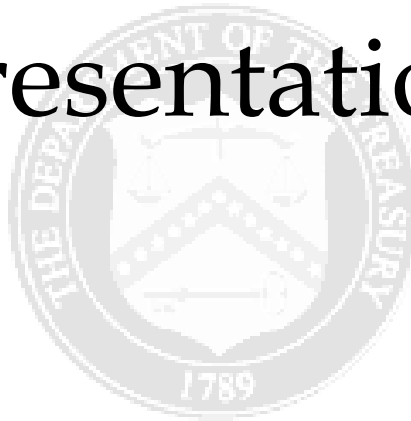


# Treasury Presentation to TBAC



# Office of Debt Management



Fiscal Year 2019 Q3 Report

# Table of Contents

I.	Executive Summary	p. 4
II.	Fiscal	
	A. Quarterly Tax Receipts	p. 6
	B. Monthly Receipt Levels	p. 7
	C. Largest Outlays	p. 8
	D. Treasury Net Nonmarketable Borrowing	p. 9
	E. Cumulative Budget Deficits	p. 10
	F. Deficit and Borrowing Estimates	p. 11
	G. Budget Surplus/Deficit	p. 12
	H. Privately-Held Net Marketable Borrowing Outlook	P. 13
III.	Financing	
	A. Sources of Financing	p. 16
	B. OMB's Projections of Net Borrowing from the Public	p. 18
	C. Interest Rate Assumptions	p. 19
	D. Projected Net Marketable Borrowing Assuming Future Issuance Remains Constant	p. 20
	E. Estimate of the Effect of SOMA Purchases on Projected Net Borrowing	P. 21
IV.	Portfolio Metrics	
	A. Historical Weighted Average Maturity of Marketable Debt Outstanding	p. 23
	B. Bills, TIPS & FRNs Outstanding as a Percent of Marketable Debt Outstanding	P. 24
	C. Maturity Profile	p. 25
V.	Demand	
	A. Summary Statistics	p. 28
	B. Bid-to-Cover Ratios	p. 29
	C. Investor Class Awards at Auction	p. 34
	D. Primary Dealer Awards at Auction	p. 38
	E. Direct Bidder Awards at Auction	p. 39
	F. Foreign Awards at Auction	p. 40
	G. Foreign Holdings: Official and Private	P. 41

# Section I: Executive Summary



# Highlights of Treasury's August 2019 Quarterly Refunding Presentation to the Treasury Borrowing Advisory Committee (TBAC)

## Receipts and Outlays

- FY 2019 year-to-date receipts were \$68 billion (3%) higher than the comparable period last year. Total receipts were 16.4% of GDP, compared to 16.7% of GDP for the same period last year. Customs duties rose \$23 billion (78%), largely resulting from new tariffs. Withheld income and FICA taxes were up \$33 billion (2%), driven by growth in wages and employment. Gross excise taxes were \$11 billion (16%) higher due primarily to the return of the Health Insurance Providers tax in October 2018. Non-withheld income and SECA taxes were up \$7 billion (1%). Individual refunds were \$23 billion (9%) lower. Federal Reserve earnings were \$16 billion (28%) lower due to the Federal Reserve paying higher short-term interest rates to depository institutions. Gross corporate taxes were \$5 billion (2%) lower, due primarily to the lower corporate tax rates established by the Tax Cuts and Jobs Act (TCJA).
- After calendar adjustments, FY 2019 year-to-date outlays were \$205 billion (7%) higher than the comparable period last year. Total outlays were 21.1% of GDP, compared to 20.7% of GDP for the same period last year. Defense expenditures were up \$38 billion (8%) due to increased spending for military personnel, operations, maintenance, and procurement. Social Security Administration outlays were \$42 billion (5%) higher due to increases in enrollment, the average benefit, and a cost-of-living adjustment of 2.8%. Treasury outlays were \$43 billion (8%) higher due primarily to increased interest on the public debt. Health and Human Services spending was \$47 billion (5%) higher due to increased Medicare and Medicaid expenditures. Education expenditures were up \$40 billion (85%) due to differences in subsidy re-estimates through this period.

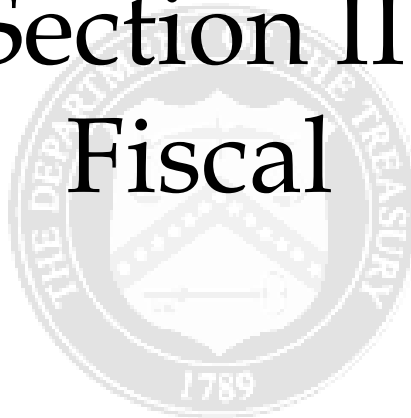
## Projected Net Marketable Borrowing (FY 2019)

- Based on the quarterly borrowing estimate, Treasury's Office of Fiscal Projections (OFP) currently forecasts a net privately-held marketable borrowing need of \$433 billion for Q4 FY 2019, with an end-of-September cash balance of \$350 billion. Privately-held marketable borrowing excludes rollovers (auction "add-ons") of Treasury securities held in the Federal Reserve's System Open Market Account (SOMA), but includes financing required due to SOMA redemptions.

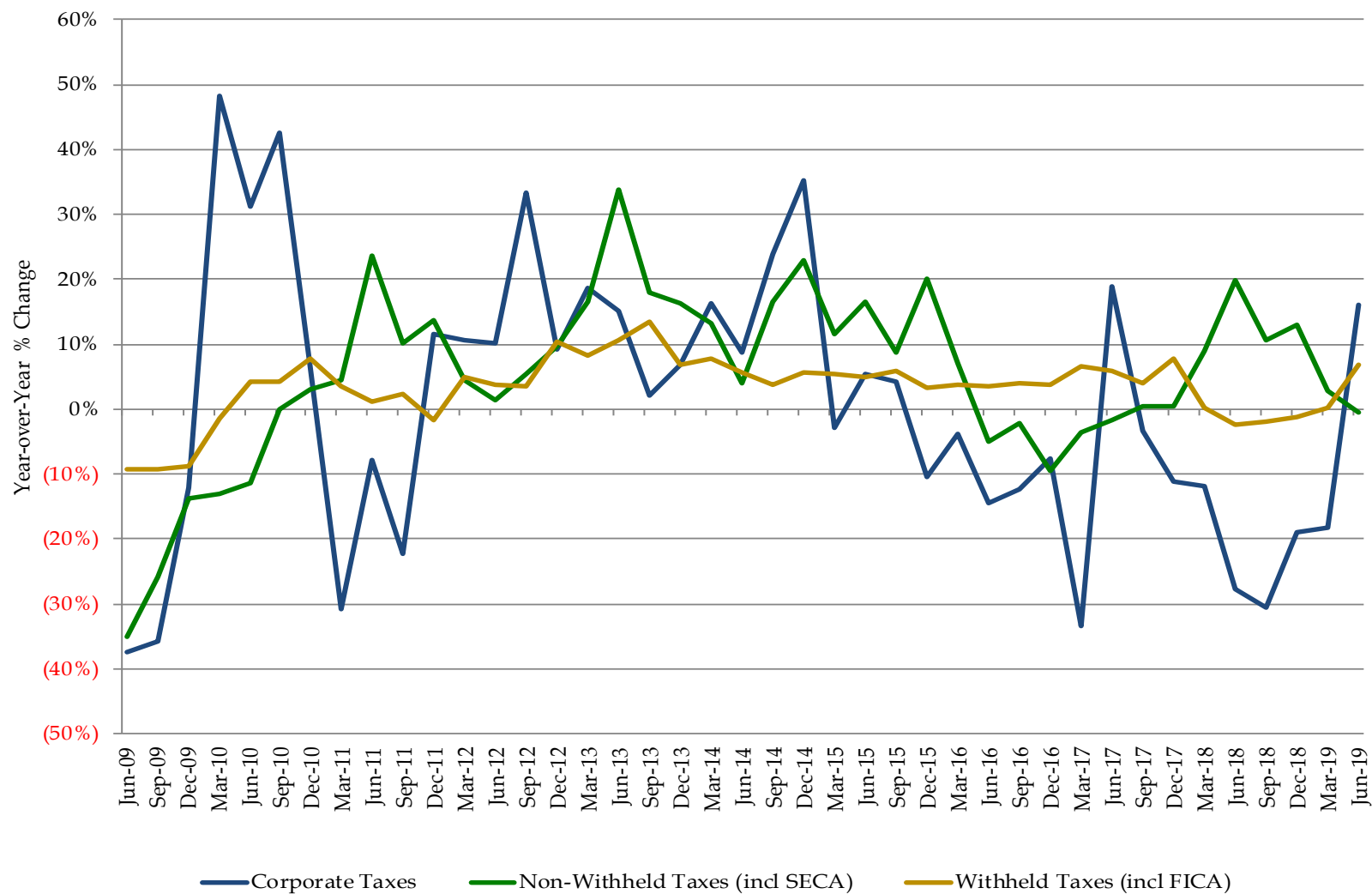
## Demand for Treasury Securities

- Bid-to-cover ratios for all securities were largely stable over the last quarter.
- Foreign demand remained steady.

# Section II: Fiscal

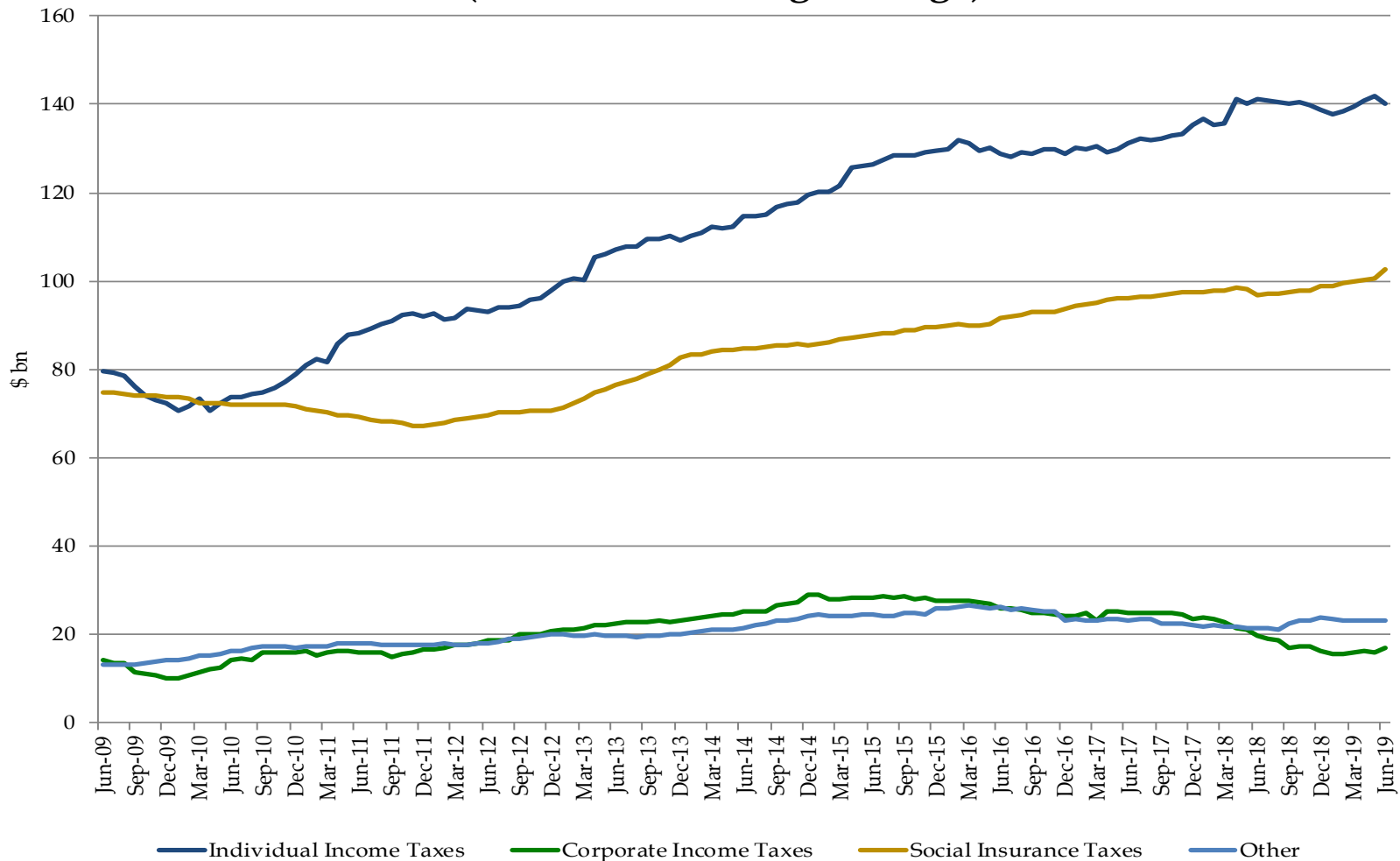


## Quarterly Tax Receipts



Source: United States Department of the Treasury

## Monthly Receipt Levels (12-Month Moving Average)

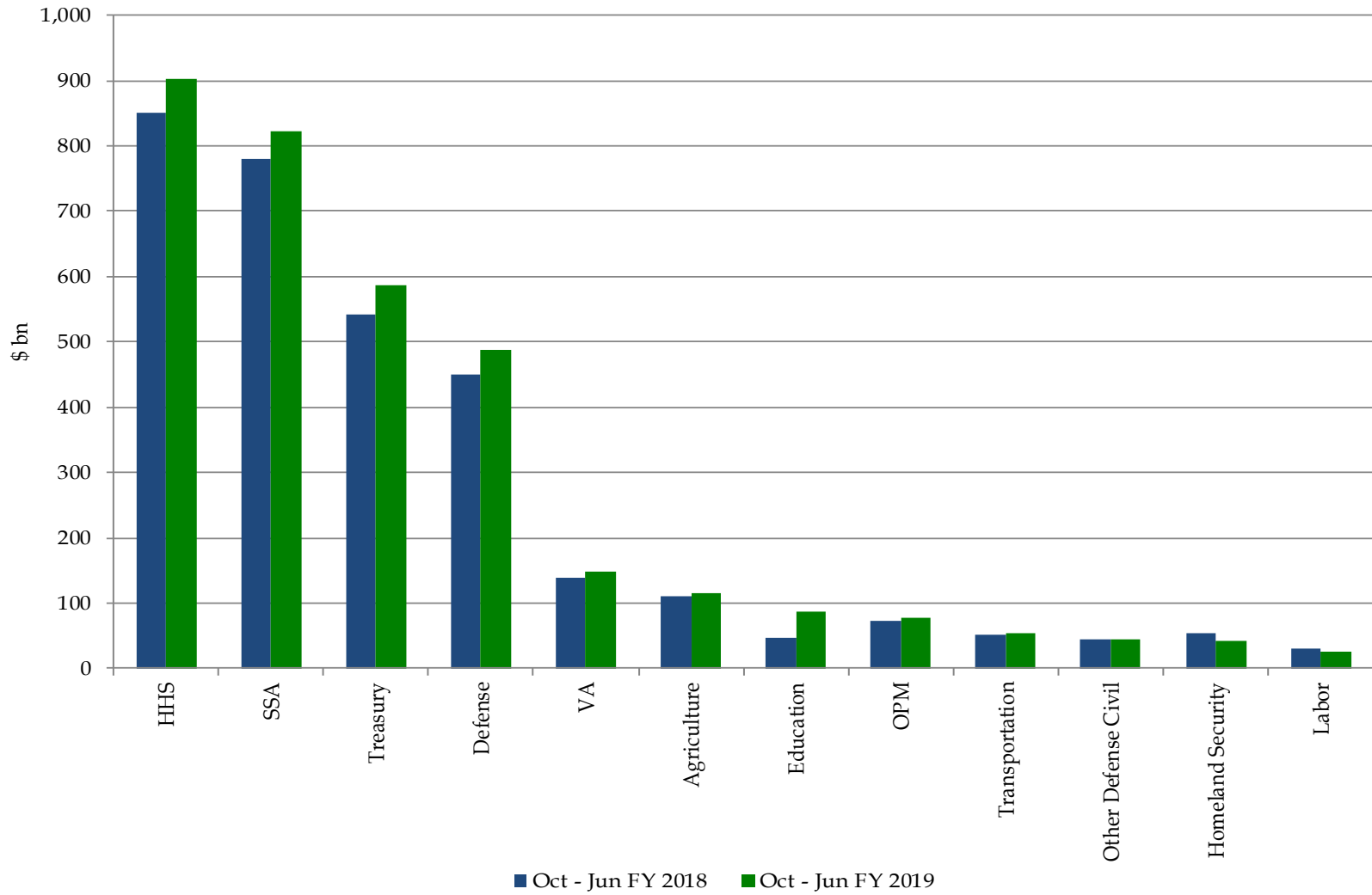


Individual Income Taxes include withheld and non-withheld. Social Insurance Taxes include FICA, SECA, RRTA, UTF deposits, FUTA and RUIA. Other includes excise taxes, estate and gift taxes, customs duties and miscellaneous receipts.

Source: United States Department of the Treasury

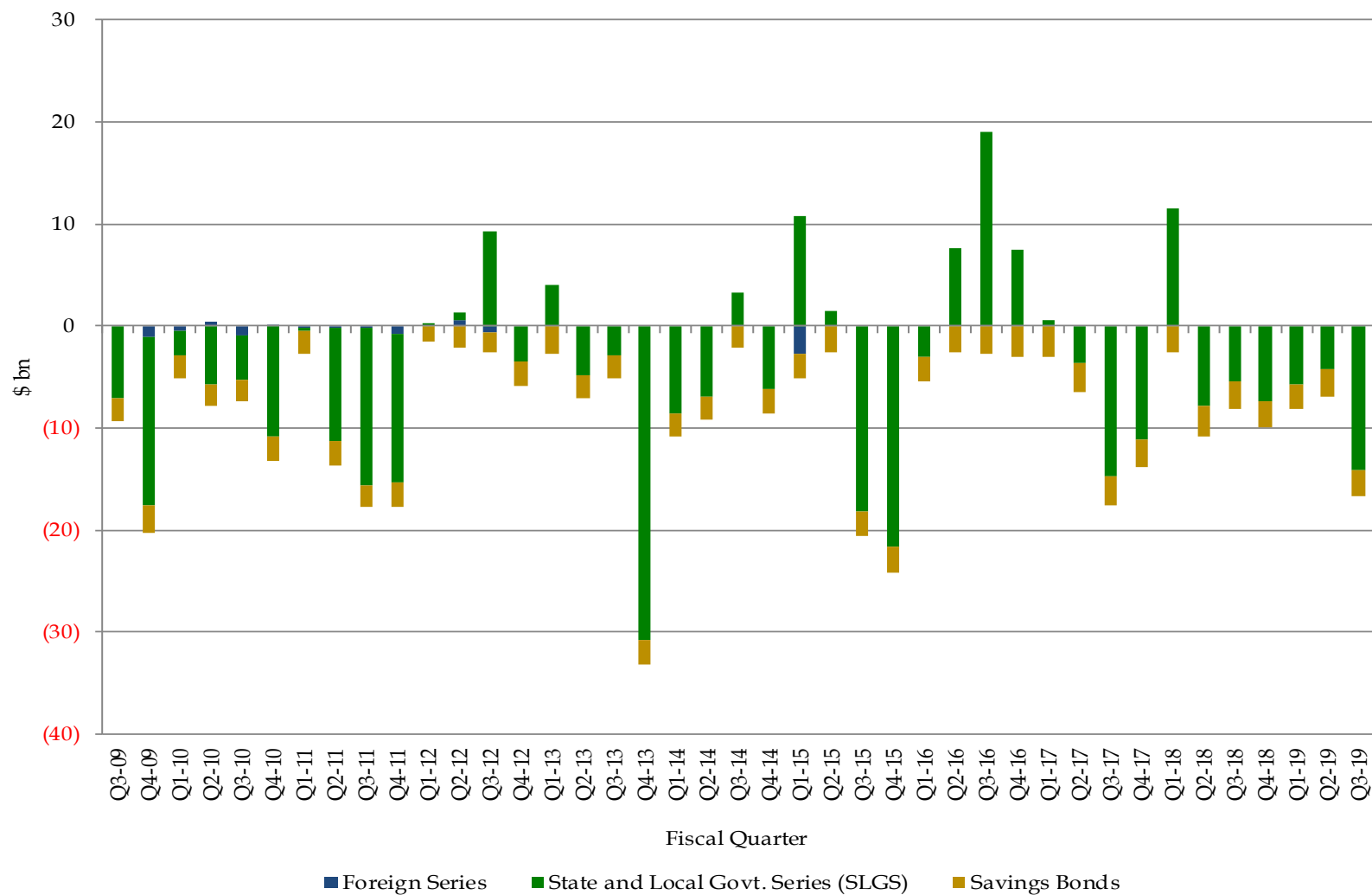


## Largest Outlays



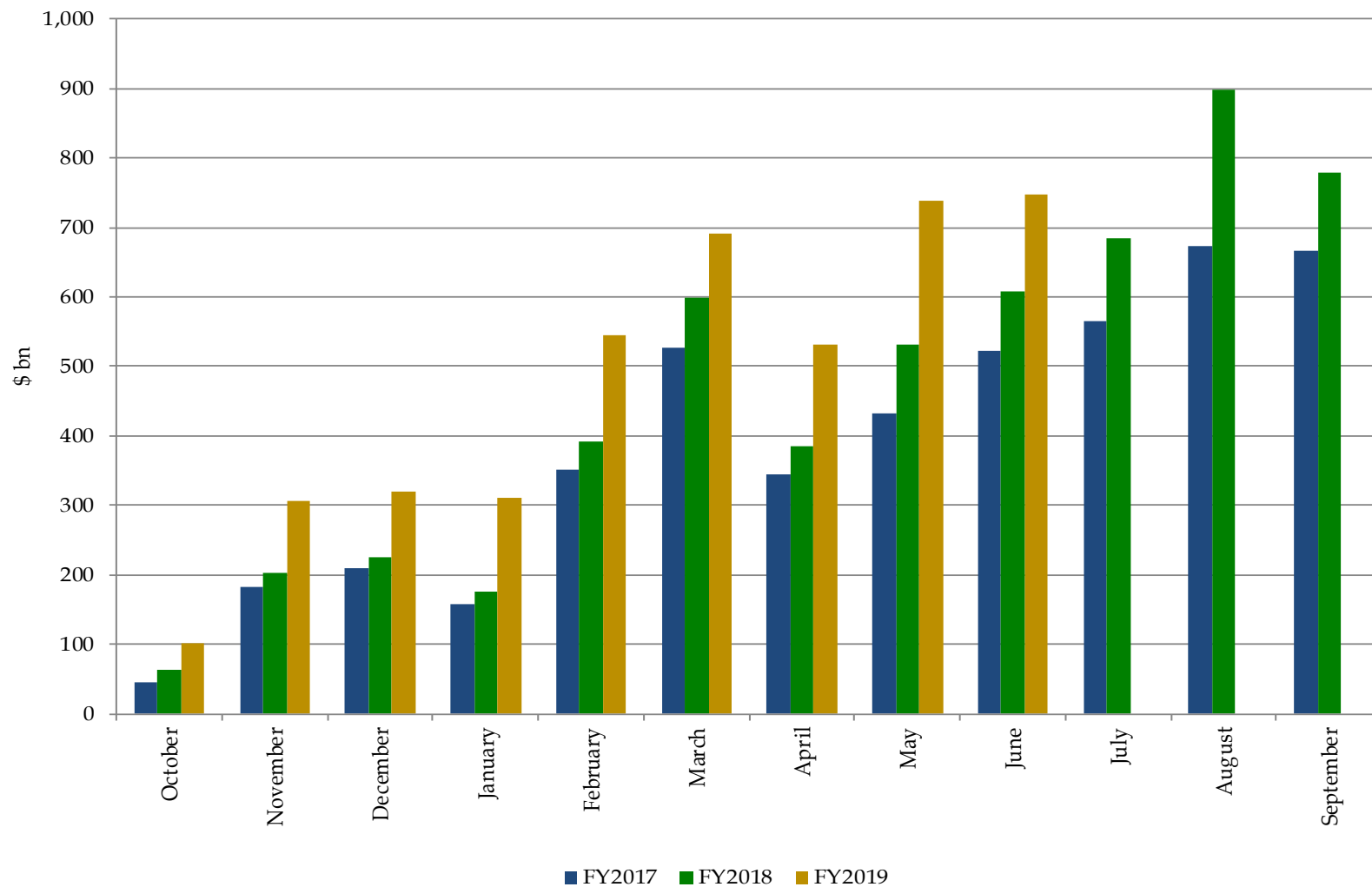
Source: United States Department of the Treasury

# Treasury Net Nonmarketable Borrowing



Source: United States Department of the Treasury

## Cumulative Budget Deficits by Fiscal Year



Source: United States Department of the Treasury

## FY 2019-2021 Deficits and Net Marketable Borrowing Estimates\*, in \$ billions

	Primary Dealers <sup>1</sup>	OFP <sup>2</sup>	OMB <sup>3</sup>	CBO <sup>4</sup>
FY 2019 Deficit Estimate	950		1,001	896
FY 2020 Deficit Estimate	1,012		1,045	892
FY 2021 Deficit Estimate	1,100		1,015	962
FY 2019 Deficit Range	900-1,050			
FY 2020 Deficit Range	900-1,250			
FY 2021 Deficit Range	962-1,290			
FY 2019 Privately-Held Net Marketable Borrowing Estimate	1,004	1,273		
FY 2020 Privately-Held Net Marketable Borrowing Estimate	1,085			
FY 2021 Privately-Held Net Marketable Borrowing Estimate	1,140			
FY 2019 Privately-Held Net Marketable Borrowing Range	782-1,260			
FY 2020 Privately-Held Net Marketable Borrowing Range	850-1,406			
FY 2021 Privately-Held Net Marketable Borrowing Range	900-1,290			
FY 2019 SOMA Redemption Estimate	229	263		
FY 2020 SOMA Redemption Estimate				
FY 2021 SOMA Redemption Estimate				
FY 2019 Net Marketable Borrowing Estimate	775	1,010	1,070	871
FY 2020 Net Marketable Borrowing Estimate	1,085		1,112	955
FY 2021 Net Marketable Borrowing Estimate	1,140		1,082	1,013
Estimates as of:	Jul-19	Jul-19	Jul-19	May-19

<sup>1</sup>Based on primary dealer feedback in July 2019.

Estimates above are medians and assume an end-of-September 2019 cash balance of \$165 billion.

<sup>2</sup>Treasury's Office of Fiscal Projections (OFP) borrowing estimates announced on July 29, 2019.

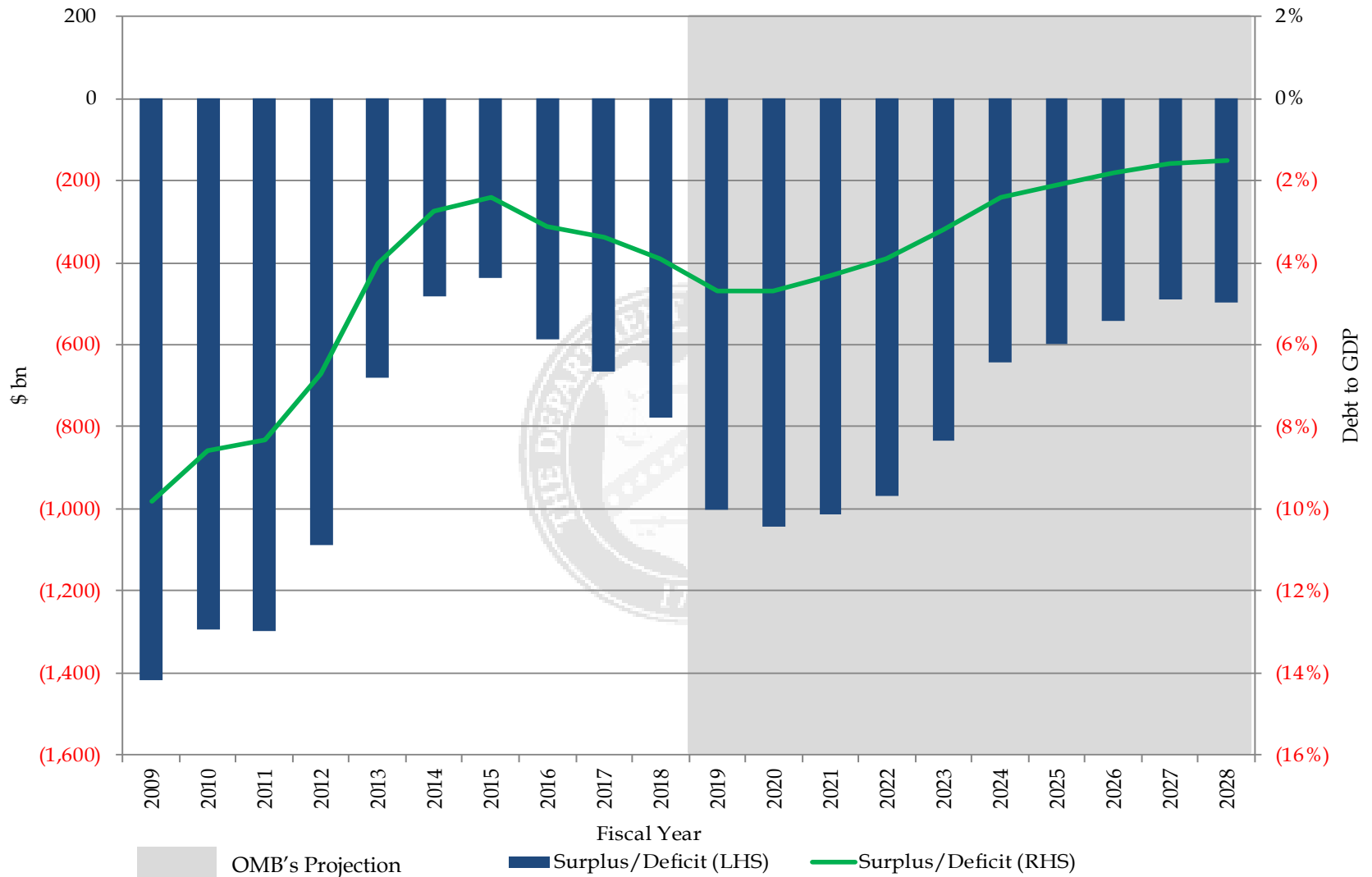
<sup>3</sup>Table S-11 of OMB's "A Budget for a Better America, Fiscal Year 2020, Mid-Session Review," July 2019.

<sup>4</sup>Table 3 of CBO's "Updated Budget Projections: 2019 to 2029," May 2019 (current law).

<sup>5</sup>Table 2 of CBO's "An Analysis of the President's 2020 Budget," May 2019.

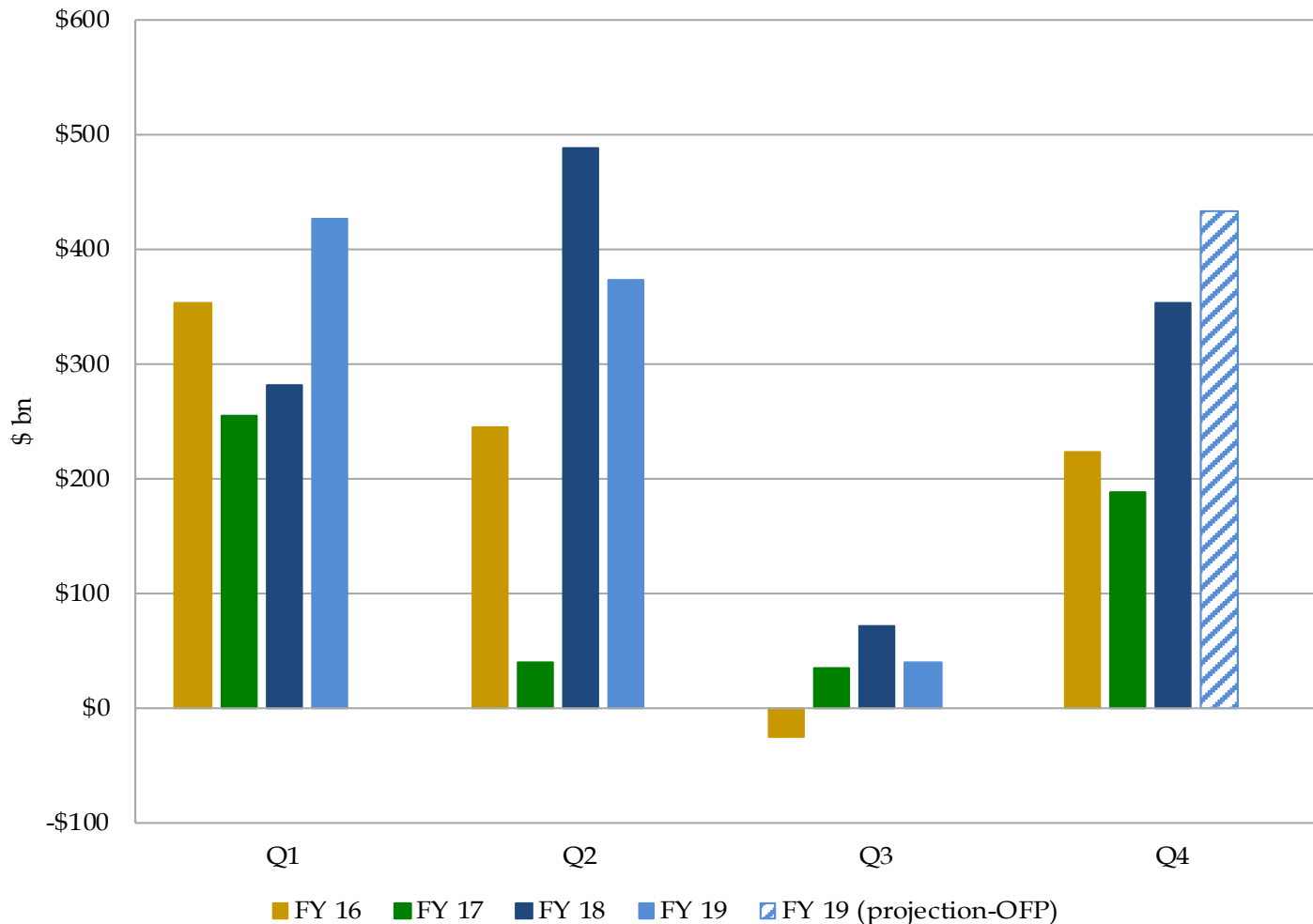
\*Privately-held marketable borrowing excludes rollovers (auction "add-ons") of Treasury securities held in the Federal Reserve's System Open Market Account (SOMA), but includes financing required due to SOMA redemptions.

# Budget Surplus/Deficit



Projections are from OMB's Table S-11 of "A Budget for a Better America, Fiscal Year 2020, Mid-Session Review," July 2019.

## Privately-Held Net Marketable Borrowing Outlook



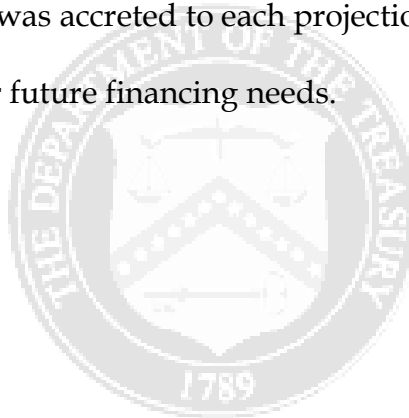
Note: Privately-held marketable borrowing excludes rollovers (auction “add-ons”) of Treasury securities held in the Federal Reserve’s System Open Market Account (SOMA), but includes financing required due to SOMA redemptions.

# Section III: Financing



## Assumptions for Financing Section (pages 16 to 21)

- Portfolio and SOMA holdings as of 06/30/2019.
- Estimates reflect a reduction in SOMA's monthly Treasury redemption cap from \$30 billion to \$15 billion beginning in May 2019 and an end date for SOMA capped redemptions at the end of September 2019, according to the FOMC's "Balance Sheet Normalization Principles and Plans" published on March 20, 2019.
- Estimates assume announced issuance sizes and patterns remain constant for nominal coupons, TIPS, and FRNs given changes made at the May 2019 refunding, while using a total of ~\$2.25 trillion of bills outstanding.
- The principal on the TIPS securities was accreted to each projection date based on market ZCIS levels as of 06/30/2019.
- No attempt was made to account for future financing needs.





## Sources of Privately-Held Financing in FY19 Q3\*

April - June 2019	
Net Bill Issuance	(229)
Net Coupon Issuance	269
Subtotal: Net Marketable Borrowing	40
Ending Cash Balance	264
Beginning Cash Balance	334
Subtotal: Change in Cash Balance	(70)
Net Implied Funding for FY19 Q3**	110

Security	April - June 2019 Bill Issuance			Fiscal Year-to-Date Bill Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
4-Week	605	685	(80)	1,815	1,835	(20)
8-Week	455	455	0	1,205	925	280
13-Week	504	576	(72)	1,638	1,779	(141)
26-Week	471	495	(24)	1,464	1,608	(144)
52-Week	78	78	(0)	260	224	36
CMBs	20	73	(53)	123	123	0
Bill Subtotal	2,133	2,362	(229)	6,505	6,494	11

Security	April - June 2019 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
2-Year FRN	56	41	15	167	123	44
2-Year	120	52	68	354	208	146
3-Year	114	72	42	339	216	123
5-Year	123	99	24	363	256	107
7-Year	96	59	37	286	197	89
10-Year	75	31	44	224	83	141
30-Year	51	0	51	152	9	143
5-Year TIPS	32	54	(22)	46	54	(8)
10-Year TIPS	11	0	11	46	15	31
30-Year TIPS	0	0	0	13	0	13
Coupon Subtotal	678	409	269	1,990	1,161	829

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

\*\*An end-of-June 2019 cash balance of \$264 billion versus a beginning-of-April 2019 cash balance of \$334 billion. By keeping the cash balance constant, Treasury arrives at the net implied funding number.

## Sources of Privately-Held Financing in FY19 Q4\*

July - September 2019	
Assuming Constant Coupon Issuance Sizes**	
Treasury Announced Net Marketable Borrowing***	433
Net Coupon Issuance	312
Implied Change in Bills	121

Security	July - September 2019 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
2-Year FRN	56	41	15	223	164	59
2-Year	160	104	56	514	312	202
3-Year	114	72	42	453	288	165
5-Year	164	139	25	527	396	131
7-Year	128	60	68	414	257	157
10-Year	75	28	47	299	111	188
30-Year	51	6	45	203	15	188
5-Year TIPS	0	0	0	46	54	(8)
10-Year TIPS	25	17	8	71	32	39
30-Year TIPS	6	0	6	19	0	19
Coupon Subtotal	779	467	312	2,769	1,628	1,141

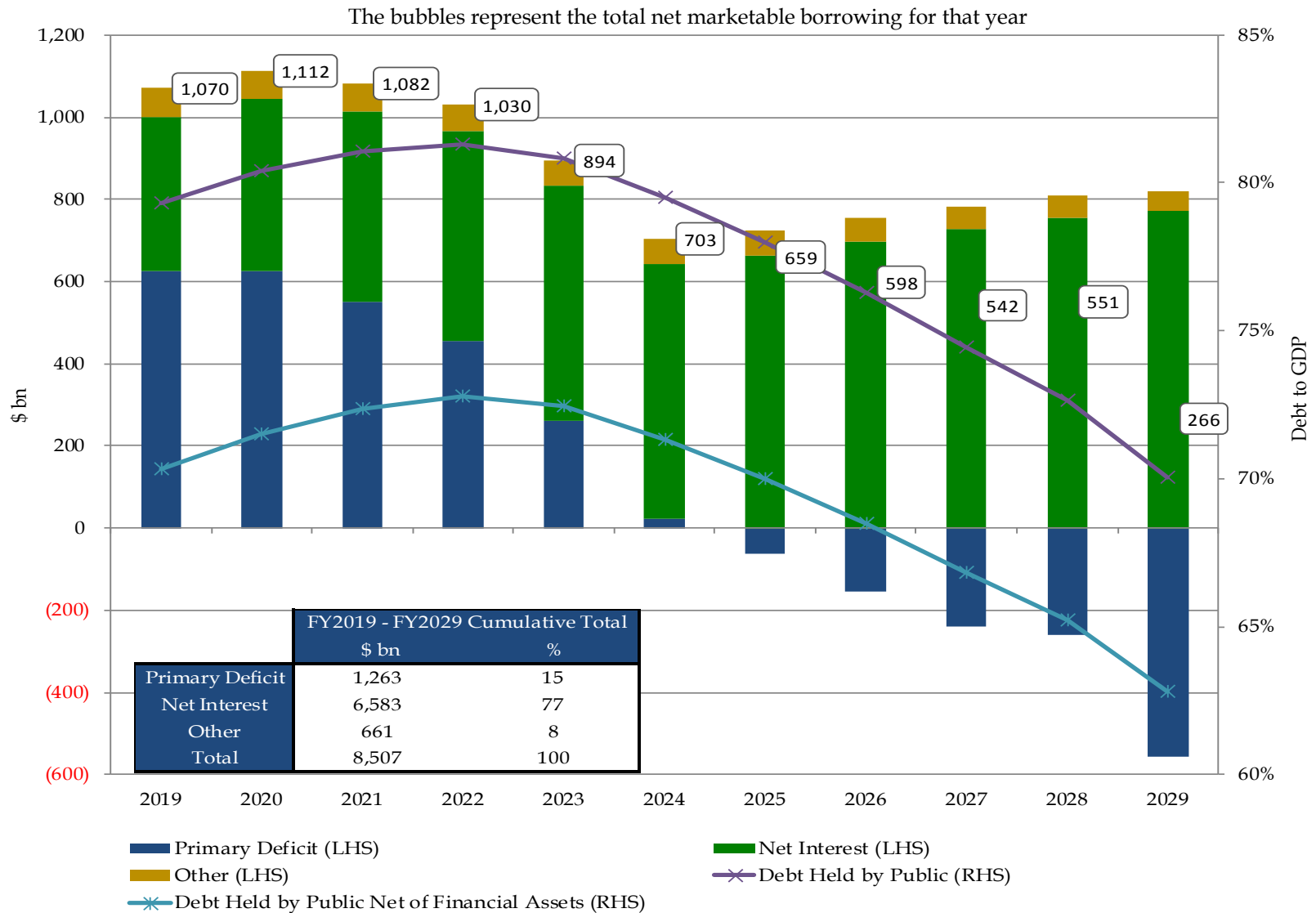
\*Privately-held marketable borrowing excludes rollovers (auction “add-ons”) of Treasury securities held in the Federal Reserve’s System Open Market Account (SOMA), but includes financing required due to SOMA redemptions.

\*\*Keeping announced issuance sizes and patterns constant for nominal coupons, TIPS, and FRNs based on changes made at the May 2019 refunding.

\*\*\*Assumes an end-of-September 2019 cash balance of \$350 billion versus a beginning-of-July 2019 cash balance of \$264 billion.

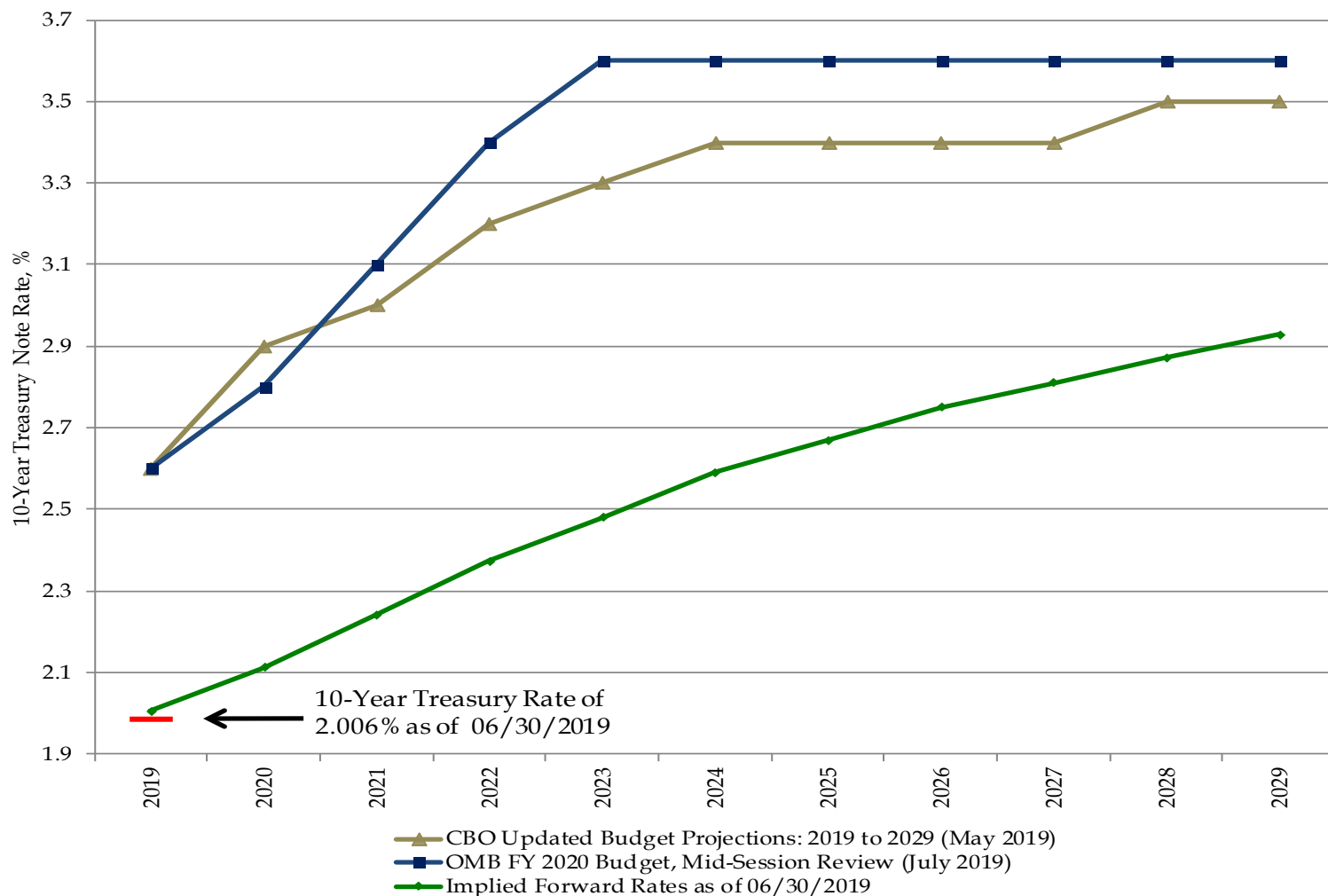
Financing Estimates released by the Treasury can be found here: <http://www.treasury.gov/resource-center/data-chart-center/quarterly-refunding/Pages/Latest.aspx>

# OMB's Projection of Borrowing from the Public



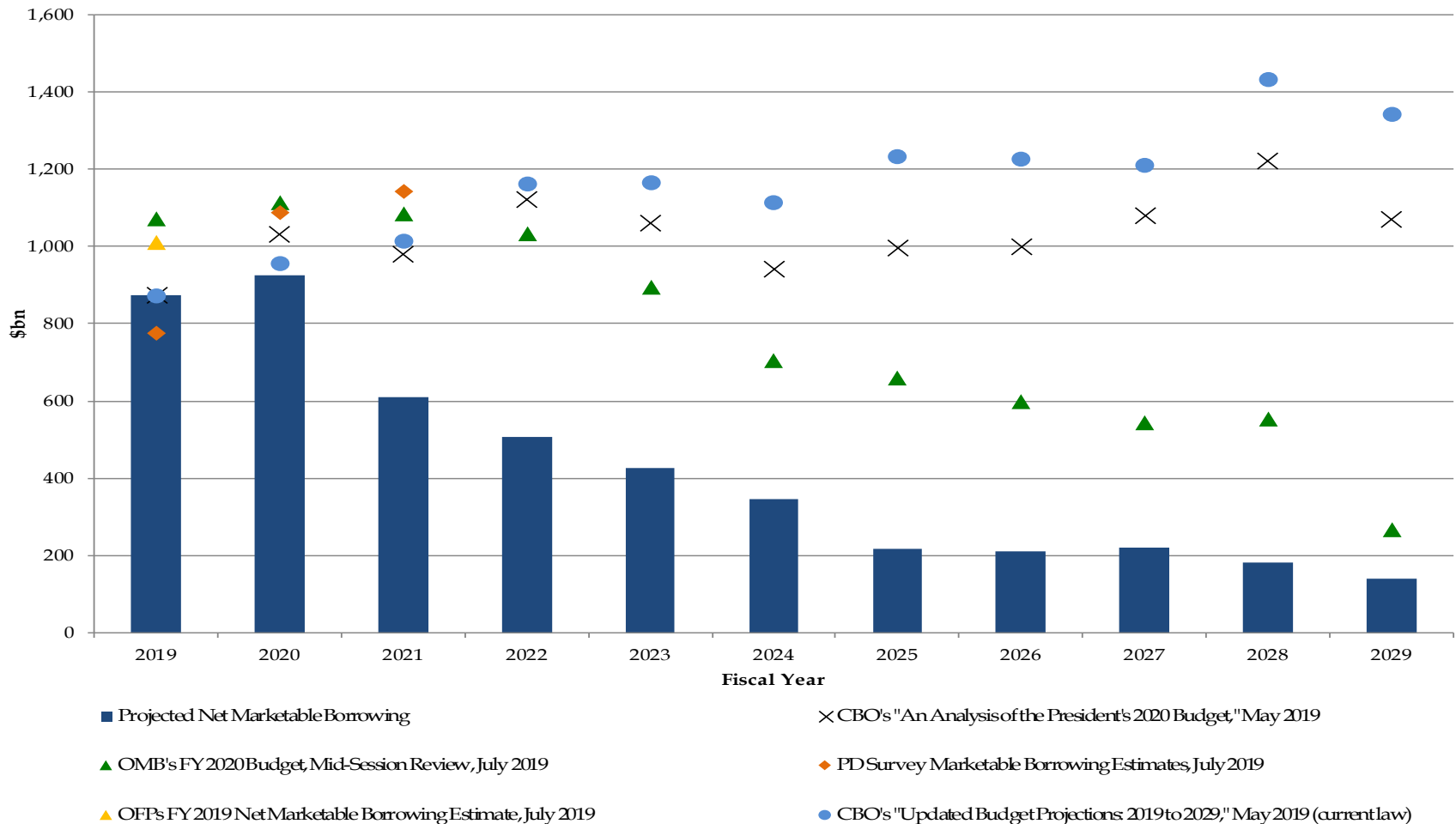
OMB's projections of the change in debt held by the public (borrowing) are from Table S-11 of "A Budget for a Better America, Fiscal Year 2020 Mid-Session Review," July 2019. "Other" represents borrowing from the public to provide direct and guaranteed loans.

## Interest Rate Assumptions: 10-Year Treasury Note



OMB's economic assumption of the 10-Year Treasury note rates are from Table 3 of OMB's "A Budget for a Better America, Fiscal Year 2020, Mid-Session Review" July 2019. CBO's economic assumption of the 10-Year Treasury note rates are from Table 3 of CBO's "Updated Budget Projections: 2019 to 2029," May 2019. The forward rates are the implied 10-Year Treasury note rates on June 30, 2019.

# Projected Net Marketable Borrowing Assuming Future Issuance Remains Constant\*

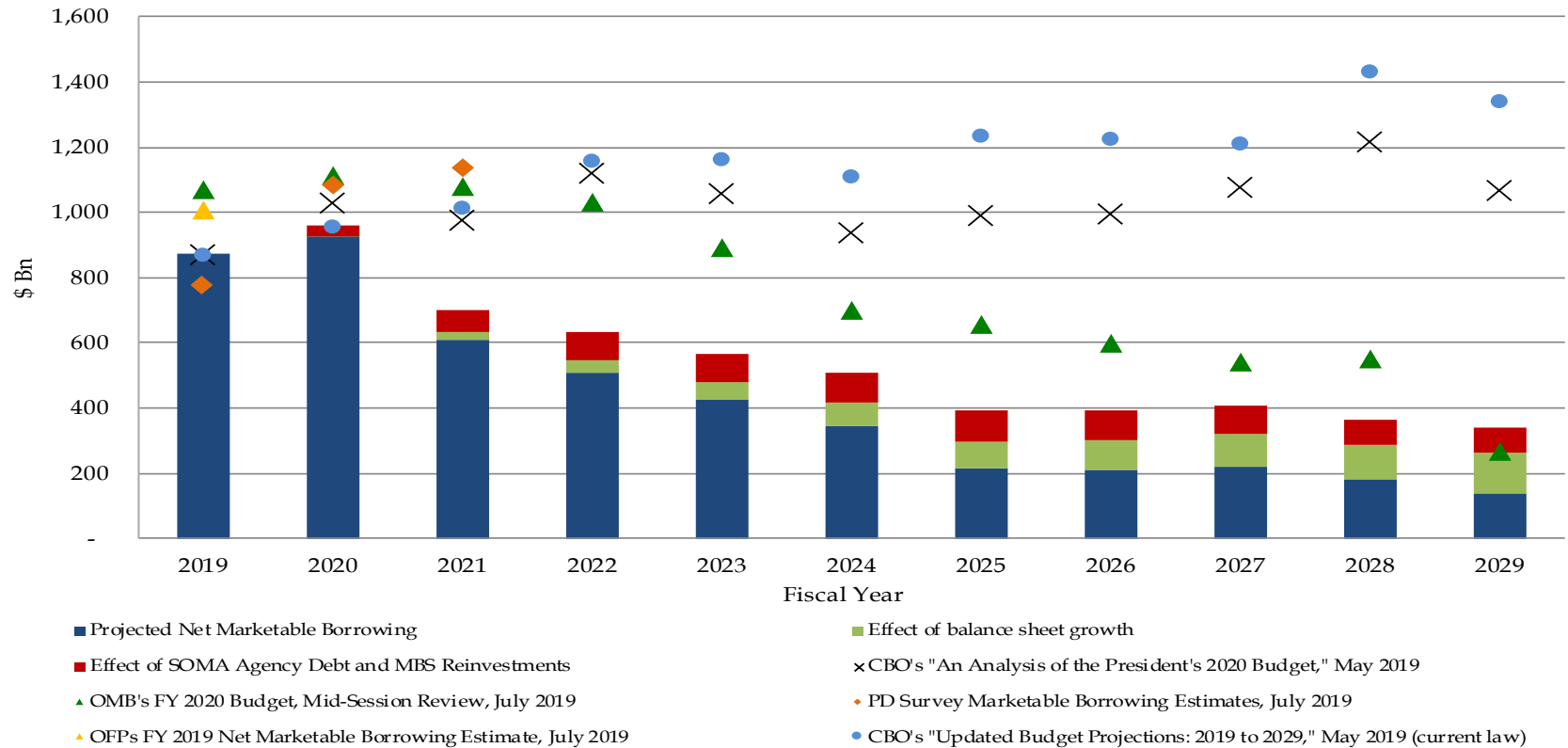


Treasury's latest primary dealer survey estimates can be found on page 11. OMB's projections of the change in debt held by the public are from Table S-11 of "A Budget for a Better America, Fiscal Year 2020, Mid-Session Review," July 2019. CBO's current law budget projections of the change in debt held by the public are from Table 3 of "Updated Budget Projections: 2019 to 2029," May 2019. CBO's budget projections of the change in debt held by the public are from Table 2 of "An Analysis of the President's 2020 Budget," May 2019. See table in the appendix section for details.

\* Projections reflect a reduction in SOMA's monthly Treasury redemption cap from \$30 billion to \$15 billion beginning in May 2019 and an end date for SOMA capped redemptions at the end of September 2019, according to the FOMC's "Balance Sheet Normalization Principles and Plans" published on March 20, 2019.

# Estimate of the Effect of SOMA Purchases on Projected Net Borrowing

## Assuming SOMA Agency Debt and Mortgage Reinvestments Match Treasury Securities Outstanding and Future Issuance Remains Constant\*



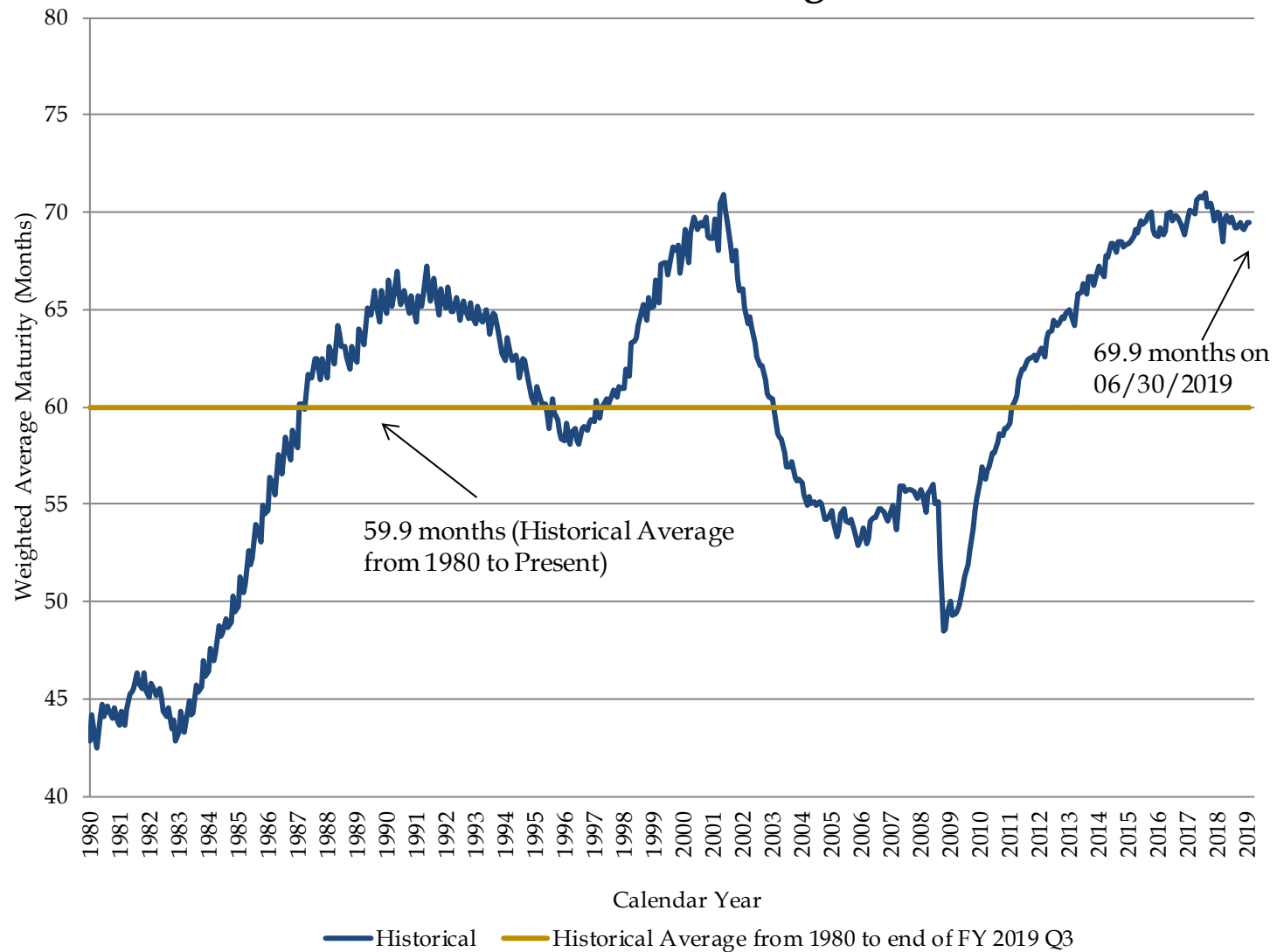
Treasury's latest primary dealer survey estimates can be found on page 11. OMB's projections of the change in debt held by the public are from Table S-11 of "A Budget for a Better America, Fiscal Year 2020, Mid-Session Review," July 2019. CBO's current law budget projections of the change in debt held by the public are from Table 3 of "Updated Budget Projections: 2019 to 2029," May 2019. CBO's budget projections of the change in debt held by the public are from Table 2 of "An Analysis of the President's 2020 Budget," May 2019.

\*Projections reflect a reduction in SOMA's monthly Treasury redemption cap from \$30 billion to \$15 billion during May-September 2019, after which redemptions will end. Projections also reflect that principal payments received from agency debt and MBS will be reinvested into Treasury securities subject to a cap of \$20 billion beginning in October 2019, according to the FOMC's "Balance Sheet Normalization Principles and Plans" published on March 20, 2019. Projections assume a prepayment of the most recent realized 3M CPR. Secondary market purchases of Treasury securities reflect Fed's guidelines for Treasury reinvestments purchases released in May 2019 at the following link: <https://www.newyorkfed.org/markets/treasury-reinvestments-purchases-faq.html>. These purchases increase marketable borrowing when they mature and are rolled over at Treasury auctions as additions. Projections also assume a 6% annual rate of balance sheet growth based on historical averages and the expectation that the Fed will increase its balance sheet beginning in 3Q CY2020 (based on Fed's March survey of primary dealers at the following link [https://www.newyorkfed.org/markets/primarydealer\\_survey\\_questions](https://www.newyorkfed.org/markets/primarydealer_survey_questions)).

# Section IV: Portfolio Metrics

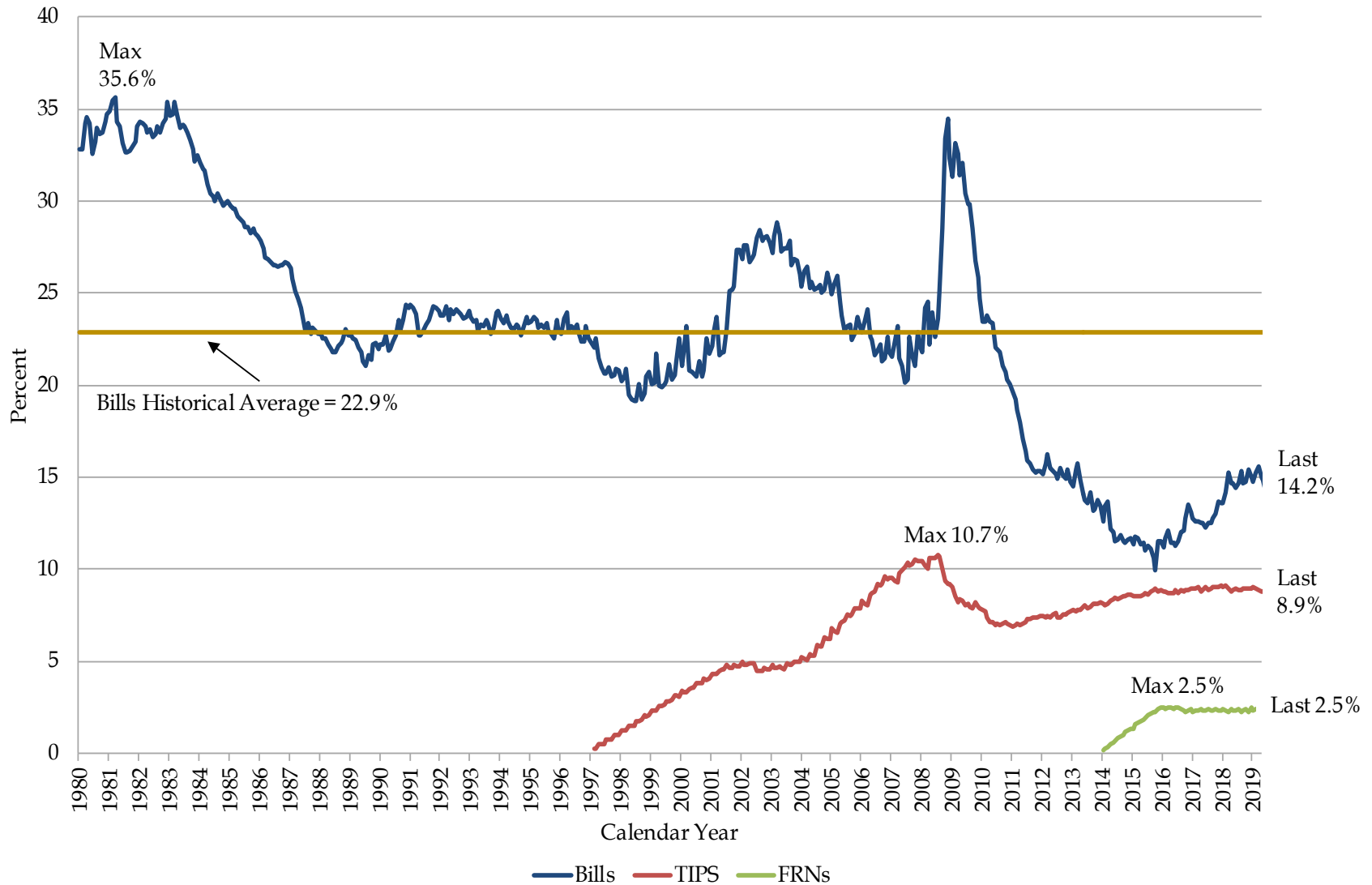


## Historical Weighted Average Maturity of Marketable Debt Outstanding

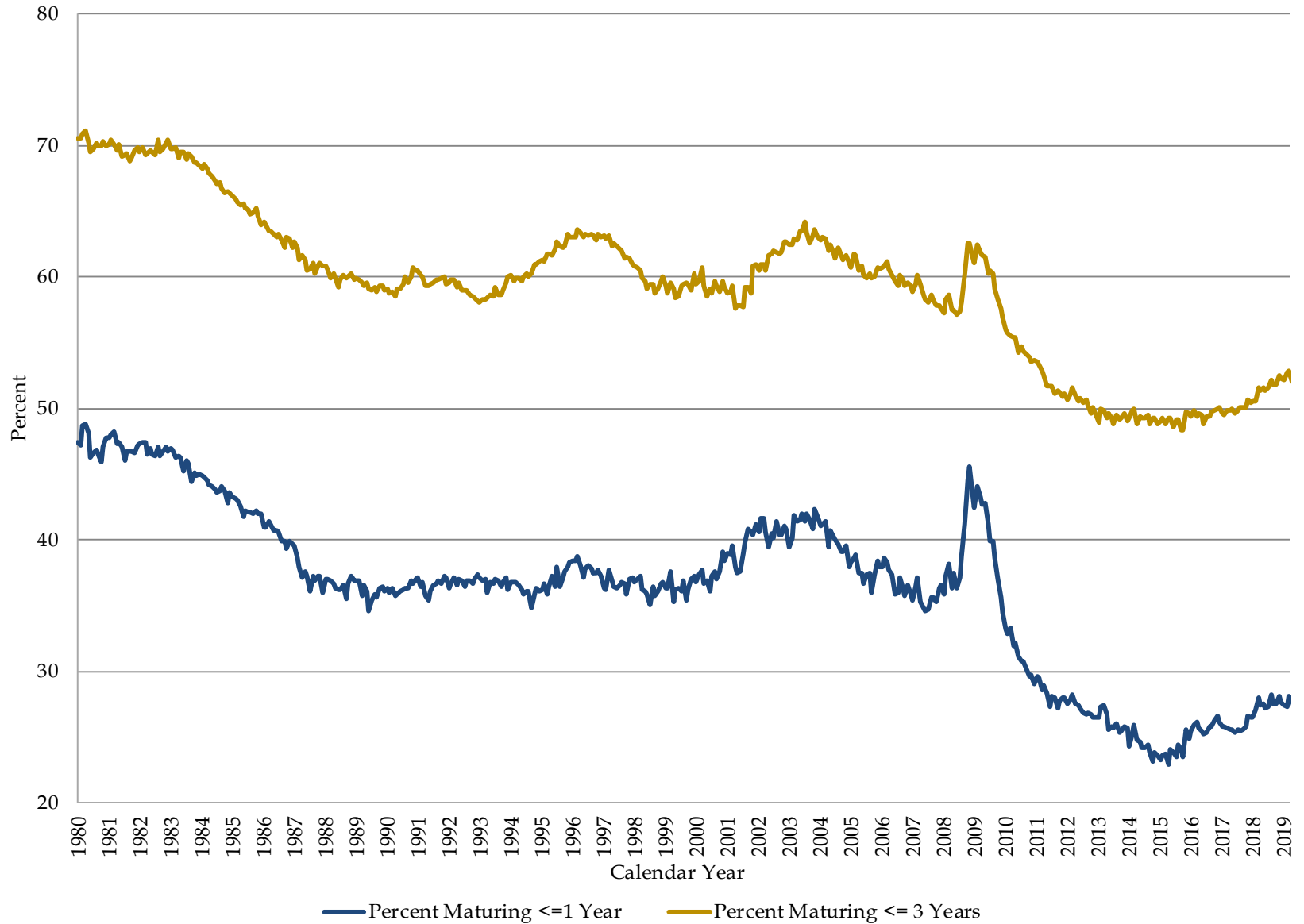




## Bills, TIPS & FRNs Outstanding as a Percent of Marketable Debt Outstanding



# Treasury Maturity Profile History



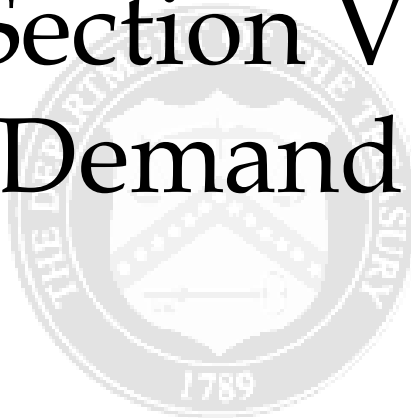
## End of Fiscal Year & Most Recent Quarter Maturity Profile, \$ billions

Date	(0,1]	(1,2]	(2,3]	(3,5]	(5,7]	(7,10]	(10,30]	Total	(0,5]
Sep-11	2,620	1,334	980	1,541	1,070	1,053	1,017	9,616	6,476
Sep-12	2,951	1,373	1,104	1,811	1,214	1,108	1,181	10,742	7,239
Sep-13	2,939	1,523	1,242	1,965	1,454	1,136	1,331	11,590	7,669
Sep-14	2,935	1,739	1,319	2,207	1,440	1,113	1,528	12,281	8,199
Sep-15	3,097	1,775	1,335	2,382	1,478	1,121	1,654	12,841	8,589
Sep-16	3,423	1,828	1,538	2,406	1,501	1,151	1,800	13,648	9,195
Sep-17	3,631	2,027	1,504	2,433	1,466	1,180	1,946	14,188	9,596
Sep-18	4,299	2,076	1,603	2,472	1,531	1,209	2,077	15,268	10,450
Jun-19	4,397	2,244	1,726	2,479	1,592	1,292	2,192	15,922	10,846

## End of Fiscal Year & Most Recent Quarter Maturity Profile, percent

Date	(0,1]	(1,2]	(2,3]	(3,5]	(5,7]	(7,10]	(10,30]	(0,3]	(0,5]
Sep-11	27.2	13.9	10.2	16.0	11.1	10.9	10.6	51.3	67.3
Sep-12	27.5	12.8	10.3	16.9	11.3	10.3	11.0	50.5	67.4
Sep-13	25.4	13.1	10.7	17.0	12.5	9.8	11.5	49.2	66.2
Sep-14	23.9	14.2	10.7	18.0	11.7	9.1	12.4	48.8	66.8
Sep-15	24.1	13.8	10.4	18.5	11.5	8.7	12.9	48.3	66.9
Sep-16	25.1	13.4	11.3	17.6	11.0	8.4	13.2	49.7	67.4
Sep-17	25.6	14.3	10.6	17.1	10.3	8.3	13.7	50.5	67.6
Sep-18	28.2	13.6	10.5	16.2	10.0	7.9	13.6	52.3	68.4
Jun-19	27.6	14.1	10.8	15.6	10.0	8.1	13.8	52.6	68.1

# Section V: Demand



## Summary Statistics for Fiscal Year 2019 Q3 Auctions

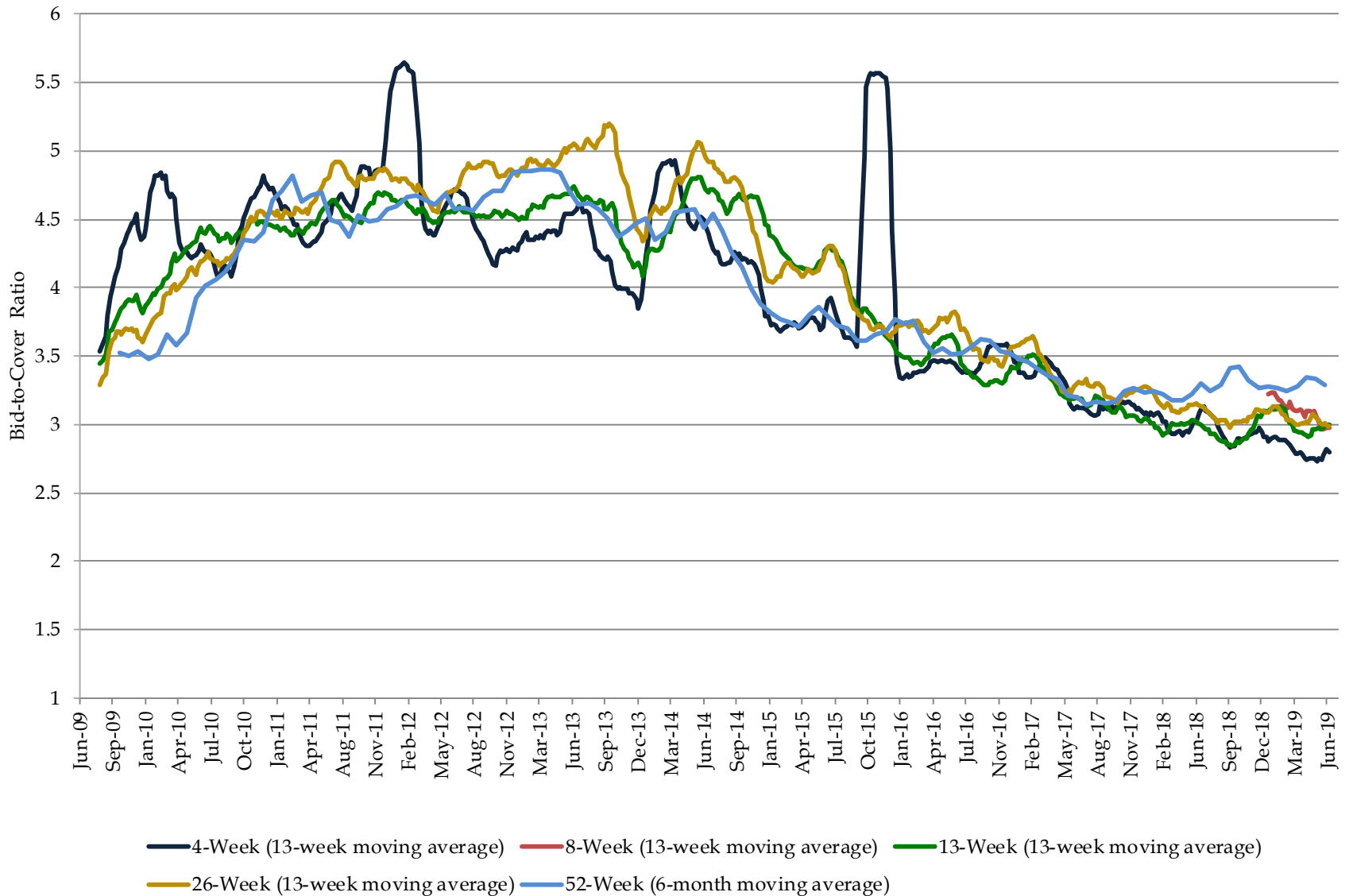
Security Type	Term	Stop Out Rate (%)*	Bid-to-Cover Ratio*	Competitive Awards (\$bn)	% Primary Dealer*	% Direct*	% Indirect*	Non-Competitive Awards (\$bn)	SOMA "Add-Ons" (\$bn)	10-Year Equivalent (\$bn)**
Bill	4-Week	2.327	2.8	575.0	57.8	2.6	39.7	20.0	0.0	5.2
Bill	8-Week	2.310	3.0	451.5	59.6	3.1	37.3	3.5	0.0	7.9
Bill	13-Week	2.320	3.0	488.4	52.3	4.0	43.7	15.6	0.0	14.3
Bill	26-Week	2.301	3.0	457.2	53.6	5.7	40.7	13.8	0.0	26.6
Bill	52-Week	2.208	3.1	76.4	45.1	2.3	52.6	1.6	0.0	8.8
Bill	CMB	2.385	3.3	20.0	64.4	4.9	30.7	0.0	0.0	0.2
Coupon	2-Year	2.058	2.6	118.9	30.0	22.4	47.6	1.1	7.0	28.4
Coupon	3-Year	2.137	2.5	113.5	36.9	17.4	45.7	0.5	13.0	42.5
Coupon	5-Year	2.057	2.4	122.9	23.5	17.8	58.7	0.1	7.2	70.6
Coupon	7-Year	2.153	2.4	95.9	23.8	18.2	58.0	0.1	5.6	75.4
Coupon	10-Year	2.363	2.4	75.0	25.6	12.3	62.0	0.0	9.2	85.5
Coupon	30-Year	2.815	2.3	51.0	26.1	13.4	60.6	0.0	6.5	132.9
TIPS	5-Year	0.345	2.5	31.9	14.7	9.8	75.6	0.1	0.2	17.9
TIPS	10-Year	0.567	3.1	11.0	13.9	29.1	57.0	0.0	1.2	12.7
FRN	2-Year	0.162	3.0	56.0	50.0	1.5	48.5	0.0	2.1	0.0

Total Bills	2.312	2.9	2,068.6	55.5	3.7	40.7	54.4	0.0	62.9
Total Coupons	2.196	2.5	577.2	28.0	17.6	54.4	1.9	48.4	435.2
Total TIPS	0.402	2.7	42.9	14.5	14.7	70.8	0.1	1.4	30.6
Total FRN	0.162	3.0	56.0	50.0	1.5	48.5	0.0	2.1	0.0

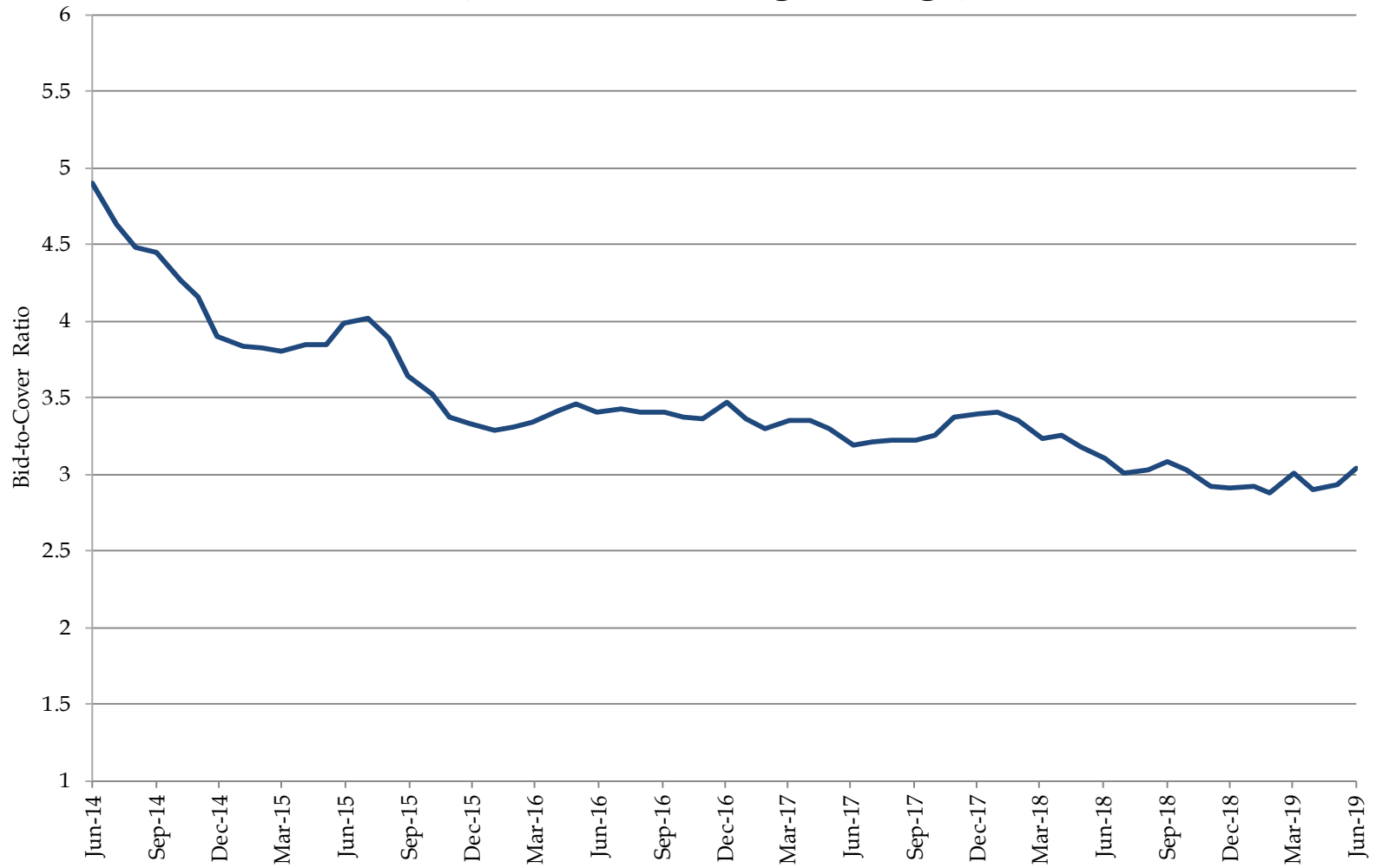
\*Weighted averages of Competitive Awards. FRNs are reported on discount margin basis.

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

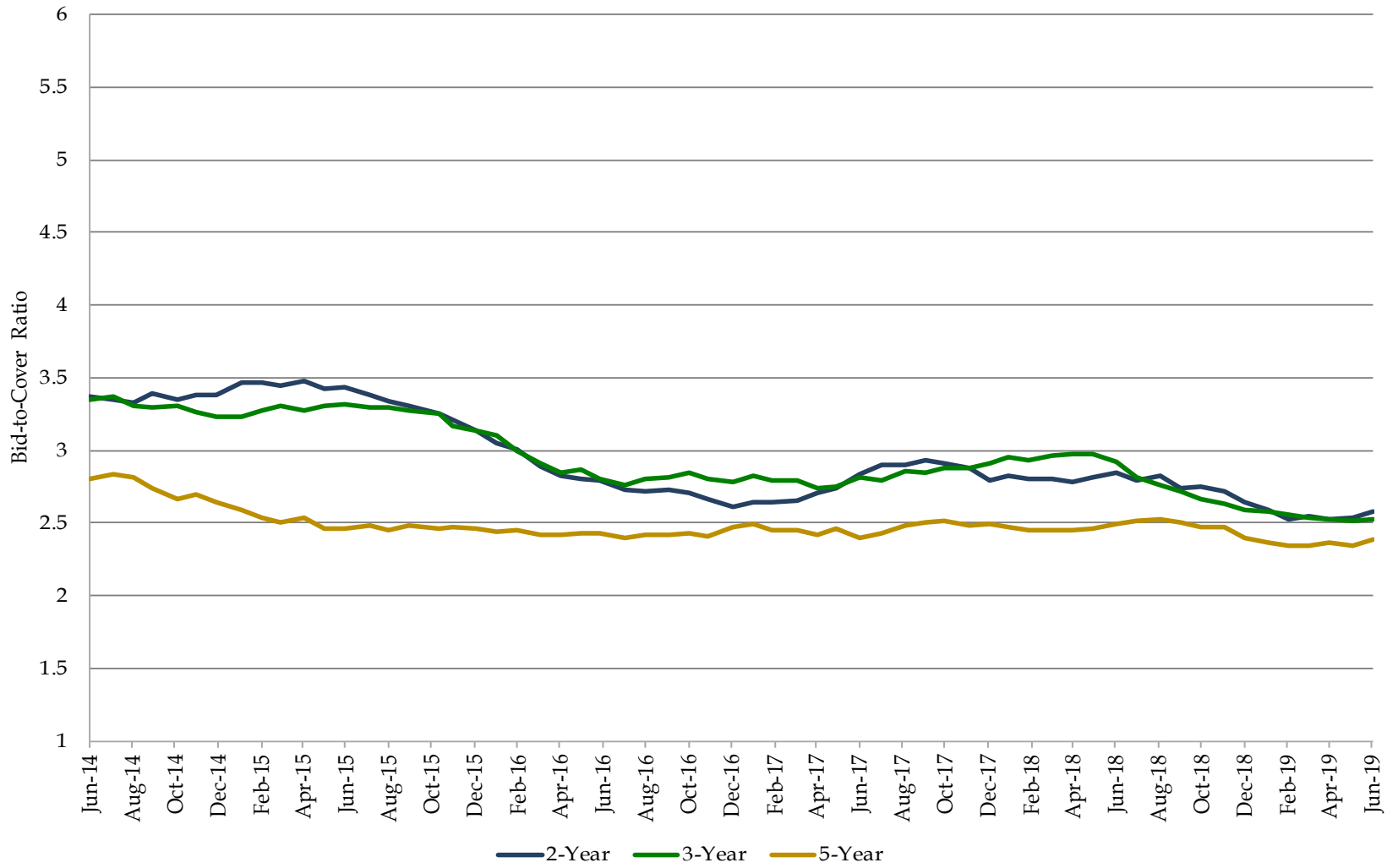
## Bid-to-Cover Ratios for Treasury Bills



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

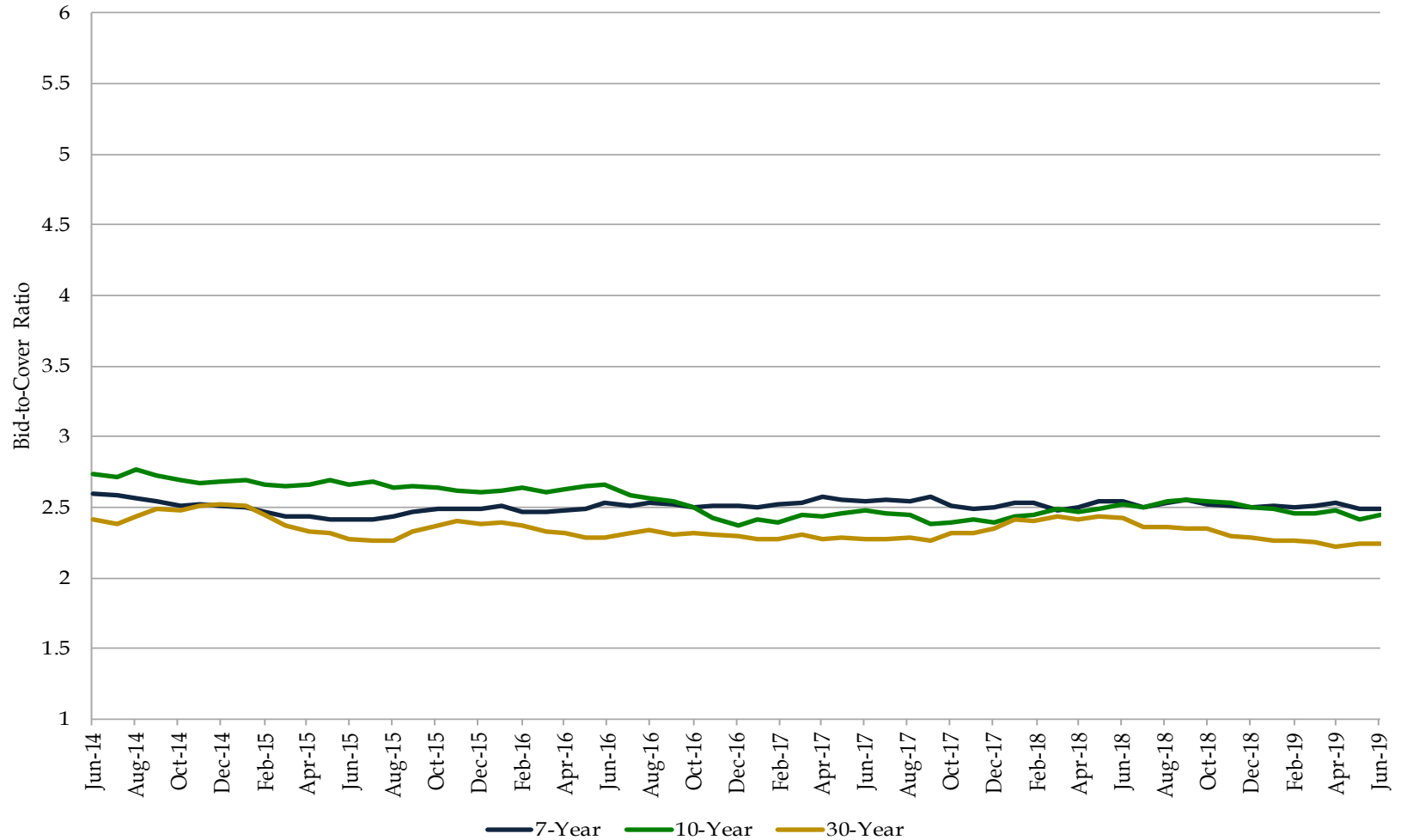


## Bid-to-Cover Ratios for 2-, 3-, and 5-Year Nominal Securities (6-Month Moving Average)

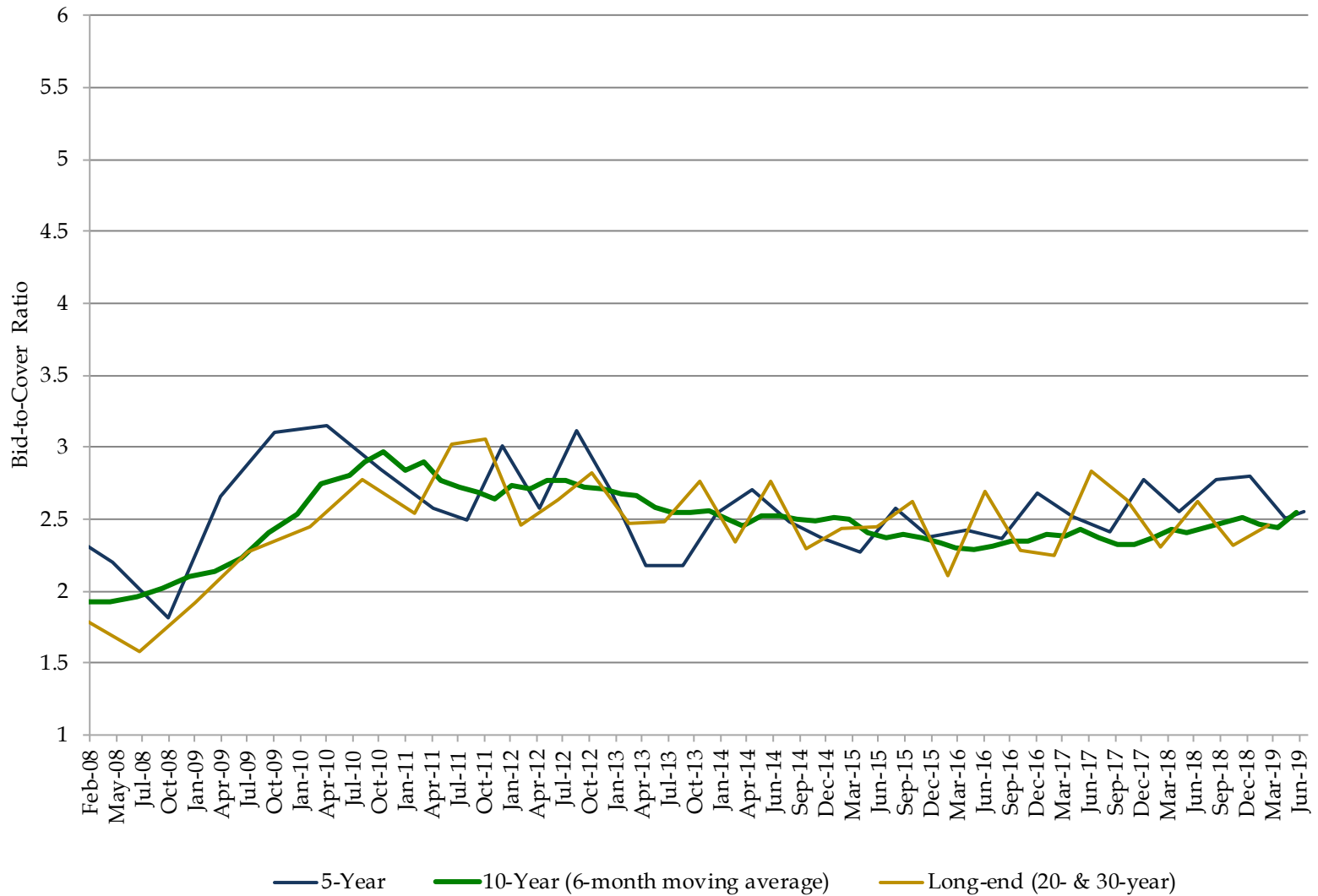




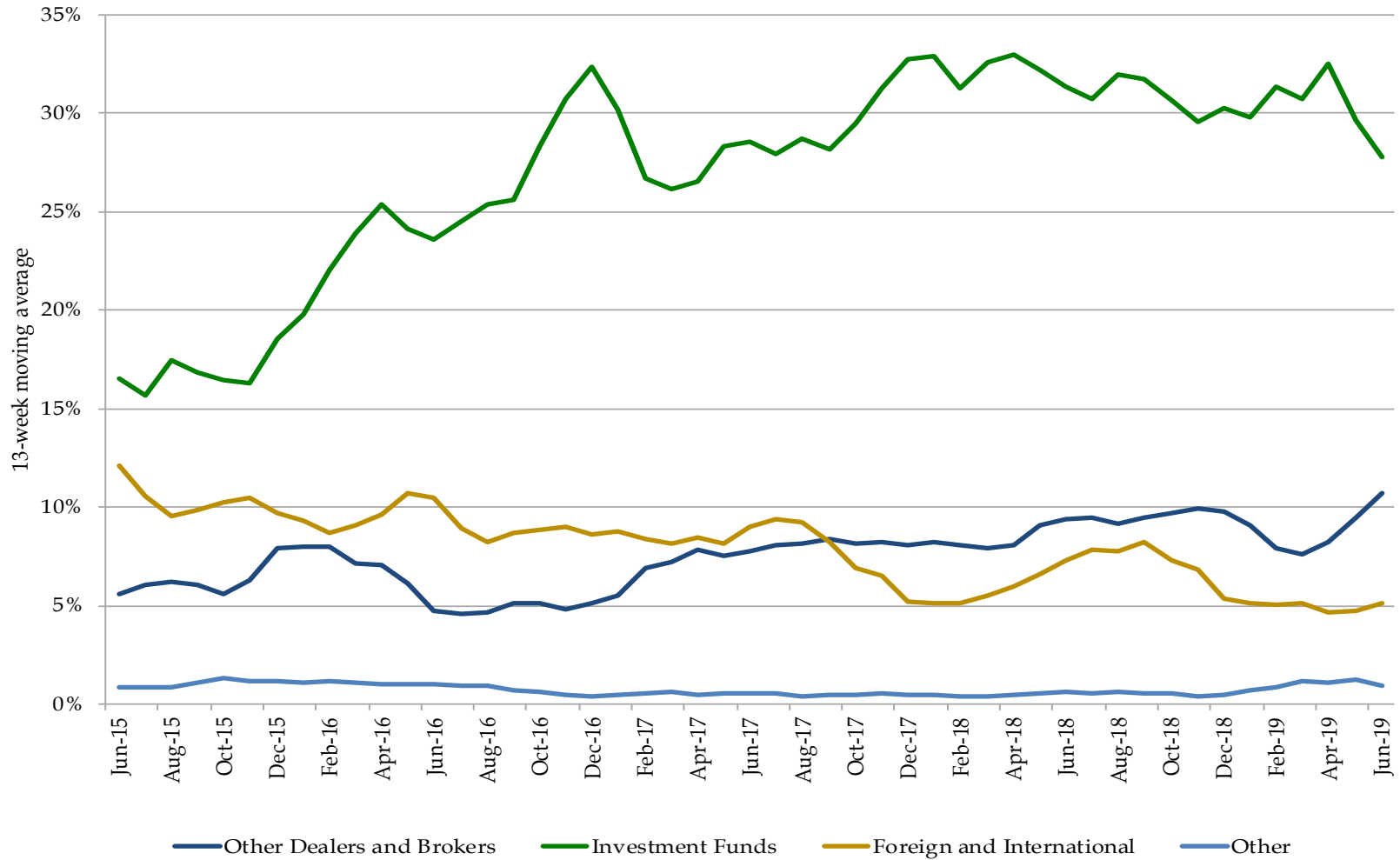
## Bid-to-Cover Ratios for 7-, 10-, and 30-Year Nominal Securities (6-Month Moving Average)



## Bid-to-Cover Ratios for TIPS

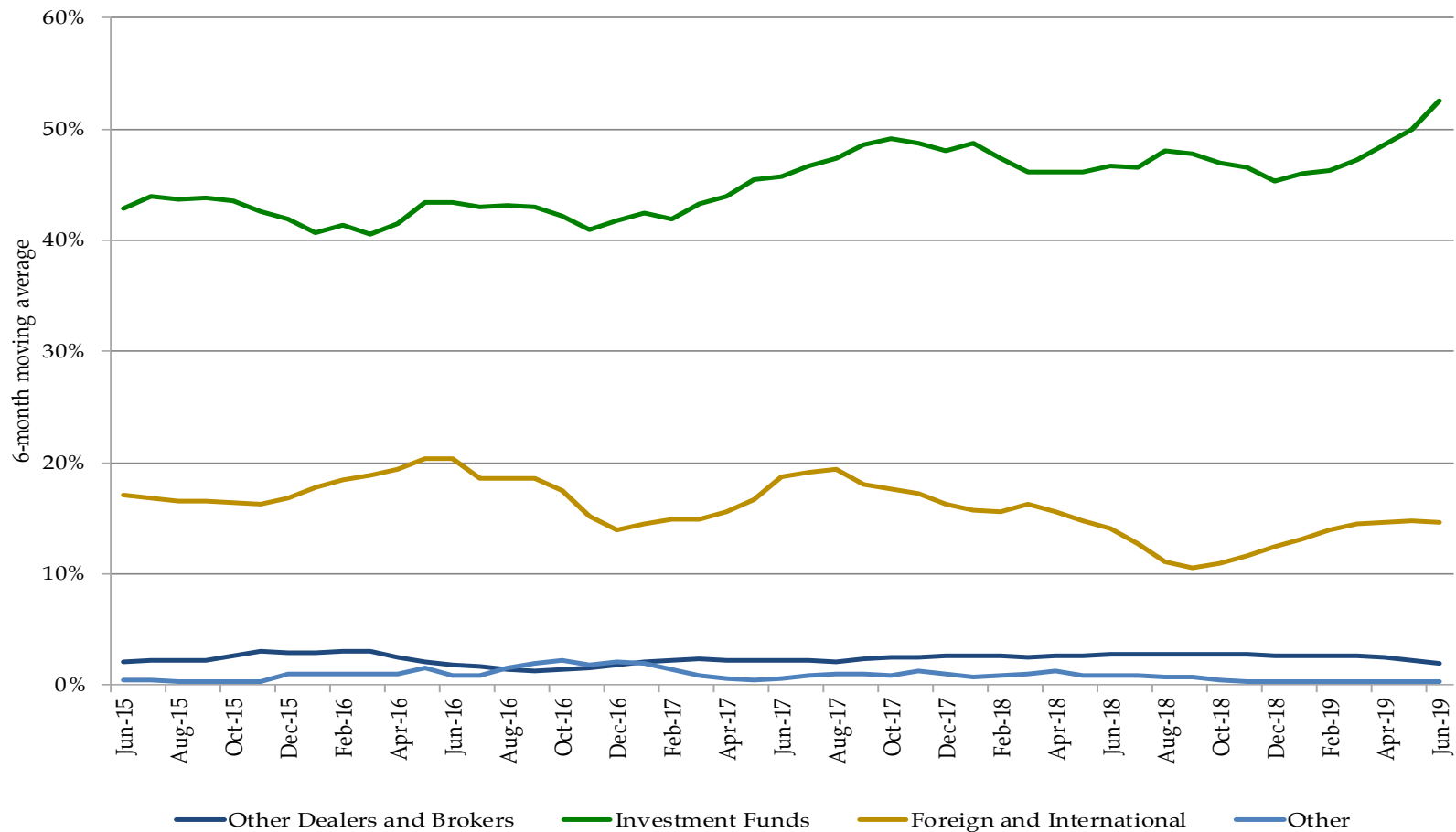


## Percent Awarded in Bill Auctions by Investor Class (13-Week Moving Average)



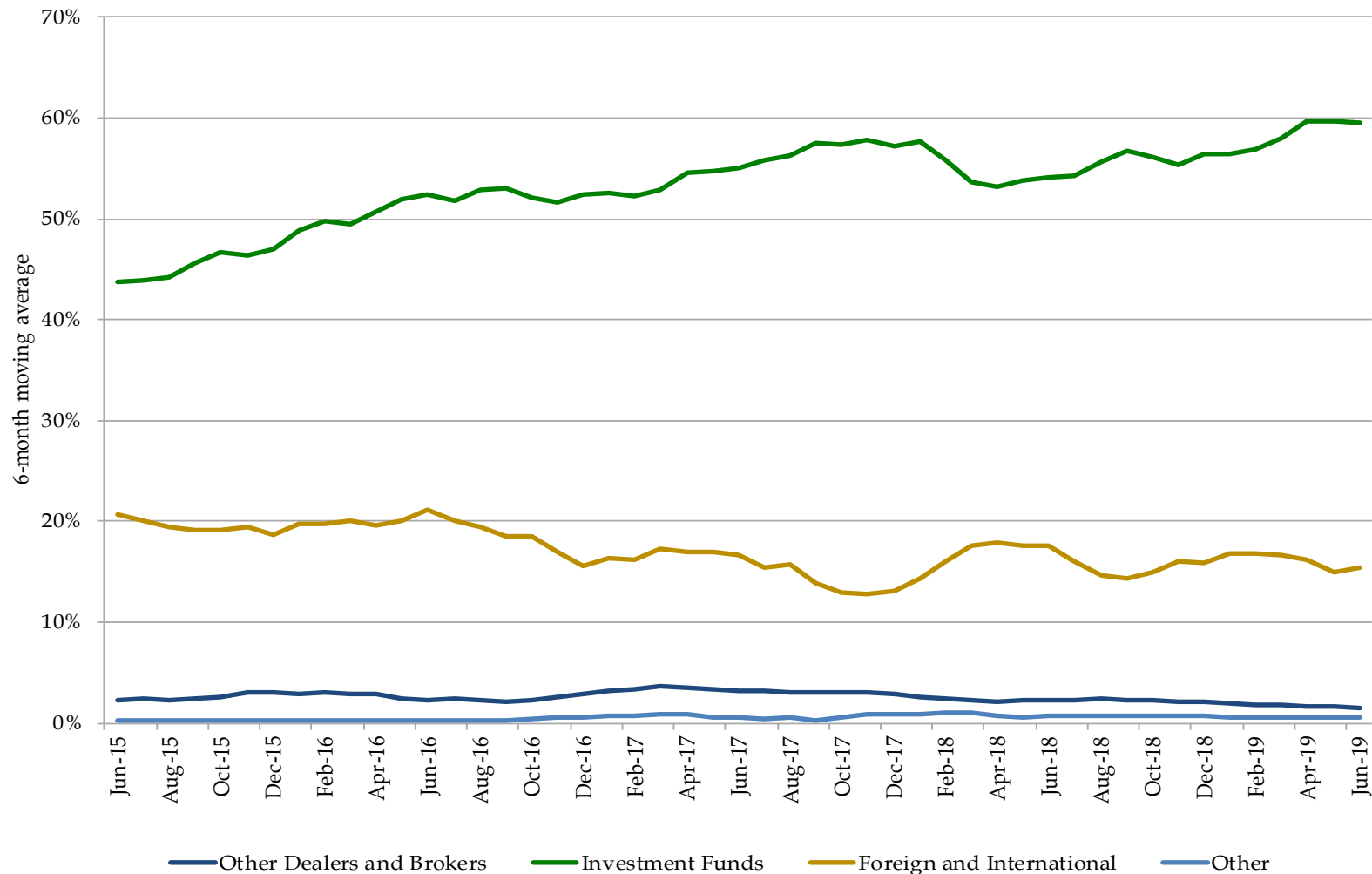
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



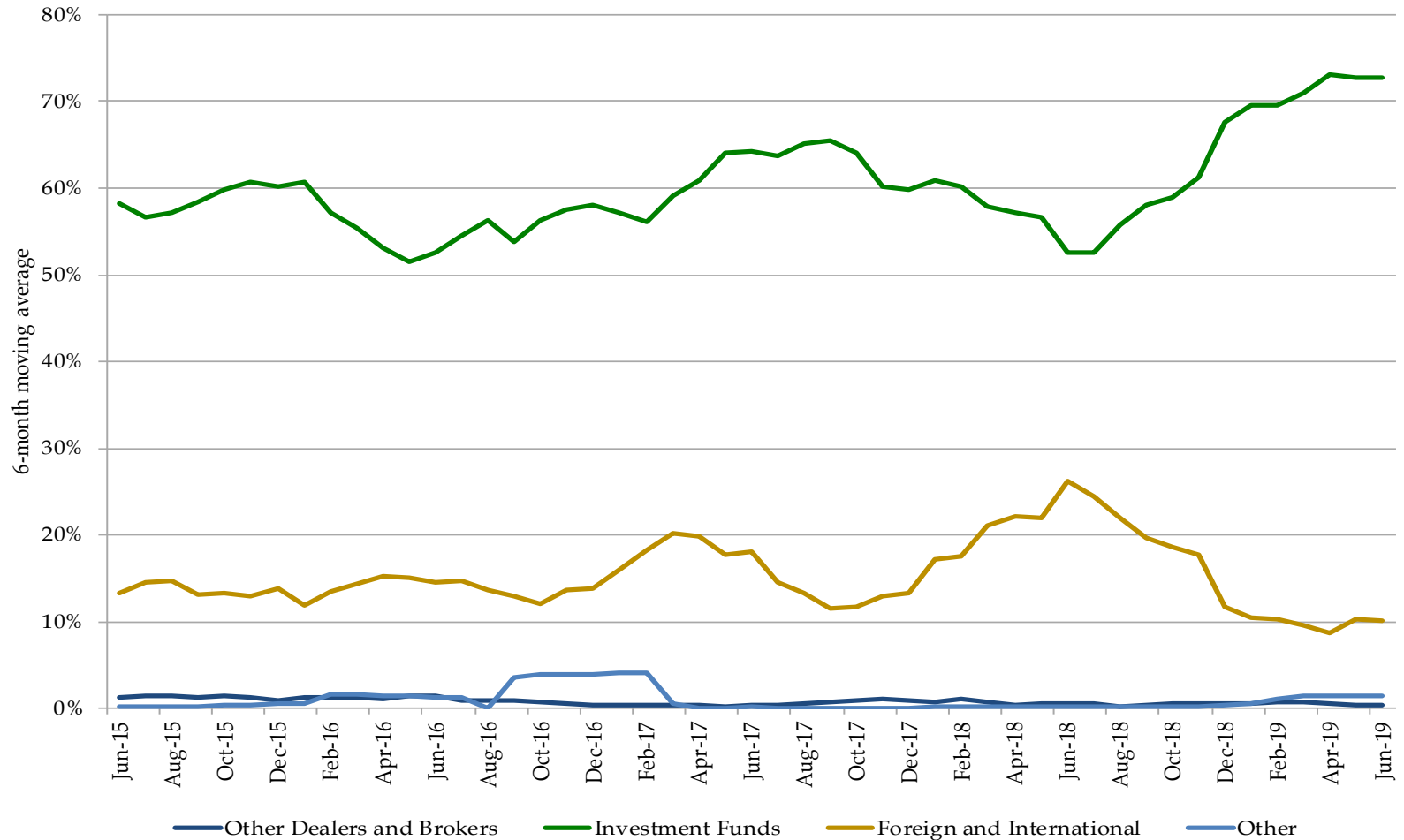
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



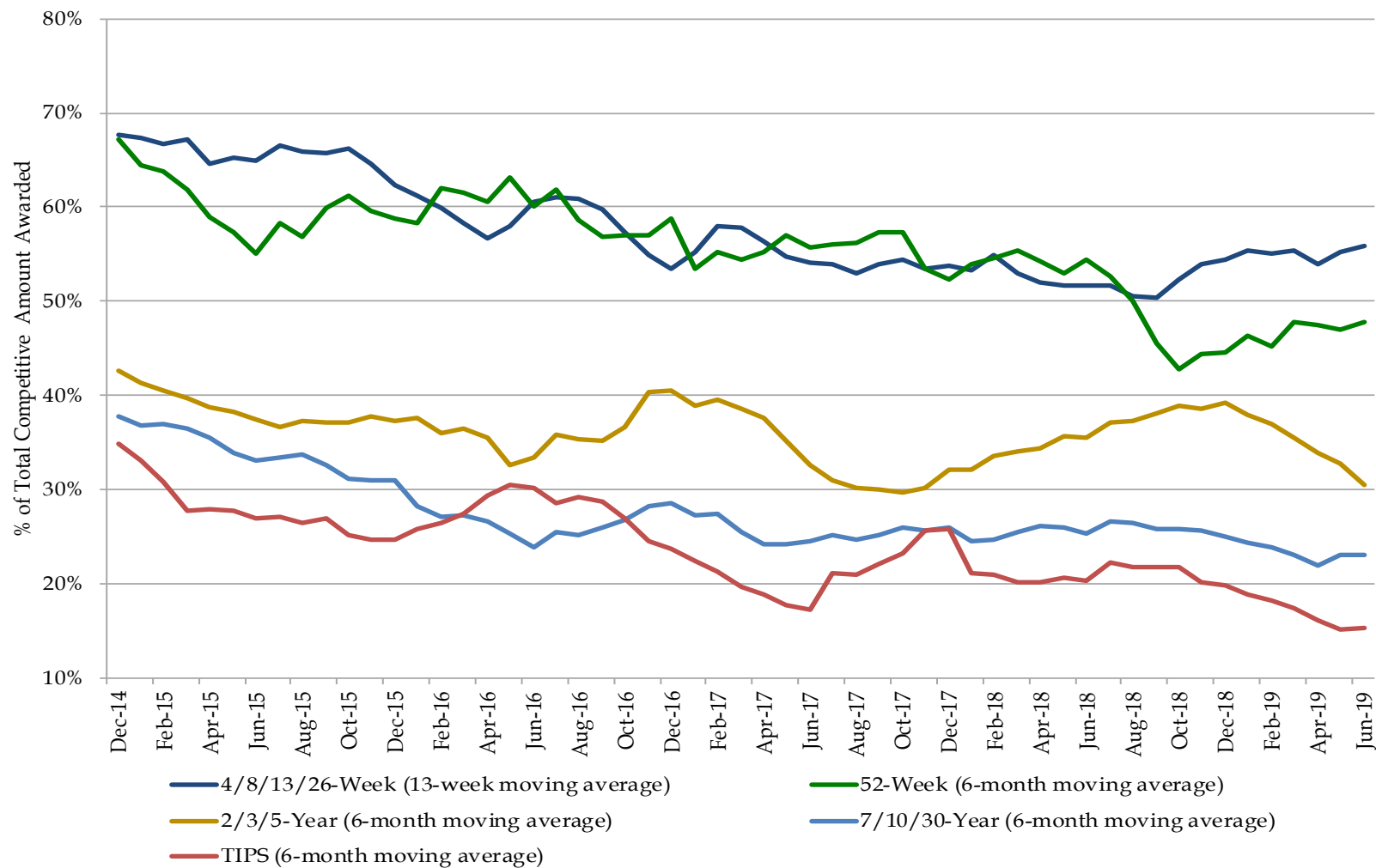
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



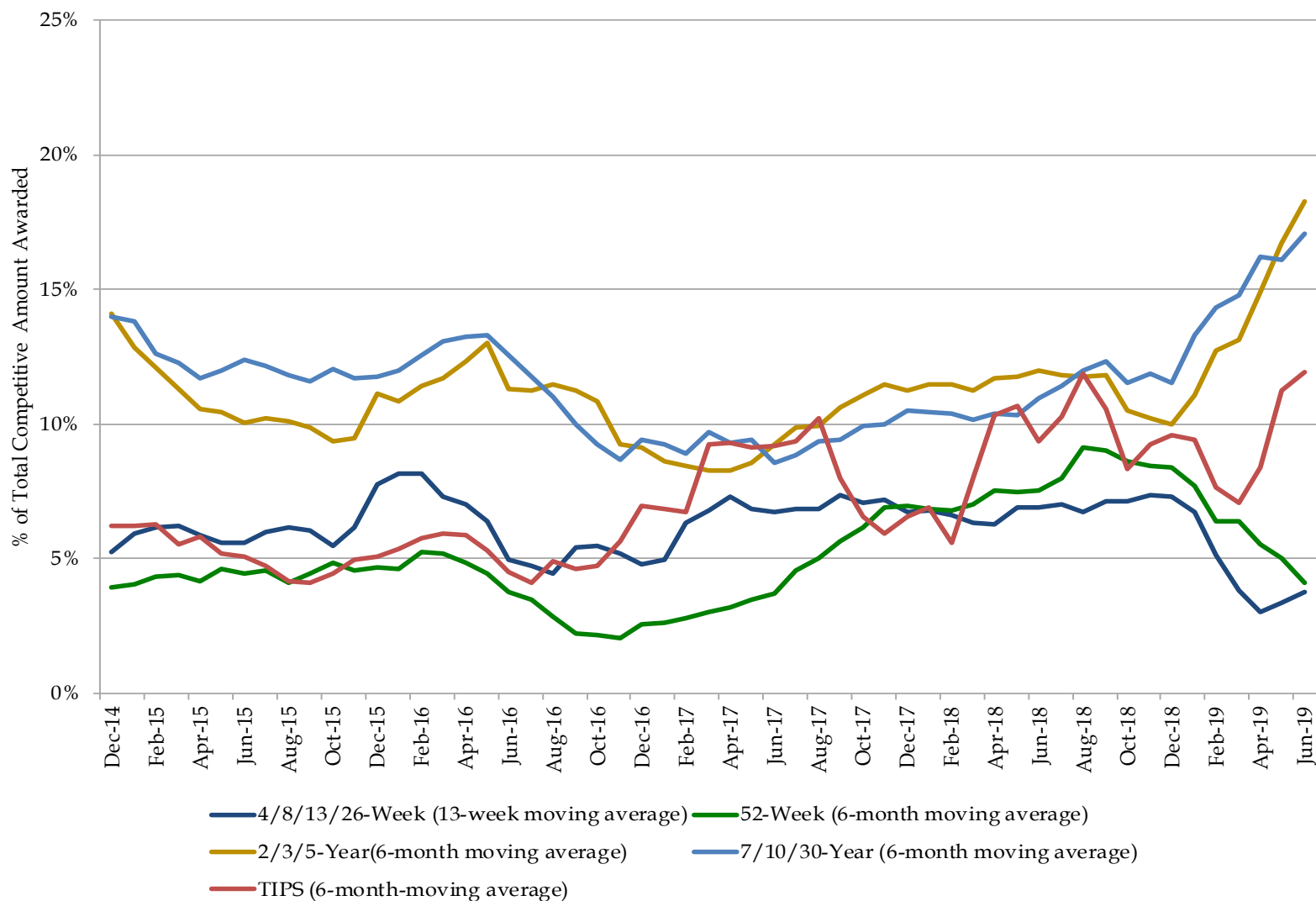
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

## Primary Dealer Awards at Auction



Excludes SOMA add-ons.

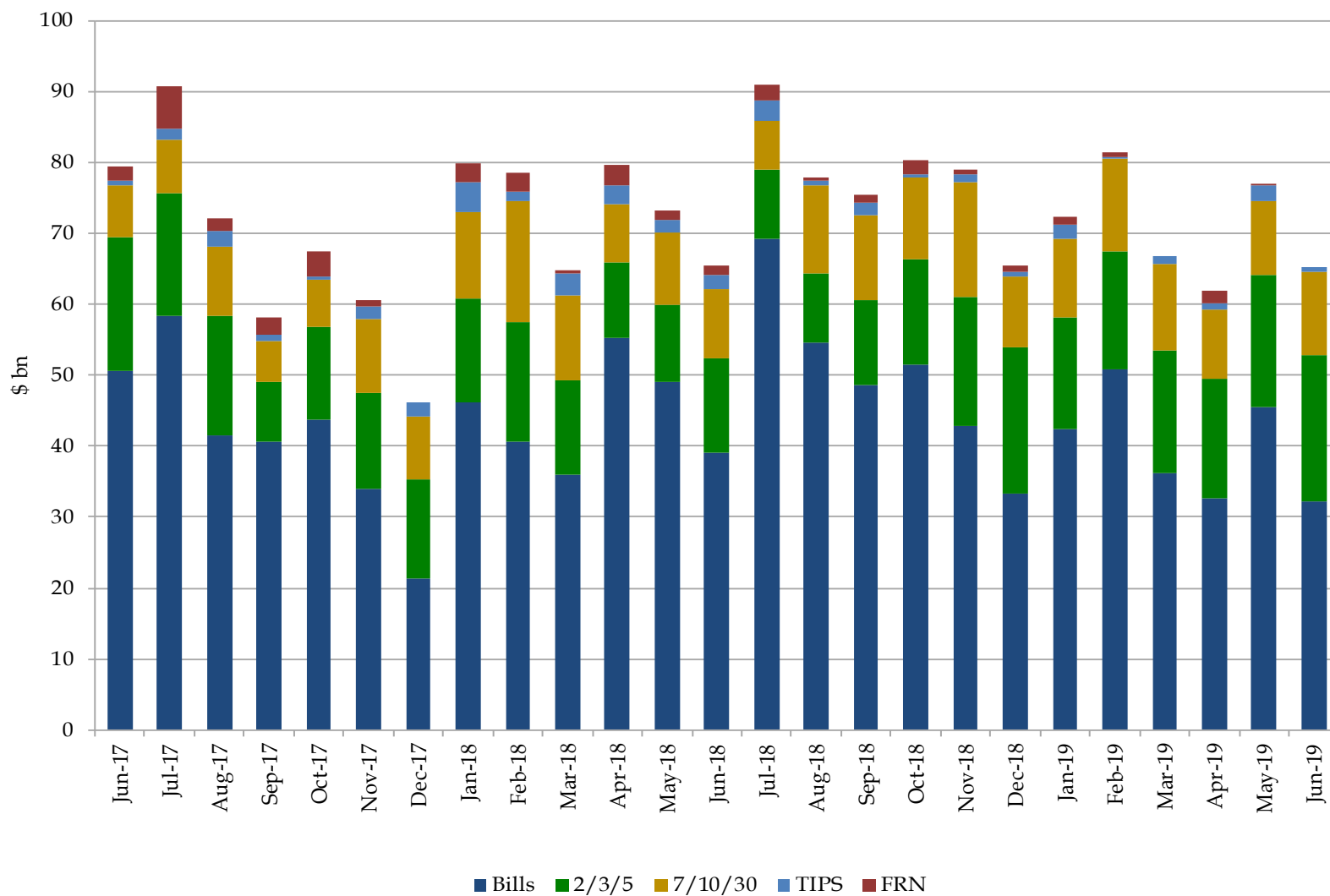
## Direct Bidder Awards at Auction



Excludes SOMA add-ons.

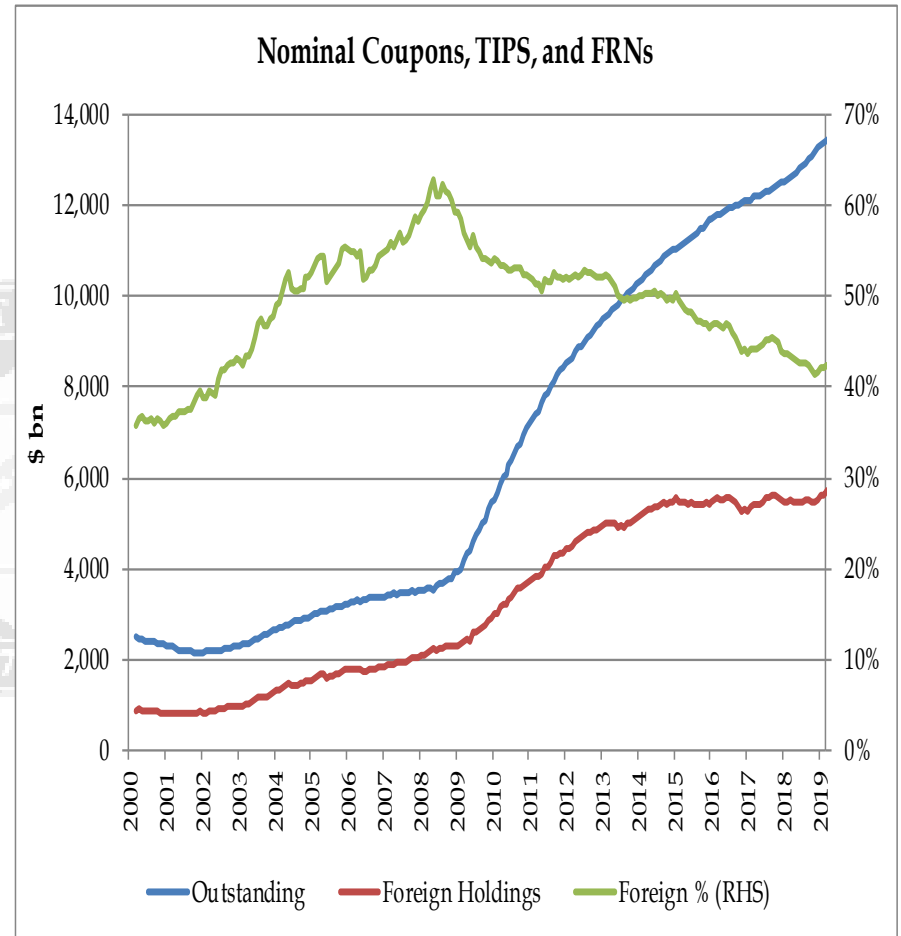
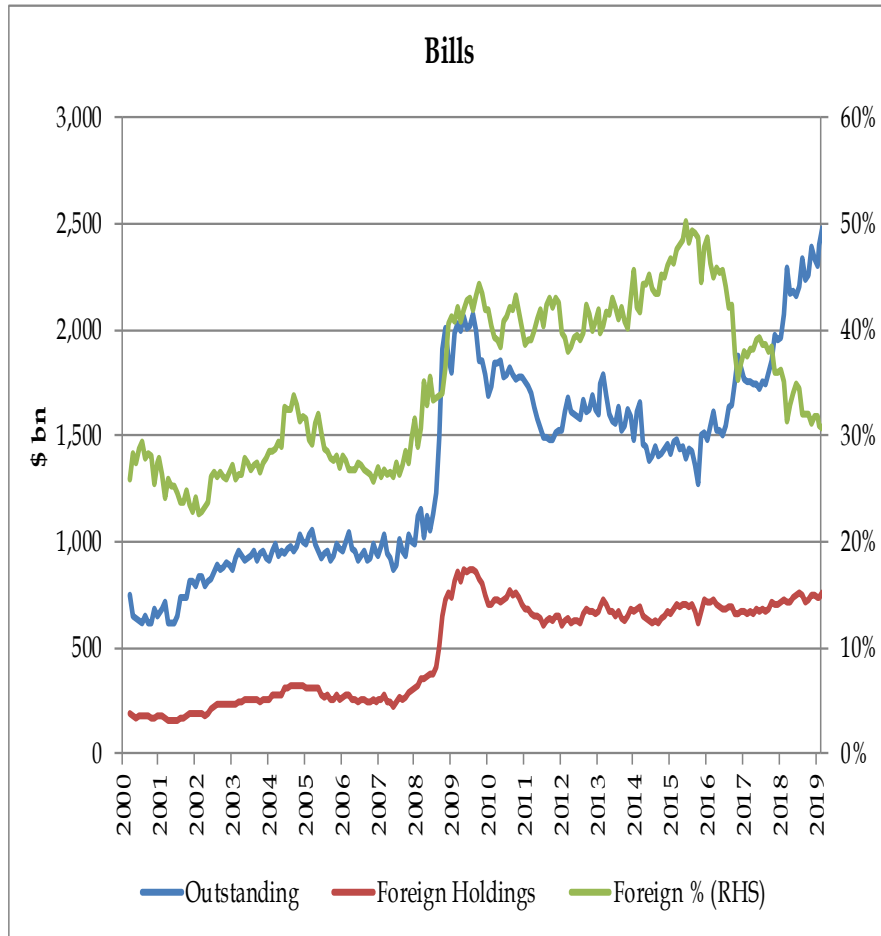


## Total Foreign Awards of Treasuries at Auction, \$ billions



Foreign includes both private sector and official institutions.

# Total Foreign Holdings



Source: Treasury International Capital (TIC) System.

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

# Appendix

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

## Historical Net Marketable Borrowing and Projected Net Borrowing Assuming Future Issuance Remains Constant, \$ billions

Fiscal Year	Bills	2/3/5	7/10/30	TIPS	FRN	Historical/Projected Net Borrowing Capacity	OMB's FY 2020 Mid-Session Review	CBO's "An Analysis of the President's 2020 Budget "	Primary Dealer Survey
2014	(119)	(92)	669	88	123	669			
2015	(53)	(282)	641	88	164	558			
2016	289	(82)	477	64	47	795			
2017	155	9	292	55	9	519			
2018	438	209	316	51	26	1,040			
2019	11	517	256	50	55	889	1,070	871	775
2020	0	461	366	51	34	912	1,112	1,030	1,085
2021	0	318	268	25	0	611	1,082	978	1,140
2022	0	117	374	16	(0)	507	1,030	1,121	
2023	0	142	262	17	5	426	894	1,060	
2024	0	77	242	29	(1)	347	703	940	
2025	0	(47)	313	(51)	(0)	216	659	993	
2026	0	(41)	294	(39)	(3)	211	598	997	
2027	0	4	243	(26)	(2)	219	542	1,077	
2028	0	(15)	247	(55)	3	181	551	1,219	
2029	0	(7)	205	(57)	0	141	266	1,068	

Net borrowing capacity reflects a reduction in SOMA's monthly Treasury redemption cap from \$30 billion to \$15 billion beginning in May 2019 and an end date for SOMA capped redemptions at the end of September 2019, according to the FOMC's "Balance Sheet Normalization Principles and Plans" published on March 20, 2019.

Treasury's latest primary dealer survey estimates can be found on page 11. OMB's projections of the change in debt held by the public are from Table S-11 of "A Budget for a Better America, Fiscal Year 2020, Mid-Session Review," July 2019. CBO's baseline budget projections of the change in debt held by the public are from Table 2 of CBO's "An Analysis of the President's 2020 Budget," May 2019.

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	4/9/2019	2.390	2.96	48.6	51.8	2.8	45.5	1.4	0.0	0.4
4-Week	4/16/2019	2.375	2.88	48.6	51.8	2.5	45.7	1.4	0.0	0.4
4-Week	4/23/2019	2.400	2.61	48.4	53.0	1.9	45.1	1.6	0.0	0.4
4-Week	4/30/2019	2.390	2.72	48.4	56.2	1.8	42.0	1.6	0.0	0.4
4-Week	5/7/2019	2.390	2.70	48.5	56.1	3.3	40.7	1.5	0.0	0.4
4-Week	5/14/2019	2.385	2.83	48.4	56.8	2.5	40.8	1.6	0.0	0.4
4-Week	5/21/2019	2.365	2.85	48.0	56.0	0.8	43.2	2.0	0.0	0.4
4-Week	5/28/2019	2.335	2.53	43.5	64.7	1.7	33.6	1.5	0.0	0.4
4-Week	6/4/2019	2.330	3.02	38.5	64.1	4.0	31.9	1.5	0.0	0.3
4-Week	6/11/2019	2.290	2.75	38.5	52.7	2.7	44.6	1.5	0.0	0.3
4-Week	6/18/2019	2.215	2.88	38.5	65.3	3.4	31.3	1.5	0.0	0.3
4-Week	6/25/2019	2.140	2.86	38.6	60.8	3.0	36.2	1.4	0.0	0.3
4-Week	7/2/2019	2.145	2.74	38.6	66.6	4.1	29.3	1.4	0.0	0.3
8-Week	4/9/2019	2.380	3.35	34.8	54.7	3.2	42.1	0.2	0.0	0.6
8-Week	4/16/2019	2.375	2.99	34.8	66.2	3.2	30.6	0.2	0.0	0.6
8-Week	4/23/2019	2.390	2.95	34.7	61.1	2.5	36.4	0.3	0.0	0.6
8-Week	4/30/2019	2.380	3.29	34.6	56.1	2.5	41.4	0.4	0.0	0.6
8-Week	5/7/2019	2.390	2.70	34.8	66.9	3.6	29.6	0.2	0.0	0.6
8-Week	5/14/2019	2.380	3.05	34.7	58.3	2.7	39.0	0.3	0.0	0.6
8-Week	5/21/2019	2.355	3.10	34.8	57.0	0.9	42.1	0.2	0.0	0.6
8-Week	5/28/2019	2.330	2.53	34.7	80.3	2.4	17.3	0.3	0.0	0.6
8-Week	6/4/2019	2.330	2.74	34.8	73.1	2.5	24.4	0.2	0.0	0.6
8-Week	6/11/2019	2.300	2.73	34.7	64.4	8.7	26.9	0.3	0.0	0.6
8-Week	6/18/2019	2.200	3.12	34.7	45.9	1.8	52.3	0.3	0.0	0.6
8-Week	6/25/2019	2.105	2.98	34.7	48.5	3.3	48.2	0.3	0.0	0.6
8-Week	7/2/2019	2.120	3.17	34.7	42.0	2.9	55.1	0.3	0.0	0.6

\*Weighted averages of competitive awards.

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

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)**
13-Week	4/4/2019	2.380	2.68	43.9	60.9	3.5	35.6	1.1	0.0	1.3
13-Week	4/11/2019	2.375	3.07	40.7	55.7	4.1	40.1	1.3	0.0	1.2
13-Week	4/18/2019	2.380	2.81	40.7	55.4	2.7	41.9	1.3	0.0	1.2
13-Week	4/25/2019	2.400	2.91	40.8	52.9	3.4	43.7	1.2	0.0	1.2
13-Week	5/2/2019	2.385	3.08	37.8	47.1	3.6	49.4	1.2	0.0	1.1
13-Week	5/9/2019	2.380	3.17	37.8	49.7	6.0	44.4	1.2	0.0	1.1
13-Week	5/16/2019	2.360	3.52	37.8	42.4	3.8	53.8	1.2	0.0	1.1
13-Week	5/23/2019	2.335	2.94	34.9	57.3	3.4	39.3	1.1	0.0	1.0
13-Week	5/30/2019	2.310	3.15	34.8	51.0	3.9	45.1	1.2	0.0	1.0
13-Week	6/6/2019	2.300	2.59	35.0	62.2	3.8	34.0	1.0	0.0	1.0
13-Week	6/13/2019	2.240	3.21	34.7	41.6	6.8	51.6	1.3	0.0	1.0
13-Week	6/20/2019	2.170	2.84	34.8	59.4	3.1	37.5	1.2	0.0	1.0
13-Week	6/27/2019	2.085	3.00	34.7	42.3	4.4	53.3	1.3	0.0	1.0
26-Week	4/4/2019	2.380	2.92	37.8	53.9	11.8	34.3	1.2	0.0	2.2
26-Week	4/11/2019	2.395	3.14	34.8	61.3	9.2	29.5	1.2	0.0	2.1
26-Week	4/18/2019	2.390	3.09	34.8	61.8	3.3	34.9	1.2	0.0	2.1
26-Week	4/25/2019	2.400	3.26	34.9	37.0	6.6	56.5	1.1	0.0	2.1
26-Week	5/2/2019	2.395	3.01	34.8	55.6	2.9	41.6	1.2	0.0	2.1
26-Week	5/9/2019	2.380	3.21	35.0	39.4	8.3	52.3	1.0	0.0	2.1
26-Week	5/23/2019	2.340	2.82	34.9	59.3	5.1	35.6	1.1	0.0	2.0
26-Week	5/30/2019	2.320	2.91	35.0	53.4	4.7	41.9	1.0	0.0	2.0
26-Week	6/6/2019	2.255	2.70	35.0	58.7	2.2	39.1	1.0	0.0	2.0
26-Week	6/13/2019	2.140	2.98	35.0	55.3	6.1	38.6	1.0	0.0	2.0
26-Week	6/20/2019	2.130	2.88	35.1	49.4	1.7	48.9	0.9	0.0	2.0
26-Week	6/27/2019	2.030	2.69	35.1	63.6	2.2	34.1	0.9	0.0	2.0
52-Week	4/25/2019	2.360	3.44	25.4	33.7	1.9	64.4	0.6	0.0	3.0
52-Week	5/23/2019	2.280	2.95	25.4	48.6	3.3	48.1	0.6	0.0	2.9
52-Week	6/20/2019	1.985	2.88	25.5	53.0	1.6	45.3	0.5	0.0	2.9
CMB	5/7/2019	2.385	3.27	20.0	64.4	4.9	30.7	0.0	0.0	0.2

\*Weighted averages of competitive awards.

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

Nominal Coupons										
Issue	Settle Date	Stop Out Rate (%)*	Bid-to-Cover Ratio*	Competitive Awards (\$bn)	% Primary Dealer*	% Direct*	% Indirect*	Non-Competitive Awards (\$bn)	SOMA "Add Ons" (\$bn)	10-Year Equivalent (\$bn)**
2-Year	4/30/2019	2.355	2.51	39.7	36.5	15.8	47.7	0.3	0.5	9.2
2-Year	5/31/2019	2.125	2.75	39.6	26.2	27.2	46.6	0.4	4.2	9.8
2-Year	7/1/2019	1.695	2.58	39.6	27.3	24.2	48.5	0.4	2.3	9.4
3-Year	4/15/2019	2.301	2.49	37.8	38.6	18.7	42.7	0.2	0.0	12.7
3-Year	5/15/2019	2.248	2.48	37.9	42.0	20.0	37.9	0.1	12.9	17.2
3-Year	6/17/2019	1.861	2.62	37.7	30.0	13.4	56.6	0.3	0.0	12.5
5-Year	4/30/2019	2.315	2.44	41.0	23.3	15.3	61.5	0.0	0.5	22.8
5-Year	5/31/2019	2.065	2.38	41.0	24.1	18.4	57.5	0.0	4.3	24.3
5-Year	7/1/2019	1.791	2.35	41.0	23.2	19.7	57.1	0.0	2.3	23.5
7-Year	4/30/2019	2.426	2.49	31.9	20.6	19.1	60.4	0.1	0.4	24.3
7-Year	5/31/2019	2.144	2.30	32.0	30.5	11.3	58.3	0.0	3.4	25.9
7-Year	7/1/2019	1.889	2.44	32.0	20.3	24.2	55.5	0.0	1.8	25.2
10-Year	4/15/2019	2.466	2.55	24.0	19.6	12.0	68.4	0.0	0.0	24.0
10-Year	5/15/2019	2.479	2.17	27.0	35.2	11.5	53.3	0.0	9.2	37.5
10-Year	6/17/2019	2.130	2.49	24.0	20.8	13.6	65.6	0.0	0.0	24.0
30-Year	4/15/2019	2.930	2.25	16.0	25.1	14.4	60.5	0.0	0.0	36.5
30-Year	5/15/2019	2.892	2.20	19.0	28.5	11.0	60.5	0.0	6.5	59.7
30-Year	6/17/2019	2.607	2.32	16.0	24.1	15.1	60.8	0.0	0.0	36.8
2-Year FRN	4/30/2019	0.139	2.68	20.0	60.2	1.3	38.5	0.0	0.3	0.0
2-Year FRN	5/31/2019	0.140	2.84	18.0	57.3	2.9	39.8	0.0	1.9	0.0
2-Year FRN	6/28/2019	0.210	3.36	18.0	31.5	0.3	68.2	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)**
5-Year TIPS	4/30/2019	0.515	2.50	16.9	15.8	8.8	75.4	0.1	0.2	9.8
5-Year TIPS	6/28/2019	0.152	2.55	15.0	13.4	10.9	75.7	0.0	0.0	8.1
10-Year TIPS	5/31/2019	0.567	3.07	11.0	13.9	29.1	57.0	0.0	1.2	12.7

\*Weighted averages of competitive awards. FRNs are reported on discount margin basis.

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

# Treasury Cash Balance Policy

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- ▶ In May 2015, Treasury announced that: “To help protect against a potential interruption in market access, Treasury will hold a level of cash generally sufficient to cover one week of outflows in the Treasury General Account, subject to a minimum balance of roughly \$150 billion.”<sup>1</sup>
- ▶ **Policy in practice:** For each business day, Treasury calculates the expected TGA outflows for one week following that day. Over the twelve-month period ending 30 June 2019, the minimum cash need consistent with this policy has averaged \$232 billion, but the top 20% of instances averaged \$365 billion with a maximum of \$489 billion. The expected week of outflows only dipped below \$150 billion (thus reverting to the \$150 billion minimum) on 12% of days in the period.
- ▶ Upon the resolution of the current debt ceiling impasse, a trimmed mean of primary dealer responses indicates that Treasury is anticipated to increase the supply of T-bills outstanding by \$178 billion over the eight-week period following resolution. In comparison, primary dealers estimated market capacity over that period at \$210 billion (trimmed mean).
- ▶ Based on conversations with the primary dealers, Treasury is generally expected to resume meeting its one-week liquidity needs at some point between the receipt of September corporate taxes (mid-month) and the end of September.



# **TBAC – CHARGE**

## **POTENTIAL 1-YEAR FINAL MATURITY**

### **TREASURY FRN**

July 2019

# The Charge

Treasury is actively evaluating the potential introduction of a 1-year final maturity FRN. Treasury is interested in a comparison of a hypothetical introduction of 1-year SOFR FRN or 1-year T-bill FRN, and an increase in 1-year T-bill issuance. Please evaluate how investor demand might vary across these products. Additionally, because any such change would be undertaken as part of Treasury's regular and predictable issuance strategy, please estimate the relative interest cost and risk to Treasury across the interest rate cycle of these three potential product choices.

# Executive Summary

- The Treasury FRN program has been a success, but secondary market trading volumes are lower than other Treasury products
- Growth in Money Market Funds and other cash balances has created demand for increased FRN or bill issuance
- Demand is expected to be highest for a 1-year SOFR FRN relative to a 1-year Bill FRN or a 1-year Bill
- 1-year SOFR FRNs should price in line with 1-year Bill FRNs
- While recent TBAC modeling suggests the current optimal debt mix would increase notes and TIPS issuance, expected investor demand argues for adding a 1-year FRN issuance point
- A 1-year SOFR FRN will allow Treasury to support development of the SOFR issuance market and an orderly transition to new reference rates, while maintaining its lowest cost of financing goal

Given expected demand, pricing and liquidity, Treasury should consider issuing a 1-year SOFR FRN

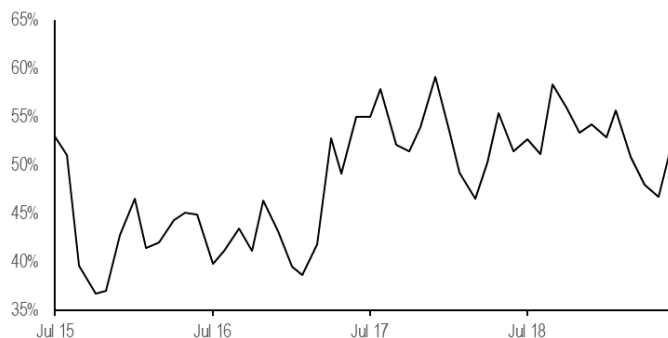
# Agenda

1. Review of Treasury FRN market
2. Alternative One-Year Issuance Strategies
3. Demand
4. SOFR FRNs
5. Treasury Issuance

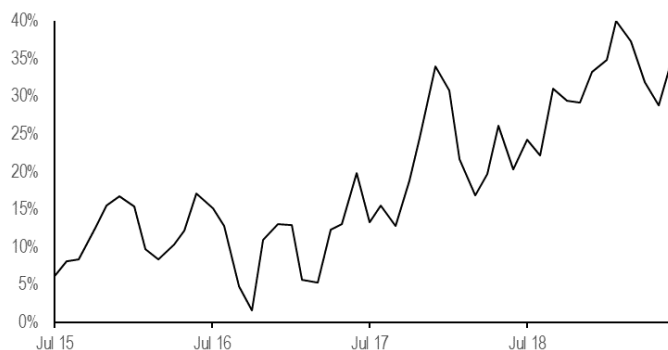
# FRN: Issuance, Demand, Pricing

- The Treasury first introduced a 2-year FRN in January 2014, a 2-year maturity indexed to a 3-month Treasury Bill
  - A total of \$997 billion Treasury FRNs have been issued over the past 5.5 years; \$410 billion remain outstanding; \$56 billion currently issued every quarter
- Auction Statistics:
  - Bid-to-cover ratios for FRNs are similar to bills, and higher than 2-year notes
  - Investment fund participation has grown meaningfully over time
  - Foreign participation has declined over time

3-month moving average of end-user demand at FRN auctions, %

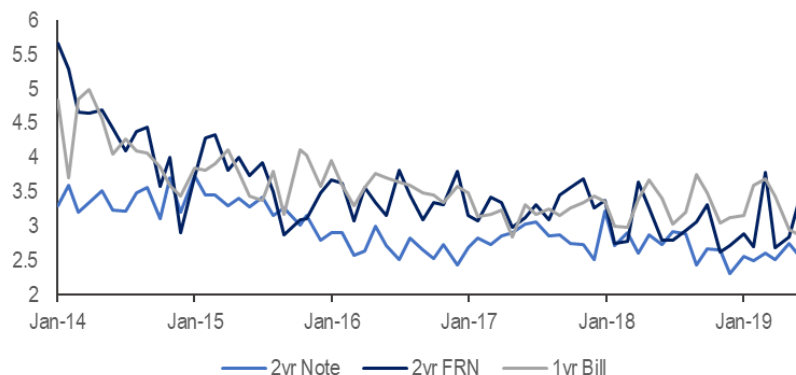


3-month moving average of investment fund demand at FRN auctions, %

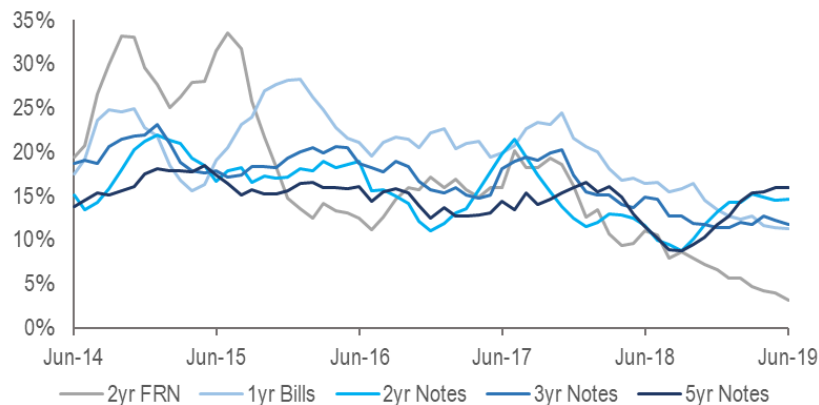


Source: US Department of the Treasury

Historical Bid-to-Cover Ratios



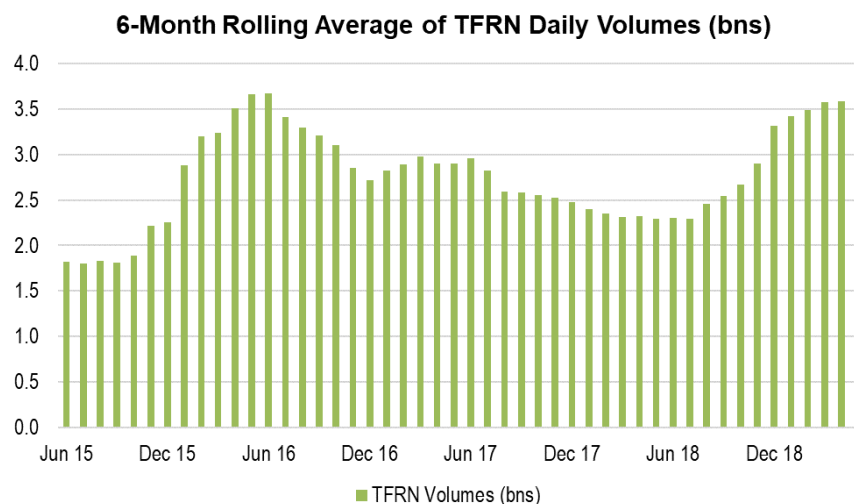
6-Month Rolling Average of Foreign Takedown (%)



Source: Treasury Direct

# FRN: Volumes and Liquidity


- FRNs are less actively traded in the secondary market compared to other Treasury securities
- Average daily FRN trading volumes are ~\$3.5 billion per day, which is ~0.85% of total FRNs outstanding
  - This is lower than the daily turnover of Bills, short coupons, and TIPS (which stand at 6.01%, 2.46%, and 1.30% respectively)
- To date, the majority of buyers of FRNs have been buy-and-hold accounts—Money Market Funds, Banks.
  - Foreign Reserve Managers had interest at inception of the FRN program
- Supply driven volatility of the index may also limit secondary market trading



	2yr FRN	Bills	Coupons <2y	TIPS
6-month ADV (bns)	3.50	135.23	92.33	18.64
Amt Outstanding (bns)	409.80	2250.93	3760.20	1432.46
<b>Daily Turnover (%)</b>	<b>0.85%</b>	<b>6.01%</b>	<b>2.46%</b>	<b>1.30%</b>

Source: SIFMA, Treasury Direct

# Alternative One Year Issuance Strategies

Index	1-year SOFR FRN	1-year T Bill FRN	Increase to 1-year Bills
Existing Product	Yes Mainly GSE issuers	Yes Rolled down 2-year Bill FRN	Yes \$26bn per month
Diversify Funding Costs	Yes	No Underlying index is 3 month T-bill	No
Will likely appeal to money market investors	Yes Provides exposure to overnight rates set daily	Yes Provides exposure to 3m point reset weekly	Partially Narrow demand base given WAM limitations
Expected Funding Capacity	High Expect demand from sec lenders and other cash buyers in addition to 2A7 funds	Medium/High Expect increased demand from 2A7 funds	Medium Possible demand for more frequent 1-year bill issuance vs. increased issuance
Expected Secondary Market Liquidity	Medium Appeal to broader set of investors may lead to better liquidity	Low Comparable liquidity to the 2-year FRN Underlying index subject to supply shocks	High \$135 bn 6-month average daily volume (all bills)
Cycle Performance	DM will widen in an easing cycle and tighten into a hiking cycle  Subject to balance sheet related volatility / spikes	DM will widen in an easing cycle (as bill yields rally) and tighten into a hiking cycle (as bill yields tighten)	Bill yields will rally into an easing cycle and sell off into a hiking cycle
Recommendation: 1-year SOFR FRN	<div>  <div> <b>PROS</b> <ul style="list-style-type: none"> <li>• Broadest appeal</li> <li>• Diversifies funding</li> <li>• Expected secondary market liquidity</li> <li>• Supportive of nascent SOFR market</li> </ul> </div> <div> <b>CONS</b> <ul style="list-style-type: none"> <li>• May cannibalize 2-year bill FRN demand</li> <li>• May impact the repo market and subsequent treasury demand</li> </ul> </div> </div>		

# Alternatives: Pricing Considerations

4/25/19 (On Prior Presentation):

US T-Bills		SOFR Futures	
3m	2.359	SFRH9	2.455
3m3m	2.384	SFRM9	2.395
6m3m	2.252	SFRU9	2.315
9m3m	2.338	SFRZ9	2.238
12mo Px:	2.333	12mo Px:	2.351

7/22/19:

US T-Bills		SOFR Futures	
3m	2.071	SFRM9	2.305
3m3m	2.043	SFRU9	1.945
6m3m	1.781	SFRZ9	1.755
9m3m	1.885	SFRH0	1.570
12mo Px:	1.945	12mo Px:	1.894

Source: Bloomberg

## 1-Year GSE SOFR Deals (YTD)

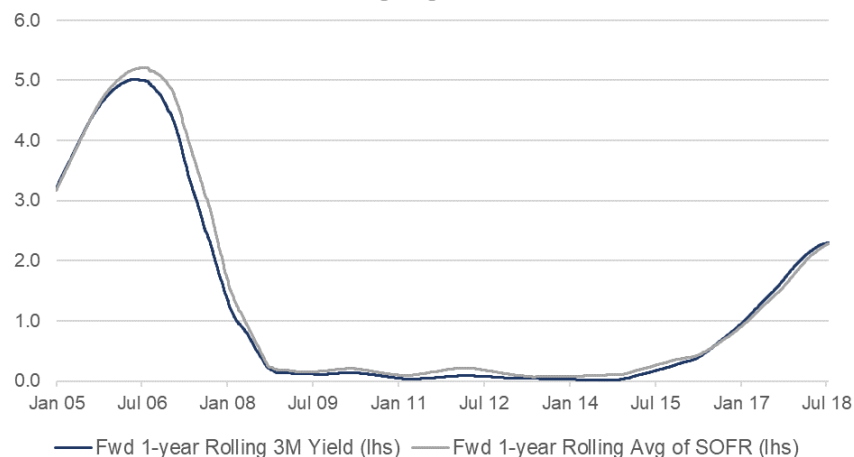
Issuer	Date	Size	Term (yrs)	Level (DM)
FHLB	1/15/2019	1,000,000,000	1	5.0
FFCB	1/29/2019	500,000,000	1	3.0
FHLB	2/19/2019	2,550,000,000	1	3.5
Freddie Mac	2/22/2019	1,000,000,000	1	2.0
FHLB	3/25/2019	4,250,000,000	1	6.5
FHLMC	3/28/2019	565,000,000	1	5.5
FHLMC	4/25/2019	2,250,000,000	1	4
FHLMC	4/26/2019	2,250,000,000	1	4
FHLMC	5/3/2019	1,200,000,000	1	3
FHLB	5/6/2019	2,000,000,000	1	3.5
FHLMC	5/15/2019	1,030,000,000	1	2.5
FHLMC	5/31/2019	2,015,000,000	1	2
FHLB	6/19/2019	3,000,000,000	1	3.5
FHLMC	7/3/2019	2,100,000,000	1	2
FHLMC	7/5/2019	2,375,000,000	1	2
FHLMC	7/9/2019	1,010,000,000	1	2
FHLB	7/15/2019	2,000,000,000	1	3

- Previous TBAC discussions have suggested that SOFR FRN pricing will be in line with Bill FRN pricing
- Updated forward breakeven analysis using SOFR futures market & T-bill market suggests that the breakeven DM spread is more attractive today
  - The difference between the 12 month T-Bill price and the 12 month SOFR price is the DM breakeven for issuance
  - DM on a 1-year SOFR Floater can be 5bps higher than a 1-year Bill Floater (vs. 2bps lower in prior analysis)
  - Currently, 1-year maturity (off-the-run 2-year) 3M Bill TFRNs trade at a 15 DM
  - Therefore, breakeven for a 1-year Treasury SOFR FRN (to be equivalent to current bill FRN) is ~20 DM (15 + 5)
- New issue 1-year GSE SOFR FRNs currently price at a DM of approximately 2-3 (as issues roll down, secondary spreads tighten)
  - The current front end Treasury - GSE spread is ~3-5 bps
- **This suggests good execution on a 1-year SOFR FRN in the current environment**



# Alternatives: Pricing Considerations<sup>1</sup>

Fwd 1-year Rolling Average of 3-month Bills vs. Fwd 1-year Rolling Avg of SOFR



Source: Bloomberg, DTCC

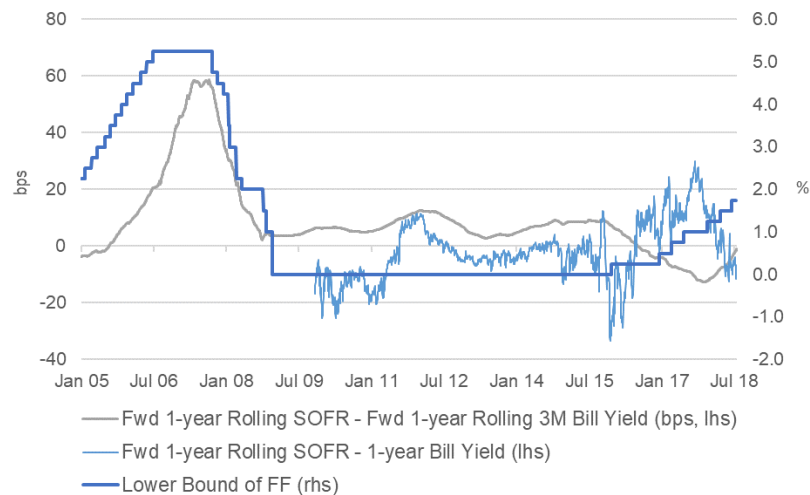
- Realized pricing of 1-year average SOFR rates and 1-year average 3-month bill rates have been relatively stable post GFC
- The breakeven relationship between Bill FRNs and SOFR FRNs is more stable than the spread between realized SOFR funding rates and 1-year bill rates
- Term structure / policy expectations in the front end may play a role in driving investor preferences.
  - Bills are responsive to expected changes in policy, while overnight (GC/SOFR) moves with actual changes in policy
  - Late cycle dynamics may see bill yields move below SOFR. The relationship is most volatile in periods of sudden shifts in central bank policy, i.e. GFC
  - DM on floaters may account for some of this difference
- Balance sheet related stresses may also lead to elevated SOFR levels relative to bills

1-year Bill Yield vs. Forward 1-year Rolling Avg of SOFR



Source: Bloomberg

1Y Realized SOFR vs. 1Y Realized 3M Bill and 1Y Bill Yield

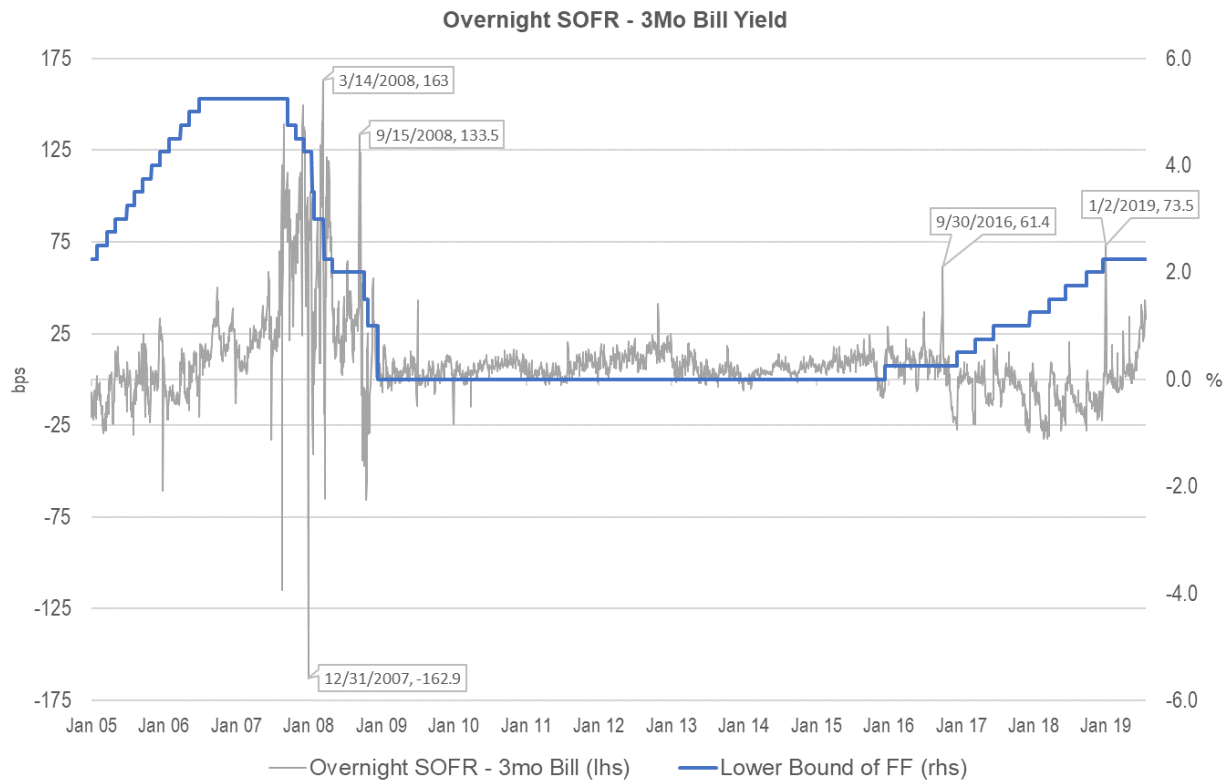


Source: Bloomberg, DTCC

<sup>1</sup> Prior to Aug 2014, DTCC GCF Repo Index was used as a proxy for SOFR. From Aug 2014 to Mar 2018, Fed published indicative SOFR data was used as a proxy for SOFR.

# Alternatives: Pricing Considerations<sup>1</sup>

- The relationship between 3-month bills and SOFR appears relatively stable during periods of stable central bank policy
- Sudden shifts in central bank policy may lead to volatility in the term structure of the front end
- The relationship also appears stretched on quarter ends, suggesting balance sheet considerations introduce additional volatility
- Prior TBAC work estimates the month end impact on SOFR FRNs to be worth 0.25-0.5 bps. More pronounced month end balance sheet constraints may lead to increased cost of a SOFR FRN

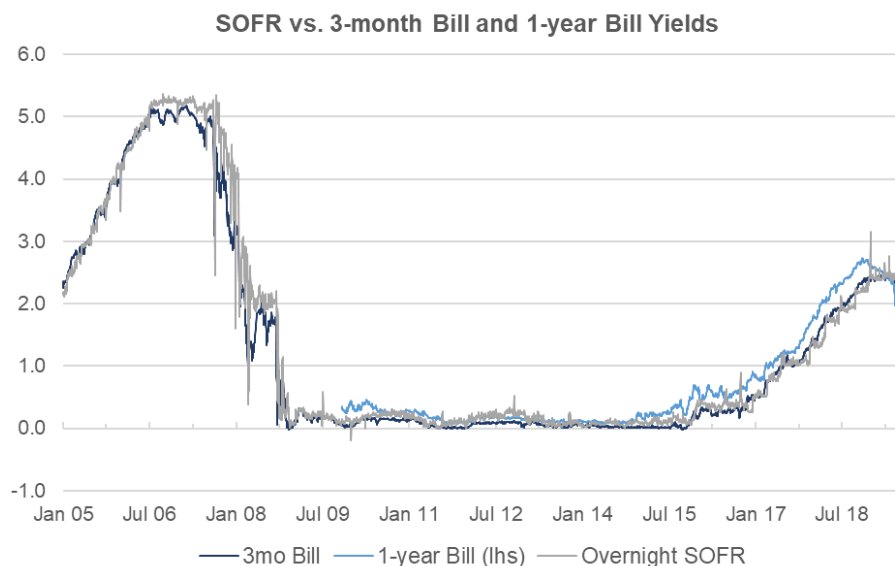


Source: Bloomberg, DTCC

<sup>1</sup> Prior to Aug 2014, DTCC GCF Repo Index was used as a proxy for SOFR. From Aug 2014 to Mar 2018, Fed published indicative SOFR data was used as a proxy for SOFR.

# Alternatives: Diversification of Funding<sup>1</sup>

- Existing FRNs have exposure to an existing Treasury funding rate given they are linked to 3-month bills
- SOFR is influenced by total supply of treasury collateral while 3 month bills are subject to a specific set of supply dynamics
- While the long term relationship may be stable, in any given period there may be different drivers of change
- Changes in SOFR and the treasury curve were most correlated in the GFC
- Changes in SOFR have been uncorrelated to changes in the treasury curve over the past 10 years
  - The average correlation between SOFR and notes has been modestly negative, whereas the average correlation between bills and notes has consistently been positive
  - Low correlation between SOFR and bills has also roughly steady
- Meanwhile, changes in 12-month bills and 3-month bills have been consistently positively correlated



Source: Bloomberg, DTCC

Correlation Matrix: Weekly Change in UST Yields 11/22/2009 to 7/15/2019			
	SOFR	3mo Bill	2Y Govt
SOFR	1.00	0.03	-0.19
GB3 Govt	0.03	1.00	0.25
GB12 Govt	-0.05	0.44	0.69
GT2 Govt	-0.19	0.25	1.00
GT3 Govt	-0.19	0.21	0.94
GT5 Govt	-0.16	0.16	0.88
GT7 Govt	-0.14	0.15	0.79
GT10 Govt	-0.15	0.15	0.73
GT30 Govt	-0.14	0.12	0.57

Source: Bloomberg

<sup>1</sup> Prior to Aug 2014, DTCC GCF Repo Index was used as a proxy for SOFR. From Aug 2014 to Mar 2018, Fed published indicative SOFR data was used as a proxy for SOFR.

# Demand: Summary

- Increasing 1-year bill issuance will not bring in new demand – the buyer of marginal bill supply is an existing bill buyer
- A new 1-year FRN will likely see demand from **2a7 Funds (Government Money Market and Prime Funds)**:
  - Under regulatory rules, 2A7 funds need to keep 30% of their assets in 7-day liquidity, most carry significantly more Government assets (including FRNs) count under that limit
  - However, they also have a 60-day WAM and a 120-day WAL rule
    - 2yr securities (including 2yr FRNs) consume a lot of WAL even though FRNs have a 1-day WAM
    - Therefore, a 1-year FRN will be much more attractive for these funds
  - 2A7 funds will have demand but are price sensitive
- A new 1-year FRN linked to SOFR will see new demand from:
  - **Securities lending participants**
    - Market is \$500-700bn
    - A 5-10% allocation to Treasury SOFR FRNs could be up to \$70 billion of new demand
    - They lend at OBFR and need a good asset-liability match for the collateral
      - Current inversion of the curve is particularly challenging
    - Portfolio WAL limits make a 1-year FRN more attractive than a 2-year FRN
  - **Investors looking for a repo / cash alternative**
    - Buy-side firms unable to participate in repo
    - Corporate Treasury accounts not set up to trade repo
    - Risk-averse cash investors are the main buyers of FRNs, rather than bill buyers

Diversifying the investor base should improve secondary market liquidity

Better secondary market liquidity should in turn generate additional demand, as investors typically consider secondary liquidity when making portfolio allocation decisions

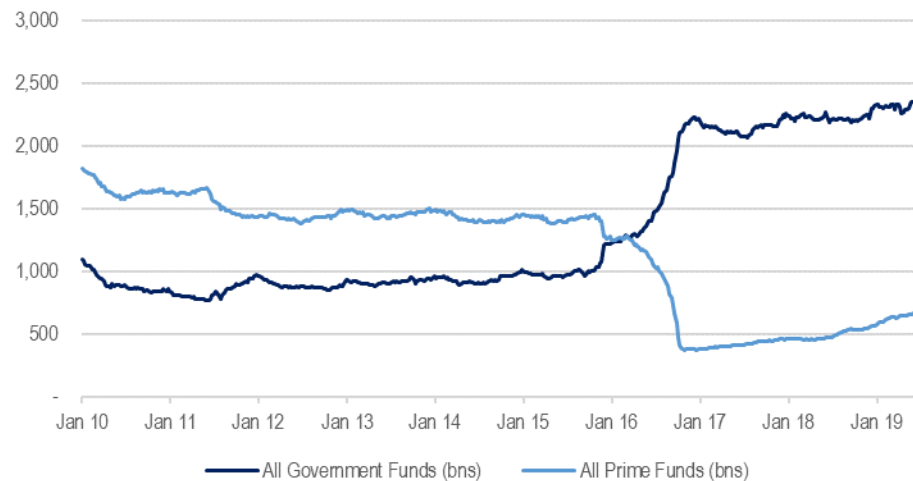
# Demand: Money Market Fund Growth

Total AUM of Taxable Money Market Funds (bns)



- Total Taxable MMFs have grown by \$700 Billion since introduction of FRNs in January 2014
- Government-only MMFs have grown by \$1.4 Trillion in that same time frame
- Money market reform caused an influx of money into Government Money Market Funds
  - This flow is not expected to reverse
- 2A7 Regulations require MMF to keep 30% of their assets in 7-day liquidity, keep the WAL under 120 days and WAM under 60 days

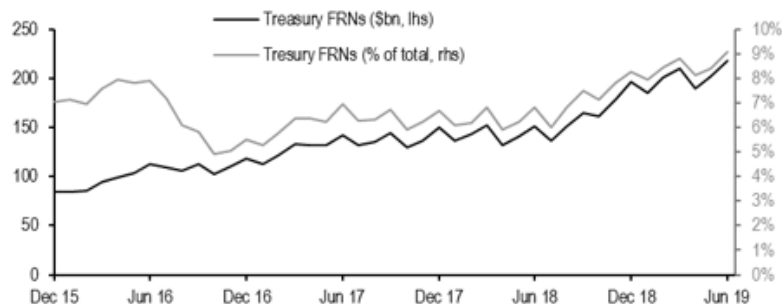
AUM of Taxable Government vs. Prime Funds



Source: <https://www.ici.org/research/stats/mmfs>

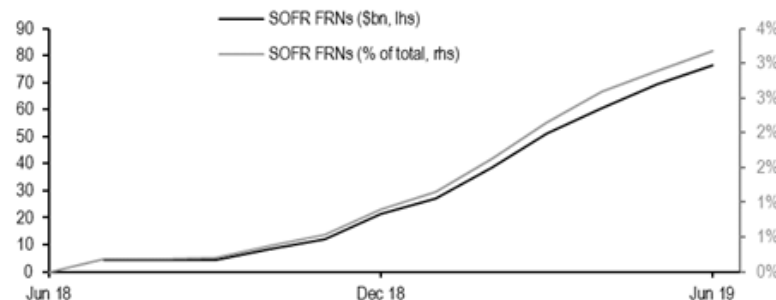
# Demand: Asset Allocations of MMFs

**TFRNs held by Government MMFs**



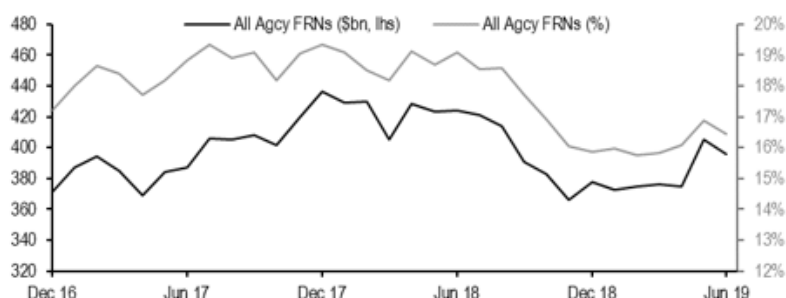
Source: Crane Data, J.P. Morgan

**SOFR FRNS held by Government MMFs**



Source: Crane Data

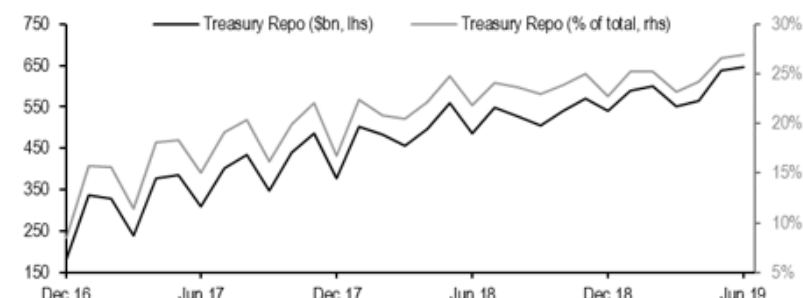
**GSE FRNS held by Government MMFs**



Source: Crane Data

- Government MMFs own \$218 billion Treasury FRNs (53.2% of outstanding) and \$396 billion GSE floaters
- Treasury FRNs now represent 9.1% of government MMF AUM
  - The maturity is the binding constraint
  - The demand for a 1-year FRN could be meaningfully larger than the demand for a 2-year FRN given the shorter WAL
- Treasury Repo allocations have grown to \$647 billion and could be the source of additional SOFR FRN demand
  - May help MMF more effectively manage repo balances which could create a positive feedback loop
  - Reduces counterparty risk
- MMFs already own \$76.5 Billion of GSE SOFR FRNs

**UST Repo held by Government MMFs**



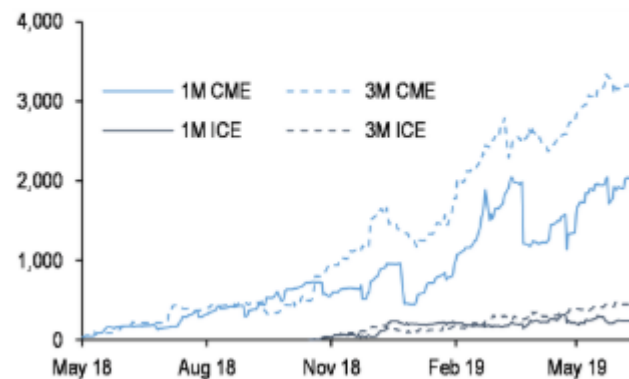
Source: Crane Data

# SOFR FRNs: SOFR Futures and Swap Volumes Growing

- Liquidity in SOFR derivatives continues to improve
  - On the exchange-traded side, open interest in SOFR futures has been steadily increasing, particularly in CME futures, with little sign of disruption following a short-lived contraction around year-end 2018 (JPM)
  - Transaction volumes in OTC SOFR derivatives have also been rising in a commensurate manner, with basis and outright SOFR trades increasingly occurring around the 2 to 3-year points (JPM)
  - The average notional on all SOFR OTC trades has increased by ~150% since the market began trading nearly a year ago, with the average trade size in recent months of around \$400mn (JPM)

**Exhibit 8: SOFR futures open interest continues to build, particularly in CME contracts**

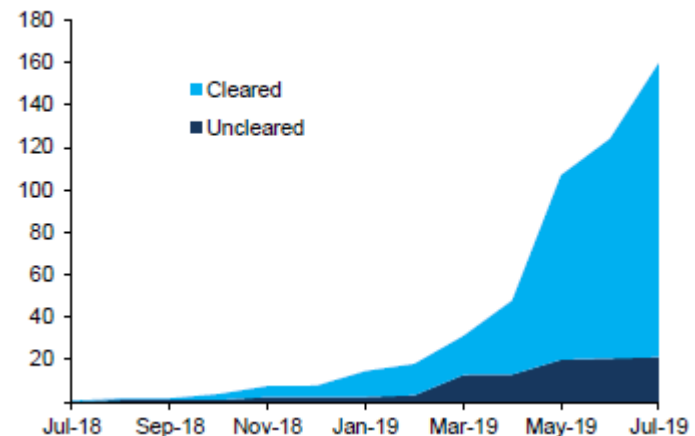
Open interest in ICE and CME SOFR futures; \$mn/bp



Source: J.P. Morgan, CME, ICE

**SOFR Swap Volumes**

Cumulative; \$bn



Source: Credit Suisse, Bloomberg (SDR)

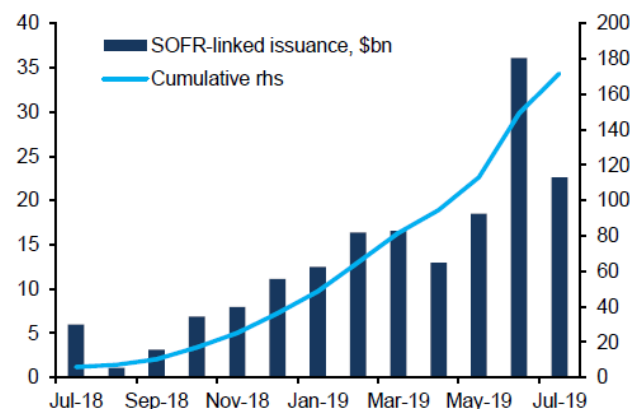
# SOFR FRNs: Existing Market

- SOFR-linked issuance has continued to grow—total SOFR-linked issuance to date is over \$170 Billion
- GSEs are the largest SOFR FRN issuers, accounting for \$139bn (82%) of the issuance
- Since the first GSE SOFR FRN issuance on 7/26/2018, 29% of agency floater issuance has been in SOFR
  - FHLMC and FNMA have switched their floating rate issuance to SOFR , while FHLB is still migrating from LIBOR to SOFR
  - FHLB is the largest issuer of SOFR floaters
  - \$101.1bn (73%) of issuance has been in <1yr maturities
- 76.5bn of SOFR-linked FRNs are held by government MMFs, a large majority of the outstanding SOFR-linked FRN universe

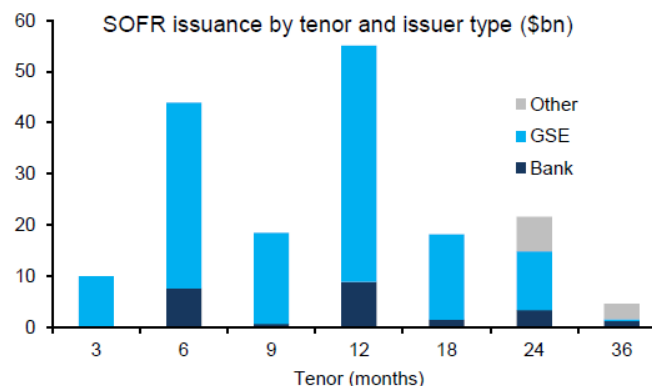
Total GSE FRN Issuance		
1-mo LIBOR	263,653,000,000	54.7%
SOFR	138,715,000,000	28.8%
3-mo LIBOR	62,104,000,000	12.9%
3-mo Bill	5,575,000,000	1.2%
Prime Rate	6,441,000,000	1.3%
Fed Funds	5,130,000,000	1.1%
<b>Total</b>	<b>481,618,000,000</b>	<b>100.0%</b>

Total GSE FRN Issuance <1yr		
1-mo LIBOR	197,083,000,000	56.5%
SOFR	101,111,000,000	29.0%
3-mo LIBOR	49,360,500,000	14.1%
Fed Funds	775,000,000	0.2%
3-mo Bill	175,000,000	0.1%
Prime Rate	440,000,000	0.1%
<b>Total</b>	<b>348,944,500,000</b>	<b>100.0%</b>

Source: Bloomberg



Source: Credit Suisse, Bloomberg



Source: Credit Suisse, Bloomberg



# SOFR FRNs: Structure

Investors and dealers alike are looking for standardization of the SOFR FRN market

There are a number of structural conventions and considerations:

- Simple vs. compound interest
- Mid-month vs end-of-month auction settlement/maturity
- Re-openings vs monthly new issues
- Interest rate reset process (look-back, coupon lockout, etc.)

	SOFR FRNs		
	GSE	Bank	SSA
<b>Simple Avg vs. Daily Compounding</b>	Simple Average	Daily Compounding	Daily Compounding
<b>Payment Date</b>	Interest period end date	Varies (interest period end date or two business days following)	Interest period end date
<b>Lookback</b>	1 business day, with weekends and holidays looking back to previous business day	Varies (0-2 business days)	5 business days
<b>Coupon Lockout</b>	Generally 2 business days	Varies (none, or 2 days only on the final interest period)	None
<b>Day Count Convention</b>	Actual/360	Actual/360	Actual/360

## Key Terms

**Averaging Method:** An average of daily SOFR rates referenced in FRNs can either be calculated by using a simple or a compound average

**Payment Date:** Payment dates can occur after interest period concludes

**Lookback:** The SOFR rate used to calculate a rate for each day is based on a SOFR rate for a prior day

**Coupon Lockout:** A single daily SOFR rate is repeated for several days going into the end of an interest period

# Treasury Issuance: 2-year Treasury FRN

2-year FRNs are auctioned as new issues in January, April, July, and October. They are also auctioned as reopenings in February, March, May, June, August, September, November, and December. The reopened security has the same maturity date, spread, and interest payment dates as the original security, but has a different issue date and usually a different price.

- **Maturity:** 2 years
- **Coupon:** Floating
- **Payment Frequency:** Quarterly
- **Reference Index:** The High Rate from the most recent 13-week Treasury bill auction (typically Thursday)
- **Reset Frequency:** Daily
- **Interest calculation:** Index Rate computed from most recent 13-week bill, plus the Spread, divided by 360
- **Averaging Method:** Simple Average
- **Lock out period:** Two business days preceding an FRN Issue Date or an FRN interest date  
*A 13-week Treasury bill auction whose rate becomes effective in the two business day Lock-Out Period prior to an FRN Issue Date or FRN Interest Date shall be ignored for purposes of calculating the interest accrual on that FRN for that day. Instead, the rate in effect for the Lock-Out Period will be from the most recent 13-week Treasury bill auction result that occurred prior to the start of the Lock-Out Period.*
- **Day Count:** Actual/360
- **Issue Date:** Original issues will be on the last calendar day of the month or first business day after; reopenings will be issued on the last Friday of a month or first business day after.
- **Dated Date:** Last calendar day of the month

<https://treasurydirect.gov/instit/statreg/auctreg/2013-18178.pdf>

# Treasury Issuance: Sample 1-year SOFR FRN

- **Consultation with Primary Dealers and end users is recommended before finalizing issuance terms and auction schedule**
- **In an April 2019 report the Alternative Reference Rate Committee (ARRC) highlights daily compounding as an averaging method:**
  - “Issuers and lenders will face a technical choice between using a *simple* or a *compound* average of SOFR as they seek to use SOFR in cash products. In the short-term, using simple interest conventions may be easier since many systems are already set up to accommodate it. However, compounded interest would more accurately reflect the time value of money, which becomes a more important consideration as interest rates rise, and it can allow for more accurate hedging and better market functioning.”
- **Daily Compounding also allows for greater alignment with the derivatives markets**
  - **Maturity:** 1 year
  - **Coupon:** Floating
  - **Payment Frequency:** Quarterly
  - **Reference Index:** SOFR, published daily by the Fed
  - **Reset Frequency:** Daily
  - **Interest Calculation:** SOFR, plus the Spread, divided by 360
  - **Averaging Method:** Daily Compounding
  - **Lock Out Period:** Two business days preceding an FRN Issue Date or an FRN interest date
  - **Lookback:** 1 business day, with weekends and holidays looking back to previous business day
  - **Day Count:** Actual/360
  - **Issue Date:** Original issues will be on the 15<sup>th</sup> of the month or first business day after
  - **Dated Date:** 15<sup>th</sup> calendar day of the month
  - **Interest Payment Date:** On the interest period end date