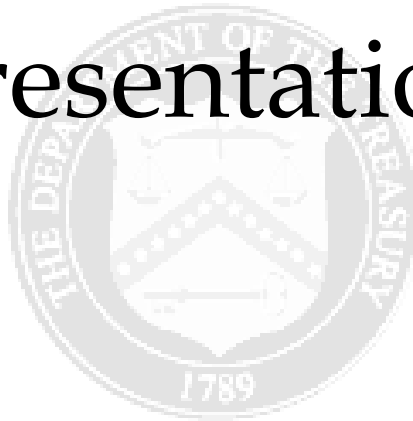


Treasury Presentation to TBAC



Office of Debt Management



Fiscal Year 2023 Q2 Report

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*All sources are from Treasury unless otherwise specified

Section I: Executive Summary



Highlights of Treasury's May 2023 Quarterly Refunding Presentation to the Treasury Borrowing Advisory Committee (TBAC)

Receipts and Outlays through Q2 FY2023 (without calendar adjustment)

	\$ 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 thru Q2 FY2023	\$2,048	-\$74	-3%	15.5%	-1.5%
Total Outlays thru Q2 FY2023	\$3,149	+\$359	+13%	23.8%	1.5%

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

Treasury OFF Near Term Fiscal Projections	Net Privately Held Marketable Borrowing (\$ billion)	Assumed End-of-Quarter Cash Balance (\$ billion)
Q3 FY2023	726	550 (Jun)
Q4 FY2023	733	600 (Sep)

*The cash balances for the next two quarter-ends assume enactment of a debt limit suspension or increase. Treasury's cash balance may be lower than assumed depending on several factors, including constraints related to the debt limit. If Treasury's cash balance for the end of either quarter is lower than assumed, and assuming no changes in the forecast of fiscal activity, Treasury would expect that borrowing would be lower by the corresponding amount(s).

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

Fiscal Year	Primary Dealers Median April 2023 (\$ billion)	OMB budget, March 2023 (\$ billion)	CBO Budget, February 2023 (\$ billion)
2023	2,080	2,328	2,143
2024	1,823	2,233	2,014
2025	1,595	1,809	1,844

**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 of monetary policy, the duration of SOMA redemptions, and the outlook for the economy.

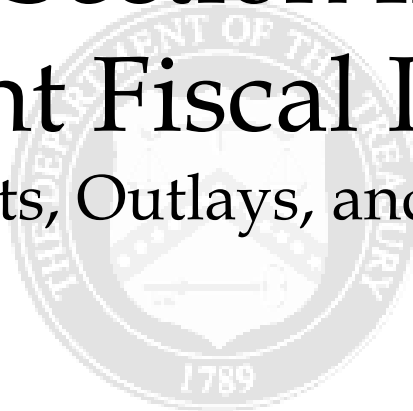
Latest Market Expectations for Treasury Financing in April:

- Primary dealers expected no changes to coupon auction sizes at the May refunding despite the fact dealers increased their aggregate median estimates for privately-held net marketable borrowing by \$600 billion for the FY23-FY25 period in May, relative to their February estimates.
- Given the forecasted financing gap over FY2023 and beyond, all dealers noted that bills could be used to address near term financing gaps because bills as a percentage of debt outstanding was close to the lower bound of the TBAC recommended range of 15 to 20 percent and demand for bills was expected to remain strong over the near term. Most dealers expect that coupon auction sizes will need to eventually rise.
- All dealers expected Treasury to keep TIPS issuance stable in the upcoming quarter.

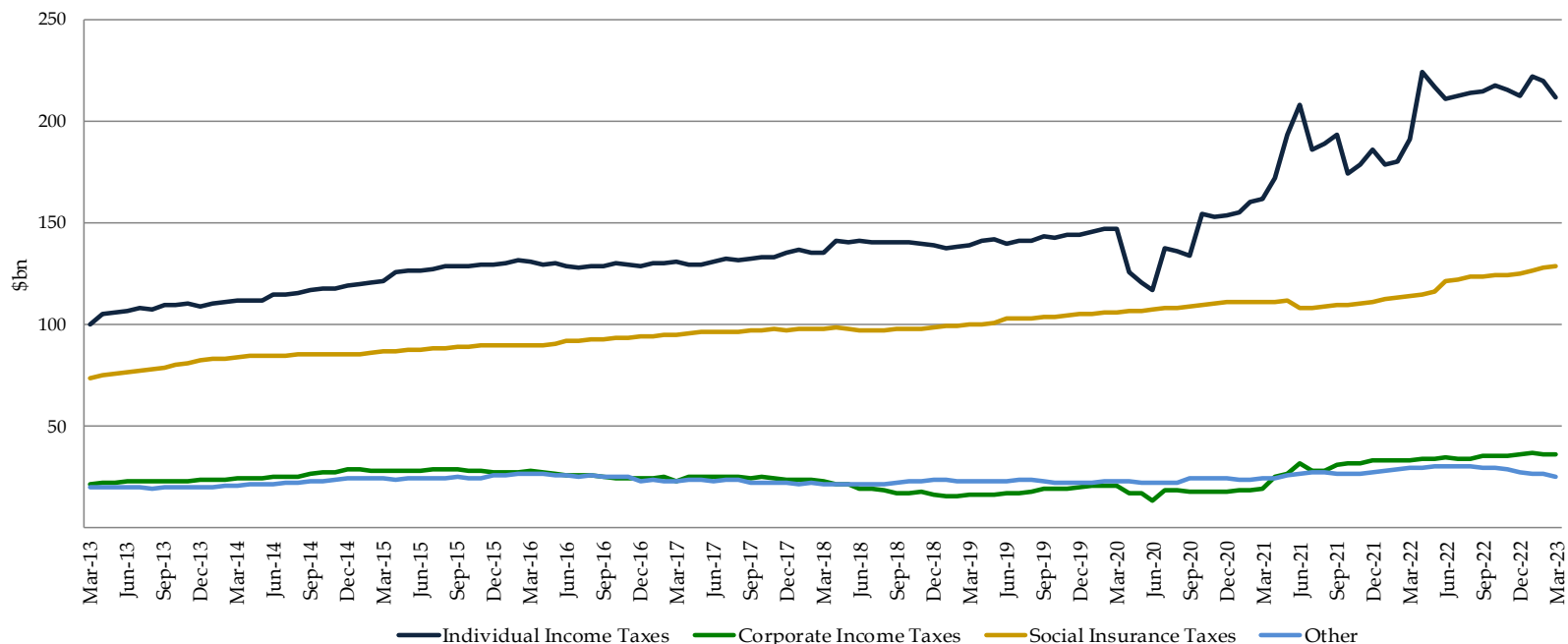
Section II:

Recent Fiscal Results

Receipts, Outlays, and Deficits



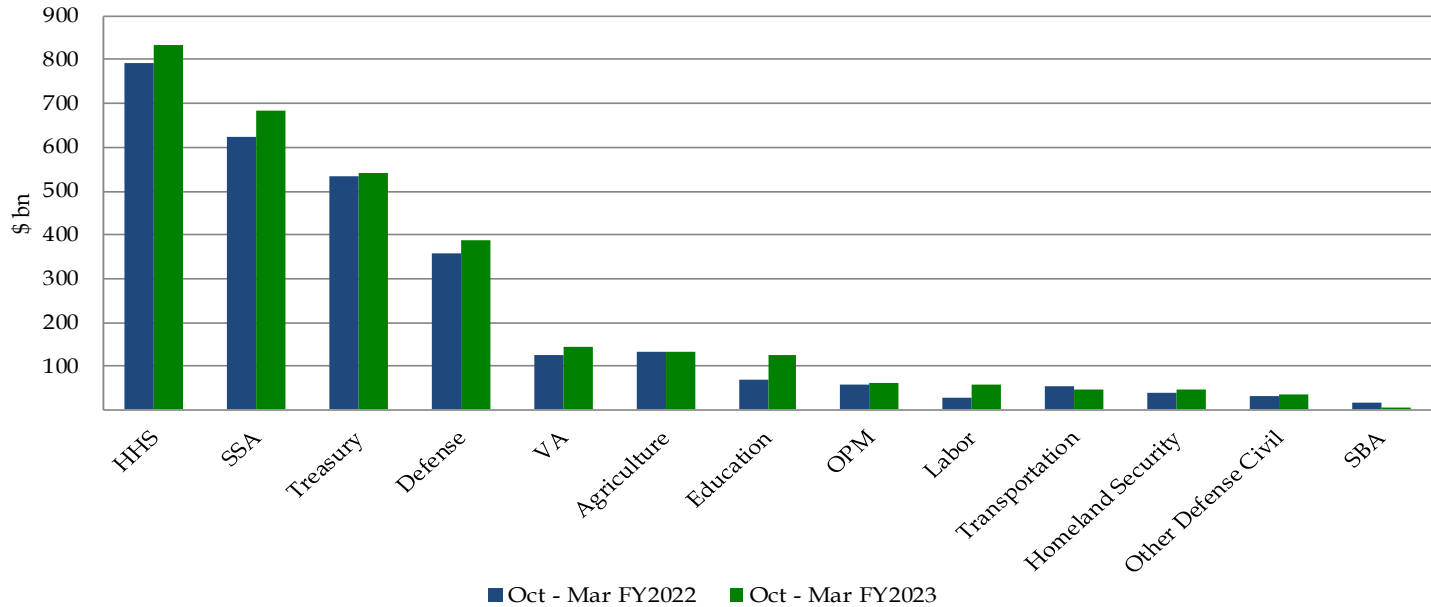
Monthly Receipt Levels (12-Month Moving Average)



Notable Receipt Category	YoY change thru Q2 FY23 (\$ billion)	YoY change thru Q2 FY23 (%)	Comments
Withheld & FICA taxes	+\$46	+3%	Due to higher wages and employment, partially offset by December's lower bonuses.
Non-withheld and SECA taxes	+\$2	+1%	Driven by general economic growth.
Individual refunds	-\$71	-59%	A decrease in cash due to elevated IRS processing of refunds over the fiscal year, including inventory.
Gross corporate taxes	+\$8	+5%	Driven by general economic growth.
Federal Reserve earnings	-\$60	-99%	Remittances have decreased year-over-year as administered rates moved higher.

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.

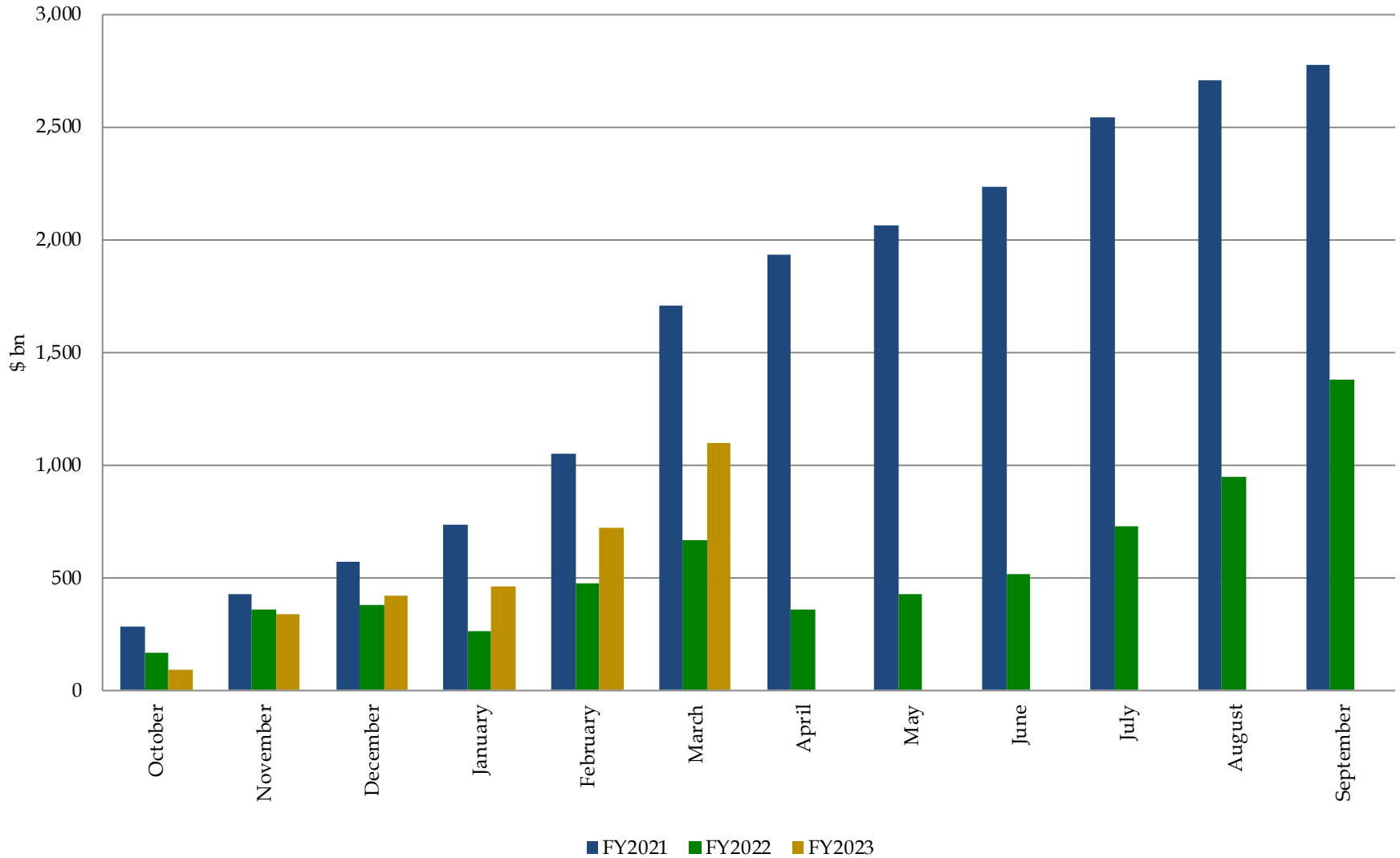
Largest Outlays



Notable Outlays Category	YoY change thru Q2 FY23 (\$ billion)	YoY change thru Q2 FY23 (%)	Comments
Social Security Administration (calendar adjusted)	+\$63	+10%	Primarily due to the COLA (8.7% this year compared to 5.7% last year) and increased number of beneficiaries.
Department of Education	+\$54	+76%	Due to several FY2023 upward modifications in Federal Direct Student Loan program subsidies.
Health and Human Services (calendar adjusted)	+\$41	+5%	Due to higher Medicare and Medicaid outlays.
Department of Labor	+\$31	+108%	Due to higher Pension Benefit Guaranty Corporation Special Financial Assistance payments.
Small Business Administration (calendar adjusted)	-\$17	-94%	Due to Paycheck Protection Program (PPP) and Economic Impact Disaster Loan (EIDL) expenditures that were recognized last year.
Other (not in the chart above)	+\$116	+155%	First, Federal Deposit Insurance Corporation outlays are \$29 billion higher. Second, FCC spectrum auction receipts (negative outlays) were booked in January 2022 (\$81 billion).

Outlays in the chart above are on calendar adjusted basis

Cumulative Budget Deficits by Fiscal Year



Section III:

Various Fiscal Forecasts

Primary Dealers, OMB, CBO



Recent Economic Forecasts

- Primary Dealer Median Estimates:

Primary Dealer Median Estimates April 2023

	<u>CY2023</u>	<u>CY2024</u>	<u>CY2025</u>
	<u>% Change from Q4 to Q4</u>		
GDP			
<i>Real</i>	0.2	1.0	na
<i>Nominal</i>	3.8	3.4	na
Inflation			
<i>CPI Headline</i>	3.3	2.5	na
<i>CPI Core</i>	3.9	2.6	na
	<u>Fourth Quarter Levels</u>		
Unemployment Rate (%)	4.2	4.7	na
	<u>FY2023</u>	<u>FY2024</u>	<u>FY2025</u>
Deficits (\$bil)	\$1,400	\$1,575	\$1,650

- Most Recent CBO and OMB Estimates:

OMB Estimates March 2023

	<u>CY2023</u>	<u>CY2024</u>	<u>CY2025</u>
	<u>% Change from Q4 to Q4</u>		
GDP			
<i>Real</i>	0.4	2.1	2.4
<i>Nominal</i>	3.2	4.3	4.6
Inflation			
<i>CPI Headline</i>	3.0	2.3	2.3
	<u>Fourth Quarter Levels</u>		
Unemployment Rate (%)	4.6	4.5	4.4
	<u>FY2023</u>	<u>FY2024</u>	<u>FY2025</u>
Deficits (\$bil)	\$1,570	\$1,847	\$1,672

CBO Estimates February 2023

	<u>CY2023</u>	<u>CY2024</u>	<u>CY2025</u>
	<u>% Change from Q4 to Q4</u>		
GDP			
<i>Real</i>	0.1	2.5	2.6
<i>Nominal</i>	3.1	4.9	4.8
Inflation			
<i>CPI Headline</i>	4.0	2.4	2.1
	<u>Fourth Quarter Levels</u>		
Unemployment Rate (%)	5.1	4.8	4.6
	<u>FY2023</u>	<u>FY2024</u>	<u>FY2025</u>
Deficits (\$bil)	\$1,410	\$1,576	\$1,752

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

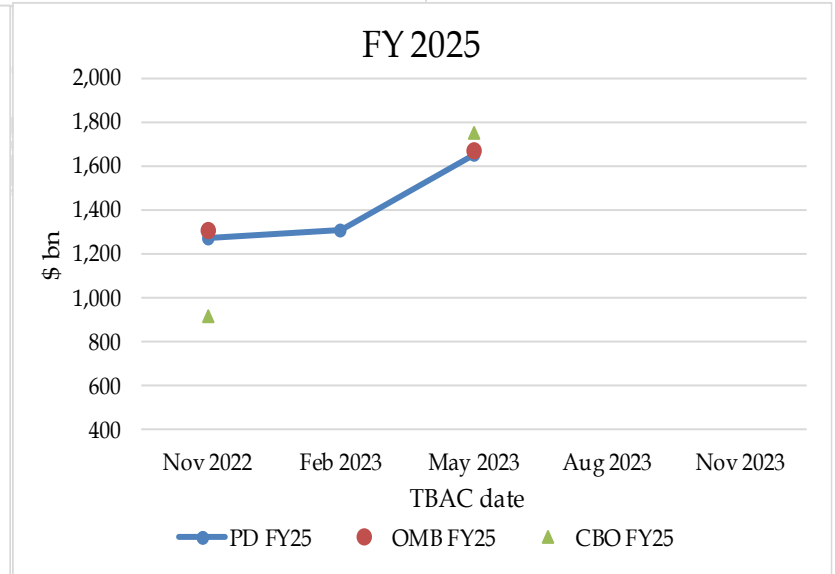
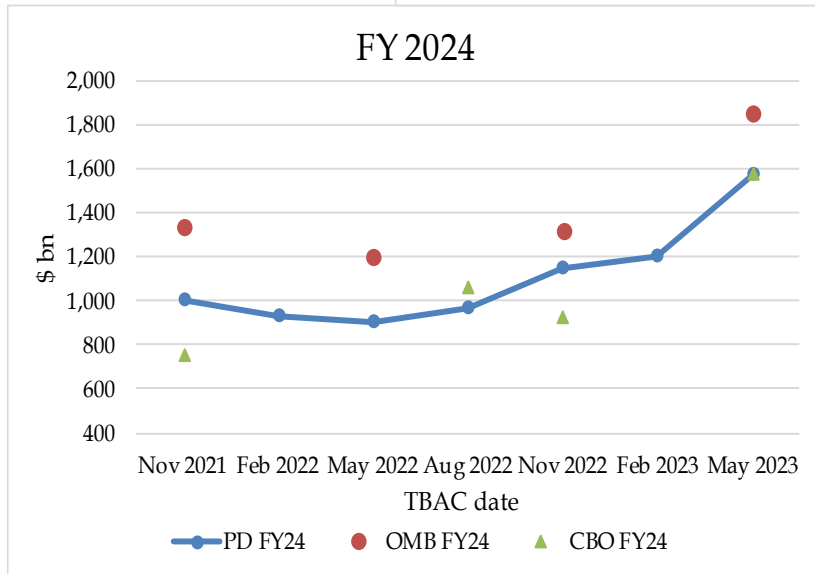
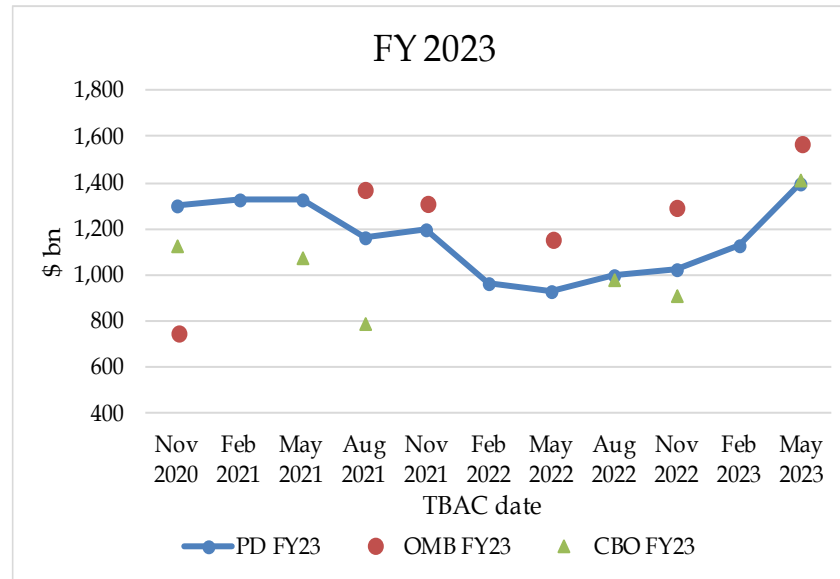
Recent Deficit Forecasts

- Primary dealers increased their deficit estimates in April relative to estimates they provided in January. Their changes reflected a slower economy, possible recession and higher interest costs.
- Dealers generally suggested that risks were asymmetrical to the upside, i.e. risks for higher deficits, and noted a high degree of uncertainty around their estimates.
- The latest OMB and CBO estimates in the table below are provided for reference.

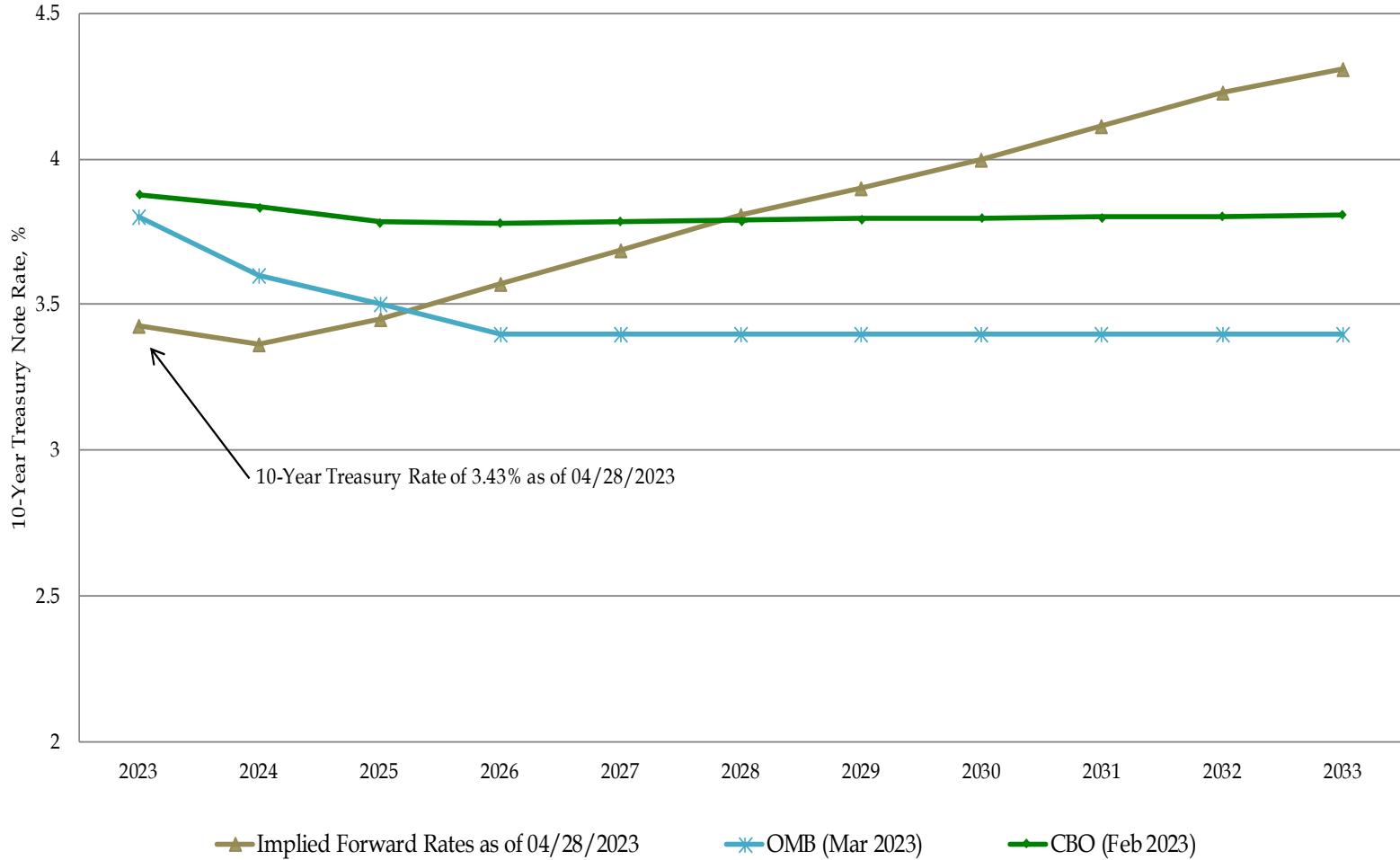
Deficit Estimates (\$ billion)	PD 25th Percentile	Primary Dealers (Median)	PD 75th Percentile	Change from Prior Quarter (Median)	OMB	CBO
FY2023	1,338	1,400	1,435	270	1,570	1,410
FY2024	1,413	1,575	1,600	375	1,847	1,576
FY2025	1,413	1,650	1,758	341	1,672	1,752
As of date	Apr-23	Apr-23	Apr-23		Mar-23	Feb-23

- OMB projections are using estimates are from Table S-1 of “Budget of The U.S. Government Fiscal Year 2024,” March 2023.
- CBO projections are using estimates are from Table 1-1 of “The Budget and Economic Outlook: 2023 to 2033,” February 2023.


Evolution of Median Primary Dealer, OMB, and CBO Deficit Estimates



Interest Rate Assumptions: 10-Year Treasury Note



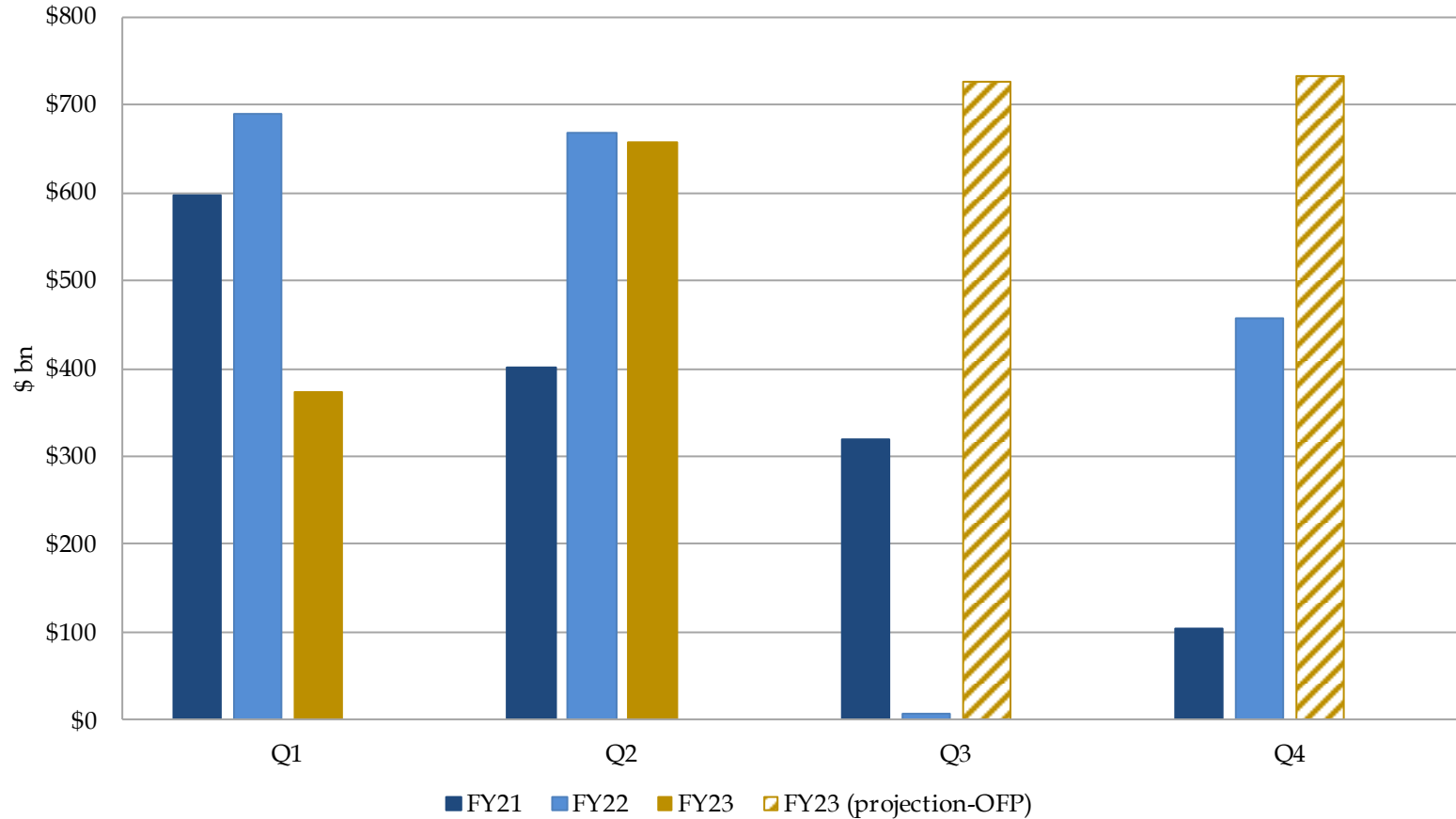
Section IV:
Estimated Borrowing Needs and
Financing Implications



Assumptions for Financing Section (pages 16 to 20)

- Portfolio and SOMA holdings as of 3/31/2023.
- Estimates assume privately announced issuance sizes and patterns remain constant for nominal coupons, TIPS, and FRNs given the issuance sizes in effect in April 2023, while using total bills outstanding of ~\$4.1 trillion.
- The principal on the TIPS securities was accreted to each projection date based on market ZCIS levels as of 3/31/2023.
- 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, this 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 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 Q3

April - June 2023	
Assuming Constant Coupon Issuance Sizes*	
Treasury Announced Net Marketable Borrowing**	726
Net Coupon Issuance	248
Implied Change in Bills	478

Sources of Privately-Held Financing in FY23 Q4

July - September 2023	
Assuming Constant Coupon Issuance Sizes*	
Treasury Announced Net Marketable Borrowing**	733
Net Coupon Issuance	159
Implied Change in Bills	574

Security	April - June 2023 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance			Security	July - September 2023 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net		Gross	Maturing	Net	Gross	Maturing	Net
2-Year FRN	68	80	(12)	204	234	(30)	2-Year FRN	68	80	(12)	272	314	(42)
2-Year	126	154	(28)	378	451	(73)	2-Year	84	115	(31)	462	566	(104)
3-Year	120	97	23	360	226	134	3-Year	120	108	12	480	334	146
5-Year	129	67	62	387	165	222	5-Year	86	43	43	473	209	264
7-Year	105	68	37	315	246	69	7-Year	70	51	19	385	297	88
10-Year	99	42	57	297	133	164	10-Year	99	41	58	396	174	222
20-Year	39	0	39	117	0	117	20-Year	27	0	27	144	0	144
30-Year	57	0	57	171	7	164	30-Year	57	7	50	228	14	214
5-Year TIPS	40	43	(3)	80	43	37	5-Year TIPS	0	0	0	80	43	37
10-Year TIPS	15	0	15	62	50	12	10-Year TIPS	32	48	(16)	94	98	(4)
30-Year TIPS	0	0	0	9	0	9	30-Year TIPS	8	0	8	17	0	17
Coupon Subtotal	798	550	248	2,380	1,555	824	Coupon Subtotal	651	492	159	3,031	2,048	983

* Keeping announced issuance sizes and patterns constant for nominal coupons, TIPS, and FRNs based on changes made before the May 2023 refunding.

** Assumes an end-of-June 2023 and end-of-September 2023 cash balances of \$550 billion and \$600 billion respectively versus a beginning-of-April 2023 cash balance of \$178 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>

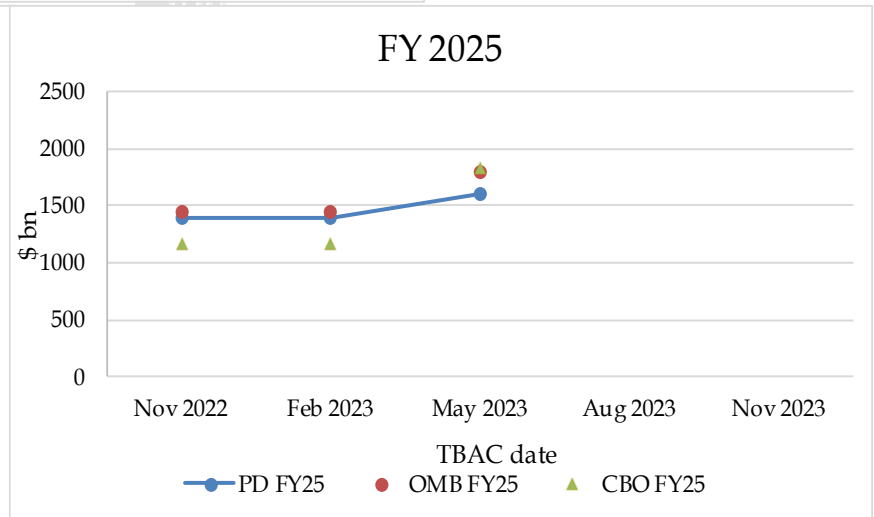
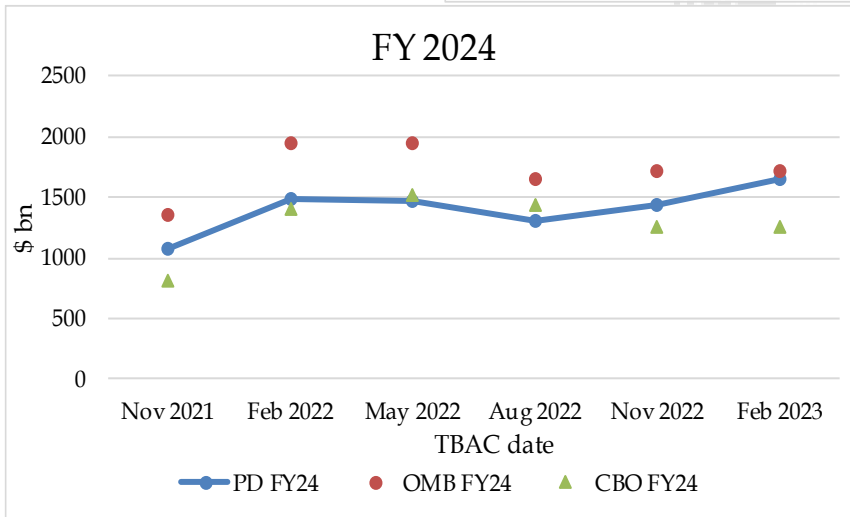
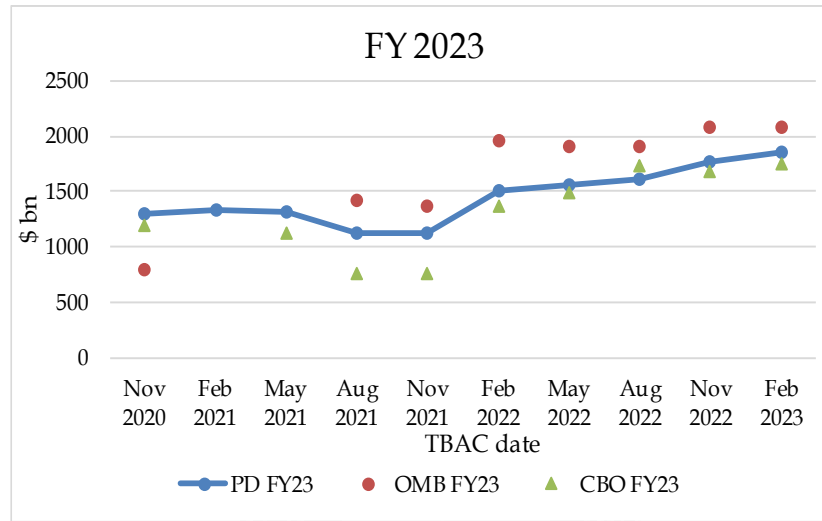
Longer-Term Privately-Held Net Marketable Borrowing Estimates and SOMA Redemption Assumptions

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

	Primary Dealer			OFP	OMB	CBO
	25th	Median	75th			
FY 2023 Deficit	1,338	1,400	1,435		1,570	1,410
FY 2024 Deficit	1,413	1,575	1,600		1,847	1,576
FY 2025 Deficit	1,413	1,650	1,758		1,672	1,752
FY 2023 SOMA Redemption	720	720	720	698		
FY 2024 SOMA Redemption	134	360	555			
FY 2025 SOMA Redemption	0	0	0			
FY 2023 Privately-Held Net Marketable Borrowing*	1,947	2,080	2,179	2,489	2,328	2,143
FY 2024 Privately-Held Net Marketable Borrowing*	1,495	1,823	2,075		2,233	2,014
FY 2025 Privately-Held Net Marketable Borrowing*	1,463	1,595	1,798		1,809	1,844
Estimates as of:	Apr-23			May-23	Mar-23	Feb-23

- *All privately-held net marketable borrowing estimates of are “normalized” using:
 - 1) the median Primary Dealer’s estimates for SOMA redemptions, and
 - 2) assuming OFP’s end of fiscal year 2023 cash balance of \$600 billion, held constant in out years.
- OMB projections are using estimates are from Table S-1 of “Budget of The U.S. Government Fiscal Year 2024,” March 2023.
- CBO projections are using estimates are from Table 1-1 of “The Budget and Economic Outlook: 2023 to 2033,” February 2023.
- OFP’s SOMA redemption estimate excludes securities maturing on 9/30/2023 (Saturday).

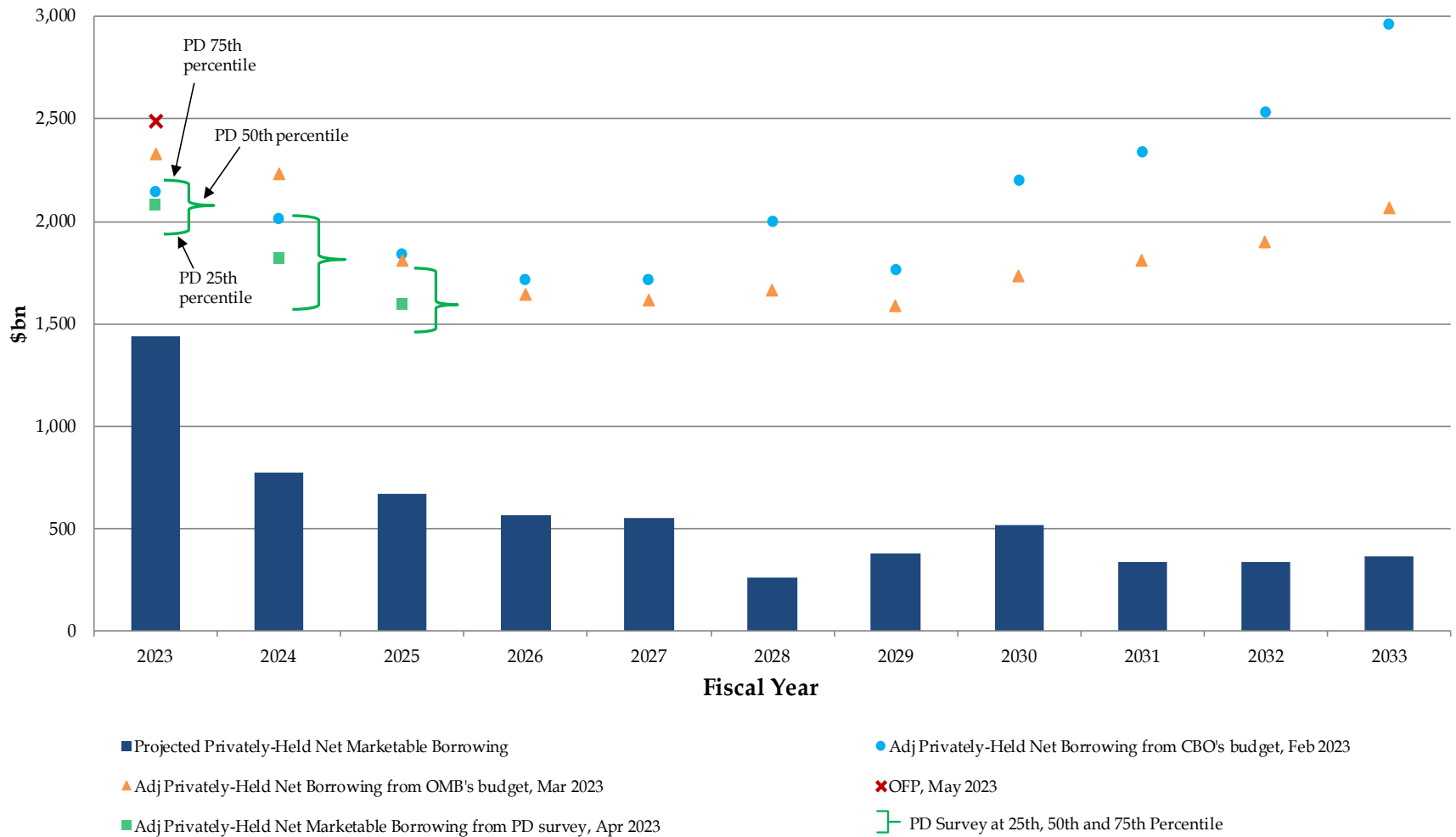
Evolution of Median Primary Dealer, OMB, and CBO Privately-Held Net Marketable Borrowing Estimates*



* 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.

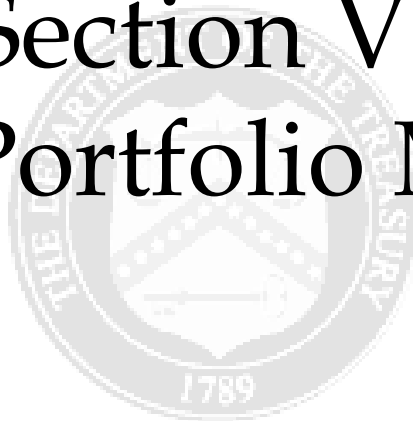
Projected Privately-Held Net Marketable Borrowing

Assuming Private Coupon Issuance & Total Bills Outstanding Remain Constant as of 03/31/2023*



*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 "Budget of The U.S. Government Fiscal Year 2024," March 2023. CBO's borrowing projections are using estimates from Table 1-1 of "The Budget and Economic Outlook: 2023 to 2033," February 2023. OMB and CBO borrowing estimates from FY23 to FY25 are normalized to privately-held net borrowing after adding PD survey median SOMA redemption assumptions for FY23/24/25. In addition, all privately-held net borrowing estimates are normalized with OFP FY23 ending cash balance of \$600 billion.

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 are meant for illustrative purposes only. The projections contained in these charts should not be interpreted as representing any future policy decisions regarding Treasury financing.

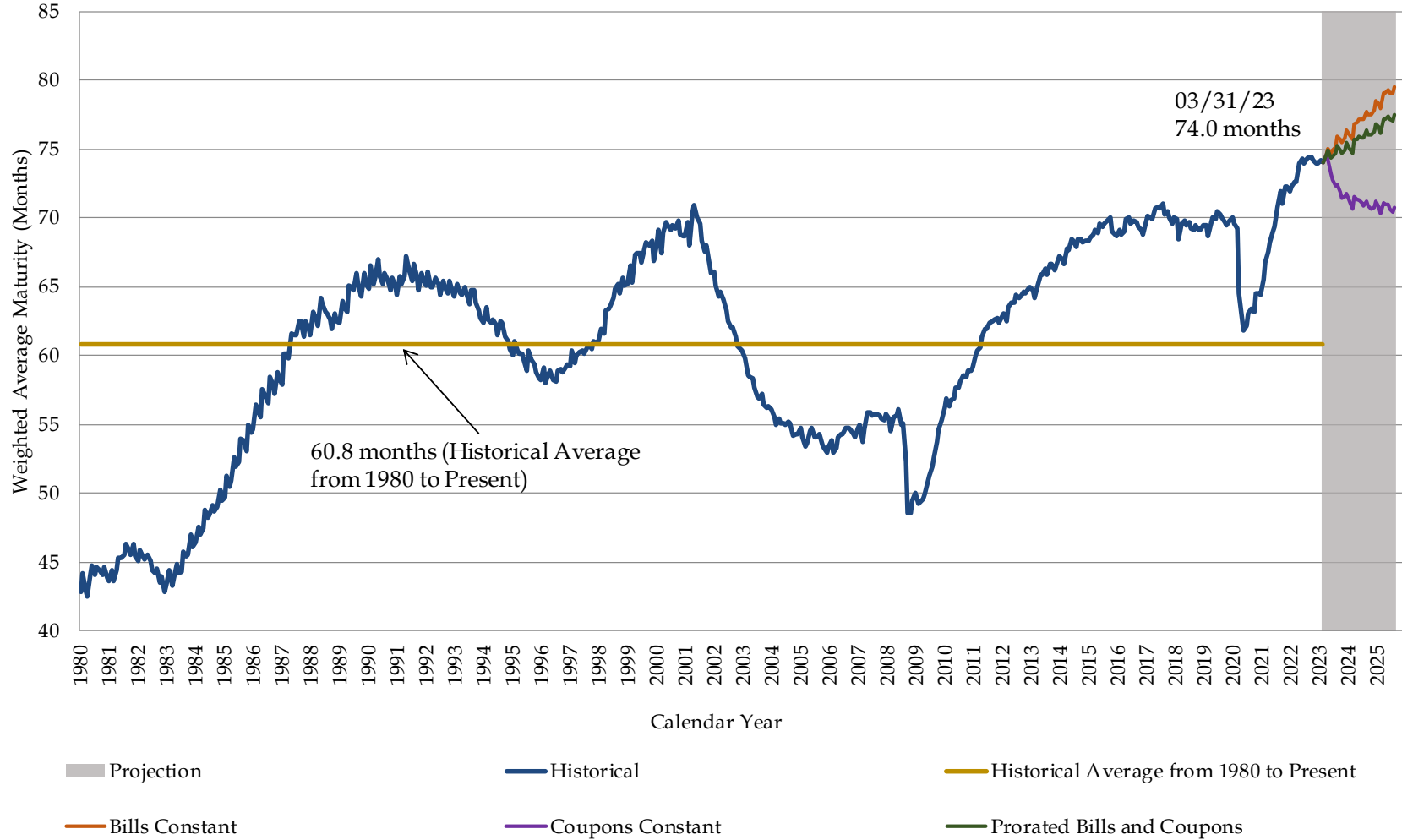
Projections illustrate how various portfolio metrics could evolve under three hypothetical financing scenarios. The scenarios were chosen to illustrate a potential range of portfolio metric outcomes based on hypothetical issuance choices.

The scenarios are:

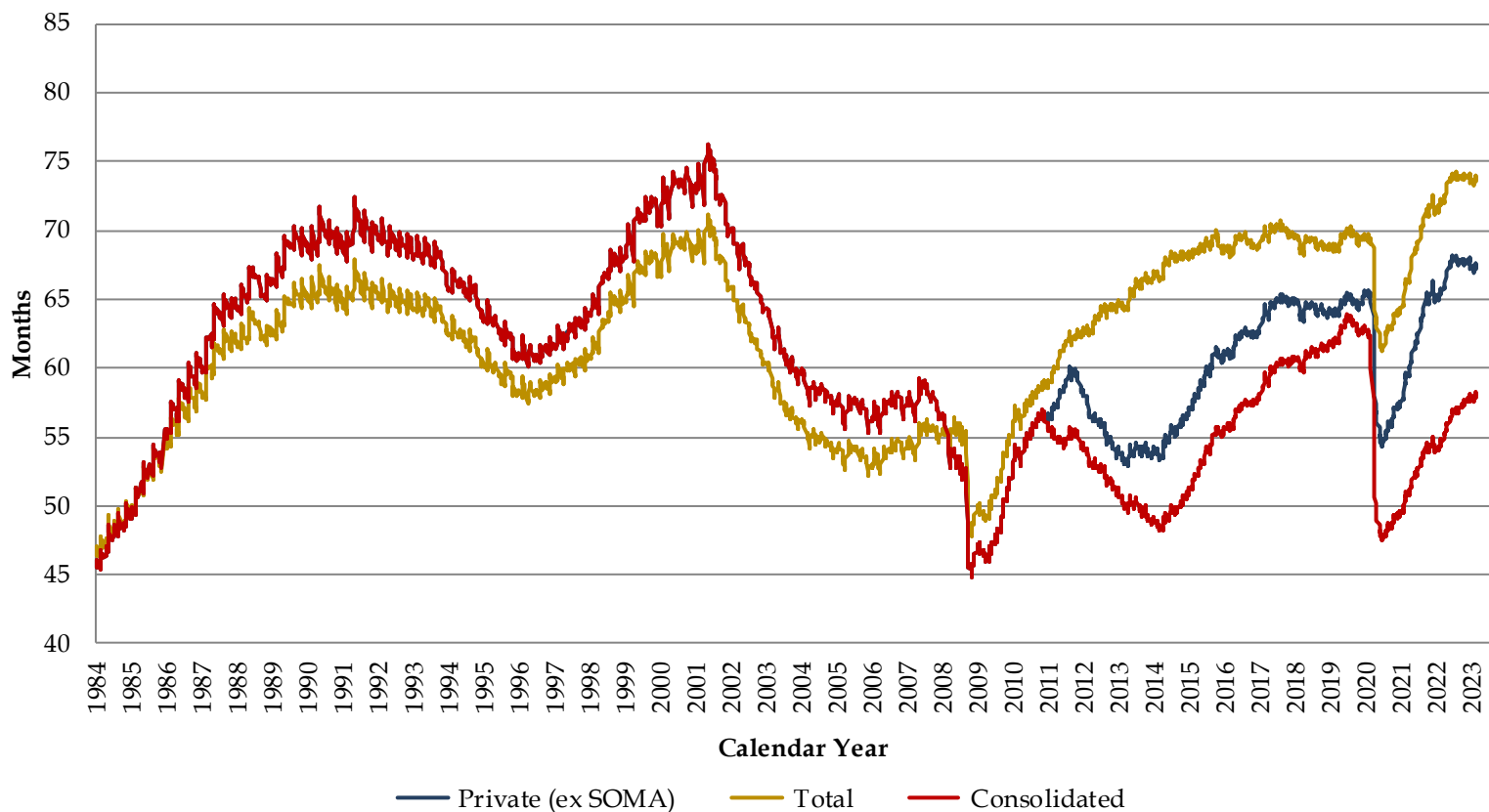
- 1) ***“Coupons Constant”***: Treasury maintains **coupon, FRN, and TIPS auction sizes constant** starting in April 2023 and addresses any changes in financing needs by only increasing or decreasing T-bill auction sizes;
- 2) ***“Bills Constant”***: Treasury maintains **T-bills aggregate supply constant** at \$4.1 trillion as of 3/31/2023 and increases or decreases coupon, FRN, and TIPS auction sizes in response to financing needs in a manner that maintains current issuance proportions going forward;
- 3) ***“Prorated Bills and Coupons”***: Treasury maintains **T-bills share constant** at 16.7% as of 3/31/2023 and addresses any changes in financing needs by pro rata increasing or decreasing coupon, FRN, and TIPS auction sizes.

Privately-held 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*

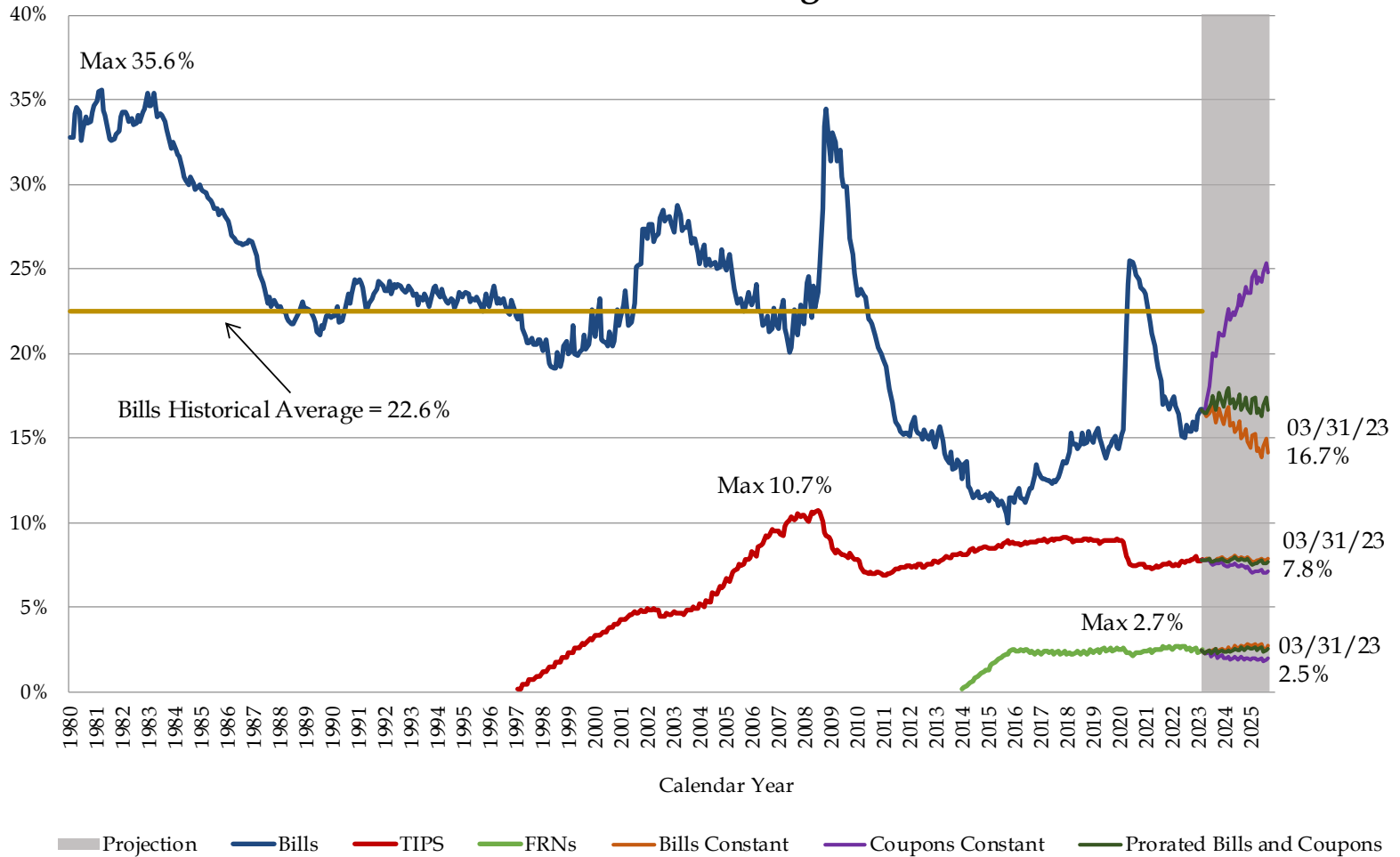


* Weighted Average Next Rate Reset (WANRR) is a “Weighted Average Maturity” metric that attempts to adjust for the floating rate aspect of some Treasury debt. The WANRR is the average time until the outstanding debt’s interest rate is set to a new interest rate. For bills and fixed rate notes and bonds, the next rate reset is equal to the maturity date.

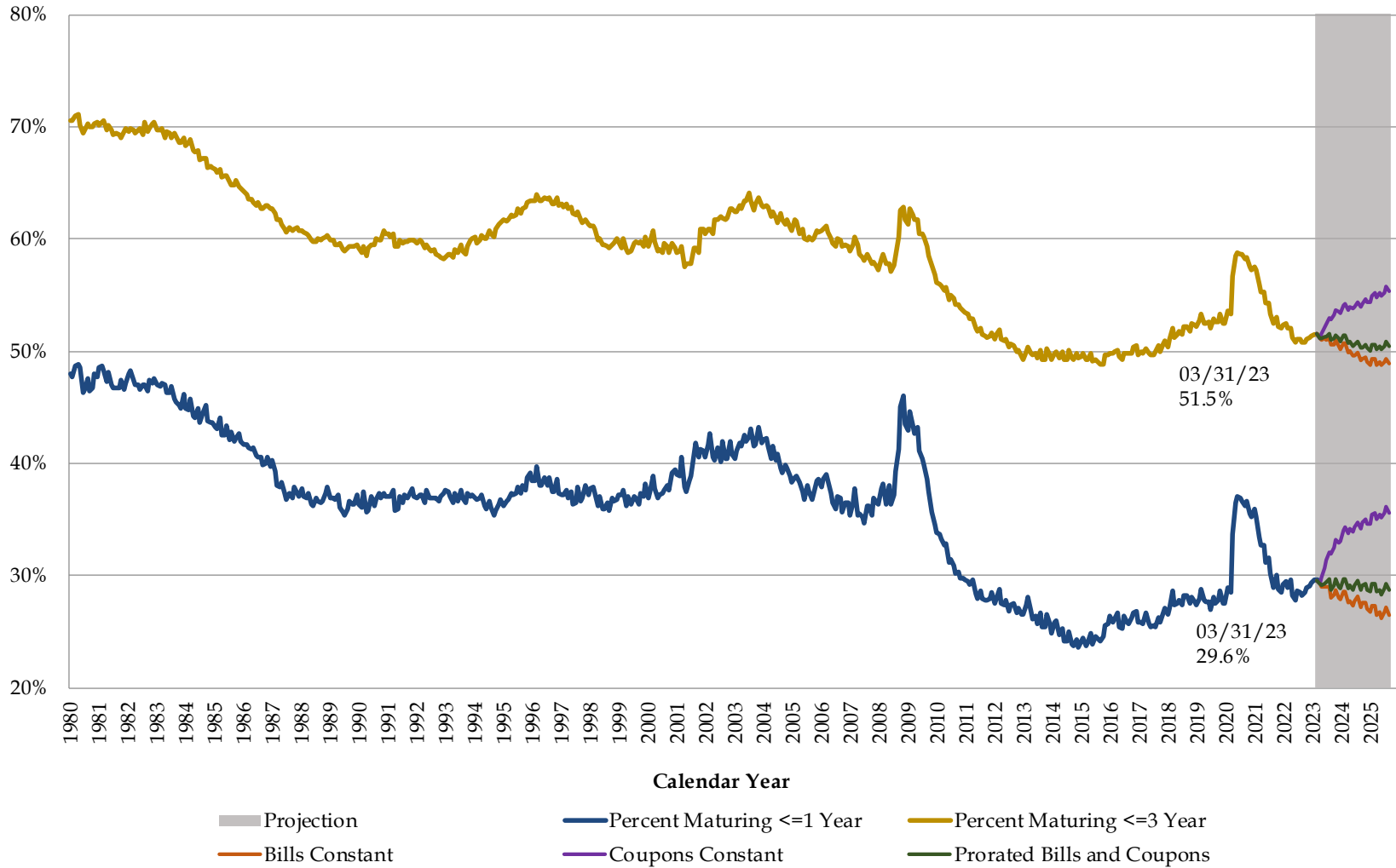
In contrast, for floating rate obligations, the time between the next rate reset date or maturity date is examined and the shorter period is used in the calculation.

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

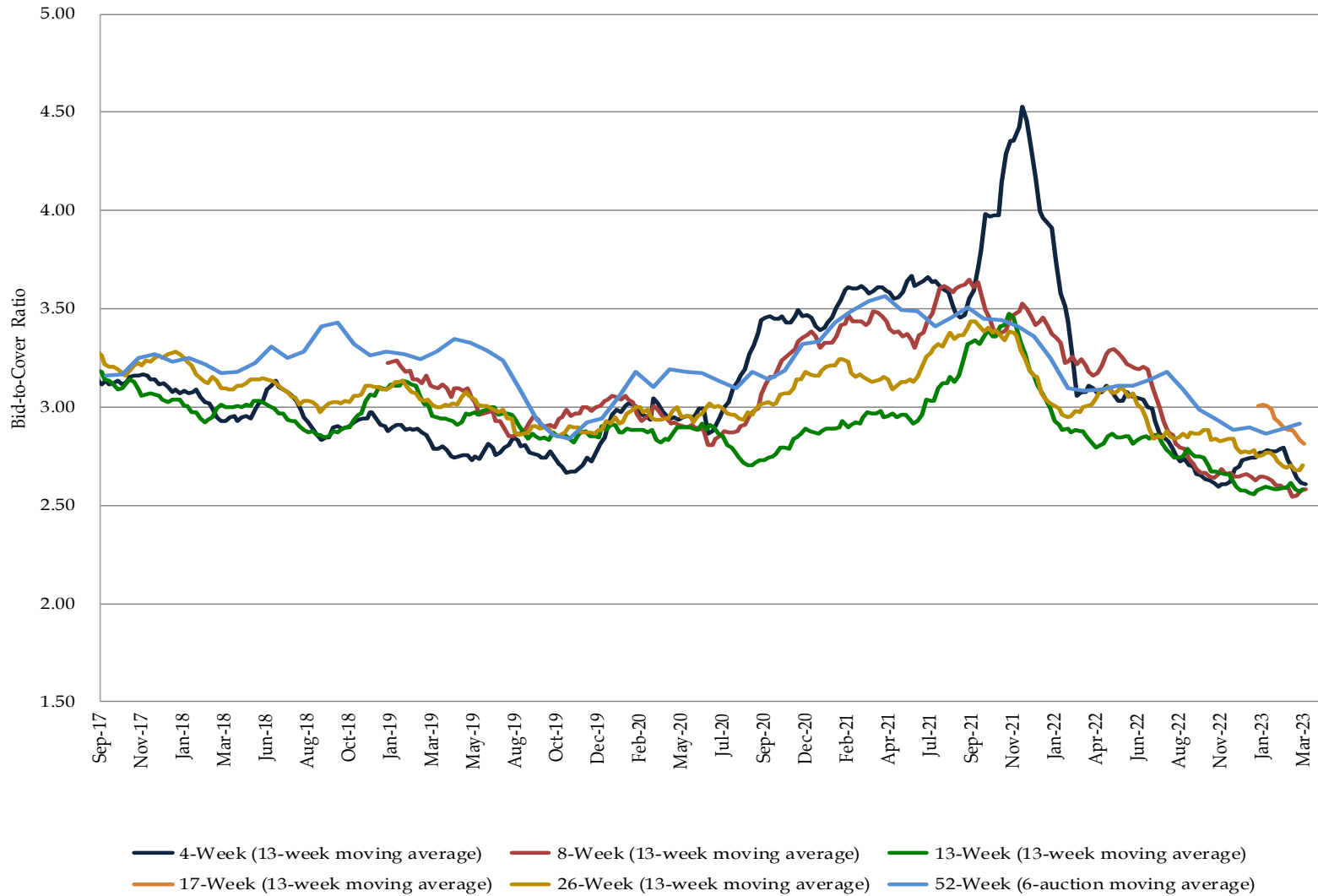


Section VI: Select Demand Metrics

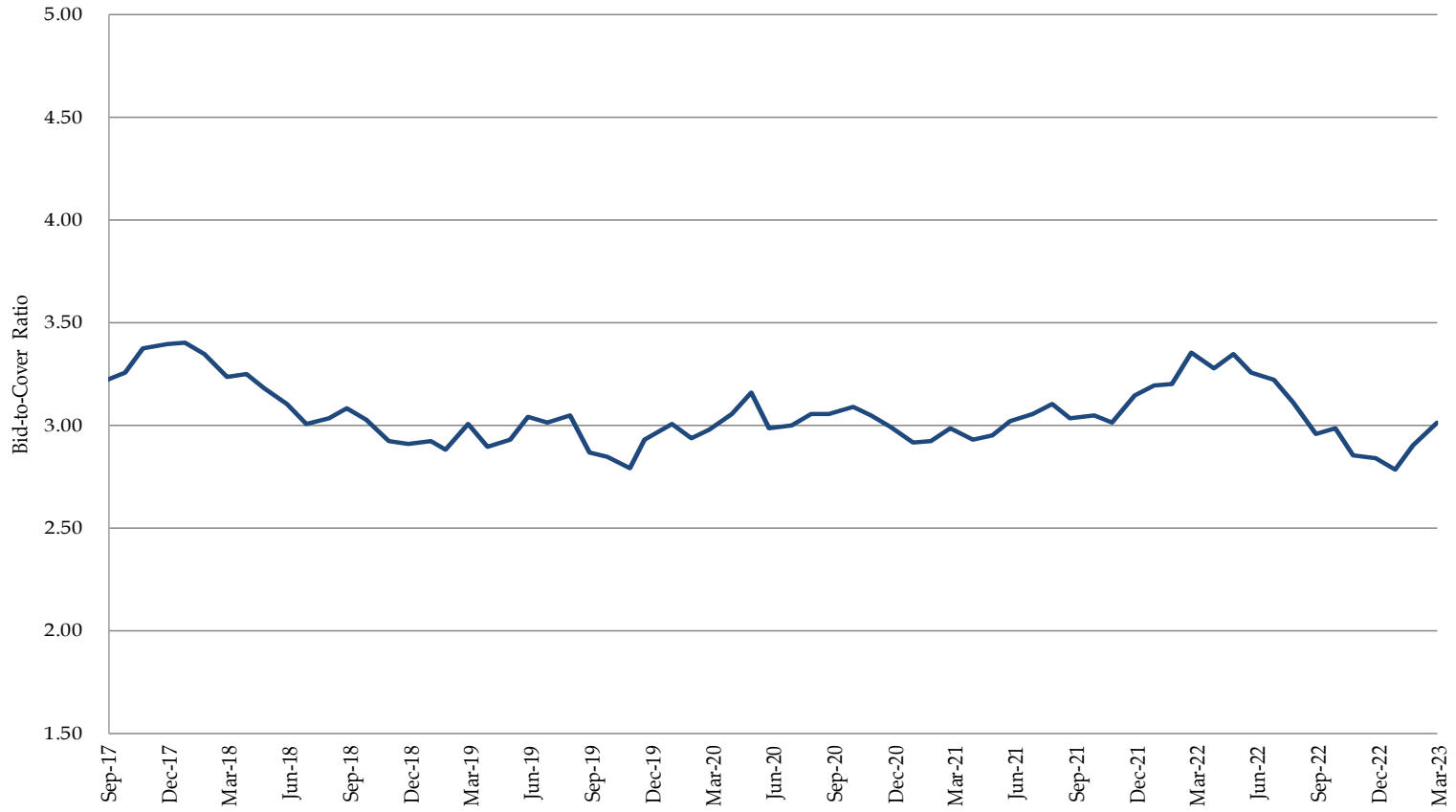
Bid-to-Cover Data, Investor Class Data,
Direct & Primary Dealer Awards, and Foreign Demand



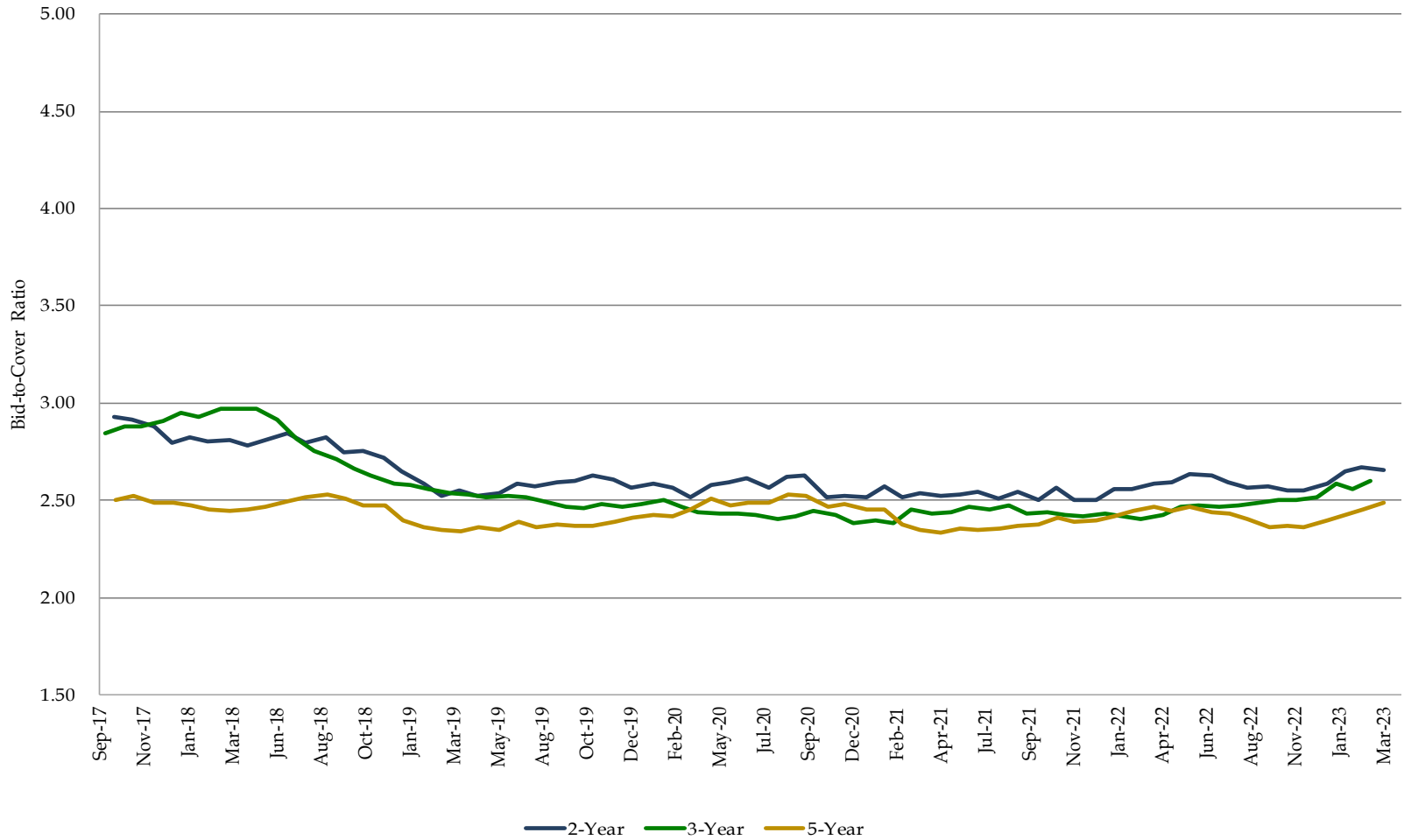
Bid-to-Cover Ratios for Treasury Bills



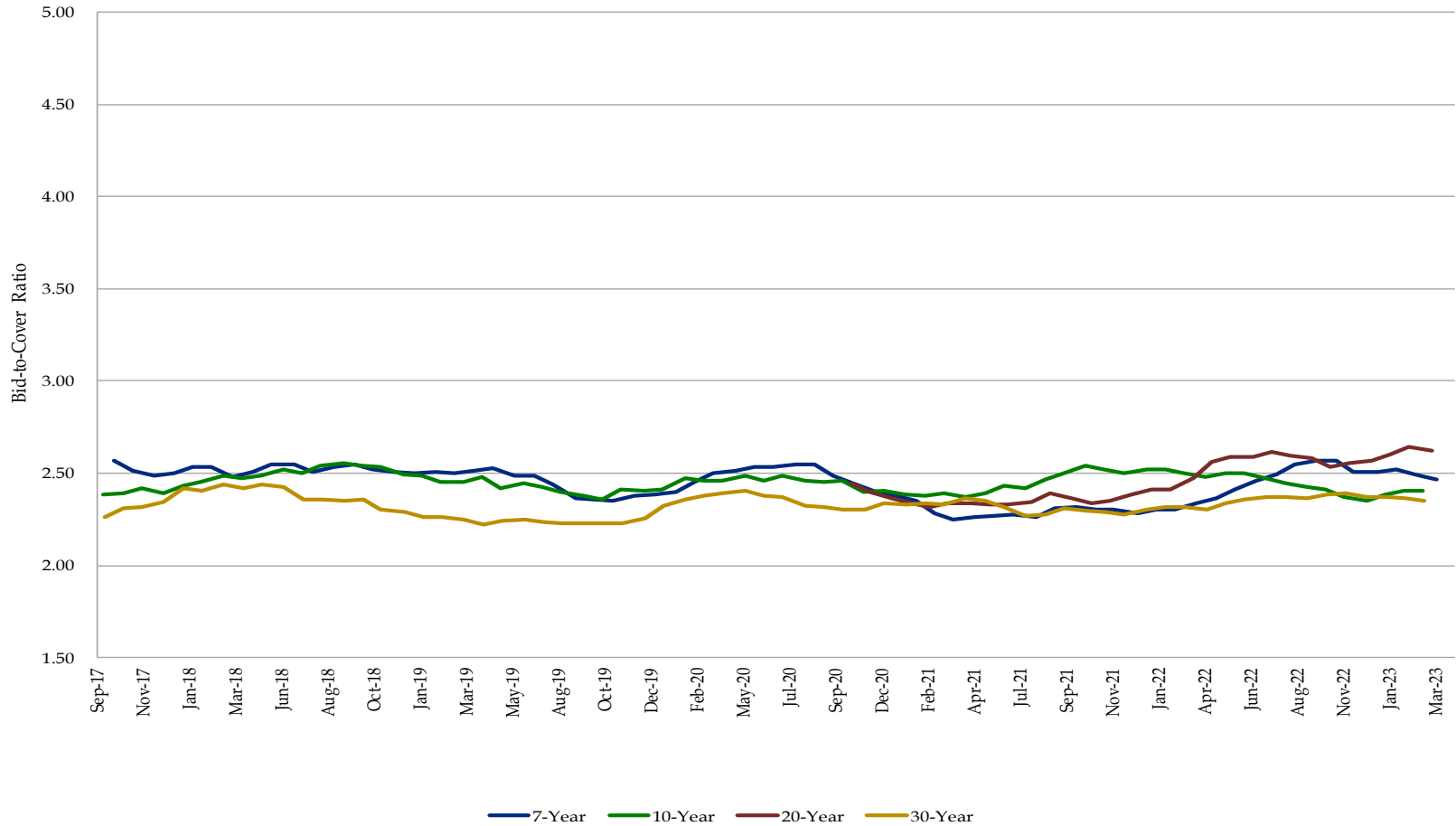
Bid-to-Cover Ratios for FRNs (6-Month Moving Average)



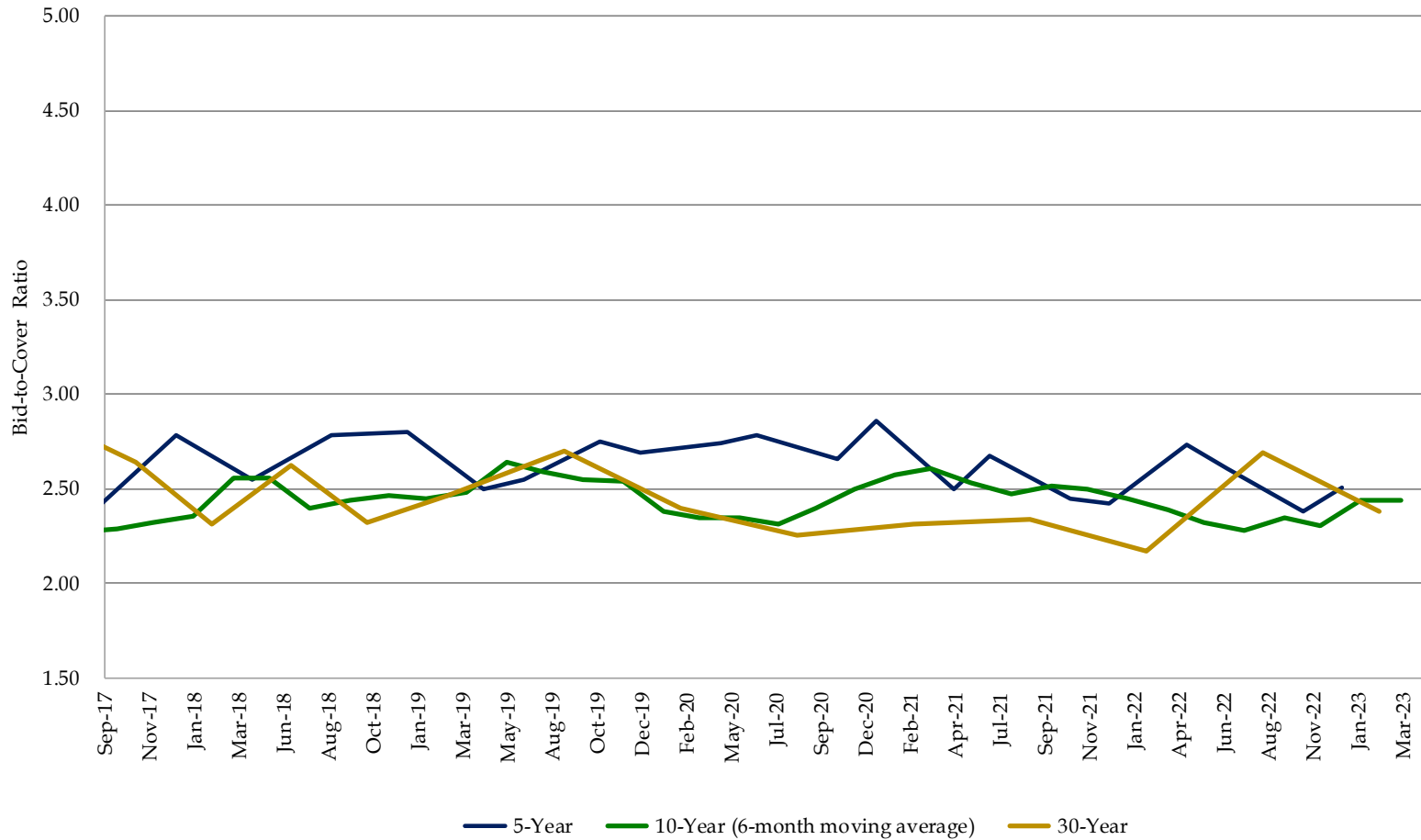
Bid-to-Cover Ratios for 2-, 3-, and 5-Year Nominal Securities (6-Month Moving Average)



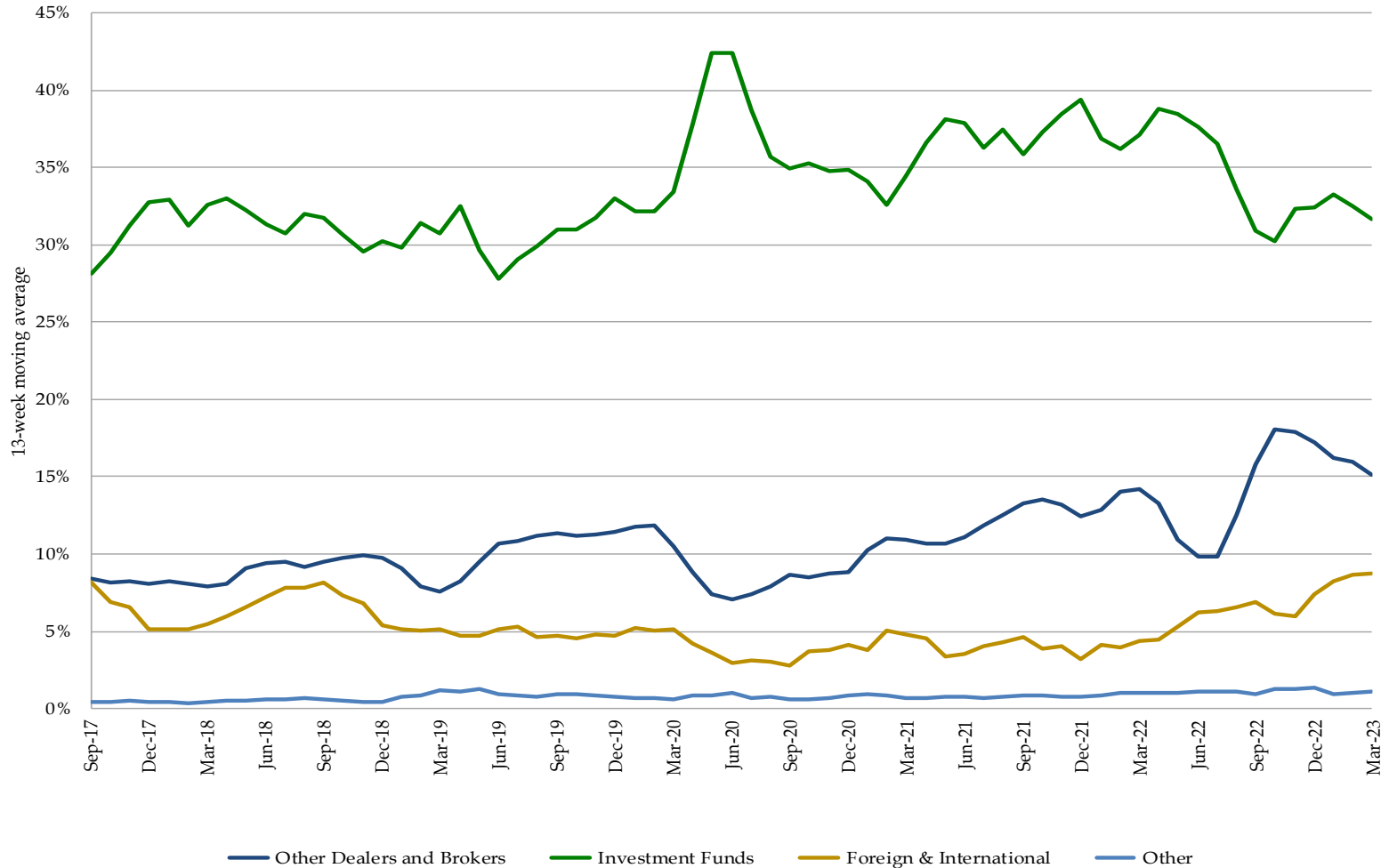
Bid-to-Cover Ratios for 7-, 10-, 20-, and 30-Year Nominal Securities (6-Month Moving Average)



Bid-to-Cover Ratios for TIPS

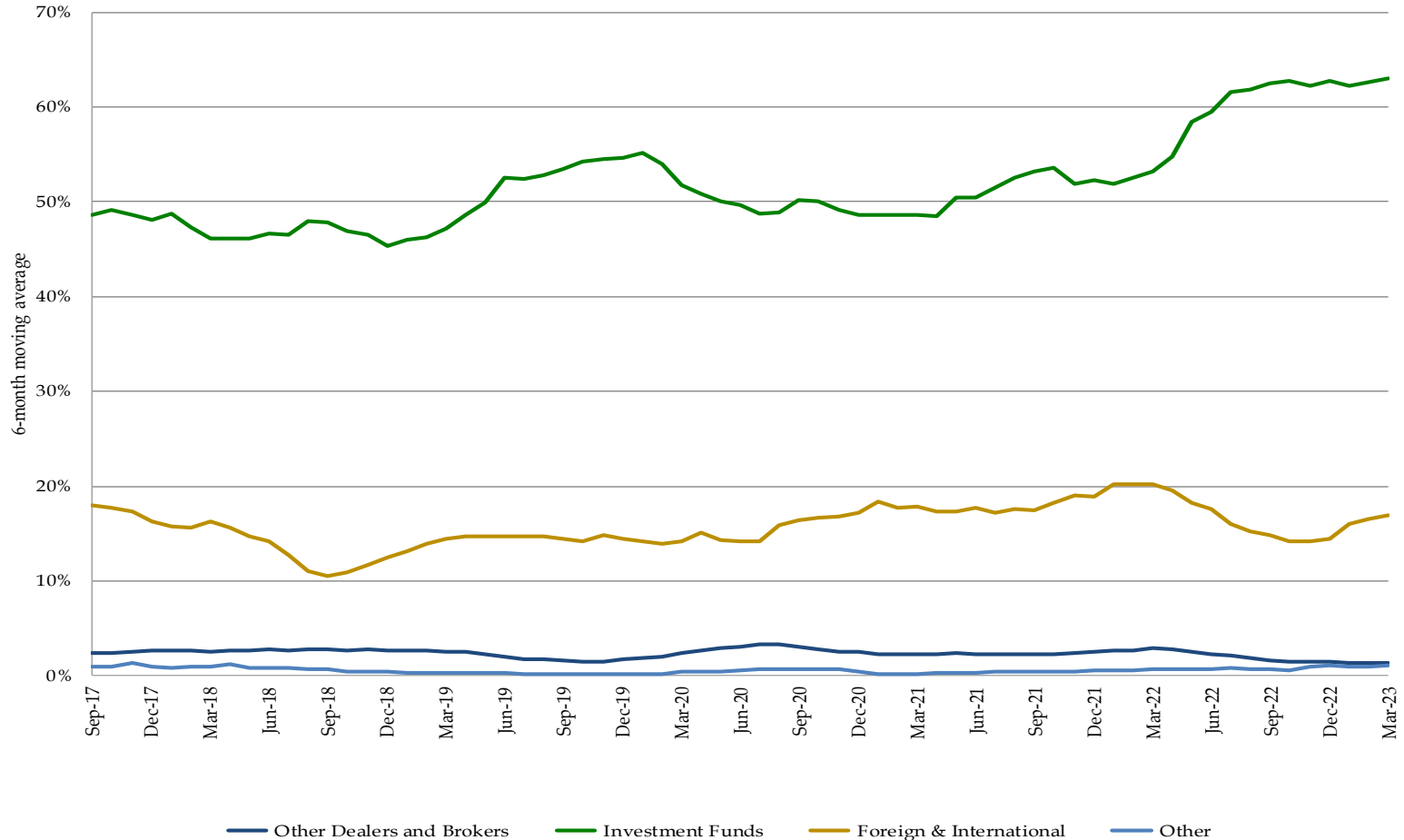


Percent Awarded in Bill Auctions by Investor Class (13-Week Moving Average)



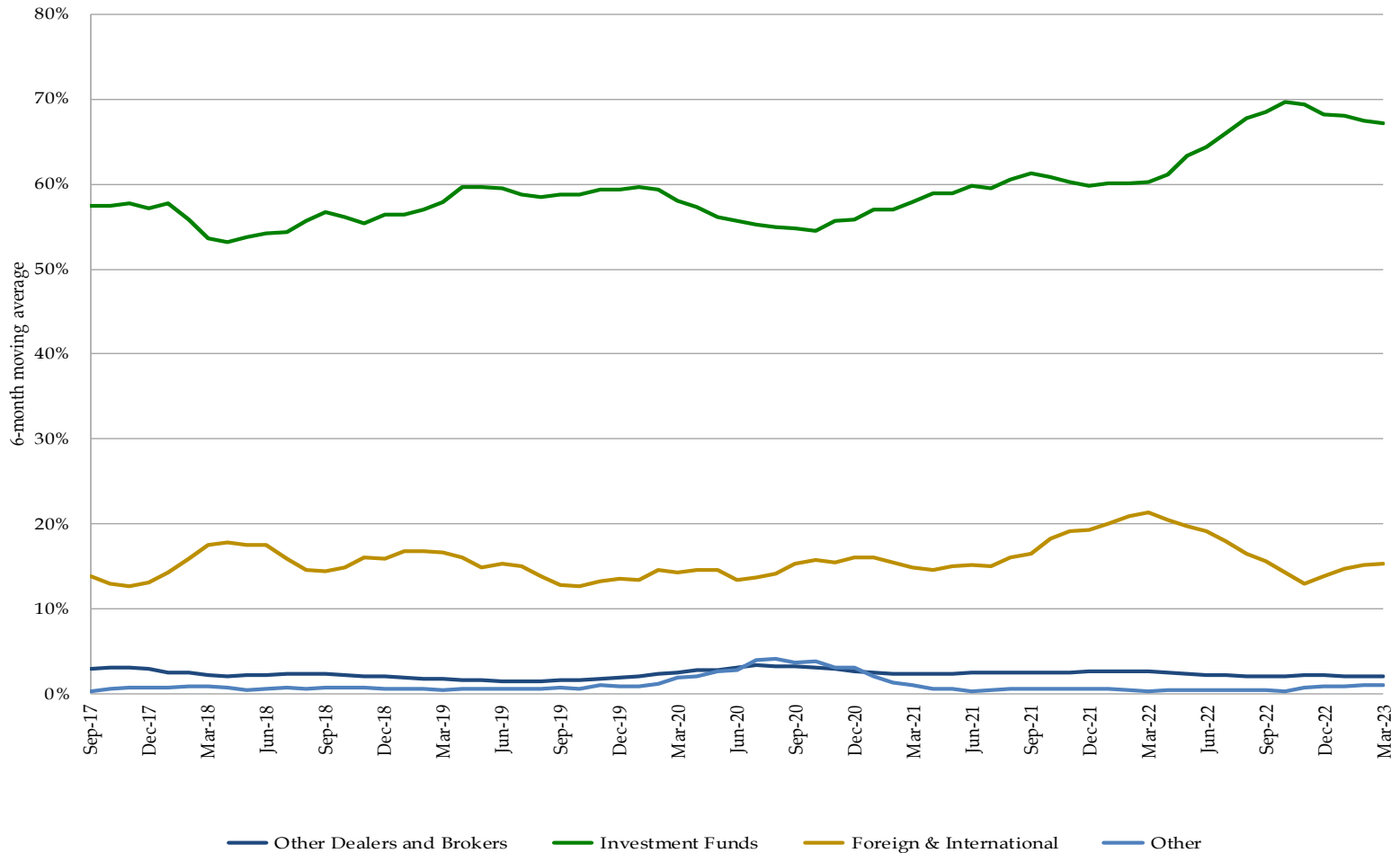
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



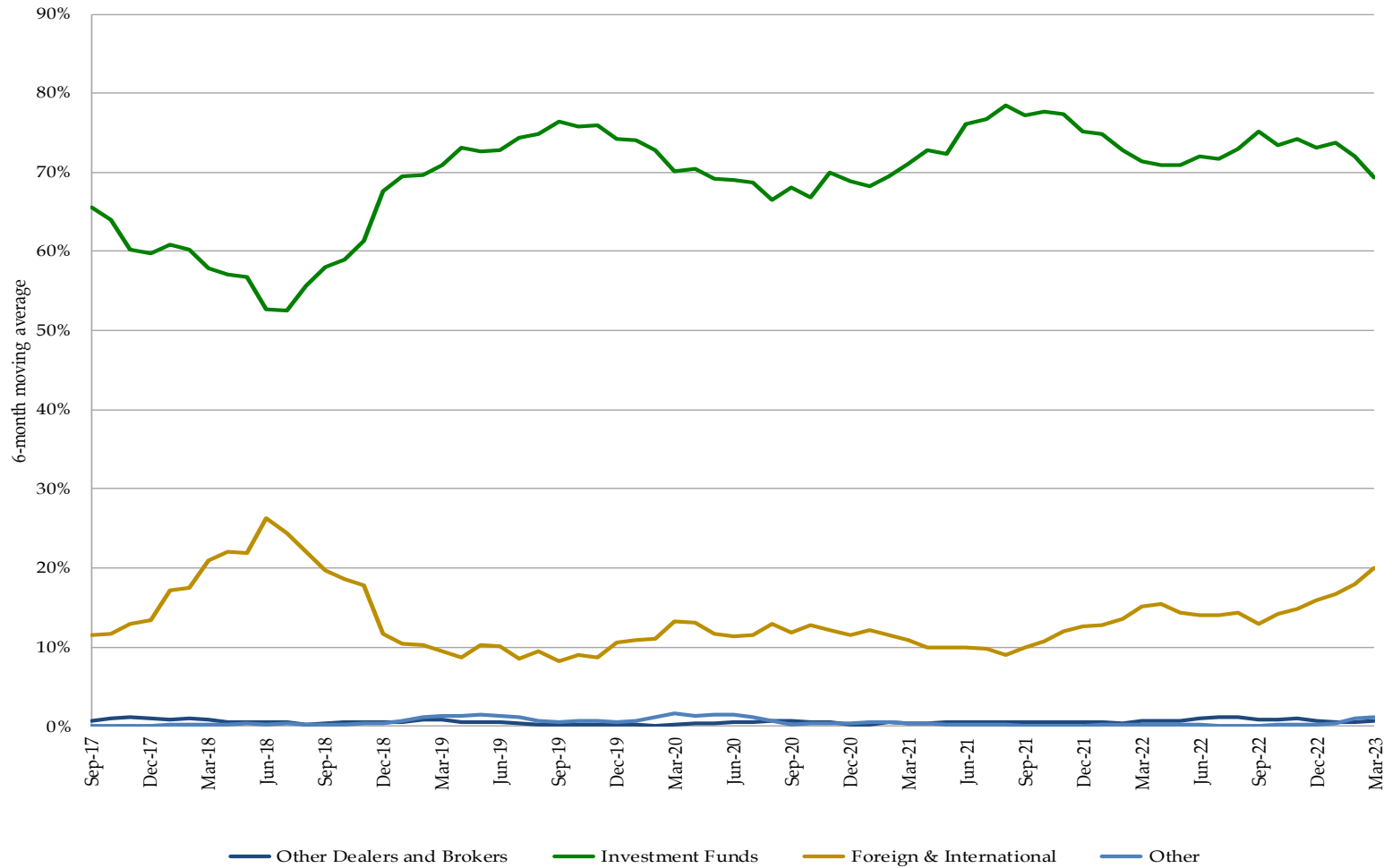
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



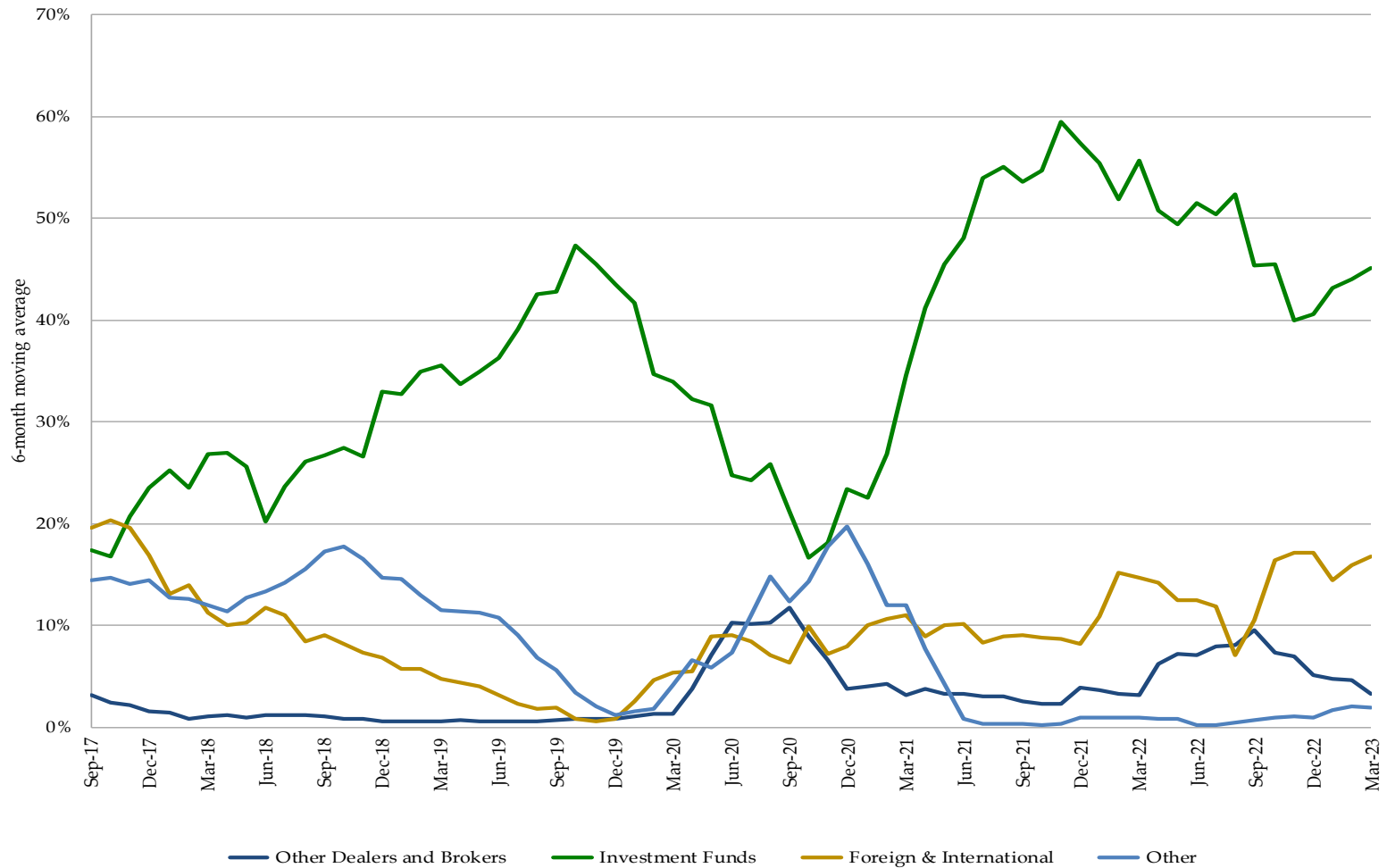
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



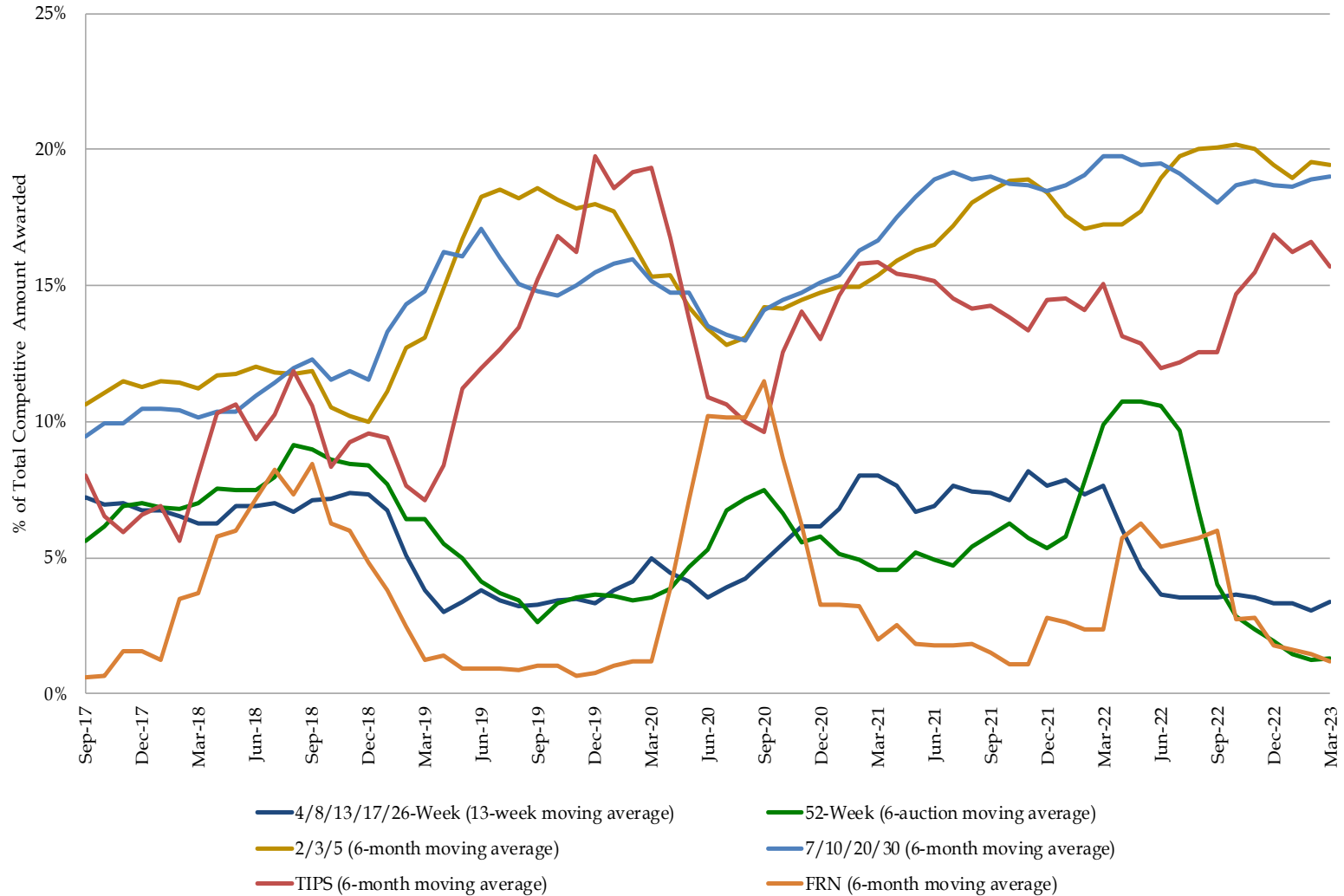
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



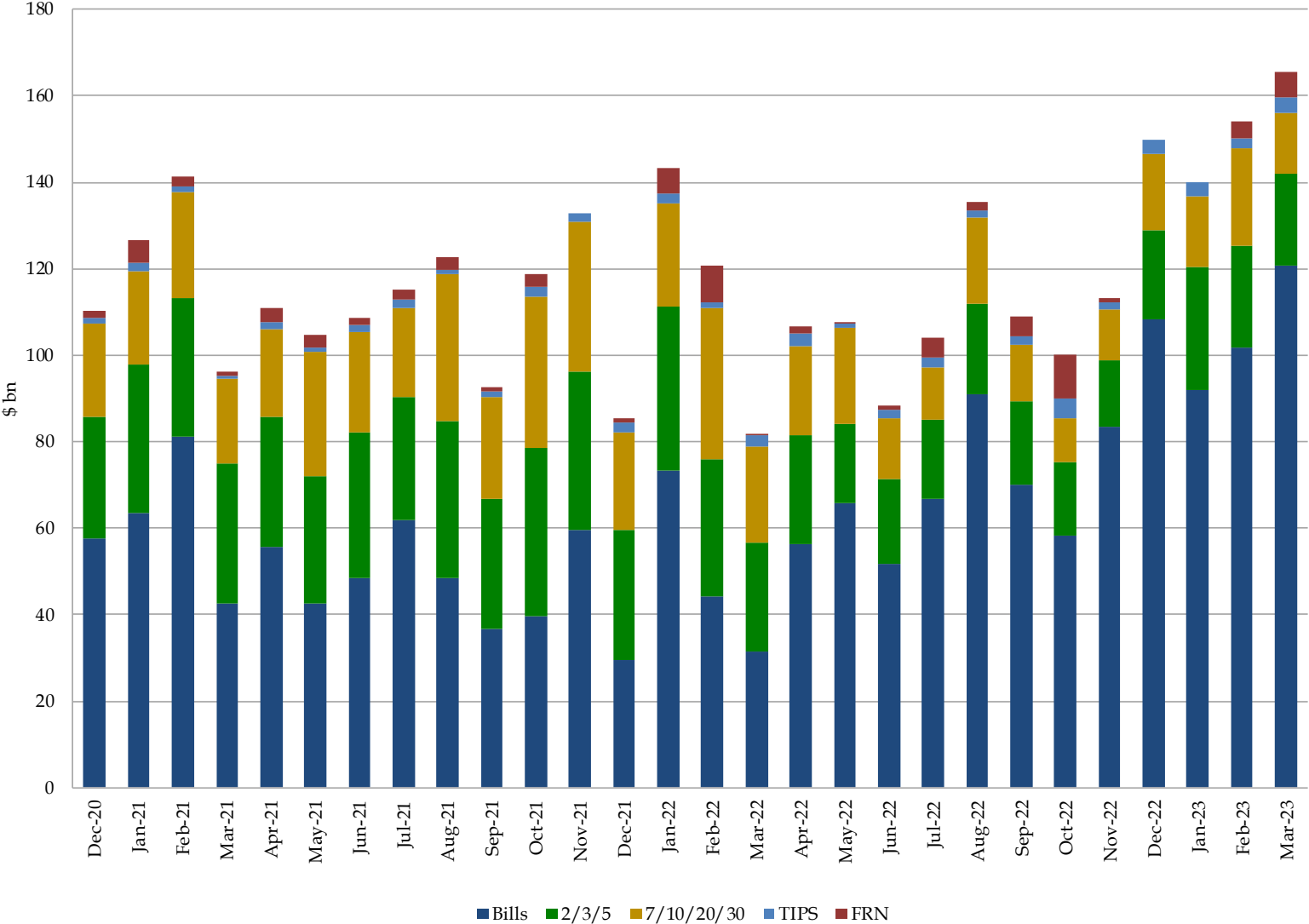
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

Direct Bidder Awards at Auction



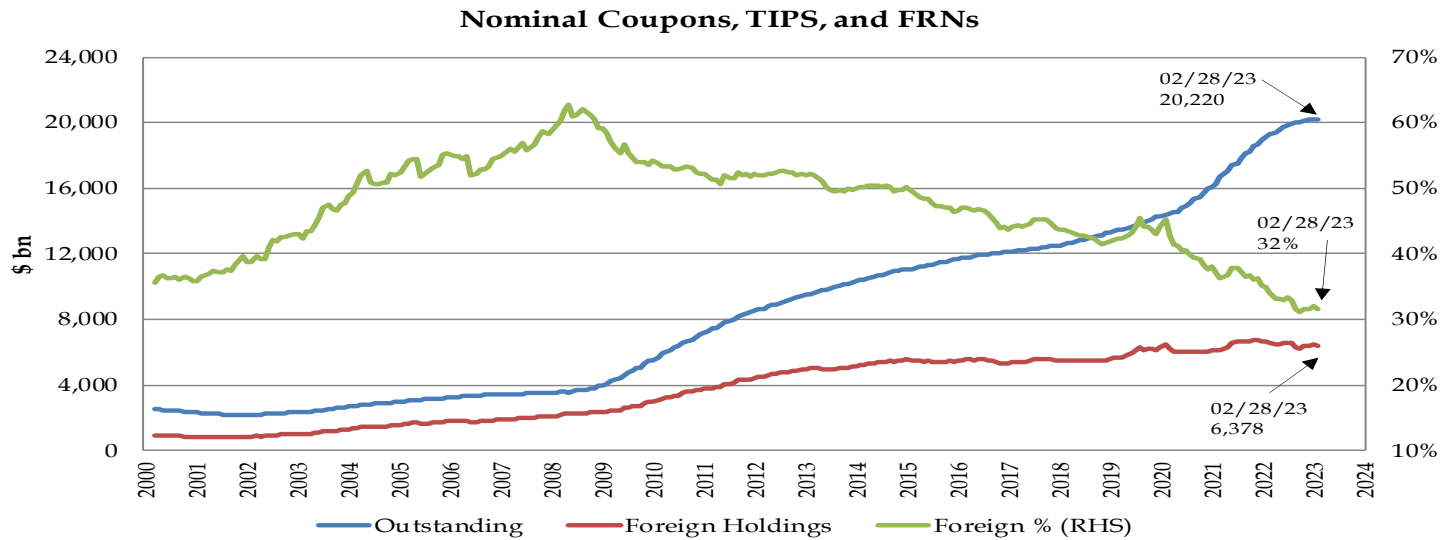
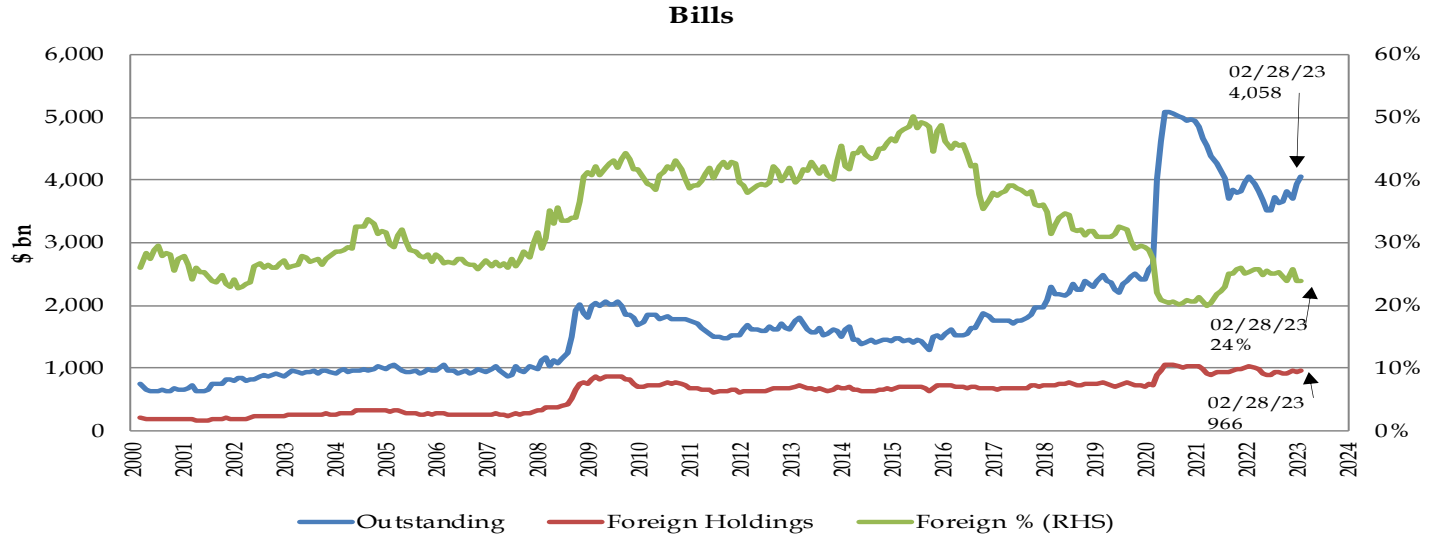
Competitive Amount Awarded excludes SOMA add-ons.

Total Foreign Awards of Treasuries at Auction, \$ billions



Foreign includes both private sector and official institutions.

Total Foreign Holdings



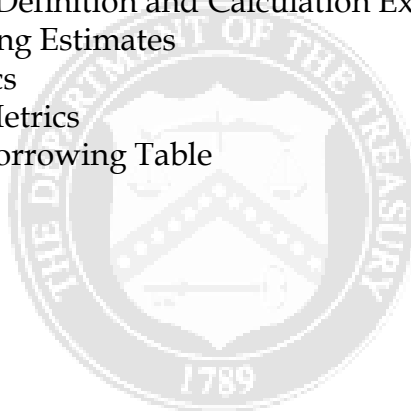
Source: Treasury International Capital (TIC) System as of February 2023.

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.

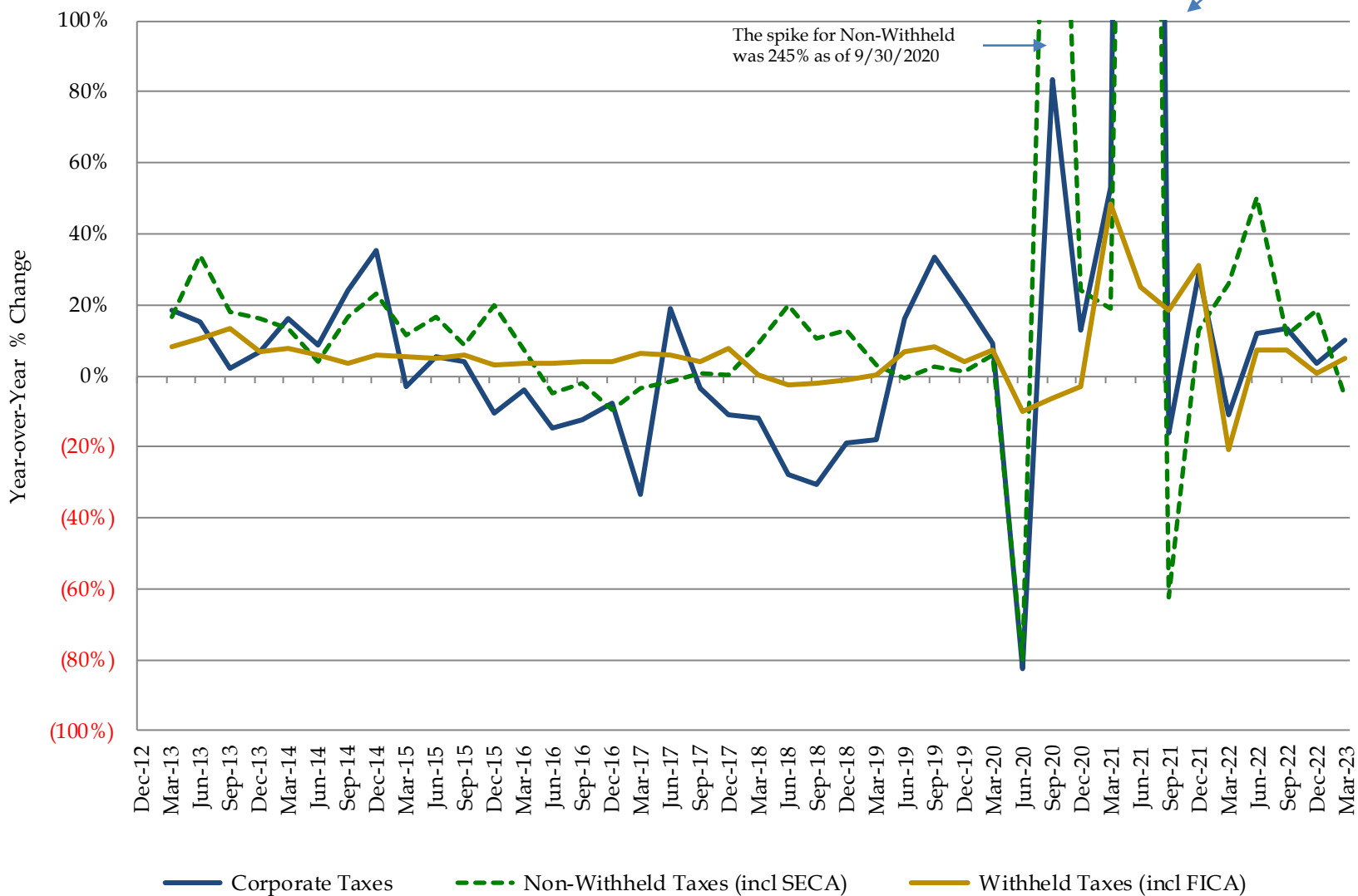
VII. Appendix

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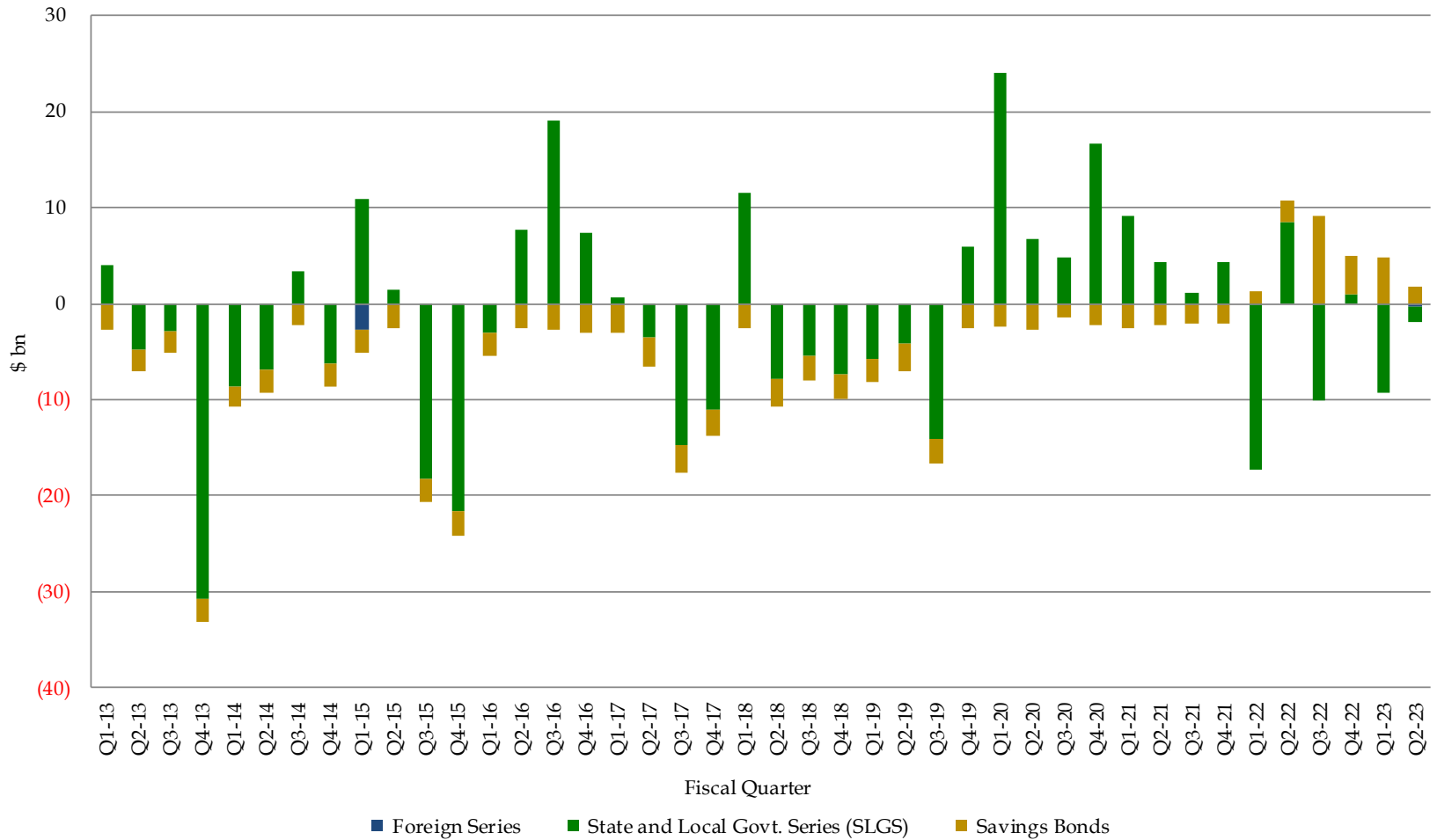


Quarterly Tax Receipts

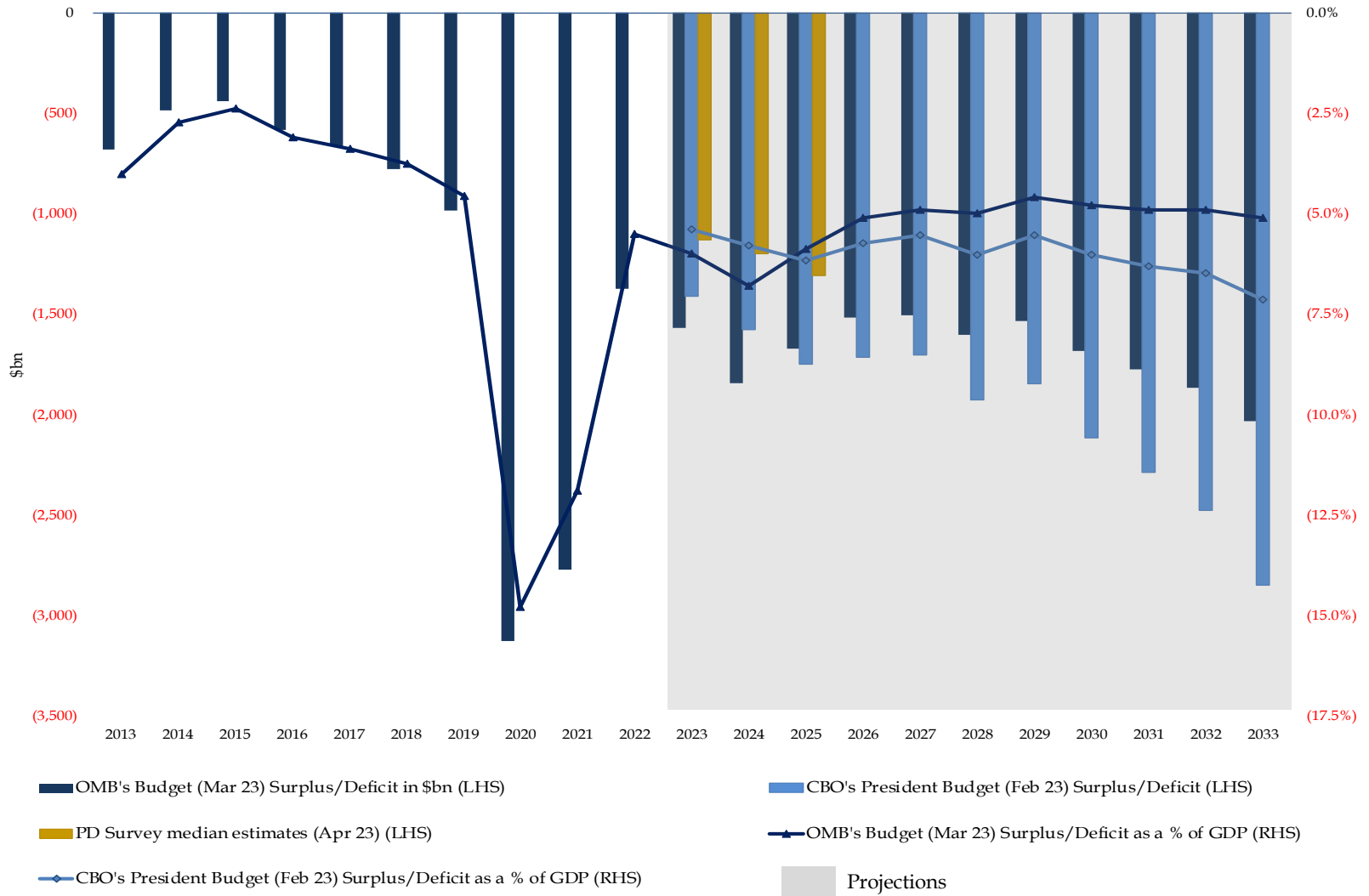


Quarterly tax receipts for Q4 FY2020 reflect the adjustment of April and June 2020 tax deadlines to July 15th, 2020.

Treasury Net Nonmarketable Borrowing



Budget Surplus/Deficit*



*OMB's projections are from OMB's Table S-1 of "Budget of The U.S. Government Fiscal Year 2024," March 2023. CBO's projections are from Table 1-1 of "The Budget and Economic Outlook: 2023 to 2033," February 2023.

Sources of Privately-Held Financing in FY23 Q2

January - March 2023	
Net Bill Issuance	380
Net Coupon Issuance	277
Subtotal: Net Marketable Borrowing	657
Ending Cash Balance	178
Beginning Cash Balance	568
Subtotal: Change in Cash Balance	(390)
Net Implied Funding for FY23 Q2*	1,047

Security	January - March 2023 Bill Issuance			Fiscal Year-to-Date Bill Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
4-Week	855	775	80	1,575	1,515	60
8-Week	720	660	60	1,365	1,290	75
13-Week	759	720	39	1,479	1,410	69
17-Week	462	198	264	792	198	594
26-Week	621	546	75	1,203	1,113	90
52-Week	102	102	0	238	238	0
CMBs						
17-Week	0	213	(213)	93	603	(510)
CMBs	235	160	75	275	200	75
Bill Subtotal	3,754	3,374	380	7,020	6,567	453

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	50	(18)	47	50	(3)
30-Year TIPS	9	0	9	9	0	9
Coupon Subtotal	916	639	277	1,582	1,005	577

Total	4,670	4,013	657	8,601	7,572	1,030
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*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.

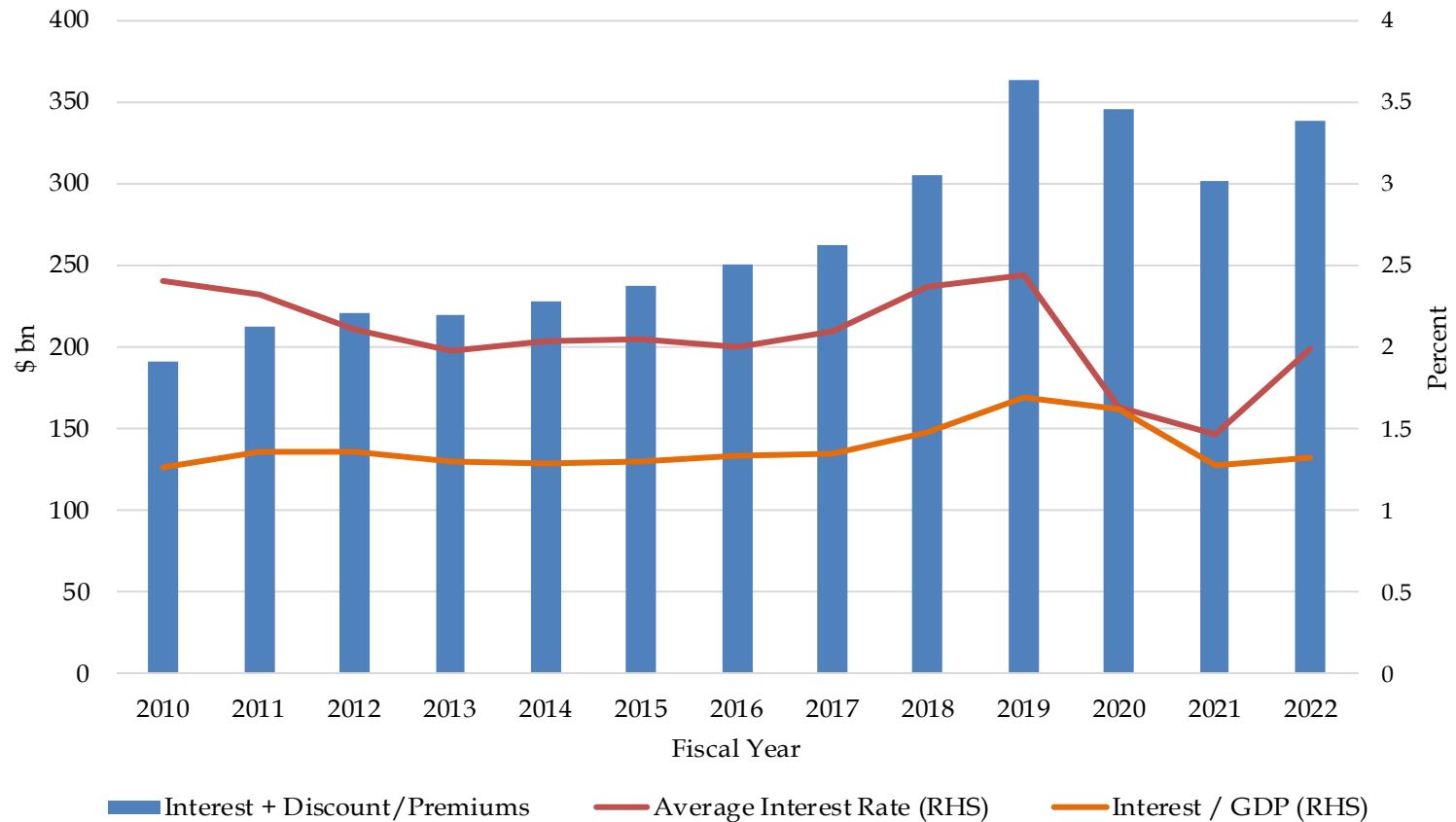
FY 2023-2025 Deficits and Privately-Held Net Marketable Borrowing Estimates, in \$ billions

	Primary Dealer			OFF	OMB	CBO
	25th	Median	75th			
FY 2023 Deficit	1,338	1,400	1,435		1,570	1,410
FY 2024 Deficit	1,413	1,575	1,600		1,847	1,576
FY 2025 Deficit	1,413	1,650	1,758		1,672	1,752
FY 2023 Change in Cash Balance	-236	-136	-86	-36	14	0
FY 2024 Change in Cash Balance	100	100	148		0	0
FY 2025 Change in Cash Balance	0	10	2		0	0
FY 2023 Total Net Marketable Borrowing					1,608	1,409
FY 2024 Total Net Marketable Borrowing					1,873	1,654
FY 2025 Total Net Marketable Borrowing					1,809	1,844
FY 2023 SOMA Redemption	720	720	720	698		
FY 2024 SOMA Redemption	134	360	555			
FY 2025 SOMA Redemption	0	0	0			
FY 2023 Privately-Held Net Marketable Borrowing*	1,947	2,080	2,179	2,489	2,328	2,143
FY 2024 Privately-Held Net Marketable Borrowing*	1,495	1,823	2,075		2,233	2,014
FY 2025 Privately-Held Net Marketable Borrowing*	1,463	1,595	1,798		1,809	1,844

Estimates as of:	Apr-23	May-23	Mar-23	Feb-23
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- *All privately-held net marketable borrowing estimates of are “normalized” using:
 - 1) the median Primary Dealer’s estimates for SOMA redemptions, and
 - 2) assuming OFF’s end of fiscal year 2023 cash balance of \$600 billion, held constant in out years.
- OMB projections are using estimates are from Table S-1 of “Budget of The U.S. Government Fiscal Year 2024,” March 2023.
- CBO projections are using estimates are from Table 1-1 of “The Budget and Economic Outlook: 2023 to 2033,” February 2023.
- OFF’s SOMA redemption estimate excludes securities maturing on 9/30/2023 (Saturday).

Historical Marketable Treasury Debt Service Cost

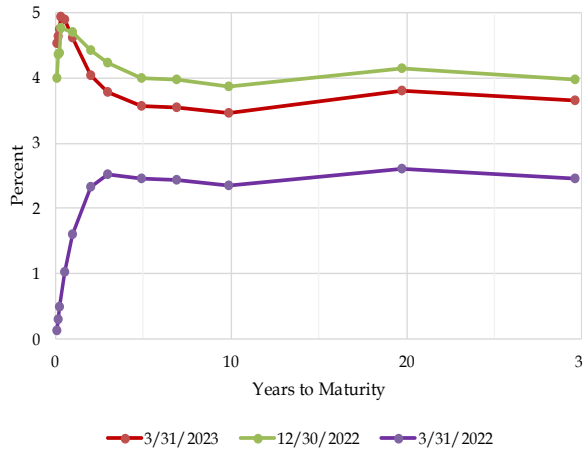


Source: <https://fiscaldata.treasury.gov/datasets>

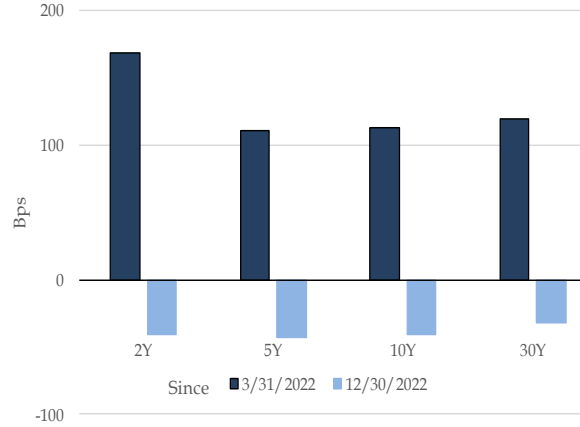
The average interest rates for total marketable debt do not include the Treasury Inflation-Indexed Securities and the Treasury Floating Rate Notes. However, they include securities from Federal Financing Bank. The average interest rates in the chart are as of corresponding fiscal year-end-dates.

Various Historical Treasury Interest Rate Metrics

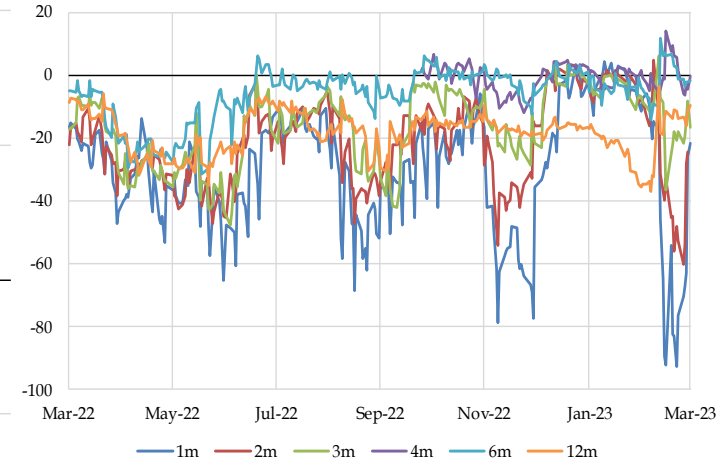
Treasury Nominal Yield Curve as of specified dates



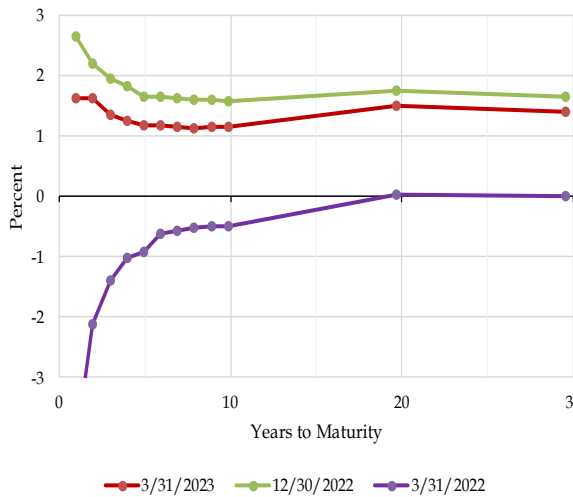
Changes in Selected Tenors Through the end of 03/31/23



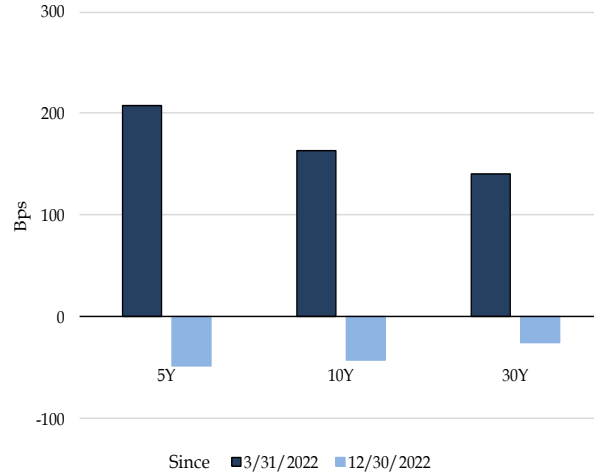
Bills-SOFR OIS spreads Through the end of 03/31/23



Treasury Real Yield Curve as of specified dates



Changes in Selected Tenors Through the end of 03/31/23



Breakevens Through the end of 03/31/23



**Projected Privately-Held Net Marketable Borrowing
Assuming Private Coupon Issuance & Total Bills Outstanding
Remain Constant as of 3/31/2023***

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	453	307	668	50	(42)	1,436
2024	0	28	682	75	(10)	776
2025	0	(47)	704	10	0	667
2026	0	(160)	700	28	0	568
2027	0	(40)	583	10	0	553
2028	0	0	271	(11)	0	260
2029	0	0	387	(6)	0	381
2030	0	0	507	9	0	516
2031	0	0	339	(3)	0	337
2032	0	0	363	(27)	0	336
2033	0	0	384	(19)	0	365

*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	1/10/2023	4.100	2.79	42.8	29.6	1.8	68.6	2.2	1.1	0.4
4-Week	1/17/2023	4.370	2.76	57.8	43.9	2.6	53.5	2.2	1.0	0.6
4-Week	1/24/2023	4.480	2.41	67.0	44.0	1.1	54.9	3.0	1.1	0.7
4-Week	1/31/2023	4.500	2.59	71.4	43.2	2.4	54.4	3.6	0.9	0.7
4-Week	2/7/2023	4.490	2.47	72.2	40.8	3.5	55.7	2.8	1.1	0.7
4-Week	2/14/2023	4.520	2.63	72.0	37.6	0.8	61.6	3.0	1.0	0.7
4-Week	2/21/2023	4.510	2.77	72.1	33.1	1.4	65.5	2.9	1.5	0.7
4-Week	2/28/2023	4.515	2.63	72.0	32.4	2.1	65.6	3.0	1.3	0.7
4-Week	3/7/2023	4.590	2.53	71.9	44.3	2.3	53.5	3.1	1.3	0.7
4-Week	3/14/2023	4.640	2.75	61.5	34.4	0.0	65.6	3.5	1.2	0.6
4-Week	3/21/2023	4.220	2.43	55.7	42.9	1.5	55.6	4.3	1.3	0.6
4-Week	3/28/2023	4.150	2.54	56.8	36.3	2.2	61.5	3.2	1.2	0.6
4-Week	4/4/2023	4.600	2.63	57.1	36.8	1.2	62.0	2.9	1.3	0.6
8-Week	1/10/2023	4.430	2.29	43.9	62.4	3.1	34.5	1.1	1.1	0.9
8-Week	1/17/2023	4.465	2.73	53.4	42.6	2.8	54.6	1.6	1.0	1.0
8-Week	1/24/2023	4.520	2.53	58.8	46.2	1.4	52.5	1.2	1.0	1.1
8-Week	1/31/2023	4.525	2.57	58.0	41.9	2.2	55.8	2.0	0.7	1.1
8-Week	2/7/2023	4.505	2.56	58.9	41.7	2.4	55.9	1.1	0.9	1.1
8-Week	2/14/2023	4.600	2.32	59.0	41.4	1.1	57.5	1.0	0.8	1.1
8-Week	2/21/2023	4.650	2.51	58.9	39.4	1.9	58.8	1.1	1.2	1.1
8-Week	2/28/2023	4.660	2.64	58.9	39.7	1.6	58.7	1.1	1.0	1.1
8-Week	3/7/2023	4.655	2.79	58.5	41.4	2.0	56.7	1.5	1.0	1.1
8-Week	3/14/2023	4.820	2.30	53.5	62.8	2.7	34.5	1.5	1.0	1.0
8-Week	3/21/2023	4.450	2.85	47.7	28.6	0.2	71.1	2.3	1.1	0.9
8-Week	3/28/2023	4.400	2.97	48.7	26.8	1.5	71.6	1.3	1.0	0.9
8-Week	4/4/2023	4.600	2.47	48.9	37.7	0.8	61.5	1.1	1.1	0.9

*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	1/5/2023	4.410	2.50	51.2	44.0	4.2	51.8	2.8	6.9	1.8
13-Week	1/12/2023	4.560	2.61	53.9	41.6	3.8	54.6	3.1	5.9	1.9
13-Week	1/19/2023	4.560	2.69	57.7	39.2	5.1	55.7	2.3	6.5	2.0
13-Week	1/26/2023	4.575	2.68	57.3	45.8	13.0	41.2	2.7	6.4	2.0
13-Week	2/2/2023	4.595	2.47	58.1	46.6	3.5	49.9	1.9	8.5	2.1
13-Week	2/9/2023	4.590	2.69	57.7	41.5	4.0	54.5	2.3	6.6	2.0
13-Week	2/16/2023	4.680	2.60	57.3	46.9	3.7	49.5	2.7	7.5	2.1
13-Week	2/23/2023	4.720	2.72	57.6	43.1	4.2	52.8	2.4	6.1	1.9
13-Week	3/9/2023	4.765	2.93	54.9	36.1	3.6	60.4	2.1	4.0	1.8
13-Week	3/16/2023	4.750	2.15	54.1	62.4	3.5	34.2	2.9	4.1	1.8
13-Week	3/23/2023	4.675	2.41	53.7	38.2	8.1	53.7	3.3	1.7	1.7
13-Week	3/30/2023	4.675	2.51	54.4	47.8	9.4	42.8	2.6	6.3	1.9
17-Week	1/10/2023	4.570	3.10	32.3	32.4	2.9	64.7	0.7	0.8	1.3
17-Week	1/17/2023	4.680	2.79	35.4	42.4	11.9	45.8	0.6	0.6	1.4
17-Week	1/24/2023	4.610	2.97	35.4	41.1	5.8	53.1	0.6	0.6	1.4
17-Week	1/31/2023	4.620	2.90	34.7	43.0	3.5	53.5	1.3	0.4	1.4
17-Week	2/7/2023	4.625	2.86	35.7	49.3	3.0	47.7	0.3	0.6	1.4
17-Week	2/14/2023	4.700	2.59	35.3	52.0	2.9	45.1	0.7	0.5	1.5
17-Week	2/21/2023	4.800	2.93	35.6	36.1	2.4	61.4	0.4	0.7	1.4
17-Week	2/28/2023	4.830	2.93	35.6	42.2	3.9	53.8	0.4	0.6	1.4
17-Week	3/7/2023	4.885	2.92	35.6	43.3	1.9	54.8	0.4	0.6	1.4
17-Week	3/14/2023	5.045	2.62	35.4	48.4	4.0	47.6	0.6	0.7	1.4
17-Week	3/21/2023	4.750	2.74	34.8	41.9	16.8	41.4	1.2	0.8	1.4
17-Week	3/28/2023	4.805	2.61	35.3	39.1	12.1	48.8	0.7	0.7	1.4

*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)*
26-Week	1/5/2023	4.635	2.78	42.3	39.4	2.4	58.1	2.7	5.8	3.1
26-Week	1/12/2023	4.710	2.48	45.3	55.1	5.8	39.1	2.7	4.9	3.2
26-Week	1/19/2023	4.685	2.68	45.5	46.3	6.9	46.8	2.5	5.2	3.2
26-Week	1/26/2023	4.685	2.76	45.3	34.0	2.3	63.7	2.7	5.1	3.2
26-Week	2/2/2023	4.680	2.93	45.9	35.8	3.5	60.6	2.1	6.8	3.3
26-Week	2/9/2023	4.755	2.63	45.0	47.9	2.8	49.3	3.0	5.3	3.2
26-Week	2/16/2023	4.840	2.54	45.3	41.8	2.4	55.8	2.7	6.0	3.3
26-Week	2/23/2023	4.915	2.71	45.1	42.1	4.0	53.9	2.9	4.9	3.1
26-Week	3/9/2023	4.970	2.80	45.0	40.9	2.9	56.1	3.0	3.4	3.0
26-Week	3/16/2023	4.700	2.29	45.1	61.6	4.5	33.9	2.9	3.5	3.0
26-Week	3/23/2023	4.620	2.87	45.7	40.7	2.2	57.1	2.3	1.4	2.9
26-Week	3/30/2023	4.650	2.85	45.7	33.3	1.7	65.0	2.3	5.3	3.1
52-Week	1/26/2023	4.470	2.87	32.4	34.3	0.8	65.0	1.6	3.6	4.6
52-Week	2/23/2023	4.795	2.89	32.2	24.2	1.1	74.7	1.8	3.5	4.4
52-Week	3/23/2023	4.390	2.85	33.0	40.6	2.0	57.4	1.0	1.0	4.1
CMB	1/19/2023	4.490	2.45	59.9	51.9	5.3	42.7	0.1	0.0	0.7
CMB	1/24/2023	4.525	2.85	59.9	40.5	0.8	58.6	0.1	0.0	0.9
CMB	2/16/2023	4.540	3.79	24.9	70.6	3.1	26.2	0.1	0.0	0.1
CMB	2/28/2023	4.460	2.93	14.9	83.3	9.3	7.4	0.1	0.0	0.1
CMB	3/30/2023	4.050	2.39	30.0	83.6	1.8	14.6	0.0	0.0	0.1
CMB	3/31/2023	4.700	2.04	45.0	75.0	2.9	22.1	0.0	0.0	0.2

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

Nominal Coupons & FRNs										
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	1/31/2023	4.139	2.94	41.4	16.3	18.7	65.0	0.6	0.0	9.9
2-Year	2/28/2023	4.673	2.61	41.3	15.0	23.0	62.0	0.7	9.5	11.7
2-Year	3/31/2023	3.954	2.44	41.4	23.0	24.2	52.8	0.6	0.0	9.7
3-Year	1/17/2023	3.977	2.84	39.8	17.3	13.2	69.5	0.2	0.0	13.9
3-Year	2/15/2023	4.073	2.33	39.7	19.9	21.1	59.1	0.3	15.6	19.4
3-Year	3/15/2023	4.635	2.73	39.8	16.8	20.7	62.5	0.2	0.0	13.4
5-Year	1/31/2023	3.530	2.64	42.9	8.8	15.4	75.7	0.1	0.0	24.2
5-Year	2/28/2023	4.109	2.48	42.8	11.0	19.0	69.9	0.2	9.8	28.5
5-Year	3/31/2023	3.665	2.48	42.9	13.3	18.2	68.5	0.1	0.0	23.5
7-Year	1/31/2023	3.517	2.69	35.0	6.1	16.8	77.1	0.0	0.0	26.7
7-Year	2/28/2023	4.062	2.49	35.0	13.7	20.8	65.5	0.0	8.0	31.2
7-Year	3/31/2023	3.626	2.39	35.0	15.4	21.4	63.2	0.0	0.0	25.9
10-Year	1/17/2023	3.575	2.53	32.0	15.1	17.9	67.0	0.0	0.0	32.0
10-Year	2/15/2023	3.613	2.66	34.9	5.4	15.2	79.5	0.1	13.7	50.6
10-Year	3/15/2023	3.985	2.35	32.0	17.7	20.0	62.3	0.0	0.0	32.0
20-Year	1/31/2023	3.678	2.83	12.0	8.1	15.6	76.3	0.0	0.0	20.2
20-Year	2/28/2023	3.977	2.54	15.0	6.7	18.0	75.3	0.0	3.4	30.2
20-Year	3/31/2023	3.909	2.53	12.0	11.9	21.1	67.0	0.0	0.0	19.9
30-Year	1/17/2023	3.585	2.45	18.0	9.0	16.3	74.6	0.0	0.0	39.5
30-Year	2/15/2023	3.686	2.25	21.0	15.8	18.9	65.2	0.0	8.2	65.6
30-Year	3/15/2023	3.877	2.35	18.0	9.4	19.8	70.7	0.0	0.0	39.1
2-Year FRN	1/31/2023	0.200	2.80	24.0	32.5	0.1	67.4	0.0	0.0	0.1
2-Year FRN	2/24/2023	0.160	3.29	22.0	30.8	0.0	69.2	0.0	0.0	0.0
2-Year FRN	3/31/2023	0.190	3.51	22.0	31.7	0.0	68.3	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	1/31/2023	1.220	2.79	16.9	7.6	13.1	79.3	0.1	0.0	19.5
10-Year TIPS	3/31/2023	1.182	2.28	15.0	10.9	16.0	73.1	0.0	0.0	16.5
30-Year TIPS	2/28/2023	1.550	2.38	9.0	9.9	14.1	76.0	0.0	2.0	31.5

*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.

Office of Debt Management



Treasury's Current Views on Buybacks as a Policy Tool

May 2023

Executive Summary

This presentation provides a high-level summary of Treasury’s current views on the use cases and design of a potential buyback program.

- ▶ A Treasury buyback program would focus on two debt management *objectives*:
 - ▶ Liquidity Support: in order to bolster market liquidity, including by establishing a predictable opportunity for market participants to sell off-the-run securities
 - ▶ Cash Management: in order to reduce volatility in Treasury’s cash balance and bill issuance

- ▶ Treasury currently believes that a buyback program could provide the greatest benefits to all stakeholders if it adheres to the following *constraints*:
 - ▶ Buyback operations would be “regular and predictable” across tenors
 - ▶ Buyback operations would not be used to fundamentally change the overall maturity profile of the debt outstanding
 - ▶ Buyback operations would not be used to mitigate episodes of acute market stress.

- ▶ Treasury would regularly evaluate the success of a buyback program by considering qualitative metrics including surveys and feedback from market participants as well as quantitative metrics related to buyback execution prices.

Buybacks: Design Parameters

TENORS / SECURITY TYPES / PURCHASE BUCKETS

- ▶ Liquidity Support: include nominal coupon and TIPS securities with maturities across the curve. 6-8 purchase buckets by tenor would allow 1-2 operations in each bucket each quarter with operations around once per week
- ▶ Cash Management: likely focused on off-the run nominal coupon and TIPS securities with short maturities
- ▶ A purchase bucket (e.g., [0 to 2y]) could be simultaneously used for both cash management and liquidity support buybacks
- ▶ T-bills, STRIPS, and FRNs likely excluded

SIZING

- ▶ Liquidity Support: Initially around \$5-\$10 billion per month (or \$60 to \$120 billion annually)
- ▶ Cash Management: Initially up to \$120 billion per year (timing affected by seasonal factors) depending on fiscal flows
- ▶ Sizes to be reevaluated periodically
- ▶ Amounts ultimately purchased may vary depending on market conditions and the quality of offers submitted in an operation
- ▶ This approach is consistent with TBAC recommendations and responses to the April 2023 primary dealer survey

Potential Communication, Platform, & Participants

COMMUNICATION

Treasury would strive to be as transparent as possible with market participants about buyback intentions, consistent with “regular and predictable” framework.

- ▶ Quarterly Announcements: Details about anticipated liquidity support and cash management buybacks to be announced as part of Quarterly Refunding.
- ▶ Pre-Operation Announcements: Notice of a few business days to be provided before conducting a specific buyback operation.
- ▶ Post-Operation Transparency: Results of buybacks to be announced shortly after the operation ends (similar to auction results).

PLATFORM

- ▶ Using the existing FRB-NY *FedTrade* platform would be the most expedient means of implementing Treasury buybacks.

PARTICIPANTS

- ▶ Initially, Treasury would conduct buyback operations only with primary dealers, with the understanding that customers may access buyback operations through a primary dealer. In addition, Treasury anticipates assessing the potential costs and benefits of allowing other counterparties to directly participate.

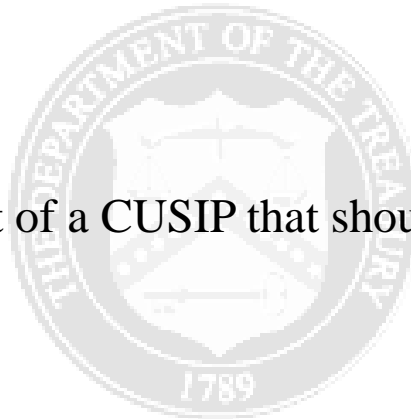
Financing of Buybacks

In general, Treasury believes buybacks should be treated like any other cash outlay for debt management purposes.

- ▶ Buybacks should not meaningfully impact WAM or other measures of overall maturity profile because they would occur regularly across the curve and be relatively small compared to the amount of debt outstanding.
- ▶ Treasury believes it would be imprudent to try to replace the duration that buybacks remove from the market in real or near-real time; attempts to do so would limit flexibility and run counter to regular and predictable issuance.

Outstanding Issues for Further Consideration

- ▶ Optimal “bucket sizes” and relative purchase amounts
- ▶ Minimum purchase amount for each operation
- ▶ Operational frequency
- ▶ “Float” - the minimum amount of a CUSIP that should remain in the market to maintain liquidity



Considerations for changing the issuance schedule for 2-, 3-, 5- and/or 7-year Treasuries

Treasury Borrowing Advisory Committee

May 2, 2023

TBAC Charge

At the February refunding, Treasury provided a summary of primary dealers' views on potential changes to the auctions schedule to reduce the number of CUSIPS for Treasury securities issued each year.

Please discuss the Committee's views on the potential benefits and risks of changing the monthly new issue schedule for the 2-, 3-, 5-, and/or 7-year nominal coupon benchmarks to one new issue and two benchmarks per quarter. Would these changes meaningfully improve Treasury market liquidity?

Agenda

- Executive Summary
- Issuance Calendar
- Impacts to Liquidity
- Conclusions

Executive Summary

Executive Summary

- Initial analysis indicates that changing the new issue schedule for 2-, 3-, 5- and 7- year notes could lead to a **marginal improvement in Treasury market liquidity**, notably in off-the-runs, and may have de minimis impacts to Treasury funding costs.
- This proposed change would **significantly reduce the number of CUSIPs** in the market, consolidating liquidity in fewer issues, and over the course of the quarter, **creating larger sizes of on-the-runs**.
 - This would support ample repo capacity, may **increase repo specialness** upon new issue, **reduce the likelihood of fails**, and possibly provide greater buyback flexibility.
 - Fewer issues would also allow for more **efficient settlement and balance sheet netting**, for both primary dealers and other market participants. Further, this may create easier implementation of any central clearing initiative.
 - One drawback is that meaningful market moves between new issue and reopenings could lead to reopenings at premiums or discounts which could negatively impact investor appetite at auction.
- Treasury futures will have fewer eligible CUSIPs for delivery, at larger sizes. This may reduce the size of the delivery baskets but could lead to **improved liquidity of both the futures contract and the underlying deliverables**, as futures-related trading activity will be in much larger cheapest-to-deliver (CTD) issues. The impact to delivery basket sizes may be most exaggerated in TU futures (2-year), with fewer eligible CUSIPs but all substantially larger in size. Given futures price off of the CTD, we expect a larger more liquid CTD would enhance futures pricing

Issuance Calendar

Current & Historical Issuance Calendars

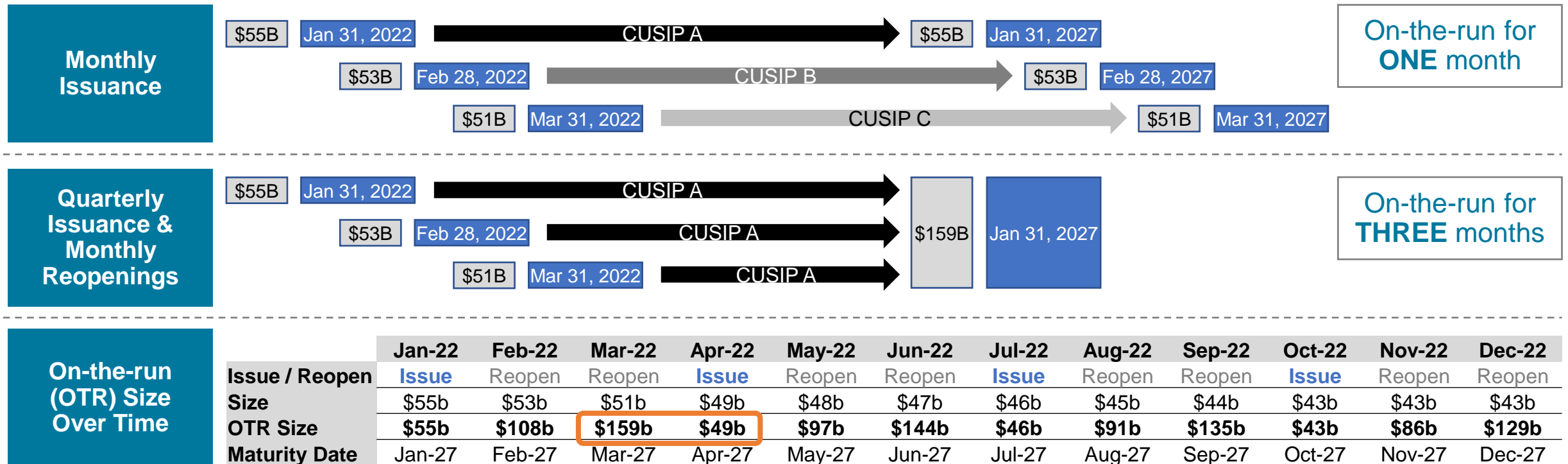
- While Treasury is a regular and predictable issuer, Treasury has changed issuance calendars for Treasury securities several times through history when issuance needs grow or shrink e.g., introducing new tenors, pausing issuance on tenors and changing the frequency of issues.
- With well-articulated advance notice and deliberate implementation, such changes generally have been well-received by the market.

	85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23	2023 Q1 Issuance
2-year	Monthly	\$126bn
3-year	Quarterly → None (May-98) → Quarterly (May-03) → None (May-07) → Monthly (Nov-08)	\$120bn
5-year	Quarterly → Monthly (Jan-91) → Quarterly (Aug-98) → Monthly (Aug-03)	\$129bn
7-year	Quarterly → None (Apr-93) → Monthly (Feb-09)	\$105bn

Source: treasurydirect.gov

Hypothetical 5-Year Notes Case Study: Issue Size Grows & On-The-Run for Longer

- Under a new quarterly issuance cadence, there would be one new issue and two reopenings per quarter as opposed to three new issues per quarter under a monthly cadence.
- While transitioning from the second reopening to the next new issue, the size of on-the-runs would likely significantly reduce, by as much as ~70%. In order to manage volatility in issue sizes, Treasury could employ an issuance strategy of larger new issues followed by subsequent smaller reopenings.
- The new cadence if implemented for 2-, 3-, 5- and 7-year notes would likely introduce the single largest issues to the market (prior largest issue = \$117b¹).

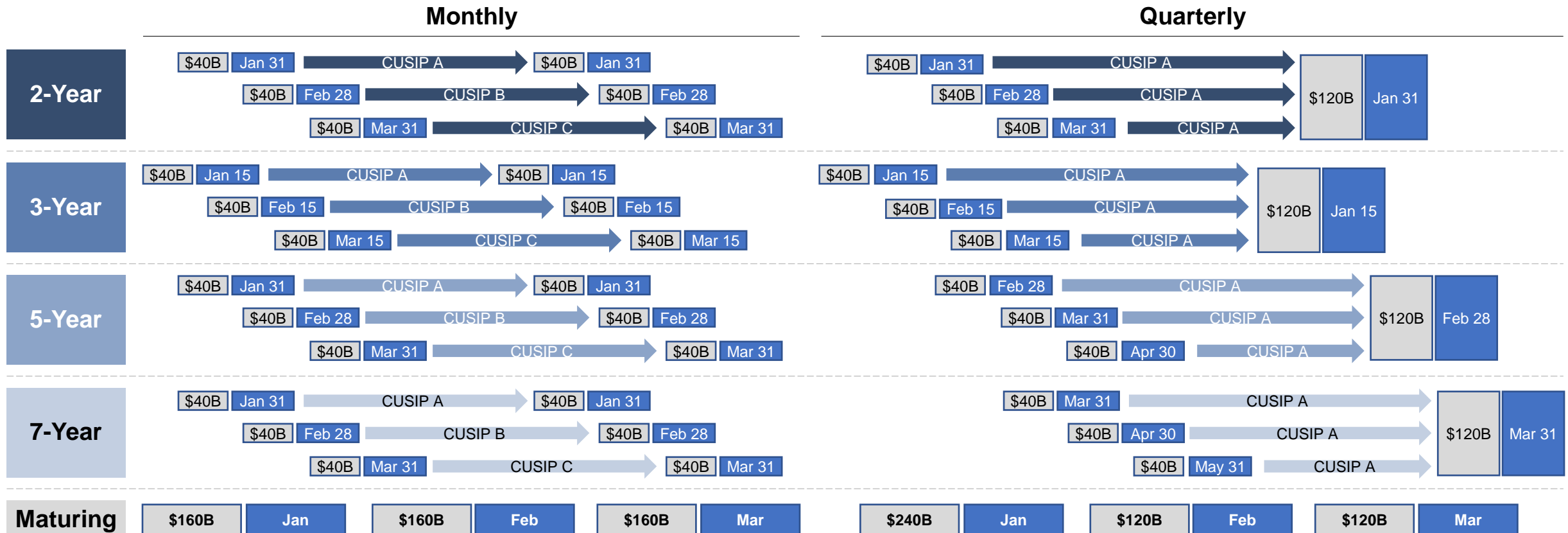


Sources: Presenting Member analysis; treasurydirect.gov

¹ Previously largest issue CUSIPs: 91282CCS8, 91282CBL4, 91282CAV3, 91282CCB5

Hypothetical Monthly vs Quarterly Issuance Cadence Case Study

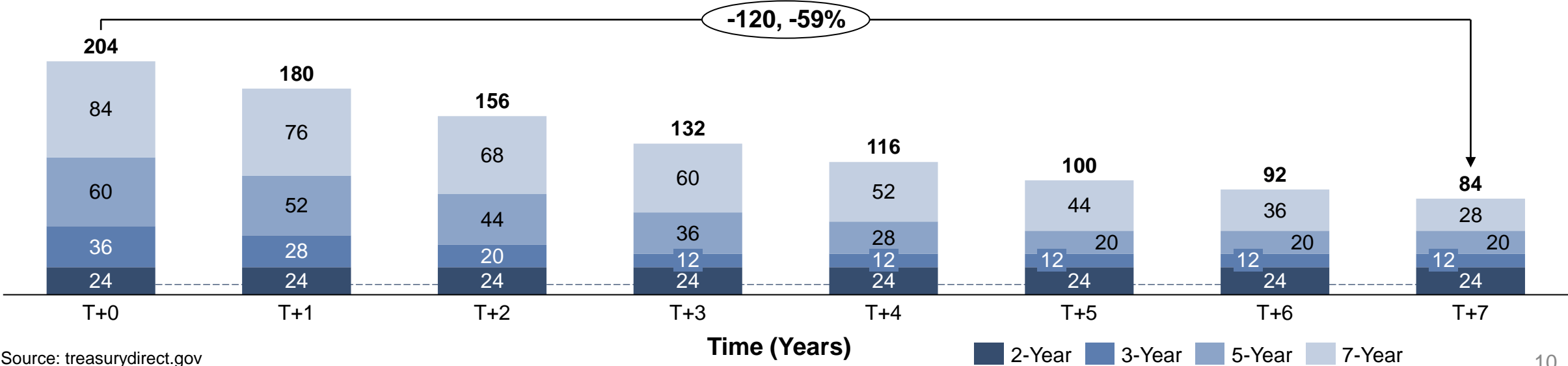
- If all four 2-, 3-, 5- and 7-year notes are migrated to a quarterly cadence, in order to maintain maturity points continuously along the curve, we would recommend staggering issues across the first, second and third months of each quarter.
- Aligning issuance cadences on quarterly cycles could introduce interdependencies, thus possibly reducing future flexibility should issuance needs meaningfully change e.g., growing or shrinking issuance needs.



Impact on the Amount of CUSIPs Outstanding for 2-, 3-, 5- and 7-Year Notes

- Moving issuance from monthly to quarterly for 2-, 3-, 5- and 7-year notes would result in eight reopenings, per year, per tenor. This would reduce the amount of CUSIPs outstanding by 136, or 67%, if fully implemented.
- Keeping one of these four issues on a monthly cadence allows for Treasury to maintain more flexibility in funding choices, this could be helpful if issuance needs change in the future. 2- and 3-year notes each have merits for remaining a monthly issue:
 - In short tenors, off-the-run securities would be subject to the most curve sensitivity and therefore maintaining presence at all points on the curve is valuable. To maintain the most liquid front part of the curve, we would propose that 2-year notes remain on the current monthly schedule – this would have the least impact on CUSIP reduction.
 - One item to note is that 3-year notes are currently issued on a mid-month schedule, whereas 2-, 5- and 7-year notes are on a month-end schedule. Full implementation of an issuance cycle change might require additional cash management as a result. Therefore, another possible choice would be to maintain 3-year notes on a monthly schedule and migrate 2-year notes to a quarterly schedule. However, this would result in a smaller CUSIP reduction of 112, or 55%.

CUSIP Reduction Due to Moving 3-, 5-, and 7-Year Notes From Monthly to Quarterly

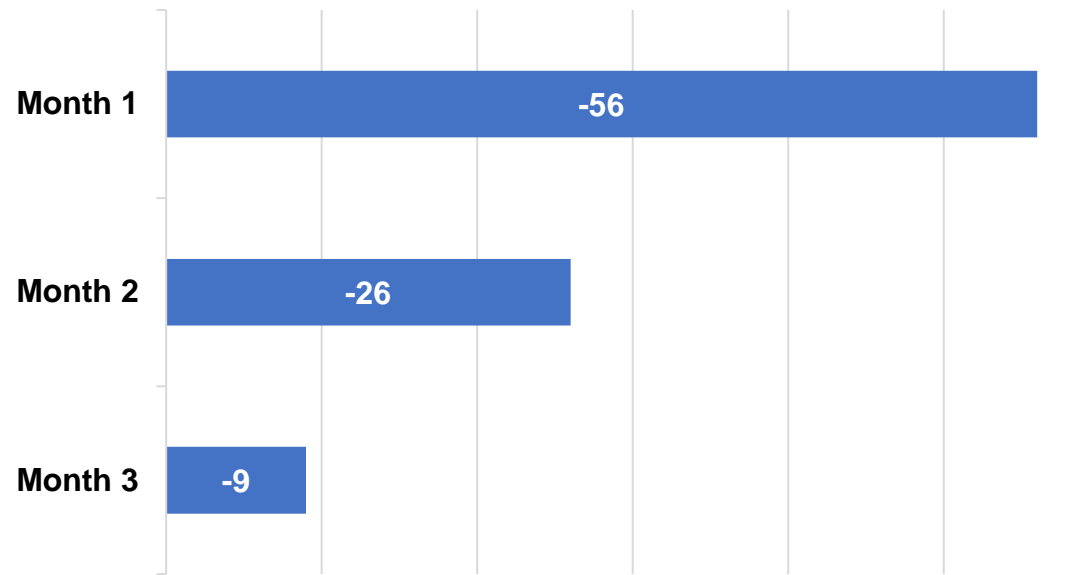


Impacts to Liquidity

Repo Market Dynamics

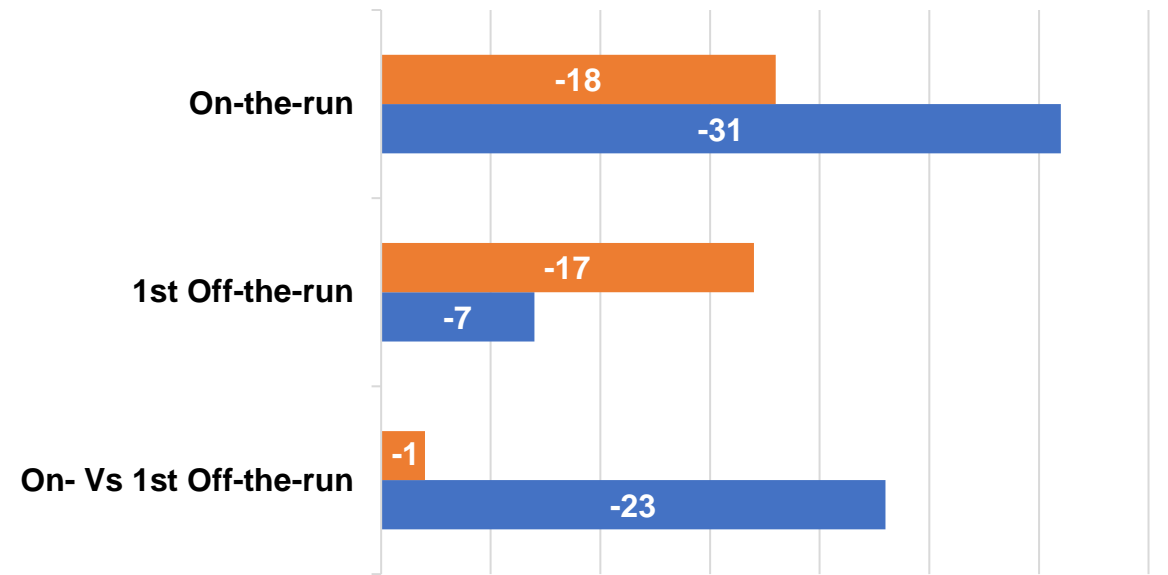
- Unsurprisingly, when analyzing 10-year notes (new issue followed by two reopenings), we find the repo specialness generally peaks in month one and moderates over subsequent months.
- If other issues are converted to this cadence, it is possible they would experience the same phenomenon.
- It is notable that repo specialness is greater for 10-year notes vs 5-year notes, and the repo spread between on-the-run and off-the-run 10-year notes is significantly greater than the repo spread between on-the-run and off-the-run 5-year notes.
- Therefore, rolling from a prior, large on-the-run issue to a new, smaller on-the-run issue could benefit Treasury issuing at tighter levels / lower yields.

On-The-Run 10-Year Note Average Repo Spread, 2010-2023



Repo Spread to General Collateral (bps)

5-Year vs 10-Year Note Repo Spreads, 2010-2023



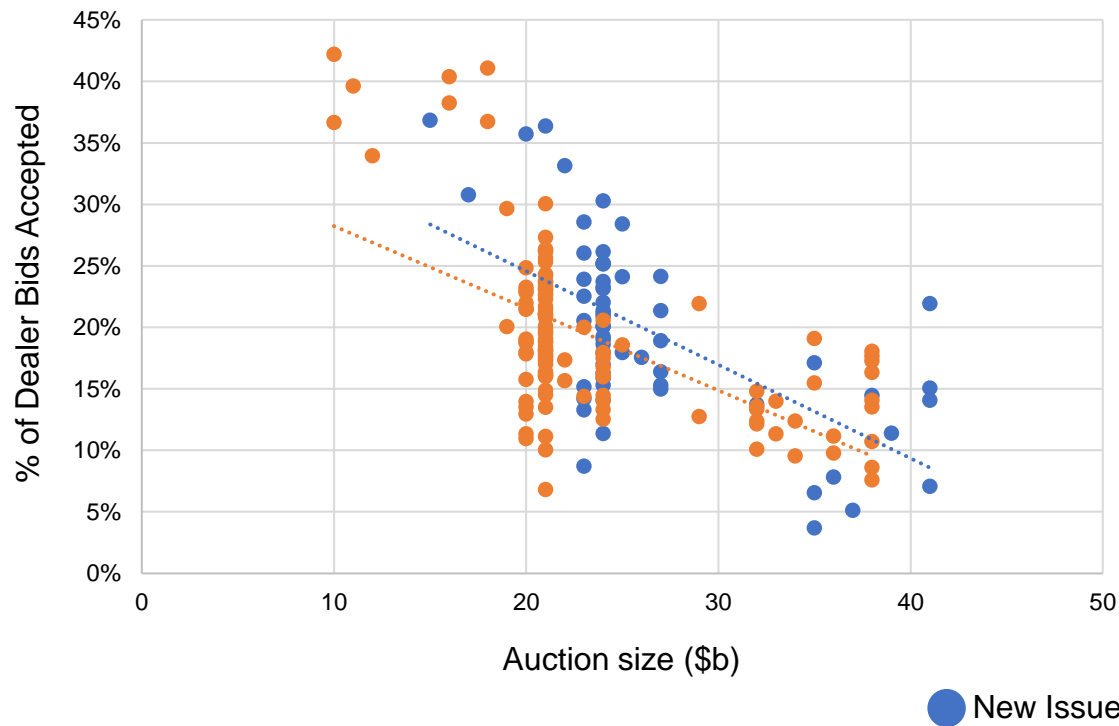
Repo Spread to General Collateral (bps)

5-Year 10-Year

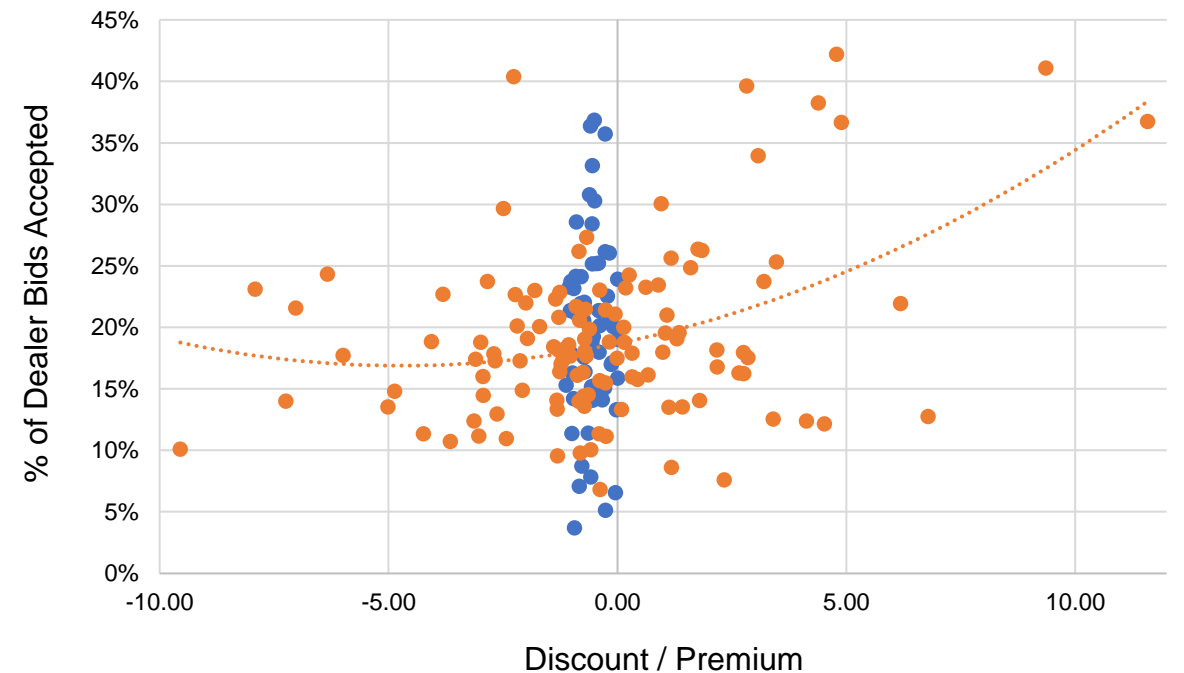
Auction Performance of Reopenings: Increased Balance Sheet Efficiency and Dealer Participation

- Historically, dealer participation and acceptance rates tend to decline as auction sizes grow.
- Reducing the number of outstanding CUSIPs should allow for increased balance sheet netting, as there will be greater concentration in fewer issues, possibly leading to greater balance sheet efficiency.
- A new issue followed by two reopenings is more likely to have auctions with prices further from par, which may lead to reduced investor appetite. However, greater balance sheet efficiency from fewer outstanding CUSIPs may allow for increased dealer participation.

% of Dealer Bids Accepted vs Auction Size (10-Year Note), 2008-2023



% of Dealer Bids Accepted vs Discount/Premium (10-Year Note), 2008-2023



Hypothetical Futures Eligibility: Possible Change in Delivery Baskets

- Treasury futures will have fewer eligible CUSIPs for delivery, at larger sizes, possibly leading to smaller delivery baskets. This may be most exaggerated in TU futures (2-year), which would likely experience the greatest delivery basket impacts. However, importantly the size of the cheapest-to-deliver (CTD) issue would be larger, reducing squeeze risk and enhancing liquidity for the contract and in turn, the CTD.
- For example, if the 5-year note is on a Jan/Apr/Jul/Oct schedule, there would be less deliverable supply than the Feb/May/Aug/Nov schedule. The specific quarterly schedule chosen for each Treasury security will have impacts on futures eligibility.
- Similar to futures, index constituents may be impacted as larger issues roll in and out of index buckets. This may lead to larger index rebalancing when these bigger issues flow through the index eligibility criteria. This could potentially increase investor appetite for seasoned issues and help support general market liquidity.

Futures Contract	Eligibility Criteria	Eligible Securities: Today	5-Year: Jan/Apr/Jul/Oct Schedule ¹	5-Year: Feb/May/Aug/Nov Schedule ²							
FVH3 Futures (UST 5-Year Mar23 Contract)	<ul style="list-style-type: none"> Treasury notes Original term to maturity: Not more than 5 years 3 months Remaining term to maturity: At least 4 year 2 months 	5-Year	3/31/2028	\$43bn							
		5-Year	2/29/2028	\$43bn							
		5-Year	1/31/2028	\$43bn	5-Year	1/31/2028	\$129bn				
		5-Year	12/31/2027	\$43bn							
		5-Year	11/30/2027	\$43bn							
		5-Year	10/31/2027	\$43bn	5-Year	10/31/2027	\$129bn		5-Year	11/30/2027	\$129bn
		5-Year	9/30/2027	\$44bn							
		5-Year	8/31/2027	\$45bn					5-Year	8/31/2027	\$132bn
		5-Year	7/31/2027	\$46bn	5-Year	7/31/2027	\$135bn				
		5-Year	6/30/2027	\$47bn							
		5-Year	5/31/2027	\$48bn				5-Year	5/31/2027	\$141bn	
		TOTAL		\$488bn	TOTAL		\$393bn	TOTAL		\$488bn	
TUH3 Futures (UST 2-Year Mar23 Contract)	<ul style="list-style-type: none"> Treasury notes Original term to maturity: Not more than 5 years 3 months Remaining term to maturity: At least 1 year 9 months and not more than 2 years 	2-Year	3/31/2025	\$42bn	2-Year	3/31/2025	\$42bn	2-Year	3/31/2025	\$42bn	
		5-Year	3/31/2025	\$41bn							
		3-Year	3/15/2025	\$48bn							
		2-Year	2/28/2025	\$42bn	2-Year	2/28/2025	\$42bn		2-Year	2/28/2025	\$42bn
		5-Year	2/28/2025	\$41bn					5-Year	2/28/2025	\$83bn
		3-Year	2/15/2025	\$50bn	3-Year	2/15/2025	\$98bn				
		2-Year	1/31/2025	\$42bn	2-Year	1/31/2025	\$42bn		2-Year	1/31/2025	\$42bn
		5-Year	1/31/2025	\$41bn	5-Year	1/31/2025	\$41bn				
		3-Year	1/15/2025	\$52bn					3-Year	1/15/2025	\$150bn
		2-Year	12/31/2024	\$42bn	2-Year	12/31/2024	\$42bn		2-Year	12/31/2024	\$42bn
5-Year	12/31/2024	\$41bn									
3-Year	12/15/2024	\$54bn									
		TOTAL		\$536bn	TOTAL		\$307bn	TOTAL		\$401bn	

Source: Presenting Member analysis; CME; Bloomberg

¹ Assumptions include 2-Year on a monthly schedule, 3-Year on Feb/May/Aug/Nov schedule

² Assumptions include 2-Year on a monthly schedule, 3-Year on Jan/Apr/Jul/Oct schedule

Conclusions

Conclusions

- Fewer and larger CUSIPs could potentially lead to **greater liquidity throughout the life of an issue, concentrating trading volumes and increasing off-the-run liquidity**.
 - This may increase repo specialness upon new issue, reduce the likelihood of fails, and support smoother market functioning.
 - Reduced CUSIPs could further result in a more efficient settlement process and potential balance sheet netting, for both primary dealers and other market participants.
 - However, meaningful market moves between a new issue and reopenings could lead to larger premiums/discounts, thus impacting investor appetite.
- Similar to futures, index constituents may be impacted as larger issues roll in and out of index buckets. This may result in larger index rebalancing when these bigger issues flow through the index eligibility criteria. This could potentially **increase investor appetite for seasoned issues and help support general market liquidity**.
- We expect market impacts could be more meaningful for the shorter end of the curve, as larger gaps between issues may be subject to greater volatility surrounding market events e.g., data, policy etc. and **market participants might prefer the granularity of having each point on the curve available**. As such, there may be more value maintaining the issuance schedule for 2-year notes as monthly.
- The process to migrate would involve a lengthy transition period during which there is risk of potentially introducing different liquidity, and risk profiles, of issues. Further analysis of the transition period would be required as the market's functioning during the transition is likely to be distinct from when fully phased in.

Appendix

Current & Historical Issuance Calendars

	85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23	2023 Q1 Issuance
2-year	Monthly	\$126b
3-year	Quarterly None (May-98) Quarterly (May-03) None (May-07) Monthly (Nov-08)	\$120b
4-year	Quarterly None (Dec-90)	n/a
5-year	Quarterly Monthly (Jan-91) Quarterly (Aug-98) Monthly (Aug-03)	\$129b
7-year	Quarterly None (Apr-93) Monthly (Feb-09)	\$105b
10-year	Quarterly 6x/yr (Jul-96) Quarterly (Aug-97)	\$99b
20-year	Quarterly None (Jan-86) Quarterly (May-20)	\$39b
30-year	Quarterly 2x/yr (Aug-93) 3x/yr (Aug-96) 2x/yr (Feb-99) None (Aug-01) Annually (Feb-06) Quarterly (Feb-09)	\$57b

Source: treasurydirect.gov

May 2023

TIPS Issuance, Demand, and Level of Supply

Please discuss what Treasury should consider for TIPS issuance for the rest of CY2023 and beyond, in the context of the committee's views on the appropriate level of TIPS supply in the medium and long-term. How have investor portfolio allocations to TIPS changed recently and how do you expect demand to evolve going forward? In addition to the share of TIPS as a percentage of total debt outstanding, are there any other measures Treasury should use to help inform the appropriate level or range of TIPS outstanding?

Executive Summary

Treasury structurally benefits from the TIPS program.

- Treasury can reduce its costs by offering TIPS to investors who need inflation protection in their portfolios.
- TIPS offset likely higher deficits during low inflation periods; past studies suggest deficit volatility decreased by TIPS share up to 13%.
- Ex-post and ex-ante cost of TIPS vs nominals are random in short run, but Treasury can use them to monitor in the long run if it is realizing structural benefits.

Recent demand environment has been cyclically weaker, but structural demand for TIPS likely remains strong.

- Reasons for investors to own TIPS remain firmly in place; TIPS are owned by a diverse investor base.
- 2022 saw retail TIPS fund outflows around negative price returns; historical experience suggests that such outflows rebound quickly.
- Market pricing of inflation, auction results, and trading activity suggest demand is not weak.

We recommend larger TIPS auction sizes within framework of regular and predictable issuance.

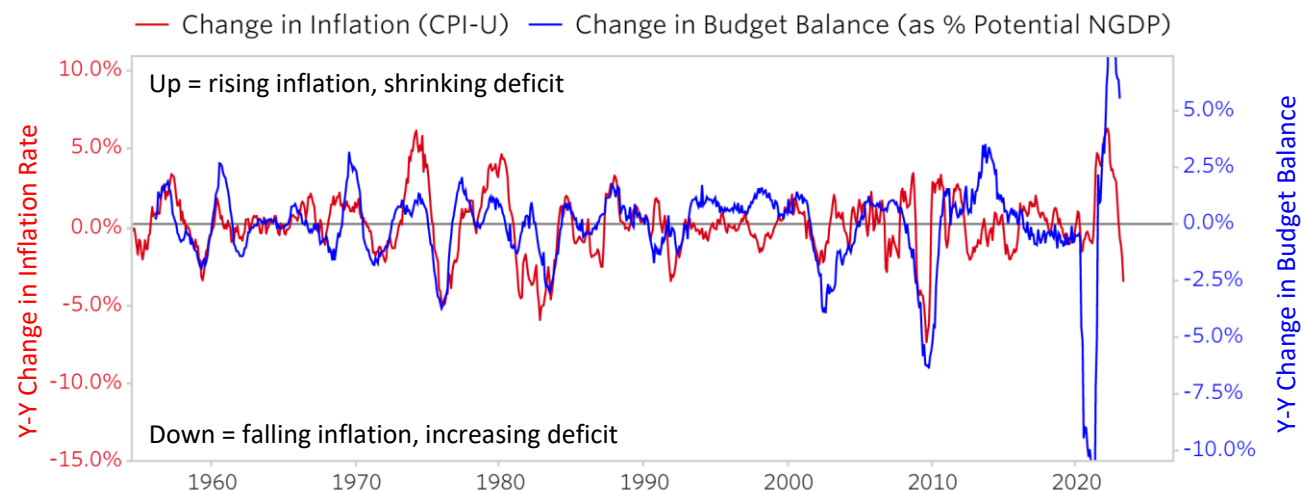
- Higher TIPS share is likely optimal for Treasury so long as market will bear additional issuance.
- Without increased auction sizes, TIPS share would fall in coming years due to higher overall deficits, coming maturities, and SOMA runoff.
- With current demand, we recommend incrementally larger auctions and monitoring of indicators to ensure market is absorbing supply.

Additional perspectives on appropriate TIPS program size (beyond share of debt) can be useful.

- Treasury could use benchmarks like TIPS outstanding relative to the domestic economy and domestic savings pool to calibrate program size.
- Relative to these benchmarks, TIPS program size has been stable at upper end of range and will likely remain so going forward.
- TIPS program size remains in middle of range of major international inflation-linked bond programs.

TIPS Are a Natural Hedge for Treasury as Government Deficit Typically Rises During Periods When Inflation Falls

- On an ex-post basis the **deficit typically rises when inflation falls** (and vice-versa). See following pages for details.
- TIPS interest costs will be lower than nominal coupon bonds during low inflation, offsetting generally higher deficits.
- Past TBAC work concluded that **total deficit volatility is reduced for TIPS allocations up to 13% of the debt stock.***



Correlation of Inflation to Government Finances

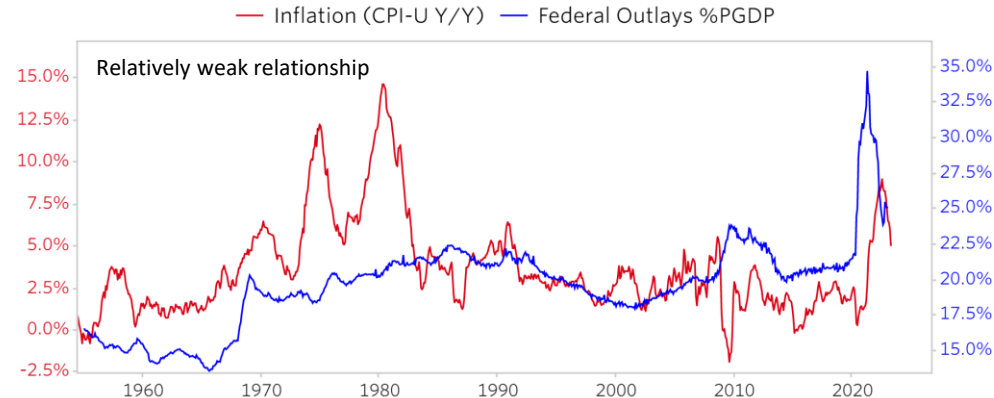
Ex-Post Correlations to CPI-U Inflation, 1950-2023

	Correlation to...		
	Changes in Inflation	Level of Inflation	
Change in Total Deficit	-38%	-20%	<i>(higher inflation <-> falling deficit)</i>
Change in Receipts	47%	20%	<i>(higher inflation <-> rising receipts)</i>
Change in Outlays	-17%	-12%	<i>(higher inflation <-> falling outlays)</i>

Source: Treasury, Bureau of Labor Statistics

Government Outlays Are Not on Net That Related to Inflation

- A bit less than 25% of federal spending is explicitly linked to broad CPI.
- Another 25% is linked to medical price components of CPI.
- Remainder (>50%) largely unindexed, though obviously affected by inflation to some extent.
- Portion of federal spending is countercyclical and works in opposite/offsetting direction, e.g. outlays on unemployment benefits.



Source: Treasury, Bureau of Labor Statistics

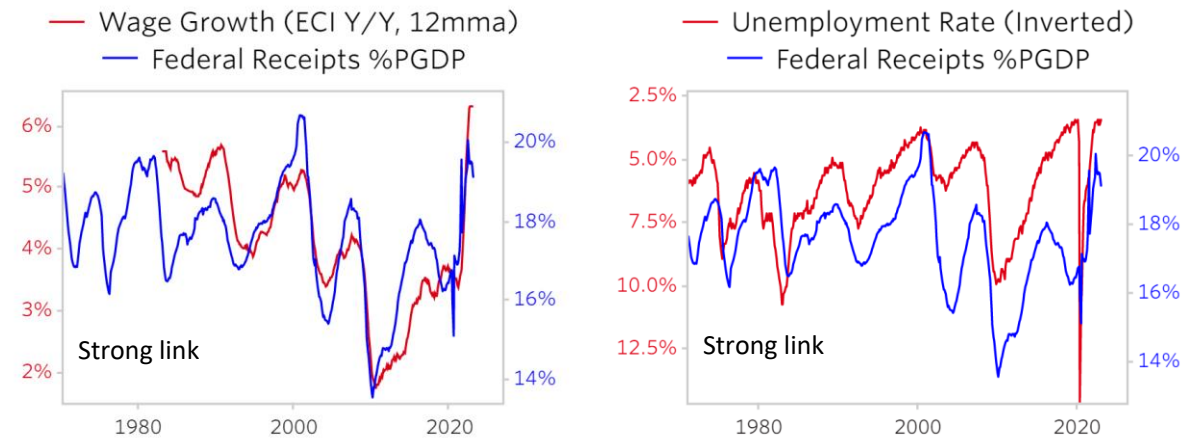
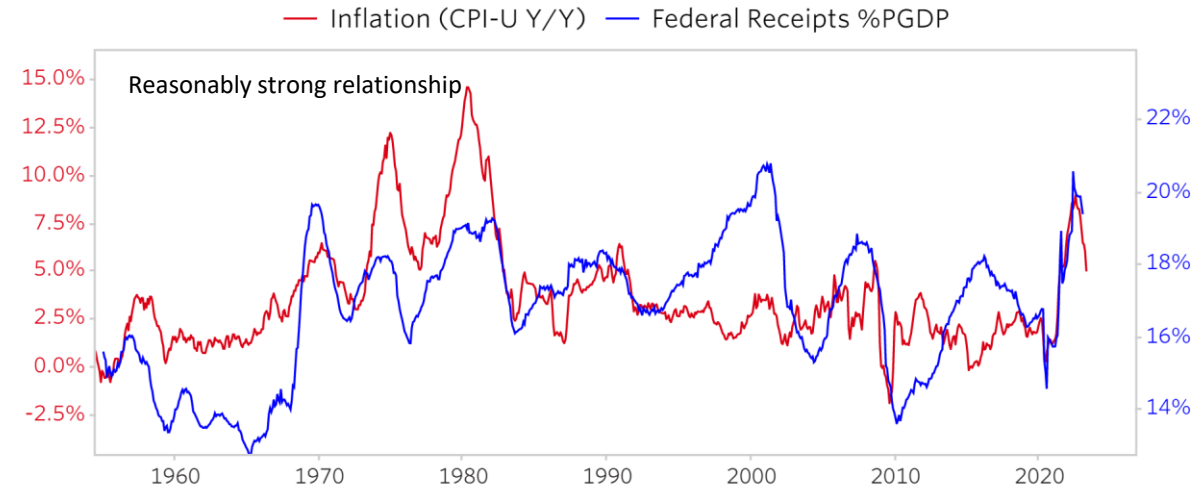
Federal Public Finances & Inflation

	Index	2022 Lvl (%GDP)	% of Total Outlays/ Receipts
Total Outlays	--	25.0%	100%
Primary Outlays	--	22.9%	92%
Indexed to CPI		5.6%	22%
Social Security	CPI-W	4.4%	18%
Military/ Civilian Retirement	CPI-W	0.9%	4%
Supplemental Security Income (SSI)	CPI-W	0.2%	1%
Driven By Medical Prices		6.2%	25%
Medicare	MEI*	3.9%	16%
Medicaid	CPI- Medical	2.3%	9%
Not Significantly Indexed	--	11.1%	44%
Defense Discretionary	--	3.0%	12%
Nondefense Discretionary	--	3.7%	15%
Other**	--	4.3%	17%
Net Interest	--	2.1%	8%
Receipts	--	19.4%	100%
Personal Income Taxes	Nominal Wages	10.3%	53%
Payroll Taxes	Nominal Wages	6.0%	31%
Other	--	3.0%	16%

*MEI is the Medicare Economic Index, which is used to measure medical cost inflation of various inputs to producing physician services. ** Other includes some veterans benefits, SNAP, and other mandatory programs.

Government Receipts Are Materially Tied to Inflationary Outcomes

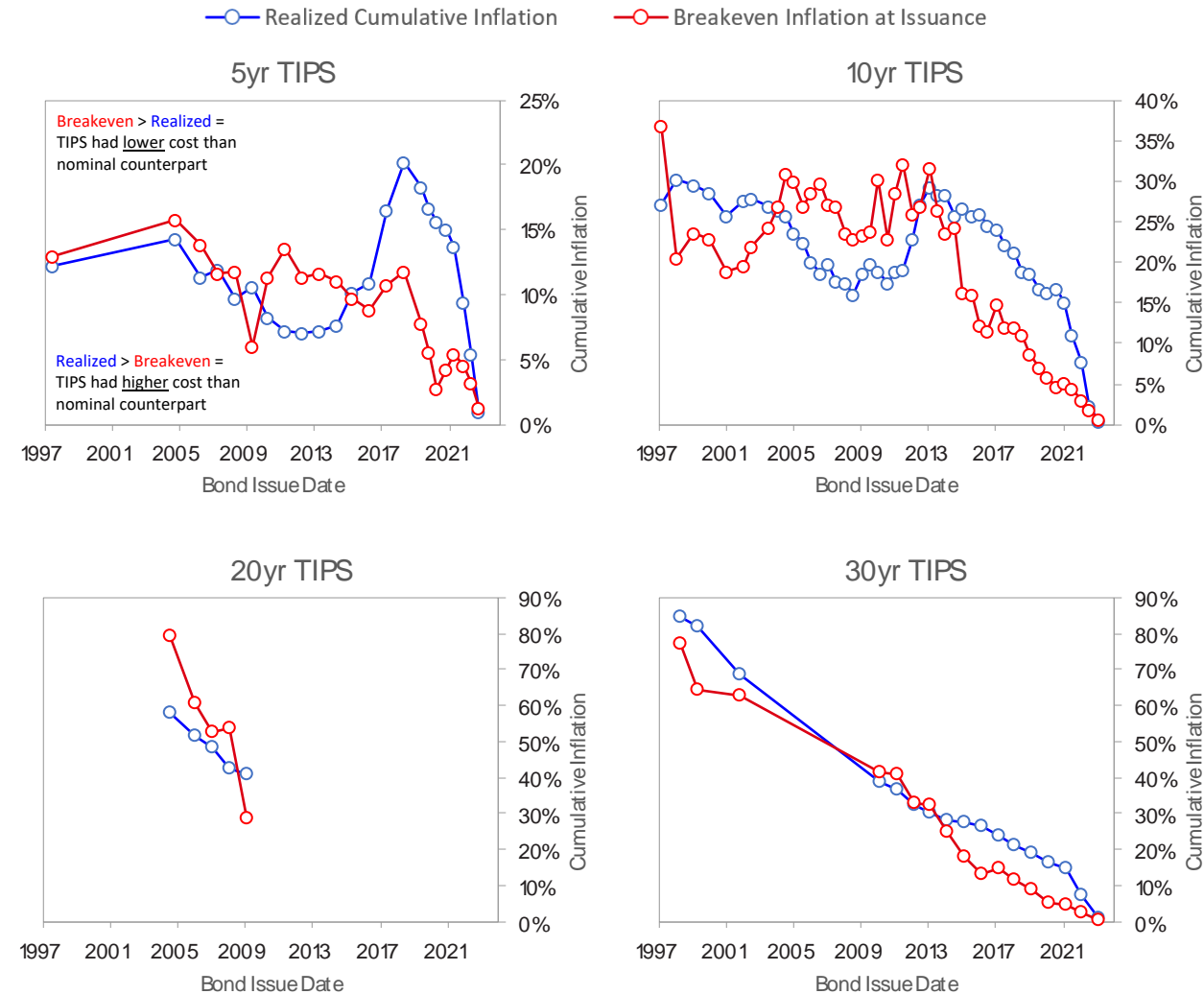
- Government receipts have a reasonably strong relationship to inflation.
- The vast majority (>80%) of federal revenues are tied to nominal incomes (see table on prior page).
- While not literally indexed, nominal incomes are significantly related to inflation:
 - Wage inflation often accompanies broader price inflation.
 - Low unemployment rates both drive higher income (via total hours worked) and higher inflation (Phillips curve relationship).



Source: Treasury, Bureau of Labor Statistics

Ex-Post Relative Cost of TIPS v Nominals Fluctuates Over Time, Broad Check on Inflation Risk Premium but Not a Guide for Short Term Issuance Choices

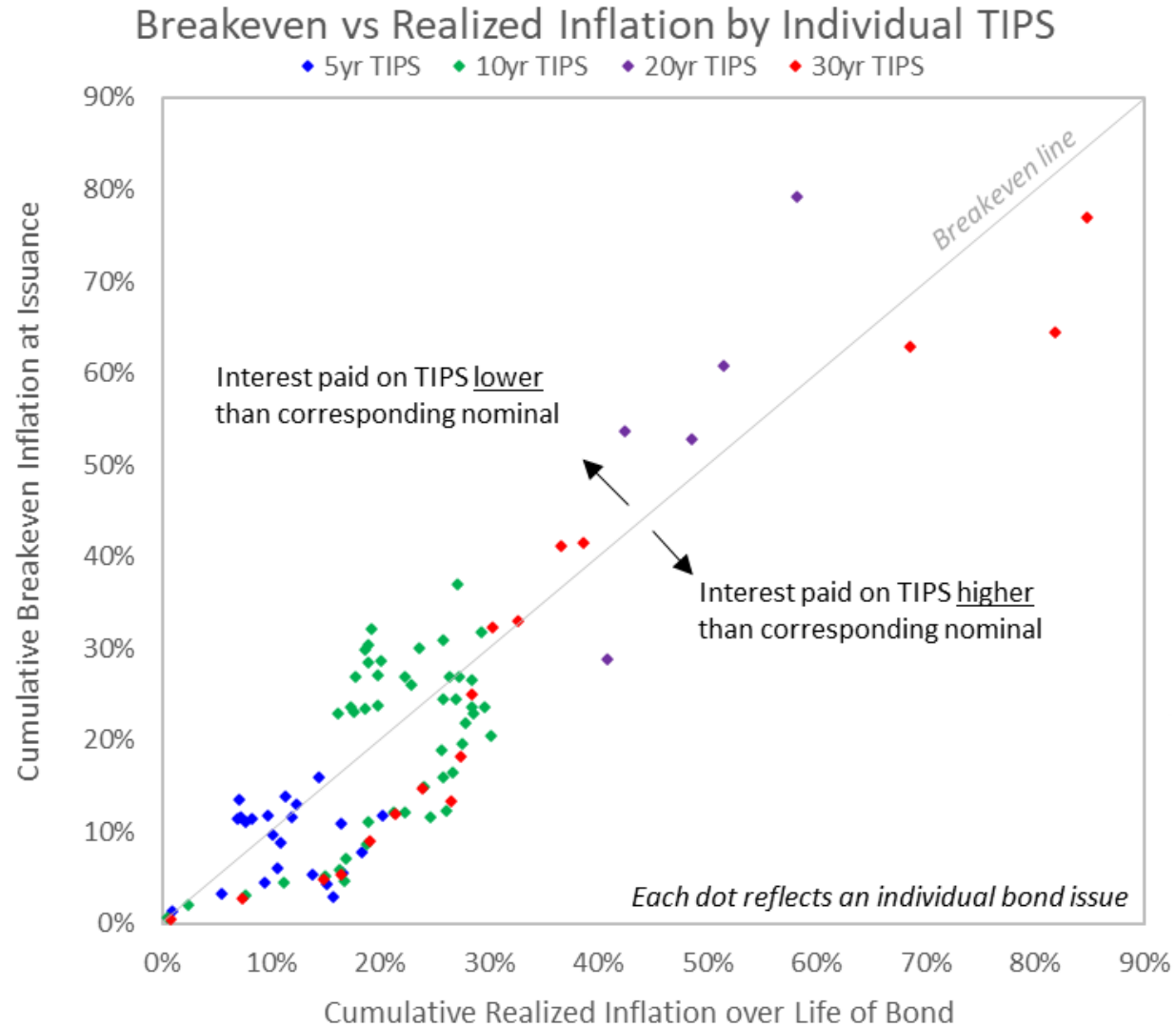
TIPS by Individual Bond: Breakeven Inflation at Issuance vs Cumulative Realized Inflation



Source: Treasury, Refinitiv, Bureau of Labor Statistics, author's calculations

- TIPS issuance decisions should be based on structural benefit to Treasury, not timing market.
- Ex-post outcomes will fluctuate over time and are semi-random in short term, e.g.,
 - TIPS issued from '15 – '21 had higher cumulative interest costs than nominal counterparts due to inflationary spike in '21 – '23.
 - Most TIPS issued from '05 – '12 had lower costs.
- Historically, around 40% of TIPS issues have realized lower interest costs than nominal counterparts. The overall cost has been \$80bln higher vs comparable nominal coupons.
- Overall program cost (\$80bln higher) reflects that the inflationary spike of '21 – '23 happened to occur when program size was larger.
- No sufficient evidence that investors have systematically over- or under-discounted inflation when pricing TIPS, but these ex-post outcomes should be monitored over the long term.

Additional Detail on Ex-Post Cost/Benefit of TIPS Over History



Share of TIPS with Lower Interest Costs Than Nominal Counterparts

	<u>% of Matured & Outstanding TIPS</u>	<u>% of Matured TIPS</u>
All TIPS	41%	67%
5yrs	43%	60%
10yrs	43%	70%
20yrs	80%	(No Matured 20s)
30yrs	24%	(No Matured 30s)

Source: Treasury, Refinitiv, Bureau of Labor Statistics, author's calculations

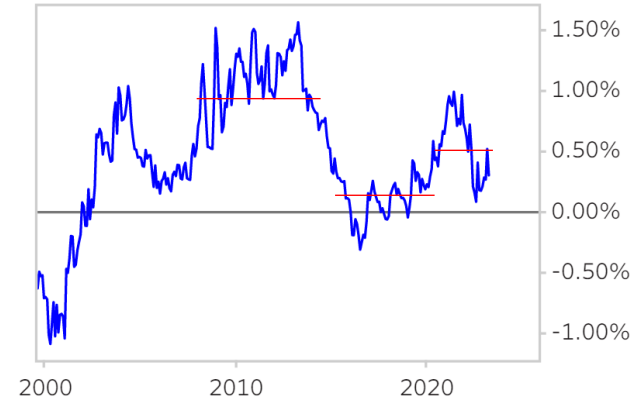
Ex-Ante, TIPS Advantage Has Recently Increased as Breakeven Inflation Has Risen More Than Investor Surveyed Inflation Expectations

Forward 5y5y Breakeven Inflation minus Surveyed Inflation Expectations

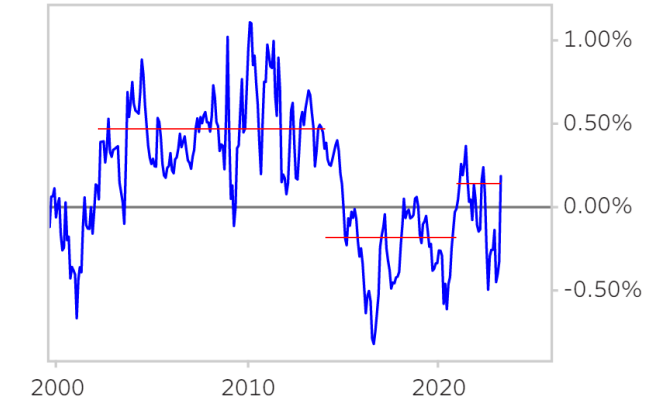
(higher readings = higher ex-ante benefit to Treasury from issuing TIPS)

- Forward breakeven inflation rates (BEI) higher than / rising relative to investors' inflation expectations.
 - Inflation surveys have different biases and methodologies, readings should be taken as indicative rather than precise.
- Ex-ante benefit of TIPS to Treasury has improved as investor demand for inflation protection has risen.
 - Note: TIPS liquidity premiums have been stable, see slide 12.
- Investor demand for inflation protection seems to have increased relative to pre-pandemic, though stable in past 1-2 years (see next slide).
- Weaker BEI relative to surveys in '15 – '19 correspond roughly to negative ex-post results for bonds issued in those periods shown on prior pages.

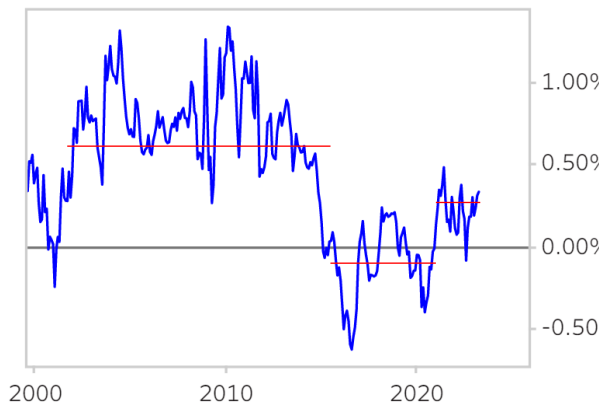
— w/ Cleveland Fed Expectations



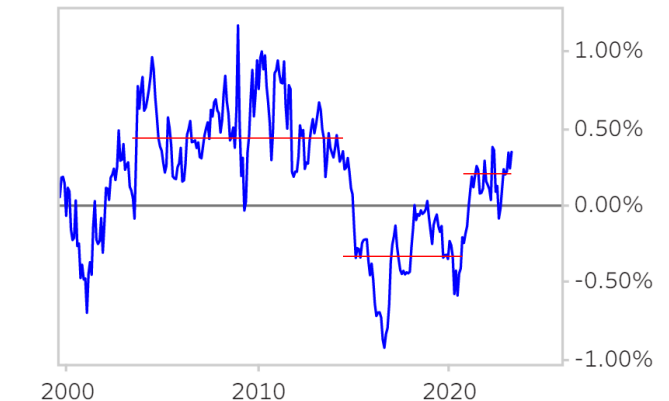
— w/ Prof Forecasters Expectations



— w/ Common Inflation Expectations



— w/ AT&T Expectations



Sources: Refinitiv, Federal Reserve. Surveys use 10yr expectations reading from indicated sources.

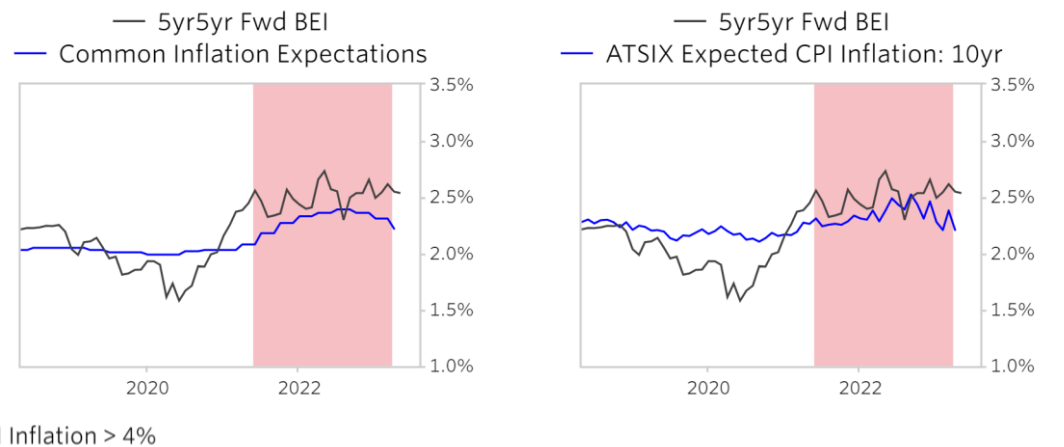
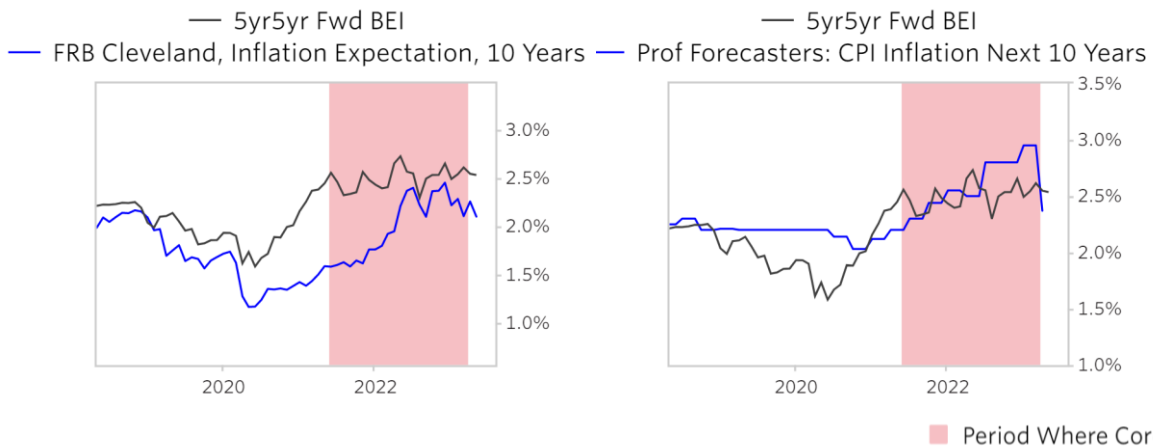
Inflation Expectations and Premiums Have Been Stable in Past Two Years

- In past two years, surveys and market pricing of inflation have largely remained anchored, reflecting credible Fed policy.
- By most measures, the gap between inflation expectations and break-even inflation has been positive and stable through the 2021 – '23 inflation (Cleveland Fed surveyed expectations is exception).
- Recent short-term drivers of risk premiums are netting:
 - Recent volatile inflation likely increasing premiums.
 - Recent negative price performance for TIPS likely offsetting by reducing investor demand (see subsequent pages).
- Note that model from Cleveland Fed* has suggested recent expansion in inflation risk premium, but that model's results have been very volatile in past ~5 years (signal/noise issue).

Inflation Expectations and Pricing In Recent Years

	Mar-21	Mar-22	Today	Last 24m Chg	Last 12m Chg
BEI 5y5f	2.5%	2.7%	2.5%	0.0%	-0.1%
Inflation Expectations					
Cleveland Fed	1.5%	1.9%	2.3%	0.8%	0.3%
Prof Forecasters	2.2%	2.5%	2.4%	0.2%	-0.1%
Common Inflation Exp	2.1%	2.4%	2.2%	0.1%	-0.1%
ATSIX Expected CPI	2.3%	2.3%	2.2%	-0.1%	-0.1%
BEI Less Expectations					
Cleveland Fed	1.0%	0.7%	0.3%	-0.7%	-0.4%
Prof Forecasters	0.3%	0.2%	0.2%	-0.1%	0.0%
Common Inflation Exp	0.4%	0.3%	0.3%	-0.1%	0.0%
ATSIX Expected CPI	0.3%	0.4%	0.3%	0.1%	0.0%

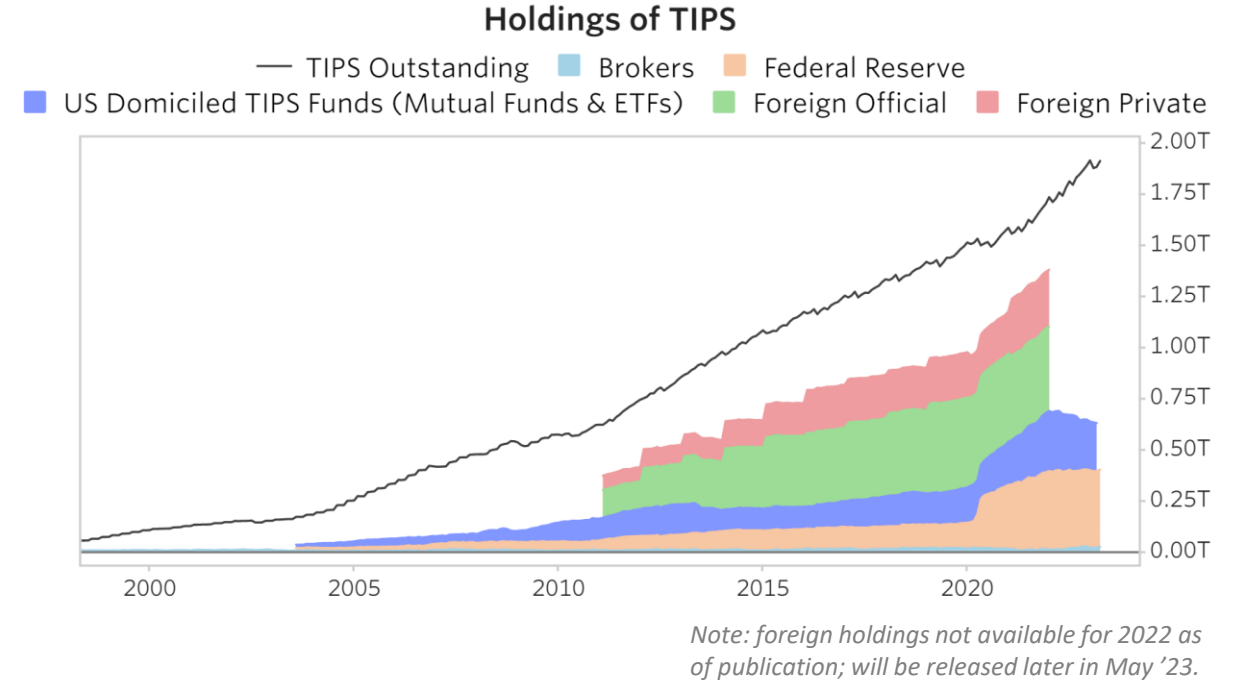
Sources: Refinitiv, Federal Reserve. Surveys use 10yr expectations reading from indicated sources.



*<https://www.clevelandfed.org/indicators-and-data/inflation-expectations>

Treasury Benefits From Offering TIPS Because They Are Good Product For Many Investors

- TIPS bring allocations to Treasury debt from investors in need of inflation protection (e.g., pensions with inflation-linked liabilities, anyone with future real consumption needs).
- Inflation-linked bonds are one of a small number of publicly traded securities that provide portfolio protection against rising inflation.
- Recent inflationary period highlights importance for investors of managing inflation exposure.
- TIPS are held by diverse group of investors including retail investment funds, pensions, asset managers, and foreign official and private portfolios, with no single group having an outsized share.



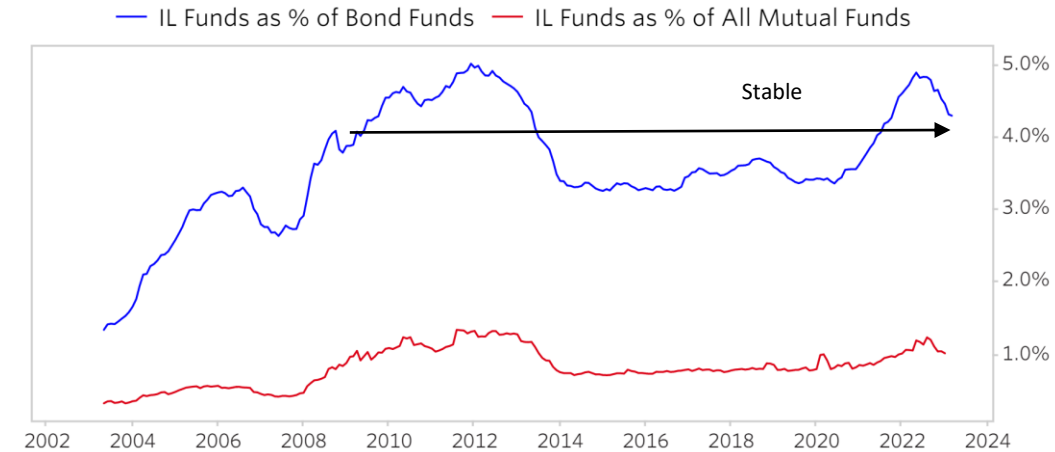
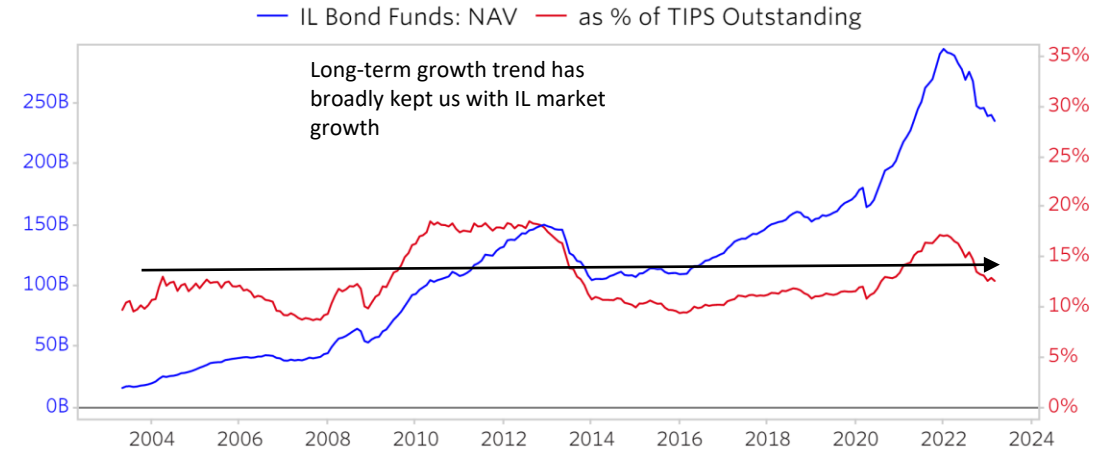
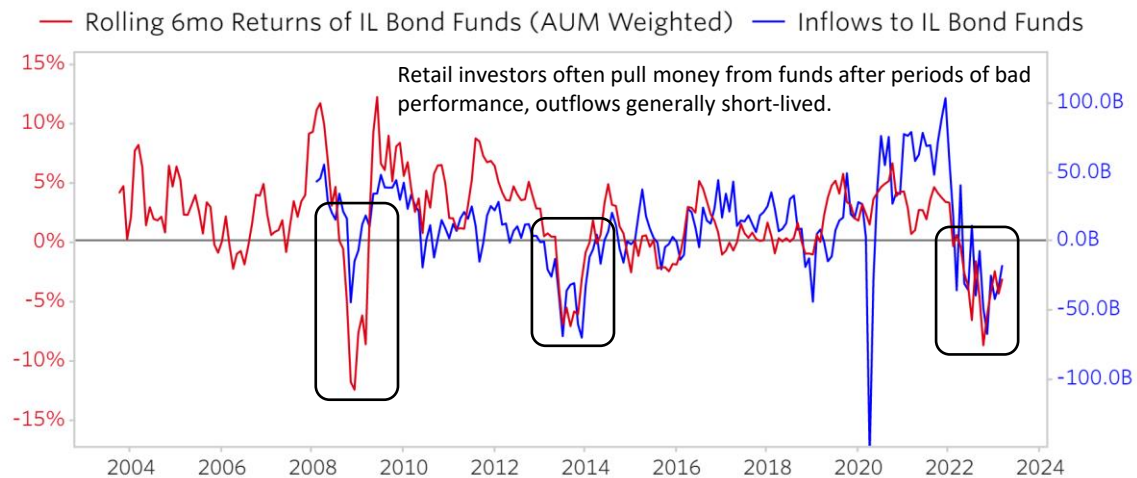
Holdings of TIPS, by Share

US Domiciled TIPS Funds (Mutual Funds & ETFs)	17%
Foreign Official Sector	24%
Foreign Private Sector	16%
Broker-Dealer Inventories	0%
Federal Reserve	22%
All Others (e.g., Pensions, Asset Managers, Households)	21%

Sources: Lipper, Department of the Treasury, Federal Reserve

Retail Demand via Dedicated TIPS Funds: Secularly Strong, Recently Weak

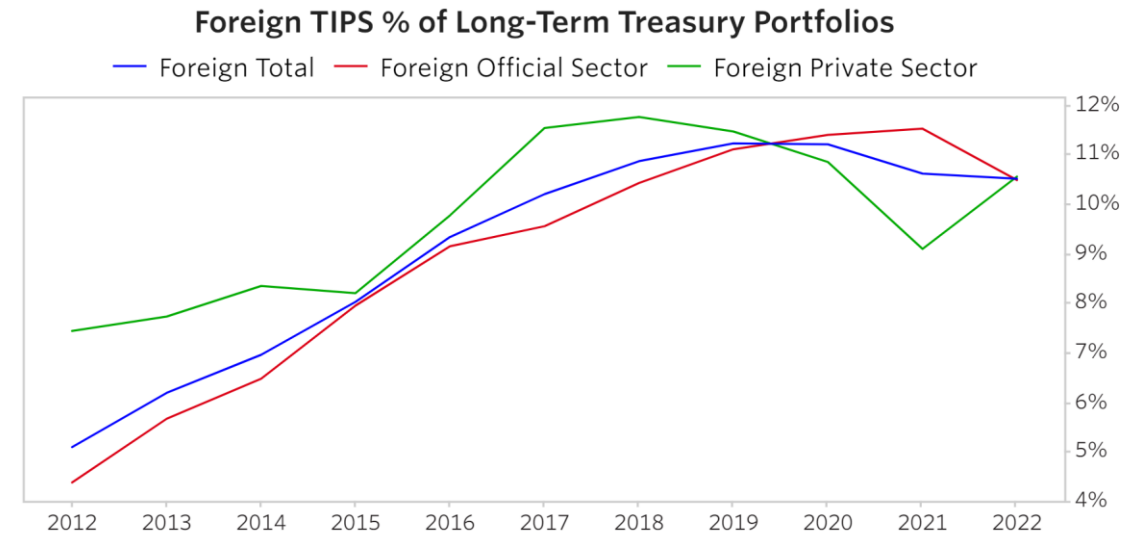
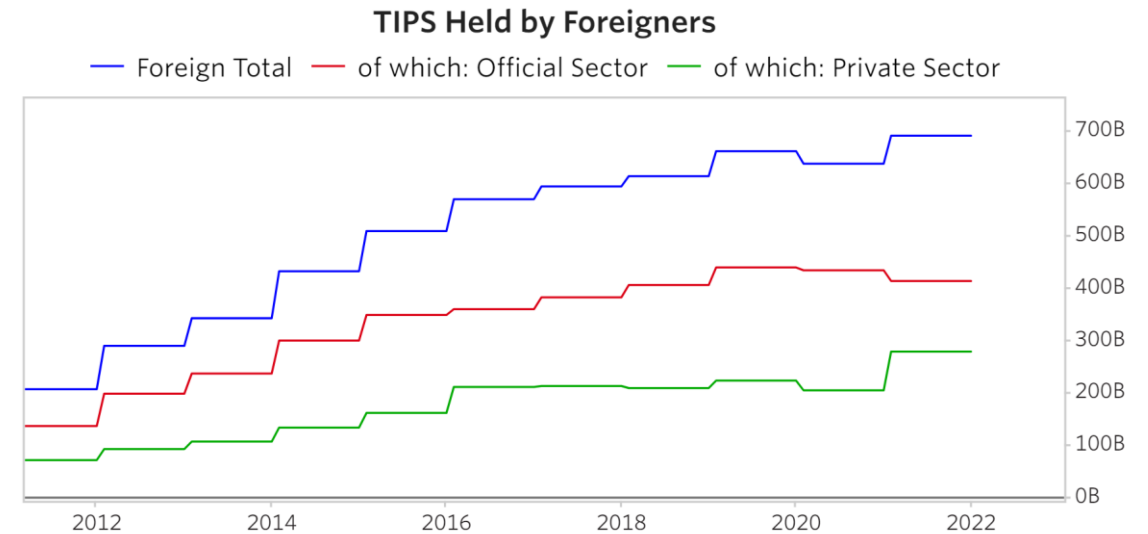
- Dedicated TIPS funds have grown substantially in recent decades.
- These funds have been stable at 4-5% of the bond fund universe and ~1% of the total mutual fund universe. They have kept pace with TIPS market growth, consistently reflecting 12-15% of TIPS outstanding.
- TIPS funds saw considerable withdrawals in 2022 as returns were weak, outflows began in April, peaked in October and have been decreasing since (through Feb.).
- Past episodes of withdrawals have tended to be short lived (3 months of outflows in '08, 14 months in '13, 1 month in '20), with inflows returning afterward.
- We would expect similar behavior today, especially in the light of recent inflationary experience and recent better returns for TIPS.



Source: Lipper, author's calculations

Foreign Investment Demand Remained Strong Through 2021

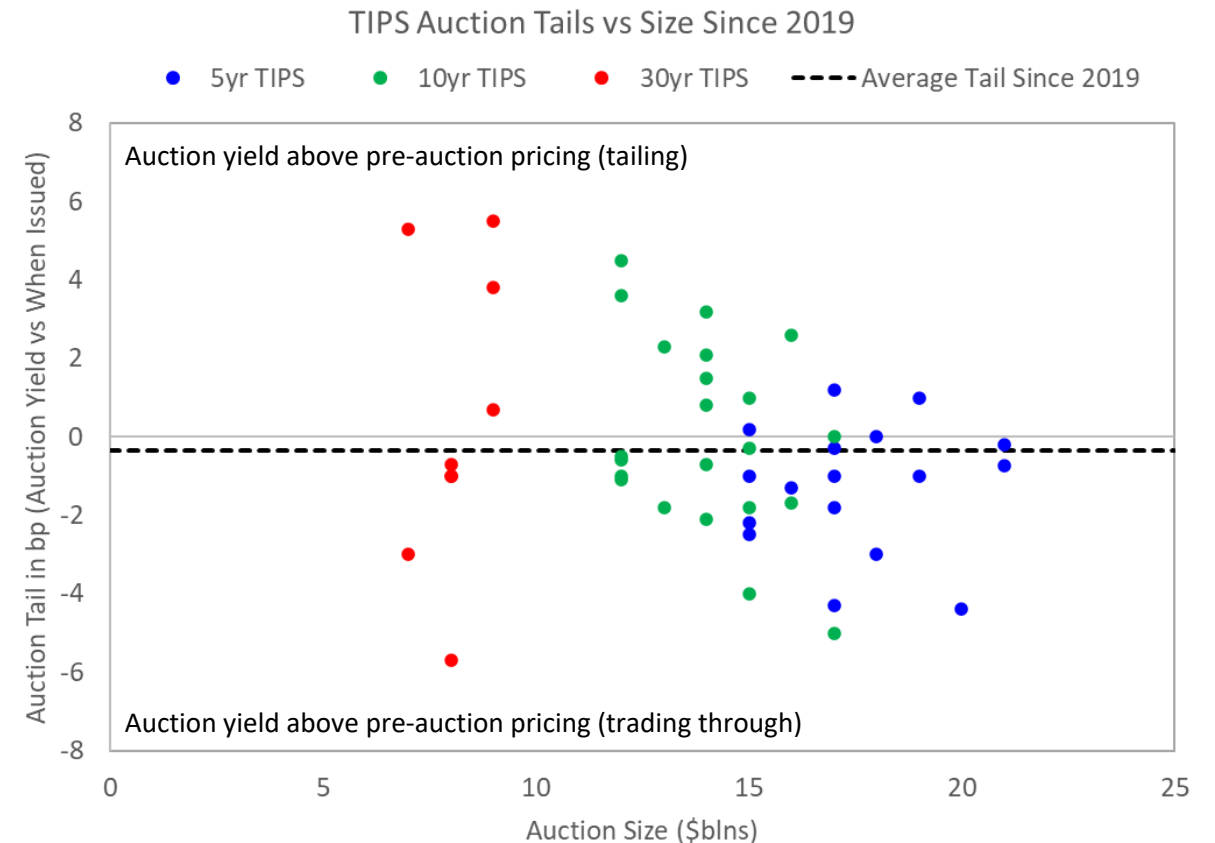
- Foreign private sector purchases of TIPS were strong through 2021*. Still-low policy rates, steeper yield curve in USD than foreign currencies, and rising inflation likely supported demand.
 - This picture is dated, 2022 figures to be released later this month.
- Foreign official sector TIPS holdings have been flat in recent years, consistent with weaker FX reserve accumulation slowing post-2015.
- TIPS allocations within foreign treasury portfolios have been flat at 10.5-11%, somewhat above the TIPS share of Treasury debt.
- Overall foreign holdings of TIPS reflect 40% of TIPS outstanding.



Source: Treasury, author's calculations

Even With Weaker Price Action in 2022, TIPS Auctions Well Absorbed, Especially at Shorter Maturities

- TIPS auctions have generally been well absorbed even as auction sizes have moderately increased in last few years.
- Auction yields coming in close to pre-auction pricing (on average trading through by 0.3 basis points since 2019).
- 5yr TIPS trading through more frequently, 10yr TIPS more balanced, and wide range on 30yr TIPS.

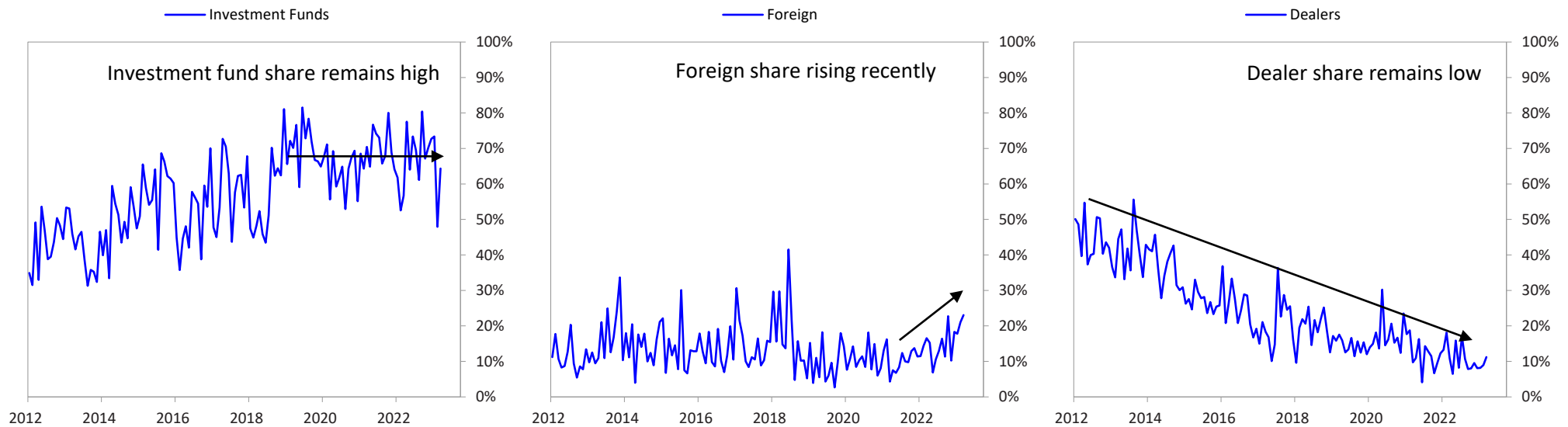


Source: Treasury, Barclays

Investor Share of Auction Allotment Has Remained Stable

- Gains in investment fund allotment at auction remaining durable.
- Dealer share remains low.

TIPS Auctions Allotment by Investor Type (All Maturities)

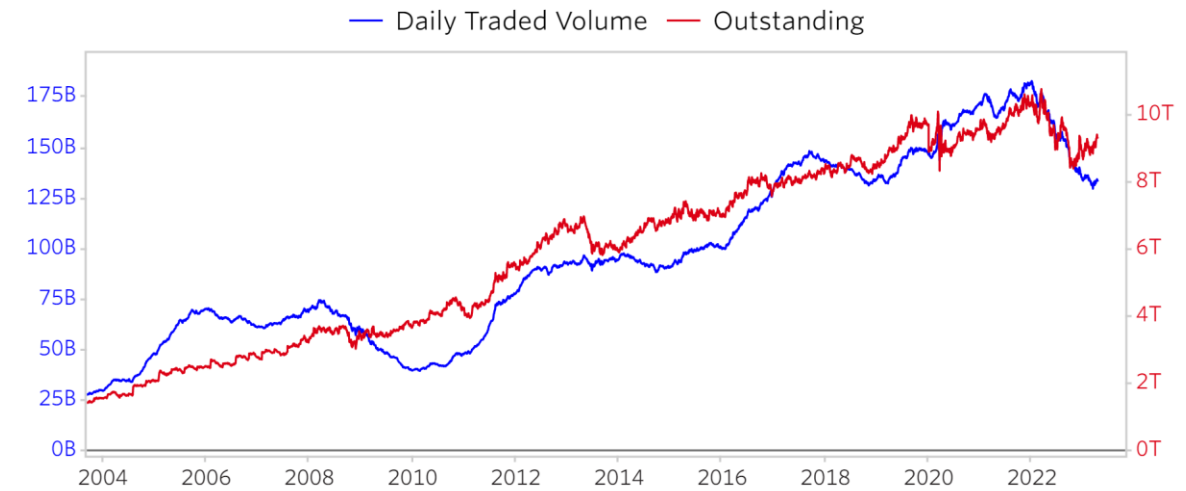


Source: Treasury

Trading Volumes Suggest Market Size Growth Has Not Outpaced Investor Demand

- Traded volumes in TIPS have increased more-or-less in line with outstanding market size over past decade.
- Ratio of traded volumes to outstanding have been stable since 2012.

IL Bond Daily Traded Volume vs Outstanding (Dollar Duration)



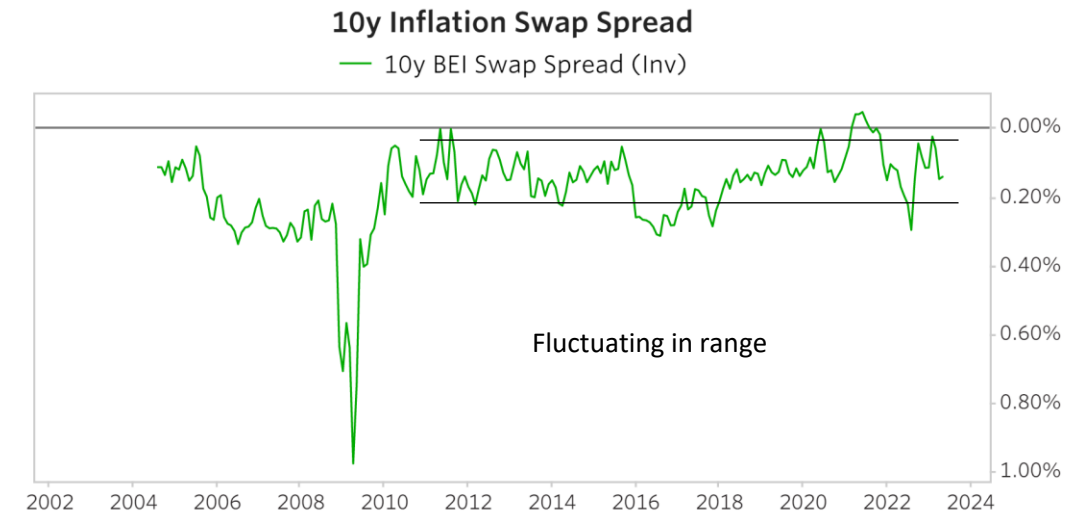
Daily Traded % Outstanding



Source: Treasury, SIFMA, author's calculations

Inflation Swap Spreads Roughly Stable, Reflecting No Aggregate Shift in TIPS Liquidity Premium

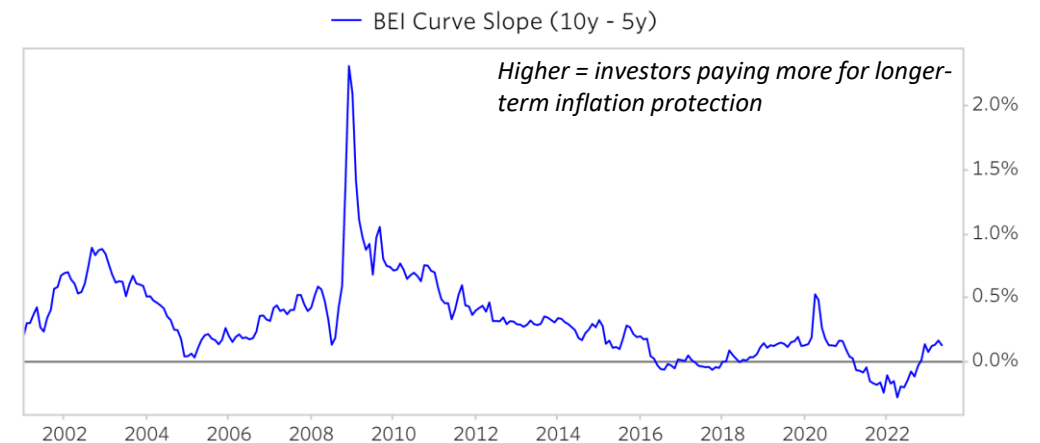
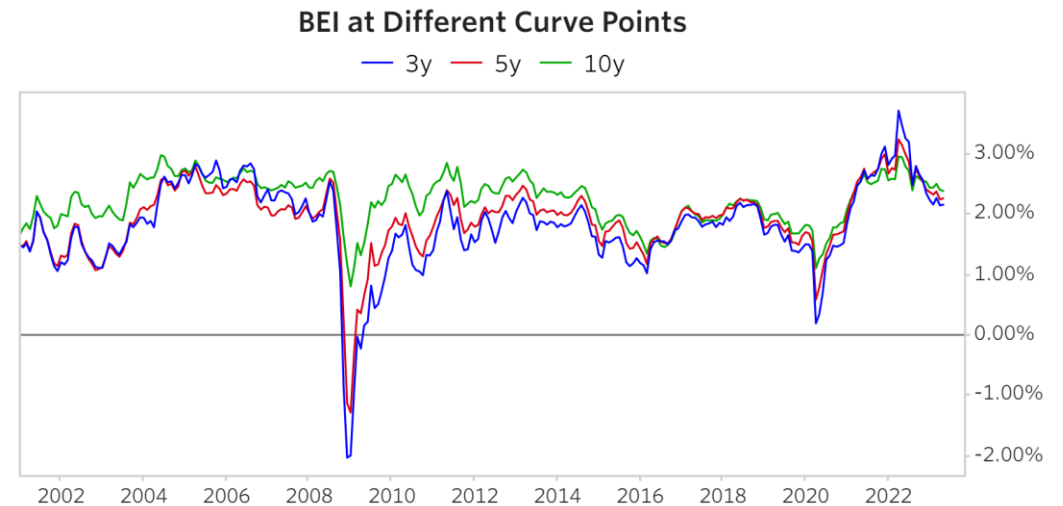
- Difference between BEI on TIPS and inflation swaps has fluctuated between 10-20 basis points since 2010, with modest exceptions in 2015 and mid-2022.
- Investors have been pricing the liquidity of TIPS at a more-or-less consistent rate.
- This suggests that the differences between surveyed and priced inflation shown on prior page mostly reflect demand trends, not shifts in liquidity.



Source: Refinitiv

Breakeven Inflation Curve Has Flattened, a Shift From Pre-2016

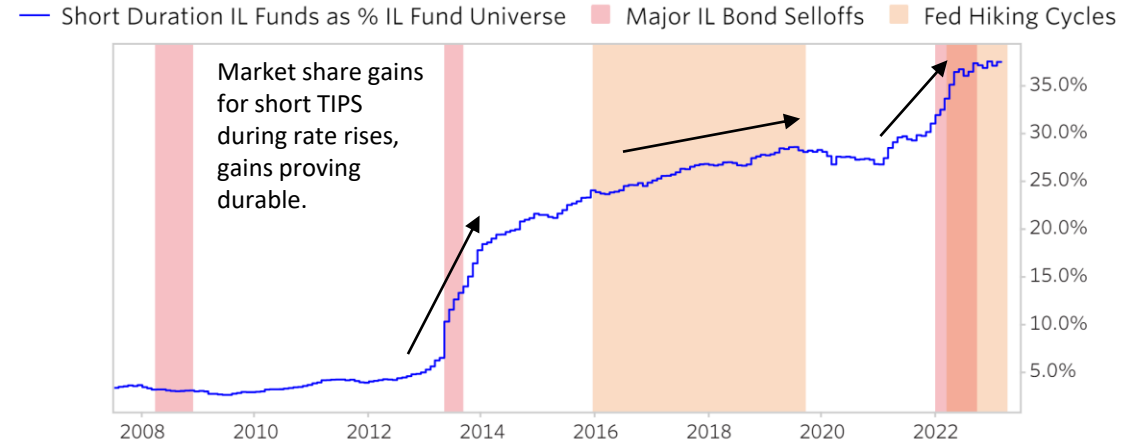
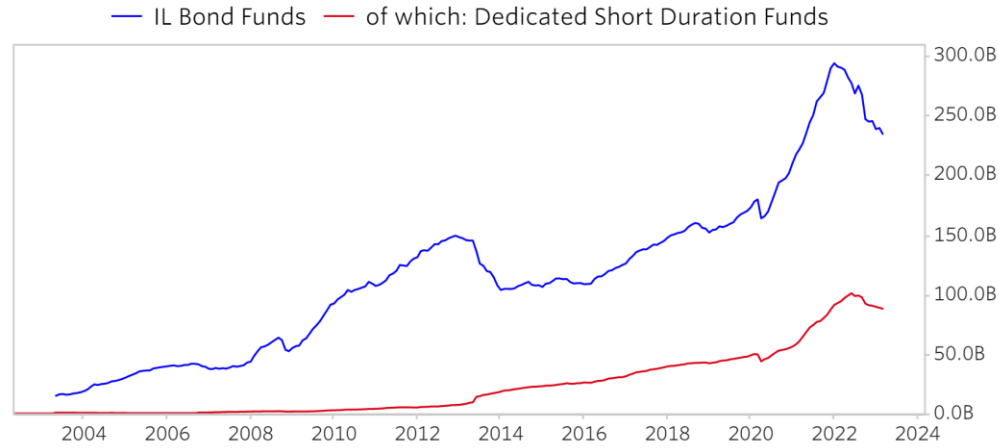
- Upward sloping breakeven inflation (BEI) curve, i.e., BEI higher at longer maturities compared to shorter maturities, was present pre-2016. This suggested investors willing to pay more for longer-term inflation protection.
- Today, that slope has flattened, likely due to increased investor demand for shorter-dated TIPS (see next page). That may suggest focusing auction size increases in shorter tenors.
- Alternative factors:
 - Could reflect better liquidity in shorter tenors.
 - Could reflect decreased inflation risk premium.
 - Could reflect expectations that inflation will be higher in near term.



Source: Refinitiv

Investor Demand for Shorter Duration TIPS Has Increased Considerably Over Past Decade

- Dedicated short-duration TIPS funds have gained considerable market share in the TIPS fund universe.
- Shift in investor demand toward shorter-duration TIPS is consistent with flattening of the breakeven inflation curve.
- Not clear if this shift will be durable across interest rate cycles. If sustained, factor for Treasury to weigh in considering maturity profile of TIPS outstanding.



Source: Lipper, author's calculations

Considerations for TIPS Issuance in CY '23 and Medium Term

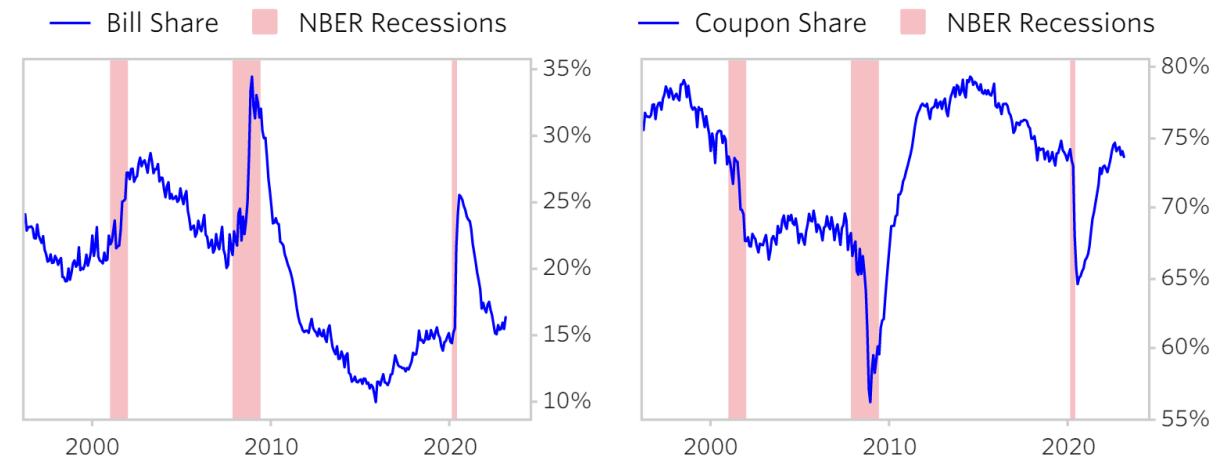
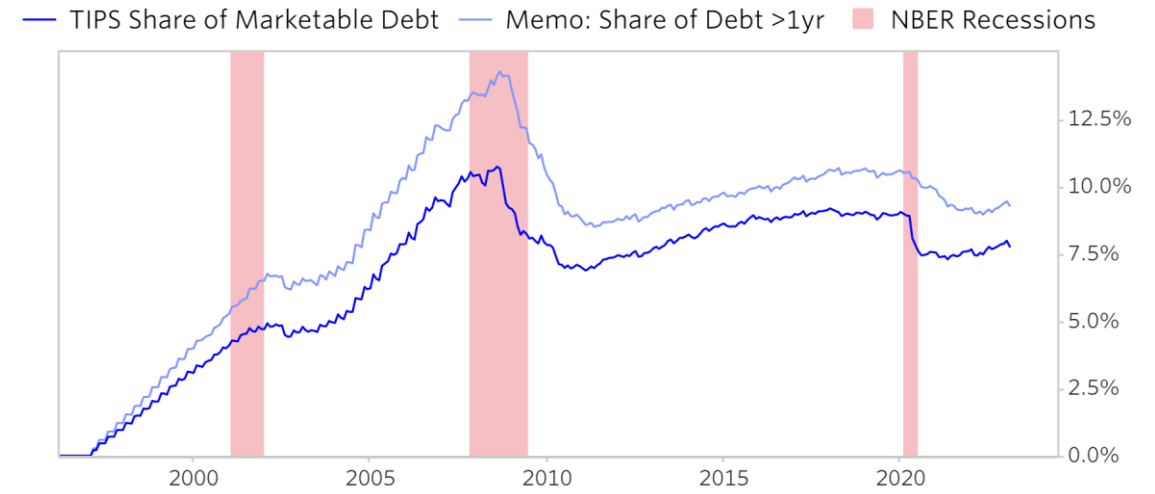
- Treasury should maintain regular and predictable issuance patterns.
- Current TIPS share is 7.6%, low end of past 15 years' range. Increasing would likely benefit Treasury as long as market can bear increases.
- TIPS share tends to fall in recessions (and did in 2020), should be rebuilt during expansions.
- TIPS share will likely fall below 7% in coming years without increase in auction sizes due to a number of factors:
 - Larger deficits,
 - Rolldown of Fed's SOMA, and
 - Increased maturities in coming years: average \$160bln/year in next 5 years vs \$110bln/year past 5 years.
- Investor demand looks healthy; inflation likely more of a concern today than in past decades when TIPS share was higher.
- Increase in retail interest for shorter maturity TIPS suggests additional supply could be focused there.

Any increases in TIPS auctions should be made with monitoring of market conditions using measures shown today, including:

- Forward break-even inflation rates relative to surveyed inflation expectations
 - Spreads between TIPS and corresponding maturity inflation swaps
 - Auction results (price performance around auctions, investor shares, etc.)
 - Retail investor inflows
 - Foreign holdings of TIPS
 - Market traded volumes / turnover
- TIPS market size relative to benchmarks like size of domestic savings pool and economy should be monitored in addition to TIPS share of marketable debt.

TIPS Share is Currently 7.6%, Lower End of Range in Recent Decades, and Will Likely Fall in Next Recession

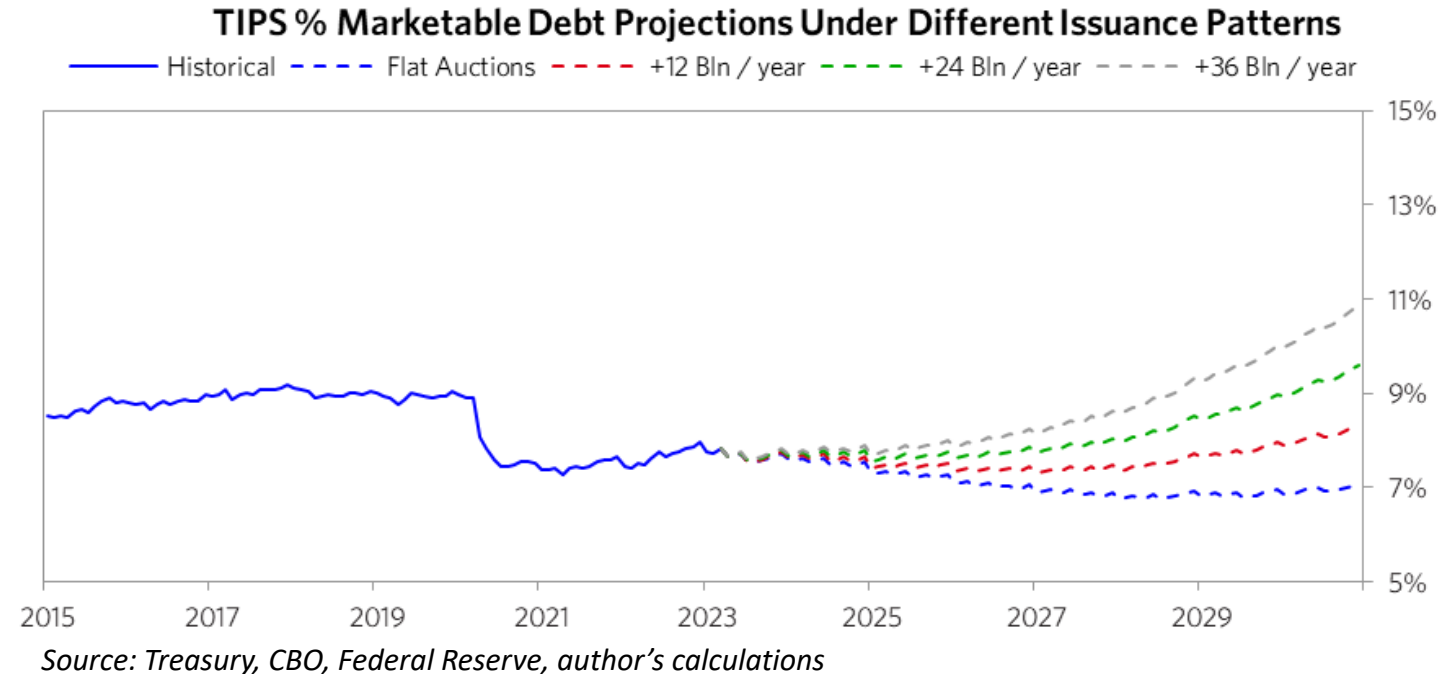
- Pandemic recession and large issuance of brought TIPS down to below 7.5% of marketable debt, the lowest level since 2007. It has gradually increased to 7.6% since then.
- We should expect drops in TIPS share during recessions, with slow recovery post-recession.
 - Relative size & depth of markets keeps TIPS issuance steadier; higher issuance in recession first pushed into bills, then nominal coupons.



Source: Treasury, NBER

With Current Auction Sizes, TIPS Share Will Likely Fall Even Without a Recession

- Each colored line shows the TIPS share under different issuance patterns.
 - For clarity, “increase of \$12bln per year” means total auctions in ‘24 are \$12bln larger than in ‘23, total auctions in ‘25 are \$12bln larger than in ‘24, and so on.
- This chart is shown for illustrative purposes only, and the projections are highly subject to volatility in various assumptions, shown below.

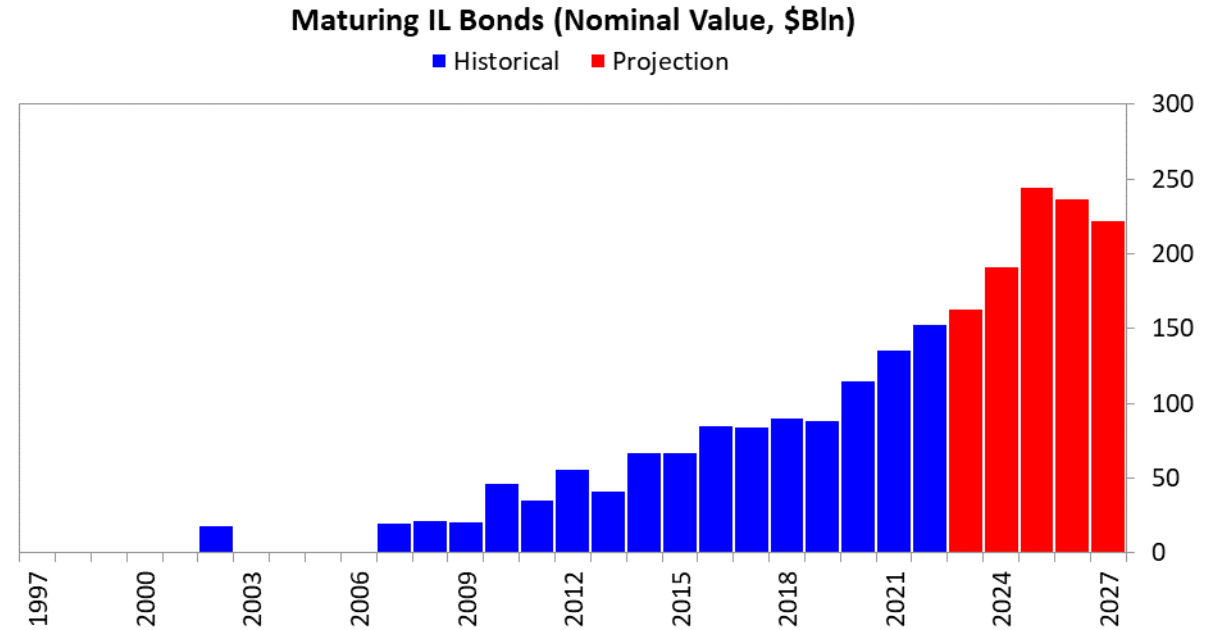


Assumptions:

- Issuance increases taken pro-rata from other products.
- Deficit evolves consistent with CBO projections.
- SOMA portfolio rolldown ends in '24, consistent with primary dealer surveys projections; Fed portfolio share of TIPS held constant from there.
- Inflation evolves consistent with Federal Reserve's Summary of Economic Projections.

TIPS Maturities Set To Accelerate, Will Decrease TIPS Share

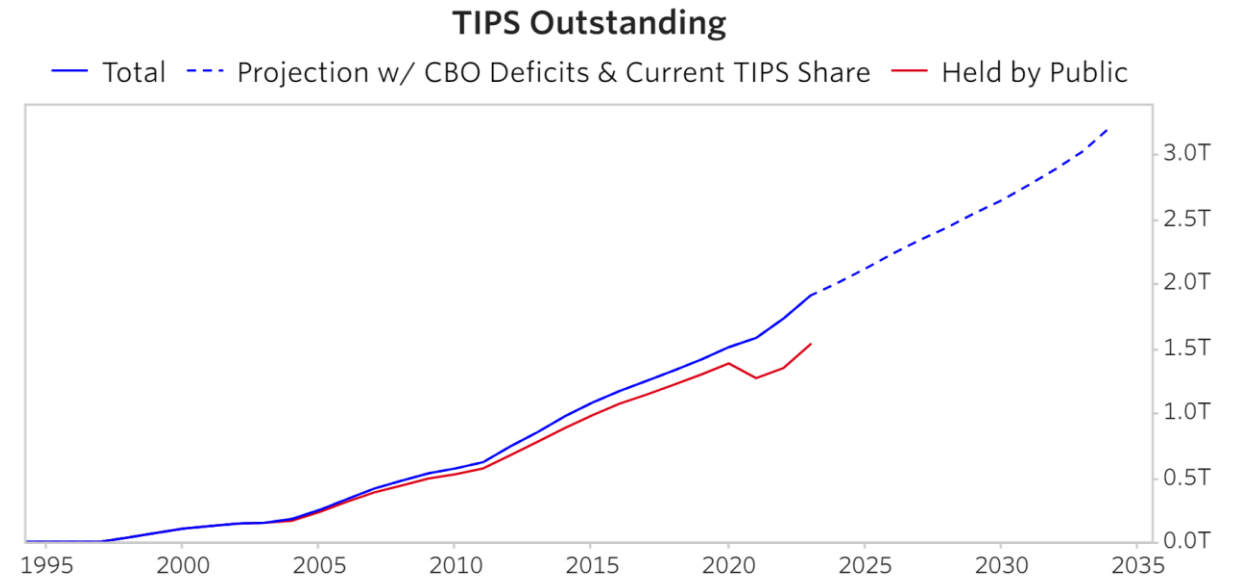
- The increasing pace of maturing IL bonds, including 20 year TIPS issued from 2005 – '09 with lots of accrued inflation, will decrease the TIPS share over time.



Source: Treasury

Treasury Should Consider Additional Perspectives Beyond Share of Marketable Debt Outstanding to Calibrate TIPS Program Size

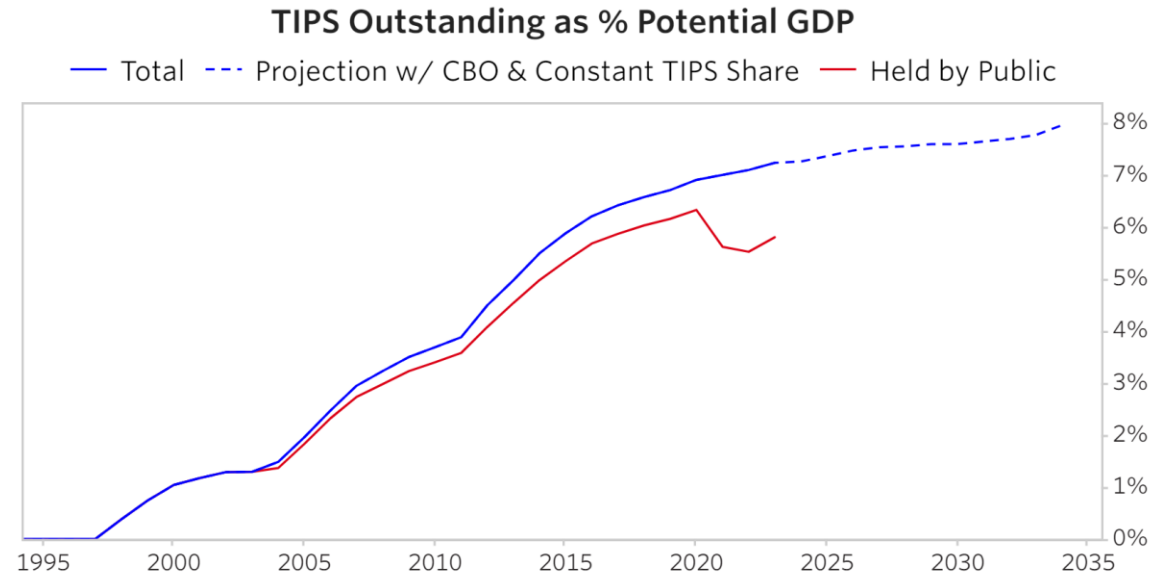
- Maintaining consistent TIPS share of marketable debt will result in total outstanding of TIPS increasing from \$2 to \$3 trillion in the next ten years using CBO financing projections.
- Public will end up owning greater share of TIPS as Fed SOMA portfolio shrinks.
- This growing size of TIPS market held by public suggests additional perspectives would be useful to benchmark program size and assess market's ability to digest issuance.



Source: Treasury, CBO, author's calculations

Proposed Benchmark: TIPS Relative to Size of Economy

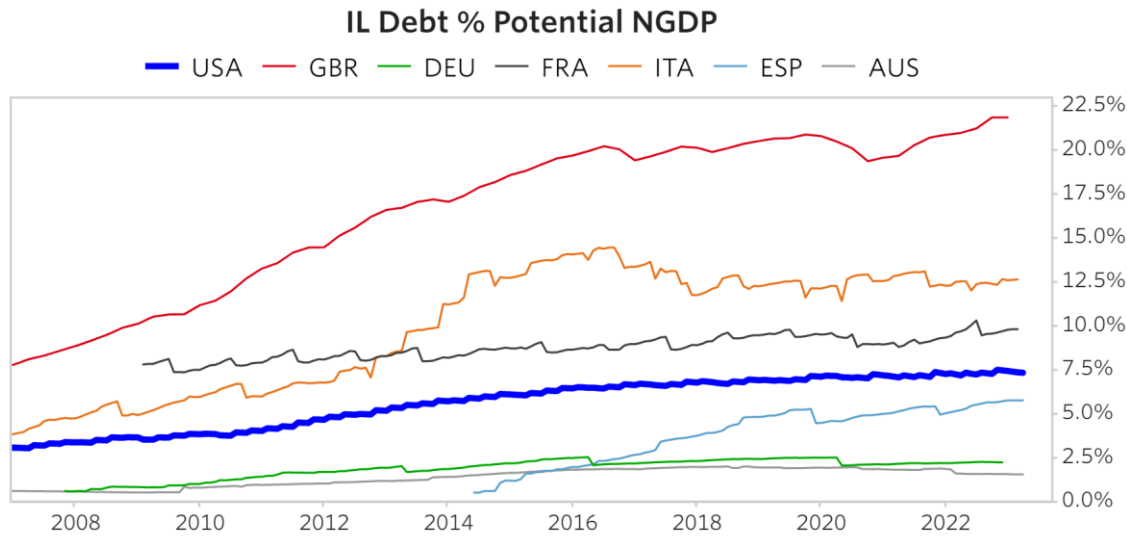
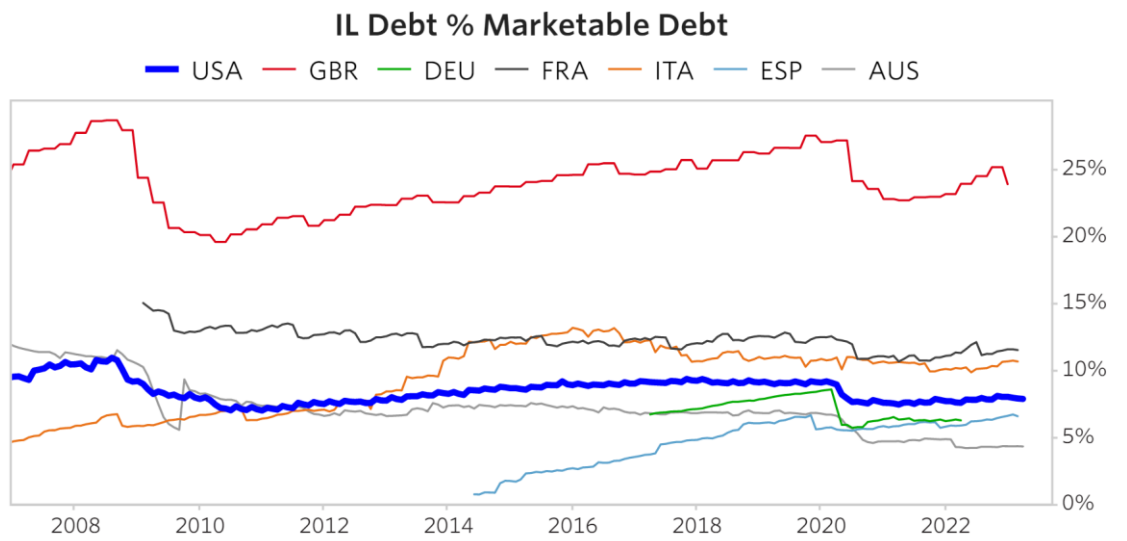
- Nominal GDP is a helpful concept for benchmarking the changes in debt stock and TIPS:
 - NGDP is tied to national incomes, which are used to service the debt.
 - Sources of demand relevant to TIPS likely grow with the economy, like household savings and the size of inflation-linked pension liabilities.
 - NGDP facilitates comparisons across time (e.g., comparing an amount of debt today to one in the distant past/future) and to other countries' programs (see subsequent page).
- We used potential NGDP to remove distortion from business cycle.
- In this perspective, TIPS have risen to highs (around 7% of NGDP). With constant debt share, TIPS would rise slowly to 8% of NGDP over next decade.
- Nominal GDP is outside of Treasury's control, so this is a check on program size and not something that can be actively managed to.



Source: Treasury, BEA, CBO, Federal Reserve, author's calculations

TIPS Program Size Is in Middle of Range of Other Developed Countries' Inflation-Linked Bond Programs as Share of Debt and Economy

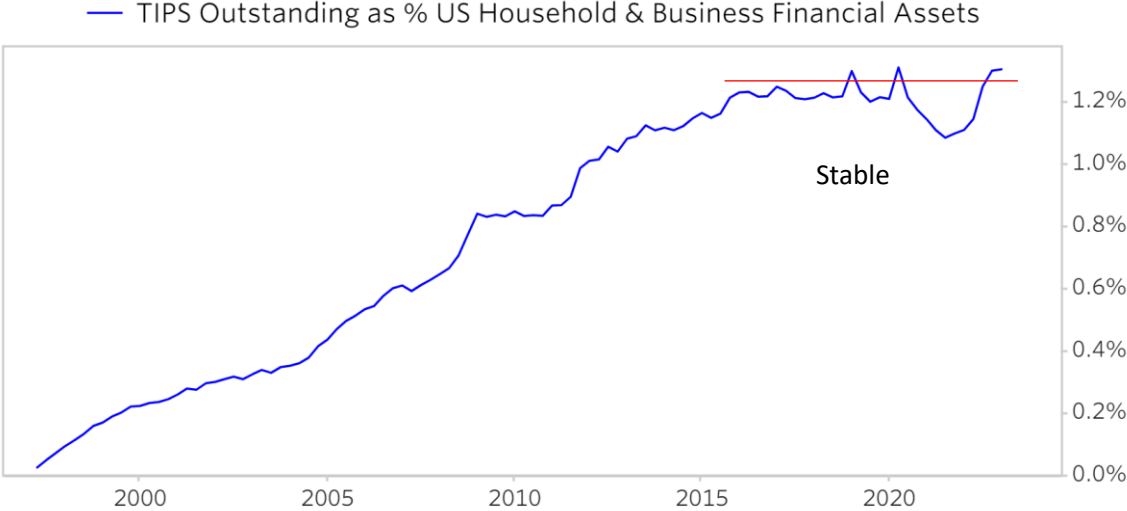
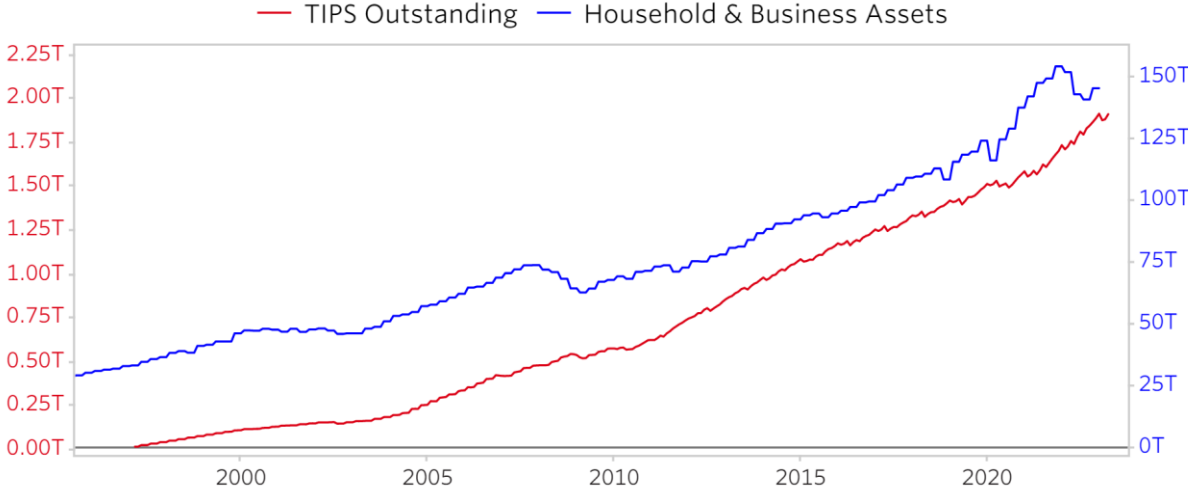
- Most major economies with inflation-linked (IL) bond programs have IL shares of market debt between 5% and 12%, Treasury's 8% is in middle of range.
 - UK is outlier with 25% IL share due to requirement of their pensions to match inflation-indexed liabilities.
- Most have IL shares of 3% to 13% of nominal GDP; Treasury's 7% is in middle of range.
- Most countries' IL shares have fallen somewhat since the pandemic as large deficits were pushed into bills/nominals.
- Caution that market structures and participants vary considerably across geographies.



Source: Indicated countries' debt management offices and national statistics agencies

Proposed Benchmark: TIPS as a Share of US Domestic Assets

- US households and businesses’ holdings of financial assets* (“domestic assets”) are a helpful reference point for TIPS market size.
- This is an “asset allocation” framework, i.e., domestic investors in aggregate have a desired allocation to TIPS, and growing the TIPS program beyond that limit could push prices lower or require more foreign demand.
- TIPS market has been stable at around 1.2% of domestic assets since 2015.
- Domestic asset growth has averaged 7.5% per year since 1950; 7.5% increase in TIPS market is \$150bln.
- As with nominal GDP, this is a check on program size and not something Treasury can actively manage.



* “Financial assets” referenced here include cash, securities, fund shares, pension & insurance assets, and other assets captured in the Federal Reserve’s Flow of Funds tables L.101 & L.102. Intermediaries’ balance sheets are not included in calculation to avoid double-counting private sector buying power.

Source: Federal Reserve Flow of Funds, author’s calculations

Conclusions

- Treasury likely accrues benefits from gradually increasing TIPS share from current levels as long as investor demand is adequate.
- Without increases in auction size, TIPS share will fall under current projections, especially if there is a recession.
- Variety of metrics suggest investor demand is strong enough to accommodate increases in auction sizes in regular and predictable manner.
- Any increases in auction sizes and TIPS share should be accompanied by monitoring of market conditions using metrics like:
 - Forward break-even inflation rates relative to surveyed inflation expectations
 - Spreads between TIPS and corresponding maturity inflation swaps
 - Auction results (price performance around auctions, investor shares, etc.)
 - Retail investor inflows
 - Foreign holdings of TIPS
 - Market traded volumes / turnover
- Increase in demand for shorter-term maturities by retail investors suggests more room to expand issuance in 5 and 10 year TIPS.
- A variety of perspectives / benchmarks should be monitored to calibrate overall TIPS program size in addition to share of marketable & marketable LT debt, such as TIPS relative to domestic assets (around 1.2% today) and TIPS relative to size of economy (7-8% today).

For future study:

- Monitor performance in different TIPS sectors, especially with respect to retail investors' shift into shorter-duration TIPS funds.
- Continued calibration of the appropriate level of TIPS share.