Treasury Presentation to TBAC

Office of Debt Management

Fiscal Year 2022 Q4 Report

Table of Contents*

*All sources are from Treasury unless otherwise specified

Section I:
Executive Summary

Highlights of Treasury's November 2022 Quarterly Refunding Presentation to the Treasury Borrowing Advisory Committee (TBAC)

Receipts and Outlays for FY2022

	$ billions	Change from same period last year ($ bn)	Change from same period last year (%)	As % of GDP	Change from same period last year (GDP %)
Total Receipts for FY2022	4,896	+850	+21%	19.6%	+1.7%
Total Outlays for FY2022	6,210	-612	-9.0%	25.1%	-5.0%

*Treasury's Projected Net Marketable Borrowing for the Next Two Fiscal Quarters**

Treasury OFP Near Term Fiscal Projections	Net Privately Held Marketable Borrowing ($ billion)	Assumed End-of-Quarter Cash Balance ($ billion)
Q1 FY2023	550	700 (Dec)
Q2 FY2023	578	500 (Mar)

*These borrowing estimates are based upon current law. The end-of-December and end-of-March cash balances assume enactment of a debt limit suspension or increase. While the debt limit is not currently binding, Treasury's cash balance may be lower than assumed depending on several factors, including constraints related to the debt limit.

*Projected Net Marketable Borrowing for the Next Three Fiscal Years from Various Sources***

Fiscal Year	Primary Dealers Median October 2022 ($ billion)	OMB "Mid-Session Review" August 2022 ($ billion)	CBO "Analysis of President Budget FY23" September 2022 ($ billion)
2023	1,765	2,087	1,678
2024	1,433	1,722	1,250
2025	1,402	1,460	1,172

** All privately-held net marketable borrowing estimates are "normalized" with details from page 18.

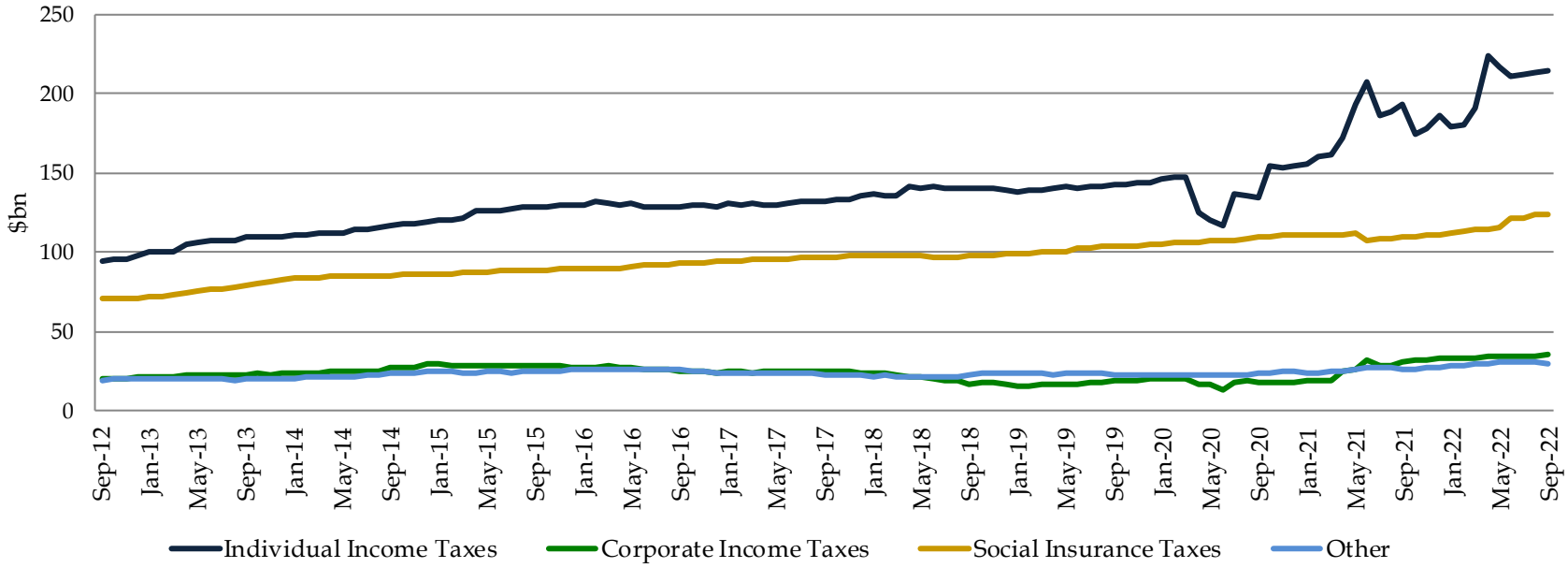
Uncertainty regarding funding needs in FY2023 and FY2024 remains relatively high, reflecting a variety of views on the path monetary policy, the duration of SOMA redemptions, and the outlook for the economy.

Latest Market Expectations For Treasury Financing In November:

- Primary dealers largely expect Treasury to leave nominal coupons auction sizes unchanged at the November refunding despite all dealers having increased their estimates for privately-held marketable borrowing needs in November relative to their August estimates.
- Given the forecasted funding gap over FY2023 and beyond, all dealers noted that because bills as a percentage of debt outstanding was near the 15 percent lower bound of the TBAC recommended range, there was ample room to increase bill issuance further in order to address near term funding needs.
- Dealers were evenly split on whether Treasury should consider increases to TIPS issuance by $1 billion for the 10-year TIPS new issues in January 2023.

Section II:
Recent Fiscal Results
Receipts, Outlays, and Deficits

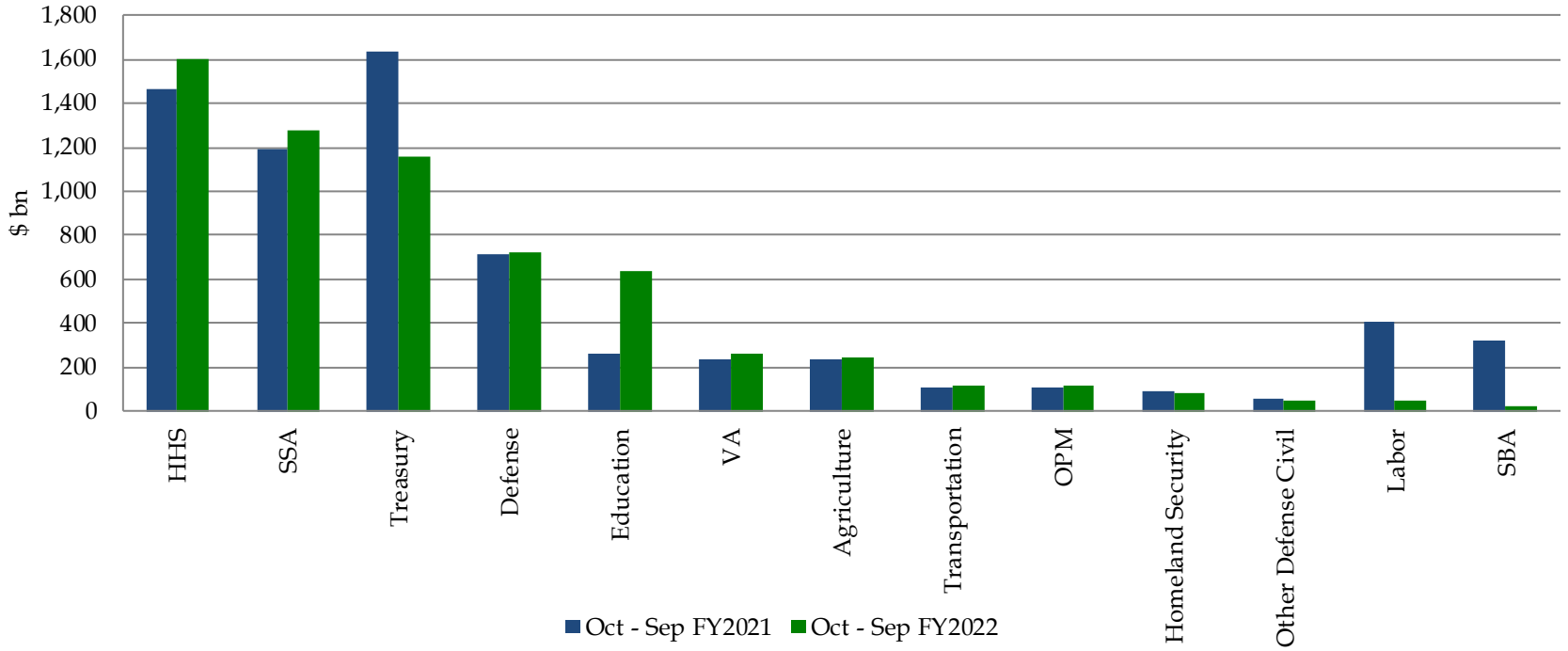
Monthly Receipt Levels
(12-Month Moving Average)



Notable Receipt Category	Change from FY21 to FY22 ($ billion)	Change from FY21 to FY22 (%)	Comments
Withheld & FICA taxes	+$382	+14%	Reflecting rising wages and employment
Non-withheld and SECA taxes	+$329	+37%	Buoyed by large final payment of 2021 tax liability in April associated with capital gains and other technical factors
Individual refunds	-$32	-12%	Due to higher levels of taxable liability for 2021 than were anticipated by individuals, leading to fewer refunds.
Gross corporate taxes	+$57	+14%	Driven by higher corporate profits
Federal Reserve earnings	+$7	+7%	Remittances increased through May, but have decreased year-over-year as higher interest rates paid on reserves could reduce or eliminate this source of receipts for up to several years.

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.

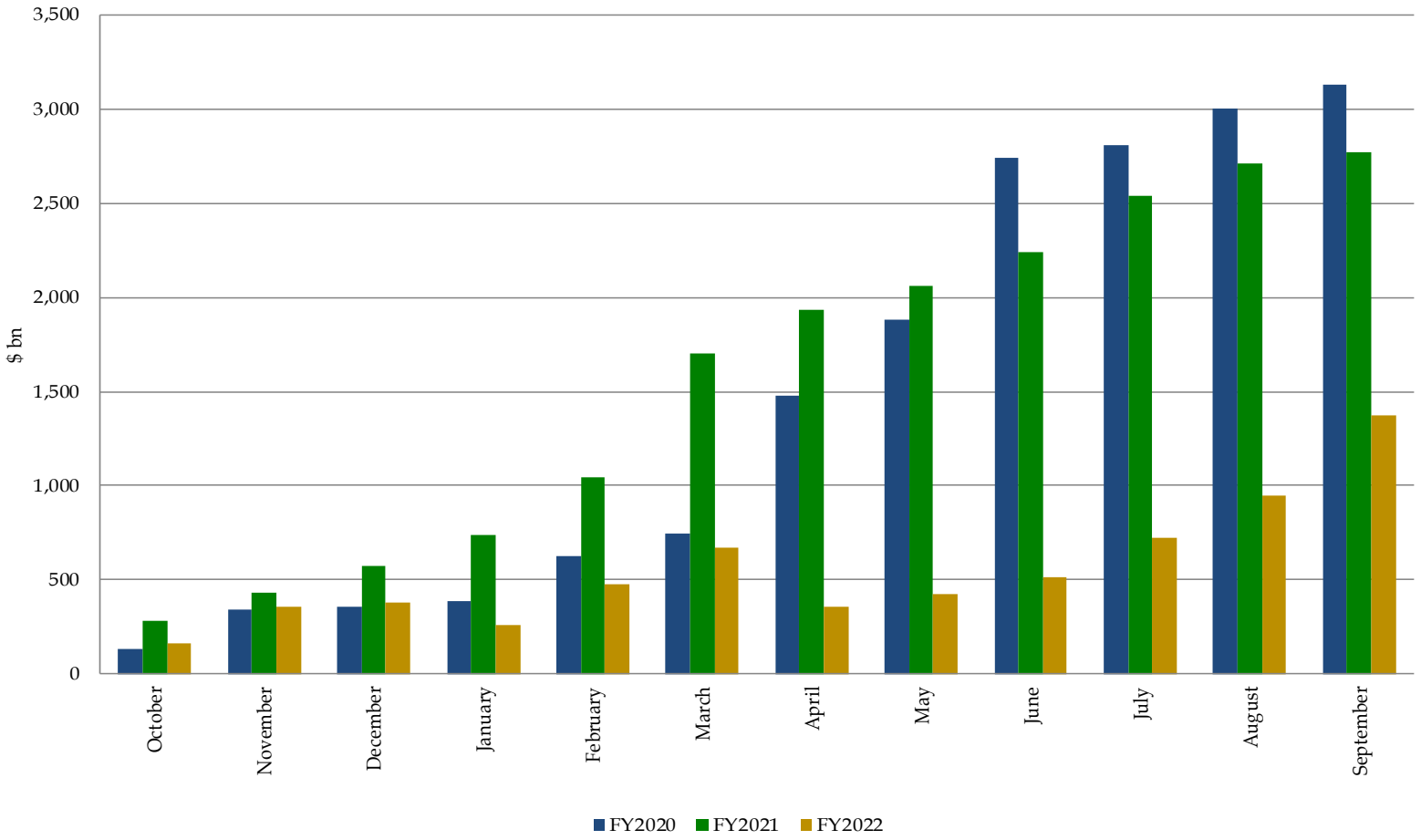
Largest Outlays



Notable Outlays Category	Change from FY21 to FY22 ($ billion)	Change from FY21 to FY22 (%)	Comments
Department of Treasury	-$472	-9%	Driven by lower Economic Impact Payments and COVID-19 relief payments, partially offset by increased tax credits and higher interest on the public debt of $155 billion.
Department of Education	+$379	+145%	Reflecting the large subsidy modification recognized in September, as well as increased spending on emergency grants through the Education Stabilization Fund to support K-12 and postsecondary education.
Department of Labor	-$353	-87%	Driven lower due to the reduction in unemployment and expiration of expanded benefits attributable to the COVID-19 pandemic.
Small Business Administration	-$300	-93%	Due to the recognition of higher subsidy costs in FY 2021 than in FY 2022.

All outlays are on calendar-adjusted basis

Cumulative Budget Deficits by Fiscal Year



Section III:
Various Fiscal Forecasts

Primary Dealers, OMB, CBO

Recent Economic Growth Forecasts

- ***Nominal and Real Growth Estimates from Primary Dealers as of October 2022:***

PD Growth Estimates	Nominal Q4/Q4 % change (median)	Nominal Q4/Q4 % change (median)	Change	Real Q4/Q4 % change (median)	Real Q4/Q4 % change (median)	Change
	October '22 est	July '22 est		October '22 est	July '22 est	
CY2022	6.7	5.5	1.2	0.3	0.6	-0.3
CY2023	3.5	3.2	0.3	0.1	1.0	-0.9

- ***Most Recent CBO and OMB Growth Forecasts:***

CBO Estimates May 2022

	% Change from Q4 to Q4		
	CY2022	*CY2023*	*CY2024*
GDP			
Real	3.1	2.2	1.5
Nominal	7.4	4.5	3.6

OMB Estimates August 2022

	% Change from Q4 to Q4		
	CY2022	*CY2023*	*CY2024*
GDP			
Real	1.4	1.8	2.0
Nominal	7.7	4.4	4.1

Note: Economic assumptions for CBO and OMB forecasts were established in March 2022 and June 2022, respectively.

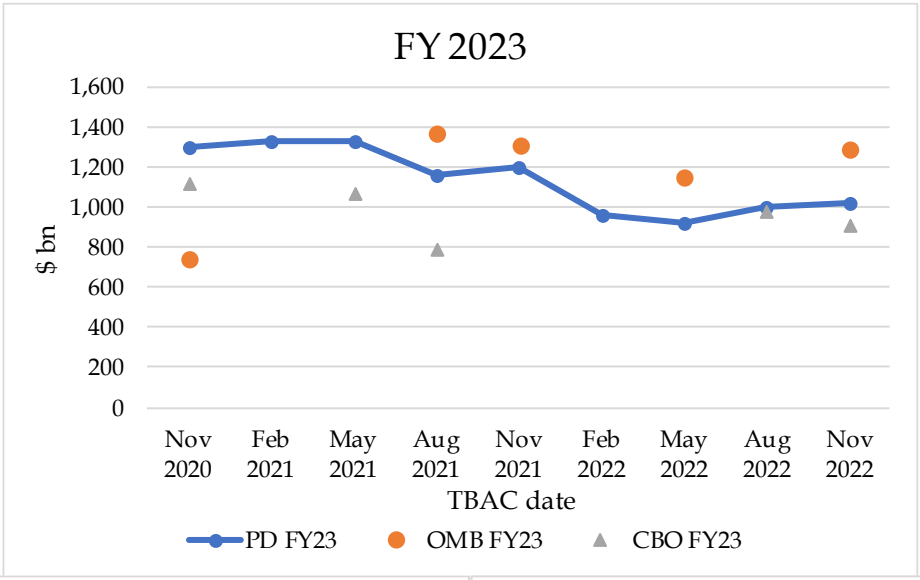
Recent Deficit Forecasts

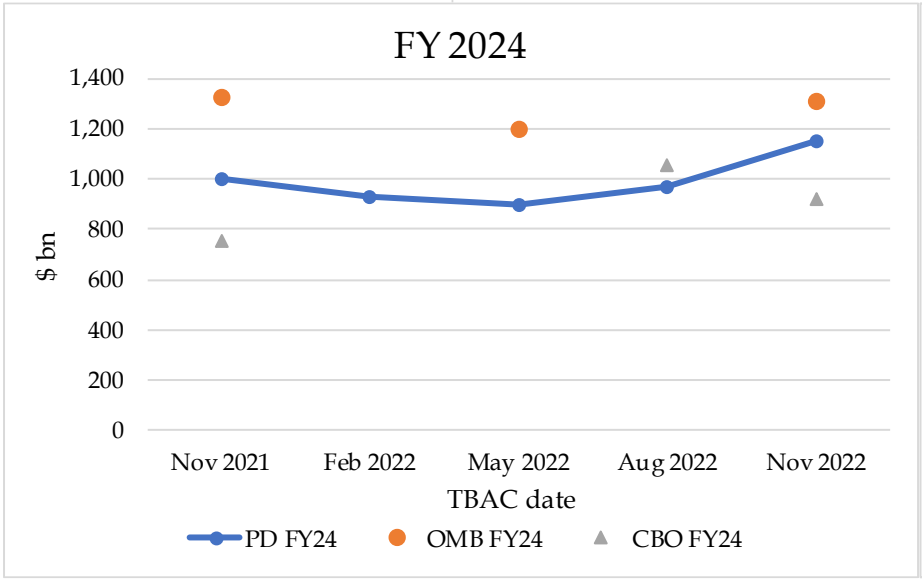
- Primary dealers increased their deficit estimates in October relative to estimates they provided in July. Their changes reflected forecasts adjustments for higher interest costs, lower Federal Reserve remittances, and a slower economy.
- Dealers generally suggested that risks were asymmetrical to the upside, i.e., risks for higher deficits, as well as a high degree of uncertainty around their estimates.
- The latest OMB and CBO estimates in the table below are provided for reference.

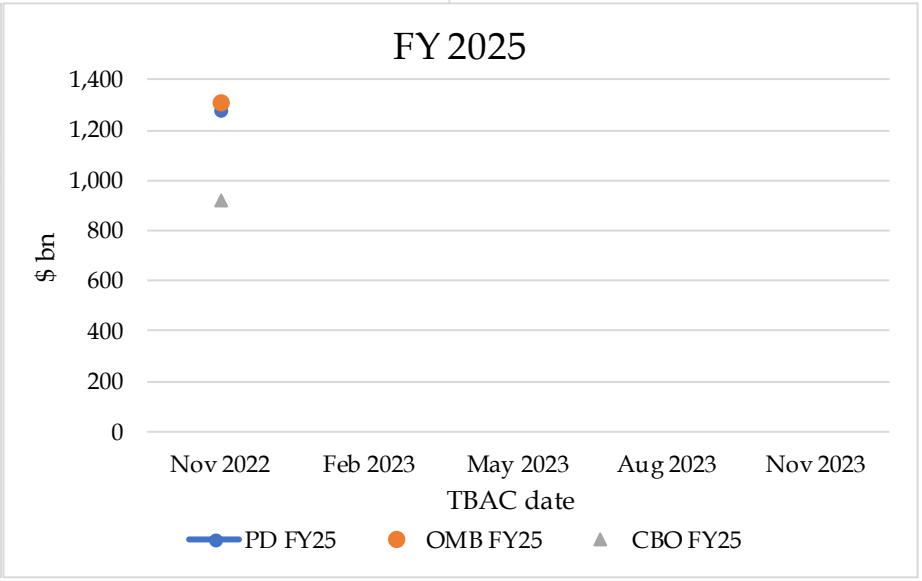
Deficit Estimates ($ billion)	PD 25th Percentile	Primary Dealers (Median)	PD 75th Percentile	Change from Prior Quarter (Median)	OMB	CBO
FY2023	984	1,020	1,150	20	1,300	908
FY2024	1,055	1,150	1,250	185	1,311	921
FY2025	1,105	1,275	1,398		1,414	1,145
As of date	Oct-22	Oct-22	Oct-22		Aug-22	Sep-22

- OMB projections are using estimates are from Table S-1 of "Mid-Session Review Budget of The U.S. Government Fiscal Year 2023," August 2022.
- CBO projections are using estimates are from Table 2 of "An Analysis of the President's 2023 Budget," September 2022.

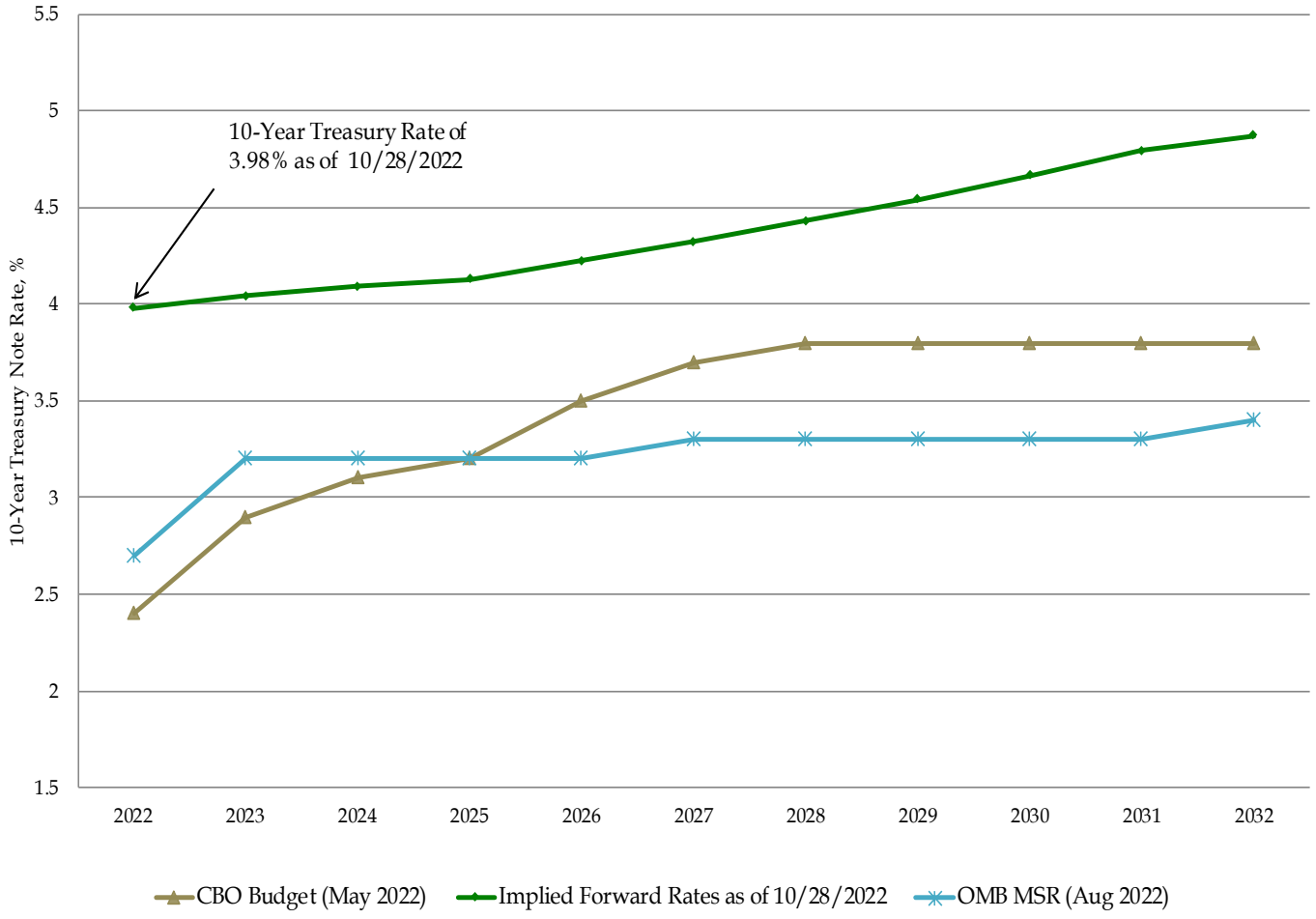
Evolution of Median Primary Dealer, OMB and CBO Deficit Estimates







Interest Rate Assumptions: 10-Year Treasury Note

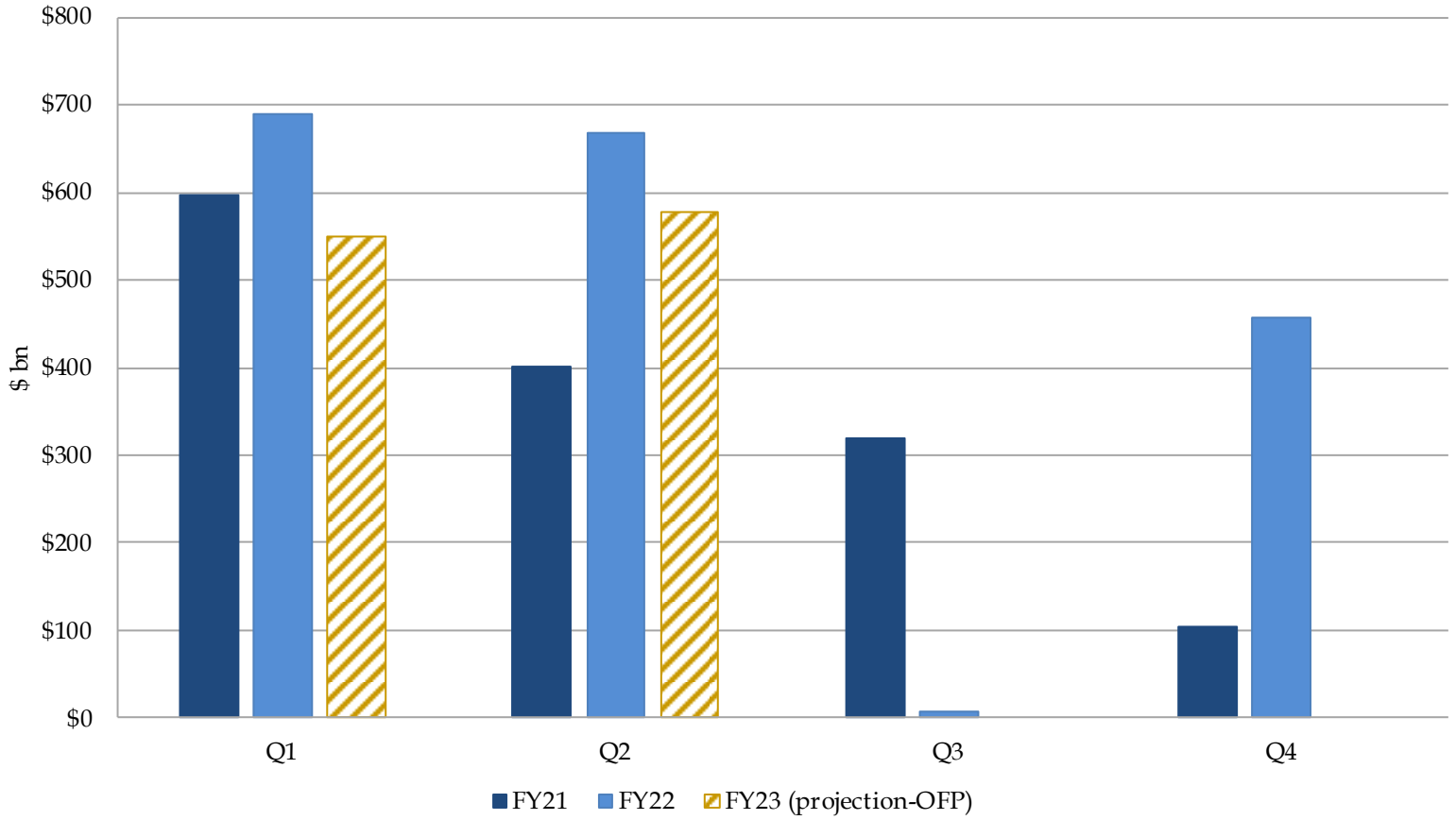


Section IV:
Estimated Borrowing Needs and Financing Implications

Assumptions for Financing Section (pages 16 to 20)

- Portfolio and SOMA holdings as of 09/30/2022.
- Estimates assume privately announced issuance sizes and patterns remain constant for nominal coupons, TIPS, and FRNs given the issuance sizes in effect in October 2022, while using total bills outstanding of ~$3.64 trillion.
- The principal on the TIPS securities was accreted to each projection date based on market ZCIS levels as of 09/30/2022.
- No attempt was made to account for future financing needs.
- **Privately-held marketable borrowing** excludes rollovers (auction "add-ons") of Treasury securities held in the Federal Reserve 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.
- All near term estimates assume enactment of a debt limit suspension or increase.

Privately-Held Net Marketable Borrowing Outlook



Implied Bill Funding for Next Two Quarters Based on Recent Borrowing Estimates

Sources of Privately-Held Financing in FY23 Q1

October - December 2022	
Assuming Constant Coupon Issuance Sizes*	
Treasury Announced Net Marketable Borrowing**	550
Net Coupon Issuance	300
Implied Change in Bills	250

Sources of Privately-Held Financing in FY23 Q2

January - March 2023	
Assuming Constant Coupon Issuance Sizes*	
Treasury Announced Net Marketable Borrowing**	578
Net Coupon Issuance	277
Implied Change in Bills	301

Security	October - December 2022 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
2-Year FRN	68	74	(6)	68	74	(6)
2-Year	84	94	(10)	84	94	(10)
3-Year	120	49	71	120	49	71
5-Year	86	26	60	86	26	60
7-Year	70	67	3	70	67	3
10-Year	99	53	46	99	53	46
20-Year	27	0	27	27	0	27
30-Year	57	2	55	57	2	55
5-Year TIPS	40	0	40	40	0	40
10-Year TIPS	15	0	15	15	0	15
30-Year TIPS	0	0	0	0	0	0
Coupon Subtotal	666	366	300	666	366	300

Security	January - March 2023 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
2-Year FRN	68	80	(12)	136	154	(18)
2-Year	168	204	(36)	252	298	(46)
3-Year	120	79	41	240	128	112
5-Year	172	73	99	258	98	160
7-Year	140	111	29	210	179	31
10-Year	99	38	61	198	91	107
20-Year	51	0	51	78	0	78
30-Year	57	5	52	114	7	107
5-Year TIPS	0	0	0	40	0	40
10-Year TIPS	32	49	(17)	47	49	(2)
30-Year TIPS	9	0	9	9	0	9
Coupon Subtotal	916	639	277	1,582	1,005	577

* Keeping announced issuance sizes and patterns constant for nominal coupons, TIPS, and FRNs based on changes made before the November 2022 refunding.
** Assumes an end-of-December 2022 and end-of-March 2023 cash balances of $700 billion and $500 billion respectively versus a beginning-of-October 2022 cash balance of $636 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

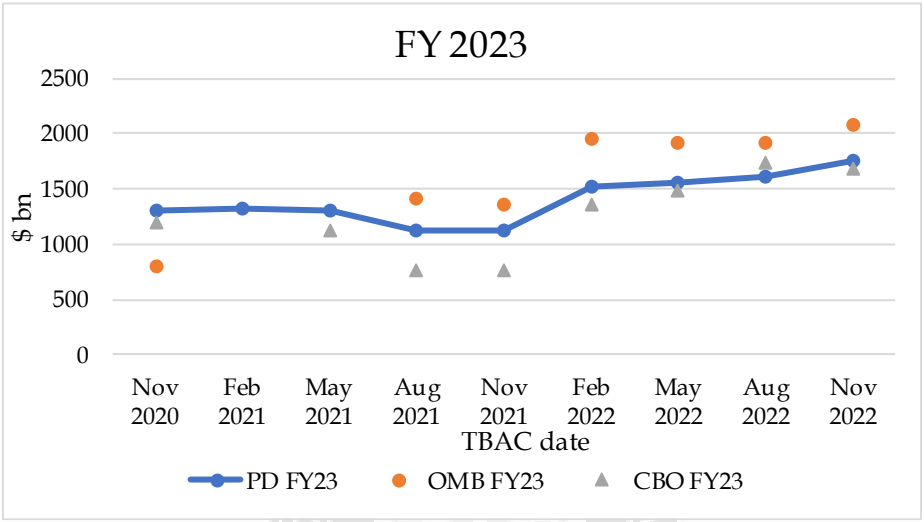
Longer-Term Privately Held Net Marketable Borrowing Estimates and SOMA Redemption Assumptions

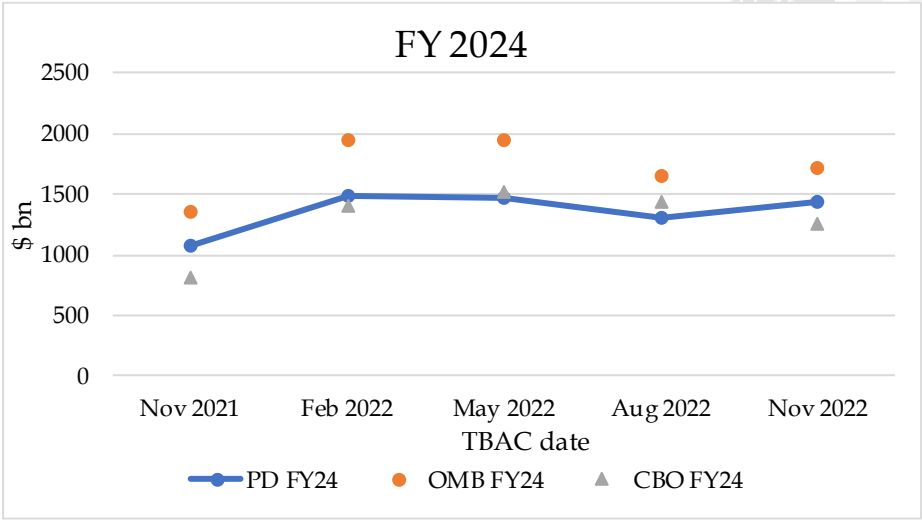
FY 2023-2025 Deficits and Privately-Held Net Marketable Borrowing Estimates*, in $ billions

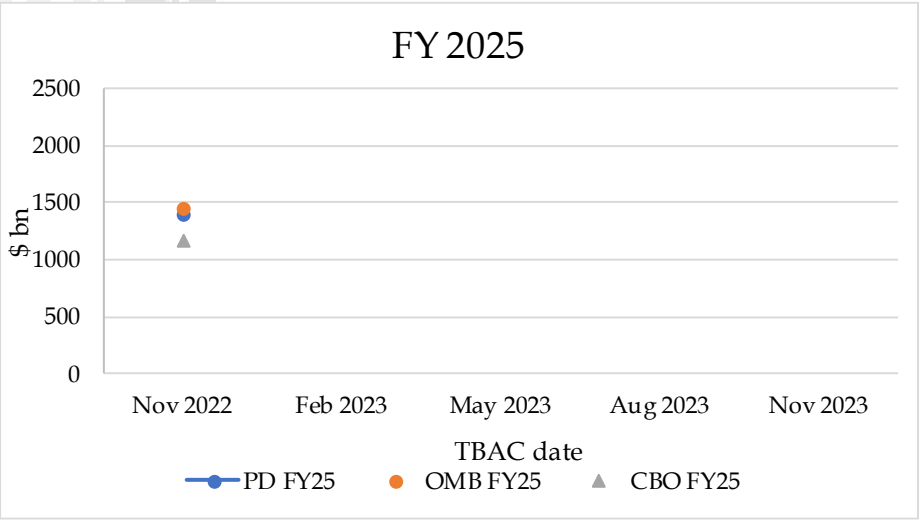
	Primary Dealer			OMB	CBO[1]	CBO[2]
	25th	Median	75th			
FY 2023 Deficit	984	1,020	1,150	1,300	908	984
FY 2024 Deficit	1,055	1,150	1,250	1,311	921	1,056
FY 2025 Deficit	1,105	1,275	1,398	1,414	1,145	1,318
FY 2023 SOMA Redemption	700	720	720			
FY 2024 SOMA Redemption	90	360	697			
FY 2025 SOMA Redemption	0	0	180			
FY 2023 Privately-Held Net Marketable Borrowing	1,650**	1,765**	1,854**	2,087**	1,678**	1,754**
FY 2024 Privately-Held Net Marketable Borrowing	1,338	1,433	1,781**	1,722**	1,250**	1,384**
FY 2025 Privately-Held Net Marketable Borrowing	1,193	1,402	1,500	1,460**	1,172**	1,344**
Estimates as of:		Oct-22		Aug-22	Sep-22	May-22

- All privately-held net marketable borrowing estimates of are "normalized" using:
  - 1) the median Primary Dealer's estimates for SOMA redemptions, and
  - 2) assuming OMB's end of fiscal year cash balance of $650 billion, held constant in out years.
- OMB projections are using estimates are from Table S-1 of "Mid-Session Review Budget of The U.S. Government Fiscal Year 2023," August 2022.
- CBO[1] projections are using estimates are from Table 2 of "An Analysis of the President's 2023 Budget," September 2022.
- CBO[2] projections are using estimates are from Table 1-1 of "The Budget and Economic Outlook: 2022 to 2032," May 2022.

Evolution of Median Primary Dealer, OMB and CBO Privately-Held Net Marketable Borrowing Estimates*



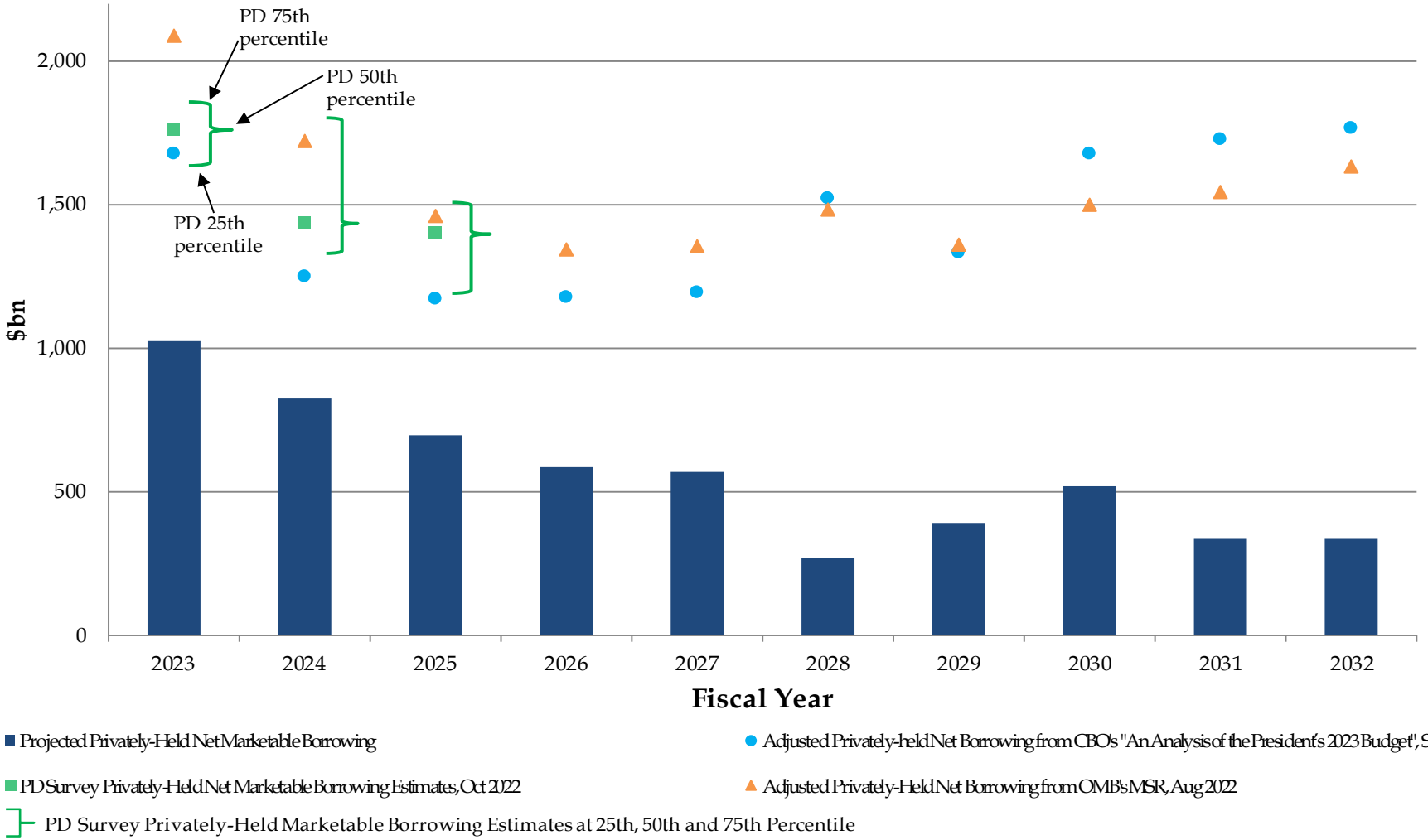




* Note that both the OMB and CBO privately-held net marketable borrowing estimates are calculated by adjusting their respective deficit estimates using dealer's median SOMA redemption estimates. In addition, all the PD, OMB and CBO privately-held borrowings are normalized with the same cash balance changes.

Projected Privately-Held Net Marketable Borrowing

Assuming Private Coupon Issuance & Total Bills Outstanding Remain Constant as of 09/30/2022*



*Treasury's latest primary dealer survey median/interquartile range estimates can be found on page 18. OMB's borrowing projections are from Table S-1 of "Mid-Session Review Budget of the U.S. Government Fiscal Year 2023," Aug 2022. CBO's borrowing projections are using estimates from Table 2 of CBO's "An Analysis of the President's 2023 Budget," Sept 2022. Both OMB and CBO borrowing estimates are normalized to privately-held net borrowing after adding PD survey median SOMA redemption assumptions for FY23/24/25. FY2022 net borrowing estimates from PD and CBO are normalized with OMB MSR fiscal-year ending cash balance of $650 billion, held constant in out years.

Section V:
Select Portfolio Metrics

Note: Several of the portfolio metric charts that follow include three years of projected metrics.

These projections are hypothetical and <u>are meant for illustrative purposes only</u>. The projections contained in these charts <u>should not</u> be interpreted as representing any future policy decisions regarding Treasury financing.

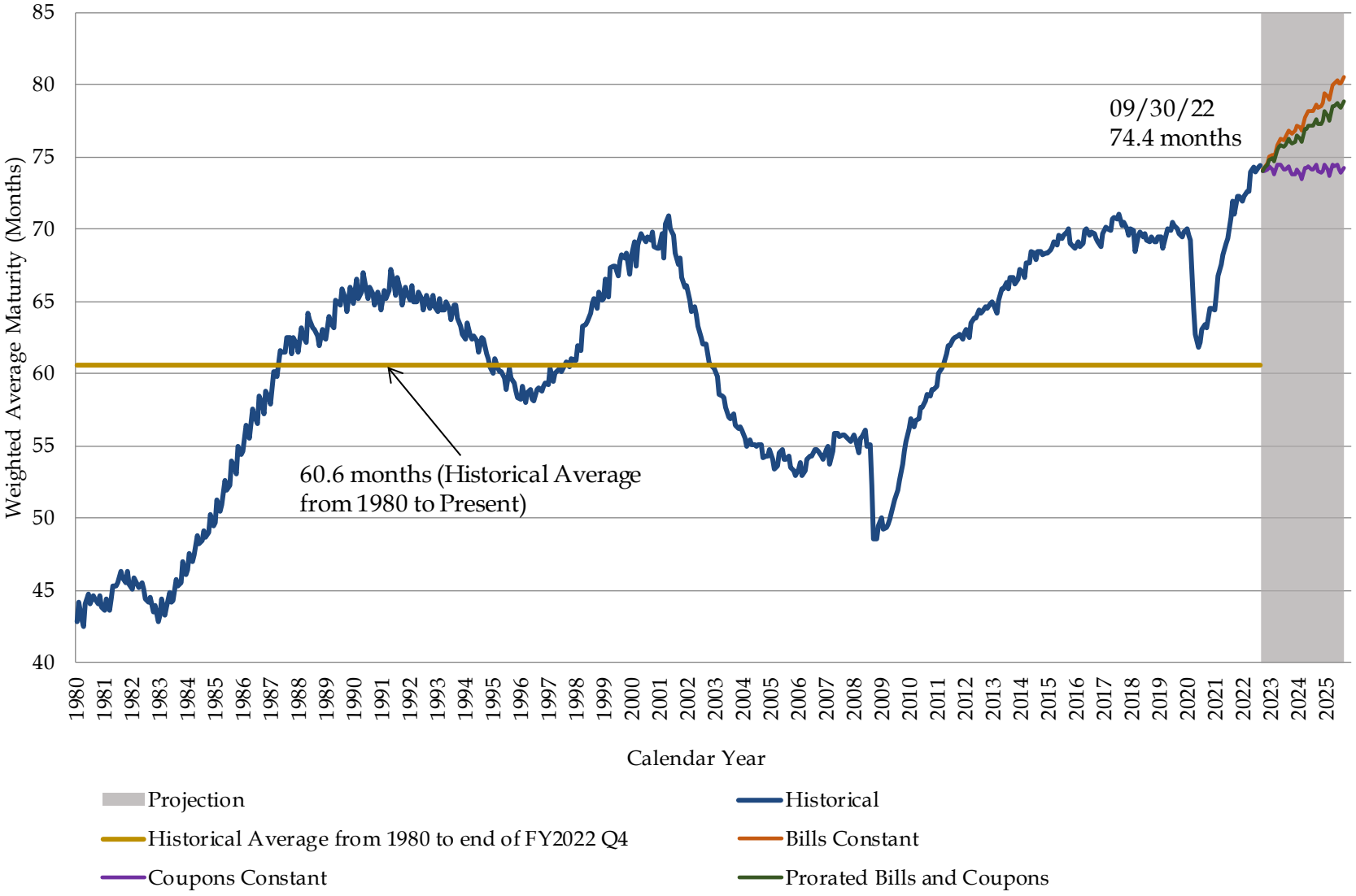
Projections illustrate how various portfolio metrics could evolve under three hypothetical financing scenarios. The scenarios were chosen to illustrate a potential range of portfolio metric outcomes based on hypothetical issuance choices.

The scenarios are:

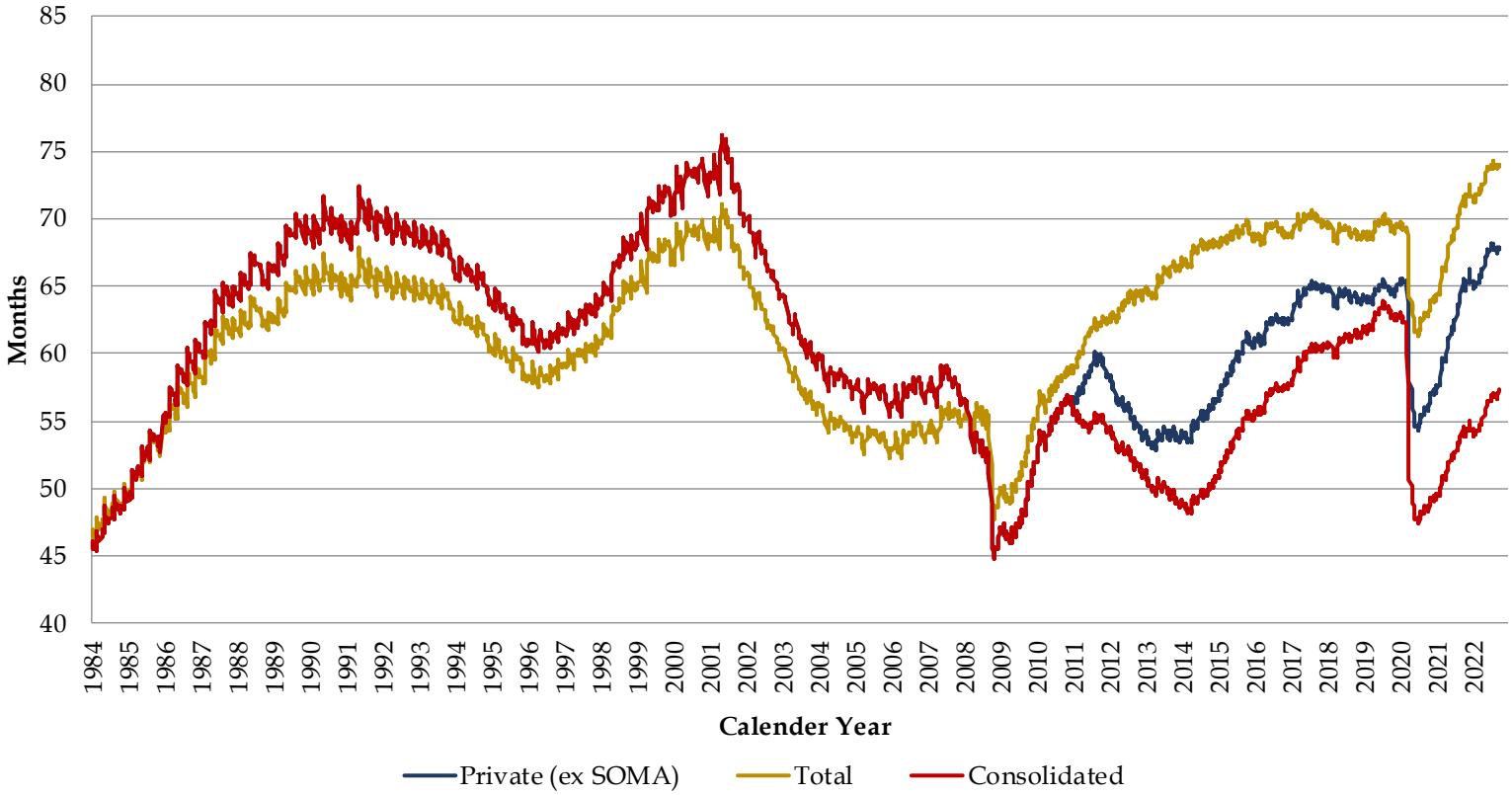
1) ***"Coupons Constant":*** Treasury maintains **coupon, FRN, and TIPS auction sizes constant** starting in October 2022 and addresses any changes in financing needs by only increasing or decreasing T-bill auction sizes;
2) ***"Bills Constant":*** Treasury maintains **T-bills aggregate supply constant** at $3.64 trillion as of 9/30/2022 and increases or decreases coupon, FRN, and TIPS auction sizes in response to financing needs in a manner that maintains current issuance proportions starting in October 2022
3) ***"Prorated Bills and Coupons":*** Treasury maintains **T-bills share constant** at 15.4% as of 9/30/2022 and addresses any changes in financing needs by pro rata increasing or decreasing coupon, FRN, and TIPS auction sizes.

Net marketable borrowing needs used in the projections section of these charts are proxied using median primary dealer estimates for FY23, FY24, & FY25 (see page 18).

Weighted Average Maturity of Marketable Debt Outstanding

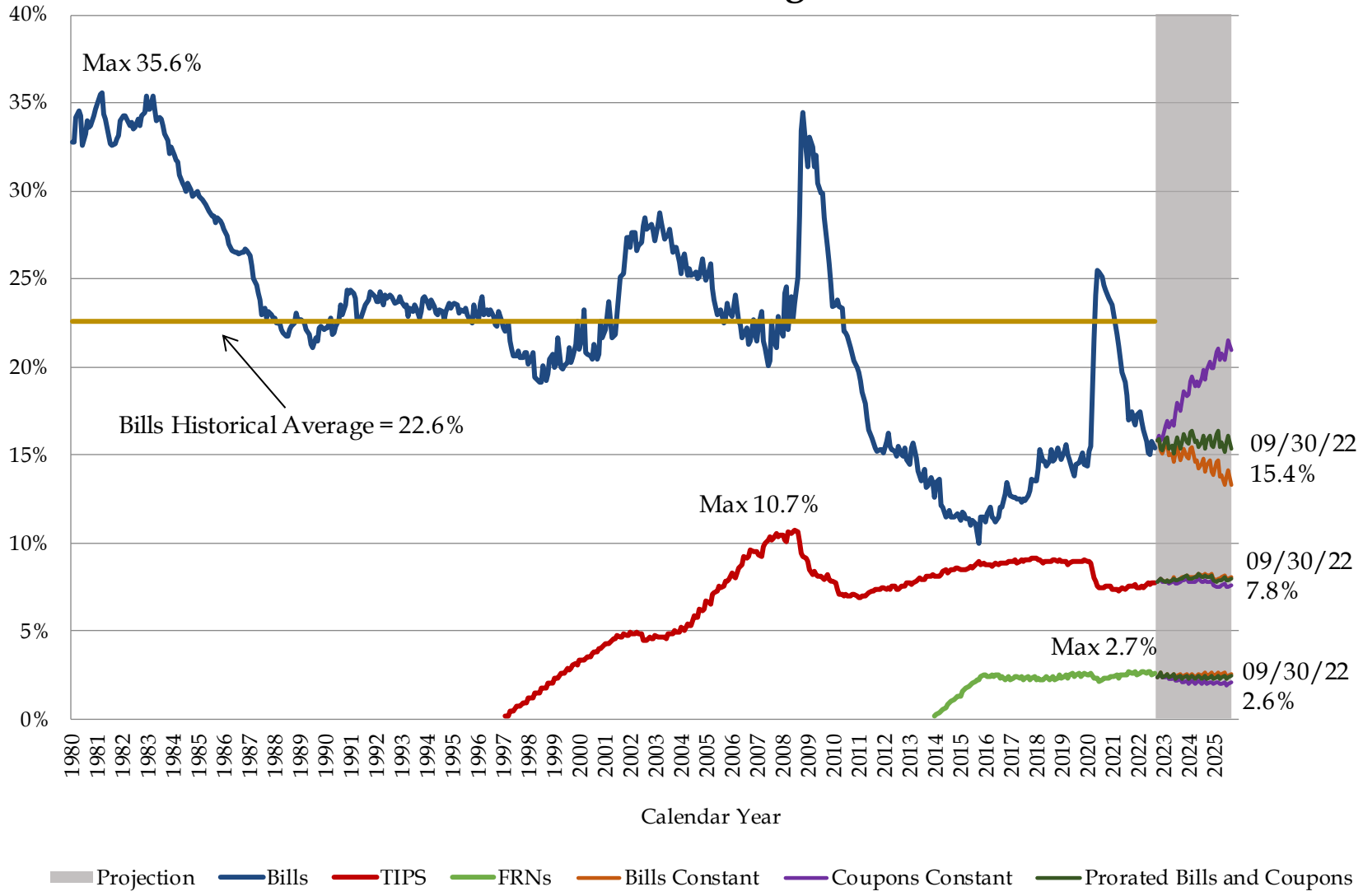


Consolidated WANRR Calculation*

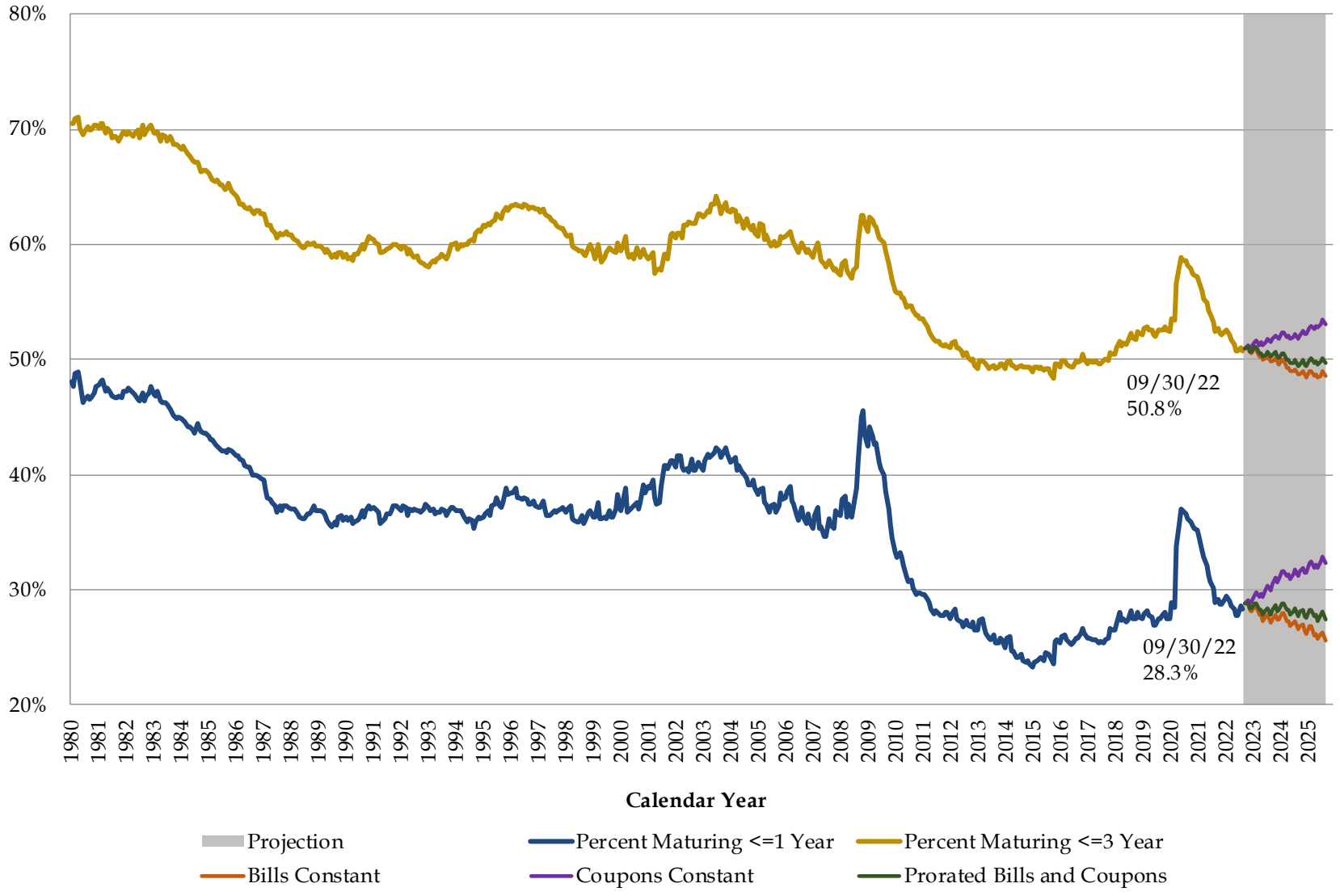


* Weighted Average Next Rate Reset (WANRR) is a "Weighted Average Maturity" metric that attempts to adjust for the floating rate aspect of some Treasury debt. The WANRR is the average time until the outstanding debt's interest rate is set to a new interest rate. For bills and fixed rate notes and bonds, the next rate reset is equal to the maturity date.
In contrast, for floating rate obligations, the time between the next rate reset date or maturity date is examined and the shorter period is used in the calculation.
The consolidated outstanding debt is defined as the private amount plus SOMA Treasury securities holdings less currency amount. In this calculation, SOMA Treasury holdings greater than the level of currency outstanding is treated as if it is a daily rate reset.

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



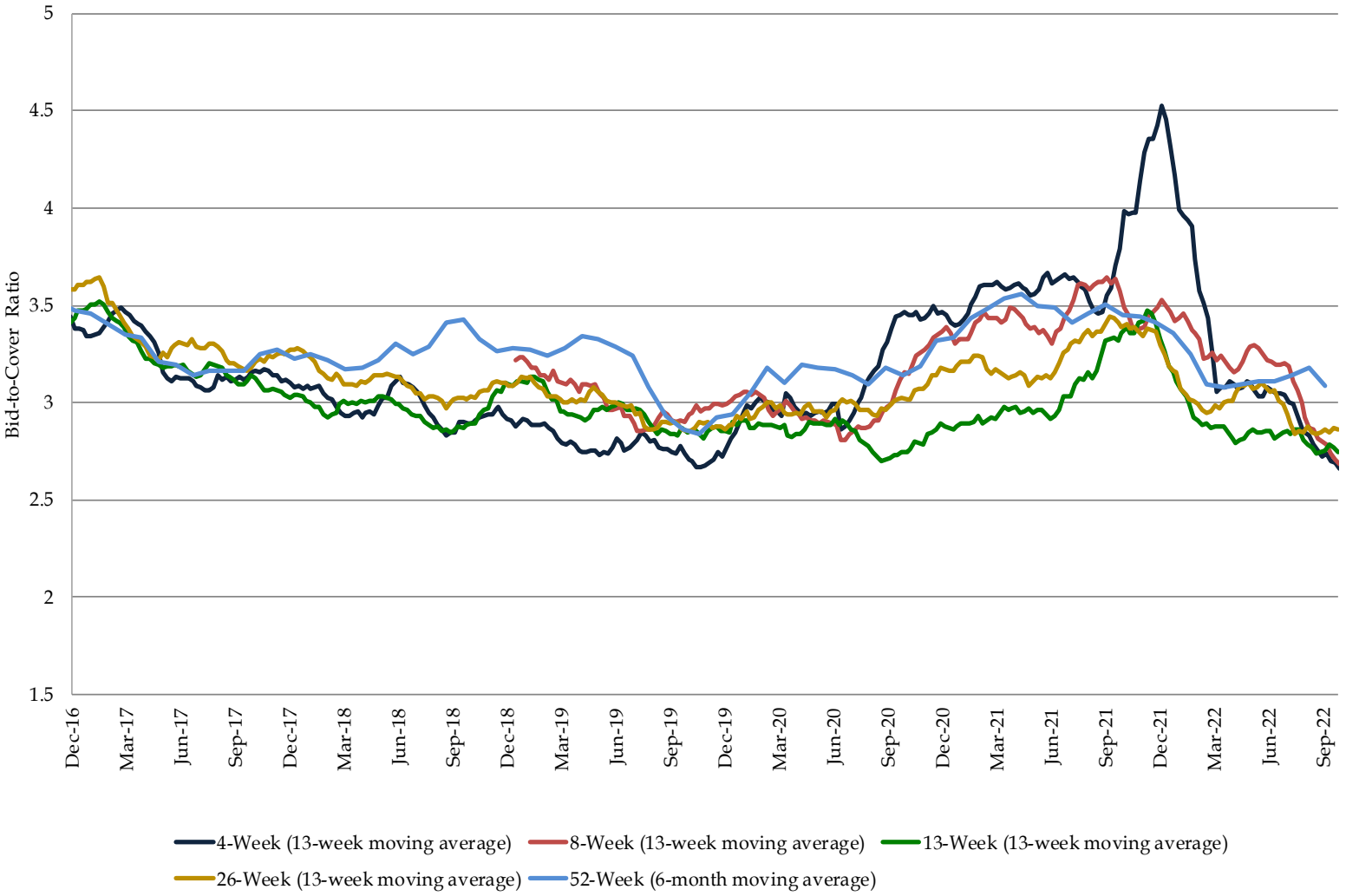
Treasury Maturity Profile



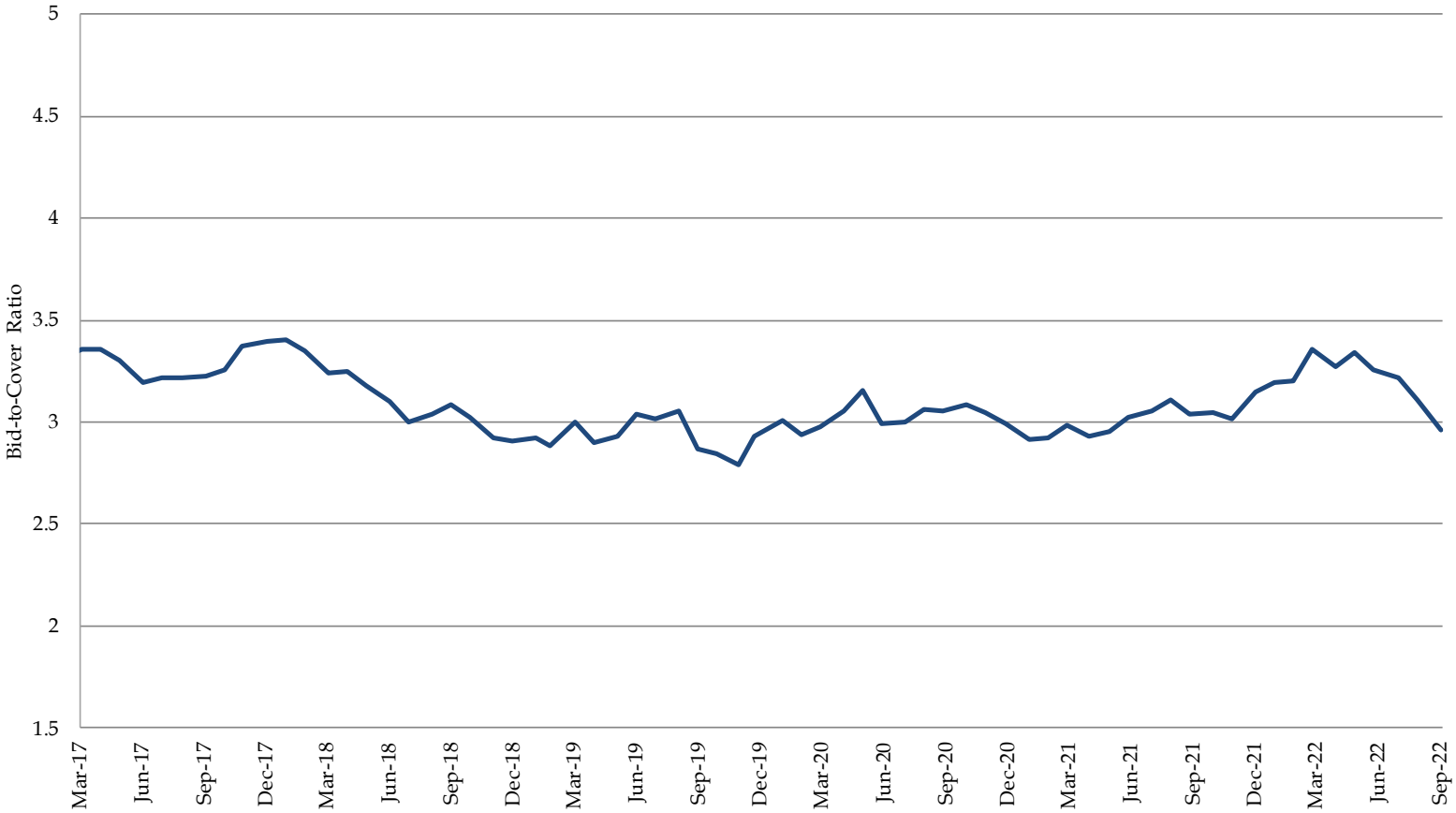
Section VI:
Select Demand Metrics

Bid-to-Cover Data, Investor Class Data,
Direct & Primary Dealer Awards, and Foreign Demand

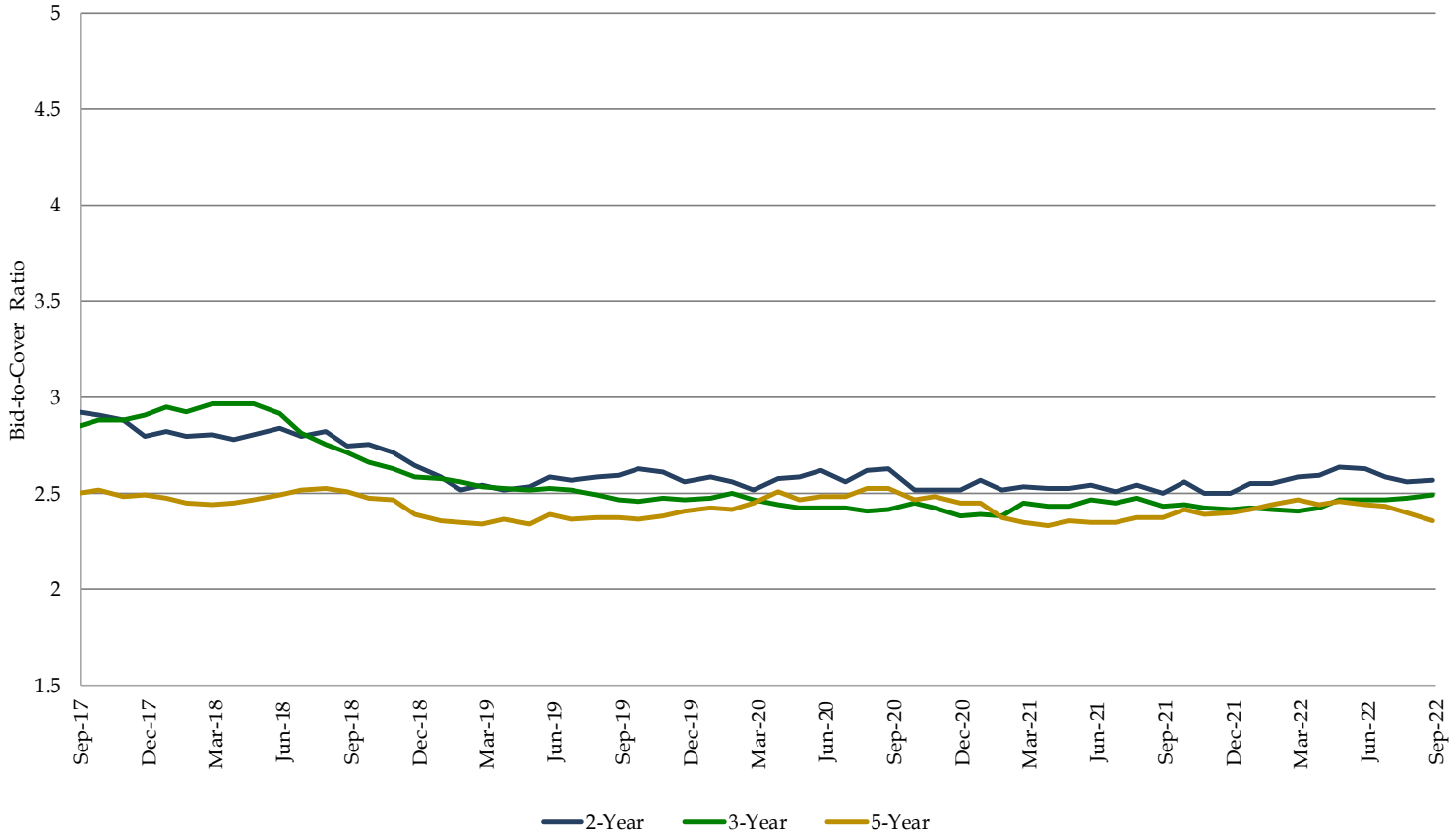
Bid-to-Cover Ratios for Treasury Bills



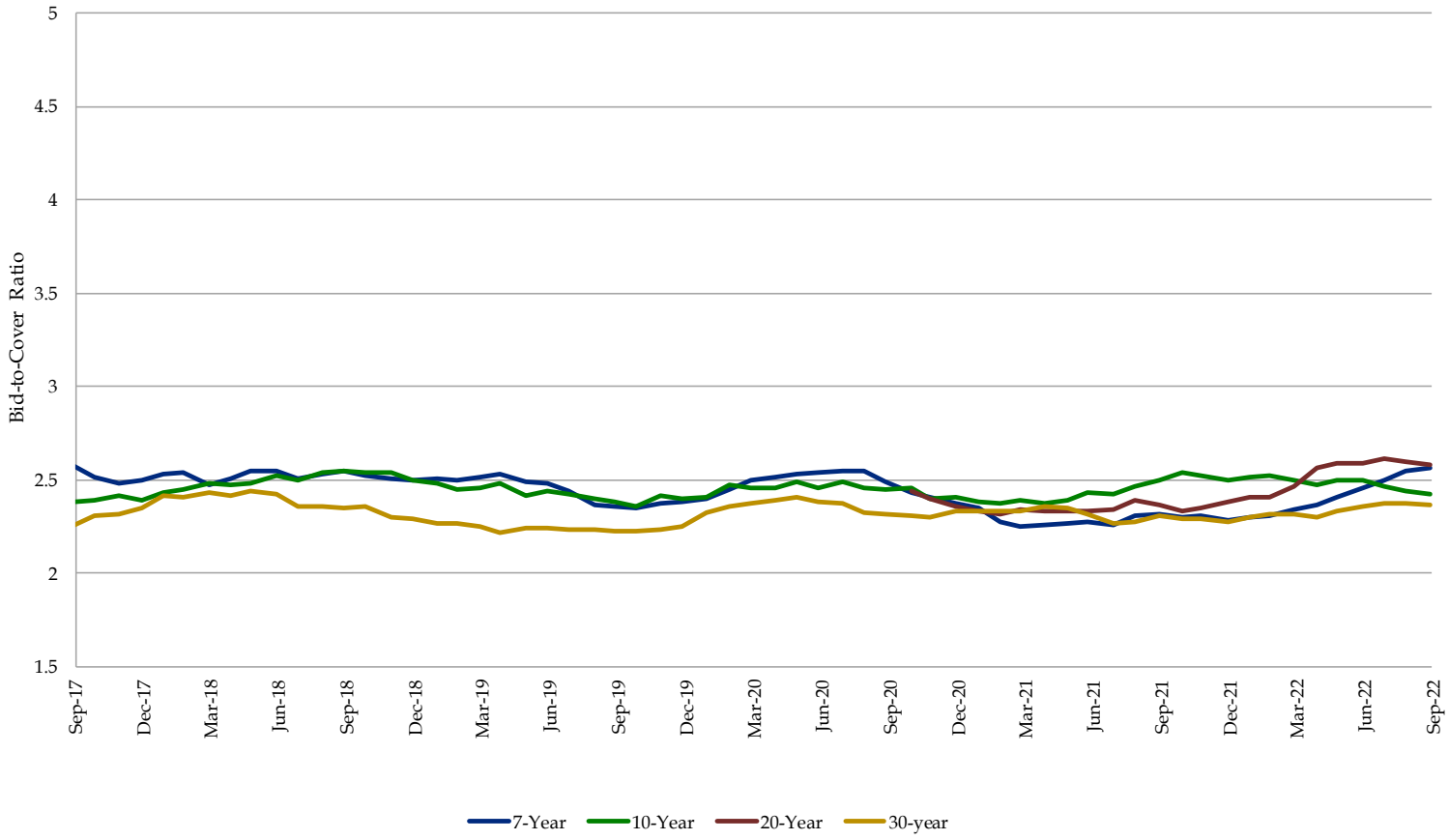
Bid-to-Cover Ratios for FRNs
(6-Month Moving Average)



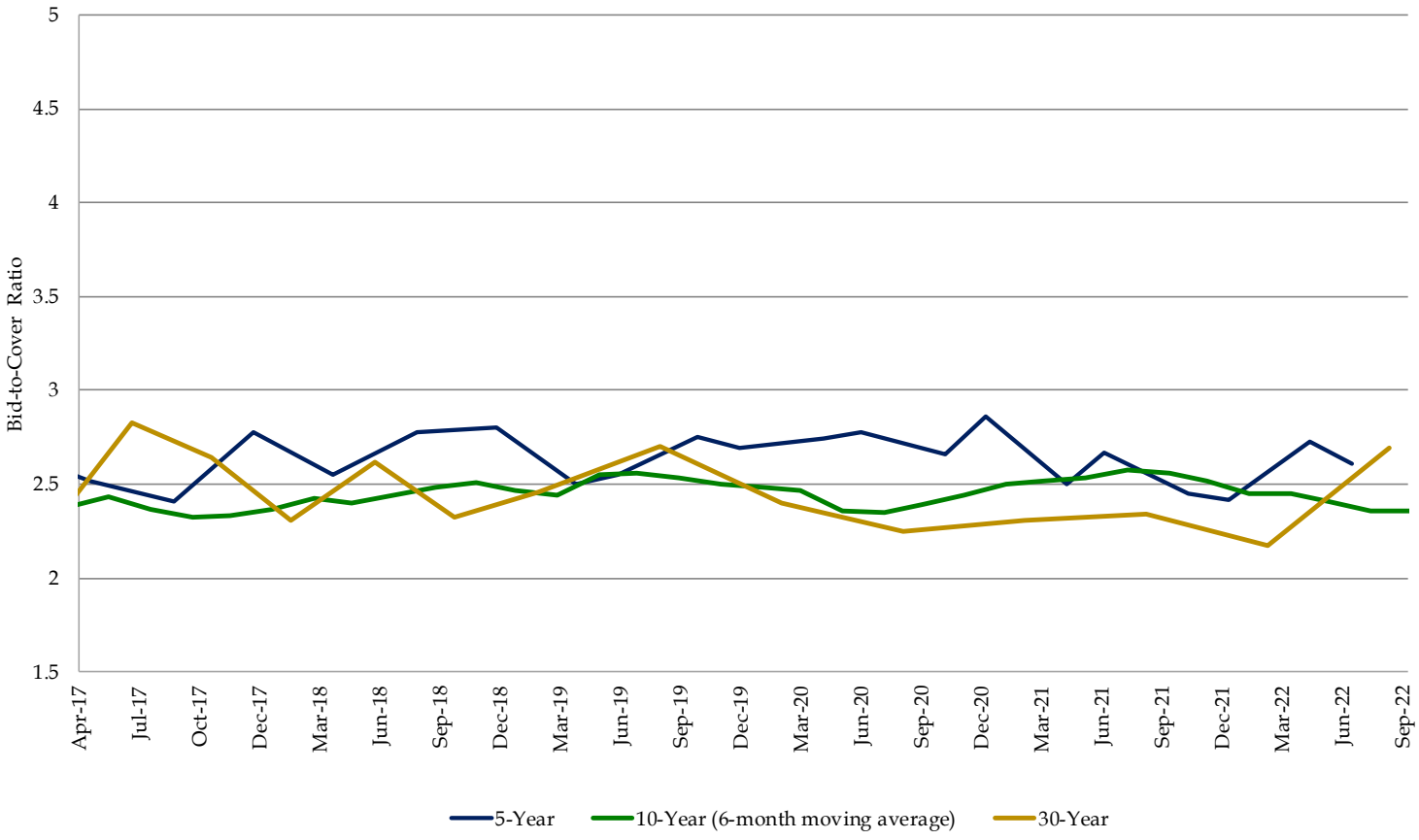
Bid-to-Cover Ratios for 2-, 3-, and 5-Year Nominal Securities (6-Month Moving Average)

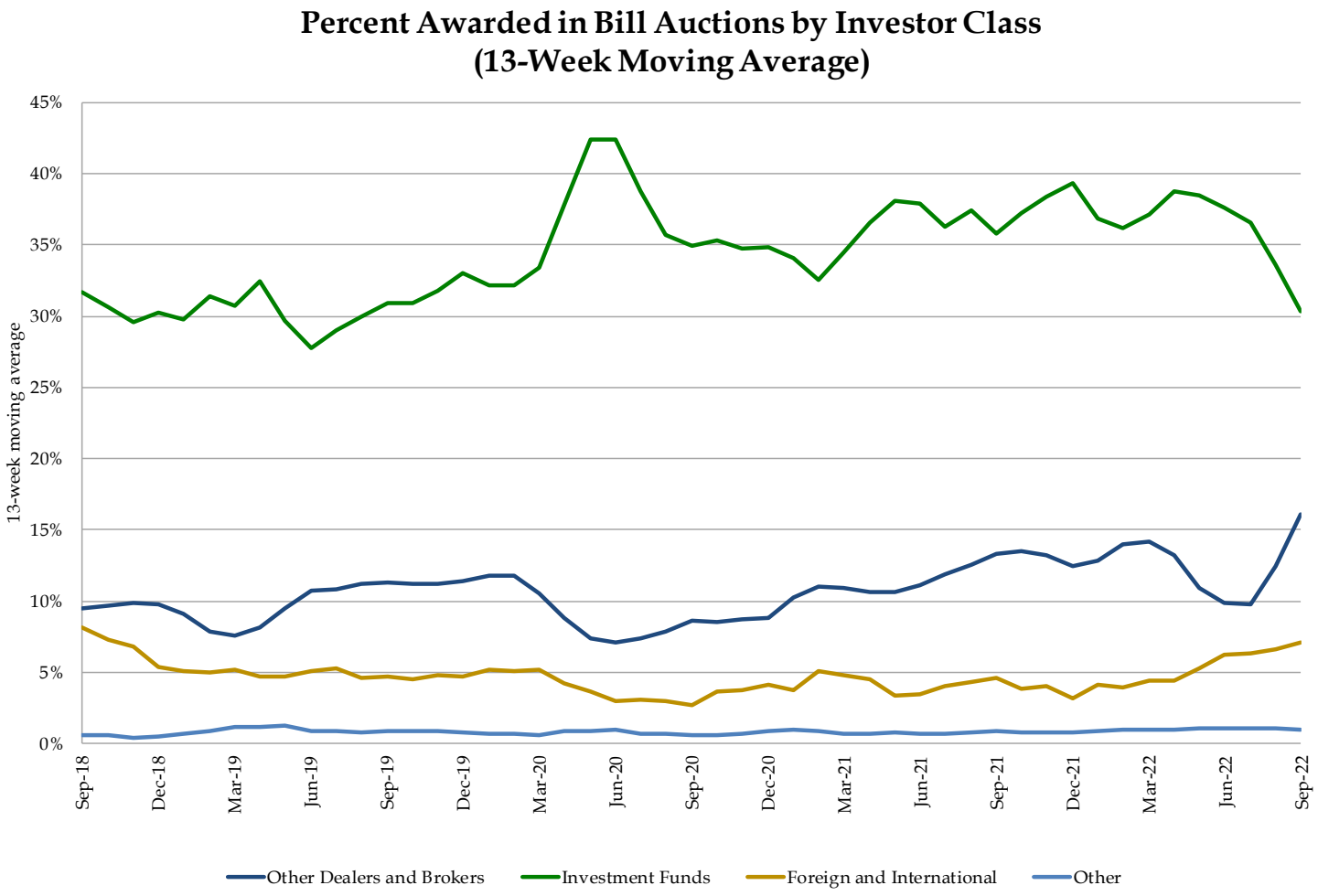


Bid-to-Cover Ratios for 7-, 10-, 20-, and 30-Year Nominal Securities (6-Month Moving Average)



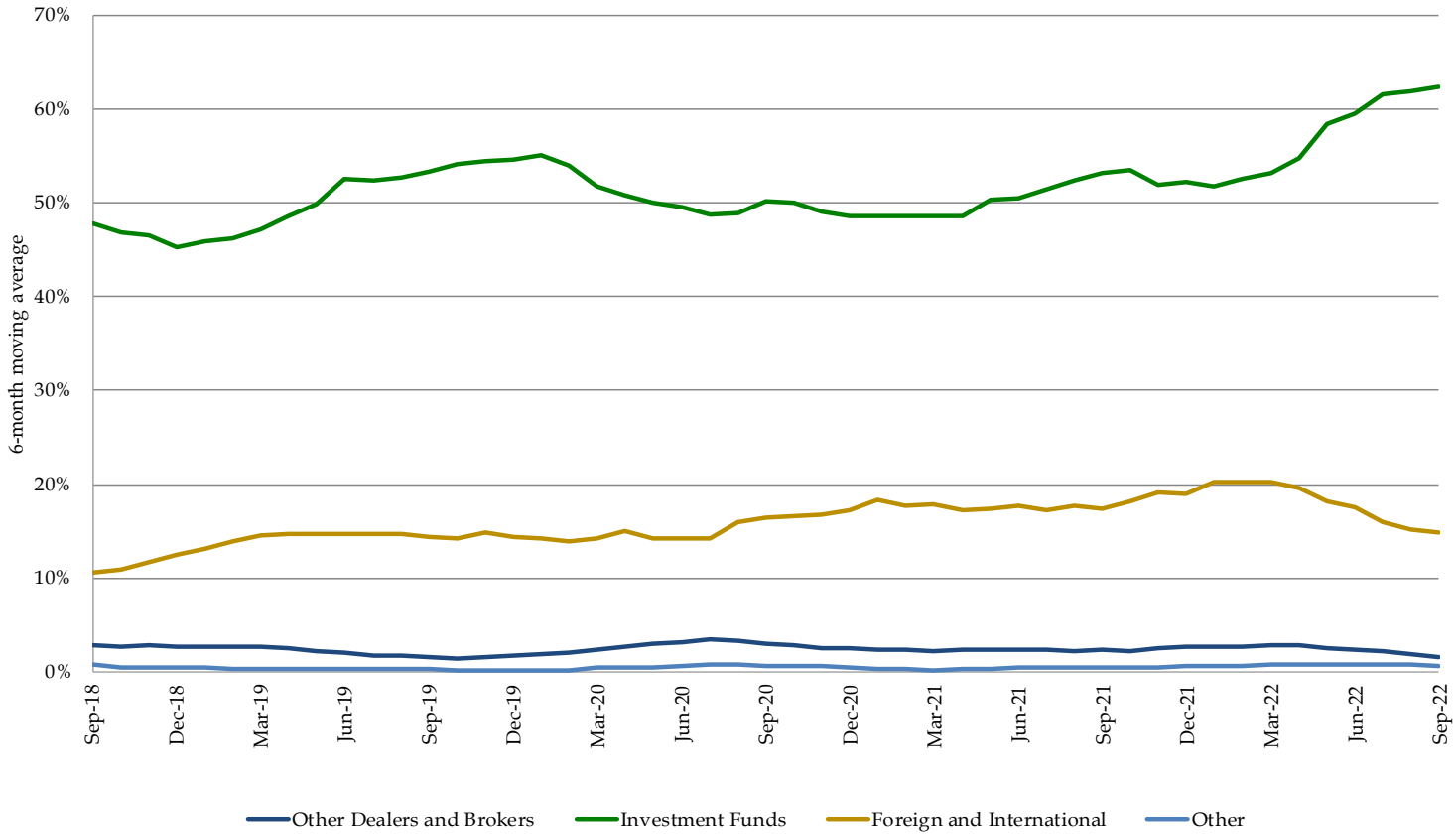
Bid-to-Cover Ratios for TIPS





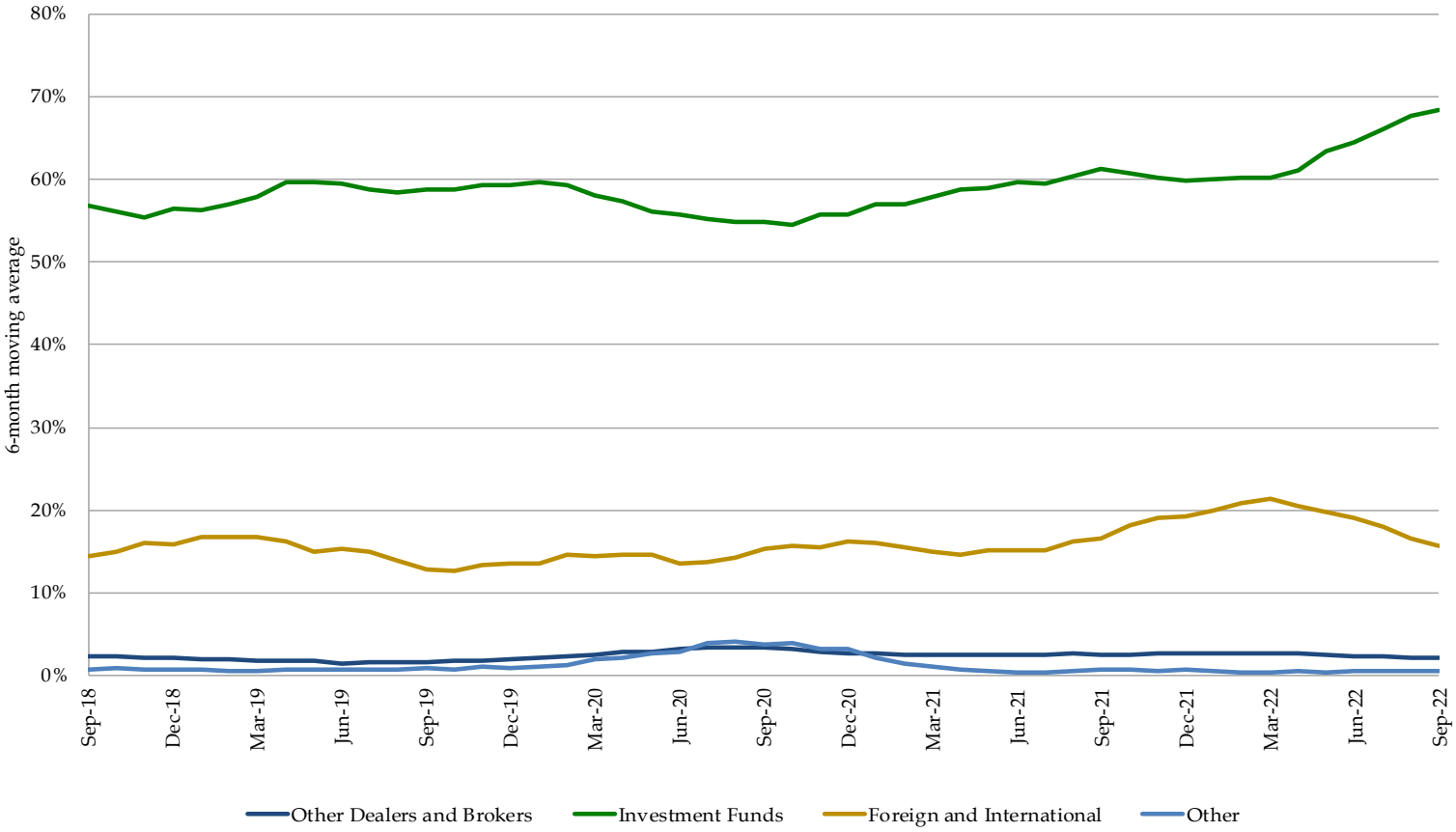
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



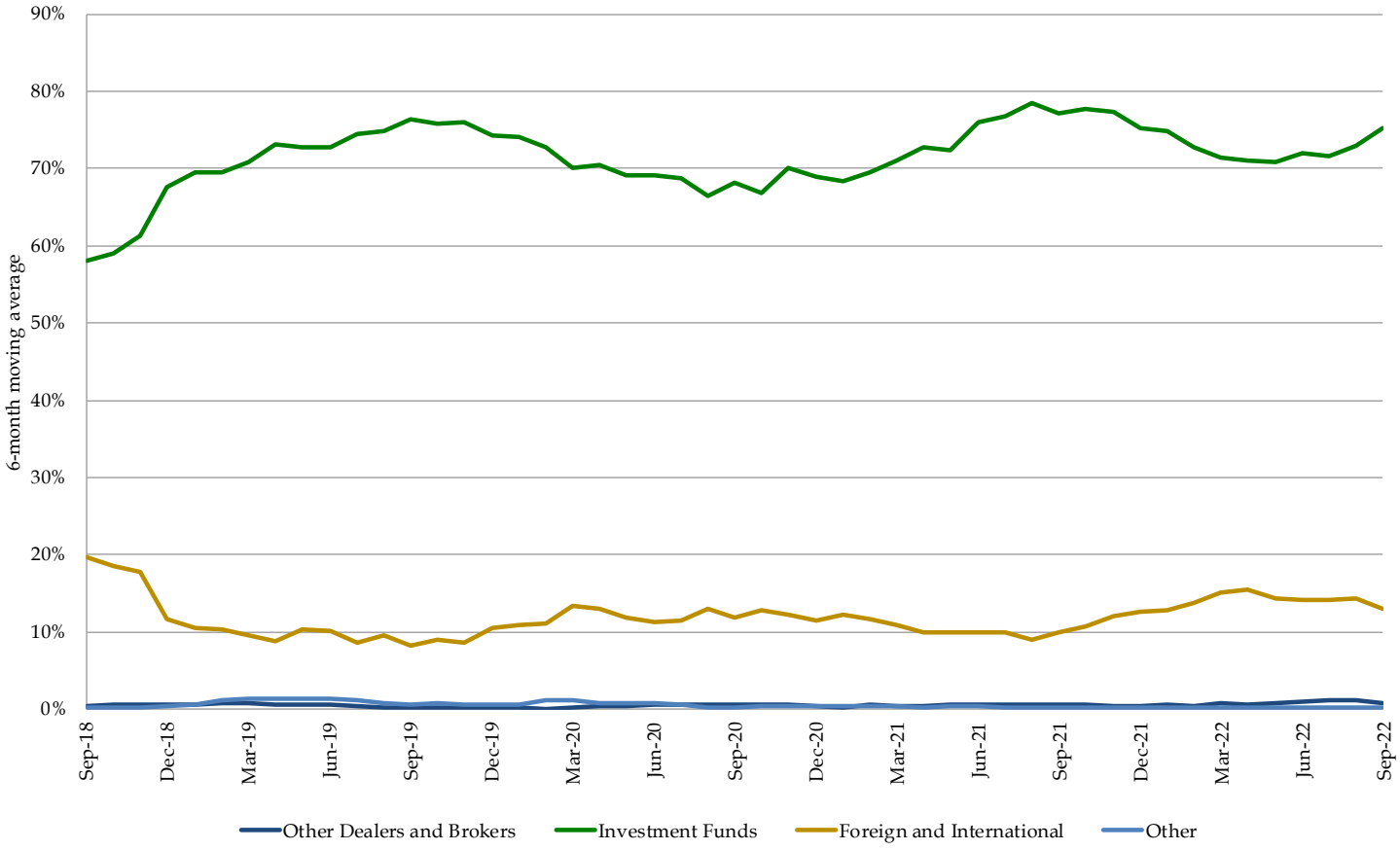
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



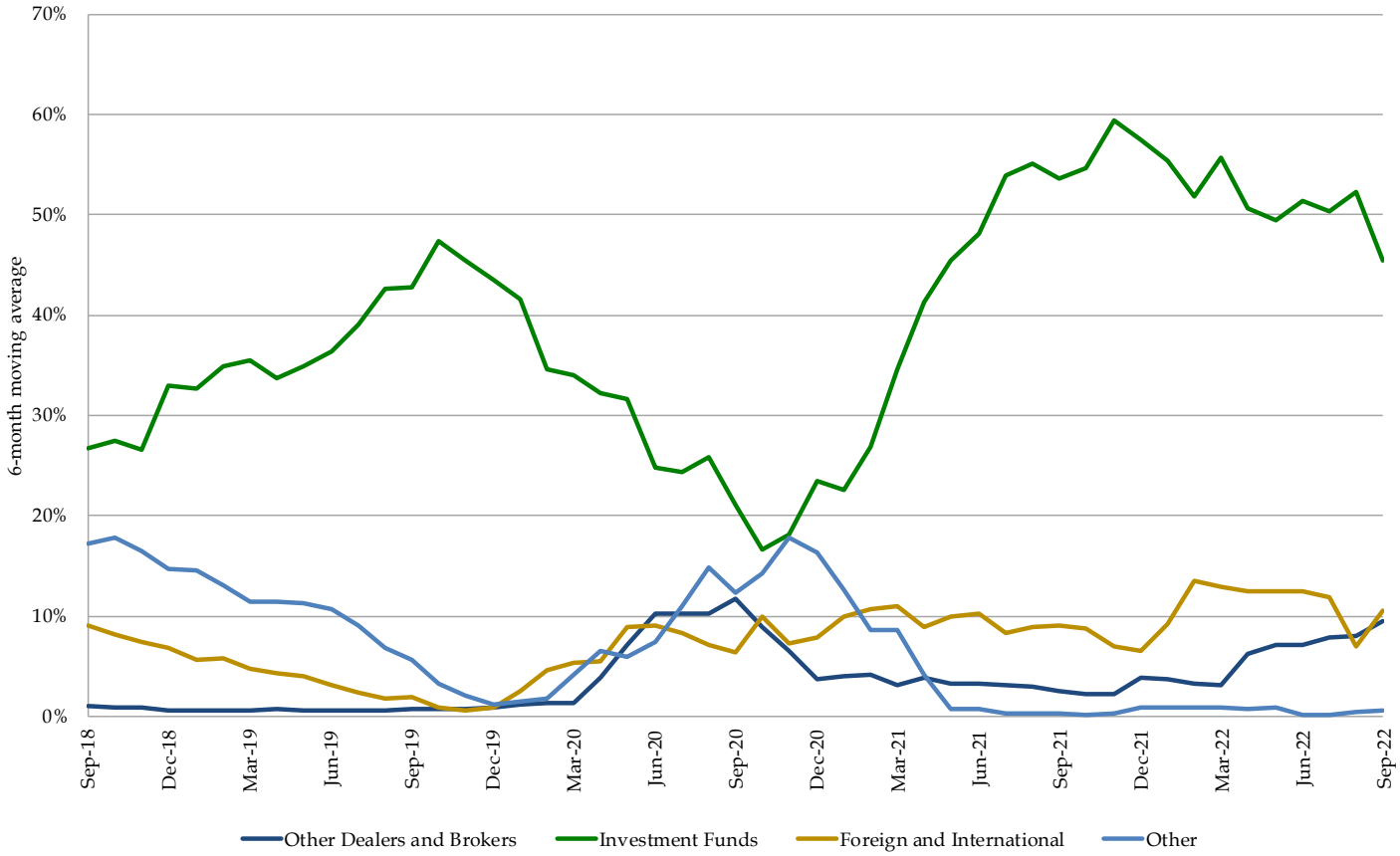
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



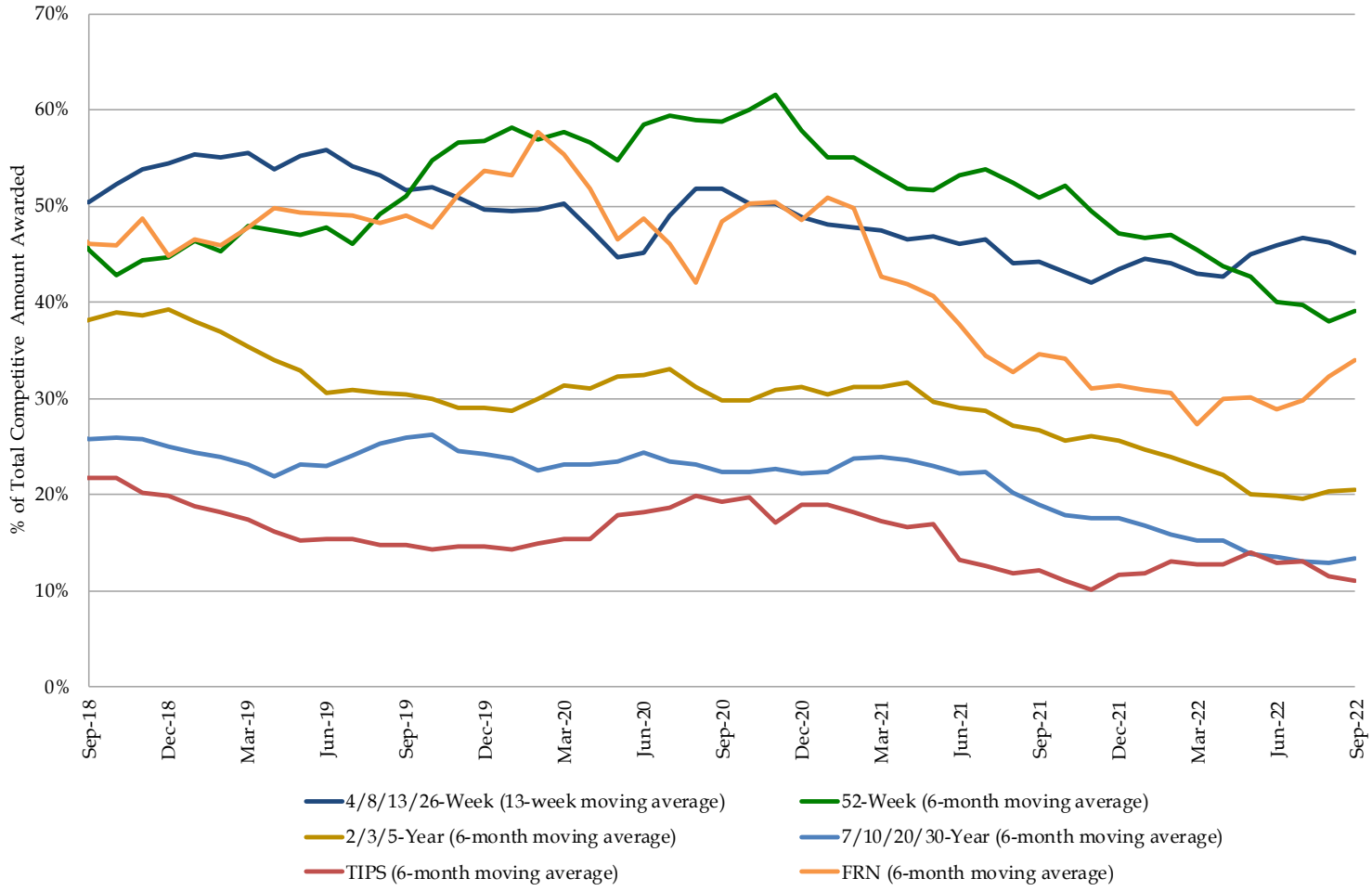
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



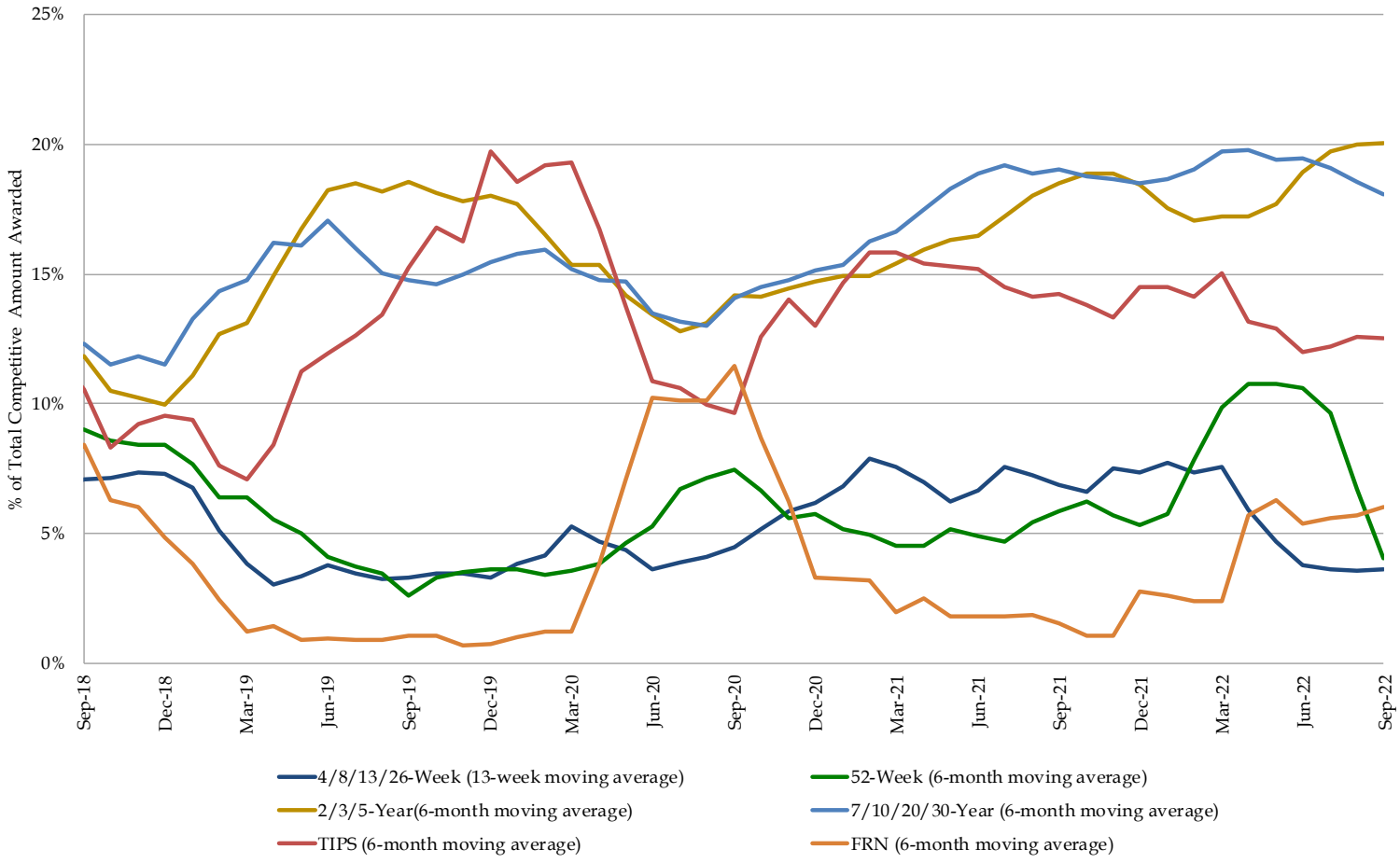
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

Primary Dealer Awards at Auction



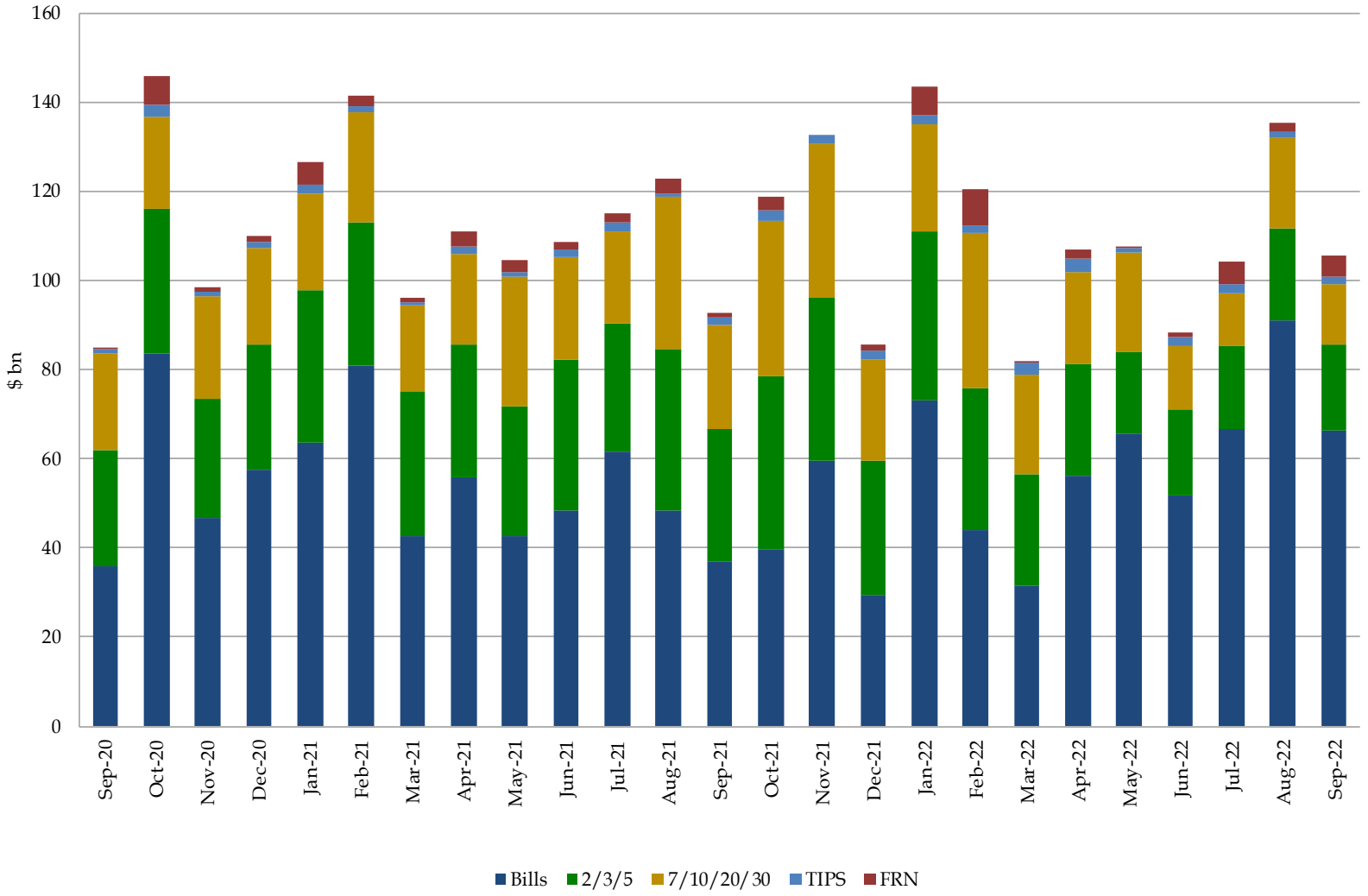
Competitive Amount Awarded excludes SOMA add-ons.

Direct Bidder Awards at Auction



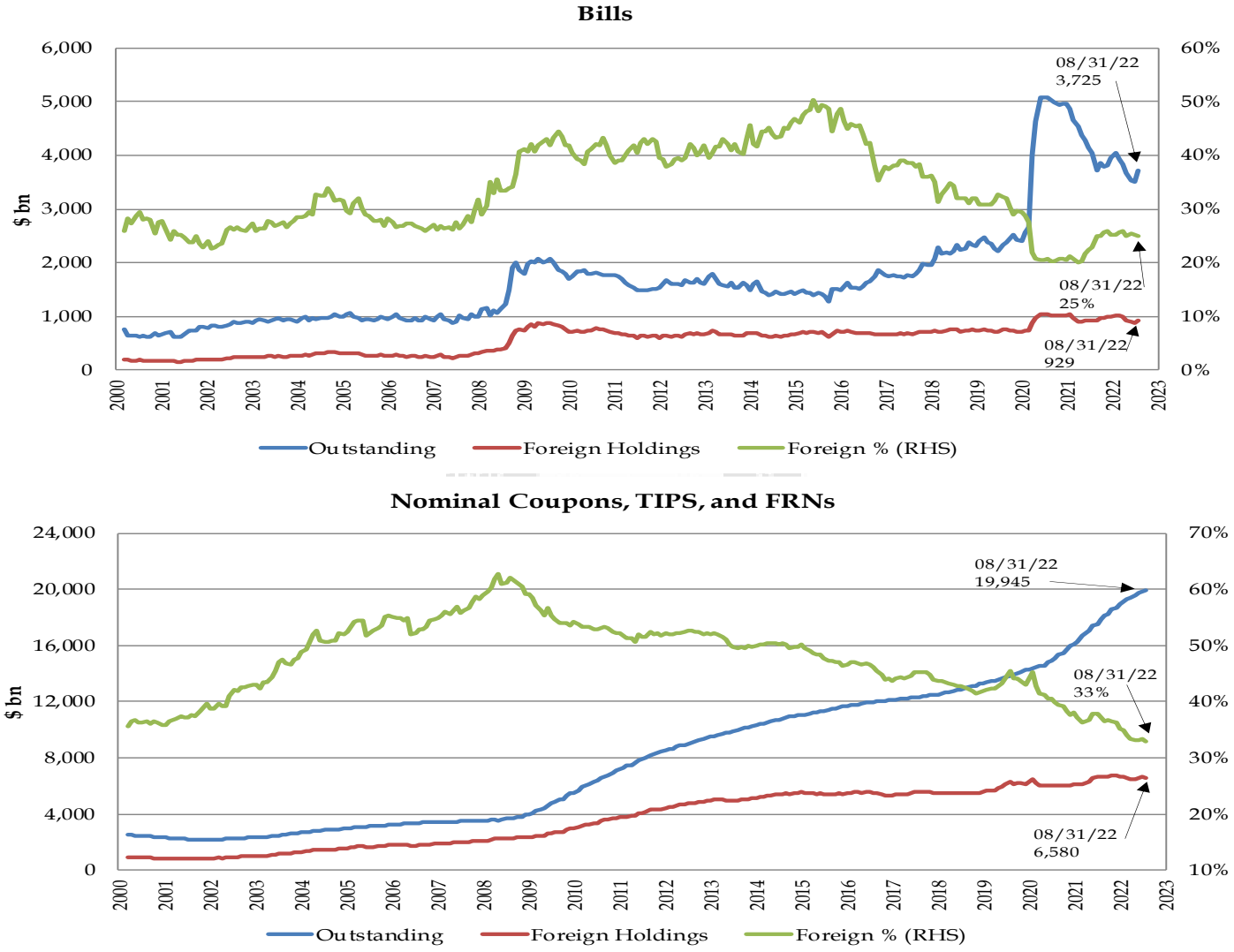
Competitive Amount Awarded excludes SOMA add-ons.

Total Foreign Awards of Treasuries at Auction, $ billions



Foreign includes both private sector and official institutions.

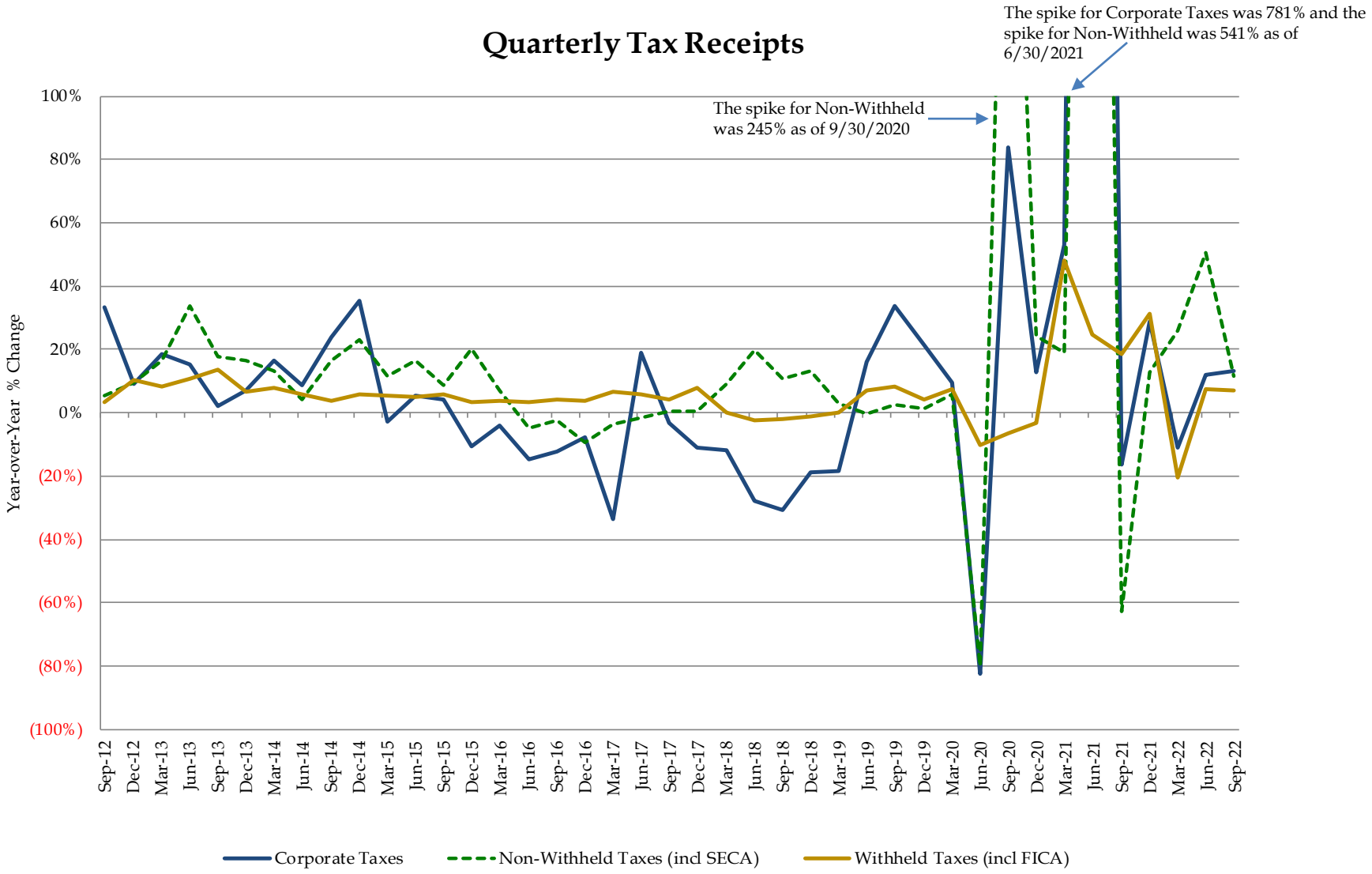
Total Foreign Holdings



Source: Treasury International Capital (TIC) System as of August 2022.
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.

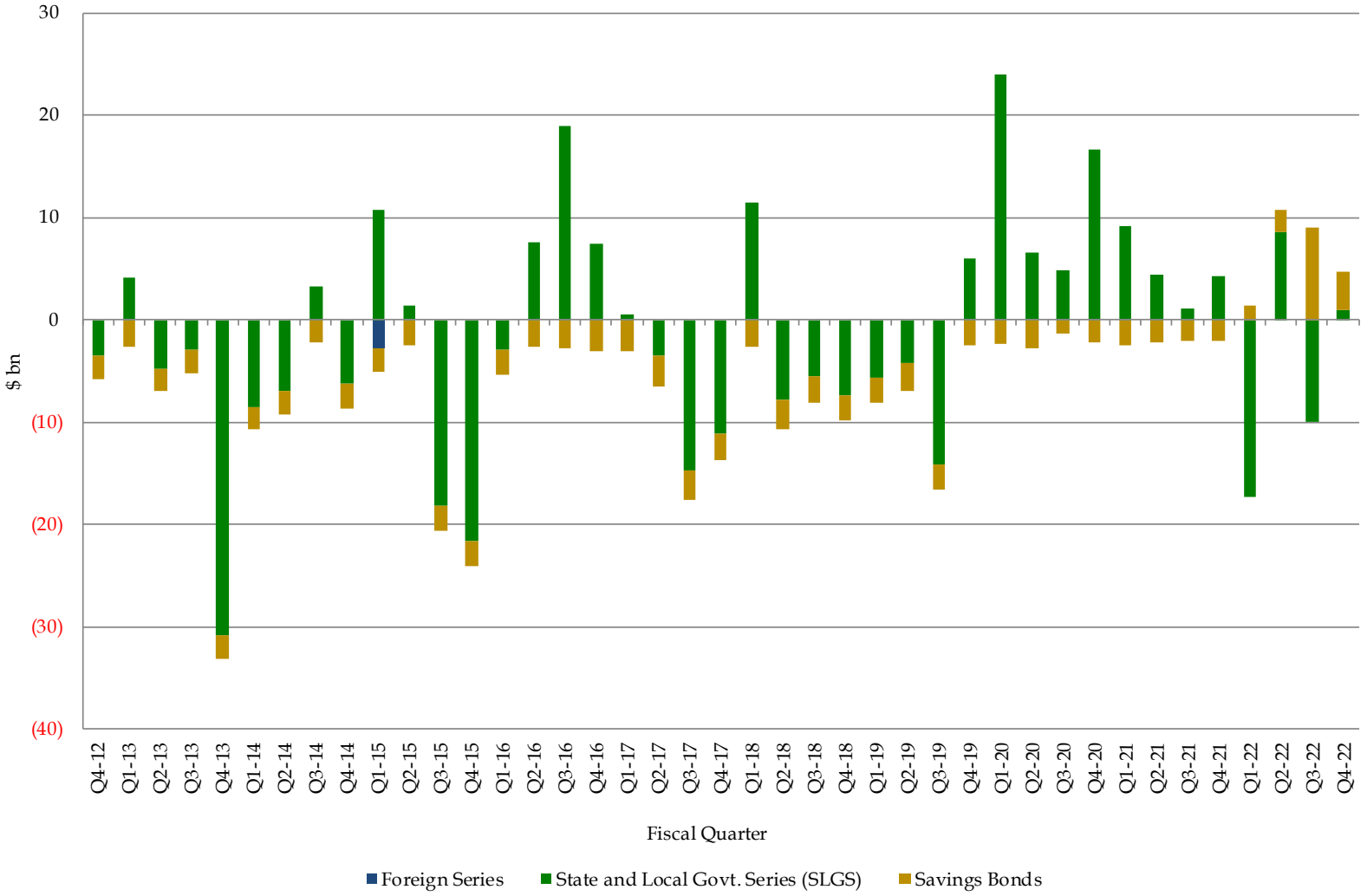
VII. Appendix

Contents

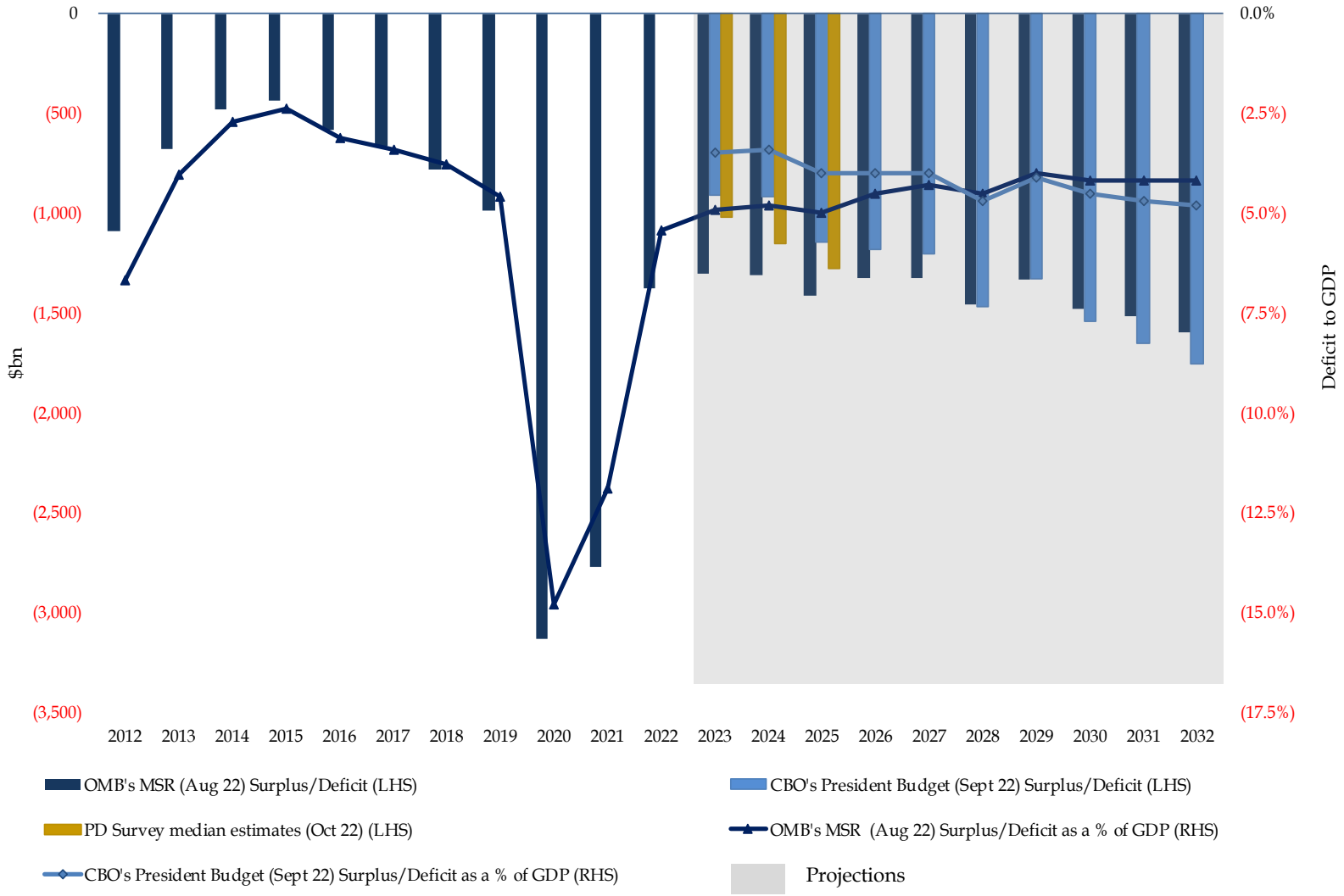


Quarterly tax receipts for Q4 FY2020 reflect the adjustment of April and June 2020 tax deadlines to July 15th, 2020.

Treasury Net Nonmarketable Borrowing



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 2023," Aug 2022. CBO's deficit projections are using estimates from CBO's Table 2 of "An Analysis of the President's 2023 Budget," Sept 2022.

Sources of Privately-Held Financing in FY22 Q4

July - September 2022	
Net Bill Issuance	137
Net Coupon Issuance	320
Subtotal: Net Marketable Borrowing	457
Ending Cash Balance	636
Beginning Cash Balance	782
Subtotal: Change in Cash Balance	(146)
Net Implied Funding for FY 2022 Q4*	603

	July - September 2022 Bill Issuance			Fiscal Year-to-Date Bill Issuance		
Security	Gross	Maturing	Net	Gross	Maturing	Net
4-Week	645	585	60	2,020	1,890	130
8-Week	580	440	140	1,800	1,665	135
13-Week	690	627	63	2,790	2,766	24
26-Week	546	657	(111)	2,400	2,622	(222)
52-Week	102	102	0	442	442	(0)
CMBs						
17-Week	390	405	(15)	1,755	1,785	(30)
CMBs	60	60	0	735	825	(90)
Bill Subtotal	3,013	2,876	137	11,942	11,995	(53)

	July - September 2022 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
Security	Gross	Maturing	Net	Gross	Maturing	Net
2-Year FRN	68	68	0	282	240	42
2-Year	132	127	5	603	432	171
3-Year	126	83	43	579	311	268
5-Year	135	76	59	615	310	305
7-Year	111	73	38	564	301	263
10-Year	100	20	80	423	111	312
20-Year	41	0	41	210	0	210
30-Year	58	4	54	255	13	242
5-Year TIPS	0	0	0	74	40	34
10-Year TIPS	32	40	(8)	90	80	10
30-Year TIPS	8	0	8	17	0	17
Coupon Subtotal	811	491	320	3,712	1,838	1,873

Total	3,824	3,367	457	15,654	13,833	1,820

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

Privately-Held Net Marketable Borrowing Definition and Calculation Example

FY 2022 Actual Deficits and Privately-Held Net Marketable Borrowing, in $ billions

	FY 2022 Actual
FY 2022 Deficit	1,375
FY 2022 + Change in Cash Balance	421
FY 2022 + Other Means of Financing (e.g. Direct Loans)	-125
FY 2022 **= Total Net Marketable Borrowing**	1,671
FY 2022 + SOMA Redemption	150
FY 2022 **= Privately-Held Net Marketable Borrowing**	1,821

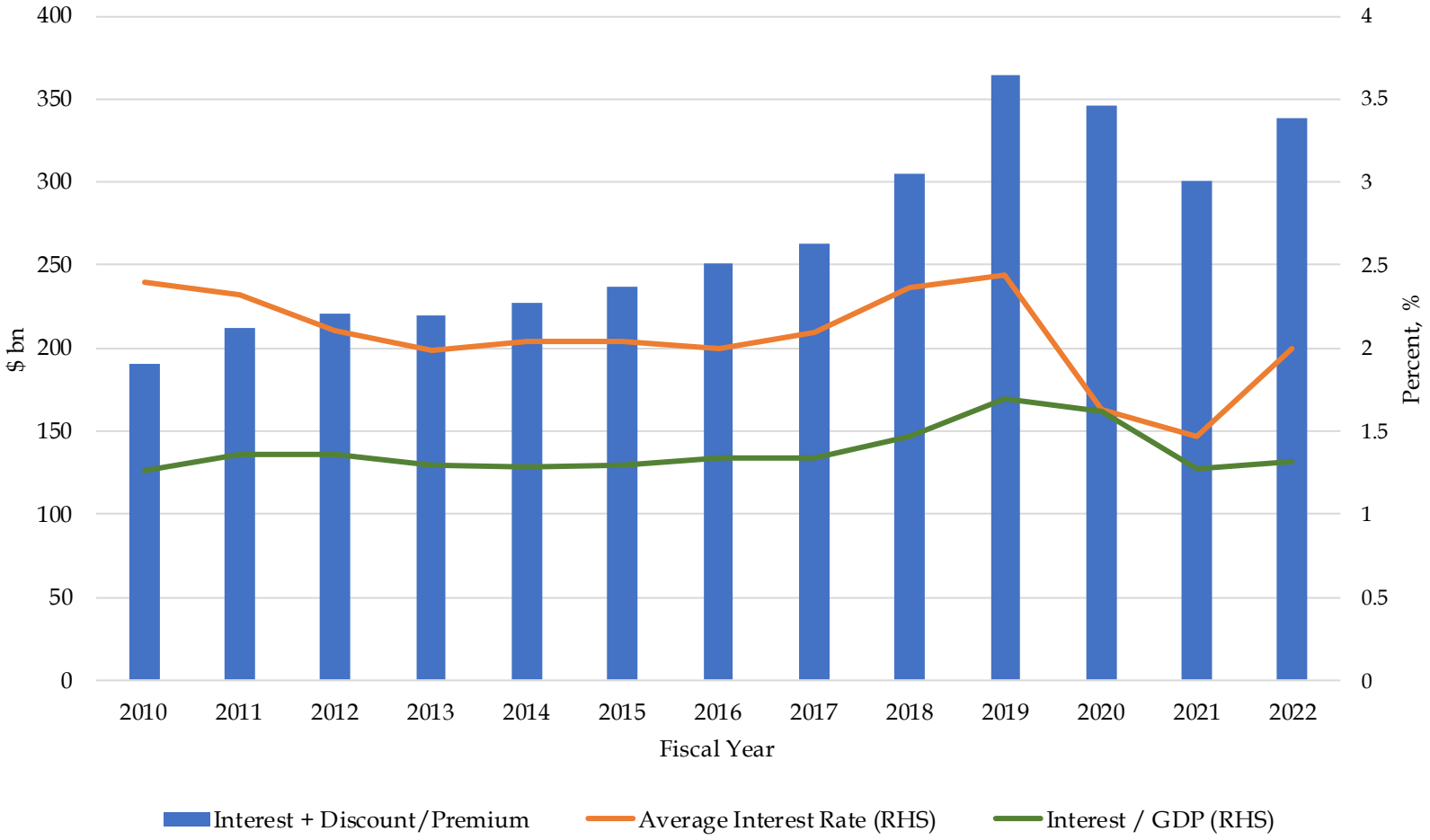
- Actual deficits are sourced from the Monthly Treasury Statement.
- Actual change in cash balance is sourced from the Daily Treasury Statement. Change in cash balance = cash balance of Sept 30, 2022 - cash balance of Sept 30, 2021
- Other Means of Financing include cash flows associated with federal credit programs, such as those related to student loans and loans to small businesses.
- Privately-Held Net Marketable Borrowing = Total Net Marketable Borrowing + SOMA Redemption
- SOMA redemption is the amount that the Federal Reserve redeems securities that Treasury has to replace with privately-held marketable borrowing. Actual SOMA redemptions amounts is from the Sources and Uses Reconciliation Table.
- Actual Privately-Held Net Marketable Borrowing is from the Sources and Uses Reconciliation Table.

FY 2023-2025 Deficits and Privately-Held Net Marketable Borrowing Estimates*, in $ billions

	Primary Dealer[1]			OMB[2]	CBO[3]	CBO[4]
	25th	Median	75th			
FY 2023 Deficit	984	1,020	1,150	1,300	908	984
FY 2024 Deficit	1,055	1,150	1,250	1,311	921	1,056
FY 2025 Deficit	1,105	1,275	1,398	1,414	1,145	1,318
FY 2023 Change in Cash Balance	-36	24	64	14	0	0
FY 2024 Change in Cash Balance	0	0	13	0	0	0
FY 2025 Change in Cash Balance	0	0	0	0	0	0
FY 2023 Total Net Marketable Borrowing				1,367	944	1,020
FY 2024 Total Net Marketable Borrowing				1,362	890	1,024
FY 2025 Total Net Marketable Borrowing				1,460	1,172	1,344
FY 2023 SOMA Redemption	700	720	720			
FY 2024 SOMA Redemption	90	360	697			
FY 2025 SOMA Redemption	0	0	180			
FY 2023 Privately-Held Net Marketable Borrowing	1,650**	1,765**	1,854**	2,087**	1,678**	1,754**
FY 2024 Privately-Held Net Marketable Borrowing	1,338	1,433	1,781**	1,722**	1,250**	1,384**
FY 2025 Privately-Held Net Marketable Borrowing	1,193	1,402	1,500	1,460**	1,172**	1,344**
Estimates as of:		Oct-22		Aug-22	Sep-22	May-22

[1] Estimates represent the medians/interquartile ranges from the primary dealer survey in October 2022.
[2] OMB projections are using estimates are from Table S-1 of "Mid-Session Review Budget of The U.S. Government Fiscal Year 2023," August 2022.
[3] CBO projections are using estimates are from Table 2 of "An Analysis of the President's 2023 Budget," September 2022.
[4] CBO projections are using estimates are from Table 1-1 of "The Budget and Economic Outlook: 2022 to 2032," May 2022.
*Privately-held marketable borrowing excludes rollovers (auction "add-ons") of Treasury securities held in the Federal Reserve 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.
**Both OMB and CBO borrowing estimates are normalized to privately-held net borrowing after adding PD survey median SOMA redemption assumptions for FY23/24/25. In addition, all the PD and CBO privately-held net borrowing estimates are normalized with OMB MSR FY23/FY24/FY25 ending cash balance of $650 billion.

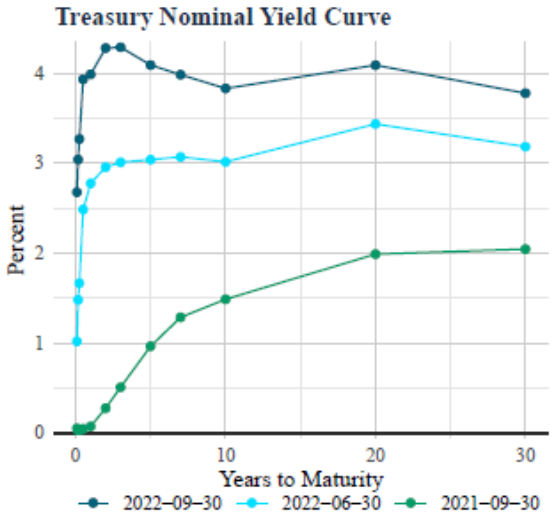
Historical Marketable Treasury Debt Service Cost

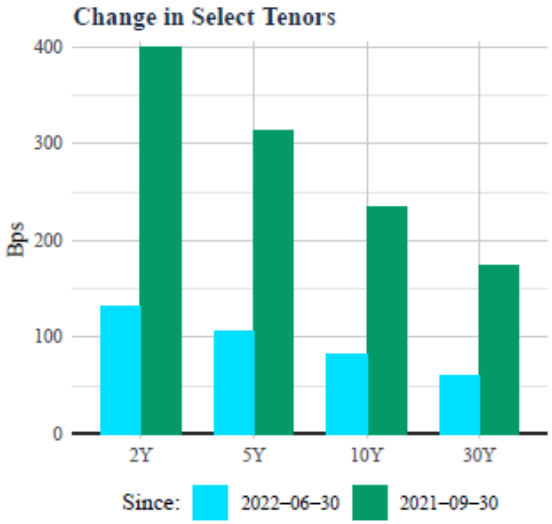


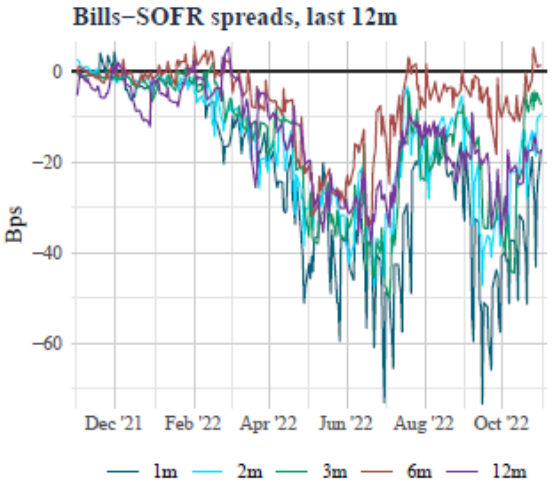
Source: https://fiscaldata.treasury.gov/datasets

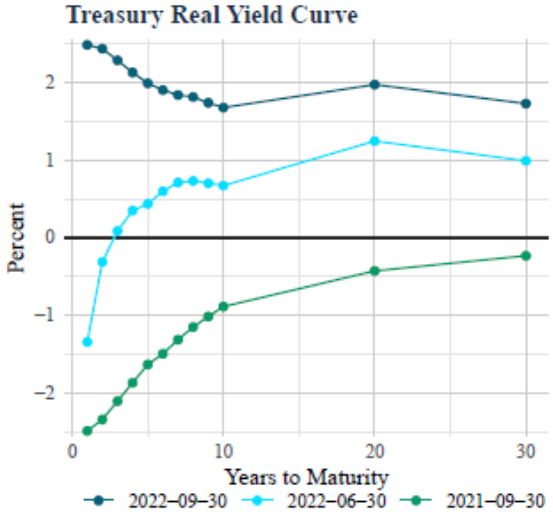
The average interest rates for total marketable debt do not include the Treasury Inflation-Indexed Securities and the Treasury Floating Rate Notes. However, they include securities from Federal Financing Bank. The average interest rates in the chart are as of corresponding fiscal year-end-dates.

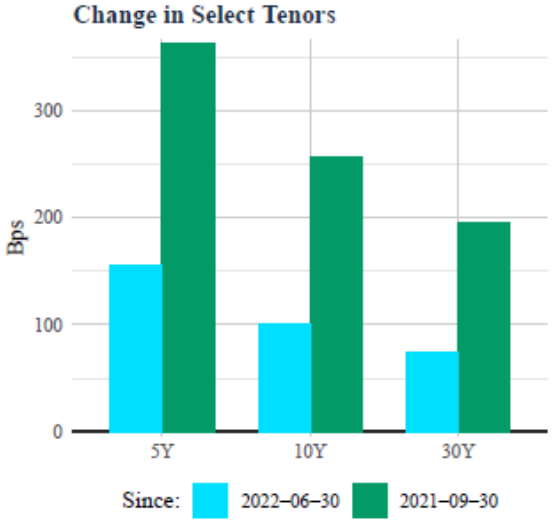
Various Historical Treasury Interest Rate Metrics

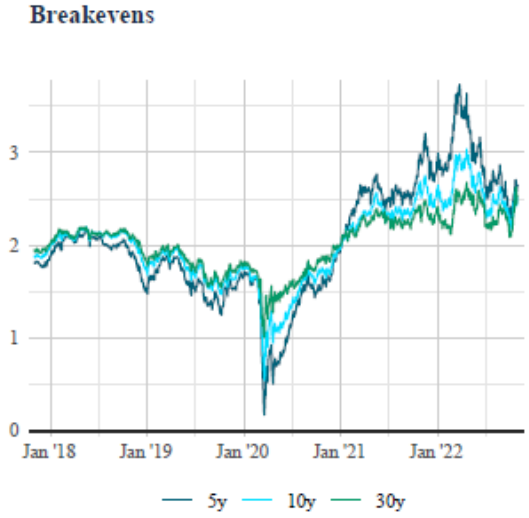












Source: Bloomberg

Projected Privately-Held Net Marketable Borrowing
Assuming Private Coupon Issuance & Total Bills Outstanding Remain Constant as of 09/30/2022*

Fiscal Year	Bills	2/3/5	7/10/20/30	TIPS	FRN	Historical/Projected Net Borrowing Capacity
2018	438	197	493	45	23	1,196
2019	137	498	534	51	59	1,280
2020	2,652	538	724	46	55	4,015
2021	(1,315)	1,260	1,328	55	92	1,420
2022	(53)	744	1,027	61	42	1,821
2023	0	341	679	46	(42)	1,024
2024	0	66	695	71	(10)	822
2025	0	(23)	716	4	0	697
2026	0	(148)	712	22	0	586
2027	0	(28)	595	4	0	571
2028	0	0	282	(13)	0	269
2029	0	0	398	(7)	0	391
2030	0	0	508	8	0	517
2031	0	0	339	(3)	0	336
2032	0	0	363	(27)	0	336

*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.

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	7/12/2022	1.530	2.87	34.0	47.1	1.0	51.9	1.0	3.6	0.3
4-Week	7/19/2022	1.980	2.75	43.9	43.6	1.2	55.1	1.1	2.9	0.4
4-Week	7/26/2022	2.120	2.44	53.6	49.7	1.6	48.7	1.4	3.5	0.5
4-Week	8/2/2022	2.140	2.66	53.0	44.9	2.0	53.2	2.0	3.4	0.5
4-Week	8/9/2022	2.110	2.80	53.6	39.2	2.8	58.0	1.4	3.5	0.5
4-Week	8/16/2022	2.150	2.44	53.7	47.4	2.4	50.2	1.3	2.9	0.5
4-Week	8/23/2022	2.150	2.53	53.7	47.1	2.9	50.1	1.3	3.4	0.5
4-Week	8/30/2022	2.310	2.37	53.7	50.0	2.4	47.6	1.3	3.3	0.5
4-Week	9/6/2022	2.470	2.65	48.4	43.2	2.3	54.6	1.6	2.8	0.5
4-Week	9/13/2022	2.500	3.03	48.0	39.6	1.2	59.2	2.0	2.3	0.5
4-Week	9/20/2022	2.670	2.70	48.4	42.3	3.0	54.6	1.6	2.8	0.5
4-Week	9/27/2022	2.660	2.82	48.1	41.0	2.3	56.8	1.9	2.7	0.5
4-Week	10/4/2022	2.660	2.54	48.3	38.2	2.4	59.4	1.7	2.6	0.5
8-Week	7/12/2022	1.840	2.77	29.3	57.3	3.9	38.7	0.7	3.1	0.6
8-Week	7/19/2022	2.270	2.47	39.2	62.7	4.3	33.0	0.8	2.6	0.8
8-Week	7/26/2022	2.230	2.71	49.2	45.3	2.3	52.4	0.8	3.2	0.9
8-Week	8/2/2022	2.210	2.79	48.5	37.3	3.2	59.5	1.5	3.1	0.9
8-Week	8/9/2022	2.280	2.54	49.5	49.3	1.7	49.0	0.5	3.2	0.9
8-Week	8/16/2022	2.430	2.35	49.6	57.0	4.0	39.0	0.4	2.6	0.9
8-Week	8/23/2022	2.490	2.77	49.3	42.6	2.2	55.1	0.7	3.1	0.9
8-Week	8/30/2022	2.610	2.73	48.9	39.9	1.7	58.3	1.1	3.0	0.9
8-Week	9/6/2022	2.730	3.02	44.3	43.4	0.8	55.8	0.7	2.5	0.8
8-Week	9/13/2022	2.765	2.93	44.3	43.1	2.1	54.8	0.7	2.1	0.8
8-Week	9/20/2022	2.925	2.64	44.2	41.0	2.4	56.6	0.8	2.5	0.8
8-Week	9/27/2022	2.990	2.60	43.9	45.8	2.3	51.9	1.1	2.4	0.9
8-Week	10/4/2022	3.065	2.57	44.1	42.8	1.1	56.1	0.9	2.4	0.8

*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	7/7/2022	1.850	2.53	43.2	57.4	5.5	37.1	1.8	7.3	1.5
13-Week	7/14/2022	2.110	2.49	49.4	49.6	3.3	47.0	1.6	6.8	1.7
13-Week	7/21/2022	2.470	2.97	52.7	41.9	10.4	47.6	1.3	7.7	1.8
13-Week	7/28/2022	2.520	2.95	52.0	40.9	2.8	56.4	2.0	7.4	1.8
13-Week	8/4/2022	2.490	2.63	52.4	48.1	3.9	48.0	1.6	8.4	1.8
13-Week	8/11/2022	2.580	2.84	52.2	32.5	4.5	63.0	1.8	6.5	1.8
13-Week	8/18/2022	2.610	2.64	52.4	43.8	4.3	51.8	1.6	7.5	1.7
13-Week	8/25/2022	2.740	2.69	51.8	35.0	4.6	60.4	2.2	6.1	1.7
13-Week	9/1/2022	2.880	3.03	52.7	45.2	2.3	52.5	1.3	6.6	1.7
13-Week	9/8/2022	2.965	3.06	52.5	35.9	3.4	60.7	1.5	4.4	1.7
13-Week	9/15/2022	3.075	2.74	52.3	42.3	3.1	54.7	1.7	4.5	1.7
13-Week	9/22/2022	3.270	2.57	52.0	42.2	4.5	53.3	2.0	1.8	1.6
13-Week	9/29/2022	3.270	2.56	51.1	40.5	3.3	56.2	2.9	6.9	1.8
26-Week	7/7/2022	2.500	2.57	40.3	54.2	3.7	42.0	1.7	6.8	2.8
26-Week	7/14/2022	2.685	2.67	40.4	53.4	4.6	42.0	1.6	5.6	2.7
26-Week	7/21/2022	2.910	2.65	40.8	47.2	11.8	41.0	1.2	6.0	2.8
26-Week	7/28/2022	2.920	3.16	39.9	42.6	1.5	56.0	2.1	5.8	2.8
26-Week	8/4/2022	2.850	2.91	40.2	43.6	10.7	45.7	1.8	6.6	2.8
26-Week	8/11/2022	3.040	3.09	40.0	49.5	4.6	45.9	2.0	5.0	2.7
26-Week	8/18/2022	3.020	2.75	40.2	45.1	3.3	51.6	1.8	5.8	2.7
26-Week	8/25/2022	3.110	2.93	39.6	38.2	3.5	58.3	2.4	4.8	2.6
26-Week	9/1/2022	3.235	2.88	40.4	45.5	4.9	49.6	1.6	5.1	2.7
26-Week	9/8/2022	3.320	3.14	40.2	51.3	3.8	44.9	1.8	3.4	2.6
26-Week	9/15/2022	3.465	3.03	40.2	42.4	15.1	42.5	1.8	3.5	2.6
26-Week	9/22/2022	3.780	2.75	40.1	57.7	5.7	36.6	1.9	1.4	2.5
26-Week	9/29/2022	3.850	2.68	38.8	47.3	2.5	50.2	3.2	5.4	2.8
52-Week	7/14/2022	2.960	3.17	33.0	45.4	3.8	50.8	1.0	4.5	4.5
52-Week	8/11/2022	3.200	3.05	32.7	34.7	2.4	62.9	1.3	4.1	4.4
52-Week	9/8/2022	3.460	2.75	33.0	41.9	1.5	56.5	1.0	2.8	4.2

*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)*
17-Week	7/12/2022	2.230	3.40	29.7	41.9	1.7	56.4	0.3	0.0	1.1
17-Week	7/19/2022	2.600	2.95	29.7	62.3	4.6	33.2	0.3	0.0	1.1
17-Week	7/26/2022	2.720	3.87	29.9	46.2	0.6	53.1	0.1	0.0	1.1
17-Week	8/2/2022	2.690	3.69	29.5	36.6	4.0	59.3	0.5	0.0	1.1
17-Week	8/9/2022	2.730	3.35	29.9	51.1	2.4	46.4	0.1	0.0	1.1
17-Week	8/16/2022	2.780	2.82	29.7	45.9	2.1	52.0	0.3	0.0	1.1
17-Week	8/23/2022	2.890	3.06	29.9	53.9	11.0	35.1	0.1	0.0	1.1
17-Week	8/30/2022	2.970	3.40	29.5	43.7	4.8	51.6	0.5	0.0	1.1
17-Week	9/6/2022	3.100	3.54	30.0	57.3	2.4	40.3	0.0	0.0	1.1
17-Week	9/13/2022	3.195	3.63	29.9	41.0	2.4	56.6	0.1	0.0	1.1
17-Week	9/20/2022	3.550	3.14	29.8	48.9	3.7	47.4	0.2	0.0	1.1
17-Week	9/27/2022	3.590	3.76	29.9	39.7	0.0	60.3	0.1	0.0	1.1
17-Week	10/4/2022	3.590	3.05	29.0	47.7	1.7	50.5	1.0	0.0	1.1
CMB	8/25/2022	2.200	2.45	59.9	58.1	3.8	38.0	0.1	0.0	0.4

*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	8/1/2022	3.015	2.58	44.3	17.9	20.0	62.0	0.7	3.9	11.1
2-Year	8/31/2022	3.307	2.49	43.0	23.0	17.3	59.7	1.0	5.7	11.1
2-Year	9/30/2022	4.290	2.51	41.1	22.2	24.8	53.0	1.9	0.0	9.7
3-Year	7/15/2022	3.093	2.43	42.7	20.3	19.4	60.4	0.3	5.5	16.3
3-Year	8/15/2022	3.202	2.50	41.7	19.6	17.3	63.1	0.3	26.6	23.1
3-Year	9/15/2022	3.564	2.49	40.8	23.6	21.9	54.5	0.2	0.0	13.5
5-Year	8/1/2022	2.860	2.46	45.9	16.8	16.8	66.4	0.1	4.0	27.4
5-Year	8/31/2022	3.230	2.30	44.9	20.6	18.2	61.2	0.1	5.9	27.1
5-Year	9/30/2022	4.228	2.27	43.8	21.7	18.7	59.6	0.2	0.0	23.3
7-Year	8/1/2022	2.730	2.60	38.0	10.6	18.4	70.9	0.0	3.3	31.0
7-Year	8/31/2022	3.130	2.65	37.0	8.6	15.7	75.7	0.0	4.8	30.2
7-Year	9/30/2022	3.898	2.57	35.9	12.8	24.7	62.5	0.1	0.0	25.8
10-Year	7/15/2022	2.960	2.34	33.0	20.7	18.0	61.3	0.0	4.2	37.2
10-Year	8/15/2022	2.755	2.53	35.0	9.9	15.6	74.5	0.0	22.1	59.0
10-Year	9/15/2022	3.330	2.37	32.0	19.8	17.9	62.3	0.0	0.0	32.0
20-Year	8/1/2022	3.420	2.65	14.0	7.9	14.1	78.0	0.0	1.2	25.8
20-Year	8/31/2022	3.380	2.30	15.0	14.7	18.3	67.0	0.0	2.0	28.2
20-Year	9/30/2022	3.820	2.65	12.0	8.1	16.6	75.3	0.0	0.0	19.9
30-Year	7/15/2022	3.115	2.44	19.0	10.5	16.3	73.2	0.0	2.4	49.5
30-Year	8/15/2022	3.106	2.31	21.0	10.8	18.5	70.6	0.0	13.3	79.9
30-Year	9/15/2022	3.511	2.42	18.0	10.9	17.1	72.1	0.0	0.0	40.0
2-Year FRN	8/1/2022	0.037	3.13	24.0	29.5	1.1	69.4	0.0	2.1	0.01
2-Year FRN	8/26/2022	0.090	2.57	22.0	42.1	0.9	57.1	0.0	0.0	0.03
2-Year FRN	9/30/2022	0.092	2.84	22.0	34.1	1.7	64.2	0.0	0.0	0.03

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	7/29/2022	0.630	2.18	16.9	15.8	17.1	67.1	0.1	0.0	19.4
10-Year TIPS	9/30/2022	1.248	2.54	15.0	7.9	21.3	70.8	0.0	0.0	16.7
30-Year TIPS	8/31/2022	0.920	2.69	8.0	11.1	12.0	76.9	0.0	1.0	30.0

*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.

Additional Public Transparency in Treasury Markets

November 2022

Treasury Charge

Additional Public Transparency

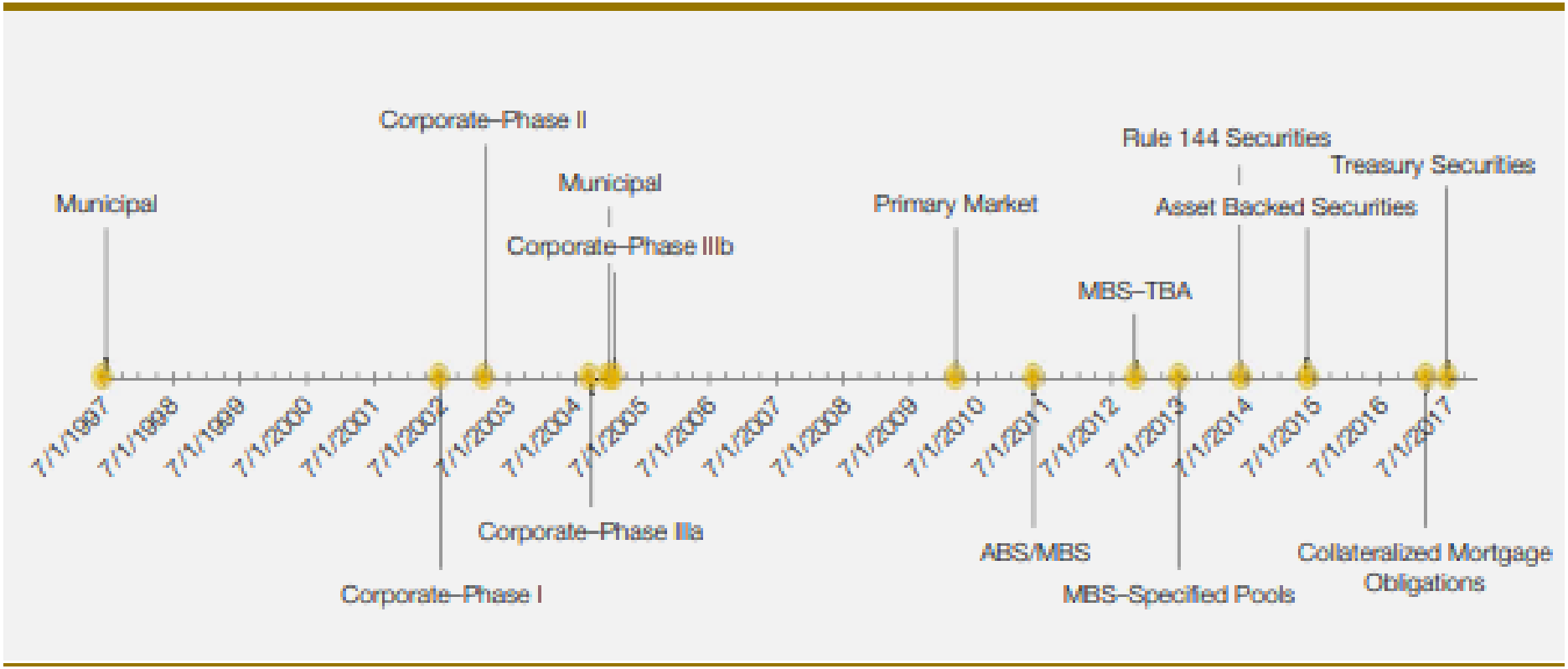
Treasury recently received public comments in response to its request for information (RFI) on additional post-trade transparency in secondary market transactions of Treasury securities. Responses were broadly supportive of efforts to incrementally increase transparency, but recommendations varied regarding the pace and extent of additional transparency. Commenters noted potential benefits, such as improving price discovery and enhanced investor confidence, and potential risks, such as increasing the cost of trading large positions in less liquid securities. Many supported steps to minimize those risks by limiting dissemination for large trades or for certain securities using trade size caps and delays as well as aggregation. They noted similar approaches used for transparency for other fixed income securities and for interest rate derivatives.

How does the Committee assess these benefits and risks of additional public transparency for post-trade transactions? What are the Committee's views on varying treatment for different security types, dissemination caps and delays, and implementation approaches? How would the Committee measure the effectiveness of additional post-trade transparency?

Agenda

US Treasuries have lagged other asset classes with dissemination rules

Regulatory Data Collection and Post-Trade Dissemination in U.S. Fixed Income Markets (1997–2017)



Timeline shows implementation of regulatory data collection and post-trade dissemination between 1997 and 2017 for U.S. municipal bonds, corporate bonds, agency debentures, asset-backed securities, mortgage-backed securities, and Treasury securities. Primary Market description – “Dealers report all U.S. agency debenture transactions, as well as primary market transactions in TRACE-eligible securities.

Source: Bessembinder , Spatt, and Venkataraman (2020) A Survey of the Microstructure of Fixed-Income Markets

Reporting and Dissemination Rules Differ Across Asset Classes

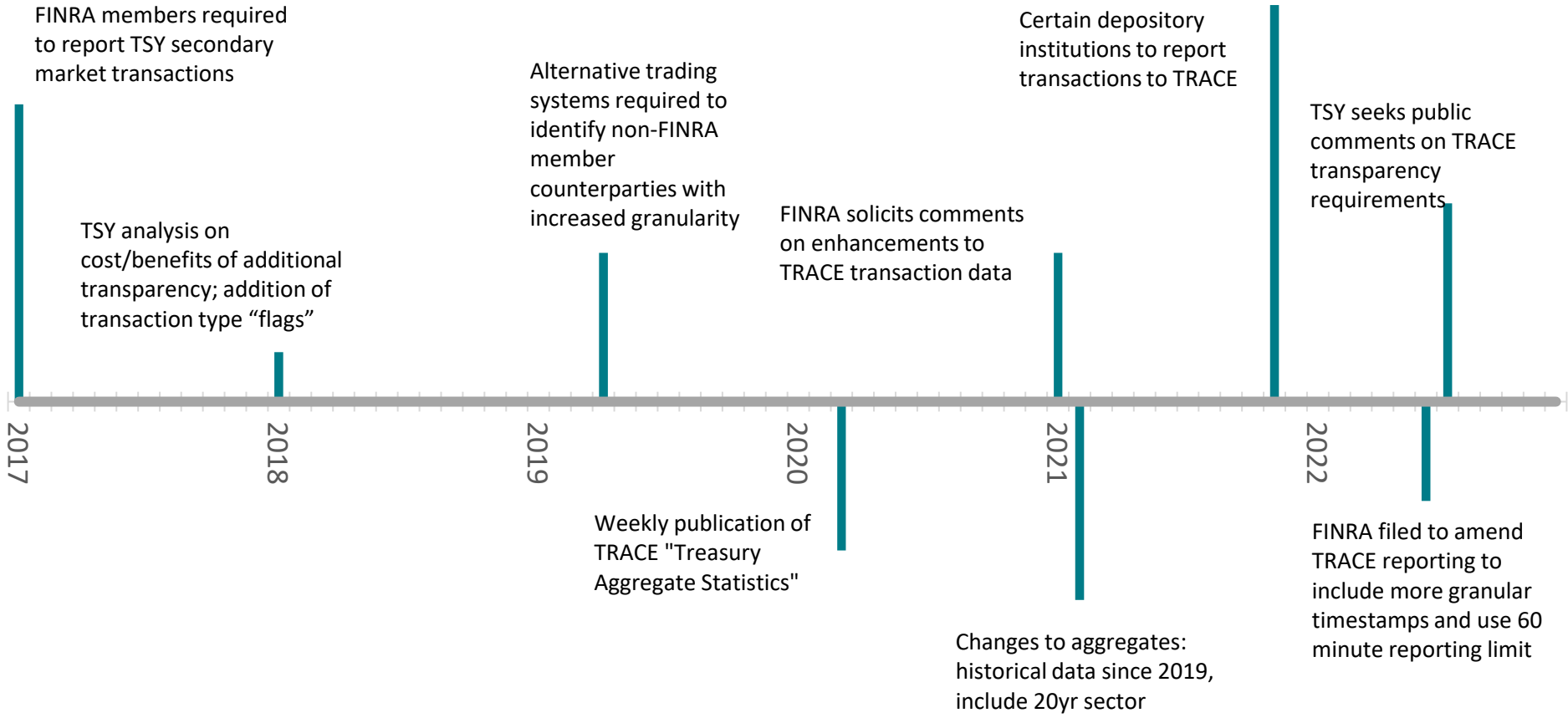
	Asset Class	Implementation / Phase-in	Reporting	Public dissemination of price and volume information	Block trade regime
Cash	**U.S. Corporate Bonds: TRACE**	**Began 2002**	**Within 15 mins**	**Immediate Dissemination**	**Volume masking in public dissemination**
		■ Phased-in 2002 – 2006, starting with dissemination of largest bonds and with longer dissemination delays ■ All bonds in scope from Jan 2006.	■ Dealers report transaction to TRACE **within 15 minutes.**		■ Investment Grade >$5m disseminated as $5m+ ■ High Yield >$1m disseminated as $1m+
	MBS TBA: TRACE	**Began 2012**	**Between 15 mins and T+1**	**Immediate Dissemination**	**Volume masking in public dissemination**
		MBS To-be-announced (TBA) transactions are included for public dissemination from Nov 2012.	■ Dealers report to TRACE between **15 minutes and T+1** depending on transaction type.	■ Public dissemination is immediate subject to certain exceptions.[2]	■ MBS TBA for Good Delivery > $25m disseminated as $25m+ ■ MBS TBA not for Good Delivery > $10m disseminated as $10m+
	Municipal Bonds: EMMA	**Began 1997**	**Within 15 mins**	**Immediate Dissemination**	**Volume masking in public dissemination**
		■ Phased-in 1997 – 2005. ■ Subject to public dissemination within 15- mins since January 2005.	■ Dealers report all transactions to EMMA **within 15 minutes.**		■ Trades >$5m are masked for 5 days in public reporting.
Non-cash	**Interest Rate Futures: CFTC Part 38**	**~2012**	**Immediate (except blocks)**	**Immediate Dissemination**	**No volume masking in public dissemination**
			■ Block trades subject to reporting determined by exchange (e.g., 5 – 15 minutes).		■ Block thresholds and reporting determined by the exchange and differ across contract type. ■ Block trades disseminated upon receipt.
	Interest Rate Swaps: CFTC Part 43[1]	**Began 2013**	**Immediate**	**Immediate Dissemination**	**Volume masking and dissemination delays**
		■ Block regime subject to multi-year phase-in, starting with lower block trade thresholds and longer dissemination delays.	■ Dealers report transaction to Swap Data Repository **"as soon as technologically practicable"**.	■ Public dissemination is immediate unless subject to a time delay (ie Blocks on 15min delay)	■ Volume masking in public dissemination, dependant on currency and maturity. ■ Dissemination delay 15-mins to 24-hours depending on underlying / counterparty type.

Source: FINRA 6700; CFTC Part 43; CFTC Part 38; CME Rule 526; MSRB G-14

[1] Revised block thresholds and notional caps will be in effect from December 4, 2023

[2] See exceptions to immediate public dissemination in FINRA 6750. Dissemination of Transaction Information https://www.finra.org/rules-guidance/rulebooks/finra-rules/6750

Treasury trade data has been collected since 2017, but transaction level data has not been publicly disseminated

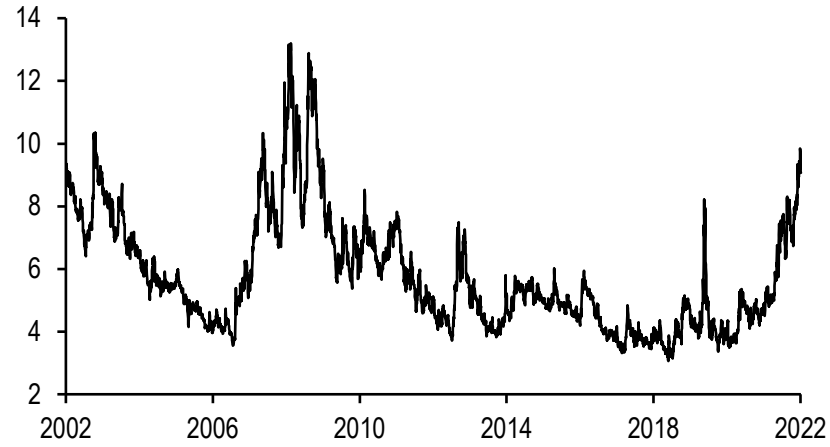


Note: Labels are at the start of the year.
Source: DEPARTMENT OF THE TREASURY (Docket No. TREAS-DO-2022-0012)

Agenda

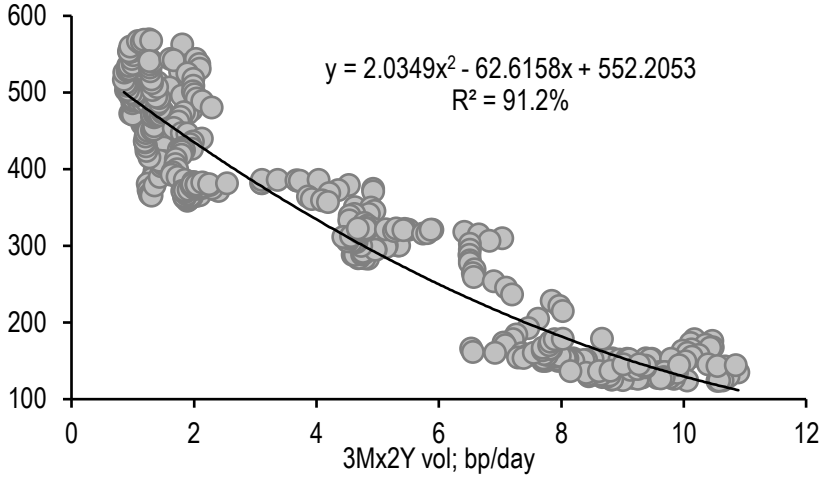
Rates volatility remains historically elevated, which is negatively impacting broad measures of Treasury market liquidity

3Mx10Y implied swaption vol; bp/day



Source: J.P. Morgan research

Duration-weighted Treasury market depth*; 1-month moving average; regressed on 3Mx2Y implied swaption vol (bp/day), regression over the 2 years; $mn 10-year Treasury equivalents



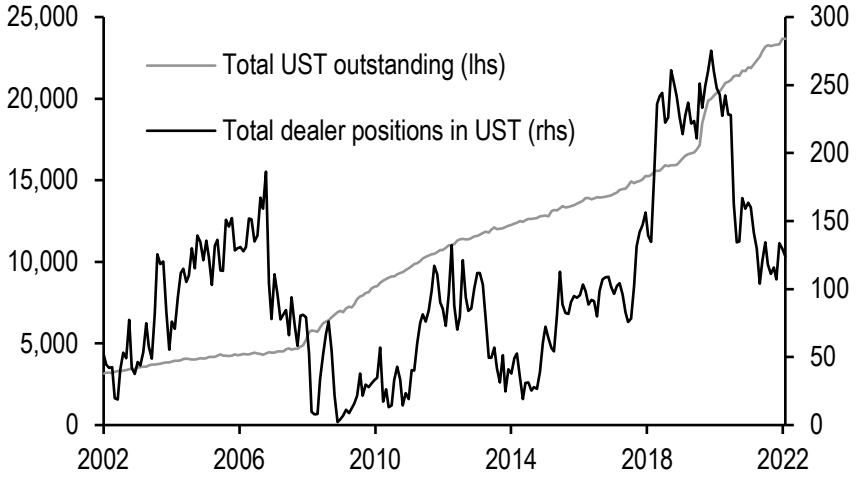
* Market depth is the sum of the three bids and offers by queue position, averaged between 8:30 and 10:30am daily. his is the sum of 2-, 5-, 10-, and 30-year depth in 10-year equivalents

Source: J.P. Morgan, BrokerTec

- Increased volatility in the treasury market typically correlates with lower market depth as we are seeing today

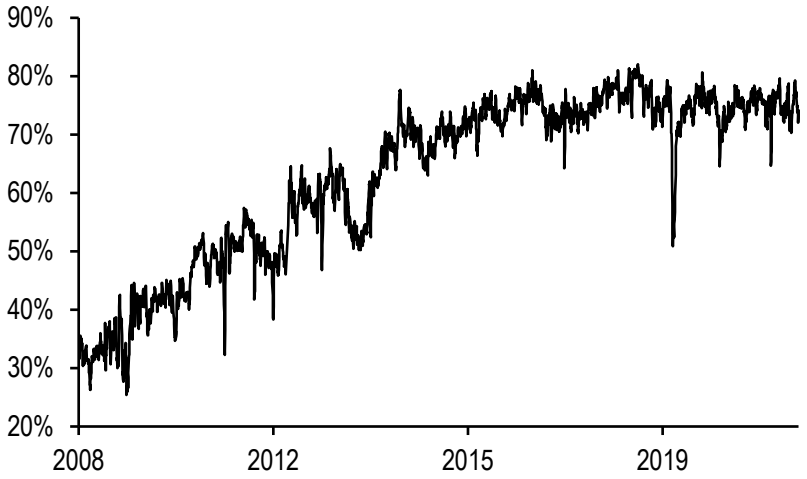
Changing Treasury market intermediation opens the door to further study transparency for Treasuries…

Total marketable US Treasury debt outstanding (lhs, $bn) versus absolute value of primary dealer positions in Treasuries (1m moving average, rhs, $bn)



Source: Federal Reserve Bank of New York

Fast* share of 10-year Treasury market depth; %**



* Orders created less than 0.3 milliseconds after the prior order book update.
** Market depth defined as the total notional available in the central limit order book (CLOB) at the best three prices, averaged across both the bid and ask stacks, see Drivers of price impact and the role of hidden liquidity, JPM research, 1/13/17. They take snapshots of the live order book for every $500mn in traded notional, and average market depth measurements from these snapshots, thus forming a volume-weighted average.
Source: J.P. Morgan research

- The Treasury market has more than doubled over the last decade, but dealer inventories and bank balance sheets in general have not kept pace in recent years. A combination of post-GFC capital and liquidity regulations, and associated changes in risk management approach, have left banks with less flexibility to absorb Treasuries in times of volatility
- Moreover, as the share of liquidity offered by more algorithmic providers has increased over the last decade, liquidity has become less resilient, declining at times of extreme stress

Agenda

Responses to RFI on Additional Transparency are mixed

27 RFI responses

(9 trade association, 4 PTF, 3 asset manager, 3 consumer group, 3 hedge fund, 2 primary dealer, and 3 other)

Possible Benefits **(cited mostly by public interest groups, hedge funds, PTFs and related trade associations)**	**Possible Risks** **(cited mostly by primary dealers, asset managers and related trade associations)**
Lower transaction costs	Negatively impact intermediation and risk transfer in less liquid segments and for large transactions
Increase liquidity (and new intermediaries)	Unlikely to boost liquidity; could decrease liquidity
Increase “market confidence”	Increase dissemination avoidance: move flows outside the U.S., incentivize smaller trading sizes
Improve risk management	Reduce participation in auction process or potential weaker pricing
Improve resilience during market stress	Harm households via holdings in mutual funds, pensions, and insurers who rely on trading quickly and in large size

- Nearly all respondents, regardless of view on benefits and risks, agreed on phased-in dissemination and block trade exemptions if there are new dissemination rules implemented
- Respondents cited U.S. corporate bond market studies to support arguments both for and against additional transparency

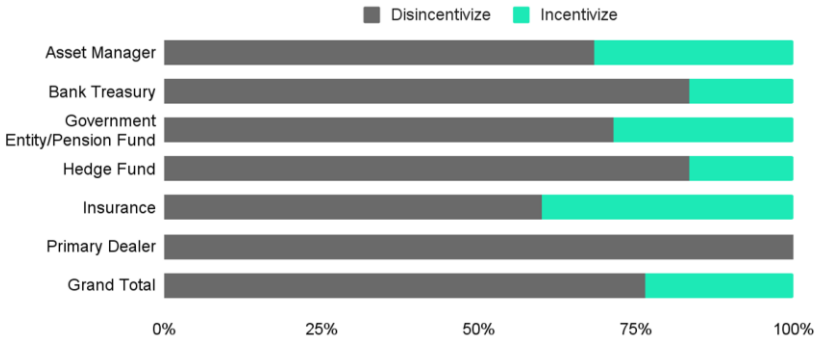
SIA Partners/SIFMA Survey Results

60 participants, 56% private firms, $68tn in combined participant AUM

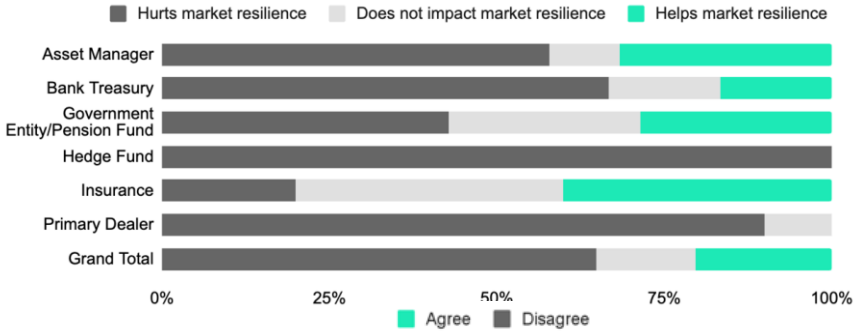
Participants (>75%) largely agreed…

- Additional transparency would disincentivize intermediation and would not help Treasury market resilience
- Volumes should be capped and transparency requirements should be different in less liquid segments
- Dissemination implementation should be phased in over time
- Do not favor shortening reporting to 60 minutes, or only support this for on-the-runs, as costs incurred could outweigh benefits

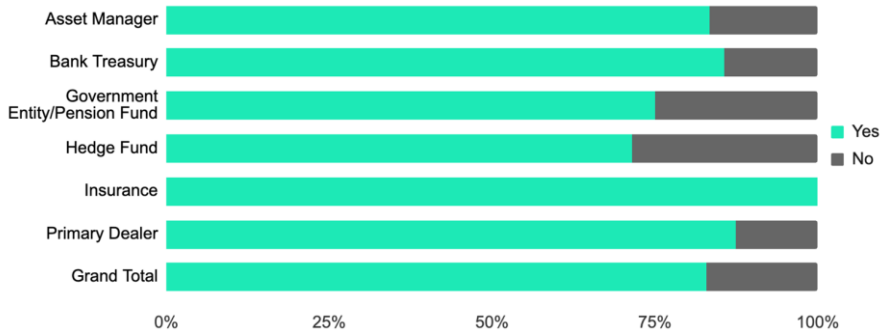
Do you believe that additional transparency would incentivize or disincentivize intermediation?



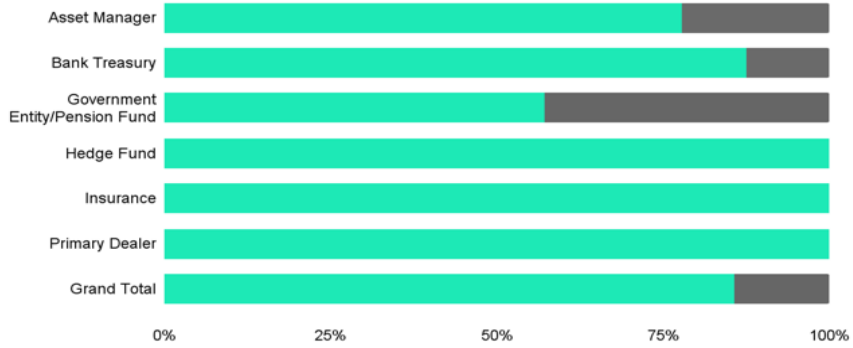
Do you believe that additional transparency would improve Treasury market resilience?



Should volumes be capped if data is disseminated at the transaction level as is done for other fixed-income securities (i.e. corporate bonds)?



Should transparency requirements be different in less liquid segments (i.e. off-the-run) than in more liquid market segments (On-the-run)?



* Source: Additional Transparency for Secondary Market Transactions of Treasury Securities- A Study on the Impact to the Market and Market Participants – October 2022. Sia Partners, was asked by SIFMA to conduct a study reviewing the Department of Treasury RFI related to transparency for U.S. Treasury products.

Post-Implementation Studies

- Market liquidity has been impacted by a number of factors over the last two decades
  - **Quantitative easing** and a period of extended low volatility
  - **Technological developments**, including electronification and high frequency trading
  - **New participants**, including algorithmic, high frequency trading firms, and ETFs
  - **Behavioral change**, including more buy and hold investment
  - **Regulatory change**, including pre/post-trade transparency, centralized trading, prudential regulations, central clearing, etc.
- Analysis of long-term trends is limited due to incomplete time series in some asset classes
- Observations on liquidity indicators in other markets may not be relevant to Treasuries in a different macro-economic and regulatory environment

Post Implementation Studies in Swaps and Futures

Swaps

- The Dodd-Frank derivatives market reforms, including pre- and post-trade transparency and centralized trading requirements, led to an improvement in liquidity metrics for IRS of between 12% and 19%, driven by an increase in competition between dealers (Benos, Payne, and Vasios 2020)

Futures

- The mean-variance frontier becomes significantly worse as order size increases, but that the frontier has improved over time. The costs of executing large orders on behalf of customers are significantly worse as order size increases (Gousgounis, Onur and Tuckman 2020)

Sources: Benos, Payne, and Vasios (2020). Centralized Trading, Transparency, and Interest Rate Swap Market Liquidity: Evidence from the Implementation of the Dodd Frank Act; Gousgounis, Onur and Tuckman (2020) Large Order Size Liquidity in Treasury Markets; Schultz and Song 2019, Transparency and dealer networks: Evidence from the initiation of post-trade reporting in the mortgage backed security market

Post-Implementation Studies: U.S. Mortgage Bonds

The U.S. Mortgage bond market transparency experience is a good proxy for Treasuries

- The introduction of post-trade transparency in the TBA market was successful at reducing transaction costs

Trading costs	Trading costs fell for investors and dealers have less need for interdealer trading (Schultz and Song 2019)
Transaction size	Implied average transaction sizes have increased (Schultz and Song 2019)
Dealer capital commitment	Dealers can commit less capital (Schultz and Song 2019)
Trading activity and turnover	Trade volume declined by almost 13% while the number of trades declined by 2.5% pre- to post-transparency (Schultz and Song 2019)
Industry concentration	Industry concentration increases as “peripheral dealers” less competitive (Schultz and Song 2019)

Sources: Schultz and Song, Transparency and dealer networks: Evidence from the initiation of post-trade reporting in the mortgage backed security market (2019)

Post-Implementation Studies: U.S. Corporate Bonds

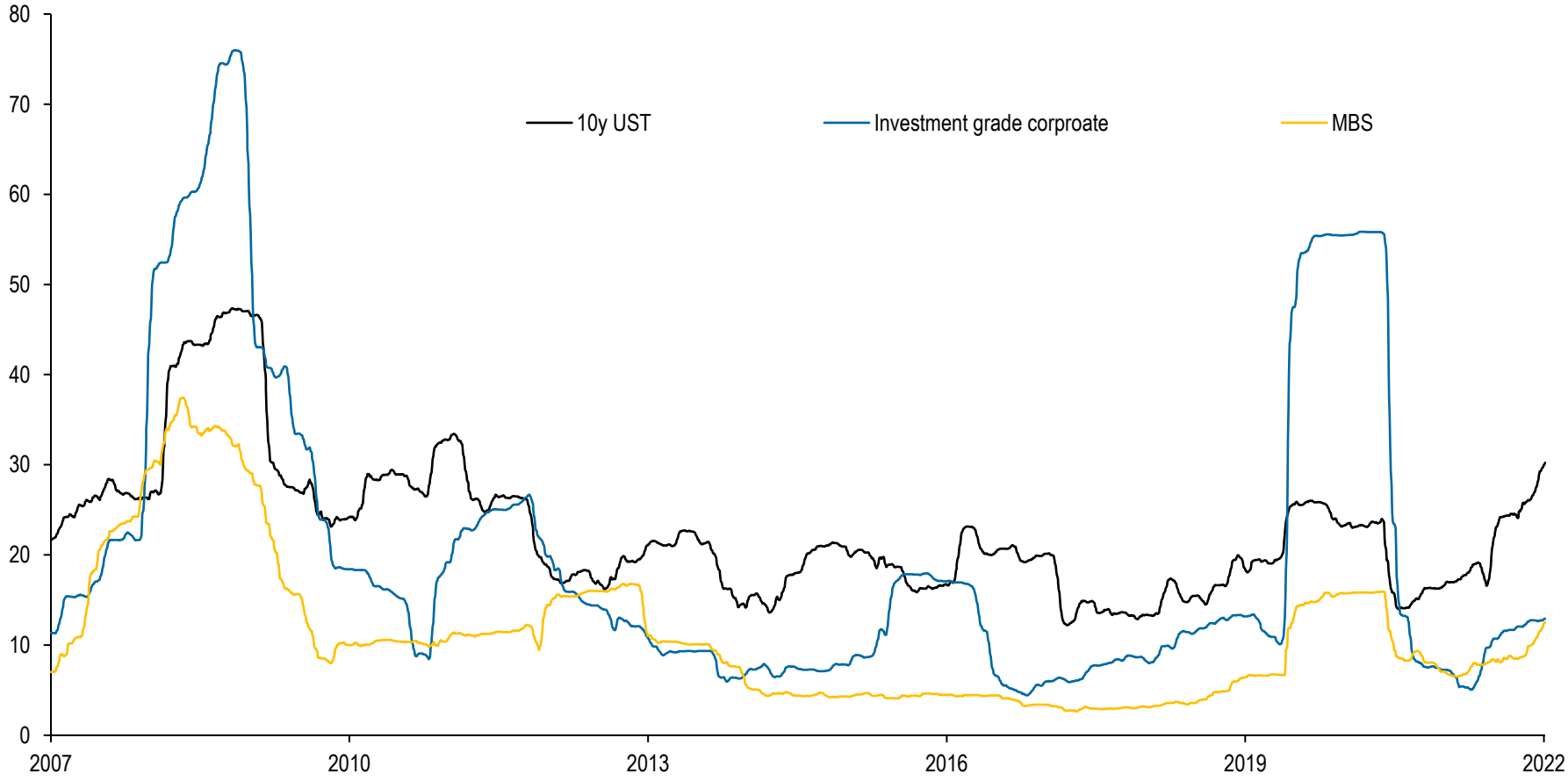
The U.S. Corporate bond market has the most extensive literature on post-implementation impacts

Transaction costs	■ For 144A bonds, transaction costs decreased following trade dissemination by approximately 10% with larger reductions observed for block transactions and bonds with lower dealer competition (Jacobsen and Venkataraman 2018). ■ Introduction of transparency through TRACE is associated with a decline in trading costs for at least some bonds (Goldstein, Hotchkiss, Sirri 2007).
Bid-ask spreads	■ Bid-ask spreads narrowed and trading costs reduced by some measures (Mizrach 2015; Asquith, Covert and Pathak 2019). ■ Except for very large trades, spreads on newly transparent bonds decline relative to bonds that experience no transparency change (Goldstein, Hotchkiss, Sirri 2007). ■ Investors have benefited from the increased transparency, through substantial reductions in the bid-ask spreads (Maxwell, Bessembinder, and Hendrik 2008).
Dealer capital commitment	■ Liquidity provision evolved away from the traditional commitment of bank-affiliated dealer capital to absorb customer imbalances (Bessembinder, Jacobsen, Maxwell and Venkataraman 2016).
Block trades	■ Participants reported that large transactions were more difficult to execute, which resulted in increased transaction costs and lower daily liquidity for investors (Greenwich Associates 2015). ■ The proportion of total volume traded in blocks of $5million or more fell by almost 15% (Mizrach 2015).
Transaction size	■ The average trade size for the 1,000 most active issues dropped almost 35% between 2007 and 2013 (Mizrach 2015).
Trading activity and turnover	■ Trading activity for some categories of bonds declined after the TRACE rules went into effect. Large trades as well as high yield trades saw the largest negative impact in trading activity (Asquith, Covert and Pathak 2019).

Sources: Jacobsen and Venkataraman 2018, Does trade reporting improve market quality in an institutional market? Evidence from 144A corporate bonds; Mizrach 2015, Analysis of Corporate Bond Liquidity; Greenwich Associates 2015, The Continuing Corporate Bond Evolution; Asquith, Covert and Pathak 2019, The Effects of Mandatory Transparency in Financial Market Design: Evidence from the Corporate Bond Market; Bessembinder, Jacobsen, Maxwell, and Venkataraman 2016, Capital Commitment and Illiquidity in Corporate Bonds; Maxwell, Bessembinder, and Hendrik 2008, Transparency and the Corporate Bond Market. Michael A. Goldstein, Edith S. Hotchkiss, Erik R. Sirri, Transparency and Liquidity: A Controlled Experiment on Corporate Bonds, The Review of Financial Studies, Volume 20, Issue 2, March 2007

Transparency appears to have limited impact in reducing volatility during times of stress

1-month delivered vol* in 10-year Treasury yields, investment grade corporate credit spreads, and 30-year current coupon MBS; bp



* 1-year standard deviation of monthly changes in yields and spreads
Source: J.P. Morgan research

Agenda

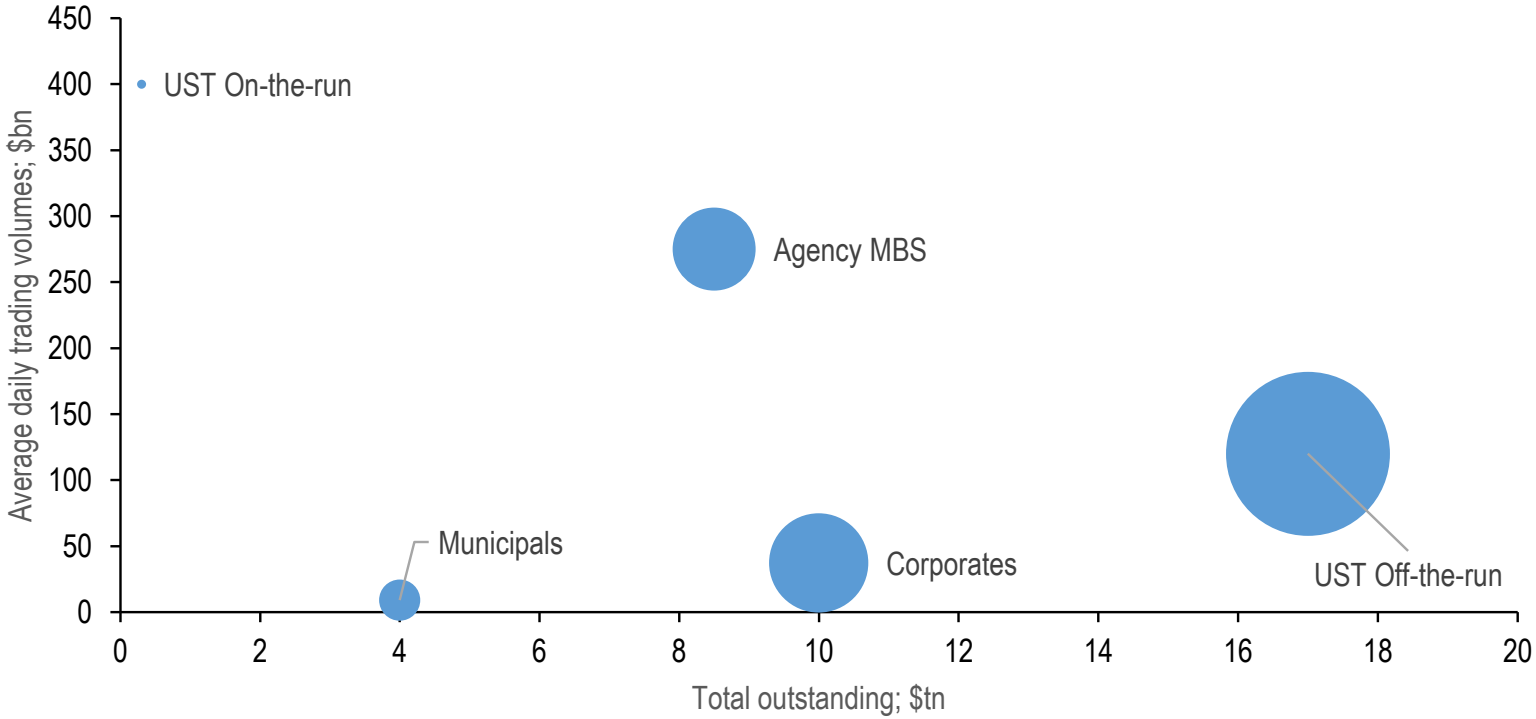
Cross-asset comparison shows the Treasury market is more highly concentrated in fewer CUSIPS, with lower direct retail ownership

	Agency MBS	Corporates	Municipals	UST On-the-run	UST Off-the-run
Total outstanding	~$8.5tn	~$10tn	~$4tn	$0.3tn	$17tn
Average daily volume (2021 average notional value)	~$275bn	~$37bn	~$9bn	~$400bn	~$120bn
Average daily transaction volume (2021 average transactions)	~10,500	~64,000 2021 IG+HY transactions	~30,000	~140,000	~17,000
Average trade size	~$25mn	~$600,000	~$300,000	~$3mn	~$7mn
Electronification	50 – 60% TBA market	30% IG 12% HY	10 – 15%	65%	35%
Number of issuers	3	~10,000	~50,000	1	1
Number of securities	~1 million	~90,000	~1 million	~7	~300
Retail Investors	4.5%	34.7%	26.4%	7.6% On-the-Run + Off-the-Run	

Source: SIFMA, MSRB Factbook, CBOE, FINRA, TRACE Factbook, Greenwich Associates, World Bank, JPM Research, U.S. Department of the Treasury
Note: All figures are approximate and indicative only; UST on- and off-the-run figures are for nominal coupons only

Off-the-run Treasuries size and trading volume are more similar to corporates, munis and Agency MBS

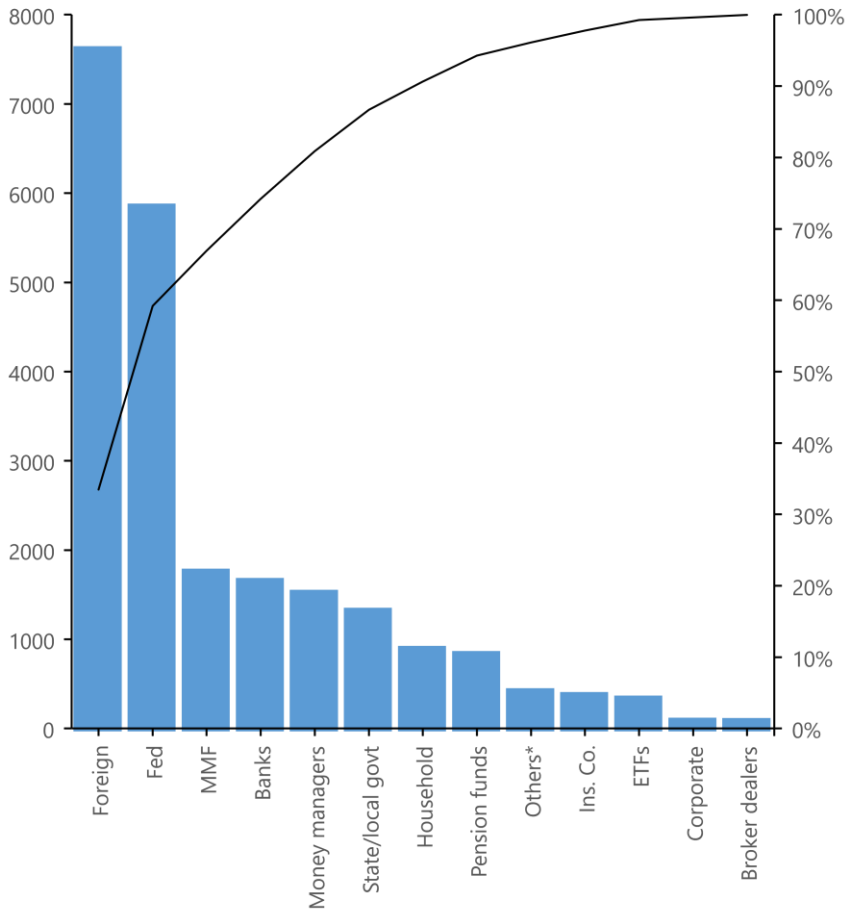
Average daily trading volumes in various fixed income products, ($bn); versus total outstanding by product ($tn); dot sizes scaled by total outstanding in each product



Source: SIFMA, MSRB Factbook, CBOE, FINRA, TRACE Factbook, Greenwich Associates, World Bank, JPM Research, U.S. Department of the Treasury
Note: All figures are approximate and indicative only; UST on- and off-the-run figures are for nominal coupons only

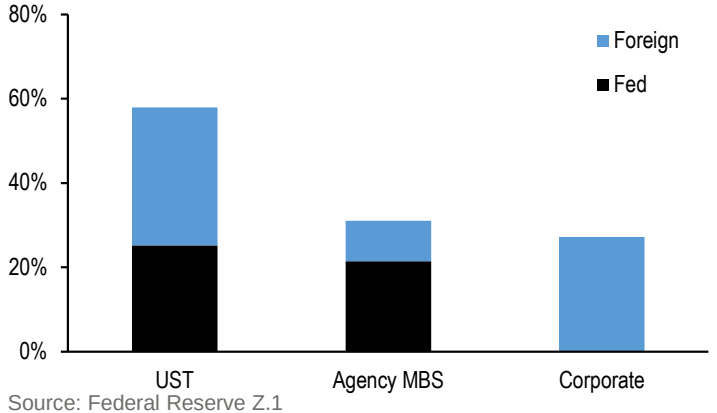
Treasuries are supported more by foreign buyers than direct retail buyers

Ownership of Treasury market by investor type ($bn lhs, % rhs)



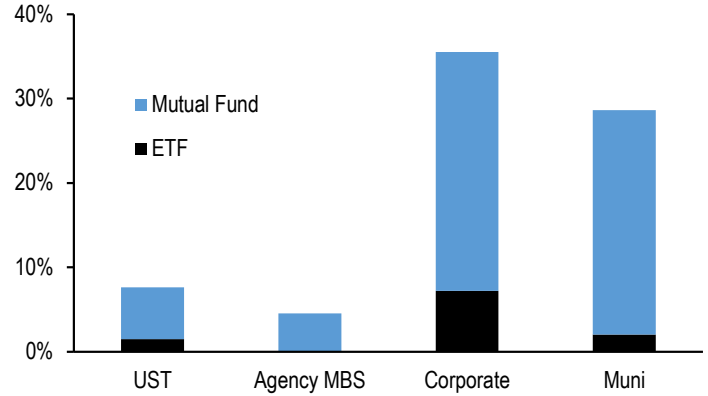
Source: Federal reserve Z.1

Federal Reserve and foreign share of US bond markets; %



Source: Federal Reserve Z.1

ETF and mutual fund share of US bond markets; %

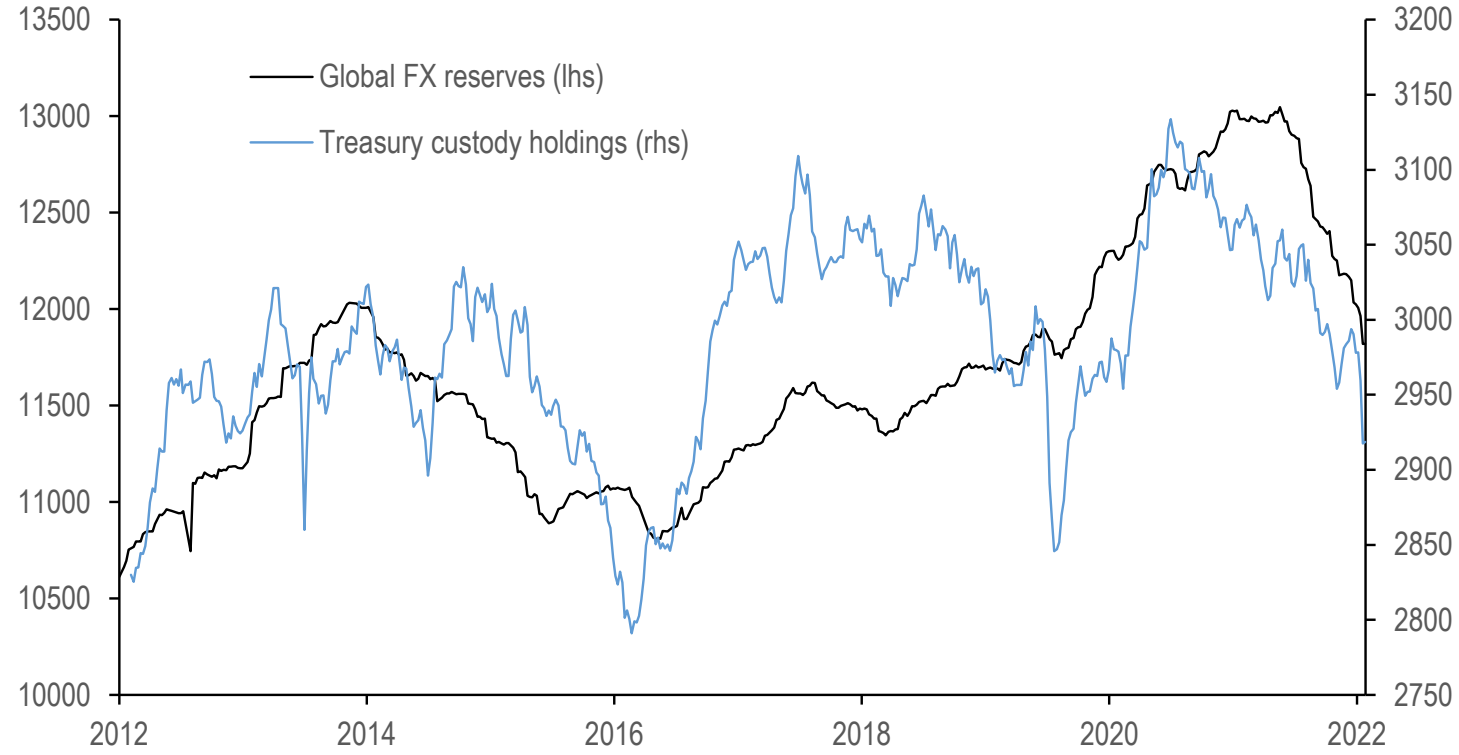


Source: Federal Reserve Z.1

- In contrast to other large US fixed income markets, the Treasury market is disproportionately held by foreign institutional investors, while retail ownership is significantly smaller
- Foreign holders tend to be concerned with the ability to execute large blocks of risk with minimal price impact

Though foreign official institutions are longer-term holders of Treasuries, there have been bouts of selling in recent years, largely in off-the-run Treasuries

Global foreign exchange reserves (lhs; $bn) versus Treasuries held in custody for foreign official and international accounts (rhs, $bn)

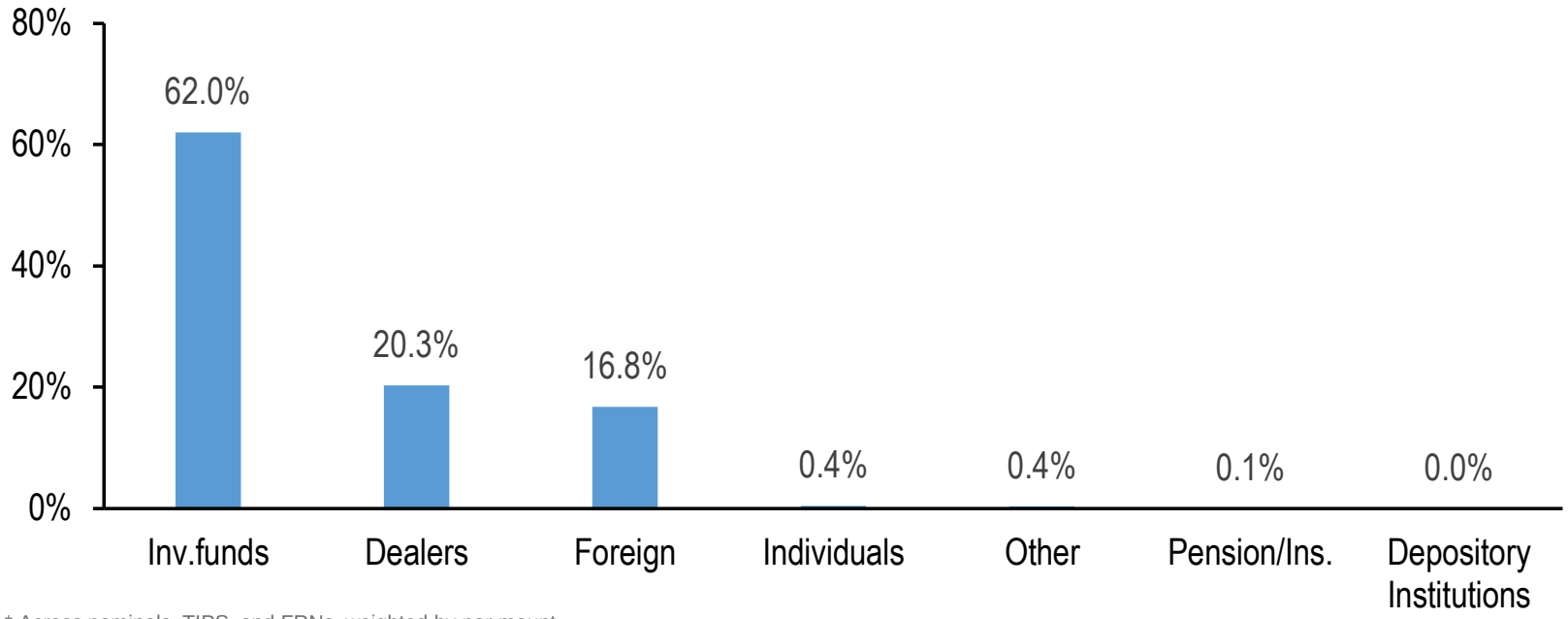


Source: Bloomberg Finance L.P., Federal Reserve

- FX reserve managers are not just buy and hold investors, but have been significant sellers of Treasuries numerous times over the last decade to intervene in currency markets or fund local needs for USD

There are three main investor types who support the auction process

Auction allotments by investor type, YTD 2022 average*; %



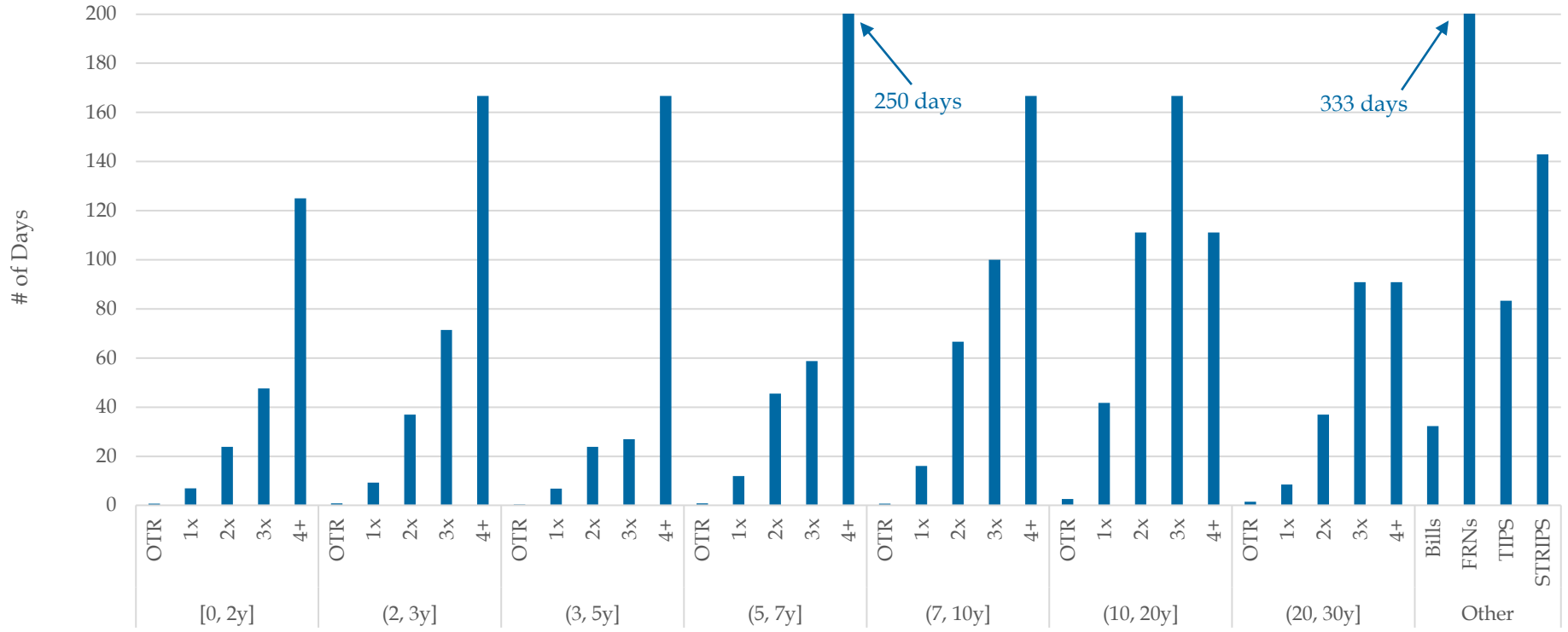
* Across nominals, TIPS, and FRNs, weighted by par mount
Source: US Treasury

- The Treasury auction process is integral to regular and predictable, cost-effective funding for Treasury
- RFI feedback from Treasury's main investors should be strongly considered to ensure strong turnout at auctions

Agenda

There is strong liquidity in on-the run securities, with significantly quicker turnover than off-the-runs, Bills, FRNs, TIPS and STRIPS…

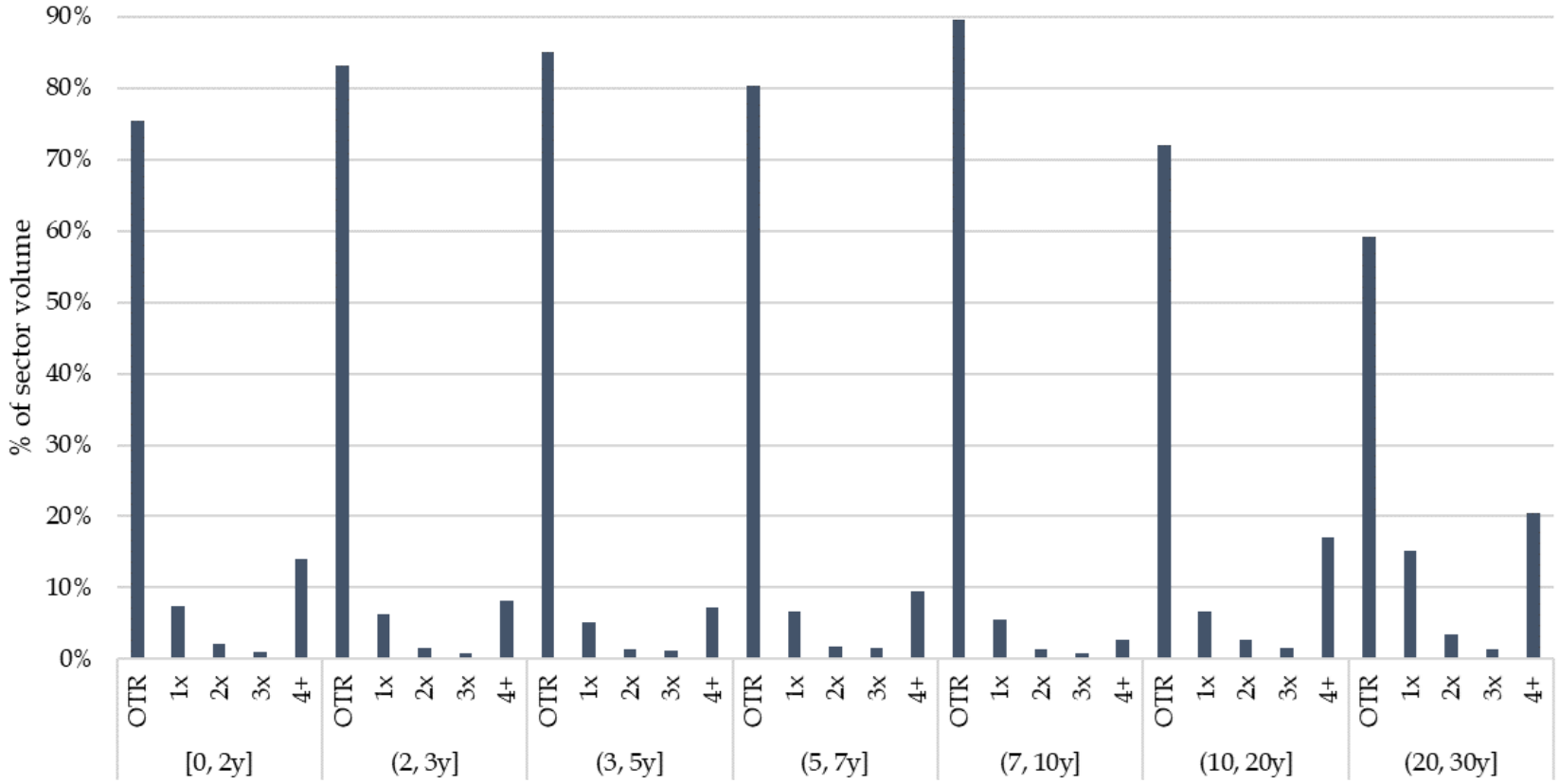
Implied full turnover in number of days
Based on average daily volumes and float amount that excludes SOMA holdings and stripped amounts in 2022



* 4+ includes all off-the-runs greater than the 3rd off-the-run
Source: FINRA TRACE, U.S. Department of the Treasury

…and on-the-run securities make up a large portion of overall Treasury trading volume…

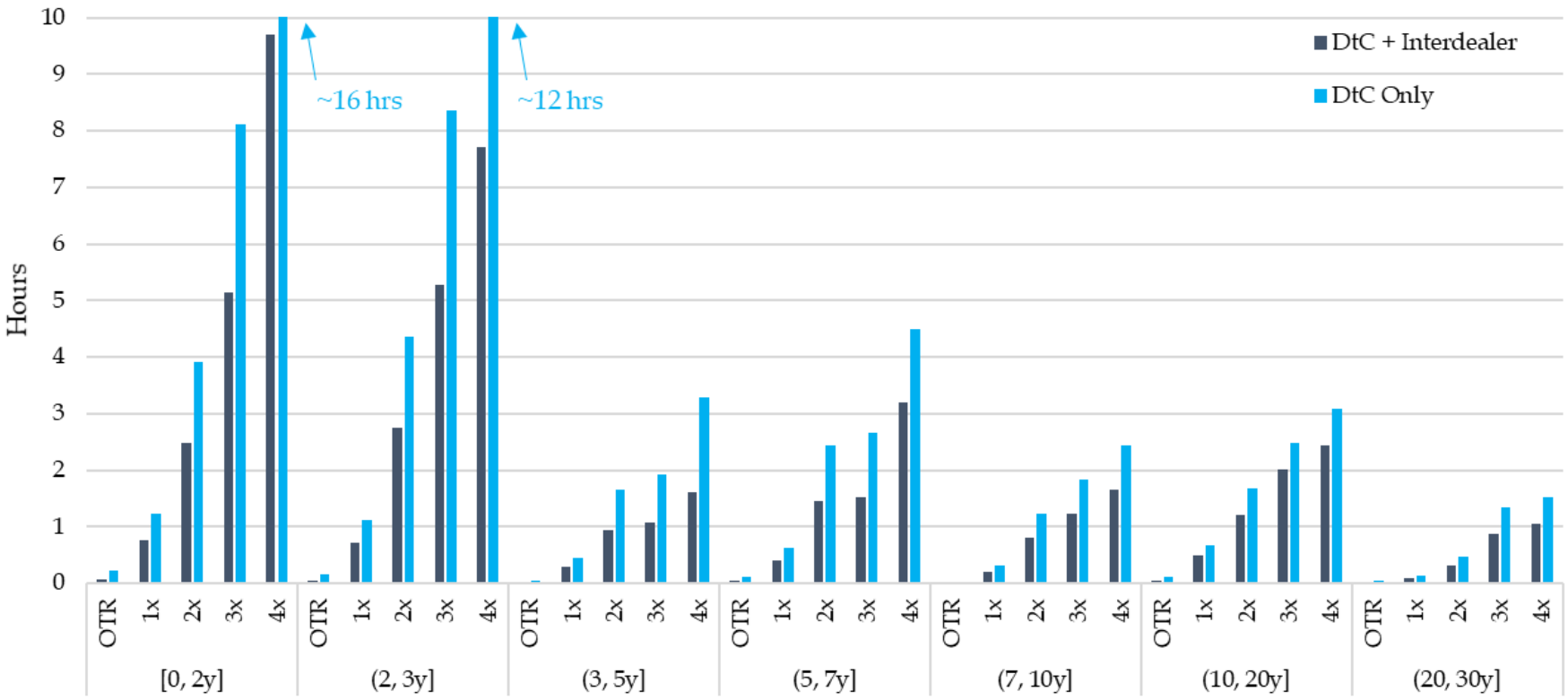
On- and off-the-run nominal coupon volumes, share of sector volume
Based on average daily volumes in DV01 in 2022



* 4+ includes all off-the-runs greater than the 3rd off-the-run
Source: FINRA TRACE, U.S. Department of the Treasury

…but the implied time to transact a significant block of duration rises sharply in more deeply off-the-run securities

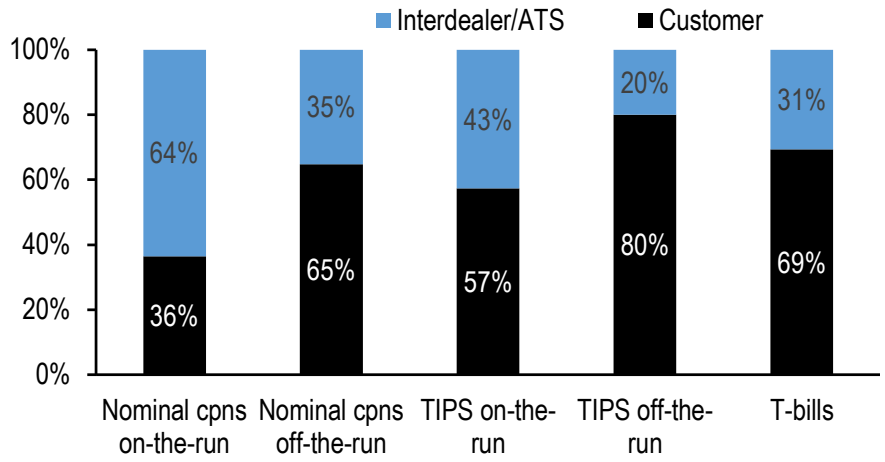
Implied hours to transact $100k DV01
By on- vs. off-the-run status; Based on average hourly volume from 8am to 4pm in 2022



* 4x is only 4th off-the-run security
Source: FINRA TRACE, U.S. Department of the Treasury

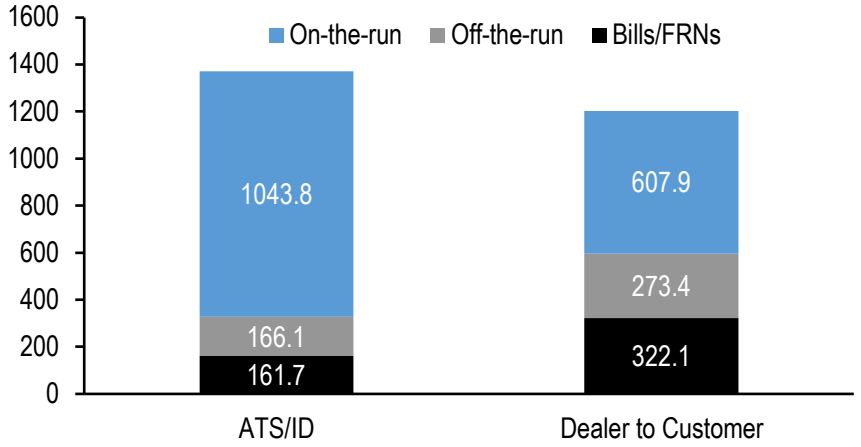
Less liquid securities are more commonly traded as Dealer to Customer (DTC)

Treasury trading volume by product type, customer vs interdealer/ATS share; %



Source: FINRA TRACE

Treasury trading volumes by counterparty, week of 7/22/22; $bn

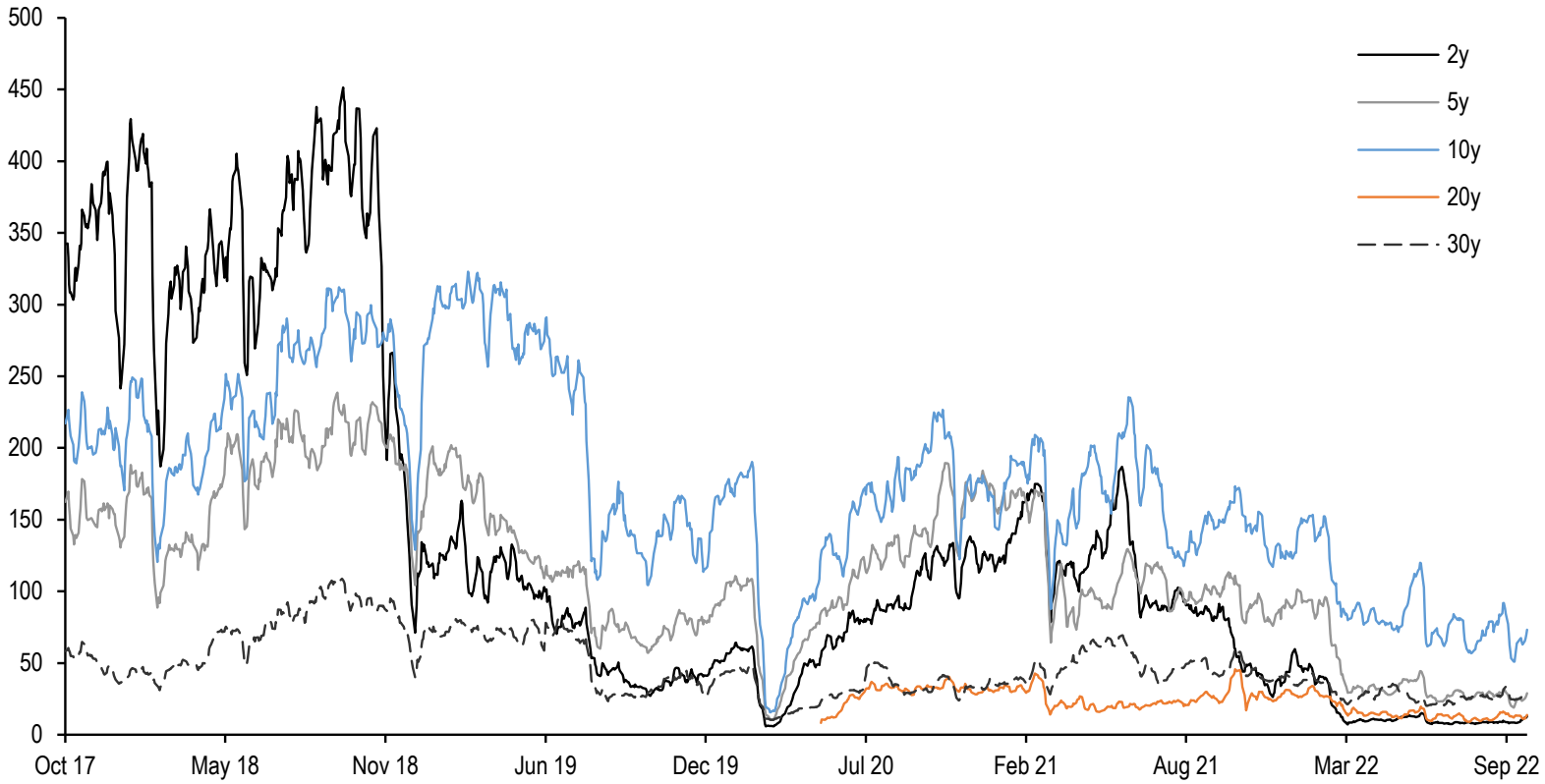


Source: FINRA TRACE, SIFMA estimates
Nominal coupons and TIPS separated into remaining years-to-maturity to include current on-the-runs. Strips included in nominal coupons off-the-run volume.

- Dealer to Customer trading represents more of the customer base who is likely to trade off-the-run securities
  - RFI feedback from this group argues against dissemination given concerns over liquidity
- ATS and interdealer market is increasingly dominated by high frequency traders who trade on-the-run securities
  - RFI feedback from this group argues in favor of additional transparency across all treasury securities to drive increased trading volumes

Treasury market liquidity is not uniformly distributed across the curve

Treasury market depth* by on-the-run tenor, 1-week moving average; $mn 10-year Treasury equivalents

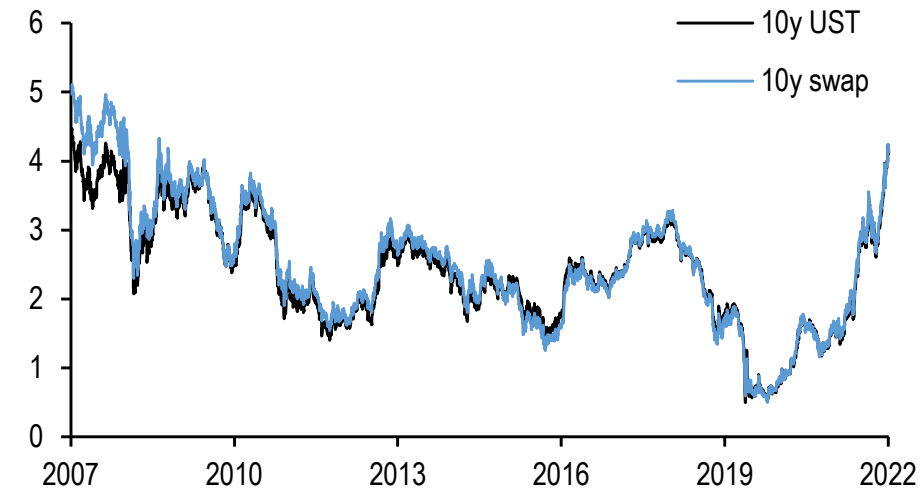


* Market depth is the sum of the three bids and offers by queue position, averaged between 8:30 and 10:30am daily.
Source: BrokerTec, J.P. Morgan research

- Liquidity across tenors differs greatly and shifts over time, making DV01 equivalents an important consideration for any proposed dissemination regime

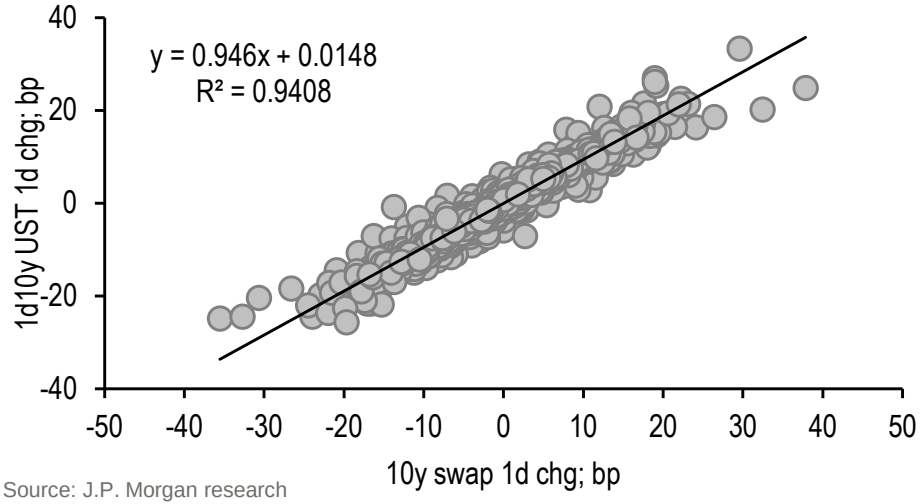
On-the-run Treasuries closely resemble swaps liquidity and price action with a high degree of correlation over the last 15 years

10-year Treasury and 10-year swap yields; %



Source: J.P. Morgan research

Daily changes in 10-year Treasury yields regressed on daily changes in 10-year swap yields (bp), regression over the last 15 years; bp

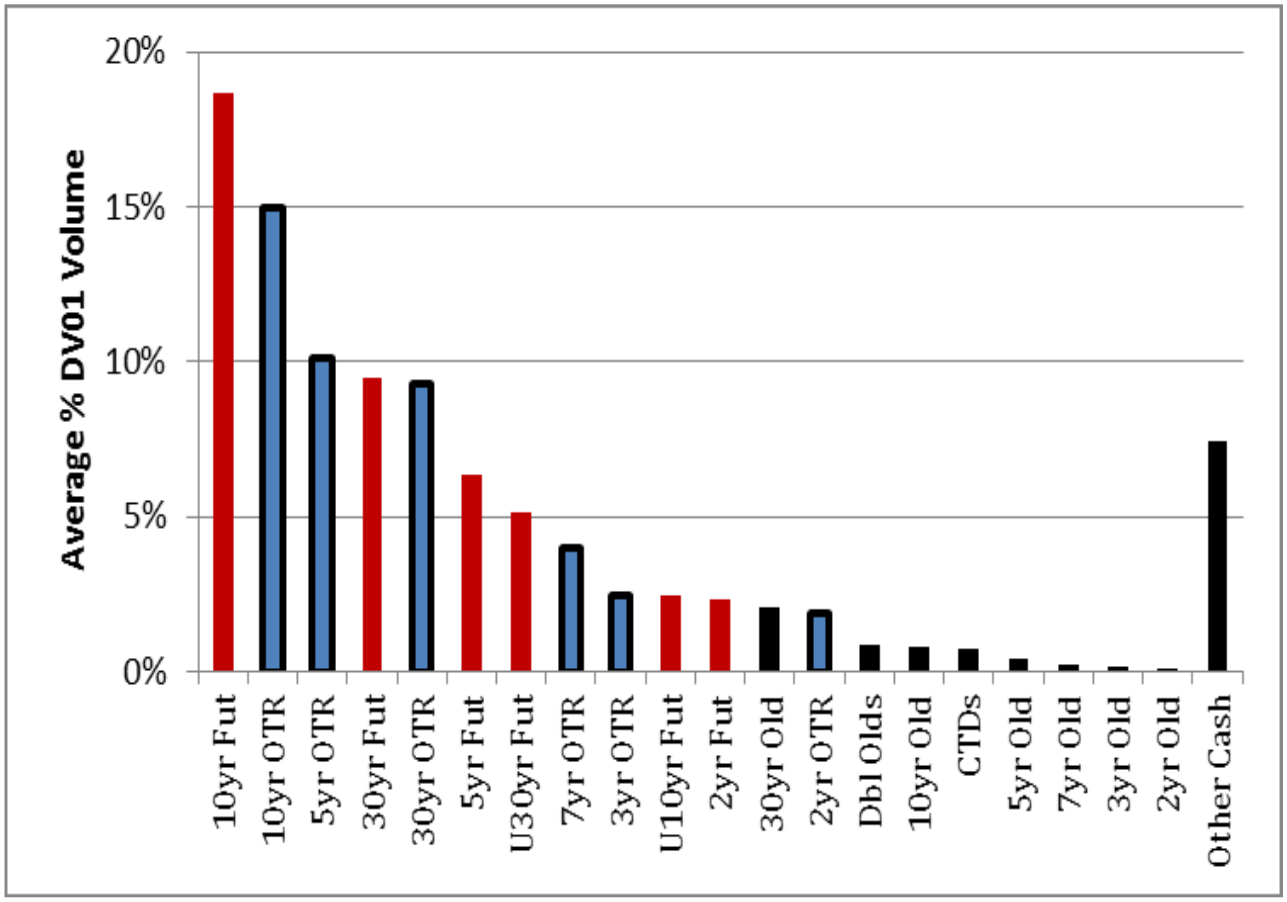


Source: J.P. Morgan research

- Given that on-the-run Treasury price action closely resembles that of swaps, the swaps reporting regime may be a good guide for on-the-run Treasuries

On-the-run Treasuries volumes also closely resemble Treasury futures

Daily traded DV01 in on-the-run Treasuries is more similar to futures than off-the-run



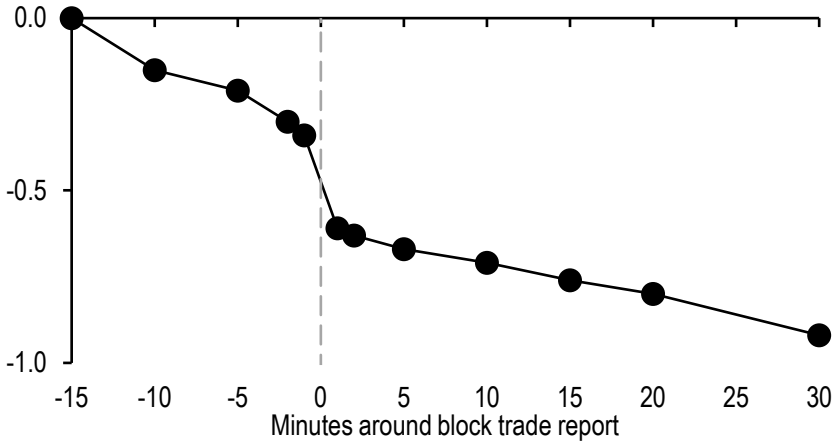
Source: Baker, McPhail, and Tuckman (2018) The Liquidity Hierarchy in the U.S. Treasury Market: Summary Statistics from CBOT Futures and TRACE Bond Data

- Given that on-the-run Treasury volumes closely resemble that of Treasury futures, the futures reporting regime may be a good guide for on-the-run Treasuries

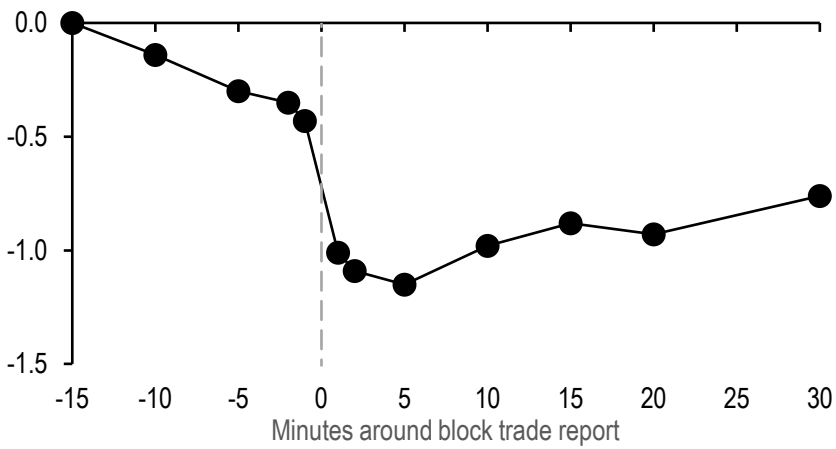
Treasury future block dissemination has price impacts

3yr average impact numbers by instrument (All Blocks in 32nds, negative means move against liquidity provider):

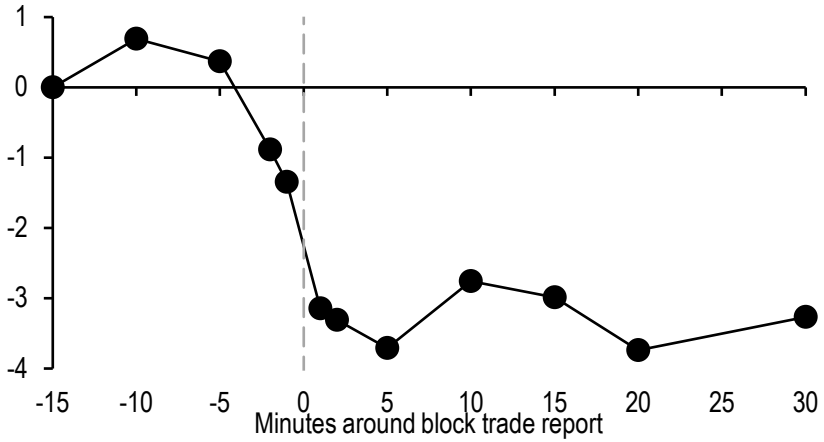
FV contract



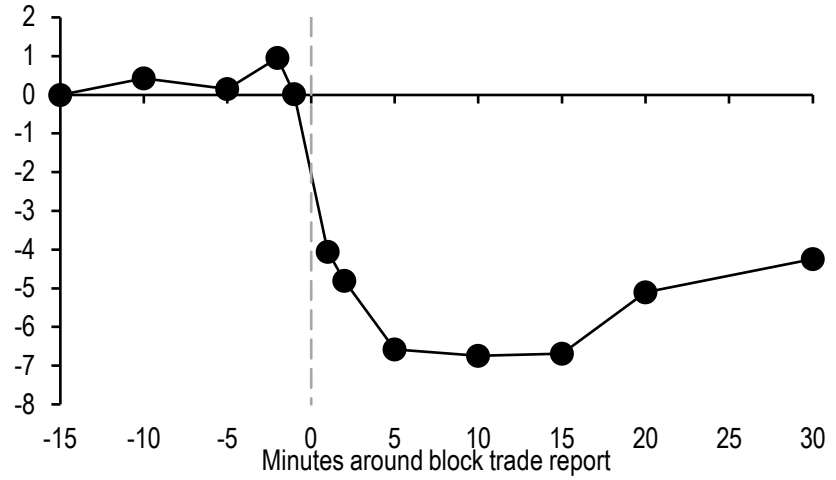
TY contract



US contract



WN contract

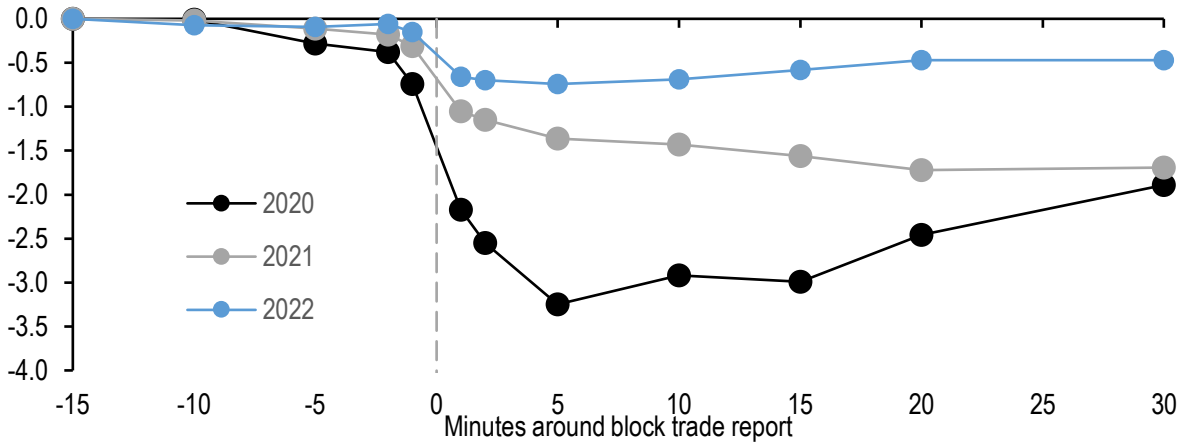


Source: TBAC member proprietary data

Treasury future block dissemination price impacts have varied over the years and is largest in times of stress

Average annual impact numbers (All Blocks in 32nds, negative means move against liquidity provider):

Average impact by years
Impact in price (in 32nds, negative is against liquidity provider):



Source: TBAC member proprietary data

Agenda

Summary of Findings

- Changing Treasury market intermediation opens the door to further study transparency for Treasuries
- While RFIs and Surveys offered mixed views on whether increased transparency will benefit liquidity and resilience, participants agreed on phased-in dissemination, dissemination delays and volume caps
- Post-trade transparency studies showed dissemination in other asset classes helped drive tighter bid/offer, but at the expense of smaller trade sizes, lower volumes and difficulty executing large transactions
- Treasury trade dissemination may enable PTFs to expand their footprint beyond on-the-runs, but they tend to pull back liquidity in times of stress
- Data shows strong parallels to Treasury futures and swaps for On-the-runs and corporate bonds and MBS for Off-the-runs, which may be used in consideration of a differentiated transparency approach

Treasury Market Summary	On-the-runs	Off-the-runs, Bills, FRNs, TIPS, STRIPS
Market resembles:	**Treasury futures and swap markets**	**Corporate and MBS markets**
Outstanding (largest amount)		✓
Volume (greatest amount)	✓	
# Securities (>300)		✓
Turnover (highest)	✓	
Daily traded DV01% (low)		✓
Common execution platform	**Alternative trading system**	**Dealer to customer**

Recommendations

1. **On-the-run securities should be subject to increased transparency and dissemination**
   - Implementation should be gradual to assess potential impacts
   - Implementation should strive to minimize operational costs to market participants
2. **On-the-run securities have similar volumes and liquidity profiles to futures and swaps**
   - Evidence from the futures market suggests that a volume cap should be applied for block trades
   - Evidence from the swaps market suggests delays should be applied for block trades
   - Block trade thresholds should be determined on a risk-adjusted basis similar to swaps thresholds (see appendix)
   - Thresholds may need to be adjusted over time as the market environment changes
   - Overnight Treasury trading has lower volume and market depth, suggesting delayed reporting, similar to other TRACE securities
3. **Impact of increased transparency and dissemination of on-the-run-securities should be assessed quantitatively and qualitatively**
   - Quantitatively against key performance indicators below – accounting for changes in market structure and the macro-environment
     - Average/median trade size
     - Trade volumes
     - Market depth
     - Price impact for varying trade sizes
     - Material changes to Treasury holdings by investor type
     - Bid/Ask spread
     - Changes to auction stats (direct vs non-direct, etc.)
   - Qualitatively through RFIs of feedback from market participants and other stake holders
   - Block sizes, caps and delays may need to be adjusted as the market changes

Recommendations

4. Off-the-runs, TIPS, STRIPS, Bills should continue to be subject to periodic aggregate disclosures

5. After assessing the impact of dissemination, incorporate observations into any evaluation of expanding to further segments

- First off-the-run securities may have enough volumes and liquidity to be evaluated for additional transparency and dissemination as part of a later implementation phase
- Further off-the-run securities, TIPS, STRIPS, Bills and FRNs should not be considered for transaction level reporting until dissemination impact is better understood

6. Continue to review other reforms that could address risk intermediation challenges

- Ensure completeness in reporting if market structure changes occur
- Examples cited in RFI responses, SIA Partners/SIFMA survey and other industry forums include:
  - Centralized Treasury and Repo Clearing
  - Adjustments to prudential requirements
  - Treasury buyback programs

Agenda

References

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- Baker, McPhail, and Tuckman (2018) The Liquidity Hierarchy in the U.S. Treasury Market: Summary Statistics from CBOT Futures and TRACE Bond Data
- Bessembinder, Jacobsen, Maxwell, and Venkataraman (2016), Capital Commitment and Illiquidity in Corporate Bonds;
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- Maxwell, Bessembinder, and Hendrik (2008), Transparency and the Corporate Bond Market
- Mizrach (2015), Analysis of Corporate Bond Liquidity
- Schultz and Song (2019) Transparency and dealer networks: Evidence from the initiation of post-trade reporting in the mortgage backed security market
- SIFMA and Sia Partners (2022) Additional Transparency for Secondary Market Transactions of Treasury Securities. A Study on the Impact to the Market and Market Participants

Agenda

Appendix

TRACE volume statistics

By remaining maturity and on- vs. off-the-run status; Float excludes SOMA holdings, as well as stripped amounts for Nominals and TIPS; Jan. - Sep. 2022

Nominals		Avg. CUSIPS	Avg. Float ($B)	ADV ($B)	Turnover (%)	Implied Full Turnover (Days)
[0, 2y]	OTR	1	49	73.5	150.9	0.7
	1x	1	50	7.3	14.5	6.9
	2x	1	52	2.2	4.2	23.8
	3x	1	53	1.1	2.1	47.6
	4+	99	3,499	26.8	0.8	125.0
(2, 3y]	OTR	1	46	56.9	123.7	0.8
	1x	1	48	5.1	10.7	9.3
	2x	1	49	1.3	2.7	37.0
	3x	1	51	0.7	1.4	71.4
	4+	37	1,357	7.8	0.6	166.7
(3, 5y]	OTR	1	52	122.0	234.2	0.4
	1x	1	54	7.9	14.7	6.8
	2x	1	55	2.3	4.2	23.8
	3x	1	56	2.1	3.7	27.0
	4+	56	2,122	13.5	0.6	166.7
(5, 7y]	OTR	1	45	53.5	119.2	0.8
	1x	1	47	3.9	8.3	12.0
	2x	1	50	1.1	2.2	45.5
	3x	1	52	0.9	1.7	58.8
	4+	33	1,519	6.3	0.4	250.0
(7, 10y]	OTR	1	68	103.3	152.1	0.7
	1x	1	108	6.7	6.2	16.1
	2x	1	111	1.7	1.5	66.7
	3x	1	109	1.1	1.0	100.0
	4+	11	637	3.9	0.6	166.7
(10, 20y]	OTR	1	31	11.8	38.6	2.6
	1x	1	58	1.4	2.4	41.7
	2x	1	64	0.6	0.9	111.1
	3x	1	65	0.4	0.6	166.7
	4+	23	423	3.7	0.9	111.1
(20, 30y]	OTR	1	40	26.6	67.0	1.5
	1x	1	61	7.2	11.8	8.5
	2x	1	62	1.7	2.7	37.0
	3x	1	62	0.7	1.1	90.9
	4+	36	951	10.2	1.1	90.9
Other securities						
Bills		50	3,864	118.1	3.1	32.3
FRNs		8	572	1.5	0.3	333.3
TIPS		48	1,294	15.5	1.2	83.3
STRIPS		145	370	2.7	0.7	142.9

4+ includes all off-the-runs greater than the 3rd off-the-run

Source: FINRA TRACE; U.S. Department of the Treasury

Appendix

TRACE trade statistics, dealer-to-customer and interdealer

By remaining maturity and on- vs. off-the-run status; 8am - 4pm, Jan. - Sep. 2022; Implied trade time measures the minutes to trade a given size based on hourly volumes

		Hourly Volume ($millions)		Trade Size ($millions)				Implied Trade Time for Specified Sizes (minutes)			
Nominals		Med. Notional	Avg. Notional	Med. Notional	Avg. Notional	Med. 100k DV01	Avg. 100k DV01	Med. Notional	Avg. Notional	Med. 100k DV01	Avg. 100k DV01
[0, 2y]	OTR	6,084.5	7,026.6	1.0	3.2	528.5	528.8	0.006	0.024	5.2	4.5
	1x	355.2	733.7	8.6	35.5	550.1	551.4	1.4	2.9	92.9	45.1
	2x	94.3	233.4	10.0	30.1	580.0	581.2	6.4	7.7	369.1	149.4
	3x	32.9	119.0	7.9	25.3	610.9	611.3	14.4	12.8	1,114.7	308.2
	4x	17.0	66.3	6.0	19.0	643.9	643.9	21.1	17.1	2,266.8	582.5
(2, 3y]	OTR	5,378.8	6,776.4	1.0	2.8	357.3	374.8	0.006	0.024	4.0	3.3
	1x	223.3	521.3	5.6	32.7	368.1	367.2	1.5	3.8	98.9	42.3
	2x	49.6	138.4	8.0	26.2	381.2	381.8	9.7	11.3	461.4	165.5
	3x	15.5	74.6	7.2	23.3	394.6	393.9	27.9	18.7	1,530.1	316.6
	4x	9.1	52.7	6.0	20.7	407.2	406.1	39.6	23.6	2,685.5	462.7
(3, 5y]	OTR	11,558.8	12,763.4	1.0	2.5	218.7	225.2	0.000	0.006	1.1	1.1
	1x	358.8	793.4	6.7	32.7	222.3	222.2	1.1	2.5	37.2	16.8
	2x	119.0	241.0	10.6	28.6	230.0	228.8	5.3	7.1	116.0	57.0
	3x	69.9	218.6	11.4	33.2	232.9	232.5	9.8	9.1	199.9	63.8
	4x	30.0	149.0	11.8	27.8	239.8	238.8	23.5	11.2	479.7	96.1
(5, 7y]	OTR	3,122.7	4,738.6	1.0	2.4	162.3	171.6	0.018	0.030	3.1	2.2
	1x	145.1	403.4	10.0	39.4	163.3	162.8	4.1	5.9	67.5	24.2
	2x	35.0	115.0	8.0	24.3	166.3	166.6	13.7	12.7	285.0	86.9
	3x	18.3	111.8	8.9	29.0	171.1	170.3	29.2	15.6	562.4	91.4
	4x	8.8	54.5	6.6	22.3	175.4	174.9	44.8	24.6	1,193.3	192.4
(7, 10y]	OTR	9,275.7	9,989.8	1.0	2.2	118.2	119.5	0.006	0.012	0.8	0.7
	1x	405.4	656.1	6.7	22.5	125.1	124.2	1.0	2.1	18.5	11.4
	2x	68.9	166.7	7.0	21.0	133.0	132.7	6.1	7.5	115.8	47.8
	3x	35.0	106.5	7.0	20.2	133.2	131.4	12.0	11.4	228.1	74.0
	4x	22.9	80.5	7.9	19.9	130.1	132.9	20.7	14.8	341.1	99.1
(10, 20y]	OTR	1,005.9	1,620.6	1.0	2.4	71.8	76.7	0.054	0.084	4.3	2.8
	1x	47.0	145.4	6.1	22.6	74.1	72.4	7.8	9.3	94.6	29.9
	2x	20.2	65.1	5.7	19.7	81.6	78.9	16.8	18.2	242.2	72.7
	3x	9.5	39.3	5.0	17.2	82.4	78.7	31.5	26.3	518.8	120.3
	4x	5.6	33.7	5.0	16.3	81.1	82.3	53.9	29.0	875.1	146.3
(20, 30y]	OTR	2,402.6	2,648.5	1.0	1.9	52.8	52.7	0.024	0.036	1.3	1.2
	1x	527.2	703.3	3.0	7.7	57.3	55.4	0.3	0.7	6.5	4.7
	2x	63.8	193.5	6.4	20.1	61.3	58.7	6.0	6.2	57.6	18.2
	3x	24.1	74.4	5.4	17.9	65.6	64.2	13.4	14.4	163.0	51.7
	4x	14.1	53.9	5.0	16.6	57.0	56.9	21.2	18.5	242.1	63.4

	Hourly Volume ($millions)		Trade Size ($millions)		Implied Trade Time for Specified Sizes (minutes)	
Other securities	Med. Notional	Avg. Notional	Med. Notional	Avg. Notional	Med. Notional	Avg. Notional
Bills	149.2	377.2	7.4	30.8	3.7	5.2
FRNs	5.7	30.9	5.0	21.6	109.4	51.8
TIPS	73.5	106.2	7.9	15.3	135.5	43.2
STRIPS	6.5	11.5	12.1	21.1	1,614.9	211.9

4x is only the 4th off-the-run security. For "Other securities," calculations at the security-level then aggregated with averages or medians as noted in the header. Median and average notional trade sizes excludes trades < $1M.

Source: FINRA TRACE; U.S. Department of the Treasury

Appendix

TRACE trade statistics, dealer-to-customer

By remaining maturity and on- vs. off-the-run status; 8am - 4pm, Jan. - Sep. 2022; Implied trade time measures the minutes to trade a given size based on hourly volumes

		Hourly Volume ($millions)		Trade Size ($millions)				Implied Trade Time for Specified Sizes (minutes)			
Nominals		**Med. Notional**	**Avg. Notional**	**Med. Notional**	**Avg. Notional**	**Med. 100k DV01**	**Avg. 100k DV01**	**Med. Notional**	**Avg. Notional**	**Med. 100k DV01**	**Avg. 100k DV01**
[0, 2y]	OTR	1,958.8	2,376.5	2.0	16.2	529.7	529.8	0.060	0.408	16.2	13.4
	1x	183.4	446.0	8.2	49.8	550.1	551.7	2.7	6.7	179.9	74.2
	2x	44.3	148.1	6.7	40.6	579.7	580.8	9.0	16.4	785.4	235.3
	3x	13.8	75.3	5.0	31.5	611.2	611.4	21.7	25.1	2,654.1	487.0
	4x	6.7	40.6	5.0	23.0	643.9	643.9	44.6	33.9	5,750.2	952.3
(2, 3y]	OTR	1,769.3	2,450.3	1.8	13.6	357.4	378.1	0.060	0.330	12.1	9.3
	1x	112.7	330.6	5.6	42.9	369.7	368.3	3.0	7.8	196.8	66.8
	2x	19.9	87.6	5.5	32.7	380.4	381.3	16.7	22.4	1,146.0	261.1
	3x	6.9	47.2	5.0	27.5	394.6	394.2	43.4	35.0	3,427.6	501.5
	4x	3.9	34.5	5.0	24.9	407.2	406.1	76.4	43.3	6,221.8	706.0
(3, 5y]	OTR	4,019.6	4,495.2	1.0	7.9	218.4	222.5	0.012	0.102	3.3	3.0
	1x	211.8	508.2	7.0	42.1	223.0	222.4	2.0	5.0	63.2	26.3
	2x	56.9	139.0	8.5	32.8	230.7	229.6	9.0	14.1	243.2	99.1
	3x	29.5	121.8	9.8	38.8	233.5	233.0	19.9	19.1	474.3	114.8
	4x	14.1	72.9	8.0	29.2	240.5	239.3	34.0	24.0	1,021.3	197.0
(5, 7y]	OTR	982.2	1,682.3	1.5	12.2	164.8	179.1	0.090	0.432	10.1	6.4
	1x	76.4	258.8	10.0	48.6	162.5	162.3	7.9	11.3	127.6	37.6
	2x	13.3	68.6	5.9	30.1	166.4	166.6	26.5	26.3	748.6	145.6
	3x	8.2	64.5	5.0	31.8	172.2	171.0	36.6	29.6	1,260.1	159.0
	4x	5.3	39.2	4.1	24.3	177.8	176.0	46.4	37.3	2,012.9	269.5
(7, 10y]	OTR	3,343.1	3,609.6	1.0	6.6	117.8	118.8	0.012	0.108	2.1	2.0
	1x	216.1	392.4	5.8	27.7	126.2	124.8	1.6	4.2	35.0	19.1
	2x	36.1	108.8	5.0	24.0	134.6	134.6	8.3	13.2	224.0	74.2
	3x	18.2	71.7	5.0	23.6	133.4	131.6	16.5	19.8	440.3	110.1
	4x	11.9	54.1	5.0	22.7	126.5	131.6	25.3	25.2	639.5	146.0
(10, 20y]	OTR	420.4	705.5	1.5	8.7	71.3	76.3	0.210	0.738	10.2	6.5
	1x	29.9	107.9	7.0	26.6	74.2	72.4	14.0	14.8	148.7	40.3
	2x	11.4	48.2	6.0	22.1	83.8	80.7	31.5	27.5	439.1	100.4
	3x	6.1	31.7	5.0	19.1	82.7	78.6	49.3	36.2	814.5	148.7
	4x	4.0	26.7	5.0	18.7	81.5	82.2	75.9	42.1	1,236.6	184.7
(20, 30y]	OTR	918.3	1,045.3	1.0	4.9	52.5	52.3	0.060	0.282	3.4	3.0
	1x	314.9	446.9	3.7	9.1	57.3	55.3	0.7	1.2	10.9	7.4
	2x	34.1	123.3	6.2	25.1	61.2	58.1	10.9	12.2	107.7	28.3
	3x	13.1	51.7	6.4	23.5	83.7	69.5	29.3	27.3	382.4	80.7
	4x	6.9	37.6	5.9	20.9	57.7	57.3	51.2	33.3	500.8	91.4

	Hourly Volume ($millions)		Trade Size ($millions)		Implied Trade Time for Specified Sizes (minutes)	
Other securities	**Med. Notional**	**Avg. Notional**	**Med. Notional**	**Avg. Notional**	**Med. Notional**	**Avg. Notional**
Bills	85.0	247.2	7.5	39.9	6.1	10.0
FRNs	3.6	28.6	7.7	31.0	223.4	74.5
TIPS	36.5	62.1	9.5	19.9	201.4	60.4
STRIPS	6.7	12.0	12.9	22.5	2,789.6	270.6

4x is only the 4th off-the-run security. For "Other securities," calculations at the security-level then aggregated with averages or medians as noted in the header. Median and average notional trade sizes excludes trades < $1M.

Source: FINRA TRACE; U.S. Department of the Treasury

Appendix

TRACE trade statistics; Jan-Sep 2022

Avg. daily volume
- On-the-run ~ $430B
- Off-the-run ~ $130B

Avg. daily # of transactions
- On-the-run ~ 187k
- Off-the-run ~ 38k

Avg. transaction size
- On-the-run ~ $2.3M
- Off-the-run ~ $3.4M

On- and off-the-run figures are for nominal coupons only
Source: FINRA TRACE; U.S. Department of the Treasury

Appendix

USD Swap Reporting Thresholds

Swaps Tenors	Cap Notl (mm)	DV01
6m<=1y	1100	111
1y<=2y	460	90
2y<=5y	240	108
5y<=10y	170	139
10y<=30y	120	217
*DV01 uses current rates and longest tenor in bucket		