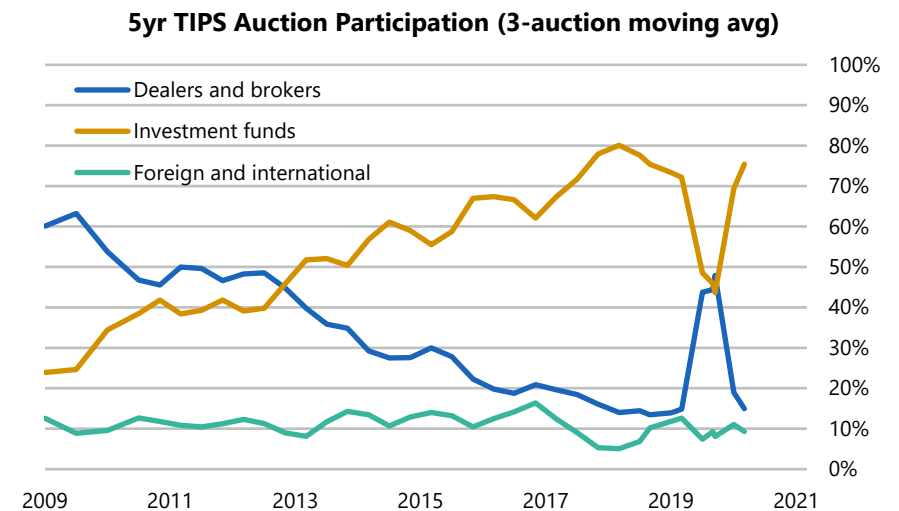
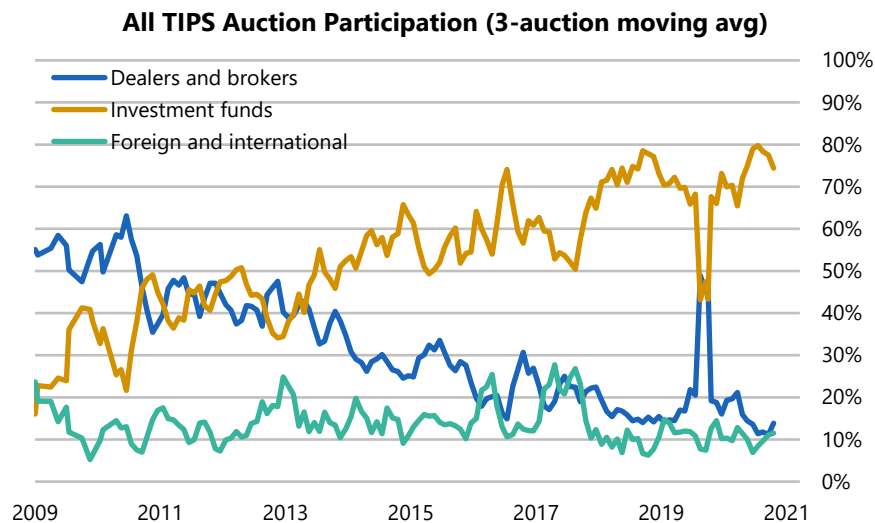
- Assets in TIPS Investment Funds have grown steadily over the years, and more rapidly over the past year. Short dated TIPS have seen more demand through funds that are dedicated to low duration strategies, in addition to demand from broad TIPS funds.
- The growth of Target Date Funds (TDFs) has also added to TIPS demand, with an estimated 2% allocation to TIPS. TDFs are currently under invested in TIPS. The recent bout of elevated inflation underscored the inflation risks of near-retirement target date funds, in particular, which hold a higher percentage of their portfolios in fixed income securities.



* Only includes funds/ETFs tracked by Morningstar. Short-Dated TIPS include funds/ETFs that focus on ≤ 5 yr maturity TIPS.
Sources: Morningstar
As of August 2021

TIPS auction data also shows strong domestic investment fund demand

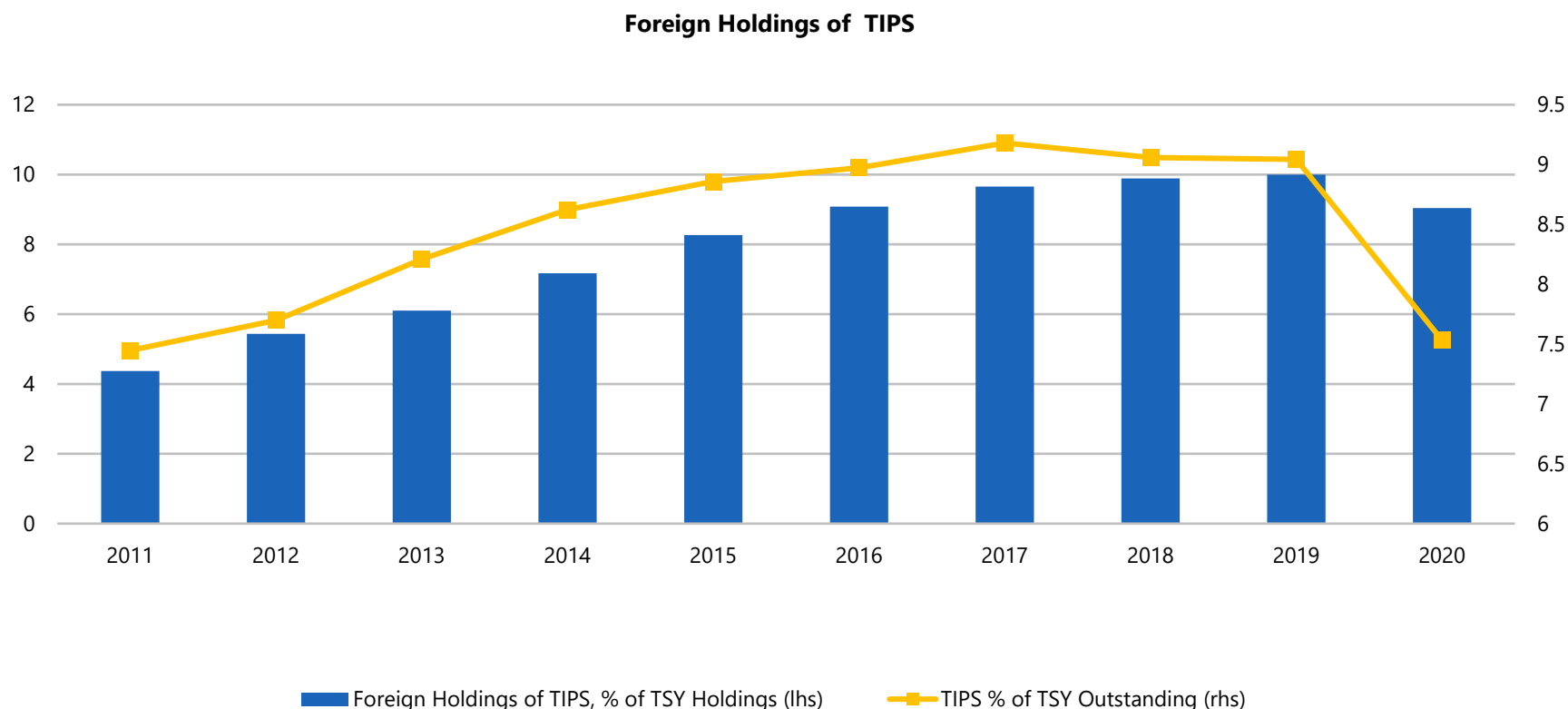
- The rise of domestic investment funds' demand is also evident in TIPS auction participation statistics. Investment Funds' participation has increased steadily to over 70%, taking shares from dealers.



Sources: US Treasury. As of September 2021

Foreign portfolio concentration of TIPS follows Treasury issuance pattern

- In recent years, foreign holdings of TIPS have generally followed Treasury issuance pattern. Indeed, as Treasury increased the TIPS share of Treasuries outstanding from 2010 to 2017, foreign investors also increased their portfolio concentration of TIPS, in aggregate. Similarly, these portfolios mirrored the pandemic related fall in the TIPS share in 2020.
- Looking ahead, we expect this pattern to persist, and for foreign holders to increase their portfolio concentration as Treasury normalizes the TIPS share. This should support demand for the increased issuance sizes.



Sources: US Treasury Annual TIC data on Long-Term Treasury holdings of foreign investors. As of YE 2020

Other considerations - global inflation linked issuance

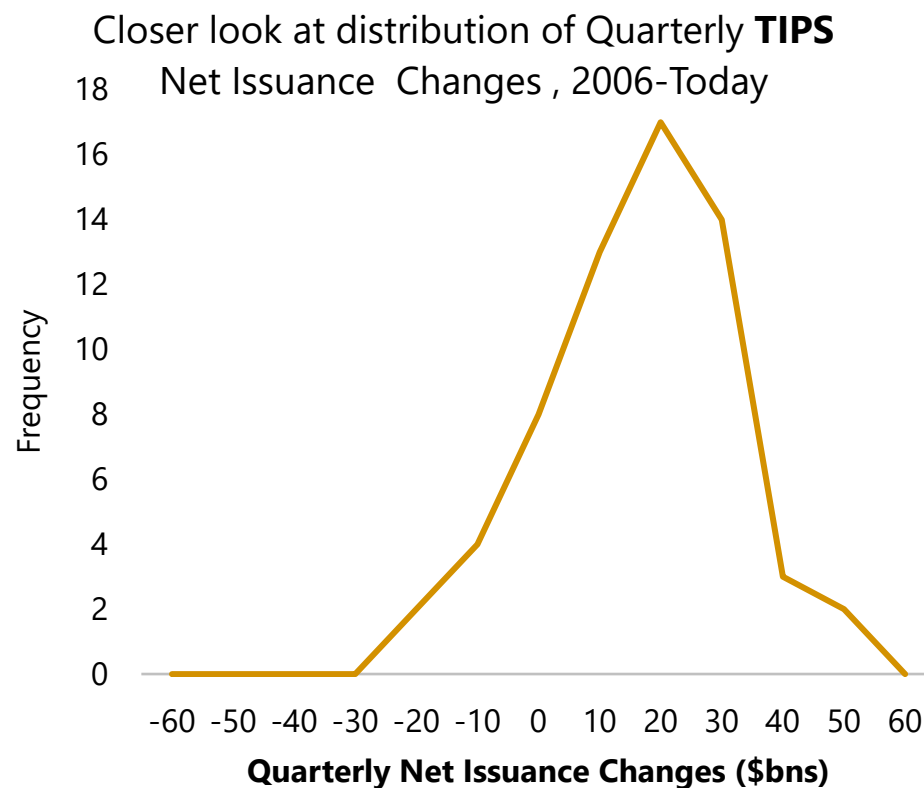
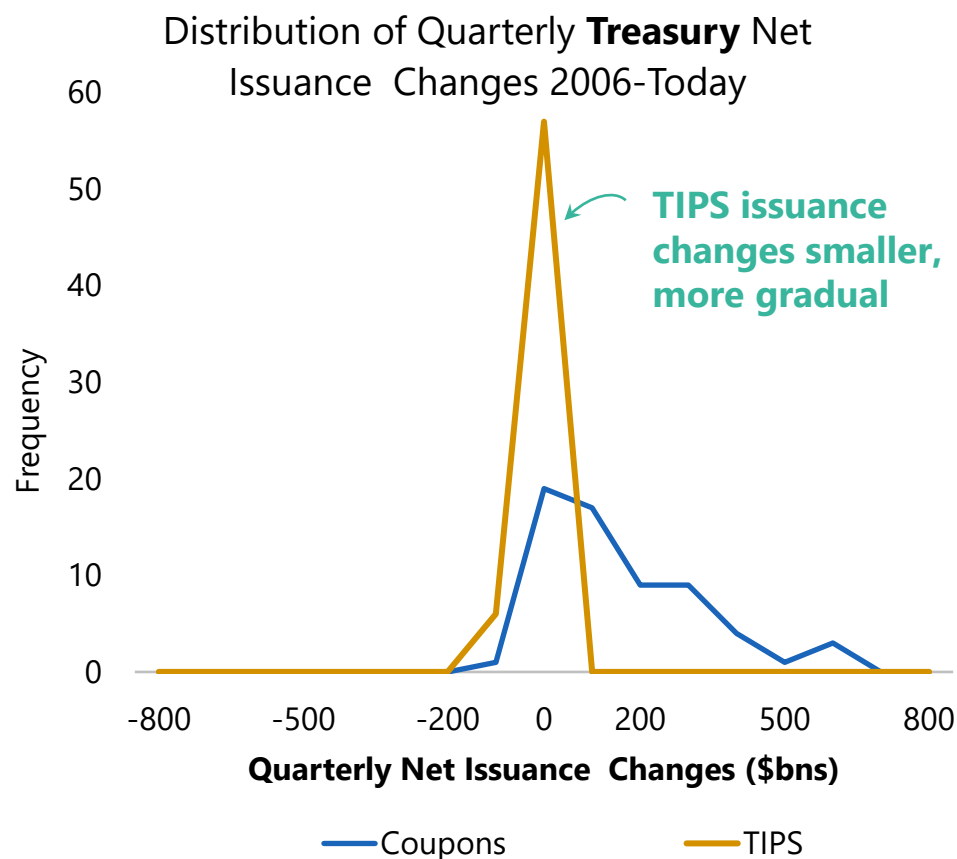
- Inflation indexed debt makes up a meaningful portion of the debt stock for a number of sovereign issuers.
- U.K. stands out at 24% Inflation Linked Debt as a percentage of Total Government Debt as many U.K. defined benefit pension liabilities have embedded inflation indexation and form a persistent demand base.
- Japan is on the lower end at <1%, most likely attributable to the issuance pause from 2008-2013, persistently low inflation and large total debt.
- Outside of U.K. and Japan, range for Inflation Linked Debt for other countries is between ~4% to ~15% with U.S. near the middle of that range.

Country	ILB Market Size (\$B)*	Total debt Outstanding (\$B)	ILB as % of Total Debt
US	1,652	21,961	7.5%
UK	668	2,772	24.1%
France	239	2,808	8.5%
Italy	174	2,636	6.6%
Germany	87	2,384	3.6%
Japan	99	10,463	0.9%
Spain	70	1,397	5.0%
Canada	50	1,222	4.1%
Australia	31	627	4.9%
Sweden	20	127	15.7%
New Zealand	15	108	13.9%
Total	3,105	46,505	6.7%
Total(ex-Japan)	3,006	36,042	8.3%

* Inflation-uplifted notional.
 Sources: Bloomberg
 As of September 2021

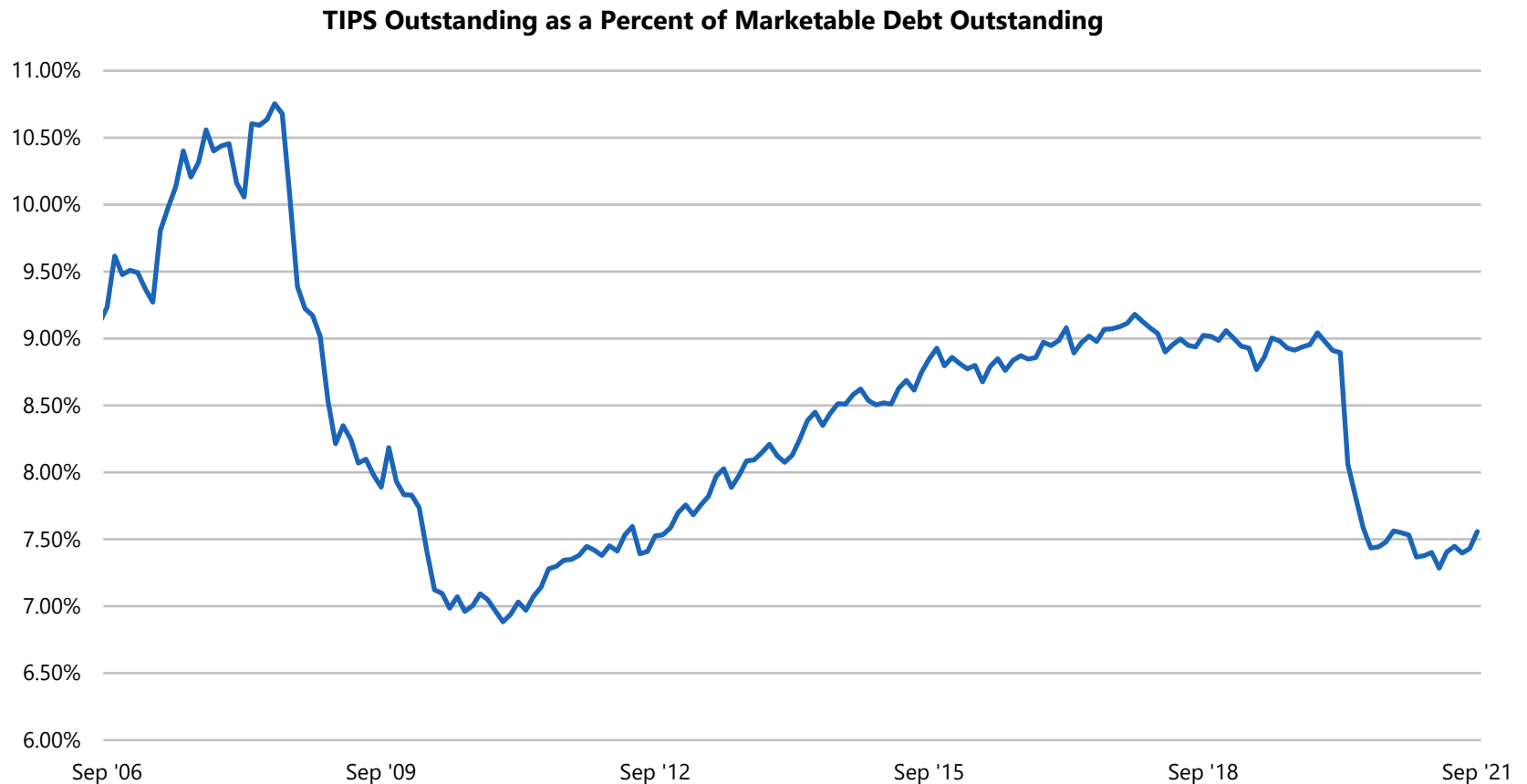
Other considerations – comparing changes in TIPS issuance vs changes in nominal coupon issuance

- Changes in TIPS issuance have tended to be more gradual than changes in nominal coupon issuance.
- Since 2006, Quarterly TIPS issuance changes have averaged around \$20-\$25bn. This compares to \$225bn for nominal coupon Treasuries. The maximum net issuance in any given quarter was \$56bn for TIPS (4Q2020), whereas the maximum issuance for coupons was \$680bn.



TIPS as a percentage of outstanding Treasuries has dropped

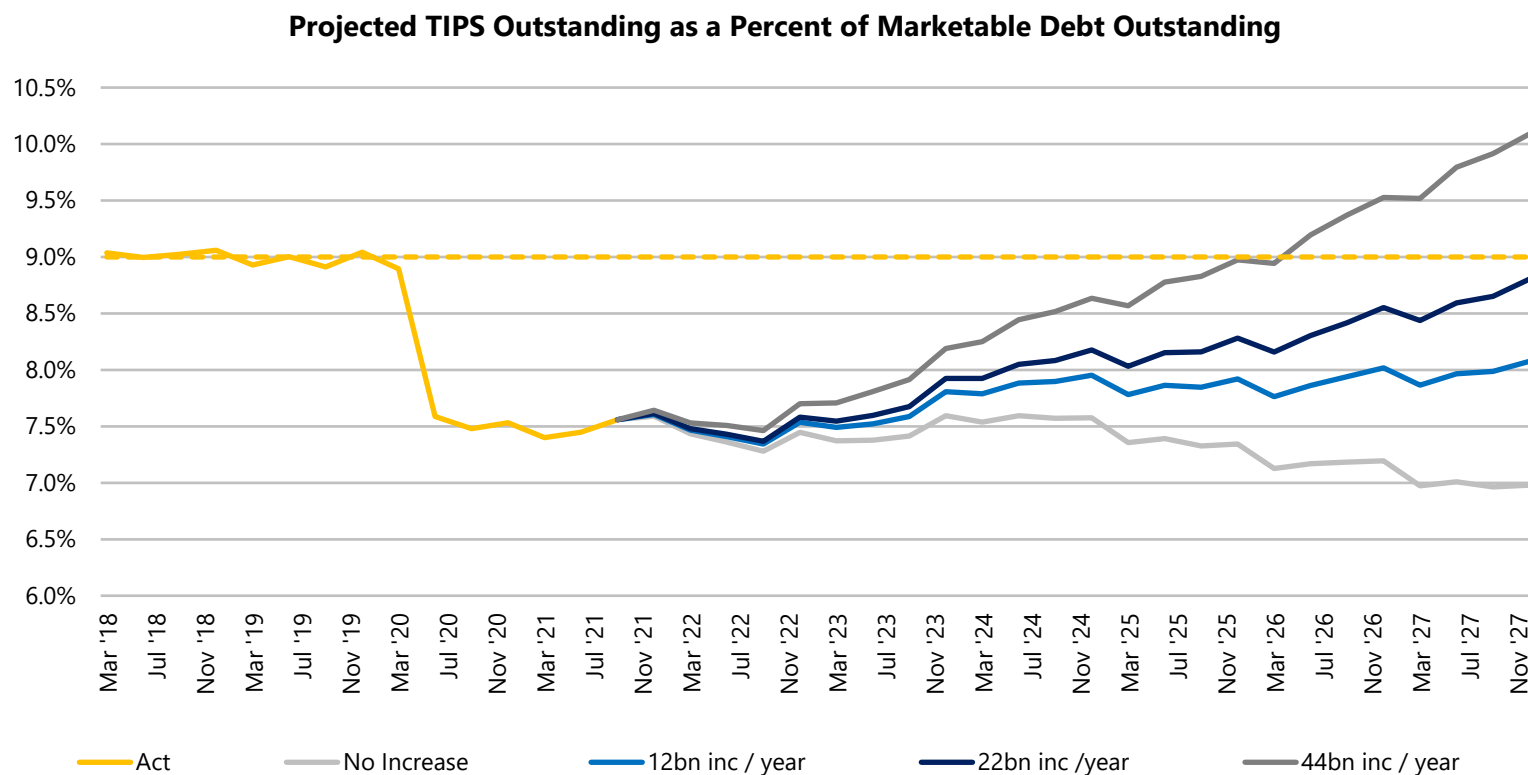
- In 2010, Treasury re-affirmed its commitment to the TIPS program and gradually increased the TIPS share of outstanding Treasuries to ~8-9%. Post-pandemic, TIPS share has dropped to 7.5%.
- Recognizing that TIPS share will drop during most recessions as a result of the necessary increases in nominal issuance, Treasury should prioritize returning the TIPS share back to the long-term target during normal times, so the share doesn't continue to decline over time.



Sources: Treasury, TBAC Calculations.
As of September 2021

TIPS as a percentage of outstanding Treasuries projections

- A steady increase in TIPS issuance starting in 2022 could bring TIPS share of outstanding debt towards 8% by year-end 2024 and would be in line with the gradual increase witnessed after the Global Financial Crisis (GFC). From 2011-2014 Treasury increased the TIPS share around 0.4ppt per year.
- A more aggressive increase would restore the percentage sooner, but would also raise annual net supply significantly and could be disruptive to the market.

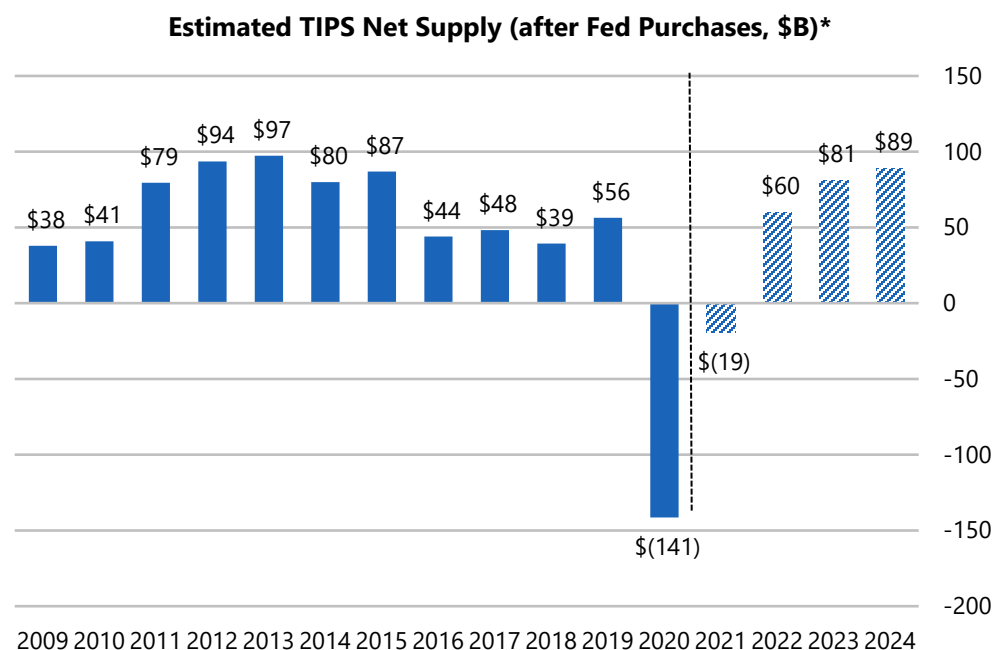


Projection scenarios: Projections are based on CBO deficit forecasts, Treasury's recent guidance and TBAC projection of coupon issuance in the future. Without any increase in TIPS issuance, the TIPS share eventually starts to fall as mandatory spending and deficits grow. TIPS principal accretion is projected to grow at 2.5% per year.

TBAC recommendation for consideration

- As shown through projections of TIPS outstanding earlier, a steady increase of TIPS issuance is needed to allow for TIPS share of Treasuries outstanding to reach 8-9%.
- An increase of \$10-\$20bn per year starting in 2022 could return the TIPS share towards 8% by the end of 2024.
- Note that dealer consensus expectation for 2022 gross issuance is \$177bn (a continuation of current pace, and +\$5bn vs 2021). Current valuation, risk premium, liquidity and demand considerations support a steady increase for 2022. Future increases for 2023 and beyond should continue to be re-evaluated as those considerations can change over time.
- Charts below use the upper-end of the recommended range (\$22bn) to illustrate the potential impact on issuance sizes and net supply.

Scenario illustration 2022 TIPS issuance	5yr	10yr	30yr	Total
January		17		17
February			10	10
March		15		15
April	20			20
May		15		15
June	18			18
July		18		18
August			9	9
September		16		16
October	21			21
November		16		16
December	19			19
Total 2022	78	97	19	194
Total 2021	70	85	17	172
Increase 2021 to 2022	8	12	2	22



* Uses projected TIPS issuance growing at 22bn per year through 2024.

Sources: Treasury, Federal Reserve, Barclays Capital, TBAC Calculations

Additional consideration – issuance pattern

- **As Treasury increases TIPS issuance further, it is also worth considering additional studies regarding issuance pattern.**
- More frequent issuance could help enhance TIPS liquidity and potentially reduce concessions going into auctions. More evenly distributed issuance calendar also allows for future increases of auction sizes.
- For example, increasing 5yr auctions to 6 times per year, and 30yr auctions to 4 times per year could spread out issuances more evenly especially if auction sizes grow further. Although that would also require additional auction slots in certain months.
- Further studies are needed to determine the optimal issuance pattern if TIPS issuance grows.

Conclusions

- Post-pandemic, as issuance of nominal securities surged, the share of TIPS in outstanding debt declined notably. A steady increase of \$10-\$20bn per year in TIPS gross issuance is recommended to gradually normalize the TIPS share of outstanding debt.
- Such an increase would be (1) in line with previous TIPS issuance changes which have tended to be smaller than changes in coupon issuance, (2) consistent with Treasury's regular and predictable objective and (3) likely well absorbed by the market given the demand factors discussed in the presentation.
- Even with such an increase, it will take a while for TIPS share to get back to target range.
- Since TIPS share tends to drop during recessions Treasury should target gradual increases during non-recessionary times. Overtime, maintaining TIPS share at 8-9% will support the market's perception of Treasury's commitment to the program while allowing Treasury to capture the cost benefits of the product.
- A 2018 TBAC study of the ALM benefits to Treasury of issuing TIPS suggests that under most economic scenarios for growth and inflation, Treasury benefits by issuing TIPS.
- Continued monitoring of TIPS sectors is warranted to reaffirm future adjustments to auction sizes and the longer-term issuance targets, as various factors could change over time.
- As TIPS issuance increases, calendar adjustments may be warranted to promote liquidity and consistency of issuance.

TBAC Charge

November 2021 Treasury
Refunding Meeting

TBAC Charge: T-bills Supply

In November 2020, the Committee recommended that Treasury, over the medium to longer term, strive to maintain T-bills in a range of 15 to 20 percent of outstanding debt. How should Treasury consider this recommended range within the context of future adjustments to coupon auction sizes and the evolving fiscal outlook, including in the short-term? What other metrics could complement Treasury's understanding of the appropriate size of the bill market?

Outline and Executive Summary

- T-bill Supply on the Current Path of Issuance in the Short-Term
 - Given TBAC's previous recommendation for coupon cuts, we consider how T-bills as a % of debt would evolve under a range of fiscal outcomes highlighting sensitivity to both coupon cuts and infrastructure.
 - If there are no coupon cuts, T-bills will fall below 15% of total debt stock before the end of 2022 and continue to fall further by the end of 2023.
 - Even with sizeable coupon cuts, T-bills as a percentage of outstanding stock is likely to dip below the 15-20% range in an effort to maintain stable and predictable coupon issuance.
- Determining the Appropriate T-bill Share over the Intermediate Term
 - Holdings of T-bills are increasingly concentrated in MMFs, though foreign investors still make up 25% of the market.
 - As T-bill supply has been declining, usage of RRP has increased indicating MMFs have no better alternatives for their investments given agency debt supply and CP supply are also low versus history.
 - Pricing indicates that T-bills are modestly rich to other parts of the curve, though this richness may be understated given RRP usage alleviates price dislocations. T-bills are not particularly rich to other front-end substitutes, but again, this is more due to the fact that supply of other front-end assets is also limited.
 - As a result, it seems that the market can easily digest a larger fraction of outstanding debt stock in T-bills, at least based on experience in recent years. As such, 15-20% may modestly undershoot what the market can absorb.
 - Market changes including balance sheet normalization and MMF reform should be considered as they could impact demand for T-bills.
- Conclusion
 - There is flexibility in the TBAC's recommended range for T-Bills to either fall below 15% of outstanding stock (in which case excess cash will likely get absorbed by the RRP facility) or for T-bills to rise modestly above 20% while still maintaining financing flexibility for Treasury.

T-bill Supply on the Current Path of Issuance in the Short-Term

We consider several issuance scenarios to address the first part of the charge:

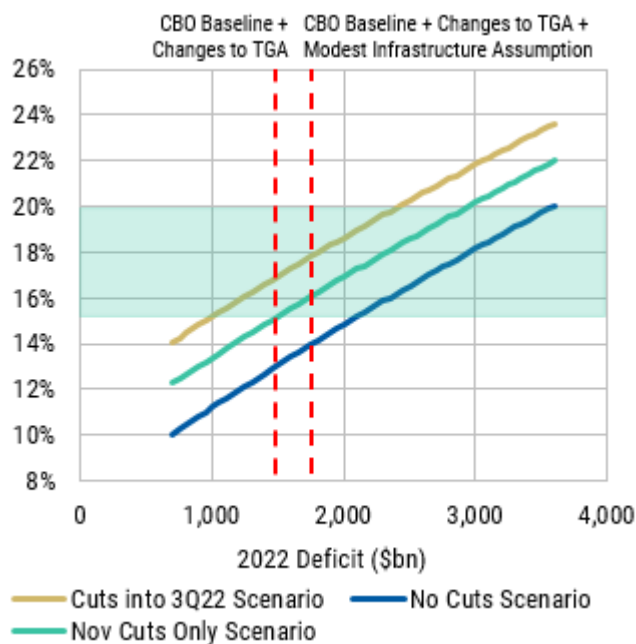
How should Treasury consider this recommended range within the context of future adjustments to coupon auction sizes and the evolving fiscal outlook, including in the short-term?

Conclusion: Even if coupon cuts are introduced in November, T-bills as a % of UST debt outstanding would likely fall below 15%. Coupon cuts would need to occur over the next several quarters in order to maintain T-bills in the 15-20% range. Given this 15-20% target is an intermediate-term objective, it is acceptable to move towards the lower edge of the range insofar as doing so helps to maintain stable and predictable coupon issuance.

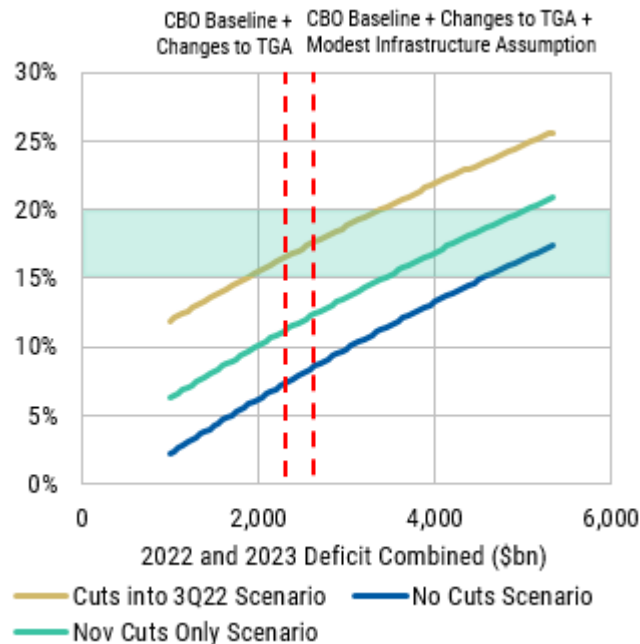
T-bill Supply on the Current Path of Issuance in the Short-Term

- We consider three scenarios: (1) there are no coupon cuts, (2) there are coupon cuts only in November consistent with the TBAC sizes indicated in August refunding, and (3) there are cuts in into the 3rd quarter of 2022.
- If there are no coupon cuts and CBO deficit estimates are realized, T-bills will be below the recommended 15-20% range both at the end of 2022 and 2023. Even if there are coupon cuts in November, T-bills will be at 15% by the end of 2022 and below 15% by the end of 2023 if (1) CBO deficits are realized and (2) the TGA was raised to \$800bn before YE2022 and remains stable.

T-bills as a % of total UST debt outstanding, YE2022

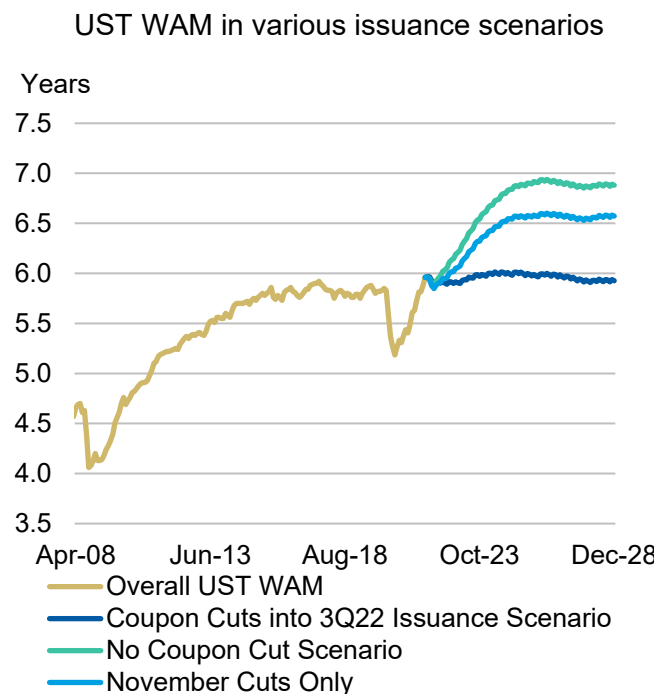
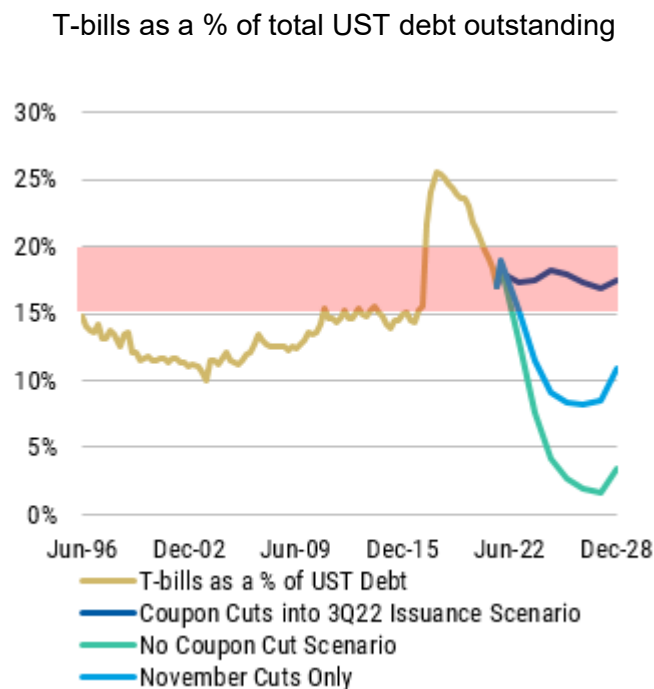


T-bills as a % of total UST debt outstanding, YE2023



T-bill Supply on the Current Path of Issuance

- Using the same three scenarios, we model out how T-bills as a % of outstanding debt and UST WAM would evolve.
- Only under a scenario in which there are sizeable coupon cuts for the next several quarters will T-bills as a % of debt be stable within the recommended 15-20% range. In this case, UST WAM remains stable at just under 6 years.
- If there are no coupon cuts or only coupon cuts in November, T-bills will fall sharply below the recommended 15-20% range and UST WAM will grow to 6.5-7 years by the end of 2023.



Determining the Appropriate T-bill Share over the Intermediate Term

Next, we turn to the second part of the charge, which focuses on T-bill supply in the longer run:

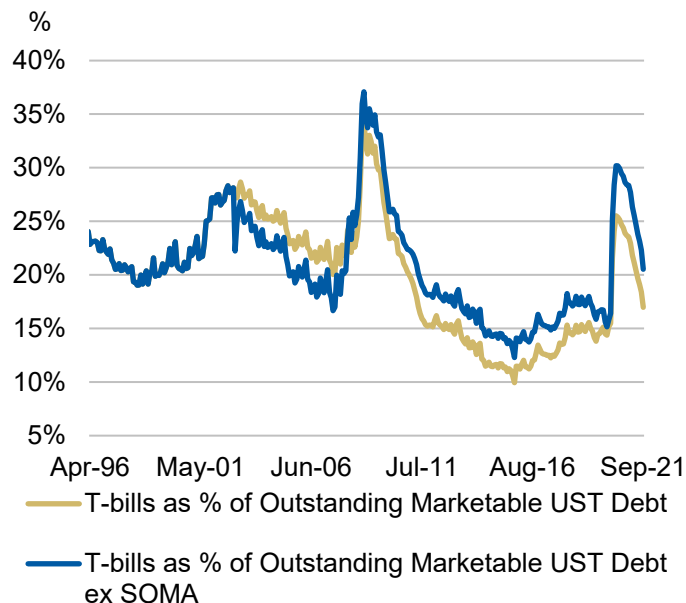
What other metrics could complement Treasury's understanding of the appropriate size of the bill market?

Conclusion: Given there is (1) an increasing amount of demand for T-bills coming from MMFs coupled with (2) an excess amount of cash sitting in the RRP waiting to earn yields greater than 5bp and (3) lack of other front-end assets, the share of T-bills in outstanding debt could likely increase above 20% without dislocating the T-bill market.

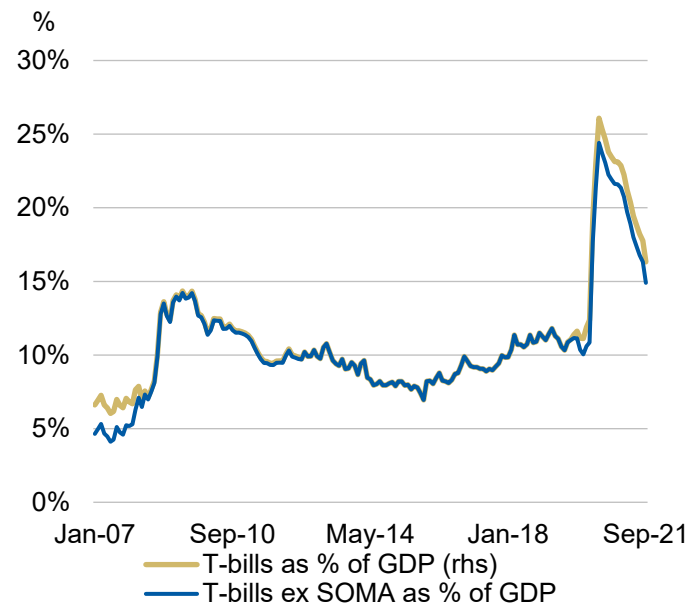
Supply in the T-bills Market

- On the supply side, T-bills outstanding has fallen notably over the course of 2021 after rising rapidly in 2020. As a % of total outstanding debt, T-bills currently take up around 17%, right within the 15-20% recommended range. Presently, T-bills as a % of UST debt ex SOMA is slightly higher at just over 20%.
- Part of the decline in T-bills in 2021 has been constraints driven by the debt ceiling. Treasury had to pay down T-bills in order to avoid exceeding the debt limit imposed on August 1, 2021. This debt limit was increased by \$480bn, but until there is a more long-lasting solution to the debt ceiling, T-bill supply is likely to be constrained by this debt limit once again in late November/December.
- T-bills as a % of UST debt is essentially back to pre-COVID levels, whereas T-bills as a % of UST debt ex SOMA is still elevated compared to pre-COVID levels. This discrepancy can be explained by the fact that from September 2019 – March 2020, the Fed had been buying T-bills and reducing the stock of privately held T-bills relative to other UST securities. However, since Fed LSAPs began in March 2020, the reverse has been true, and the Fed is reducing the stock of non-T-bill privately held UST securities relative to that of T-bills.

T-bills as a % of outstanding debt has fallen in 2021



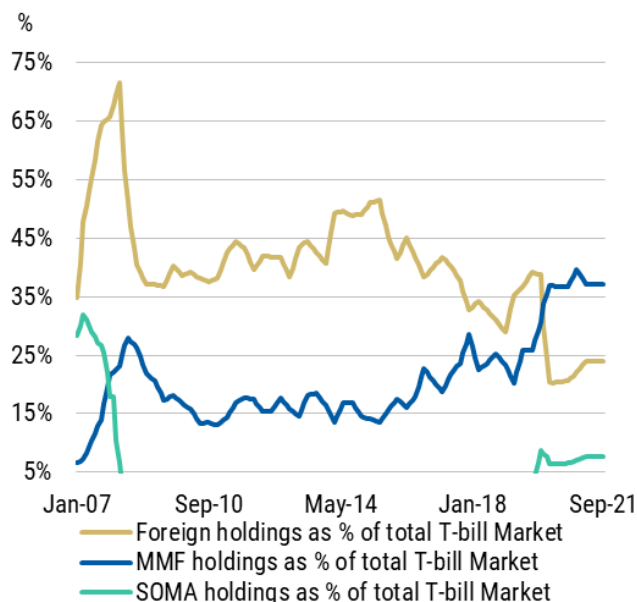
T-bills as a % of GDP is still above longer-run averages of ~10%, but is falling rapidly



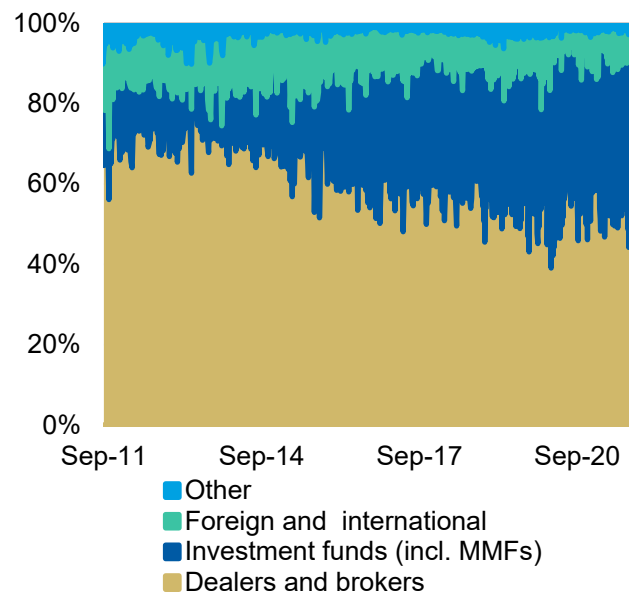
Demand Structure in the T-bills Market

- Foreign investment and MMFs continue to make up over 60% of T-bill ownership.
- However, over the last several years, and particularly in early 2020, MMFs have become a more dominant owner of T-bills. MMF ownership now exceeds 35% of the total market, whereas foreign holders have fallen to just under 25%.
- In auctions, investment funds (including MMFs) represent a growing portion of T-bill takedowns. This increase in takedowns from MMFs has eroded broker/dealer and foreign share. However, dealers still take down roughly half of new issues.

Ownership of T-bills is dominated by MMFs



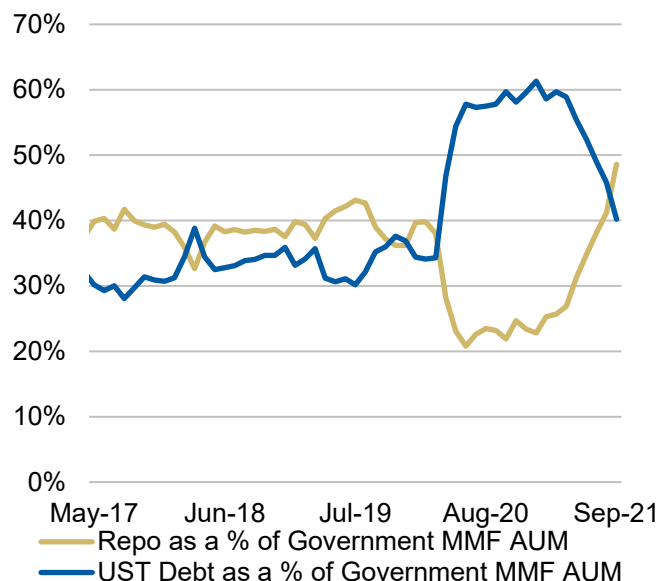
Investment Funds (incl. MMFs) are an increasing proportion of auction takedown of T-bills



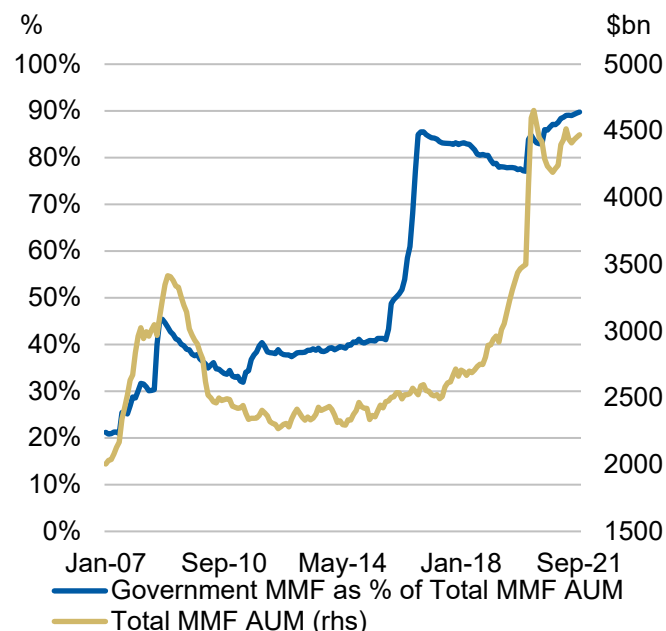
Zooming in on MMF Demand

- Though MMFs have become increasingly large players in the T-bills market, their holdings of UST securities as a % of MMF AUM has actually declined. This decline in UST holdings as a % of AUM is likely because:
 - Overall MMF AUM has grown substantially in the last year alongside Fed's LSAP. Most of this AUM growth has been experienced by Government MMFs, which now represent nearly 90% of the MMF industry.
 - The debt ceiling has recently constrained T-bill supply. Once there is a more long-lasting solution to the debt ceiling and the Treasury can resume normal T-bill issuance, some of this decline in UST holdings as a percentage of MMF AUM will naturally reverse.
- This growth in Government MMFs is coming from (1) banks encouraging large clients to deposit with MMFs instead of the bank directly and (2) continued transition of Prime MMFs into Government MMFs.
- UST debt holdings as a percentage of MMF AUM have declined though MMFs represent a growing portion of T-bill holdings. This suggests that the market could absorb more supply.

Repo holdings as a % of Government MMF AUM is at multi-year highs



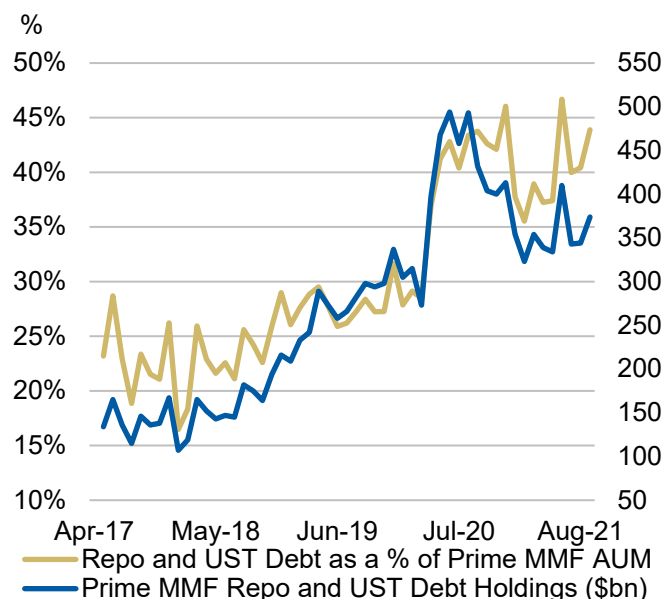
Overall MMF AUM growing, but driven by growth in Government MMF



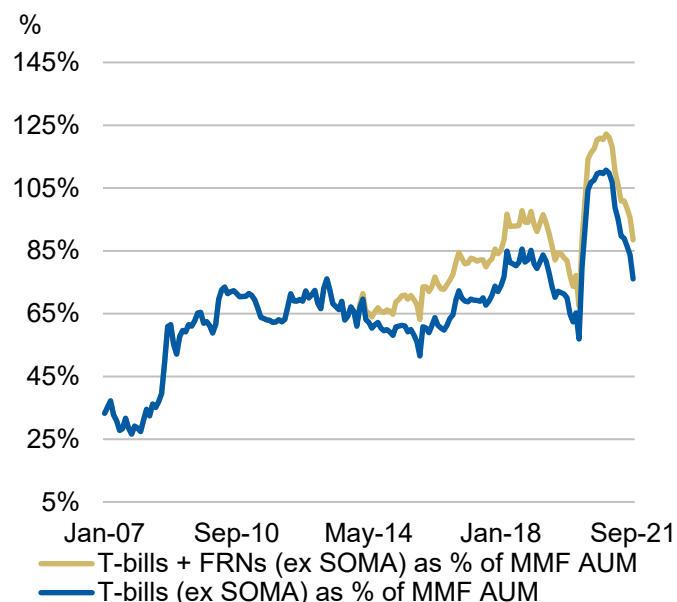
Zooming in on MMF Demand

- Not only have Government MMFs been increasing holdings of UST debt and repo, but Prime MMFs have as well. Holdings of UST and repo are increasing both in dollar amounts and as a % of overall Prime MMF AUM.
- Total T-bills outstanding ex SOMA as a % of MMF AUM has been declining.
- These patterns suggest that T-bill supply may not be large enough to keep pace with the potential demand for T-bills from MMFs.

Prime MMF holdings of UST debt and repo increasing



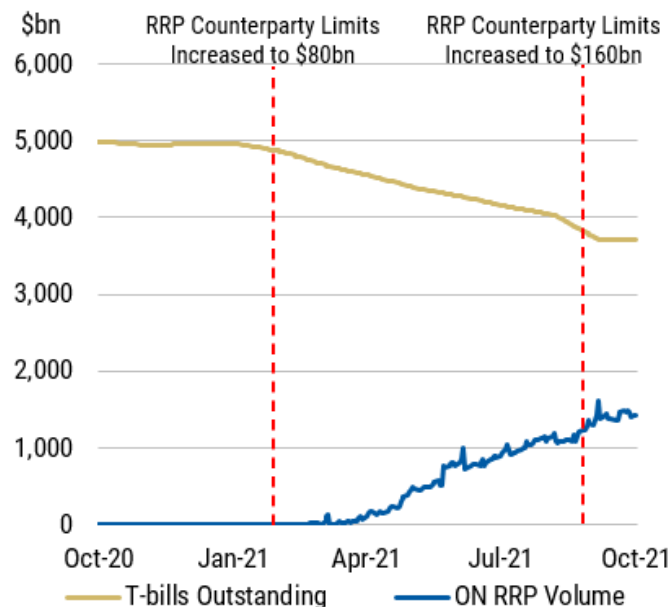
T-bills relative to overall MMF AUM is nearly back to pre-COVID levels



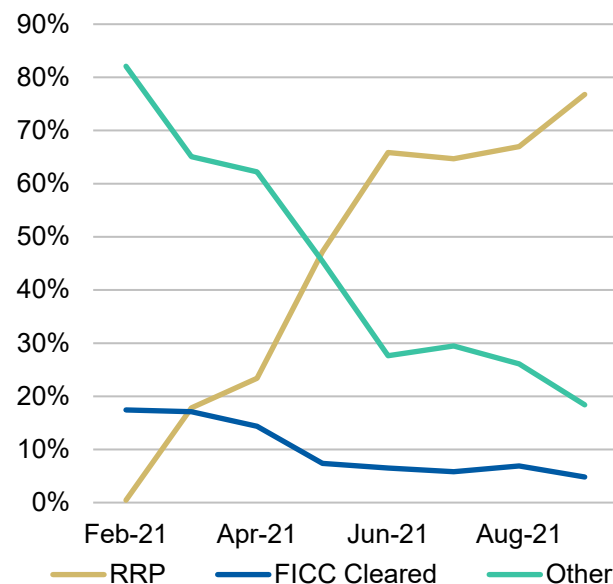
Considering RRP's Role in the Front-End

- Increased usage in the RRP facility indicates that there is excess cash sitting in the front-end as MMFs wait to earn market yields higher than 5bp. This growth in the RRP really began in March 2021, when large T-bill paydowns began. While tracking cash can be difficult, it is reasonable to assume that a lot of the cash generated from T-bill paydowns in 2021 has been invested in the RRP.
- As a result, the amount of RRP done with the Fed compared to overall MMF repo holdings has grown to nearly 80%. Even though the counterparty size limitations are conducive to large usage, it is unlikely the Fed wants to play such a central role in MMF functioning in the long-run.

RRP usage has been steadily growing as T-bills have been paid down through 2021



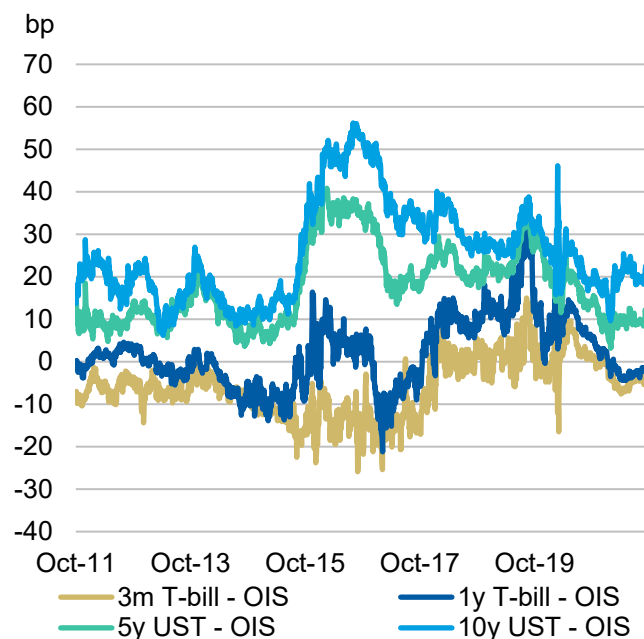
Nearly 80% of all MMF repo is RRP done with the Fed



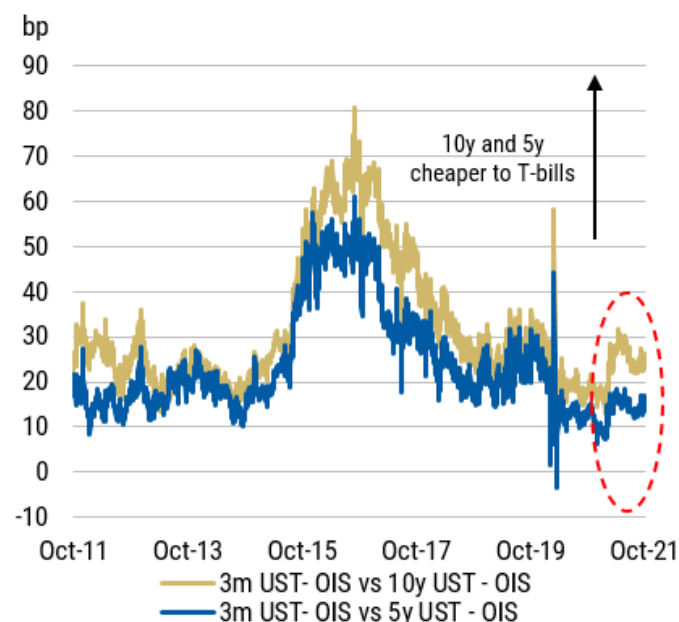
T-bill Valuations Relative to Other Parts of the UST Curve

- As a result of the shifting supply/demand dynamics, T-bills have richened modestly versus other points of the curve YTD.
- On a historical basis, T-bills are not trading particularly rich compared to other points on the curve.
- However, large availability of repo via the RRP is likely limiting demand for T-bills <5bps and thus understating richness of T-bills relative to other parts of the curve.

UST – OIS at various points on the curve, 10y history



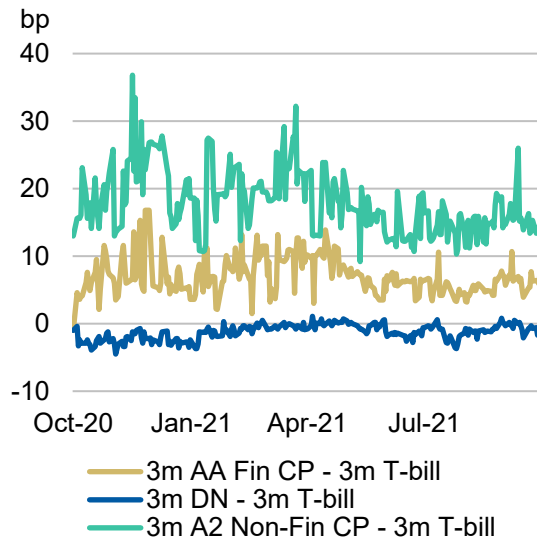
Spread of 3m T-bills – OIS vs other points on the UST curve, 10y history



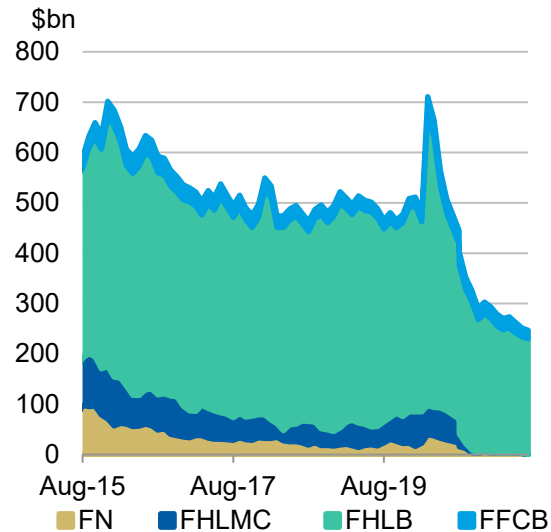
T-bill Valuations Relative to Other Front-End Substitutes

- Compared to other front-end substitutes, T-bills have been trading fairly in line.
- It is hard for T-bills to richen more from here given MMFs would rather earn 5bp placing their cash at the RRP facility.
- Other front-end assets, such as CP and agency debt, remain rich given a lack of supply. For example, non-financial corporates have become the largest *owners* of CP, whereas they used to be net issuers of CP. This is a result of increased cash that corporates have on hand.

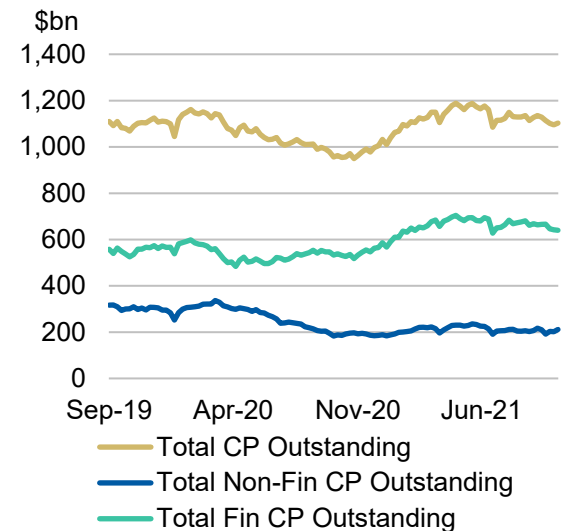
T-bills aren't necessarily trading rich to other front-end assets



Supply of agency DNs has declined to \$250bn from over \$700bn in March 2020



Supply of overall CP is roughly flat to pre-COVID levels, whereas supply of Non-Fin CP has declined

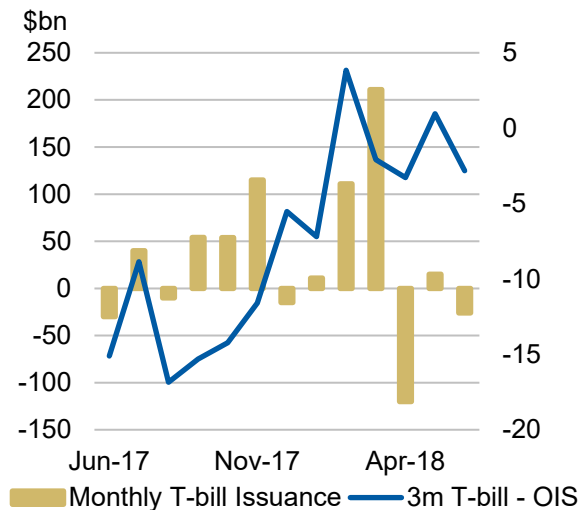


Other Considerations:

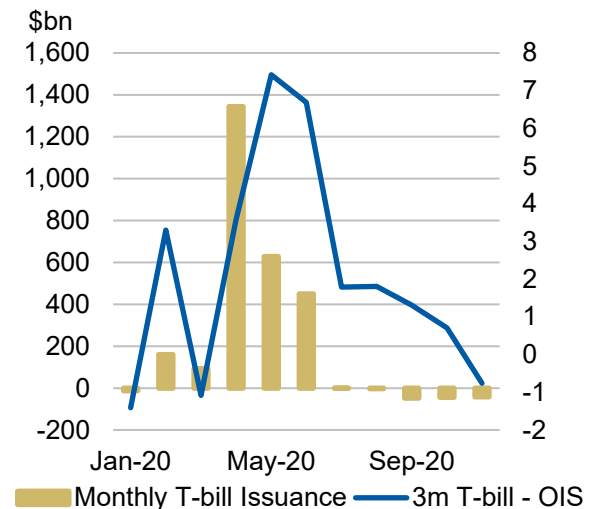
Does Flow of Issuance Matter in Addition to Stock?

- In 2020, T-bills were able to grow by nearly \$3tn without any substantial dislocation of the T-bills market. The most cheapening seen was in April 2020 when the pacing of T-bill issuance far outweighed the speed at which new MMF AUM was created. There was nearly \$1.5tn new T-bills issued that month alone. Yet, T-bills cheapened only 7bp relative to OIS.
- However, in other instances, T-bill issuance picking up led to substantial cheapening of T-bills vs OIS. For example, in late 2017 to early 2018, an increase in T-bill issuance, albeit smaller than in 2020, led to almost 20bp of cheapening over the course of several months.
- So, perhaps it is worth considering if not only stock of T-bill outstanding, but also flow of issuance matters for T-bill sizing. As with overall stock of T-bills, as the supply of broad money grows and the deficit continues to grow over time, the amount the market can absorb in any given month is likely not a static number either.

T-bills cheapen in late 2017-early 2018 amidst larger issuance



T-bill cheapening was more muted in 2020

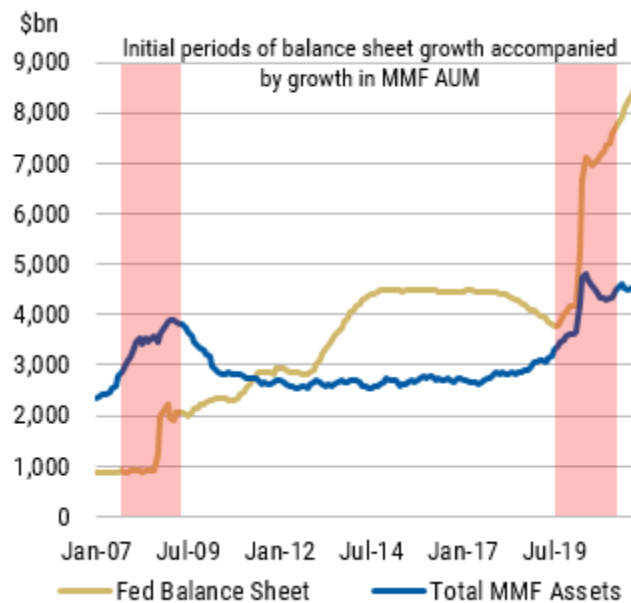


Other Considerations:

Does the Fed Balance Sheet Matter for T-bill Sizing?

- While the Fed and Treasury are independent entities, the balance sheet policy the Fed employs could have implications for the right amount of T-bills that the Treasury should issue.
- While the Fed is expanding their balance sheet, this is often initially met with an increase in MMF AUM. This also tends to coincide with a fiscal impulse which leads to more T-bill issuance, so T-bills are readily absorbed by the growth in MMF AUM. After the recovery takes foot, MMF AUM growth tends to taper off, even if balance sheet keeps increasing, as investors put cash to work in other risk assets.

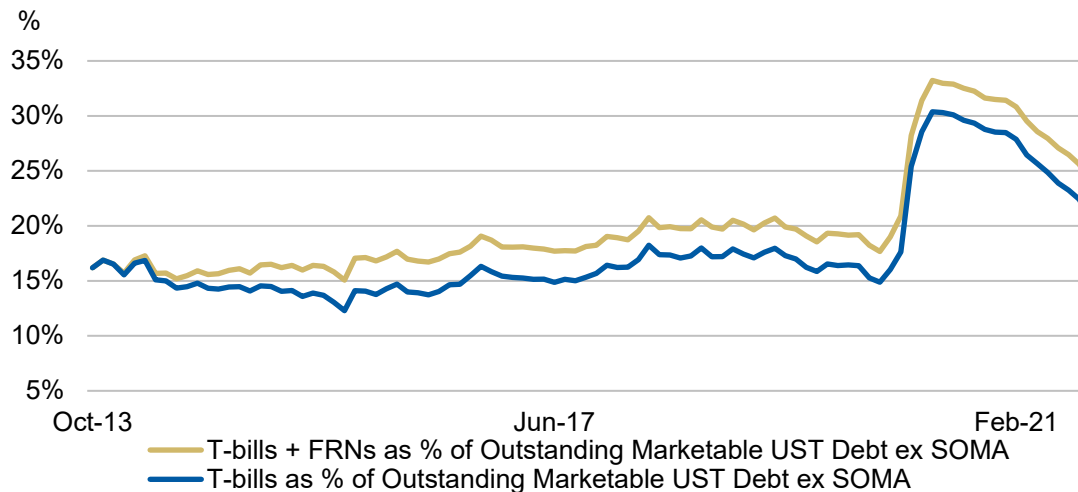
Early stages of balance sheet growth tend to coincide with growth in MMF AUM



- But is the converse true when the Fed is shrinking their balance sheet? In 2018-2019, MMF AUM grew despite a shrinking Fed balance sheet.
- It is difficult to quantify the impact on T-bills as on one hand, (1) a shrinking balance sheet means fewer reserves which in theory means less cash available to absorb T-bill supply, but (2) the portfolio balance channel effect of LSAPs tends to have a larger impact on rates further out the curve, which could lead to further cheapening of coupons relative to T-bills.

Other Considerations: Should FRNs be Included in this Metric?

- Rather than looking at T-bills as a % of UST debt, should TBAC consider T-bills + FRNs as a % of UST debt? FRNs make up a small portion of UST debt outstanding, roughly 4% currently, so this shift doesn't make a massive difference presently.
- Given their similar demand base, it may be worthwhile considering the two in conjunction with one another. This may be especially true should the Treasury pursue issuance of a SOFR FRN.
- Right now, T-bill + FRNs take up around 20% share of total marketable debt and just under 25% ex SOMA. Given the Fed has not been purchasing T-bills or FRNs under LSAPs, the spread between T-bill + FRN share of total outstanding debt and that of outstanding debt ex SOMA has been driven wider.



Other Considerations:

Financial Stability and MMF Reform

- In prior TBAC charges, as well as academic research*, it has been suggested that increased supply of public sector short-term, liquid assets may reduce attractiveness of other short-term liabilities, namely those of the private sector. This could help to enhance stability in the financial system.
 - It is also worth considering whether banks have a preference for T-bills vs other UST securities. Though the two forms of HQLA are treated similarly under capital requirements, the difference in maturity could have different implications for internal liquidity metrics. The decision on what proportion of T-bills to hold vs coupons is also not likely the same bank to bank, but pinpointing individual bank's preferences can be difficult.
- Given the large outflows that the Prime MMFs experienced in March 2020, there are ongoing discussions regarding future MMF reform. Many of the proposals considered in the President's Working Group Report** from December 2020 are likely to lead to further outflows from Prime MMFs and into Government MMFs. In this case, on margin, there would likely be even more demand for T-bills given Prime MMFs invest in a broader universe of front-end assets compared to Government MMFs.

Source:

[TBAC Charge](#), November 2017

* [“The Demand for Short-Term, Safe Assets and Financial Stability”](#) by Carlson, Duygan-Bump, Natalucci, Nelson, Ochoa, Stein, and den Heuvela

** [“Report of the President's Working Group on Financial Markets Overview of Recent Events and Potential Reform Options for Money Market Funds”](#), President's Working Group

Conclusion

- In the short-run, even if coupon cuts are introduced in November, T-bills as a % of UST debt outstanding would likely fall below 15%. Coupon cuts would need to occur over the next several quarters in order to maintain T-bills in the 15-20% range. Given this 15-20% target is an intermediate-term objective, it is acceptable to move towards the lower edge of the range to help maintain stable and predictable coupon issuance.
- Given there is (1) increasing demand for T-bills from MMFs coupled with (2) a large amount of cash at the RRP earning 5bps and (3) a lack of other front-end assets, there is likely scope for T-bill issuance to increase above 20% without creating pressure on T-bill valuations.
- As such, there is flexibility in the TBAC's recommended range for T-bills to either fall below 15% of outstanding stock in which case excess cash will likely get absorbed by the RRP facility or for T-bills to rise modestly above 20% while still maintaining financing flexibility for the Treasury.