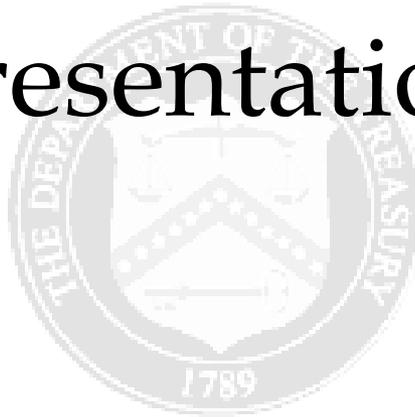


# Treasury Presentation to TBAC



# Office of Debt Management



Fiscal Year 2017 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. Eleven 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
III.	Financing	
	A. Sources of Financing	p. 15
	B. OMB's Projections of Net Borrowing from the Public	p. 17
	C. Interest Rate Assumptions	p. 18
	D. SOMA Normalization Impact on Net Marketable Borrowing	p. 19
IV.	Portfolio Metrics	
	A. Weighted Average Maturity of Marketable Debt Outstanding with Projections	p. 23
	B. Maturity Profile	p. 24
V.	Demand	
	A. Summary Statistics	p. 29
	B. Bid-to-Cover Ratios	p. 30
	C. Investor Class Awards at Auction	p. 35
	D. Primary Dealer Awards at Auction	p. 39
	E. Direct Bidder Awards at Auction	p. 40
	F. Foreign Awards at Auction	p. 41

# Section I: Executive Summary



# Highlights of Treasury's August 2017 Quarterly Refunding Presentation to the Treasury Borrowing Advisory Committee (TBAC)

## Receipts and Outlays

- Fiscal year-to-date, total receipts are up by 2 percent driven mainly by individual income and payroll taxes which increased by \$65 billion.
- Fiscal year-to-date, total outlays are up by 6 percent driven mainly by an increase of \$102 billion over these 4 categories: Health and Human Services (HHS), Treasury outlays for inflation accruals, Social Security Administration (SSA), and Education.

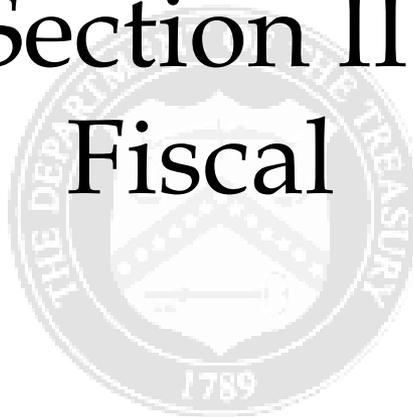
## Sources of Financing

- Based on the Quarterly Borrowing Estimate, Treasury's Office of Fiscal Projections currently projects a net marketable borrowing need of \$96 billion for Q4 FY 2017, with an end-of-September cash balance of \$60 billion. For Q1 FY 2018, the net marketable borrowing need is projected to be \$501 billion, with an end-of-December cash balance of \$360 billion.

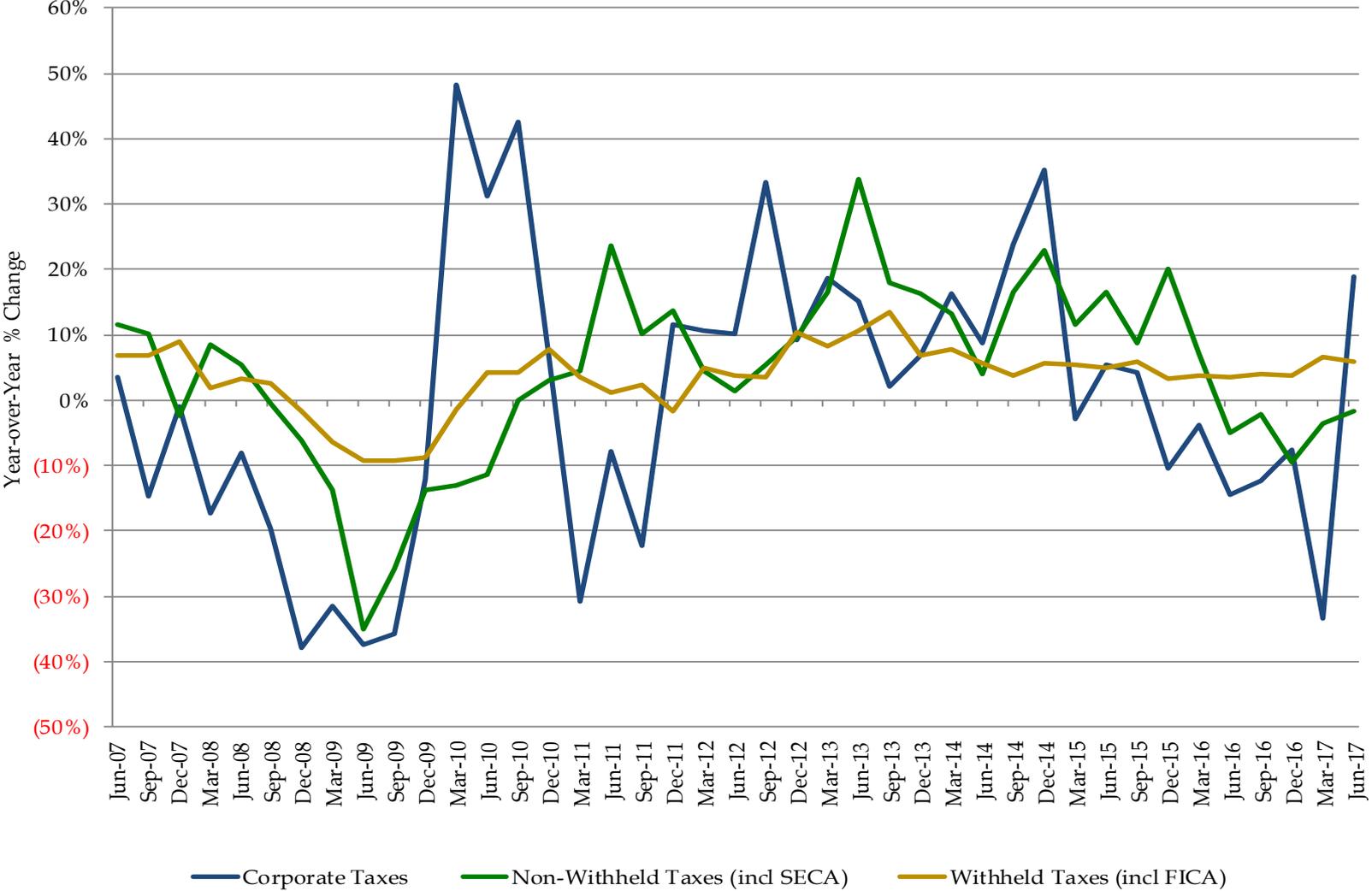
## Projected Net Marketable Borrowing

- Treasury continues to analyze and model various scenarios to address potential funding needs based on deficit forecasts and expectations for SOMA Treasury redemptions.
- Assumptions include full SOMA reinvestments until October 2017, followed by SOMA capped redemptions until the second half of 2021. These assumptions are based on the June FOMC addendum to the Policy Normalization Principles and Plans and expectations from the FRB-NY June 2017 Survey of Primary Dealers and the July projections for the SOMA portfolio.

# Section II: Fiscal

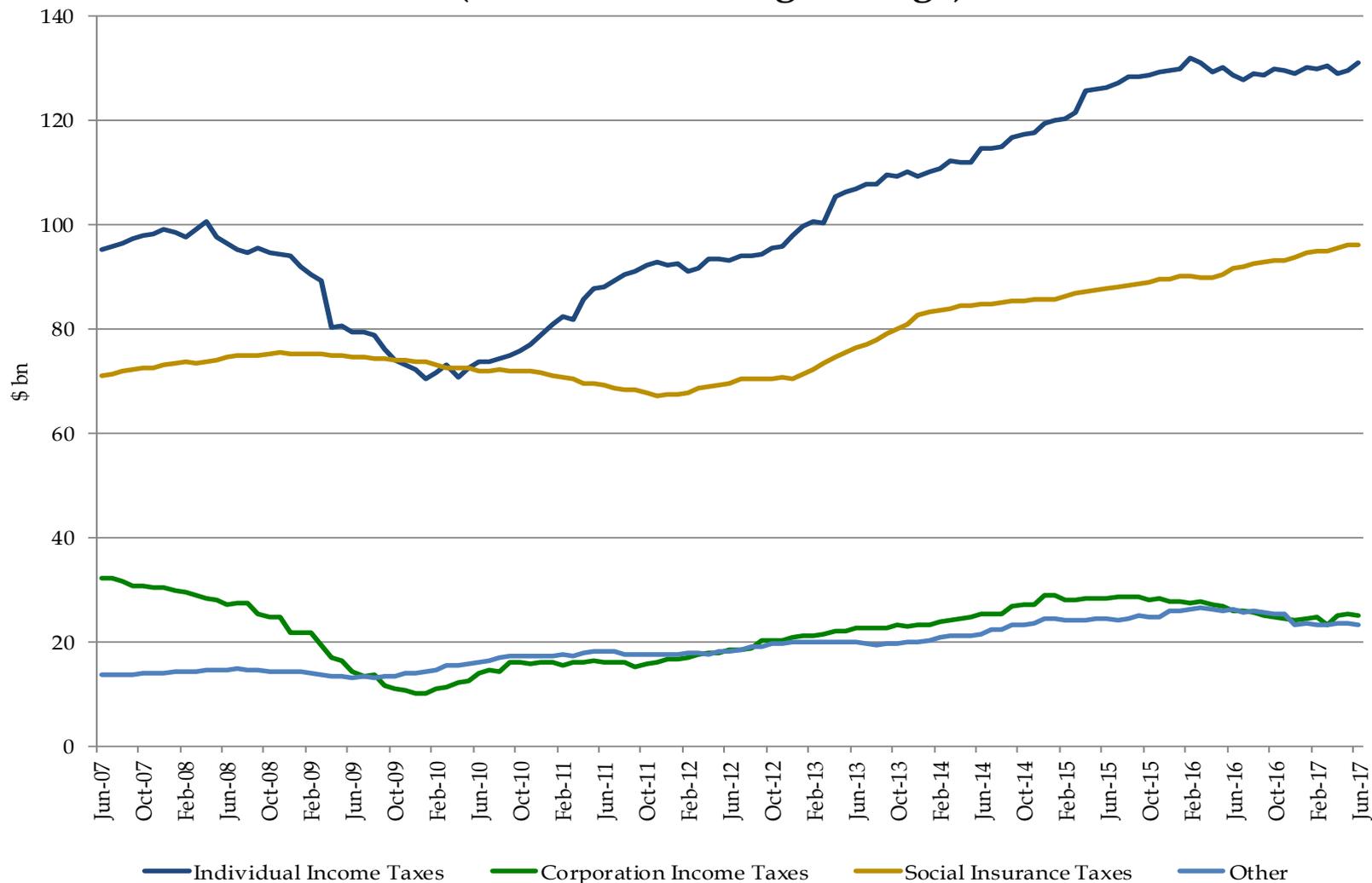


# Quarterly Tax Receipts



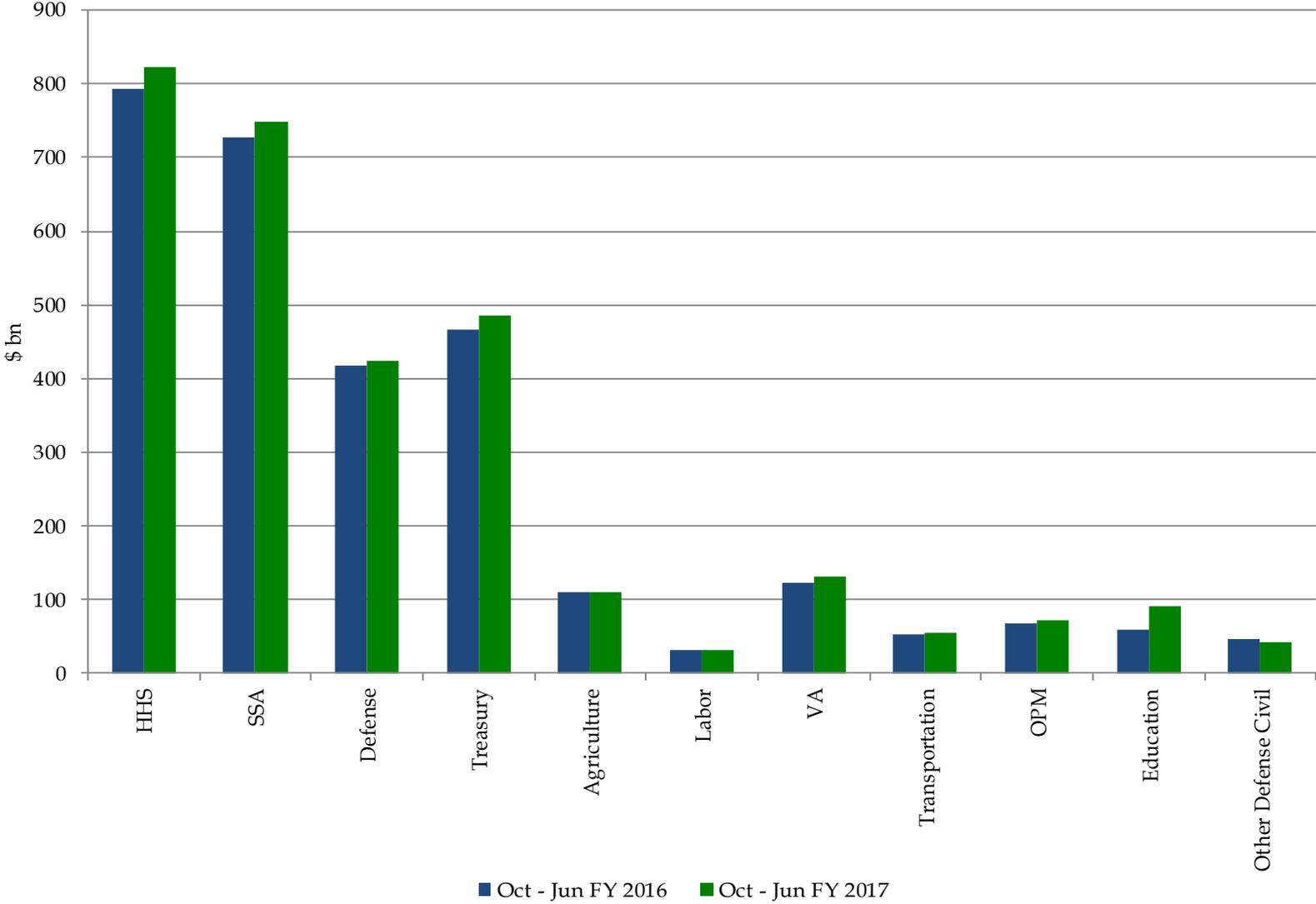
Source: United States Department of the Treasury

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



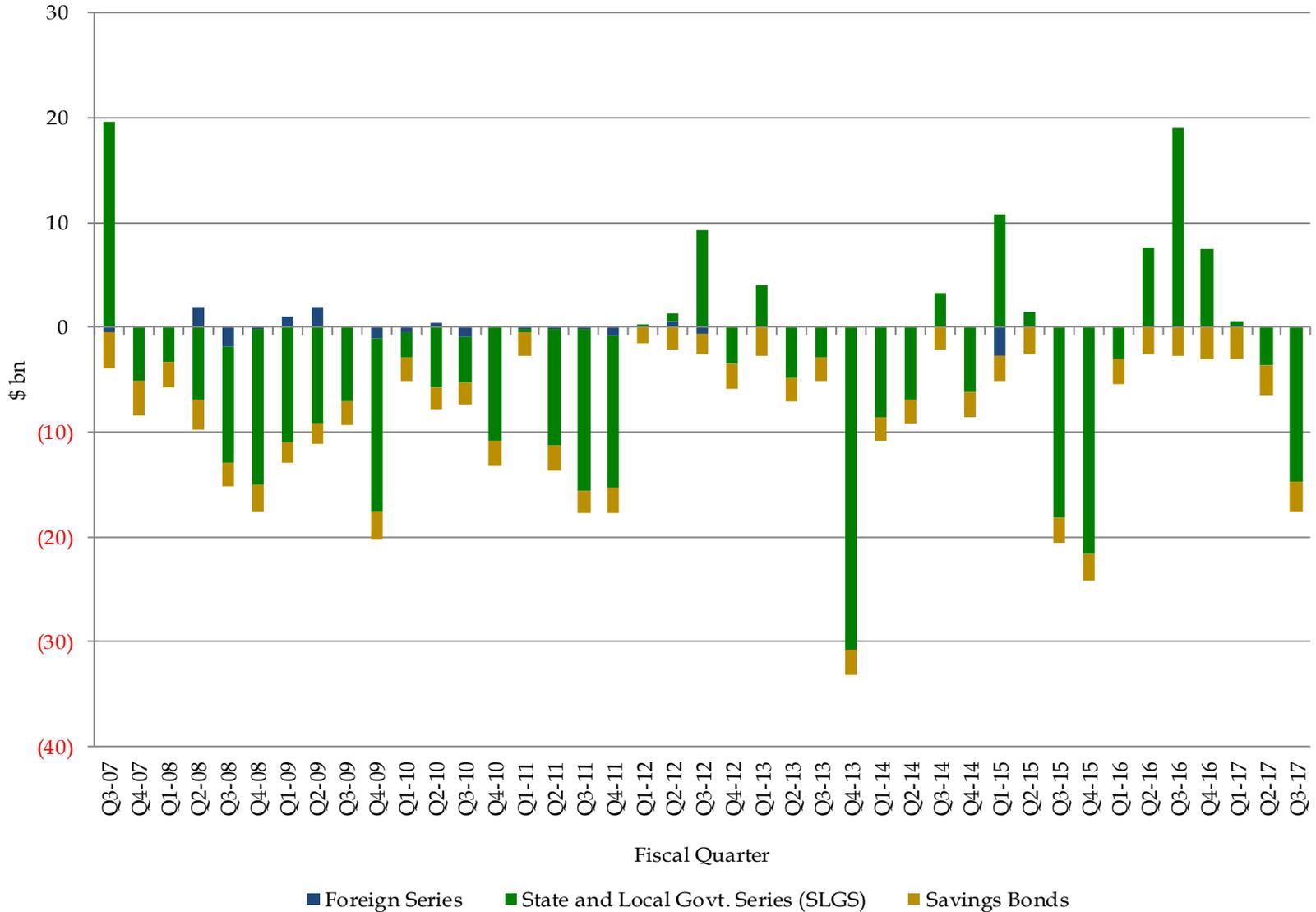
Individual Income Taxes include withheld and non-withheld. Social Insurance Taxes include FICA, SECA, RRTA, UTF deposits, FUTA and RUIA. Other includes excise taxes, estate and gift taxes, customs duties and miscellaneous receipts.  
 Source: United States Department of the Treasury

# Eleven Largest Outlays

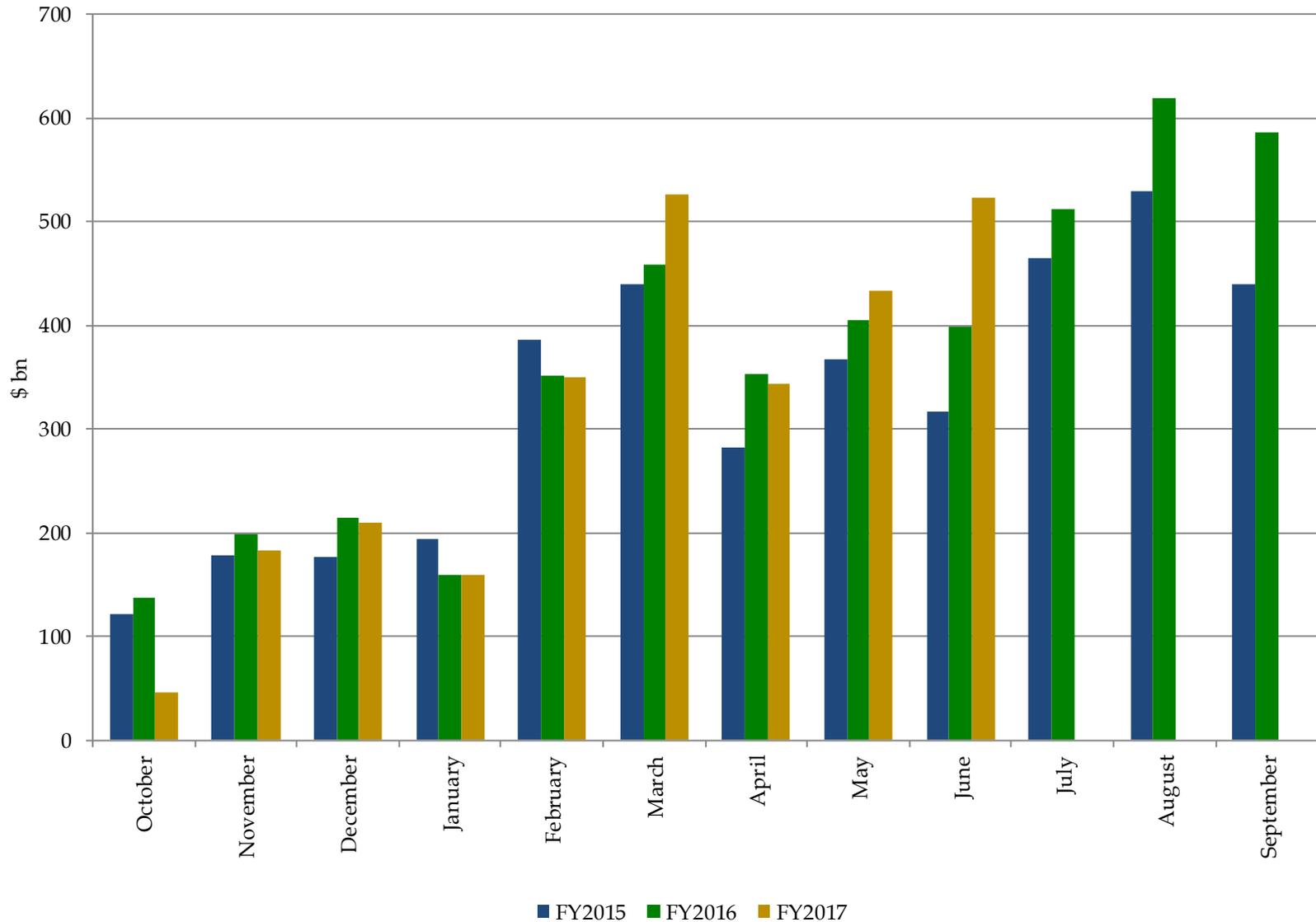


Source: United States Department of the Treasury

# Treasury Net Nonmarketable Borrowing



## Cumulative Budget Deficits by Fiscal Year



## FY 2017-2019 Deficits and Net Marketable Borrowing Estimates

In \$ billions

	Primary Dealers <sup>1</sup>	CBO <sup>2</sup>	CBO <sup>3</sup>	OMB <sup>4</sup>
FY 2017 Deficit Estimate	664	693	693	602
FY 2018 Deficit Estimate	690	563	593	440
FY 2019 Deficit Estimate	789	689	689	526
FY 2017 Deficit Range	559-720			
FY 2018 Deficit Range	550-875			
FY 2019 Deficit Range	650-980			
FY 2017 Net Marketable Borrowing Estimate	544	488	488	426*
FY 2018 Net Marketable Borrowing Estimate	855	881	912	529**
FY 2019 Net Marketable Borrowing Estimate	891	745	748	604
FY 2017 Net Marketable Borrowing Range	373-895			
FY 2018 Net Marketable Borrowing Range	550-1130			
FY 2019 Net Marketable Borrowing Range	670-1100			
Estimates as of:	Jul-17	Jun-17	Jul-17	May-17

<sup>1</sup>Based on primary dealer feedback on July 24, 2017. Estimates above are averages.

<sup>2</sup>Summary Table 1 of CBO's "An Update to the Budget and Economic Outlook: 2017 to 2027"

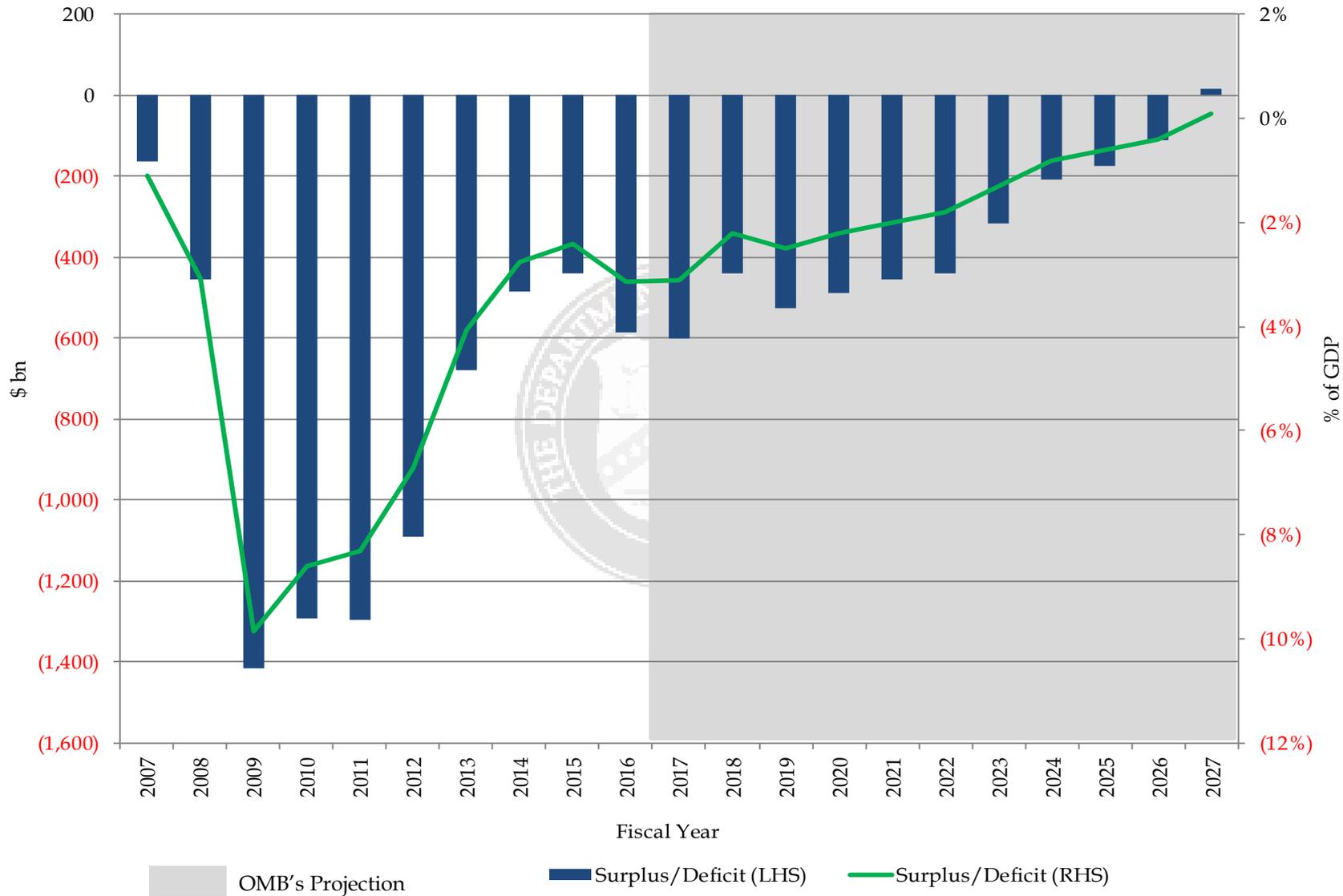
<sup>3</sup>Table 1 and 2 of CBO's "An Analysis of the President's 2018 Budget"

<sup>4</sup>Table S-10 of OMB's "Budget of the United States Government, Fiscal Year 2018"

\* OFP's FY 2017 Net Marketable Borrowing Estimate.

\*\*The "Budget of the U.S. Government Fiscal Year 2018" assumes an end-of-September cash balance target of \$350 billion. Given that OFP's FY2017 Net Marketable Borrowing Estimate assumes an end-of-September cash balance target of \$60 billion, the combined FY2017-18 figure would be \$290 billion higher in an equivalent comparison.

# Budget Surplus/Deficit



Projections are from Table S-10 of "Budget of The U.S. Government Fiscal Year 2018."

# Section III: Financing



## Assumptions for Financing Section (pages 15 to 20)

- Portfolio and SOMA holdings as of 06/30/2017.
- Full SOMA reinvestments until October 2017, followed by SOMA capped redemptions until the second half of 2021. These assumptions are based on the June FOMC addendum to the Policy Normalization Principles and Plans and expectations from the FRB-NY June 2017 Survey of Primary Dealers and the July projections for the SOMA portfolio.
- Assumes announced issuance sizes and patterns constant for nominal coupons, TIPS, and FRNs as of 06/30/2017, while using an average of ~\$1.7 trillion of bills outstanding.
- The principal on the TIPS securities was accreted to each projection date based on market ZCIS levels as of 06/30/2017.
- No attempt was made to match future financing needs.



## Sources of Financing in Fiscal Year 2017 Q3

April - June 2017	
Net Bill Issuance	(39)
Net Coupon Issuance	74
<b>Subtotal: Net Marketable Borrowing</b>	<b>35</b>
Ending Cash Balance	181
Beginning Cash Balance	92
<b>Subtotal: Change in Cash Balance</b>	<b>89</b>
<b>Net Implied Funding for FY 2017 Q3*</b>	<b>(54)</b>

Security	April - June 2017 Bill Issuance			Fiscal Year-to-Date Bill Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
4-Week	640	670	(30)	1,843	1,843	0
13-Week	507	450	57	1,462	1,457	5
26-Week	429	427	2	1,228	1,192	36
52-Week	60	60	(0)	200	170	30
CMBs	25	93	(68)	163	163	0
<b>Bill Subtotal</b>	<b>1,661</b>	<b>1,700</b>	<b>(39)</b>	<b>4,896</b>	<b>4,825</b>	<b>71</b>

Security	April - June 2017 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
2-Year FRN	45	41	4	130	123	7
2-Year	88	52	36	260	214	46
3-Year	80	87	(7)	233	267	(34)
5-Year	115	132	(17)	340	348	(8)
7-Year	95	95	(1)	280	291	(11)
10-Year	71	26	45	206	71	134
30-Year	44	16	28	128	34	93
5-Year TIPS	16	48	(32)	30	48	(18)
10-Year TIPS	12	0	12	51	21	30
30-Year TIPS	6	0	6	19	0	19
<b>Coupon Subtotal</b>	<b>571</b>	<b>496</b>	<b>74</b>	<b>1,676</b>	<b>1,417</b>	<b>259</b>

<b>Total</b>	<b>2,232</b>	<b>2,196</b>	<b>35</b>	<b>6,572</b>	<b>6,242</b>	<b>330</b>
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\*An end-of-June 2017 cash balance of \$181 billion versus a beginning-of-March 2017 cash balance of \$92 billion. By keeping the cash balance constant, Treasury arrives at the net implied funding number. Gross issuance values include SOMA add-ons.

## Sources of Financing in Fiscal Year 2017 Q4

July - September 2017	
Assuming Constant Coupon Issuance Sizes*	
Treasury Announced Net Marketable Borrowing**	96
Net Coupon Issuance	105
Implied Change in Bills	(9)

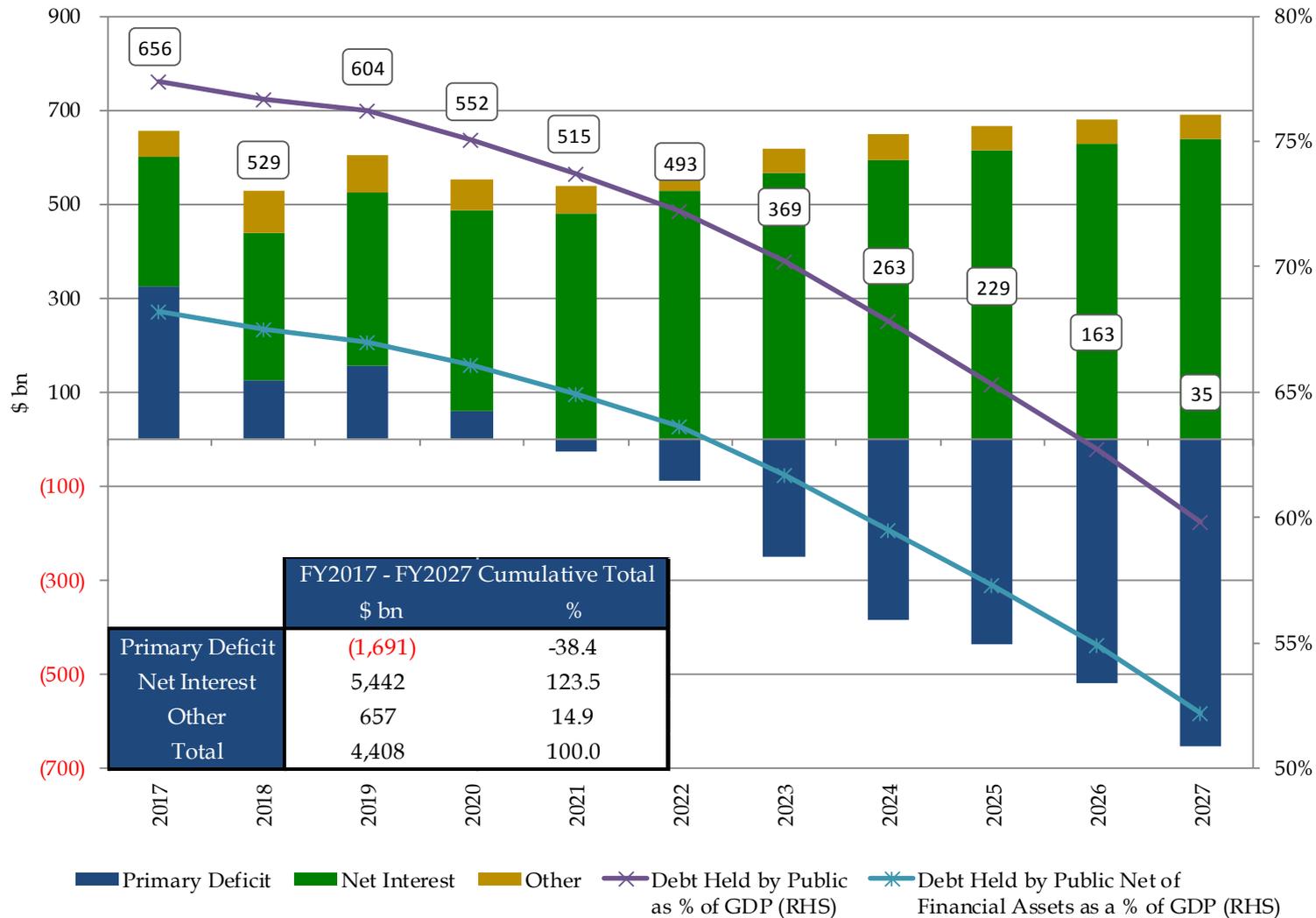
Security	July - September 2017 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
2-Year FRN	42	41	1	173	164	8
2-Year	55	26	29	315	240	75
3-Year	80	81	(1)	313	348	(35)
5-Year	72	96	(24)	412	444	(32)
7-Year	60	60	(0)	340	351	(11)
10-Year	70	28	42	276	99	177
30-Year	44	11	33	172	45	126
5-Year TIPS	14	0	14	44	48	(3)
10-Year TIPS	26	17	9	76	37	39
30-Year TIPS	0	0	0	19	0	19
Coupon Subtotal	464	359	105	2,140	1,777	364

\*Keeping announced issuance sizes and patterns constant for nominal coupons, TIPS, and FRNs as of 06/30/2017.

\*\*Assumes an end-of-September 2017 cash balance of \$60 billion versus a beginning-of-July 2017 cash balance of \$181 billion.

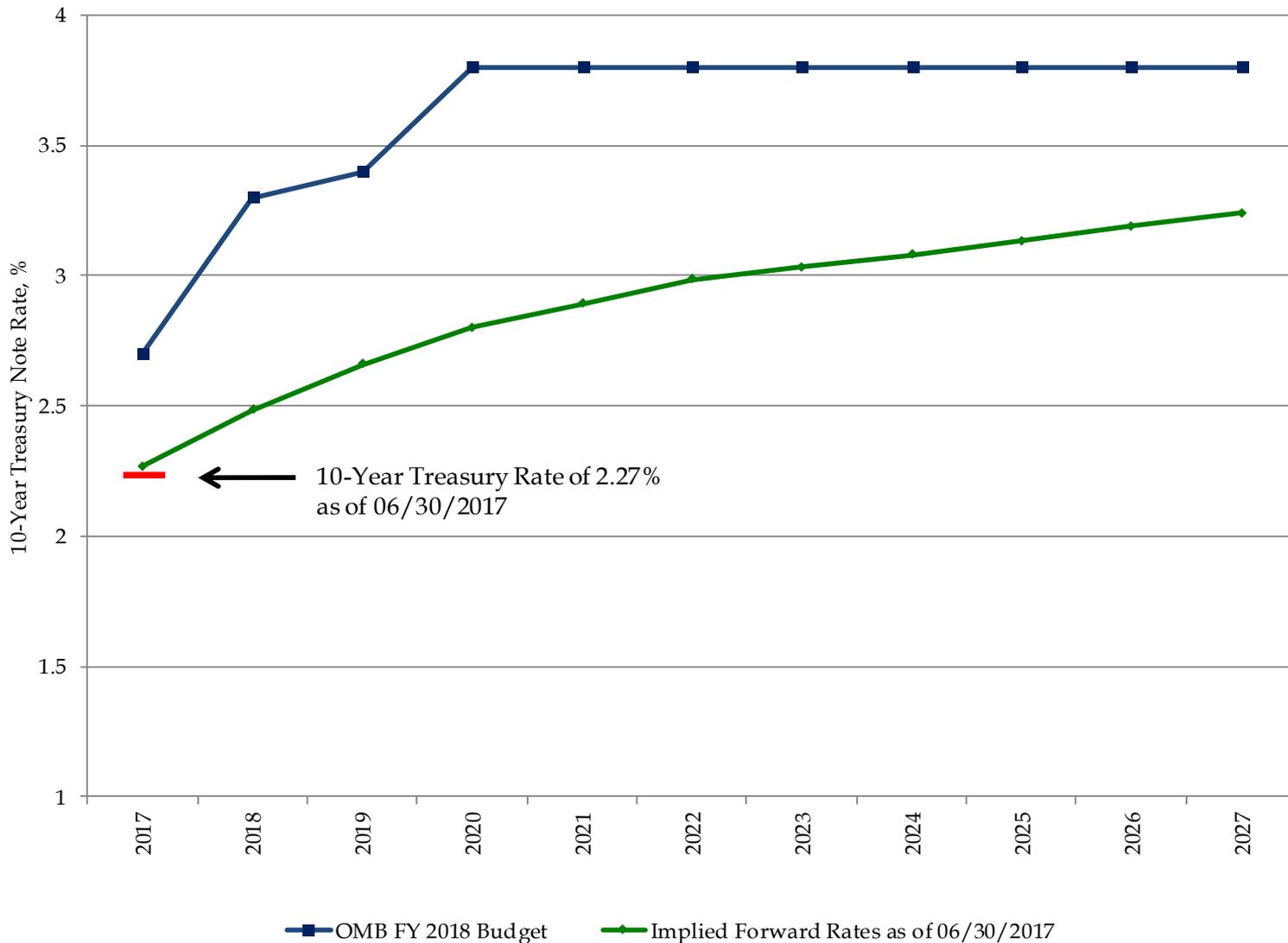
Financing Estimates released by the Treasury can be found here: <http://www.treasury.gov/resource-center/data-chart-center/quarterly-refunding/Pages/Latest.aspx>

# OMB's Projection of Borrowing from the Public



OMB's projections of net borrowing from the public are from Table S-10 of "Budget of the U.S. Government Fiscal Year 2018." Data labels represent the change in debt held by the public in \$ billions. "Other" represents borrowing from the public to provide direct and guaranteed loans.

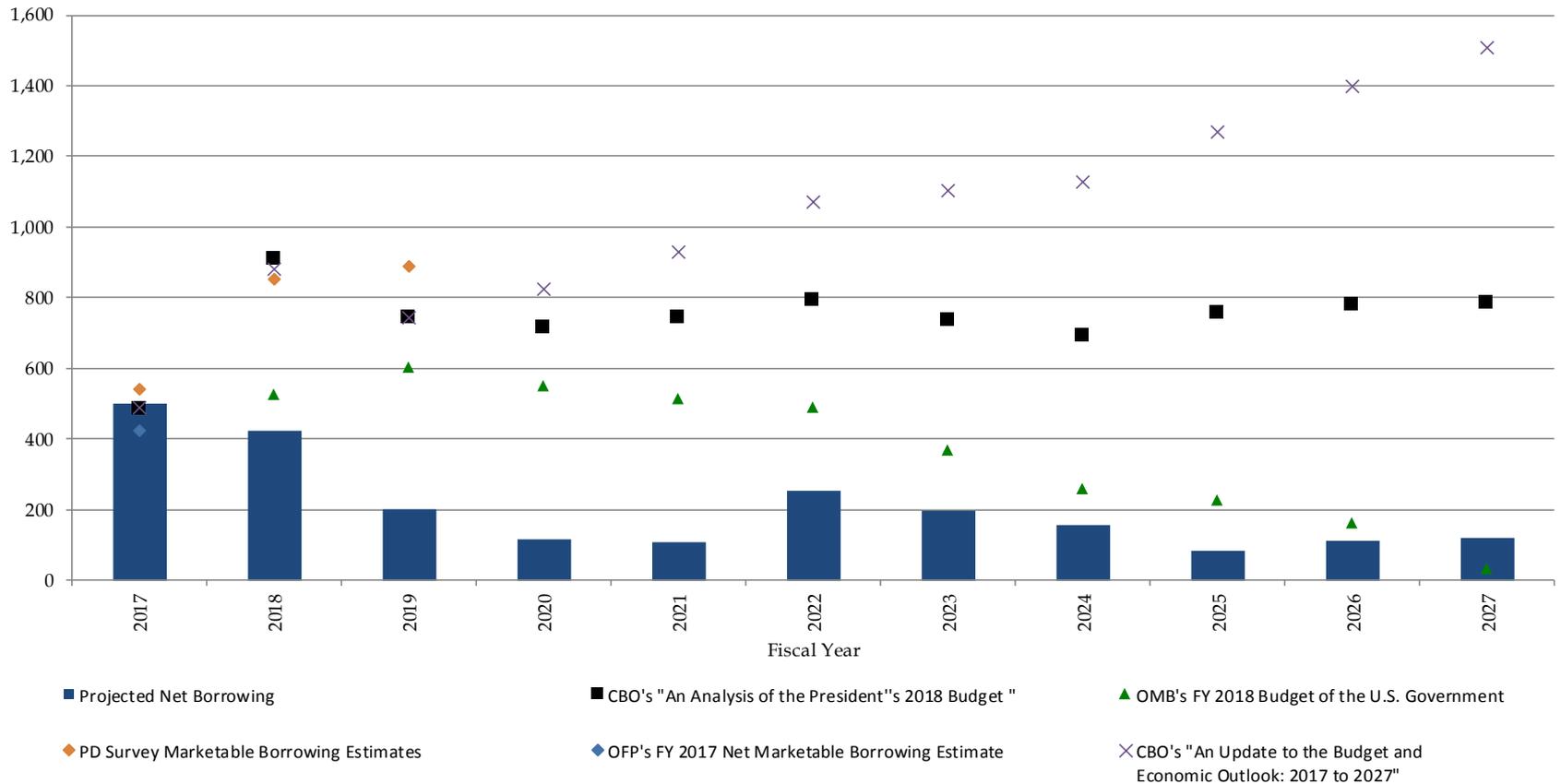
## Interest Rate Assumptions: 10-Year Treasury Note



OMB's economic assumption of the 10-Year Treasury Note rates are from Table S-9 of OMB's "Budget of the United States Government, Fiscal Year 2018." The forward rates are the implied 10-Year Treasury Note rates on June 30 of that year.

# Impact of SOMA Actions on Projected Net Borrowing Assuming Future Issuance Remains Constant

With Capped Fed Redemptions (\$ bn)\*



Treasury's primary dealer survey estimates can be found on page 11. OMB's projections of net borrowing from the public are from Table S-10 of "Budget of the U.S. Government Fiscal Year 2018." CBO's estimates of the borrowing from the public are Summary Table 1 of "The Budget and Economic Outlook: 2017 to 2027." See table at the end of this section for details.

\*Reflects capped SOMA Treasury redemptions after September 2017 up until the second half of 2021.

## 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 2018 Budget of the U.S. Government	CBO's "An Analysis of the President's 2018 Budget "	Primary Dealer Survey
2012	139	148	738	90	0	1,115			
2013	(86)	86	720	111	0	830			
2014	(119)	(92)	669	88	123	669			
2015	(53)	(282)	641	88	164	558			
2016	289	(82)	477	64	47	795			
2017	138	9	292	55	8	502	426*	488	544
2018	0	92	276	55	0	423	529**	912	855
2019	0	61	101	46	(6)	201	604	748	891
2020	0	(31)	138	16	(7)	116	552	719	
2021	0	(40)	152	(3)	(3)	106	515	747	
2022	0	33	226	(10)	3	253	493	797	
2023	0	27	172	(8)	6	197	369	737	
2024	0	5	160	(9)	0	156	263	694	
2025	0	(28)	164	(51)	(1)	84	229	758	
2026	0	(23)	178	(42)	(2)	111	163	782	
2027	0	(0)	155	(32)	(2)	120		787	

Net Borrowing capacity reflects full SOMA reinvestments until October 2017, followed by SOMA capped redemptions until the second half of 2021.

Treasury's primary dealer survey estimates can be found on page 11. OMB's projections of net borrowing from the public are from Table S-10 of "Budget of the U.S. Government Fiscal Year 2018." CBO's estimates of the borrowing from the public are from Table 1 and 2 of "The Budget and Economic Outlook: 2017 to 2027."

\*OFP's FY 2017 Net Marketable Borrowing Estimate

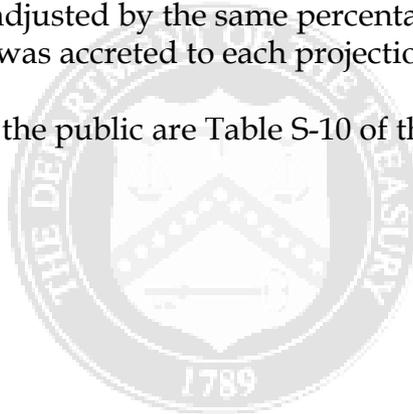
\*\*The "Budget of the U.S. Government Fiscal Year 2018" assumes an end-of-September cash balance target of \$350 billion. Given that OFP's FY2017 Net Marketable Borrowing Estimate assumes an end-of-September cash balance target of \$60 billion, the combined FY2017-18 figure would be \$290 billion higher in an equivalent comparison.

# Section IV: Portfolio Metrics

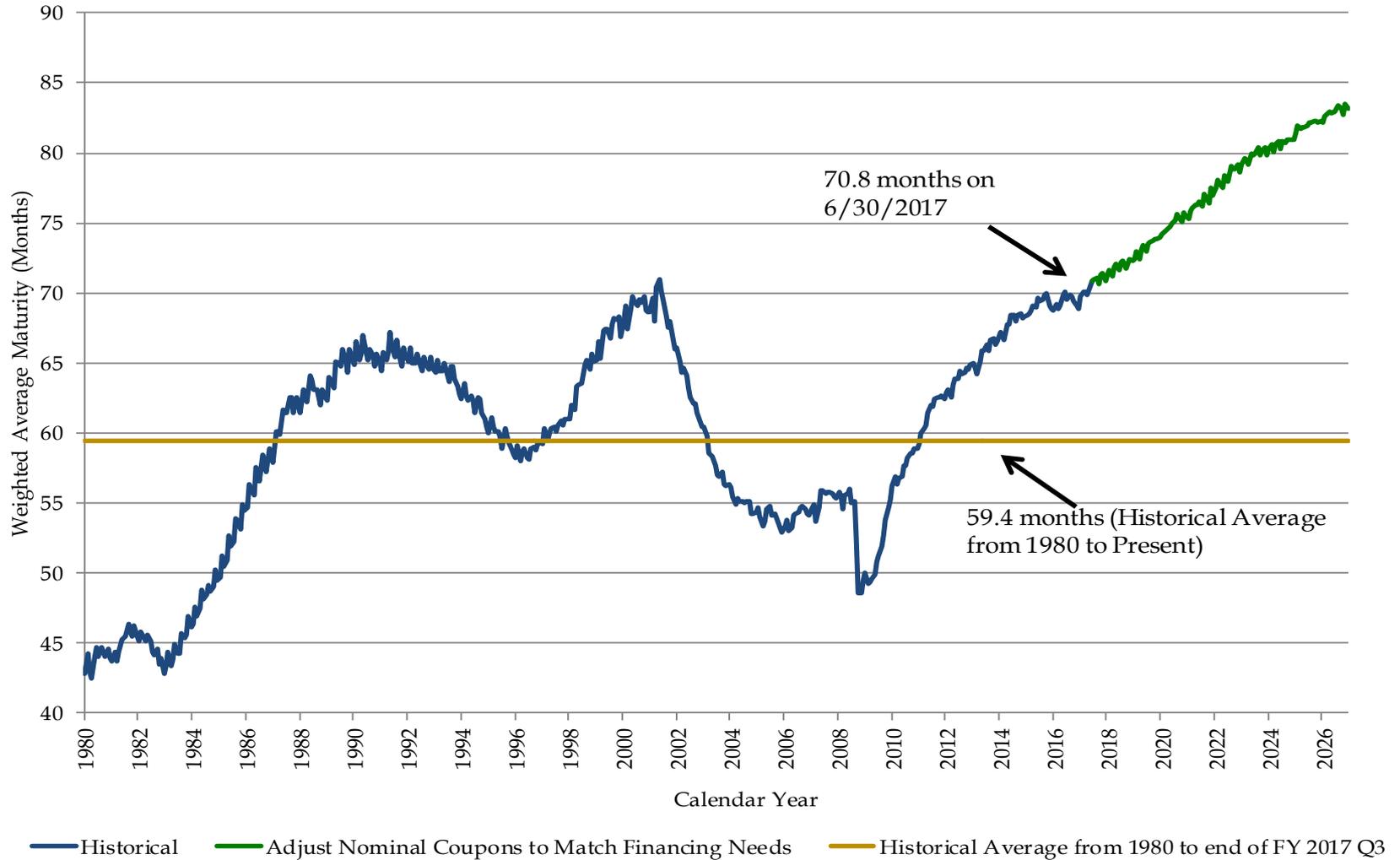


## Assumptions for Portfolio Metrics Section (pages 23 to 27) and Appendix

- Portfolio and SOMA holdings as of 06/30/2017.
- Full SOMA reinvestments until October 2017, followed by SOMA capped redemptions until the second half of 2021. These assumptions are based on the June FOMC addendum to the Policy Normalization Principles and Plans and expectations from the FRB-NY June 2017 Survey of Primary Dealers and the July projections for the SOMA portfolio.
- Assumes announced issuance sizes and patterns constant for nominal coupons, TIPS, and FRNs as of 06/30/2017, while using an average of ~\$1.7 trillion of bills outstanding.
- To match OMB's projected borrowing from the public for the next 10 years, nominal coupon securities (2-, 3-, 5-, 7-, 10-, and 30-year) were adjusted by the same percentage.
- The principal on the TIPS securities was accreted to each projection date based on market ZCIS levels as of 06/30/2017.
- OMB's estimates of borrowing from the public are Table S-10 of the "Budget of the U.S. Government Fiscal Year 2018."

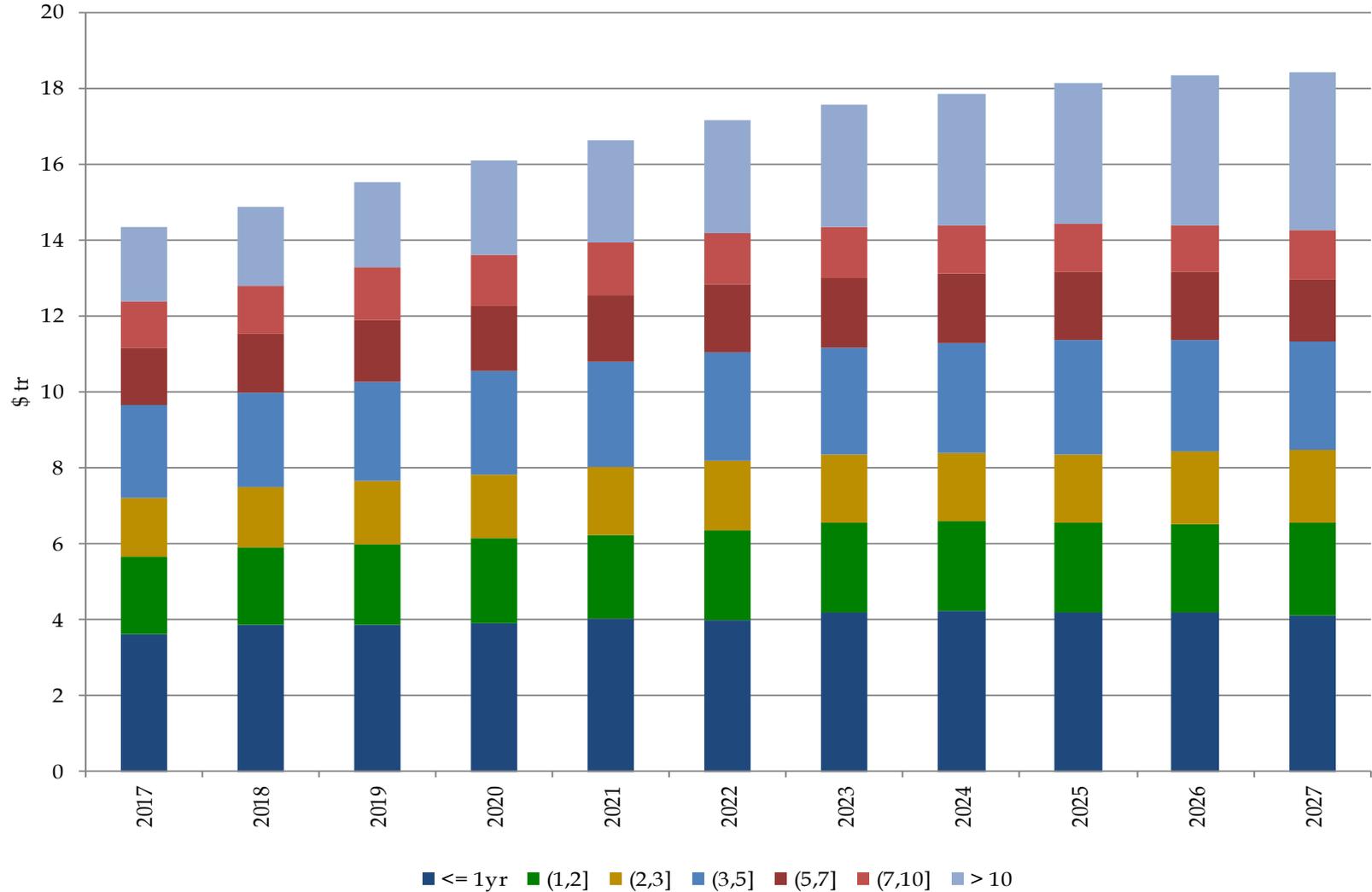


# Weighted Average Maturity of Marketable Debt Outstanding



This scenario does not represent any particular course of action that Treasury is expected to follow. Instead, it is intended to demonstrate the basic trajectory of average maturity absent changes to the mix of securities issued by Treasury.

## Projected Maturity Profile from end of Fiscal Year



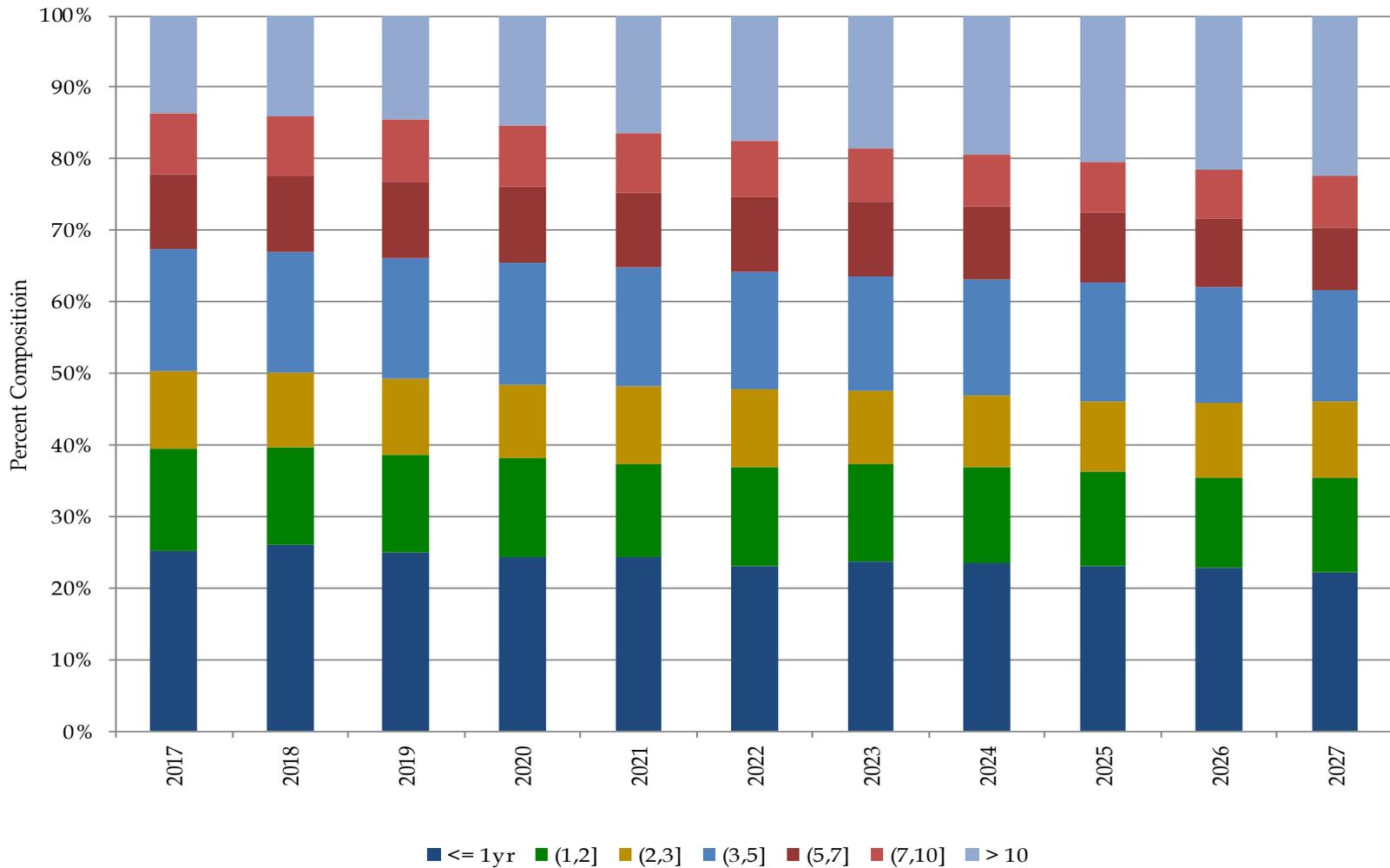
This scenario does not represent any particular course of action that Treasury is expected to follow. Instead, it is intended to demonstrate the basic trajectory of average maturity absent changes to the mix of securities issued by Treasury. See table on following page for details.

## Recent and Projected Maturity Profile, \$ billions

End of Fiscal Year	<= 1yr	(1,2]	(2,3]	(3,5]	(5,7]	(7,10]	> 10	Total	(0,5]
2009	2,702	774	663	962	559	643	695	6,998	5,101
2010	2,563	1,141	895	1,273	907	856	853	8,488	5,872
2011	2,620	1,334	980	1,541	1,070	1,053	1,017	9,616	6,476
2012	2,951	1,373	1,104	1,811	1,214	1,108	1,181	10,742	7,239
2013	2,939	1,523	1,242	1,965	1,454	1,136	1,331	11,590	7,669
2014	2,935	1,739	1,319	2,207	1,440	1,113	1,528	12,281	8,199
2015	3,097	1,775	1,335	2,382	1,478	1,121	1,654	12,841	8,589
2016	3,423	1,828	1,538	2,406	1,501	1,151	1,800	13,648	9,195
2017	3,615	2,050	1,535	2,463	1,491	1,210	1,966	14,328	9,662
2018	3,867	2,045	1,558	2,510	1,559	1,245	2,095	14,879	9,979
2019	3,864	2,120	1,676	2,607	1,640	1,351	2,254	15,512	10,267
2020	3,908	2,244	1,642	2,759	1,702	1,355	2,482	16,093	10,553
2021	4,032	2,178	1,815	2,779	1,727	1,393	2,712	16,636	10,804
2022	3,966	2,382	1,840	2,834	1,784	1,372	2,981	17,161	11,023
2023	4,170	2,381	1,810	2,814	1,818	1,333	3,238	17,565	11,175
2024	4,202	2,374	1,824	2,867	1,832	1,294	3,470	17,863	11,267
2025	4,162	2,398	1,785	3,023	1,793	1,245	3,722	18,128	11,368
2026	4,186	2,307	1,923	2,947	1,782	1,244	3,937	18,326	11,364
2027	4,097	2,434	1,930	2,868	1,638	1,305	4,127	18,399	11,328

This scenario does not represent any particular course of action that Treasury is expected to follow. Instead, it is intended to demonstrate the basic trajectory of average maturity absent changes to the mix of securities issued by Treasury. Portfolio composition by original issuance type and term can be found in the appendix (Page 44).

## Projected Maturity Profile from end of Fiscal Year



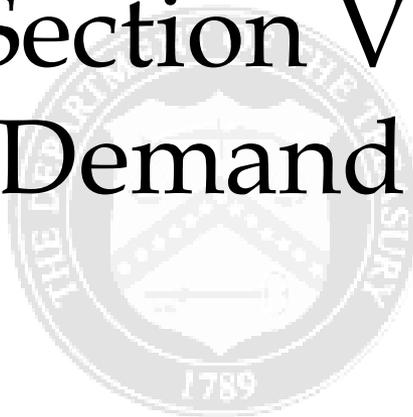
This scenario does not represent any particular course of action that Treasury is expected to follow. Instead, it is intended to demonstrate the basic trajectory of average maturity absent changes to the mix of securities issued by Treasury. See table on following page for details.

## Recent and Projected Maturity Profile, percent

End of Fiscal Year	<= 1yr	(1,2]	(2,3]	(3,5]	(5,7]	(7,10]	> 10	(0,3]	(0,5]
2009	38.6	11.1	9.5	13.7	8.0	9.2	9.9	59.1	72.9
2010	30.2	13.4	10.5	15.0	10.7	10.1	10.0	54.2	69.2
2011	27.2	13.9	10.2	16.0	11.1	10.9	10.6	51.3	67.3
2012	27.5	12.8	10.3	16.9	11.3	10.3	11.0	50.5	67.4
2013	25.4	13.1	10.7	17.0	12.5	9.8	11.5	49.2	66.2
2014	23.9	14.2	10.7	18.0	11.7	9.1	12.4	48.8	66.8
2015	24.1	13.8	10.4	18.5	11.5	8.7	12.9	48.3	66.9
2016	25.1	13.4	11.3	17.6	11.0	8.4	13.2	49.7	67.4
2017	25.2	14.3	10.7	17.2	10.4	8.4	13.7	50.2	67.4
2018	26.0	13.7	10.5	16.9	10.5	8.4	14.1	50.2	67.1
2019	24.9	13.7	10.8	16.8	10.6	8.7	14.5	49.4	66.2
2020	24.3	13.9	10.2	17.1	10.6	8.4	15.4	48.4	65.6
2021	24.2	13.1	10.9	16.7	10.4	8.4	16.3	48.2	64.9
2022	23.1	13.9	10.7	16.5	10.4	8.0	17.4	47.7	64.2
2023	23.7	13.6	10.3	16.0	10.4	7.6	18.4	47.6	63.6
2024	23.5	13.3	10.2	16.1	10.3	7.2	19.4	47.0	63.1
2025	23.0	13.2	9.8	16.7	9.9	6.9	20.5	46.0	62.7
2026	22.8	12.6	10.5	16.1	9.7	6.8	21.5	45.9	62.0
2027	22.3	13.2	10.5	15.6	8.9	7.1	22.4	46.0	61.6

This scenario does not represent any particular course of action that Treasury is expected to follow. Instead, it is intended to demonstrate the basic trajectory of average maturity absent changes to the mix of securities issued by Treasury. Portfolio composition by original issuance type and term can be found in the appendix (Page 44).

# Section V: Demand



## Summary Statistics for Fiscal Year 2017 Q3 Auctions

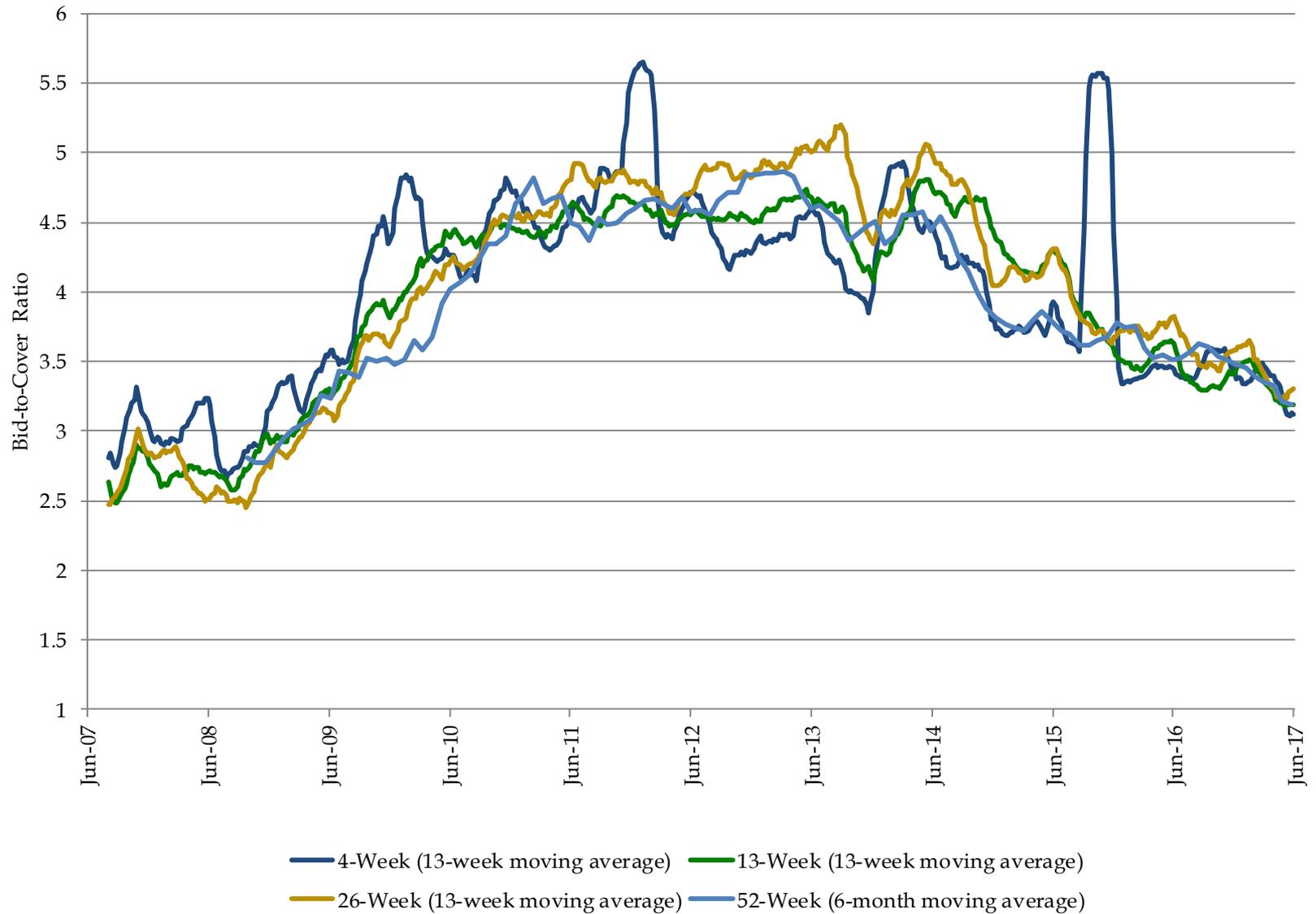
Security Type	Term	Stop Out Rate (%)*	Bid-to-Cover Ratio*	Competitive Awards (\$bn)	% Primary Dealer*	% Direct*	% Indirect*	Non-Competitive Awards (\$bn)	SOMA Add Ons (\$bn)	10-Year Equivalent (\$bn)**
Bill	4-Week	0.772	3.1	634.1	58.0	6.7	35.3	5.1	0.0	5.6
Bill	13-Week	0.905	3.2	497.3	54.2	8.8	37.0	6.5	0.0	14.3
Bill	26-Week	1.022	3.3	416.6	48.6	4.2	47.2	5.6	0.0	24.2
Bill	52-Week	1.141	3.1	58.7	59.0	4.3	36.7	0.7	0.0	6.8
Bill	CMB	0.735	3.1	25.0	56.7	12.6	30.7	0.0	0.0	0.1
Coupon	2-Year	1.315	2.9	77.2	28.4	14.1	57.6	0.5	9.8	19.7
Coupon	3-Year	1.532	2.8	71.5	36.0	8.0	56.1	0.2	8.1	26.8
Coupon	5-Year	1.845	2.4	101.8	28.6	7.7	63.7	0.2	12.9	62.4
Coupon	7-Year	2.067	2.6	84.0	18.5	12.0	69.5	0.0	10.6	70.1
Coupon	10-Year	2.313	2.4	63.0	30.9	5.2	63.9	0.0	7.8	71.4
Coupon	30-Year	2.960	2.2	39.0	31.9	5.9	62.2	0.0	5.1	99.3
TIPS	5-Year	-0.049	2.5	15.9	16.7	9.2	74.2	0.1	0.0	9.1
TIPS	10-Year	0.420	2.6	11.0	11.3	8.4	80.3	0.0	1.3	13.1
TIPS	30-Year	0.880	2.8	5.0	15.5	8.4	76.1	0.0	0.6	16.6
FRN	2-Year	0.067	3.2	41.0	43.7	0.4	55.9	0.0	3.6	0.0

Total Bills	0.889	3.2	1,631.7	54.5	6.7	38.8	17.9	0.0	50.9
Total Coupons	1.910	2.6	436.5	28.5	9.2	62.4	0.9	54.2	349.7
Total TIPS	0.258	2.6	31.9	14.6	8.8	76.6	0.1	1.9	38.8
Total FRN	0.067	3.2	41.0	43.7	0.4	55.9	0.0	3.6	0.0

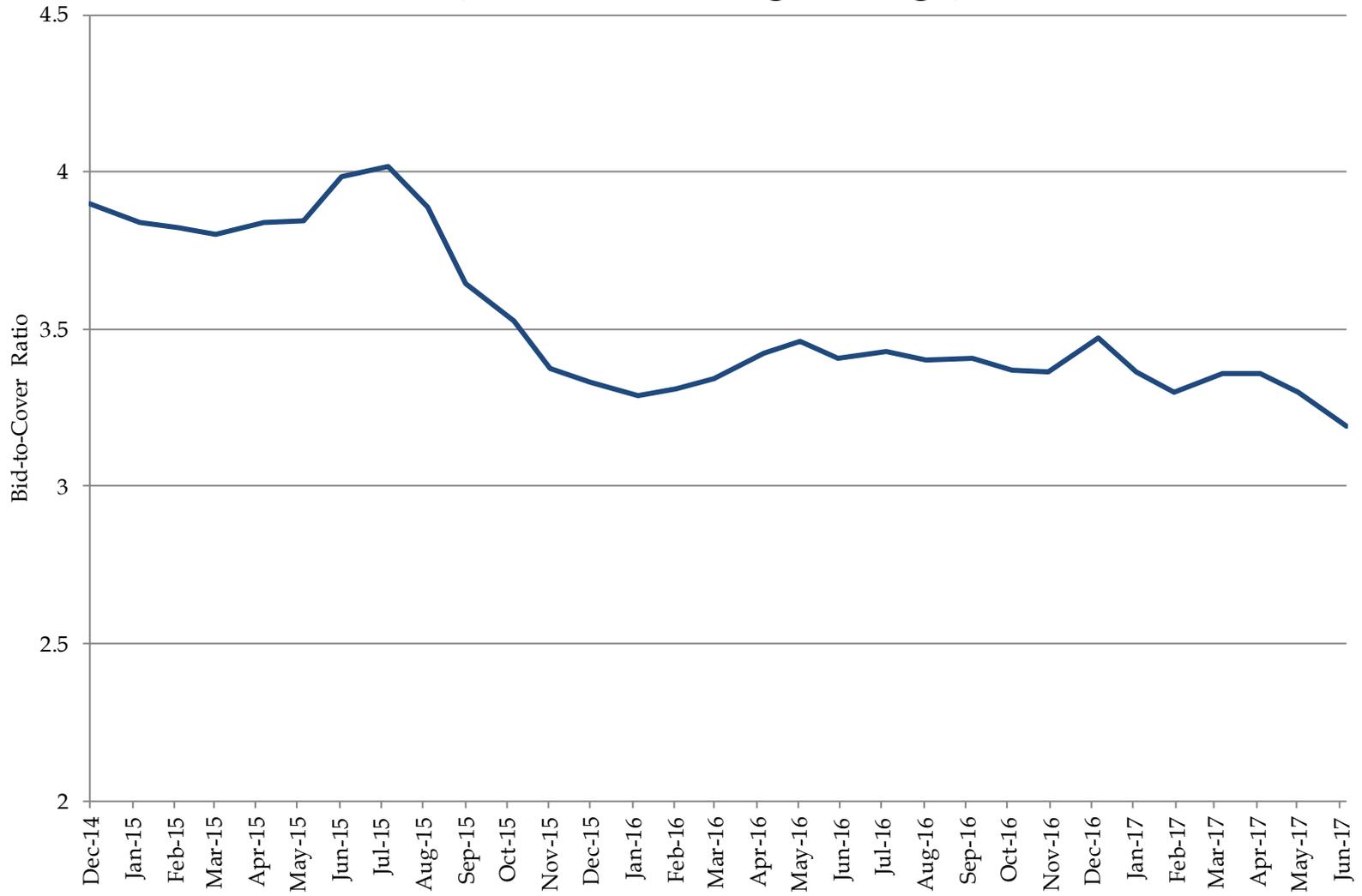
\*Weighted averages of Competitive Awards.

\*\*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.

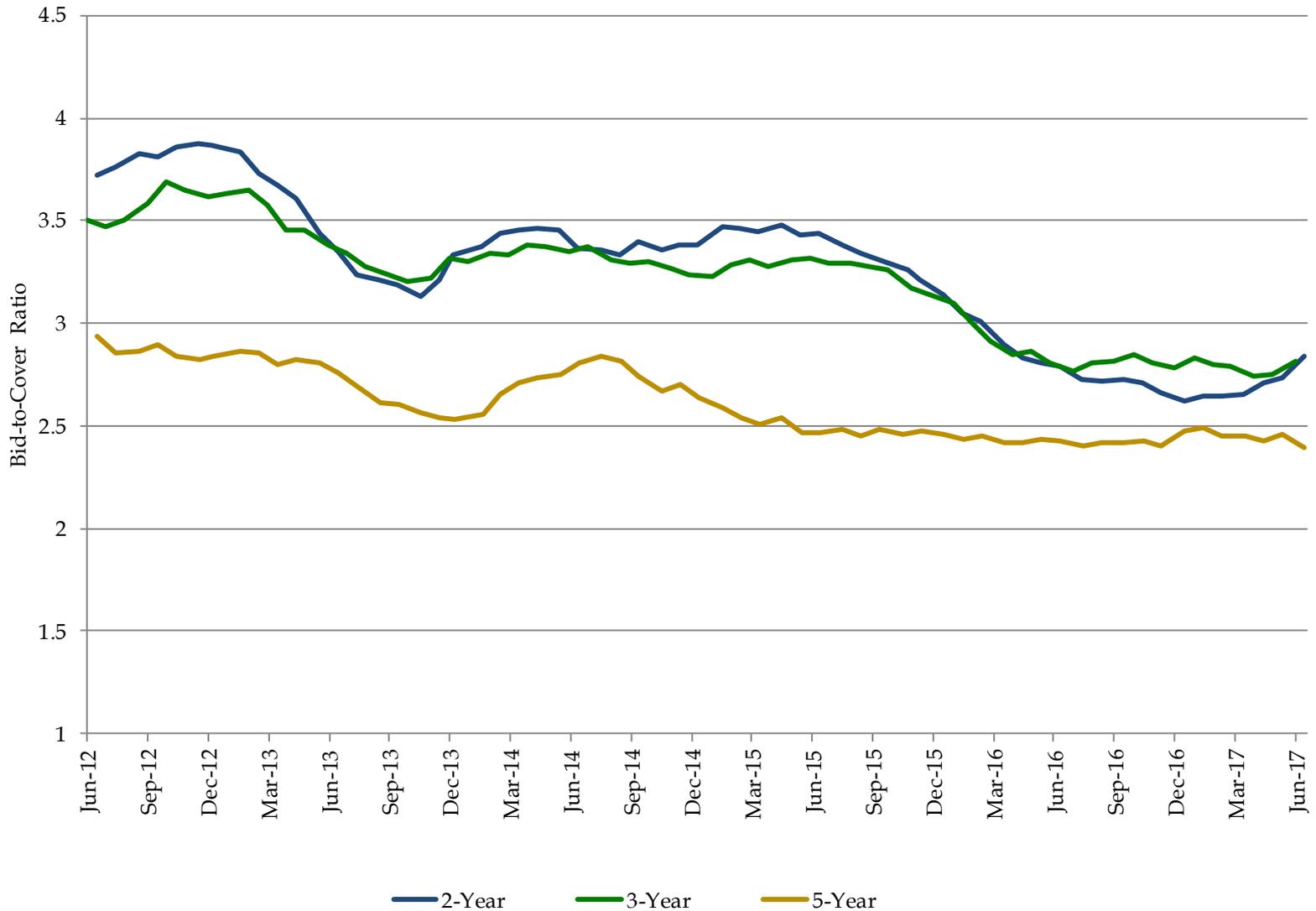
# Bid-to-Cover Ratios for Treasury Bills



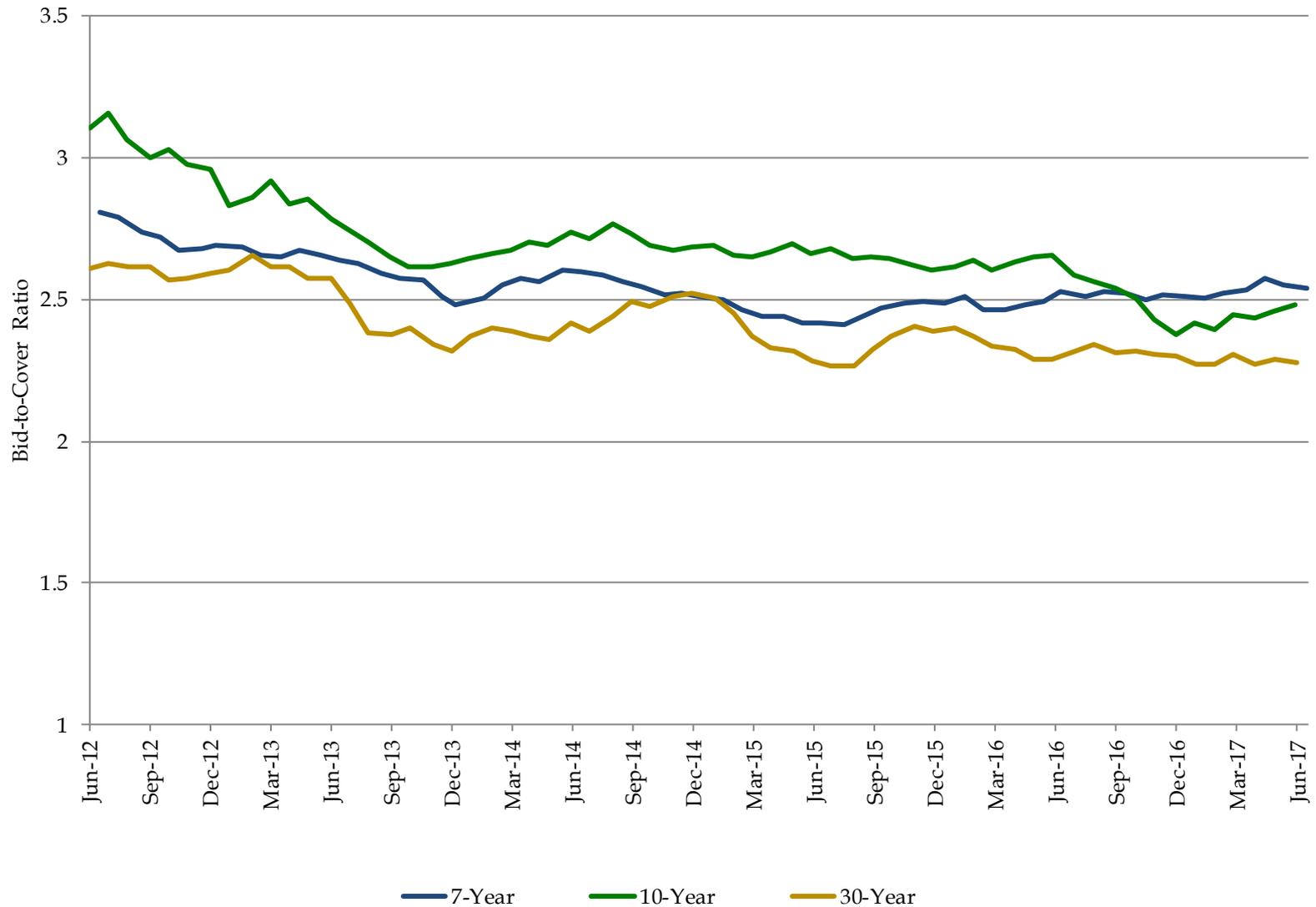
## Bid-to-Cover Ratios for FRNs (6-Month Moving Average)



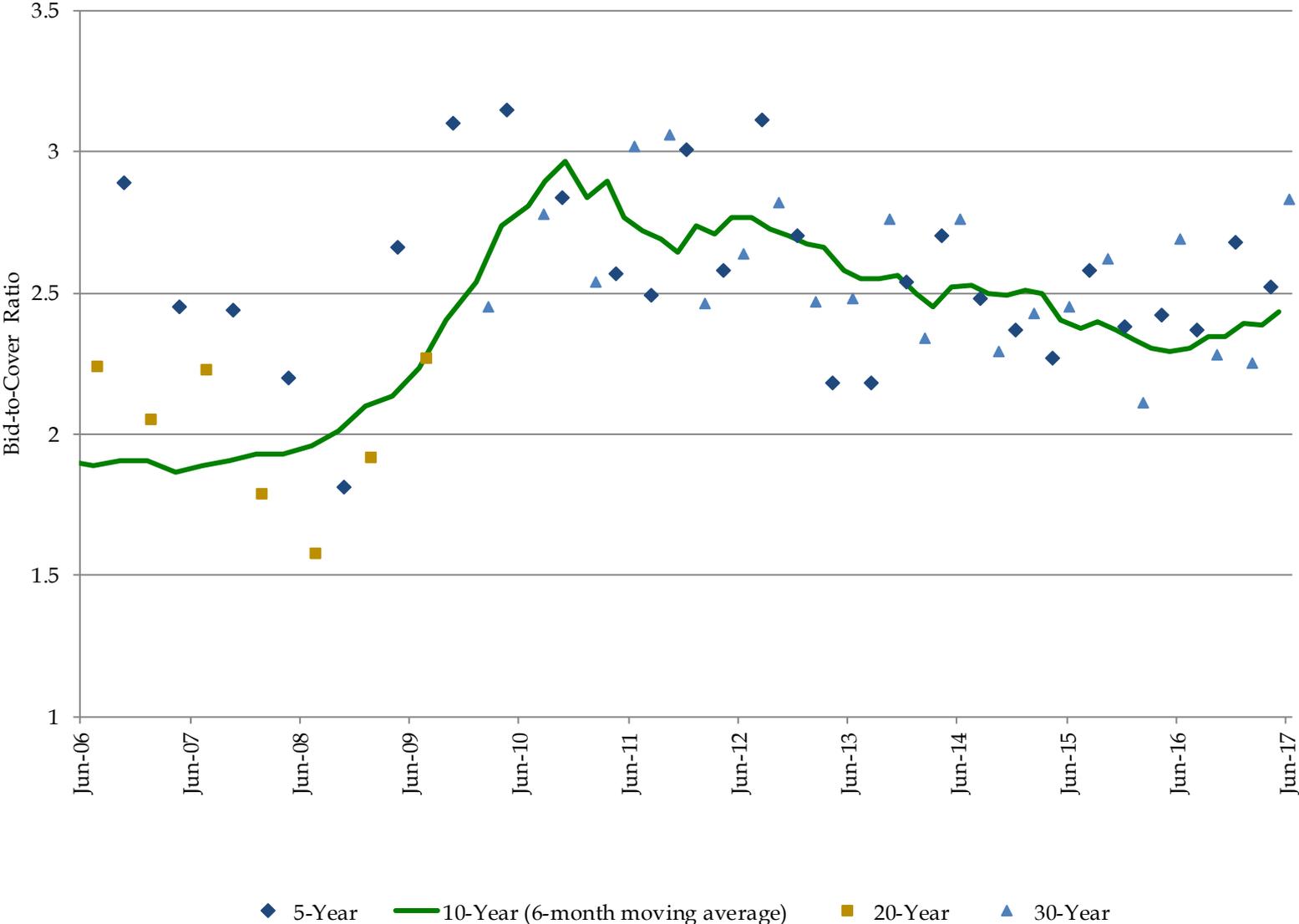
## Bid-to-Cover Ratios for 2-, 3-, and 5-Year Nominal Securities (6-Month Moving Average)



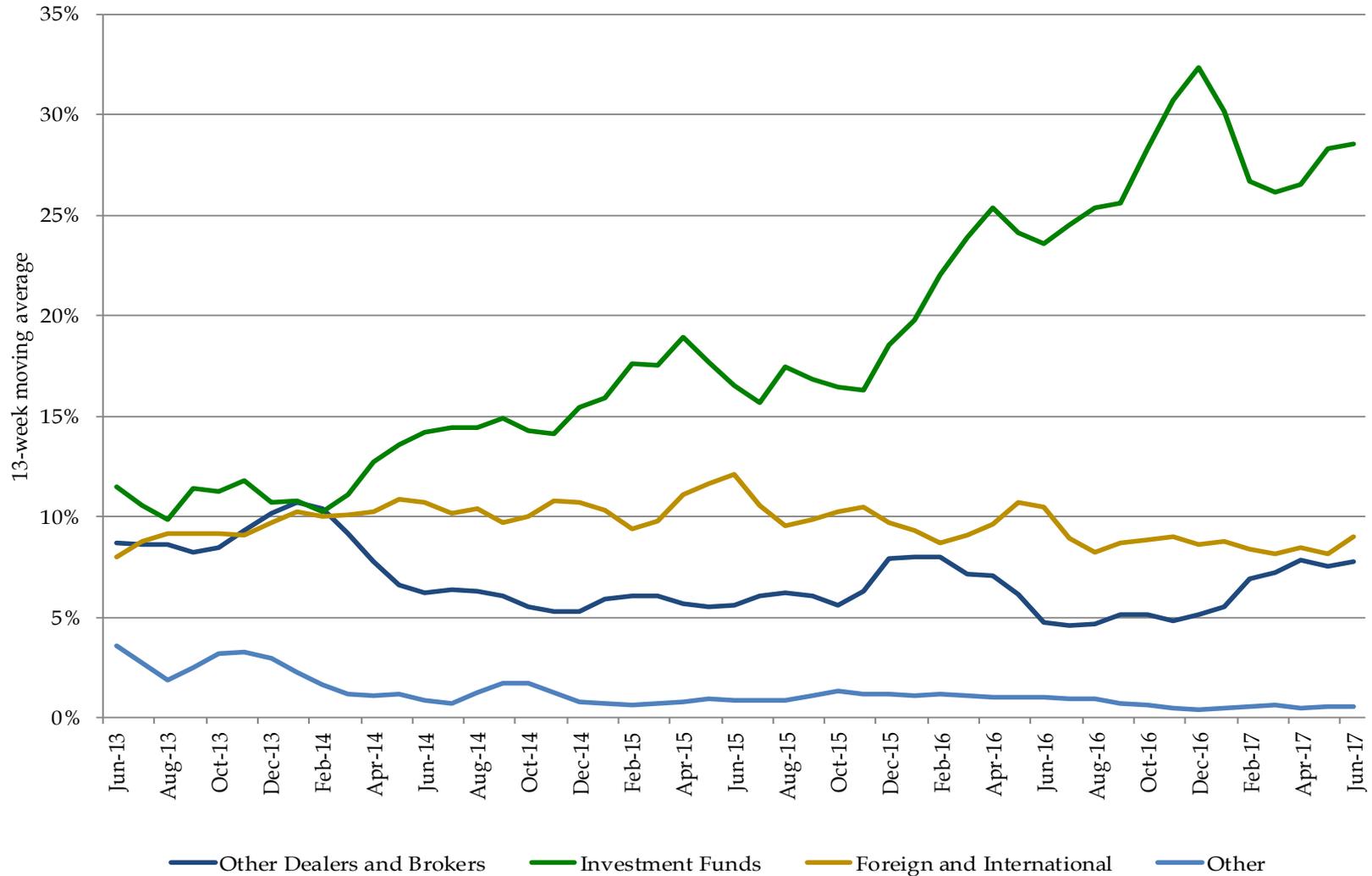
## Bid-to-Cover Ratios for 7-, 10-, and 30-Year Nominal Securities (6-Month Moving Average)



# Bid-to-Cover Ratios for TIPS

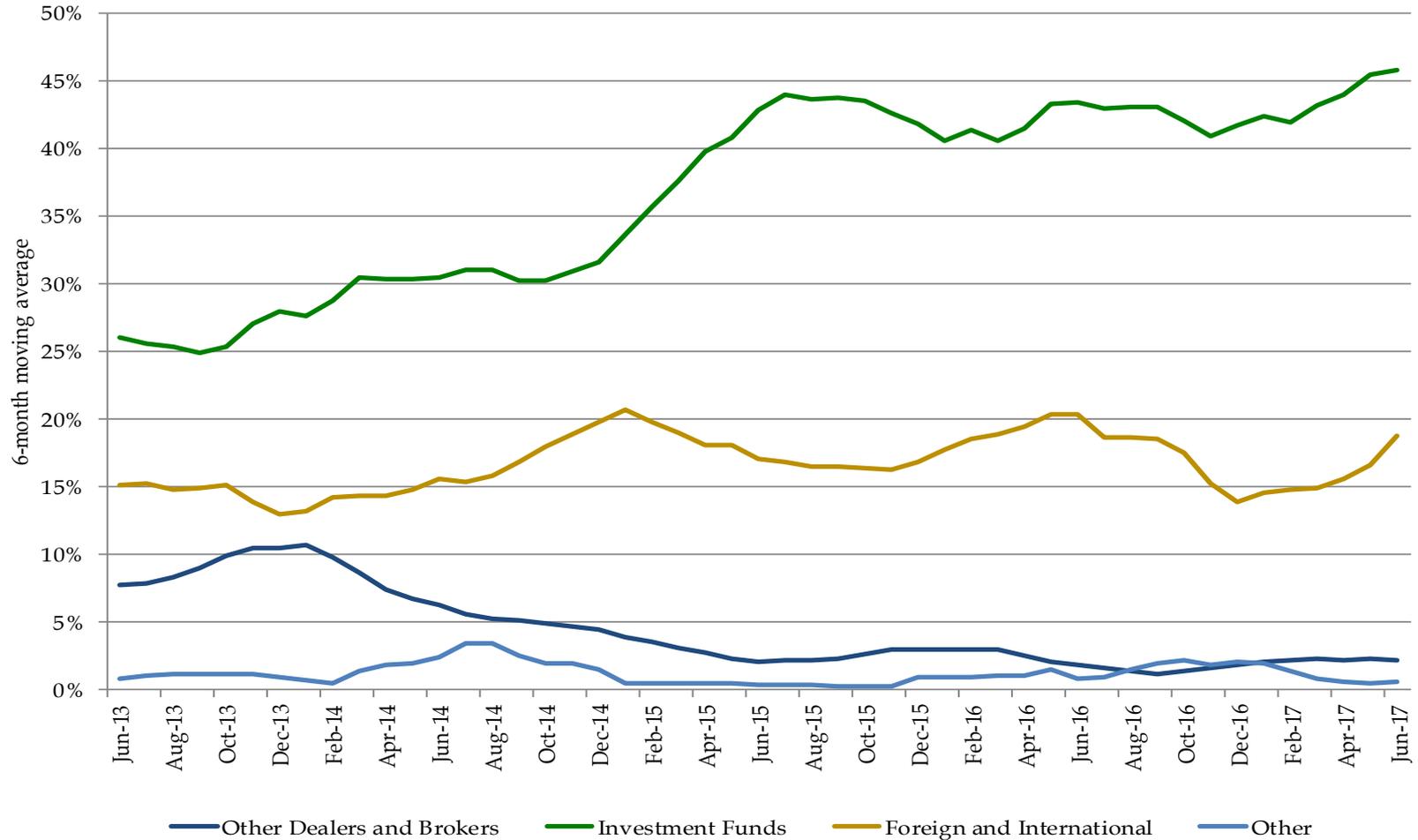


## Percent Awarded in Bill Auctions by Investor Class (13-Week Moving Average)



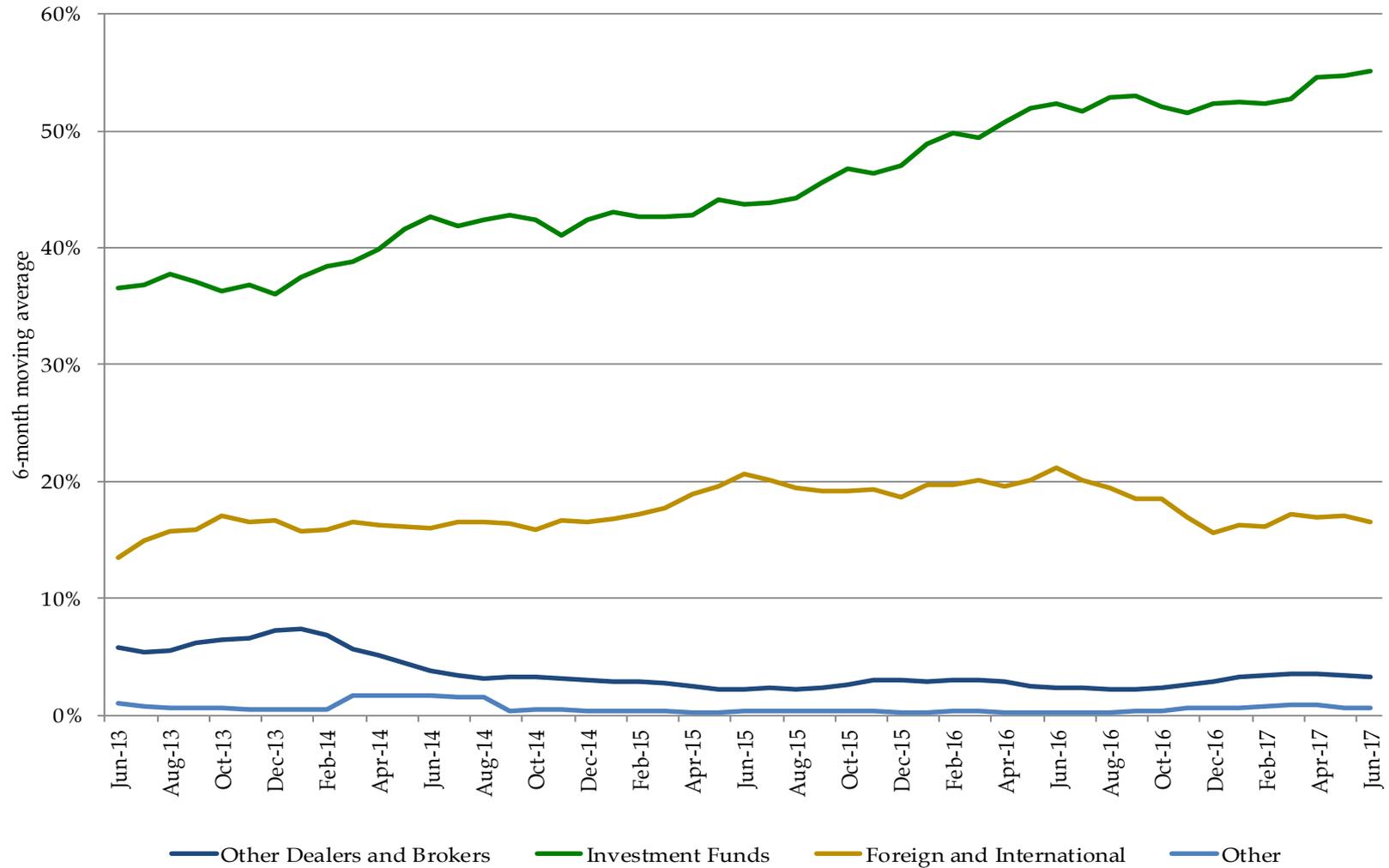
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



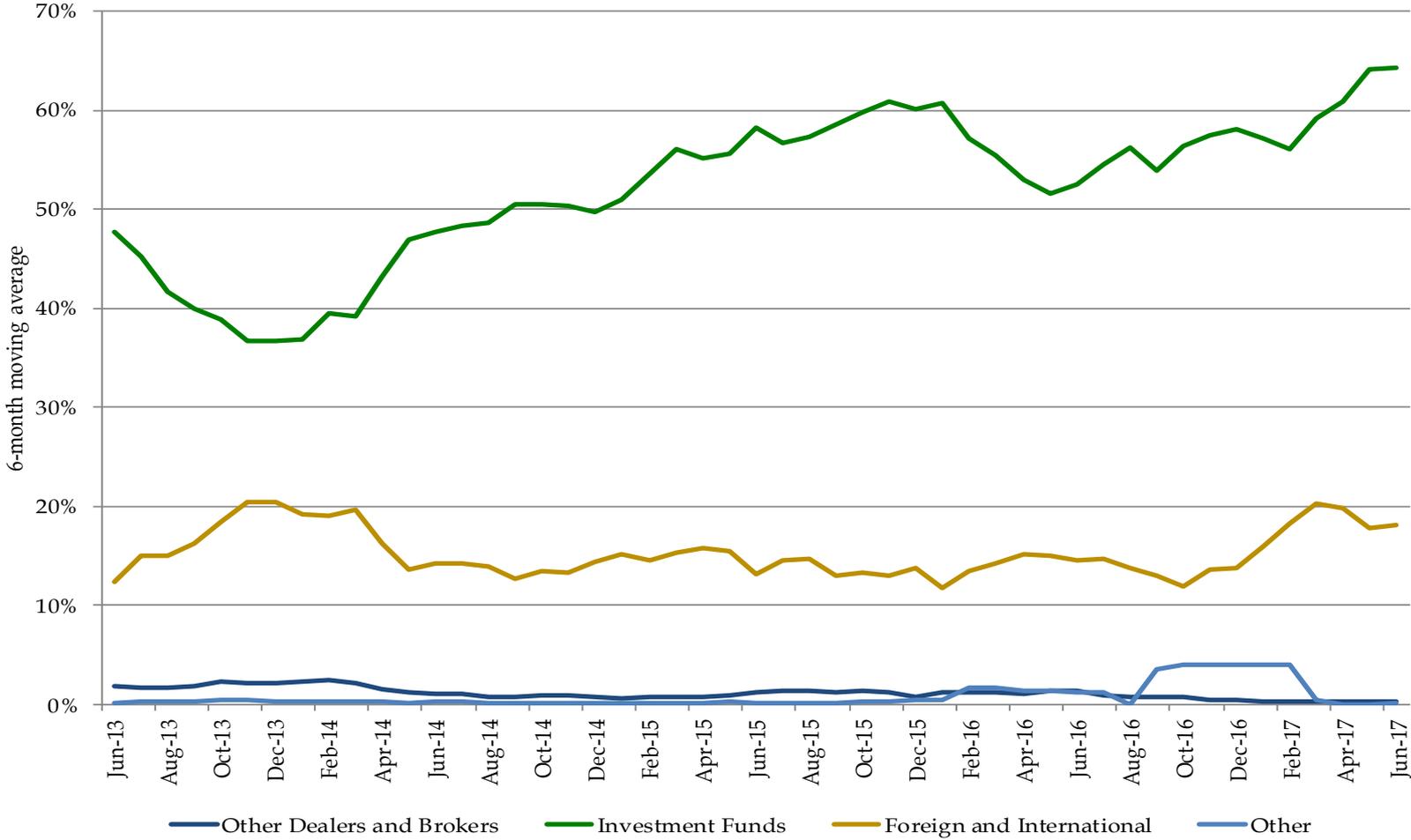
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



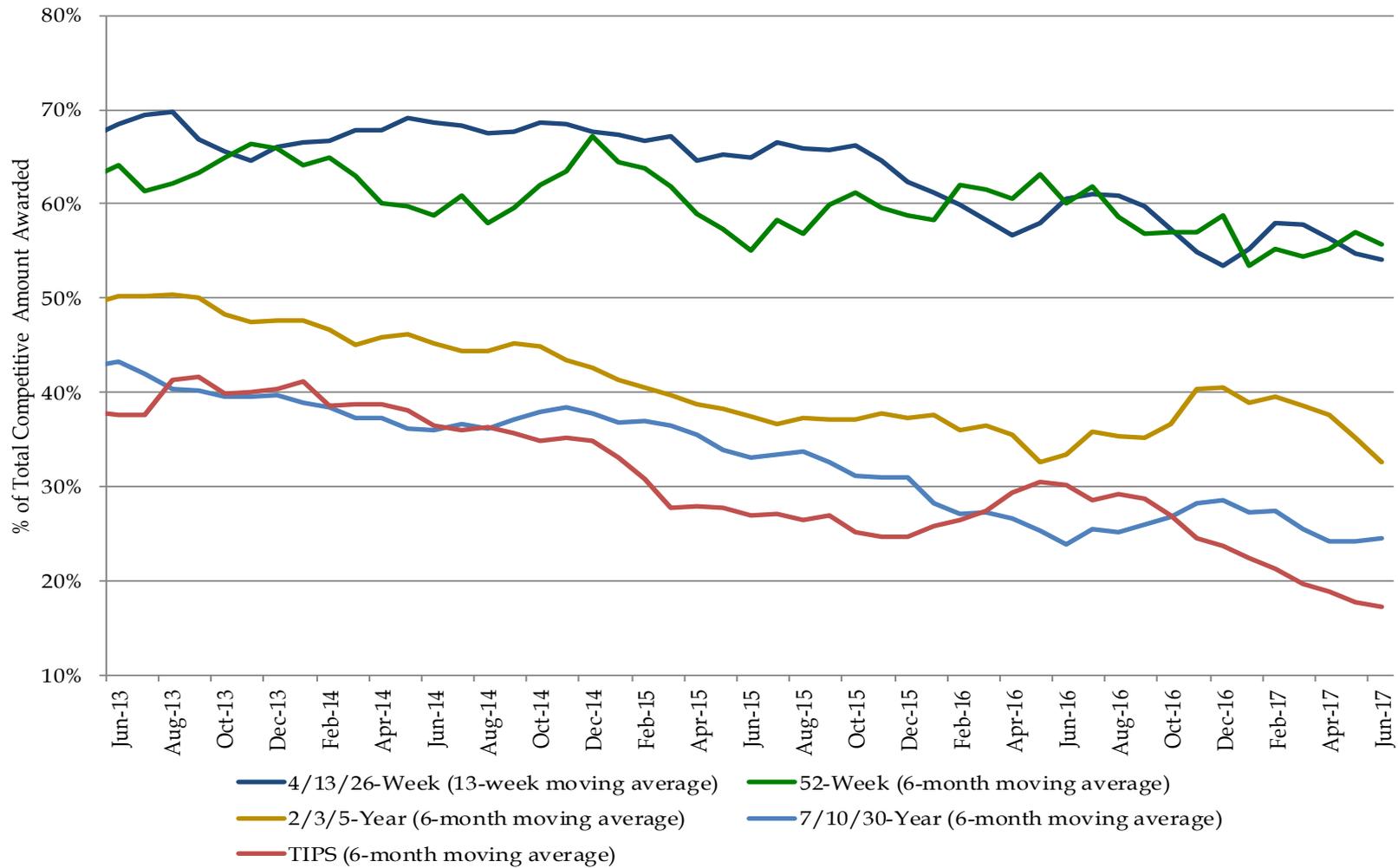
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



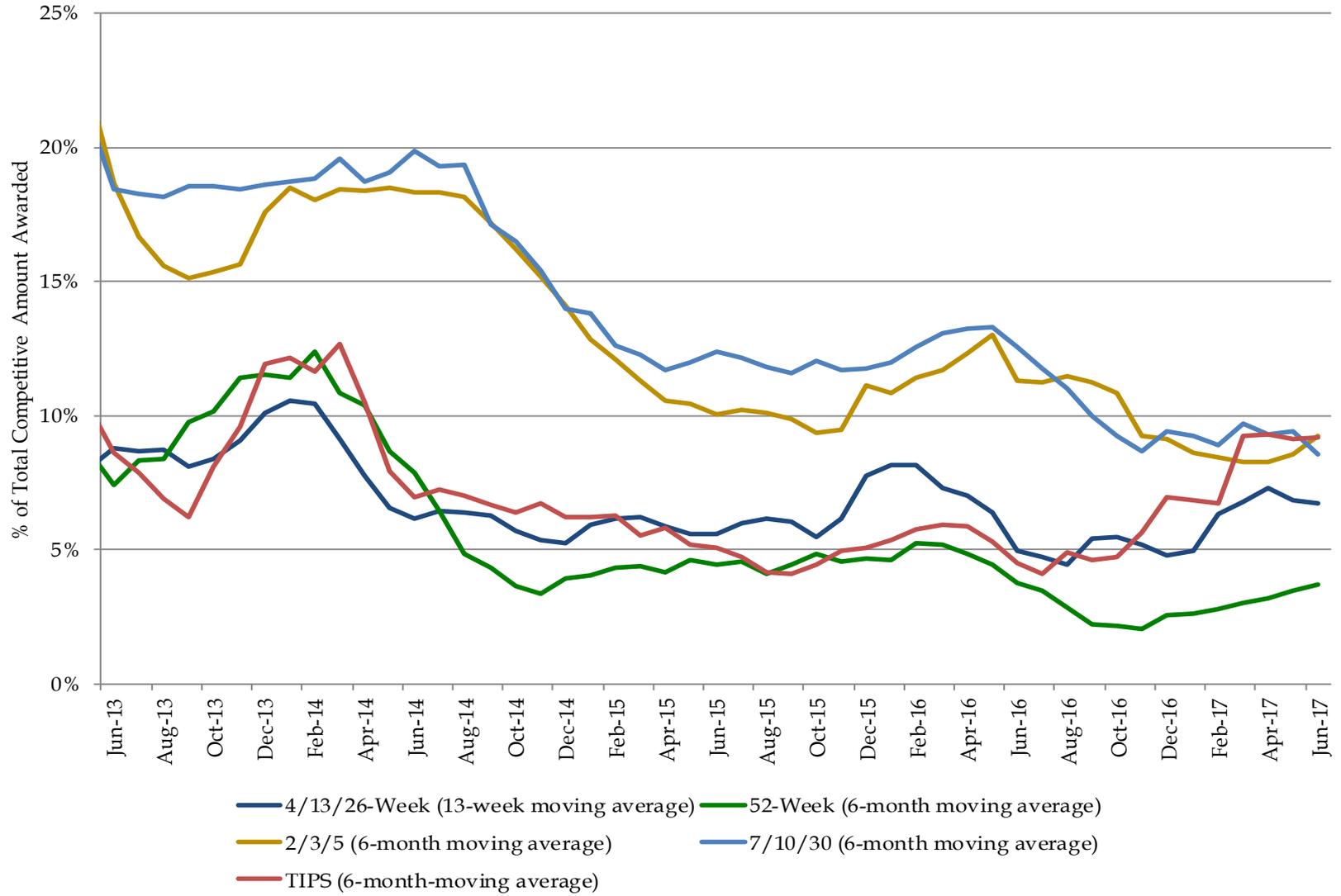
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

# Primary Dealer Awards at Auction



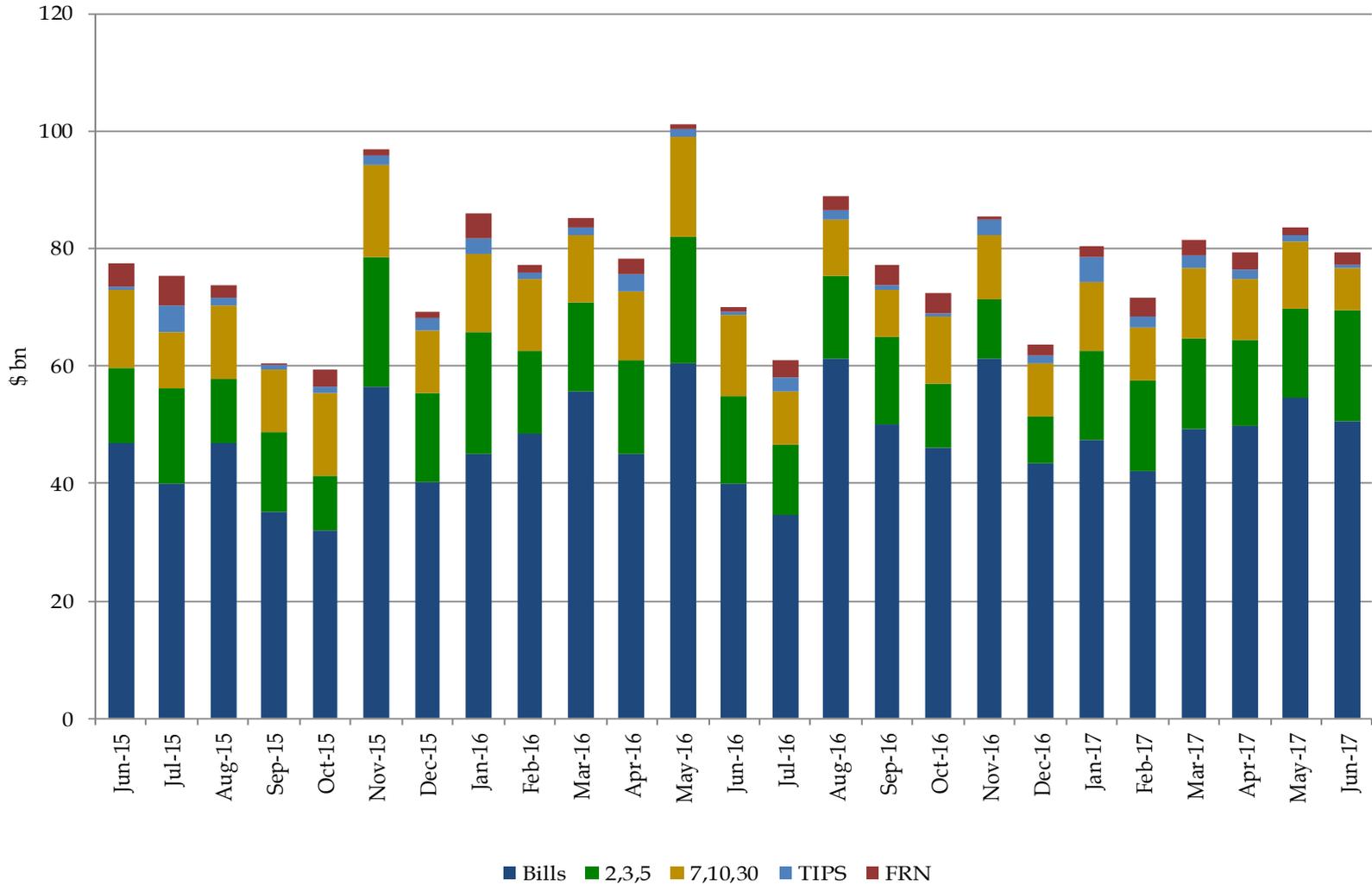
Excludes SOMA add-ons.

# Direct Bidder Awards at Auction



Excludes SOMA add-ons.

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

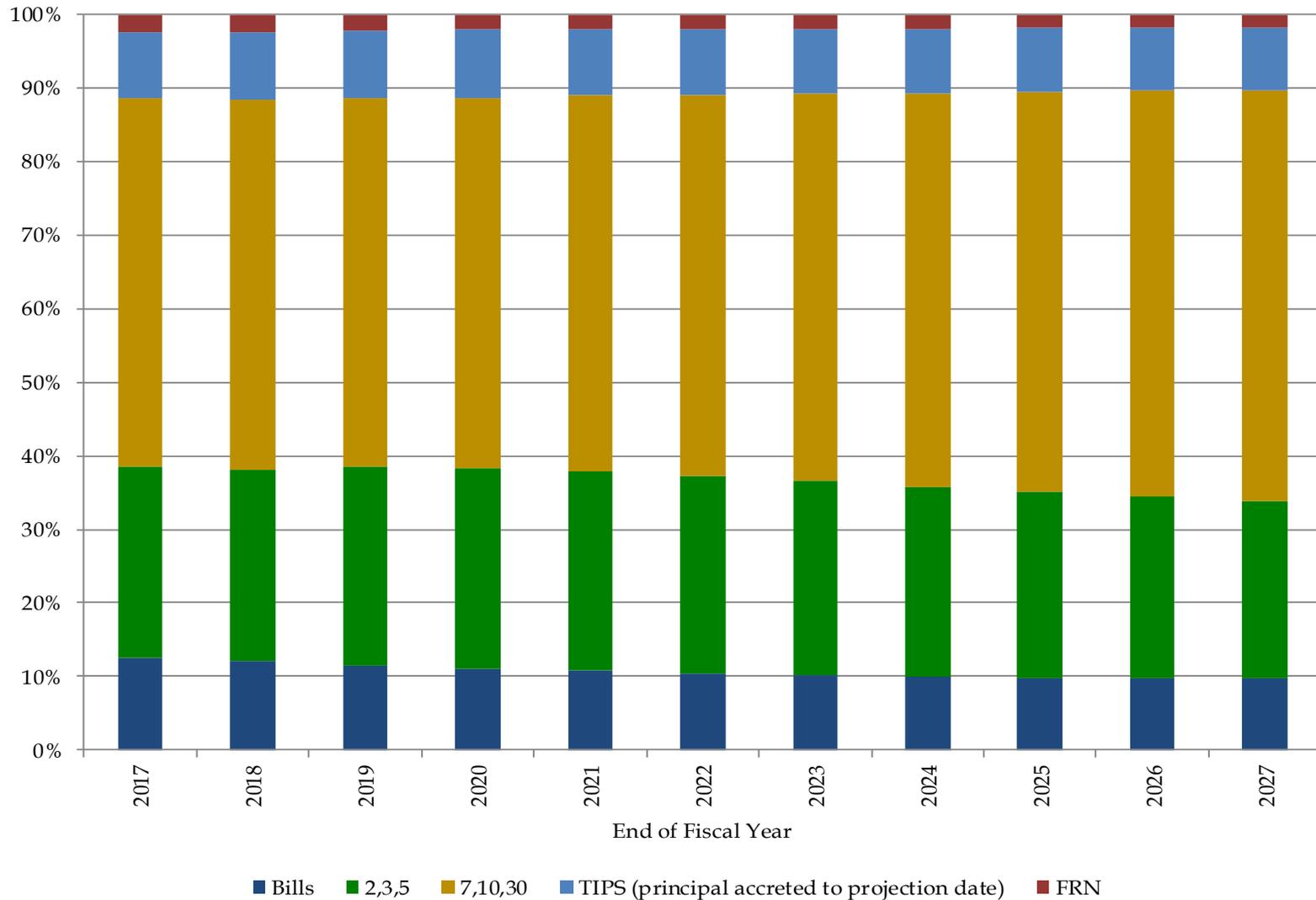


Foreign includes both private sector and official institutions.

# Appendix

The seal of the U.S. Department of the Treasury is centered behind the word "Appendix". The seal is circular and features a shield with a scale of justice, a sword, and a chevron with stars. The text "THE DEPARTMENT OF THE TREASURY" is written around the top inner edge of the seal, and "1789" is at the bottom.

## Projected Portfolio Composition by Issuance Type



This scenario does not represent any particular course of action that Treasury is expected to follow. Instead, it is intended to demonstrate the basic trajectory of average maturity absent changes to the mix of securities issued by Treasury. See table on following page for details.

## Recent and Projected Portfolio Composition by Issuance Type, Percent

End of Fiscal Year	Bills	2-, 3-, 5-Year Nominal Coupons	7-, 10-, 30-Year Nominal Coupons	Total Nominal Coupons	TIPS (principal accreted to projection date)	FRN
2009	28.5	36.2	27.4	63.6	7.9	0.0
2010	21.1	40.1	31.8	71.9	7.0	0.0
2011	15.4	41.4	35.9	77.3	7.3	0.0
2012	15.0	38.4	39.0	77.4	7.5	0.0
2013	13.2	35.8	43.0	78.7	8.1	0.0
2014	11.5	33.0	46.0	79.0	8.5	1.0
2015	10.6	29.4	49.0	78.3	8.8	2.2
2016	12.1	27.0	49.6	76.6	8.9	2.4
2017	12.5	26.2	50.0	76.2	9.0	2.4
2018	12.0	26.2	50.4	76.5	9.2	2.3
2019	11.5	26.9	50.1	77.0	9.3	2.2
2020	11.1	27.1	50.5	77.6	9.2	2.1
2021	10.7	27.2	51.1	78.2	9.1	2.0
2022	10.4	26.8	51.9	78.8	8.9	1.9
2023	10.2	26.5	52.6	79.1	8.9	1.9
2024	10.0	25.9	53.4	79.3	8.8	1.9
2025	9.8	25.3	54.4	79.7	8.6	1.8
2026	9.7	24.7	55.3	79.9	8.5	1.8
2027	9.7	24.2	55.8	80.0	8.5	1.8

This scenario does not represent any particular course of action that Treasury is expected to follow. Instead, it is intended to demonstrate the basic trajectory of average maturity absent changes to the mix of securities issued by Treasury.

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	4/6/2017	0.760	3.03	54.5	61.3	9.2	29.5	0.4	0.0	0.5
4-Week	4/13/2017	0.760	3.09	54.6	56.3	5.6	38.1	0.3	0.0	0.5
4-Week	4/20/2017	0.750	3.25	54.5	50.8	7.1	42.1	0.4	0.0	0.5
4-Week	4/27/2017	0.735	3.32	59.6	49.7	10.5	39.7	0.4	0.0	0.5
4-Week	5/4/2017	0.725	2.99	54.6	64.1	7.1	28.8	0.4	0.0	0.5
4-Week	5/11/2017	0.710	3.25	54.5	53.7	8.1	38.1	0.4	0.0	0.5
4-Week	5/18/2017	0.695	2.99	54.5	51.9	4.9	43.2	0.4	0.0	0.5
4-Week	5/25/2017	0.735	2.85	54.5	67.2	4.1	28.7	0.4	0.0	0.5
4-Week	6/1/2017	0.840	2.68	44.6	75.6	4.5	19.9	0.4	0.0	0.4
4-Week	6/8/2017	0.840	3.35	39.5	46.4	7.6	46.0	0.4	0.0	0.3
4-Week	6/15/2017	0.885	3.27	34.5	65.4	3.3	31.3	0.4	0.0	0.3
4-Week	6/22/2017	0.850	3.42	34.6	53.9	4.8	41.3	0.4	0.0	0.3
4-Week	6/29/2017	0.890	3.11	39.6	60.1	8.1	31.9	0.4	0.0	0.3
13-Week	4/6/2017	0.790	3.14	38.5	64.2	8.2	27.6	0.5	0.0	1.1
13-Week	4/13/2017	0.825	3.28	38.5	43.5	8.1	48.4	0.5	0.0	1.1
13-Week	4/20/2017	0.820	3.11	38.4	54.1	10.9	35.0	0.5	0.0	1.1
13-Week	4/27/2017	0.820	3.09	37.5	60.3	12.7	27.0	0.5	0.0	1.1
13-Week	5/4/2017	0.845	3.03	38.4	73.7	7.9	18.4	0.5	0.0	1.1
13-Week	5/11/2017	0.900	3.23	38.3	44.7	12.4	42.9	0.5	0.0	1.1
13-Week	5/18/2017	0.905	3.09	38.3	59.1	7.1	33.8	0.5	0.0	1.1
13-Week	5/25/2017	0.920	3.23	38.4	42.0	7.3	50.7	0.5	0.0	1.1
13-Week	6/1/2017	0.960	3.17	37.5	53.2	7.4	39.4	0.5	0.0	1.1
13-Week	6/8/2017	0.980	3.28	38.5	42.1	6.7	51.3	0.5	0.0	1.1
13-Week	6/15/2017	0.990	3.51	38.3	46.5	8.8	44.7	0.5	0.0	1.1
13-Week	6/22/2017	1.010	3.18	38.2	63.0	7.3	29.7	0.6	0.0	1.1
13-Week	6/29/2017	1.000	3.10	38.3	58.2	10.1	31.7	0.5	0.0	1.1
26-Week	4/6/2017	0.910	3.29	32.0	60.8	4.1	35.1	0.5	0.0	1.9
26-Week	4/13/2017	0.950	3.25	32.0	38.5	2.3	59.2	0.4	0.0	1.9
26-Week	4/20/2017	0.945	3.14	32.2	64.4	5.6	30.1	0.4	0.0	1.9
26-Week	4/27/2017	0.955	3.42	31.6	49.4	4.9	45.7	0.4	0.0	1.9
26-Week	5/4/2017	0.975	3.25	32.1	55.9	3.5	40.6	0.4	0.0	1.9
26-Week	5/11/2017	1.015	3.01	32.3	50.9	3.9	45.1	0.4	0.0	1.9
26-Week	5/18/2017	1.020	3.15	32.2	43.8	3.6	52.6	0.5	0.0	1.8
26-Week	5/25/2017	1.050	3.06	32.2	50.9	3.2	45.8	0.4	0.0	1.8
26-Week	6/1/2017	1.060	3.62	31.6	31.7	8.2	60.1	0.4	0.0	1.8
26-Week	6/8/2017	1.070	3.35	32.4	36.6	4.1	59.3	0.3	0.0	1.9
26-Week	6/15/2017	1.100	3.76	32.3	45.4	4.4	50.2	0.4	0.0	1.9
26-Week	6/22/2017	1.120	3.35	32.2	52.8	2.9	44.2	0.5	0.0	1.9
26-Week	6/29/2017	1.110	3.35	31.6	50.7	4.0	45.4	0.5	0.0	1.9
52-Week	4/27/2017	1.060	3.23	19.2	58.1	3.1	38.7	0.2	0.0	2.3
52-Week	5/25/2017	1.145	2.84	19.8	73.4	3.4	23.2	0.2	0.0	2.2
52-Week	6/22/2017	1.215	3.31	19.7	45.3	6.4	48.2	0.3	0.0	2.3
CMB	4/11/2017	0.720	4.61	0.0	100.0	0.0	0.0	0.0	0.0	0.0
CMB	6/1/2017	0.735	3.14	25.0	56.7	12.6	30.8	0.0	0.0	0.1

\*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	5/1/2017	1.280	2.85	25.7	29.7	11.4	58.9	0.2	3.5	6.7
2-Year	5/31/2017	1.316	2.90	25.8	30.4	12.4	57.2	0.1	3.1	6.5
2-Year	6/30/2017	1.348	3.03	25.7	25.0	18.3	56.6	0.2	3.2	6.6
3-Year	4/17/2017	1.525	2.62	23.8	39.9	8.3	51.8	0.1	0.2	8.1
3-Year	5/15/2017	1.572	2.76	23.9	39.9	9.3	50.8	0.0	7.9	10.8
3-Year	6/15/2017	1.500	3.00	23.8	28.2	6.2	65.6	0.1	0.0	8.0
5-Year	5/1/2017	1.875	2.34	34.0	37.4	5.3	57.3	0.0	4.6	21.1
5-Year	5/31/2017	1.831	2.67	33.9	22.7	8.6	68.7	0.1	4.1	20.5
5-Year	6/30/2017	1.828	2.33	33.9	25.6	9.2	65.2	0.1	4.1	20.8
7-Year	5/1/2017	2.084	2.73	28.0	8.8	9.5	81.7	0.0	3.8	23.7
7-Year	5/31/2017	2.060	2.54	28.0	21.6	17.2	61.2	0.0	3.4	23.1
7-Year	6/30/2017	2.056	2.46	28.0	25.2	9.4	65.4	0.0	3.4	23.3
10-Year	4/17/2017	2.332	2.48	20.0	29.5	5.3	65.2	0.0	0.2	20.1
10-Year	5/15/2017	2.400	2.33	23.0	34.2	5.1	60.7	0.0	7.6	31.3
10-Year	6/15/2017	2.195	2.54	20.0	28.6	5.3	66.1	0.0	0.0	20.0
30-Year	4/17/2017	2.938	2.23	12.0	29.7	5.8	64.5	0.0	0.1	27.1
30-Year	5/15/2017	3.050	2.19	15.0	35.6	5.3	59.1	0.0	5.0	45.2
30-Year	6/15/2017	2.870	2.32	12.0	29.6	6.7	63.7	0.0	0.0	27.0
2-Year FRN	5/1/2017	0.070	3.35	15.0	36.9	0.3	62.8	0.0	2.0	0.0
2-Year FRN	5/26/2017	0.050	2.99	13.0	58.4	0.8	40.8	0.0	0.0	0.0
2-Year FRN	6/30/2017	0.080	3.13	13.0	36.7	0.2	63.1	0.0	1.6	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	4/28/2017	(0.049)	2.52	15.9	16.7	9.2	74.2	0.1	0.0	9.1
10-Year TIPS	5/31/2017	0.420	2.56	11.0	11.3	8.4	80.3	0.0	1.3	13.1
30-Year TIPS	6/30/2017	0.880	2.83	5.0	15.5	8.4	76.1	0.0	0.6	16.6

\*Weighted averages of competitive awards.

\*\*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.

# TBAC Charge: Normalization of SOMA portfolio

*What factors should Treasury consider as it thinks about the additional funding needed to meet future redemptions from the Fed's SOMA Treasury portfolio? For example, when should Treasury begin increasing auction sizes and in what tenors? How should Treasury plan for any unforeseen shocks to borrowing needs over the period when the Fed is normalizing the SOMA portfolio? Are there any disruptive secondary-market impacts related to unwinding the SOMA portfolio that Treasury needs to consider? (E.g., market dislocations as the stock of lendable securities in SOMA declines?) If so, what might Treasury consider to address such concerns?*

# Agenda

1. Expectations for balance sheet normalization
  - When will Fed start phasing out Treasury holdings?
  - What will be the size of Treasury holdings once the Fed balance sheet is normalized?
  - How will the Fed distribute eventual Treasury purchases across maturities?
  
2. Expectations for resulting Treasury issuance
  - How large will Treasury's financing needs be? When should Treasury start increasing auction sizes?
  - What will be the impact on auction stop-out rates?
  - What is the recommended distribution across tenors for higher financing needs?
  
3. Market implications of balance sheet normalization
  - Will SOMA redemptions have disruptive secondary market impacts?
  - What will be the impact on financial markets overall including risk assets?
  - How will the repo market be impacted?

# 1. Expectations for balance sheet normalization

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# Summary of expectations for Fed balance sheet normalization

- The FOMC will announce a phasing out of Treasury and MBS reinvestments at the September FOMC meeting to start October 1<sup>st</sup>, 2017.
- When conducting monetary policy, the FOMC will maintain the current floor system. We estimate “steady state” reserves of \$650 billion, which includes a “buffer”.
  - The balance sheet will reach normal levels by 1Q 2021.
  - At time of normalization, Treasury holdings to be \$1.7 trillion, down from \$2.5 trillion now.
- After normalization, the Fed will reinvest all maturing Treasuries on a pro-rata basis across auctions. Maturing MBS will be reinvested in T-bills.
  - The Fed’s holdings of Treasuries will grow by \$100-200bn per year post normalization.
  - The impact on 10y premiums should be 40bp over the period.

# FOMC approach to reducing SOMA holdings

- The Committee intends to gradually reduce the Federal Reserve's securities holdings by decreasing its reinvestment of the principal payments it receives from securities held in the System Open Market Account. Specifically, such payments will be reinvested only to the extent that they exceed gradually rising caps.
- For payments of principal that the Federal Reserve receives from maturing Treasury securities, the Committee anticipates that the cap will be \$6 billion per month initially and will increase in steps of \$6 billion at three-month intervals over 12 months until it reaches \$30 billion per month.
- For payments of principal that the Federal Reserve receives from its holdings of agency debt and mortgage-backed securities, the Committee anticipates that the cap will be \$4 billion per month initially and will increase in steps of \$4 billion at three-month intervals over 12 months until it reaches \$20 billion per month.
- The Committee also anticipates that the caps will remain in place once they reach their respective maximums so that the Federal Reserve's securities holdings will continue to decline in a gradual and predictable manner until the Committee judges that the Federal Reserve is holding no more securities than necessary to implement monetary policy efficiently and effectively.

# Current Federal Reserve Balance Sheet

## Federal Reserve Balance Sheet

USD \$bls, As of June 2017

### Assets

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Securities held outright	4,235
<i>US Treasuries</i>	2,465
<i>Agency Debt and MBS</i>	1,770
Other Assets	274

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<b>Total Assets</b>	<b>4,510</b>
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### Liabilities and Capital

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Currency in Circulation	1,560
Deposits	280
<i>Treasury General Account</i>	198
<i>FMUs and others</i>	77
<i>Foreign Officials</i>	5
<i>Term Deposits</i>	-
Reverse Repurchase Agreements	505
<i>Foreign RRP</i>	241
<i>Others</i>	264
Other Liabilities and Capital	47

Reserve Balances	2,118
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<b>Total Liabilities and Capital</b>	<b>4,510</b>
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# A framework for projecting Fed balance sheet normalization

- To project the future path of the Federal Reserve's balance sheet we estimate the evolution of the various Federal Reserve asset and liability accounts. We know the near-term path of Treasury coupon reinvestments with certainty.\* Forecasting the other accounts can be boiled down to three key questions:
  - What is the natural growth of Fed liabilities, excluding reserves?
    - Currency in circulation
    - Treasury General Account (TGA)
    - Foreign and other RRP
    - FMU accounts
  - What is the steady state level of reserves?
    - Will the Fed use a floor or corridor system for effective Fed funds?
    - What are the additional banking system reserve needs due to post crisis regulations, including LCR?
  - What is the pace of MBS prepays?
    - Future path of interest rates?

\*Note, the path of TIPS inflation compensation is uncertain.

# Base case expectations

## Federal Reserve Balance Sheet

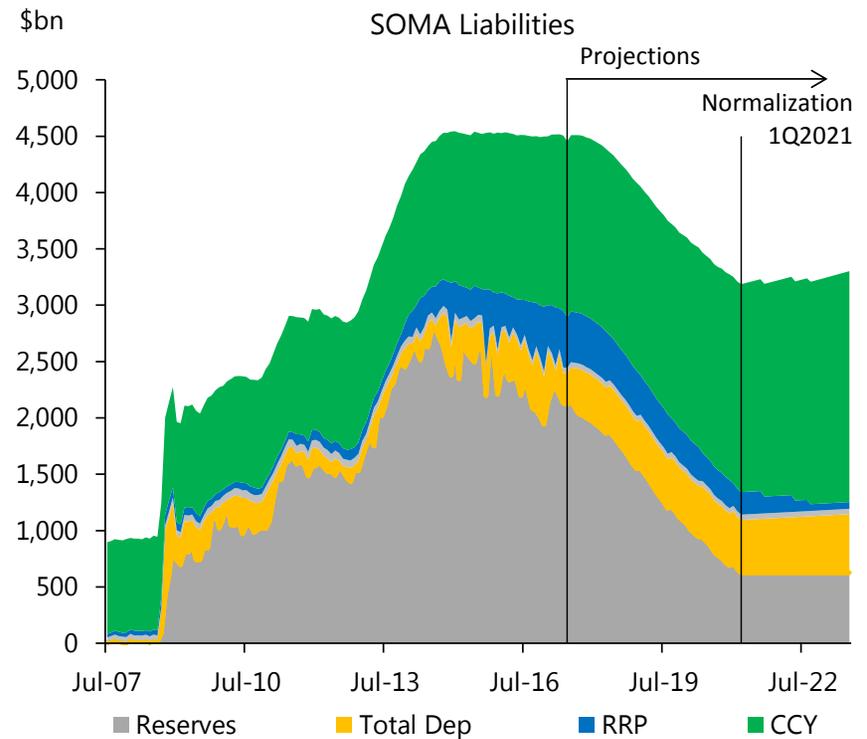
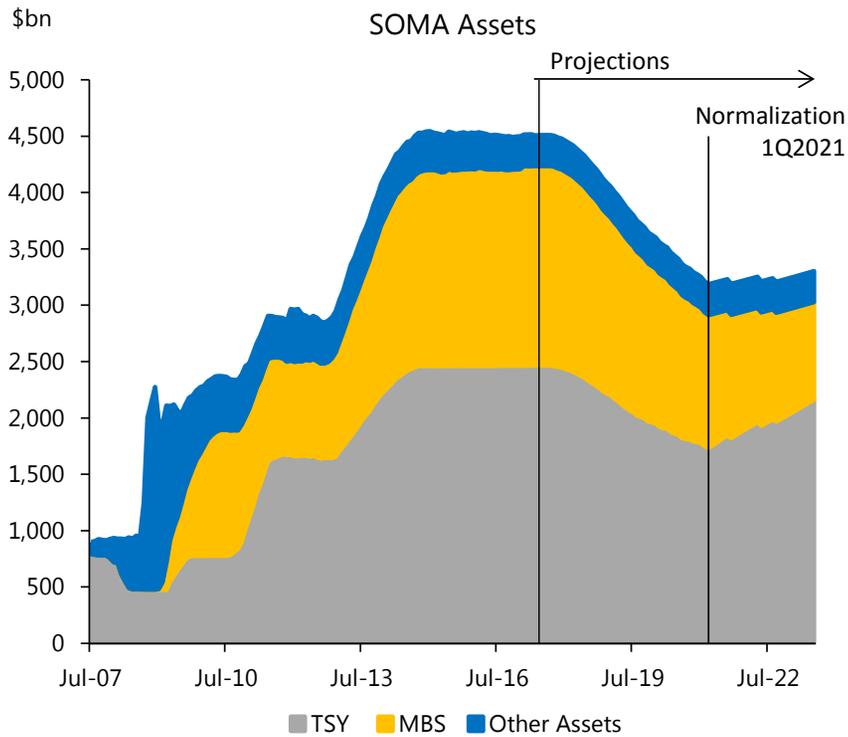
<i>USD \$bls, As of June 2017</i>	<b>Current</b>	<b>1Q2021**</b>	<b>Diff</b>
<b>Assets</b>			
TSY	2,465	1,735	(730)
MBS	1,770	1,178	(592)
Other Assets	274	274	-
<b>Total Assets</b>	<b>4,510</b>	<b>3,187</b>	<b>(1,323)</b>
<b>Liabilities</b>			
CCY in Circulation	1,559	1,821	262
Total Deposits	280	468	188
RRPs	505	200	(305)
Other Liabilities & Capital	47	47	-
Bank Reserves	2,119	650	(1,469)
<b>Total Liabilities</b>	<b>4,510</b>	<b>3,187</b>	<b>(1,324)</b>

- Currency in circulation – grows 4.5% a year, lower than post-crisis growth of 7%, due to higher opportunity cost of holding cash as rates rise
- TGA – Treasury cash balances return to 5-day liquidity standard after debt ceiling suspended / reset and grow with GDI afterward
- FMU Deposits – FMU margin accounts expected to grow inline with banking system deposits
- RRP – Dealer RRP facility slowly phased out over time. Foreign RRP balances unchanged to slightly lower. Foreign RRP rate is set based on average of relevant o/n rates. Balances have been stable despite rate hikes.
- Steady state reserves (key assumption) - Our \$650bn steady state reserve forecast based on estimated future LCR – related bank reserve demand (\$500bn) plus additional buffer to maintain floor system (\$150bn).
- MBS prepays (key assumption) – MBS prepay as forwards are realized.

\*\* We expect b/s to reach steady state in !Q 2021

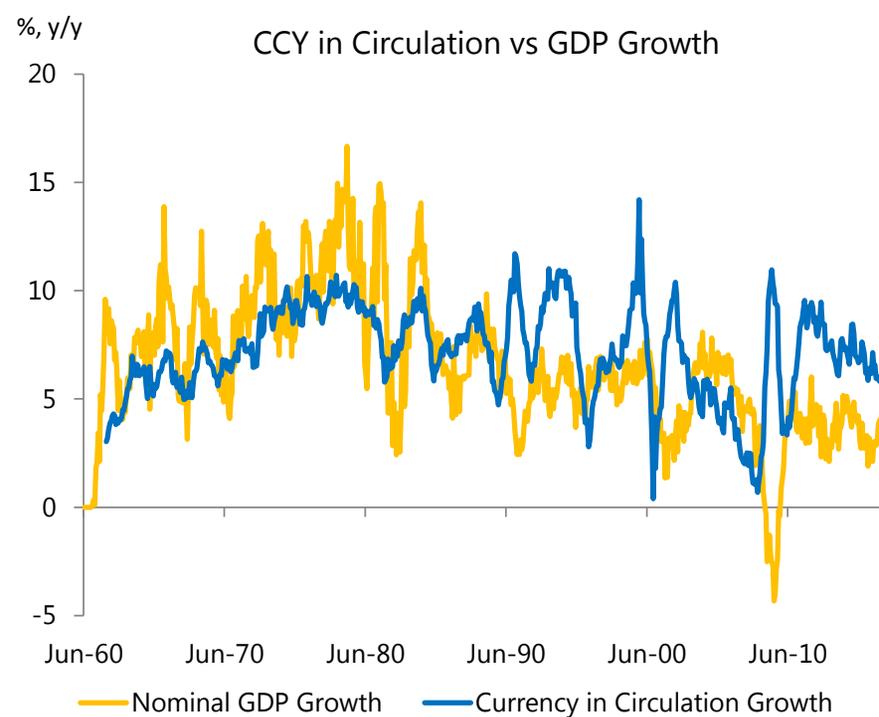
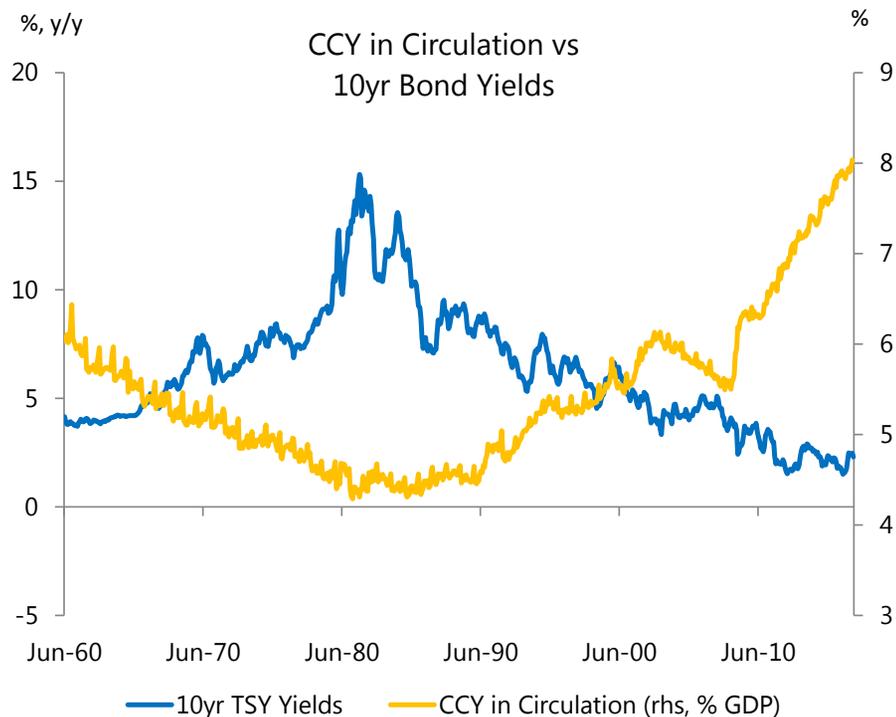
# Projected Path of SOMA Assets and Liabilities

The projections are most sensitive to the “Key Assumptions”, including 4.5% currency growth, \$650bn steady state reserves and MBS prepays as forwards are realized.



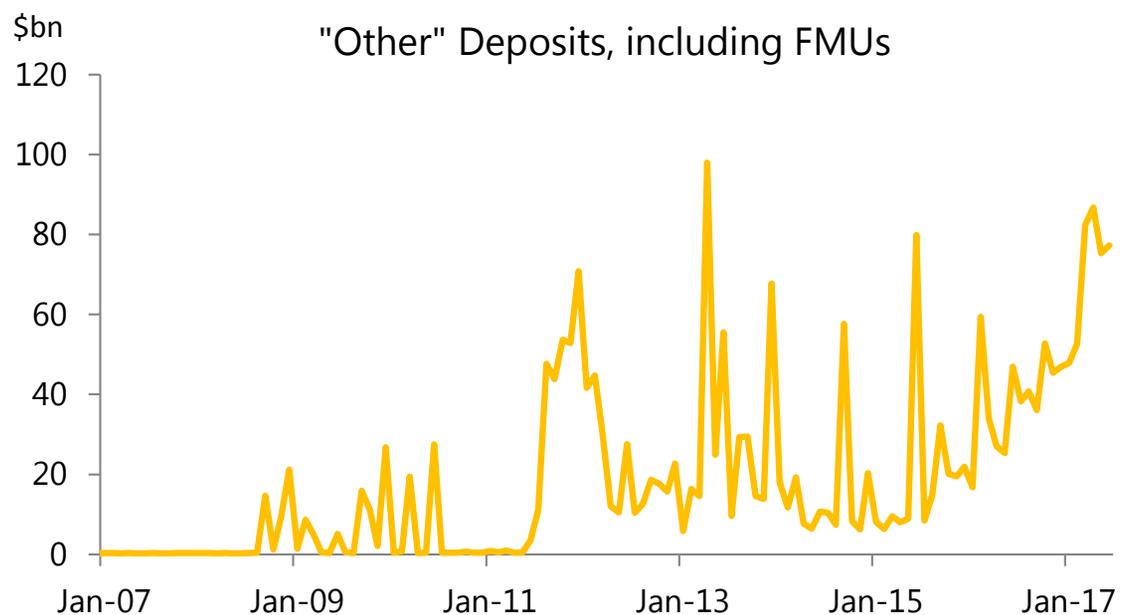
# Currency in Circulation– Growth likely to decline as rates rise

Currency in circulation growth is a function of the opportunity costs of holding cash and GDP growth. Other factors like currency digitalization could also be influential. Similar to the 2004-2006 Fed hiking cycle, currency demand growth will likely decline relative to GDP as the Fed continues to raise interest rates.



# Modest Increases in FMU Deposits Held at the Fed

On January 2015, the Board of Governors of the Federal Reserve announced the 8 clearing houses designed as systemically important Financial Market Utilities (FMUs) could establish deposit accounts at the Federal Reserve. Since then, FMU deposits – client margin balances – have grown by about \$70bn.



# Steady State Excess Reserves Likely Higher than Pre-Crisis

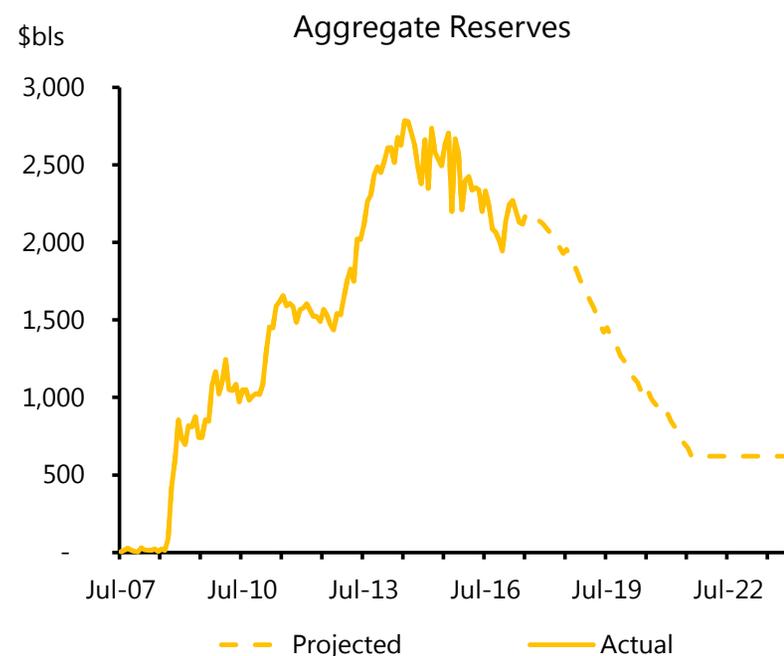
The November 2016 FOMC minutes indicated that SOMA participants are generally in favor of maintaining the floor system for monetary policy management. This requires maintaining the minimum supply of reserves at remains on the flat portion of the bank reserve demand curve.

## Estimated LCR-Related Reserve Demand

	LCR Level	Haircut	Banks >\$250bn
<b>Cap-Adjusted HQLA</b>			
Eligible Level 1	1	100%	1,350
<i>of which Reserves</i>	1	100%	428
Eligible Level 2A	2a	85%	523
Eligible Level 2B	2b	50%	65
<b>Total HQLA</b>			<b>1,938</b>
<b>Total Assets</b>			13,841
<b>HQLA / Total Assets</b>			14%
<b>Reserves/HQLA</b>			22%
<b>Projected HQLA</b>			2,200
<i>Of which Reserves</i>			500
<b>Reserve Buffer to Maintain Floor</b>			150
<b>Total Steady State Reserves</b>			650

Source: FDIC Call Report, Rezende Et al (2016), PIMCO Calculations

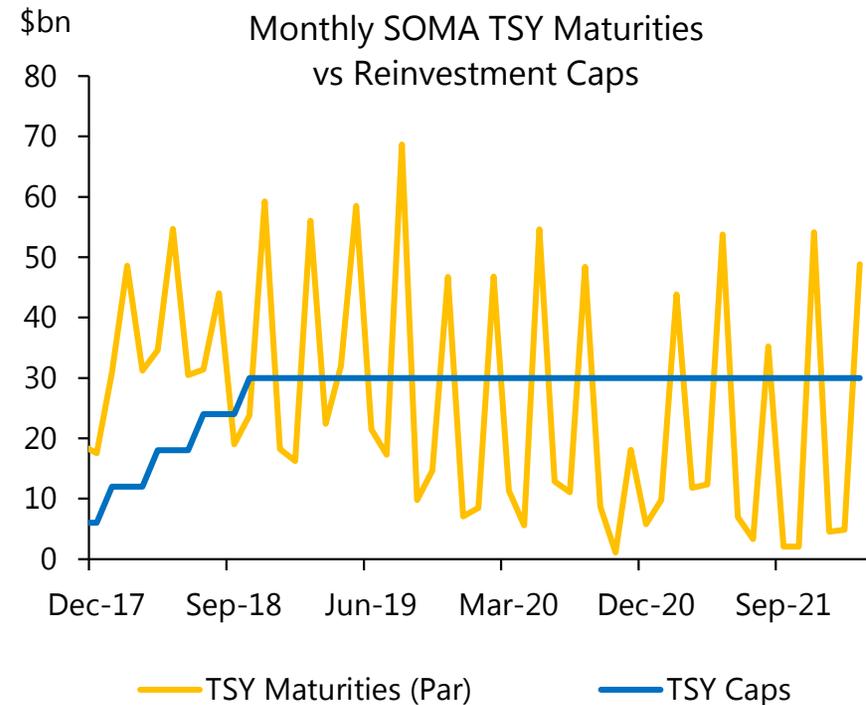
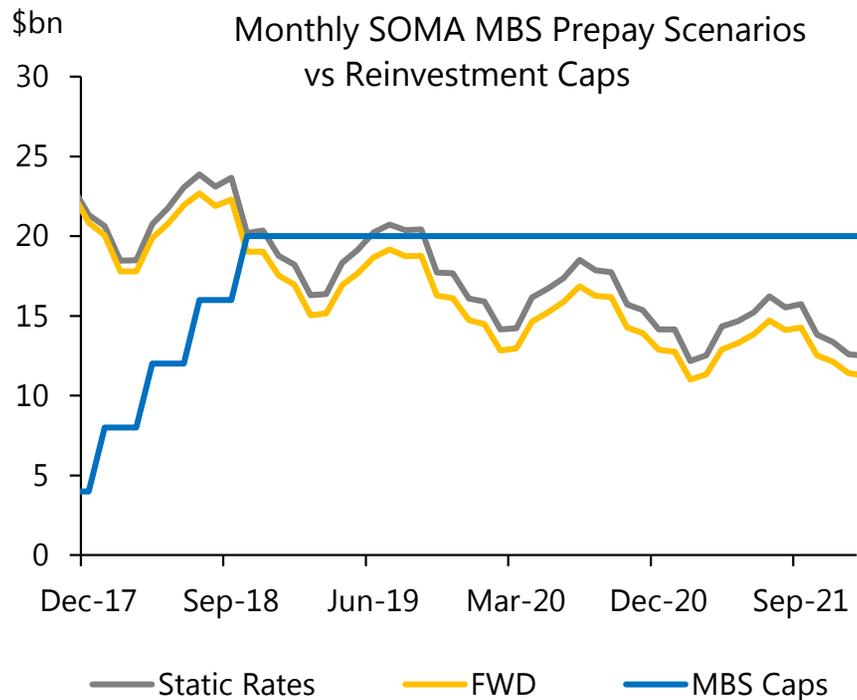
\*Aggregate Deposits are assumed to grow by 4% per year.



Post crisis regulations, including the liquidity coverage ratio (LCR), have likely increased banking system demand for reserves. We estimate that system wide HQLA is currently \$1.9 trillion, of which 22% is bank reserves. We expect this to grow inline with deposits over time. Our \$650bn steady state reserve forecasts are based on estimated future bank reserve demand (\$500bn) plus an additional buffer to maintain the floor system (\$150bn).

# Treasury and Projected MBS Maturities vs Announced Caps

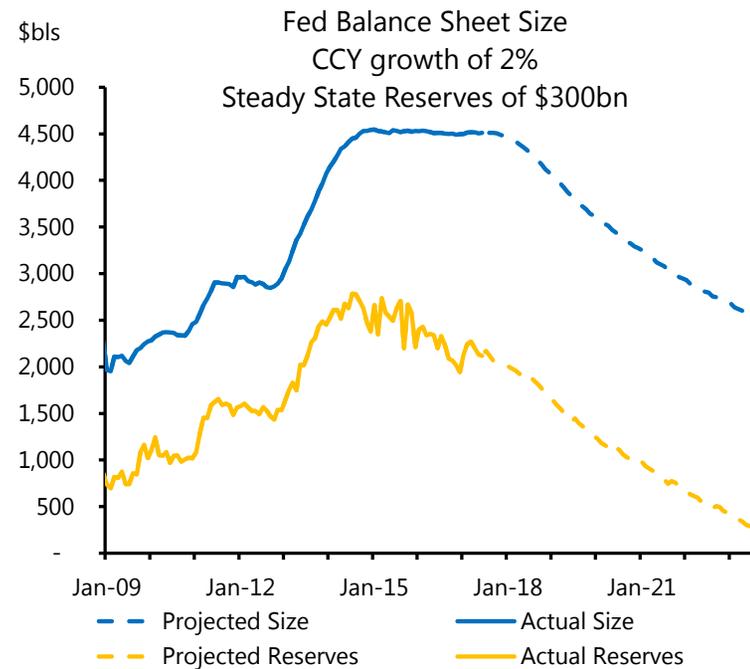
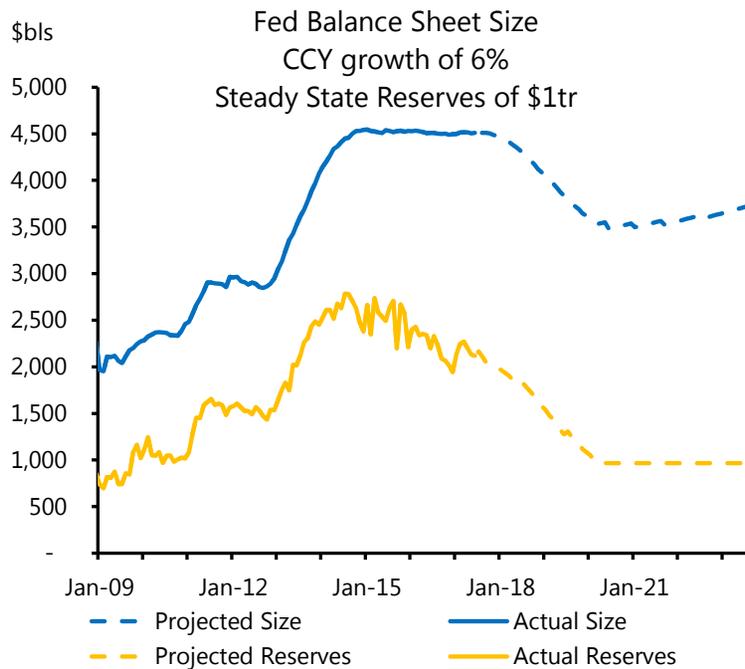
During many months, the actual proceeds of SOMA Treasury and MBS maturities are expected to be less than the respective cap. After the first year, monthly maturing MBS proceeds are estimated to come under the cap most of the time, while Treasury proceeds will be under the cap around half of the time.



Rates +/- 50 bps from forwards would imply size of terminal MBS holdings ~ +/- \$ 60 bn

# Projections of Fed Balance Sheet Size: Various Scenarios

Under alternative scenarios for steady state reserves and currency growth, the length of time required to normalize the balance sheet varies from roughly 2.5- to 6-years, and the projected incremental Treasury funding need varies from \$510bn to \$1tril.



**Date Steady State Reached Under Various Scenarios**

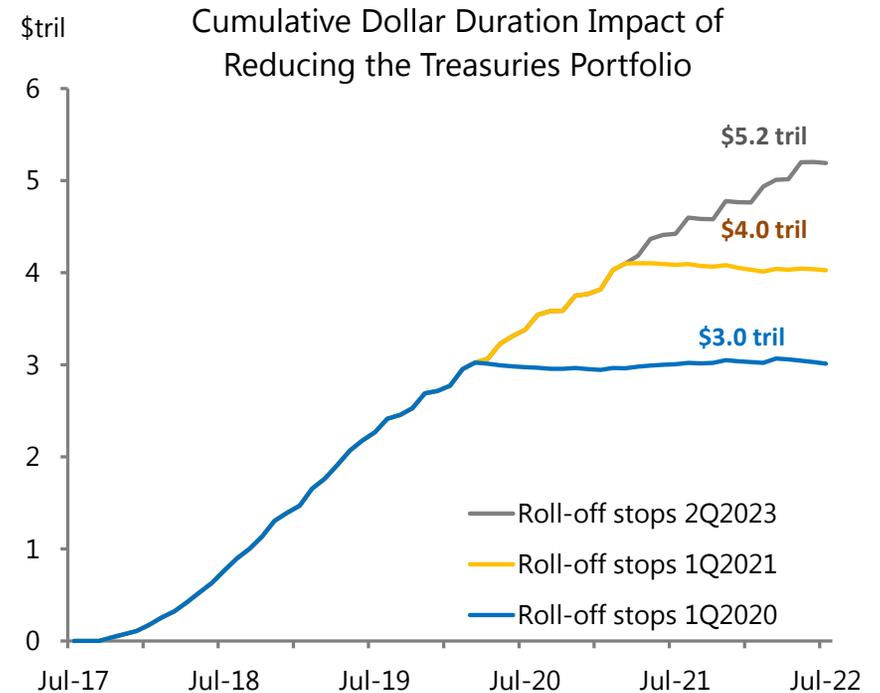
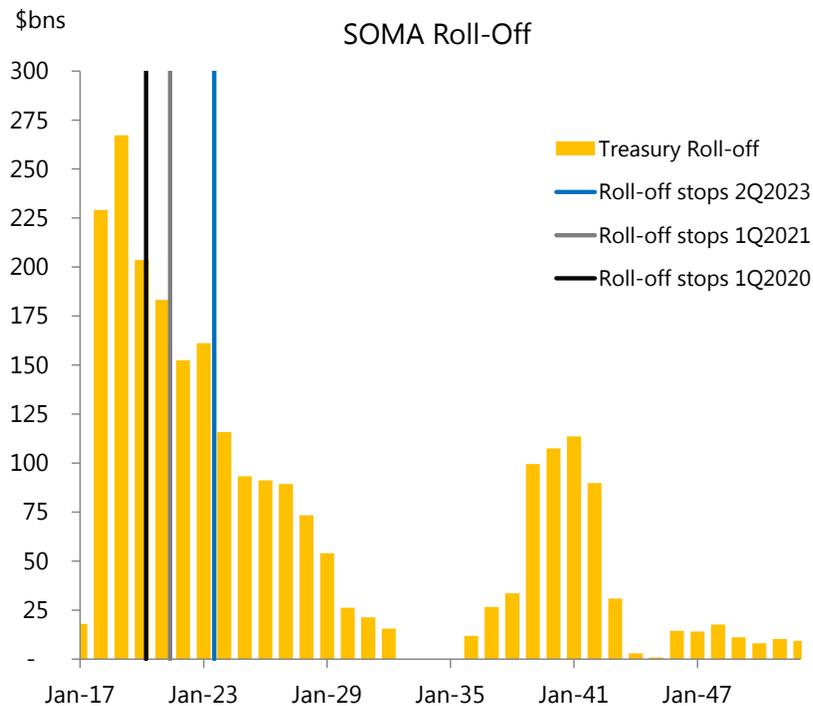
		Reserves		
		\$300B	\$650B	\$1T
CCY Growth	2%	3Q2023	3Q2021	3Q2020
	4.5%	1Q2022	<b>1Q2021</b>	2Q2020
	6%	4Q2021	3Q2020	1Q2020

**Projected Treasury Funding Need Under Various Scenarios**

		Reserves		
		\$300B	\$650B	\$1T
CCY Growth	2%	1030	850	650
	4.5%	890	<b>730</b>	560
	6%	810	650	510

# Dollar duration impact of the B/S reduction in Treasuries

In our base case, incremental dollar duration supplied to the Treasury market would reach \$4T\* (or \$470B in 10Y equivalent\*\*) due to the reduction in the Treasury portfolio from October 2017 to March 2021 (at which point tapering stops as reserves level of \$650B is reached).



Dollar duration = par amount x duration, Treasury auctions are assumed to be increased on a pro-rata basis.

\*\* Calculated by dividing the dollar duration by the 10Y Bond current duration (8.6)

# 10yr Term Premium Impact

Based on a number of studies of the privately held supply impact on 10yr Term premiums, we estimate the decline in SOMA securities holdings over the next 4yrs could raise 10yr Treasury yields by 40bps, all else equal.

<b>Study</b>	<b>Sample</b>	<b>10yr Yield Effect per 1ppt of GDP (bp)</b>
Modigliani-Sutch (1966,1967)	Operation Twist	0
Greenwood-Vayanos	Postwar US	4
Bernanke et al (2004)	US	10
Krishnamurthy et al (2010, 2011)	QE1 and QE2	4
Gagnon et al (2011)	QE1	7
D'Amico et al (2012)	QE1	12
Hamilton et al (2011)	QE2	4
Hancock et al (2011)	QE1	8
Swanson (2011)	Operation Twist	4
Neely (2011)	QE1	4
<b>Average</b>		<b>6</b>
Projected Decline in Fed Asset Holdings (Next 4yrs, % of GDP)		7ppts
10yr Yield Impact (bp)		40

We expect the impact on the MBS spread to be a further 10-15 bps in the absence of regulatory changes.

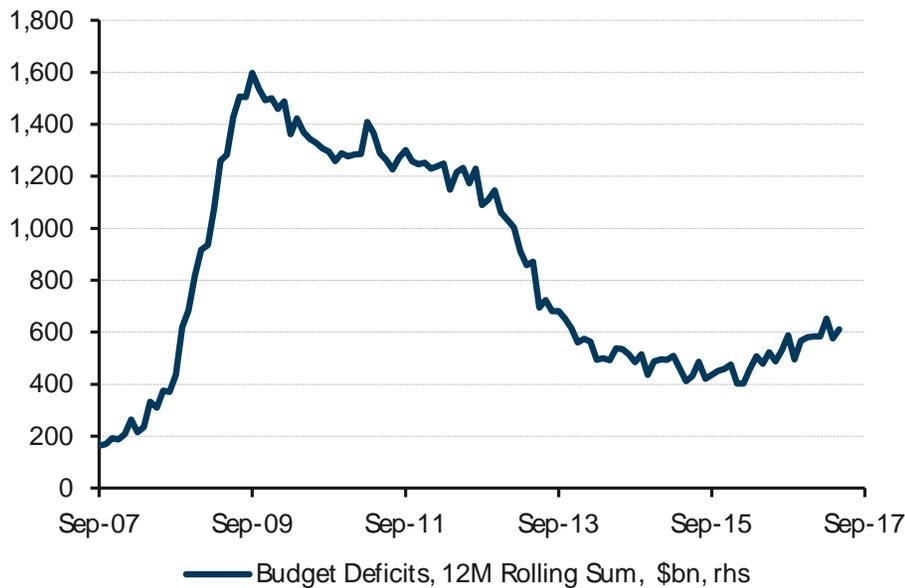
## 2. Expectations for resulting Treasury issuance

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# Primary dealer surveys forecast rising budget deficits

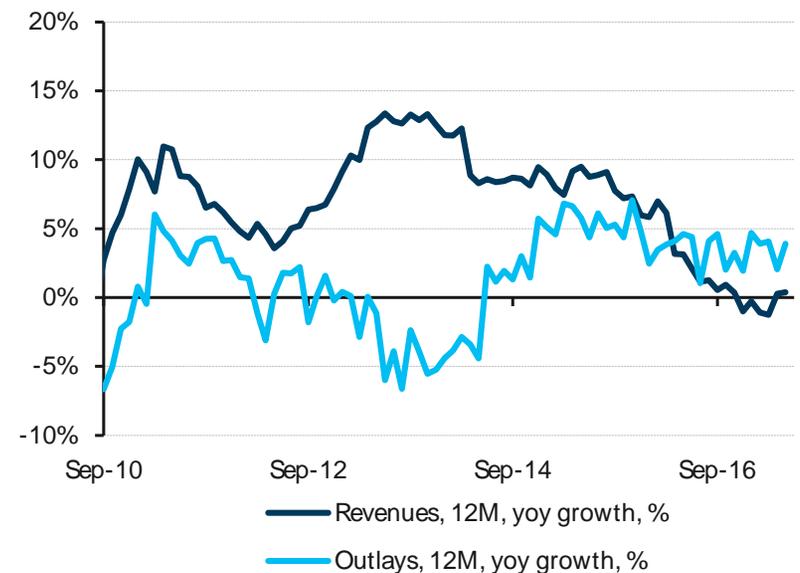
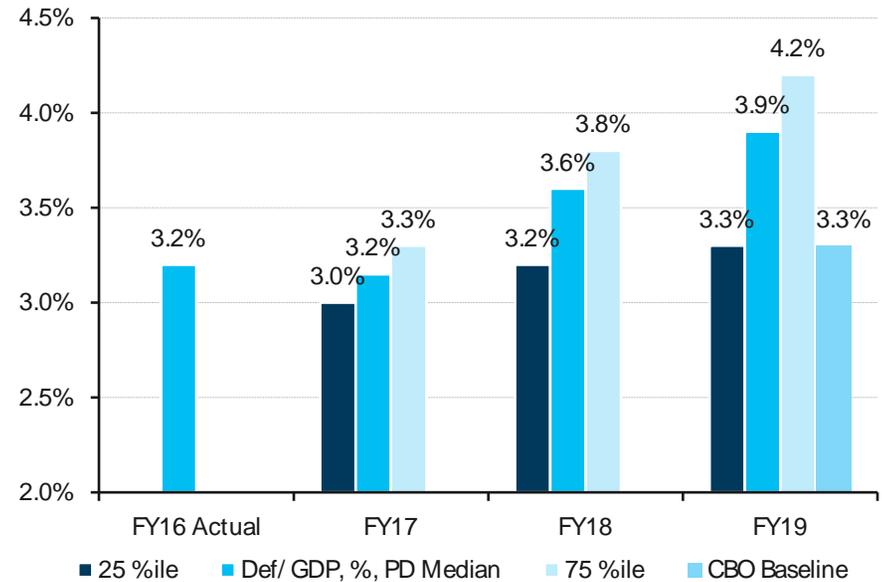
- Budget deficits have widened from post-crisis lows as revenue growth has slowed down amid a steady increase in outlays
- The latest NY Fed survey shows median expectation of deficits of 3.9% by FY-19 (~\$800bn), versus 3.2% in FY-17 (~\$600bn).
- These estimates likely assume modestly expansionary fiscal policy. CBO baseline is for 3.3% budget deficits in FY-19 vs PD median of 3.9%

## Budget deficits have widened from the post-crisis lows



Source: New York Fed Primary Dealer Survey, Haver Analytics, Barclays Research

## Primary dealers expect deficits to widen



# Borrowing needs over coming years – median estimates

- Borrowing needs are likely to be substantial higher over the coming years if budget deficits widen as per the PD survey
- In 2017, the Treasury partly financed deficits by reducing its cash balance. Returning the cash balance to desired levels, will add to borrowing needs
- Student loans related borrowing needs remain elevated at \$75-\$100bn
- Overall, borrowing needs could be in the range of \$850bn-\$1trillion over the coming years as compared with \$500-\$550bn in 2017

**Borrowing needs are likely to be significantly higher over the coming years**

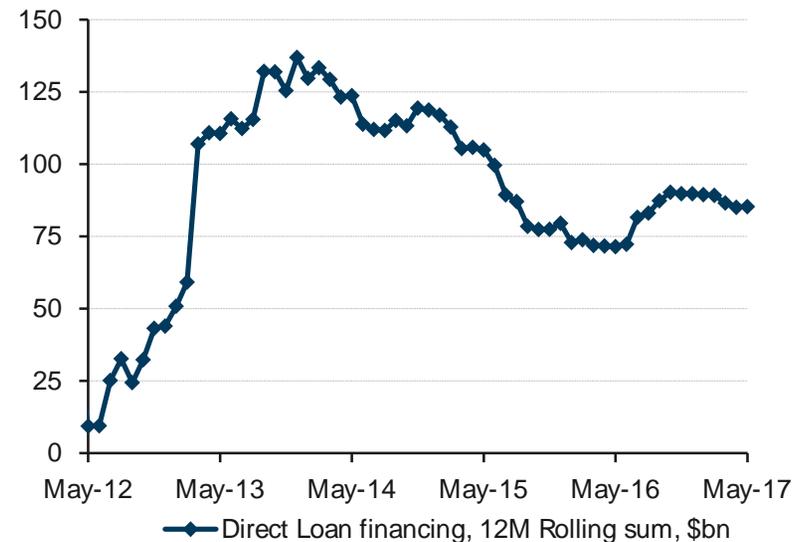
\$bn	CY-17	CY-18	CY-19	CY-20
Budget Deficits	600	740	830	920
Change in Cash Balance	-150	50	0	0
Others (mainly Std loans)	75	90	90	90
<b>Net Borrowing Needs</b>	<b>525</b>	<b>880</b>	<b>920</b>	<b>1,010</b>

Note: The cash balance is assumed to be \$250bn at YE-17, rising to \$300bn by YE-18.  
Source: New York Fed Primary Dealer Survey, US Treasury, Haver Analytics, Barclays Research

**Current cash balance is likely low relative to desired level**



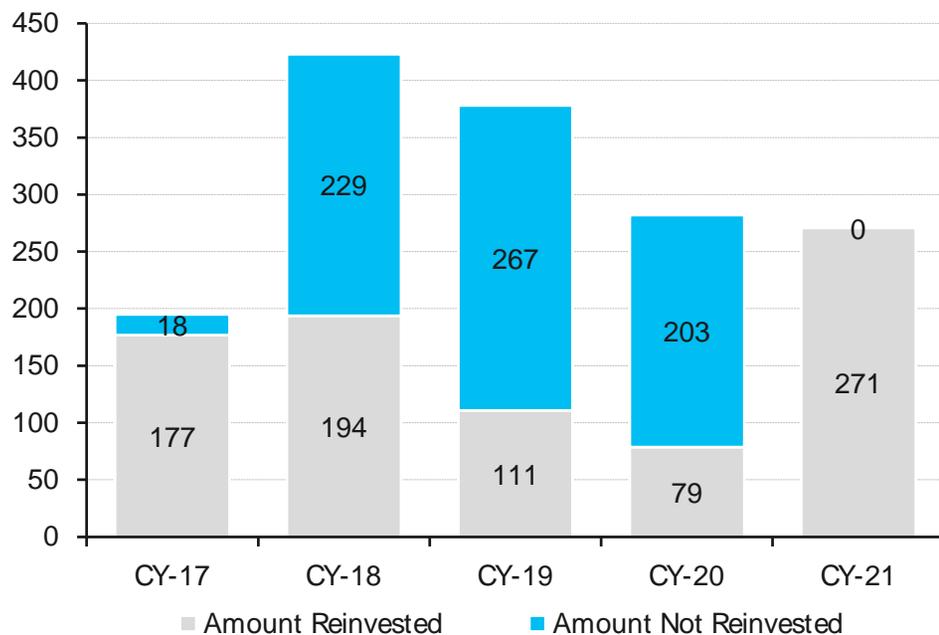
**Student loans related borrowing needs remain significant**



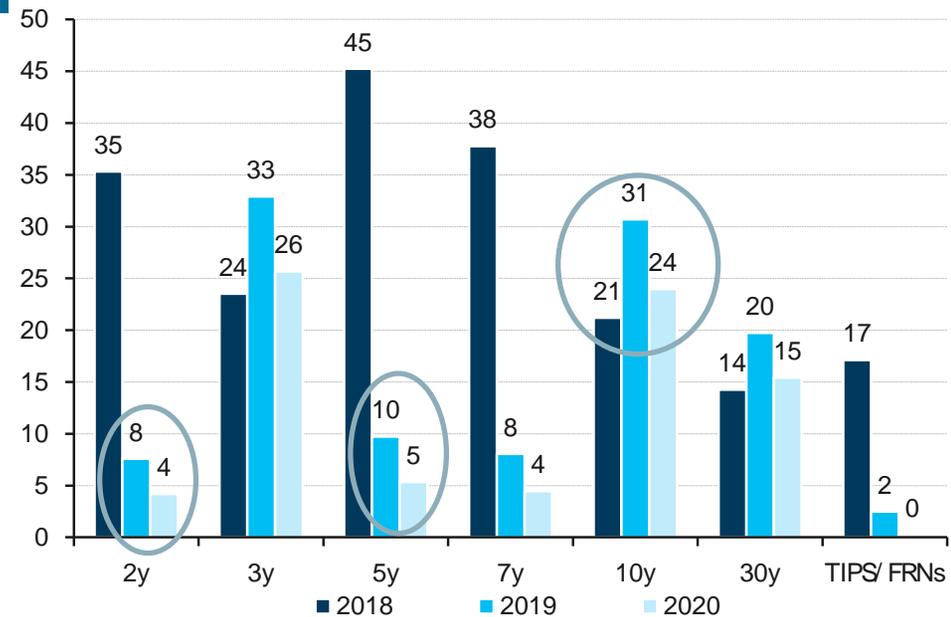
# Addons: elevated in 2018 but below 2017 levels in 2019/2020

- SOMA addons would be substantially smaller under the proposed strategy, than in the status quo
- Of the ~\$425bn maturing in the Fed's Treasury portfolio in 2018, ~\$195bn would be reinvested. Still addons would be higher than those in 2017 which are expected to be ~\$180bn.
- SOMA addons should fall to ~\$110bn in 2019 and ~\$80bn in 2020. The distribution of maturing Treasuries suggests that the reduction would come mainly at month end auctions.
- Assuming that the normalization process is complete by early 2021, the Fed would need to resume reinvestments of maturing Treasuries in 2021.
- Net Treasury purchases related to re-investing pay-downs in the Agency portfolio and those needed to keep reserve balances unchanged (mainly, keeping up with the increase in the currency in circulation) will likely be conducted in the secondary market.

**SOMA add-ons will still be elevated in 2018 falling below 2017 levels in 2019/2020**



**Addons at month end auctions (2s,5s,7s) would fall much more than those at mid-month auctions (3s,10s,30s)**



Source: Federal Reserve, New York Fed, US Treasury, Barclays Research

# Treasury issuance likely to rise significantly over coming years

- Both net and gross issuance to public would need to steadily rise over the coming years.
- Primary reason for increased net issuance is higher borrowing needs (\$475-\$500bn higher in CY-20 vs. CY 17). Assuming that the share of T-bills is steadily raised to ~16%, net issuance ex-bills would still need to be \$325bn higher in 2020 vs. 2017.
- Annual gross issuance ex-bills would need to increase more. The amount of maturing debt which has to be refinanced is scheduled to steadily rise (~\$250bn higher in CY-20 vs. CY 17).
- Reduced SOMA add-ons further add to gross issuance to public but are not the primary direct reason for increasing issuance; Would be \$100bn lower in 2020 (\$80bn) vs. 2017 (\$180bn)
- As compared with 2017, annual offering amounts ex-bills would be ~\$275bn higher in CY-18, ~\$475bn higher in CY-19 and ~\$670bn in CY-20.
- While SOMA add-ons would increase in 2021, offering amounts to public need not have to fall as 1. budget deficits may rise further, 2. the Treasury may want to stabilize the share of the T-bill universe, thus reducing the net cash raised via T-bills and 3. the amount of maturing debt that needs to be refinanced rises further.

\$bn	CY-17	CY-18	CY-19	CY-20	CY 18 vs. 17	CY 19 vs. 17	CY 20 vs. 17
a. Net Borrowing Needs	525	880	920	1,010	355	395	<b>+485</b>
b. Net Bill Issuance*	124	237	257	286	113	133	<b>+161</b>
c. Net Issuance ex-bills (a-b)	401	643	663	724	242	262	<b>+324</b>
d. Maturing Debt ex-bills	1,824	1,872	1,972	2,073	49	148	<b>+250</b>
e. Gross Issuance ex-bills (c+d)	2,224	2,515	2,635	2,798	291	411	<b>+574</b>
f. SOMA Add-ons	177	194	111	79	17	-66	<b>-98</b>
<b>g. Offering Amounts (e-f)</b>	<b>2,047</b>	<b>2,321</b>	<b>2,524</b>	<b>2,719</b>	<b>+274</b>	<b>+477</b>	<b>+672</b>
Bills, % Debt	13%	14%	15%	16%			

Note: \*T-bills as a % of outstanding debt is assumed to gradually rise to 16% by YE-20. The amount of maturing debt in future years is estimated assuming a proportional increase in all nominal auction sizes starting early next year. Source: Federal Reserve, New York Fed, US Treasury, Barclays Research

## Deficits: PD median versus Administration forecasts

\$bn	CY-17	CY-18	CY-19	CY-20	
Budget Deficits	600	500	480	460	<b>Administration</b>
Change in Cash Balance	-150	50	0	0	
Others	75	90	90	90	
<b>Net Borrowing Needs</b>	<b>525</b>	<b>640</b>	<b>570</b>	<b>550</b>	
\$bn	CY-17	CY-18	CY-19	CY-20	
Budget Deficits	600	740	830	920	<b>Primary dealer median</b>
Change in Cash Balance	-150	50	0	0	
Others (mainly Std loans)	75	90	90	90	
<b>Net Borrowing Needs</b>	<b>525</b>	<b>880</b>	<b>920</b>	<b>1,010</b>	

Note: We convert the Administration's FY deficit forecasts into CY forecasts here

# Treasury financing needs: PD median vs Administration forecasts

## Administration

\$bn	CY-17	CY-18	CY-19	CY-20	CY 18 vs. 17	CY 19 vs. 17	CY 20 vs. 17
a. Net Borrowing Needs	525	640	570	550	115	45	25
b. Net Bill Issuance*	124	203	203	208	79	78	84
c. Net Issuance ex-bills (a-b)	401	437	367	342	36	-33	-59
d. Maturing Debt ex-bills	1,824	1,872	1,972	2,036	49	148	212
e. Gross Issuance ex-bills (c+d)	2,224	2,309	2,339	2,378	85	115	154
f. SOMA Addons	177	194	111	79	17	-66	-98
<b>g. Offering Amounts (e-f)</b>	<b>2,047</b>	<b>2,115</b>	<b>2,228</b>	<b>2,299</b>	<b>+68</b>	<b>+181</b>	<b>+252</b>
Bills, % Debt	13%	14%	15%	16%			

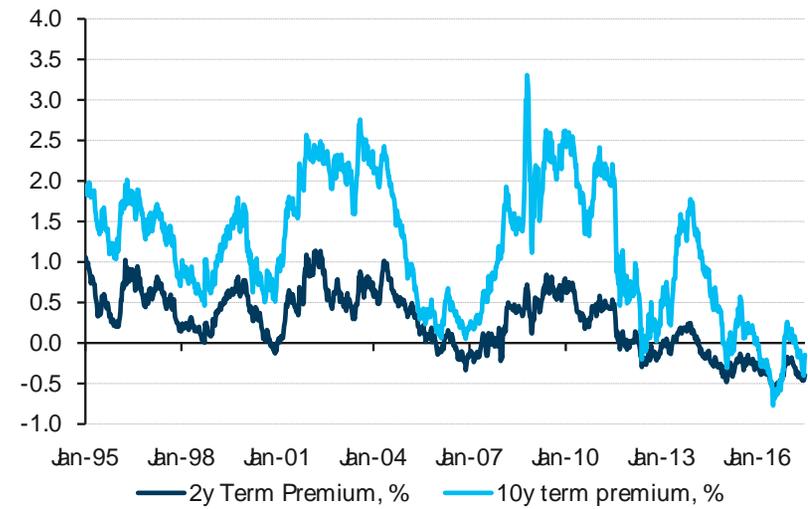
## Primary dealer median

\$bn	CY-17	CY-18	CY-19	CY-20	CY 18 vs. 17	CY 19 vs. 17	CY 20 vs. 17
a. Net Borrowing Needs	525	880	920	1,010	355	395	+485
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Bills, % Debt	13%	14%	15%	16%			

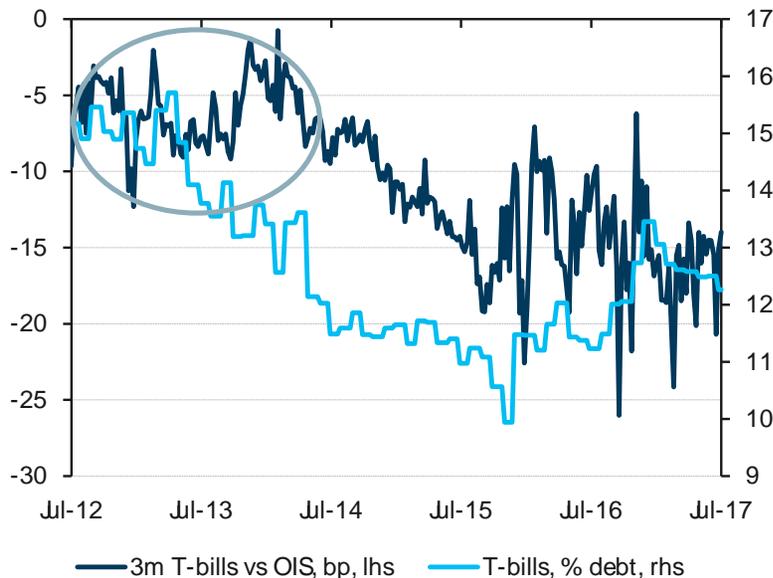
# How should the Treasury distribute the required increases? Ex-ante cost analysis suggests increasing issuance across the curve

- T-bills have remained rich versus similar maturity OIS rates even as their share has risen from the lows. This likely reflects the increase in demand base due to money market reform. There is room for further expanding the T-bill universe.
- Term premia across the nominal curve is low in a historical context, suggesting ex-ante cost of issuing term debt is low. The Treasury should consider across-the-board increases.
- Inflation risk premia is likely negative which suggests a relatively smaller percentage increase in TIPS auction sizes would be desirable

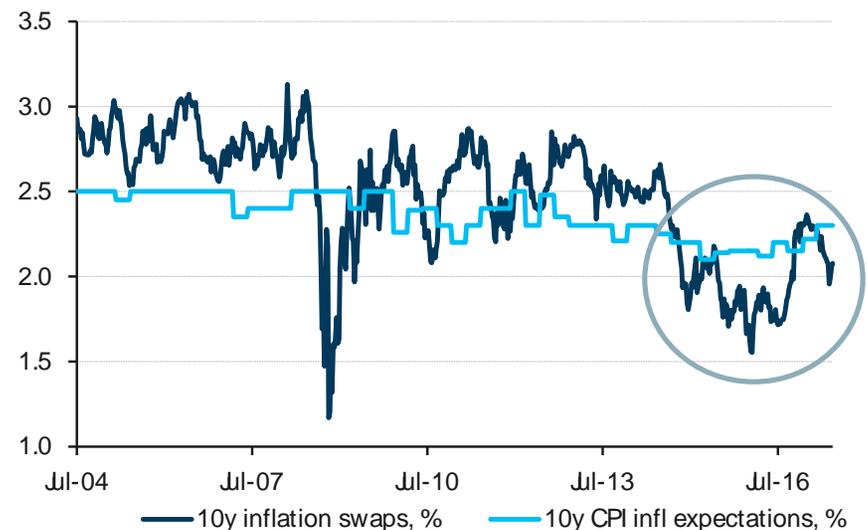
**Term Premia is low across the curve, allowing for increasing term issuance across the curve**



**T-bills are trading rich to similar maturity OIS suggesting room for increasing the share of the T-bill universe**



**Inflation risk premia is likely negative, suggesting the increase in TIPS issuance could be relatively smaller**

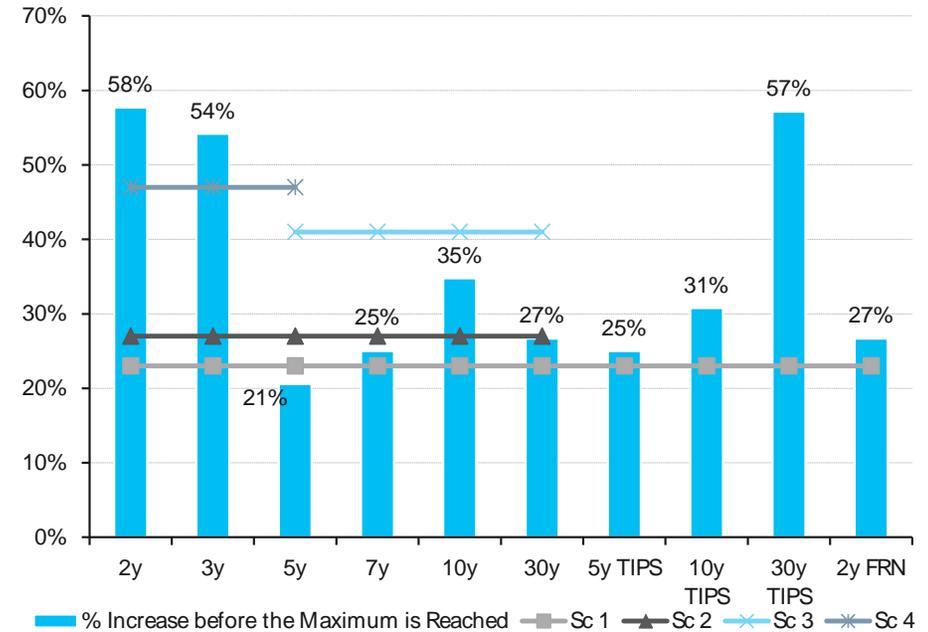


Source: New York Fed ACM Model, SPF, Haver Analytics, Barclays Research

# Given median fiscal forecast and potential limits on auction sizes, an across-the-board increase in issuance is a viable option

- In addition to ex-ante costs considerations, the distribution of the required increases should take into account the maximum size Treasury can issue without significant yield deviation, though this may change over time (use primary dealer survey as a guide).
- Assuming no changes in auction sizes this year, the Treasury is scheduled to issue (in gross terms) ~\$2.05 across all tenors including TIPS and FRNs, ~\$1.75trn in 2y-30y nominal coupons, ~\$1.15trn in 5y-30y nominal coupons and ~\$1trn in 2y-5y nominal coupons in 2017.
- Sc 1: An across-the-board proportional increase of auction sizes by about 20-25% would suffice through 2019. Such a percentage increase would be within the range PDs have highlighted in the latest auction size survey
- Sc 2: If increasing sizes proportionally only for 2y-30y nominal coupon issues, the required % increase would be roughly 25-30%; still mostly within the desired range.
- Sc 3: If increasing sizes proportionally only for 5y-30y nominal issues, the required % increase would be roughly 40%; well above what PDs have noted that can be absorbed without significant yield deviation.
- Sc 4: If increasing sizes proportionally only for 2y-5y nominal fixed coupon issues, the required % increase would be almost 50%; within the limit for 2y and 3y but well above that for the 5y.
- Hence, Scenarios 1 and 2 seem more desirable.**

	CY-17 Issuance	CY-18	CY-19	CY-20
Required Increase in Annual Gross Issuance (ex-bills), \$bn		+274	+477	+672
		% Increase vs 2017 Levels		
Sc 1. All Tenors including FRNS/TIPS	2,047	13%	<b>23%</b>	33%
Sc 2. Only 2y-30y Nom Cpns.	1,752	16%	<b>27%</b>	38%
Sc 3. Only 5y-30y Nom Cpns.	1,152	24%	<b>41%</b>	58%
Sc 4. Only 2y-5y Nom Cpns.	1,008	27%	<b>47%</b>	67%



Source: Federal Reserve, New York Fed, US Treasury Primary Dealer Survey, Barclays Research

# Issuance: PD median versus administration forecasts

	CY-17 Issuance	CY-18	CY-19	CY-20
Required Increase in Annual Gross Issuance (ex-bills), \$bn		+68	+181	+252
		% Increase vs 2017 Levels		
Sc 1. All Tenors including FRNS/TIPS	2,047	3%	9%	12%
Sc 2. Only 2y-30y Nom Cpns.	1,752	4%	10%	14%
Sc 3. Only 5y-30y Nom Cpns.	1,152	6%	16%	22%
Sc 4. Only 2y-5y Nom Cpns.	1,008	7%	18%	25%

Administration

	CY-17 Issuance	CY-18	CY-19	CY-20
Required Increase in Annual Gross Issuance (ex-bills), \$bn		+274	+477	+672
		% Increase vs 2017 Levels		
Sc 1. All Tenors including FRNS/TIPS	2,047	13%	<b>23%</b>	33%
Sc 2. Only 2y-30y Nom Cpns.	1,752	16%	<b>27%</b>	38%
Sc 3. Only 5y-30y Nom Cpns.	1,152	24%	<b>41%</b>	58%
Sc 4. Only 2y-5y Nom Cpns.	1,008	27%	<b>47%</b>	67%

Primary dealer median

Note: \*T-bills as a % of outstanding debt is assumed to gradually rises to 16% by YE-20. The amount of maturing debt in future years is estimated assuming a proportional increase in all nominal auction sizes starting early next year. Source: Federal Reserve, New York Fed, US Treasury, Barclays Research

# Impact on auction stop out rates of across-the-board increases would be limited

- The impact of across-the-board increases in auction sizes on auction stop out rates would also be limited
- Judging from the latest primary dealer survey on auction sizes, raising auction sizes would have the biggest effect on stop out rates on longer tenors. For a \$1bn/mo change over a 12 month period, the median forecast is for the stop out rate to be 4bp and 5bp higher 12 month forward for 30y Nominals and TIPS respectively.
- Assuming that auction sizes are raised to required levels (based on the % increase needed in 2019) over a 12 month period, the effective increase in auction sizes per month would be less than a \$1bn/month under Scenarios 1 and 2. For longer tenors, the increase would be less than \$0.5bn/mo.
- This also suggests that the Treasury should distribute the increases rather than concentrate them in a few tenors

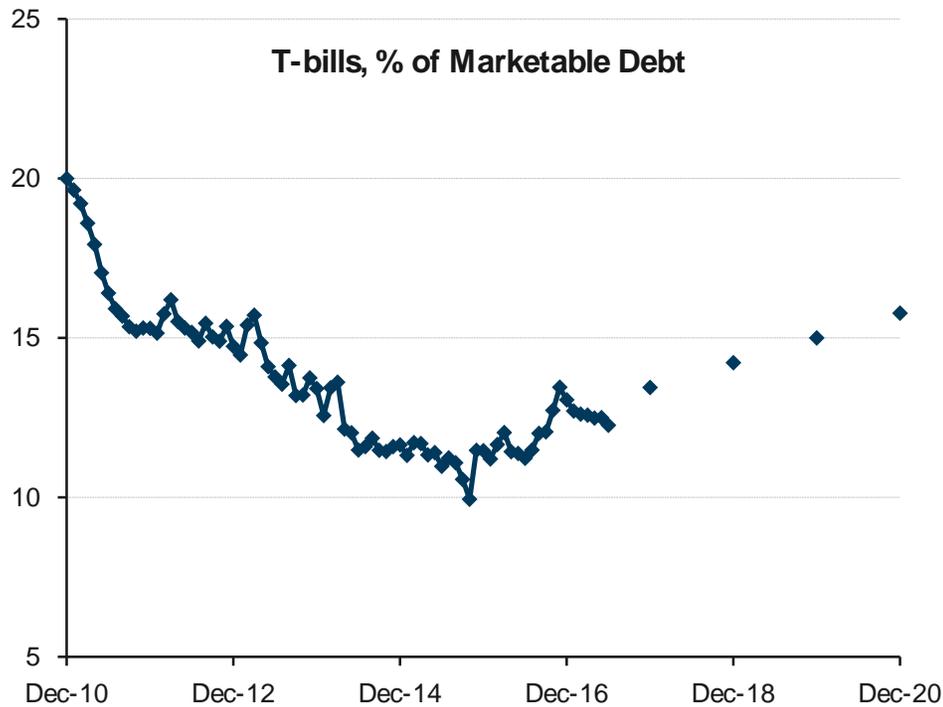
	Current New Issue Sizes, \$bn	Cumulative change in auction sizes over a 12M period, \$bn		Effective Rate of Change, \$bn/m		PD Response on Impact of Auction Stop out Rate 12M Fwd	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Median for a \$1bn/M increase, bp	Standard deviation, bp
2y	26	6	7	0.5	0.6	1	1.0
3y	24	6	6	0.5	0.5	1	1.4
5y	34	8	9	0.7	0.8	2	2.4
7y	28	6	8	0.5	0.6	2	3.5
10y	23	5	6	<b>0.4</b>	<b>0.5</b>	<b>3</b>	2.9
30y	15	3	4	<b>0.3</b>	<b>0.3</b>	<b>4</b>	4.3
5y TIPS	16	4		0.3		3	3.0
10y TIPS	13	3		0.2		3	3.9
30y TIPS	7	2		<b>0.1</b>		<b>5</b>	5.8
2y FRN	15	3		0.3		1	1.9

Source: Federal Reserve, New York Fed, US Treasury, Barclays Research

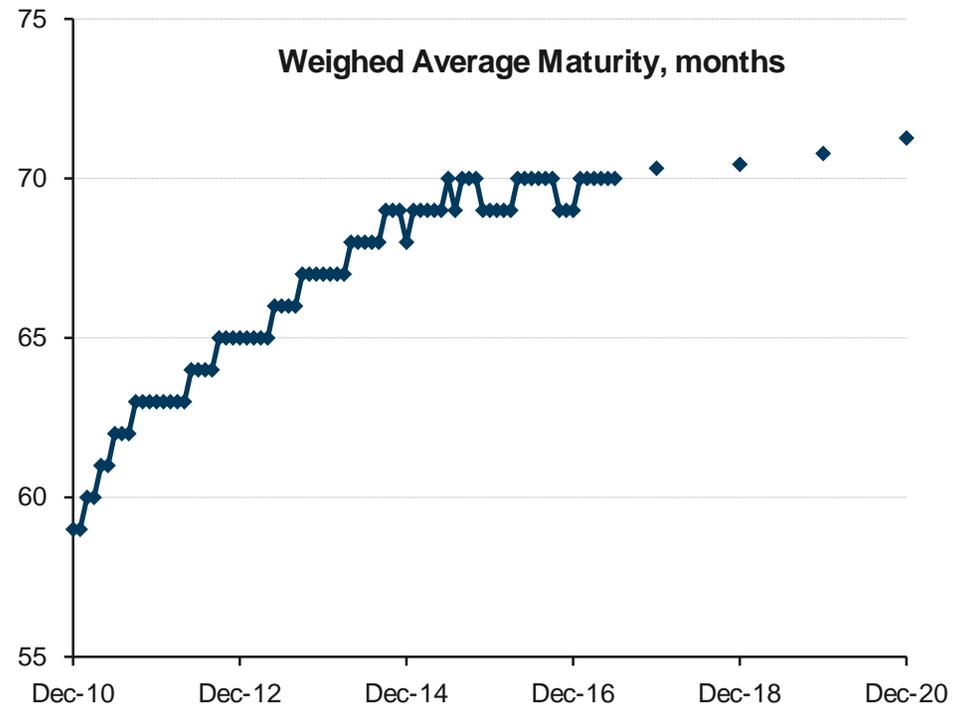
# An across-the-board increase in auction sizes would also ensure a modest further lengthening of the average maturity

- The share of T-bills outstanding would rise from current low levels.
- The weighted average maturity (WAM) would also gradually rise over the coming years, after having stalled at ~70 months for the past couple of years.
- Were the Treasury to instead rely just on T-bills (or say issues up to the 5y tenor) to meet the increase in borrowing needs, the WAM is likely to fall.

Share of T-bill universe would rise from the recent lows



Weighted Average Maturity would also modestly rise assuming a proportional increase in nominal coupon auction sizes



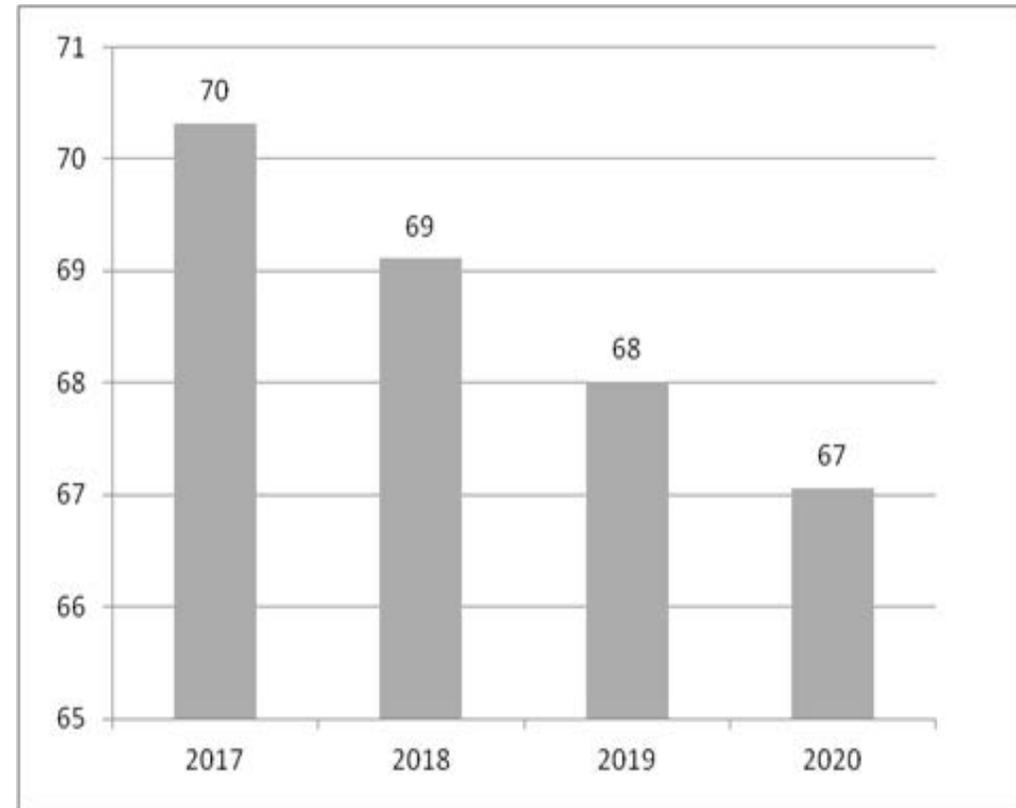
Source: Federal Reserve, New York Fed, US Treasury, Barclays Research

# Treasury financing needs with a large jump in T-bill's share

## Bill share to 22% in 3 years

	CY-17	CY-18	CY-19	CY-20
Net Borrowing	525	880	920	1,010
Net Bills	124	578	639	714
Net Issuance ex-bills	401	302	281	296
Maturing Debt ex-bills	1,824	1,872	1,972	2,022
Gross Issuance ex-bills	2,224	2,174	2,253	2,318
Amount Reinvested	177	194	111	79
Amount Not Reinvested	18	229	267	203
Offering Amounts	2,047	1,980	2,142	2,239
Change vs 2017		-67	95	192
<b>Memo: Bills, % Debt</b>	<b>13%</b>	<b>16%</b>	<b>19%</b>	<b>22%</b>

## WAM goes down in this scenario



# Summing up issuance needs

- Net and gross issuance to public would need to steadily rise over the coming years for three main reasons:
  - Treasury's borrowing needs are likely to be substantially higher over the coming years as budget deficits steadily widen, especially if a fiscally expansionary policy is put in place
  - The amount of maturing debt which needs to be refinanced is also scheduled to rise
  - SOMA run-off will simply add to these factors, but will not be the main driver
- The Treasury should consider increasing auction sizes across all tenors in addition to the traditional manner of responding to cyclical debt needs, which relies primarily on the short end:
  - Ex-ante cost considerations suggests that there is room to expand the T-bill universe and increase term issuance as well. Low inflation risk premia suggests the increase in TIPS issuance could be smaller
  - Likely limits on issue sizes and the impact on auction stop out rates also suggest distributing the required increases rather than concentrating them at either the front end or the long end.
  - Under this proposal, the WAM would gradually increase. Were the Treasury to concentrate increases at the front end of the curve, WAM is likely to fall.
- In terms of the timing of increases,
  - Given that higher borrowing needs are the primary driver for higher issuance needs over the medium term and not the change in the Fed's reinvestment policy per se, the Treasury should carefully consider fiscal policies as it makes decisions about various debt management scenarios..
  - If the median medium-term fiscal forecast is a good guide, Treasury should consider increasing coupon debt as soon as the November refunding and as late as Q1 2018.
  - In particular, our recommendation is that Treasury consider a broader increase in issuance across tenors.

## 3. Market implications of balance sheet normalization

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# Takeaways

## Linear Normalization with the Potential for Nonlinear Credit Risks

**Part 1: Risk premium compression.** Central bank balance sheet expansion, declining bond risk premium, and lower yields induced rising investor bond demand and tighter credit spreads. Corporates filled the demand gap with a surge in borrowing used for equity buybacks. Pure financial engineering.

**Part 2: Risk Premium decompression, accelerators:** Small increases in yields can potentially lead to large changes in risk premium. Credit is the key transmission. Pro-cyclical behavior of investors who 'piggy backed' central bank purchases and ECB tapering are possible accelerators to the rise in US risk premium in a tail risk event.

**Part 3: Let markets clear.** A downside risk in a stress scenario is a meaningful decline in risk assets. But it isn't systemic. Banks and households have not leveraged to higher asset prices. It is a financial engineering shock.

# Low Risk Premium Driven by Declining Real Yields

Risk premium have declined with lower real yields, counter to historic norm of risk narrowing with higher real yields

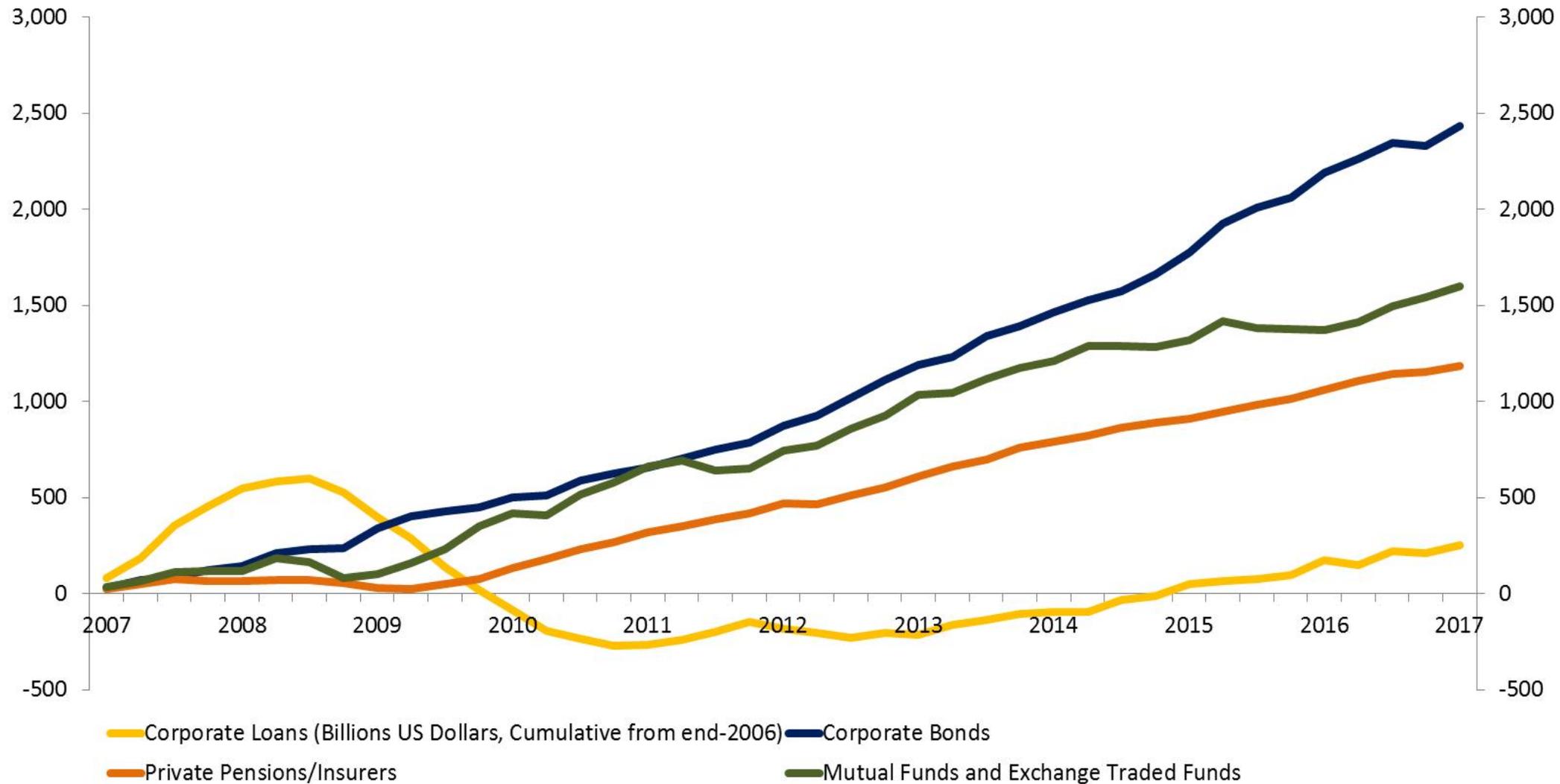
**Risk Premium Low and Low Real Rates**  
(median of percent rank for BBB credit spread, B-BBB spread, bond volatility index, and equity volatility index)



# Corporate Bonds Satisfy Surge in Investor Demand

Mutual fund and ETFs have been main vehicles for risk premium compression, and corporates filled the demand gap

Cumulative Flows by Asset Class and Investor Type



# Corporate Leverage is High, More Sensitive to Higher Rates

Consequence – corporates have peak leverage based on expectations of permanently lower rates and tight spreads

### US Investment-Grade Net Leverage Ratio

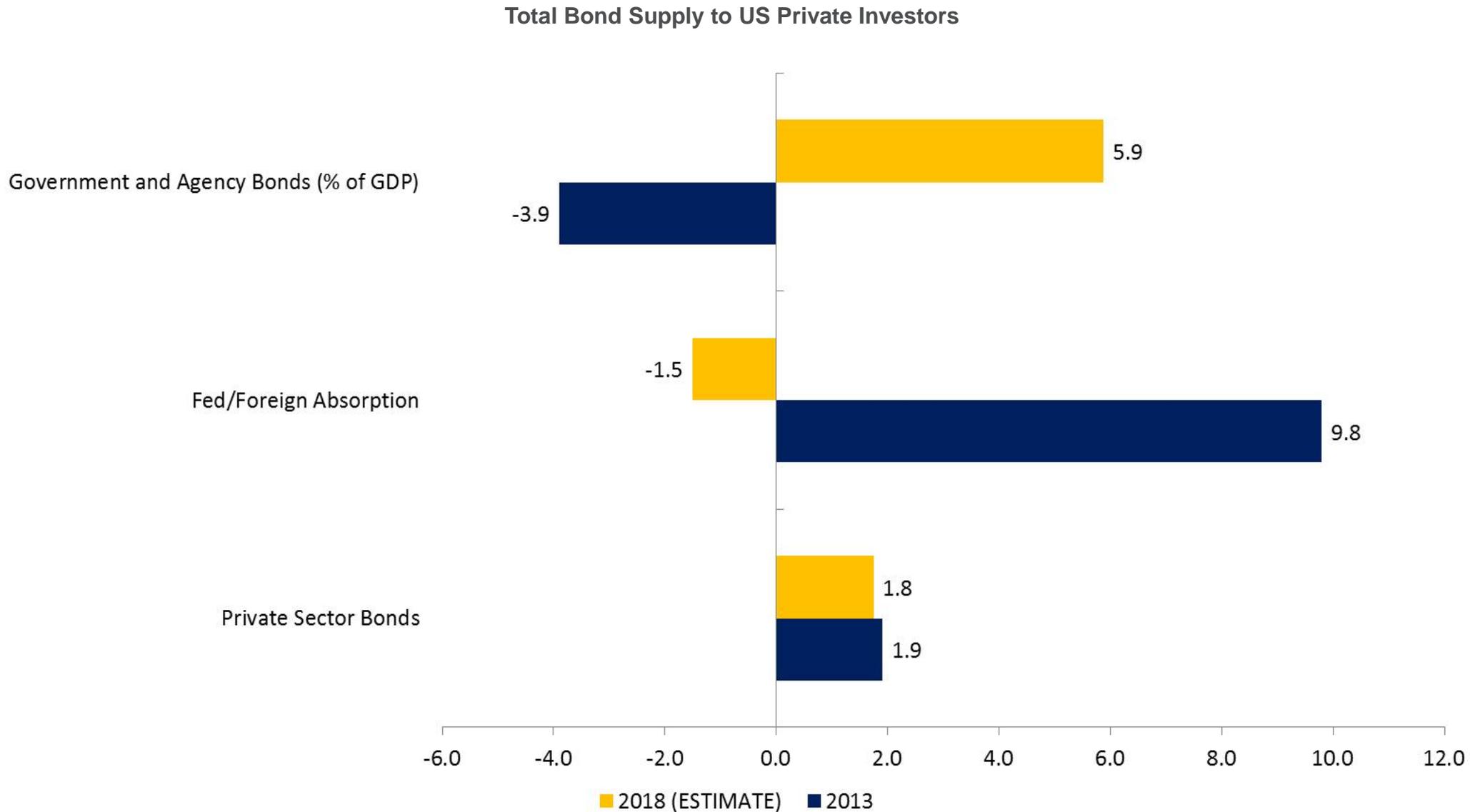


### US Average Interest Coverage Ratio



# Bond Demand-Supply = Larger Private Risk Premium

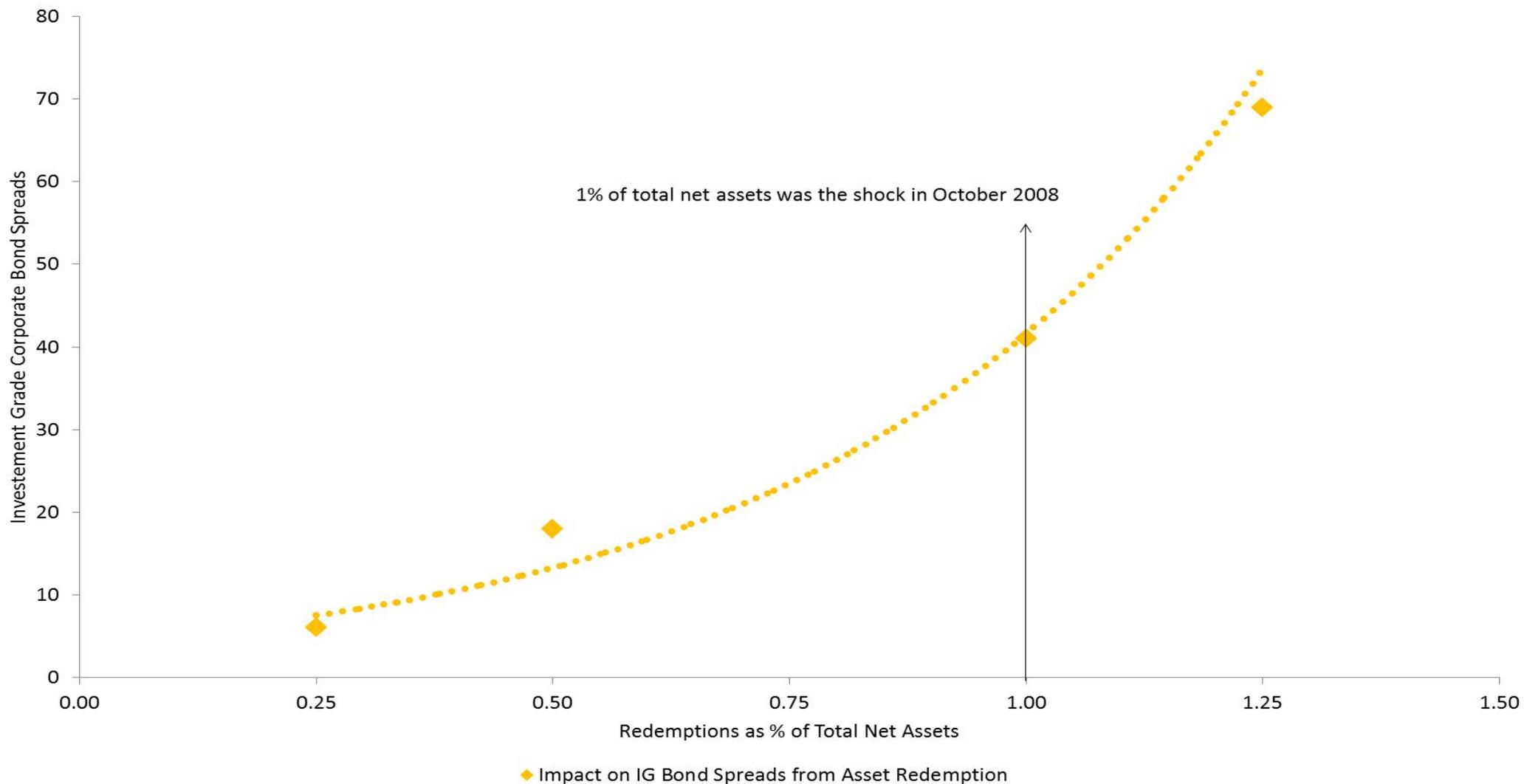
More challenging than 2013 tantrum – investors have more bonds to absorb, risk premium on private debt will rise



# Pro-cyclical Bond Inflows Amplify Impact on Credit Spreads

Redemptions from bond funds have a large impact on corporate bond spreads, amplifying the rise in credit spreads

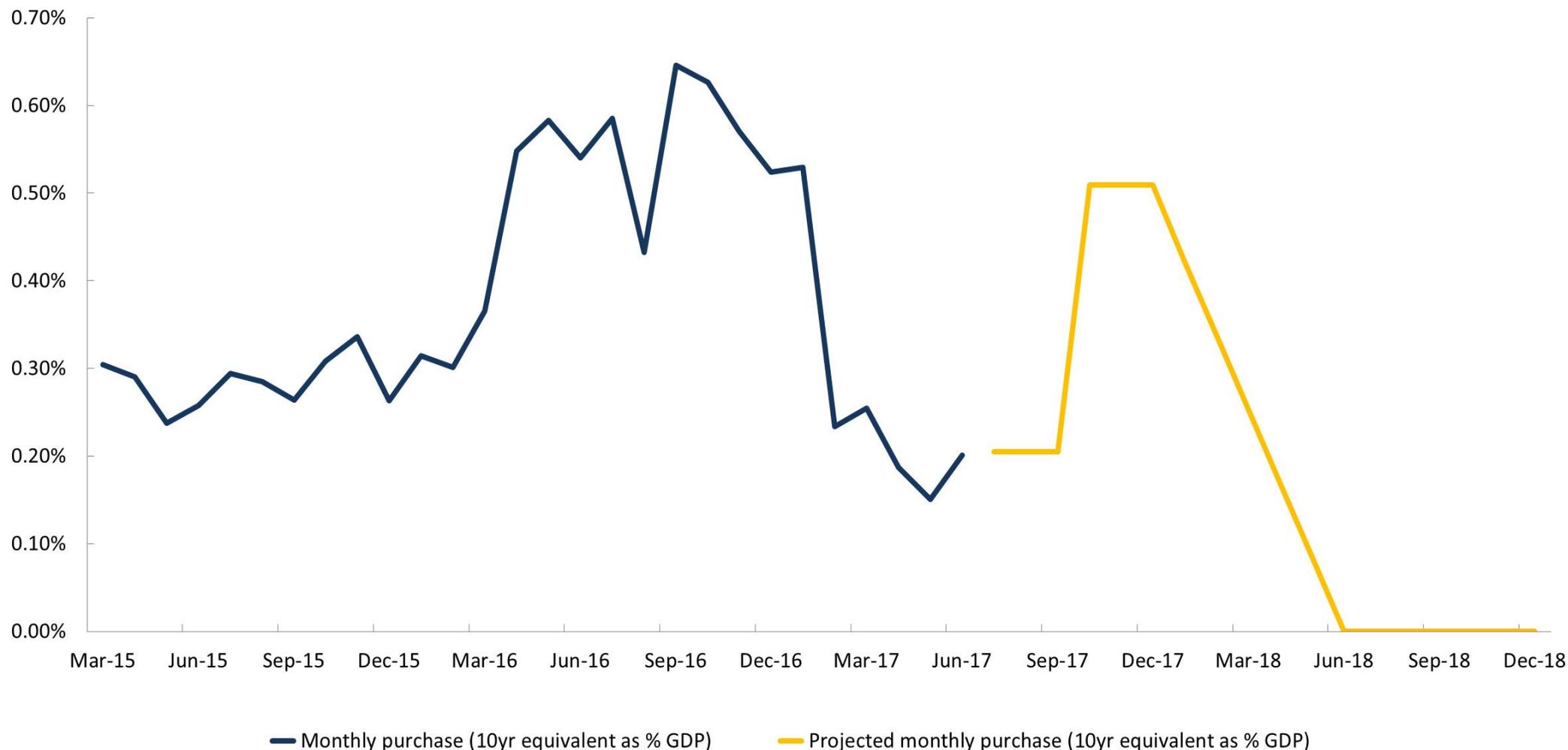
### Impact on Investment Grade Spreads to Investor Asset Redemptions



# ECB Tapering Adds Impulse to Higher US Yields

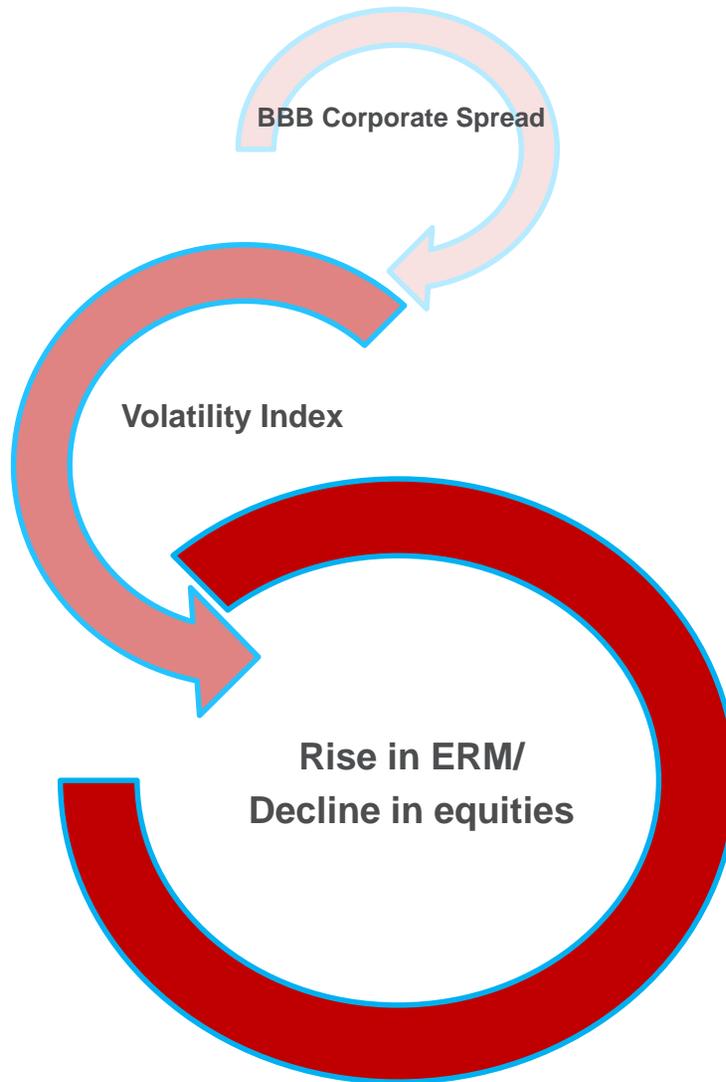
ECB asset purchases compressed German real yields and lowered yields in the US – already working in reverse

German Central Bank Bond Purchases  
Percent of GDP



# Stress Scenario Example: Rising Risk Premium – Faster Rise in Credit Spreads

Amplification from normalization could possibly come from wider credit spreads and be transmitted to equity buybacks and valuations



## Key Input: Judgment on rise in credit risk premium

- Stress scenario: spreads tighten as real rates rise (-15bp)
- Rise in corporate financing gap to 1% of GDP through Q1 2018 (+50bp)
- Amplification from bond redemptions (+100bp)
- No amplifiers from Euro area tapering or other factors

## Key Input: VIX-Credit Spread Model

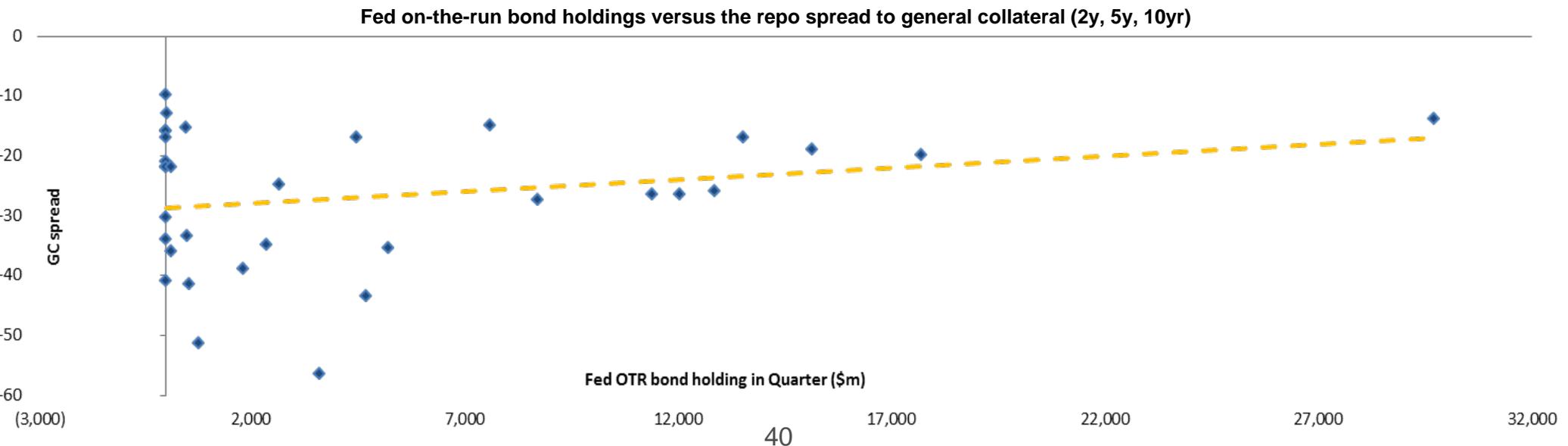
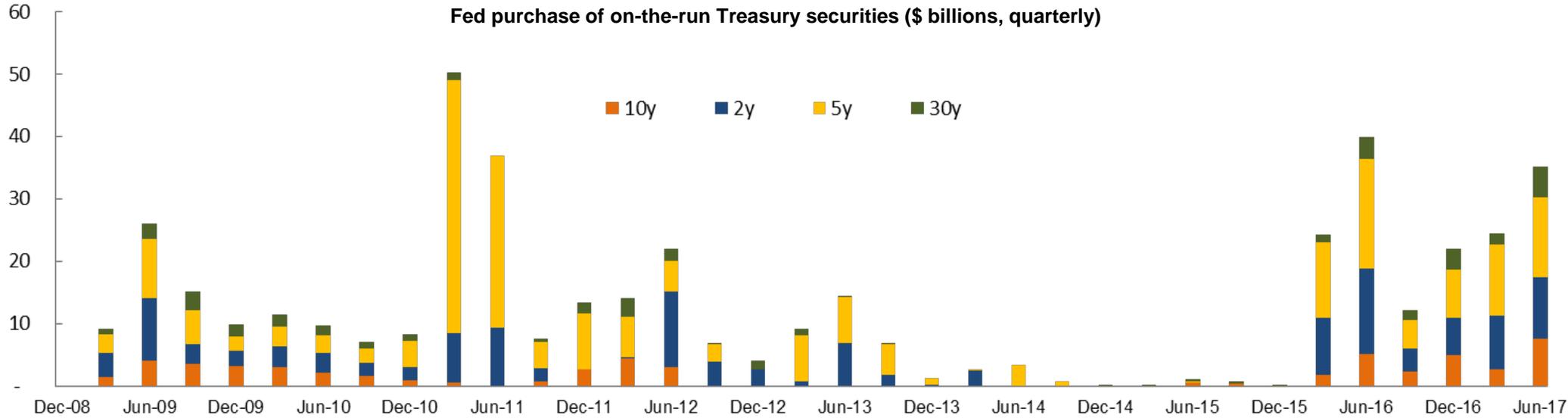
- Causality from credit spread to volatility rather than VIX exogenous
- Credit spread has an embedded short equity put
- VIX +10 points from wider credit spreads

## Key Input: VIX-Equity Risk Premium Model

- Equity risk premium rises ~40%, still below historic norms
- 2018 S&P earnings 133 (+3.5% in EPS w/ NIPA profits +2.9%)
- Rise in 10-year real interest rates from 0.5% to 1.0%
- Partial pass-through of higher equity risk premium

# How Will The Repo Market be Impacted?

Fed normalization estimated to increase borrowing costs of benchmark 2s, 5s, and 10s by a modest 5bps on average



# Annex 1: Fed estimate of term premium impact

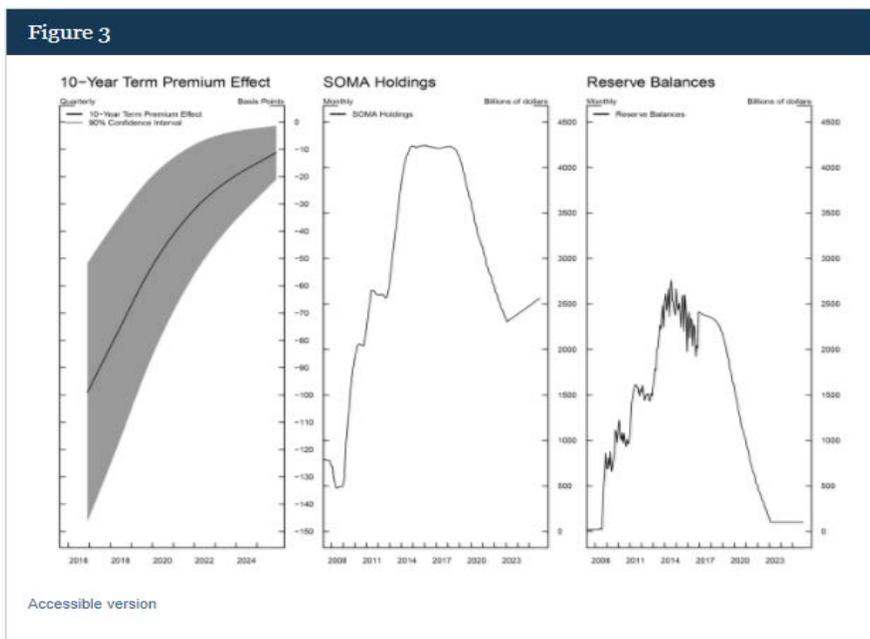


Table 1\*

LSAP Policies	Estimated Decline in 10-Year Treasury Yield (basis points) at onset of the program	Other Studies
LSAP 1	34	91 - (Event Studies); 36 to 82 (Regressions) - Gagnon et al. (2011) 100 - Krishnamurthy and Vissing-Jørgensen (2011) 20 to 30 - (Treasury security purchases only) - D'Amico and King (2013) 35 - (Treasury security purchases only) - D'Amico et al. (2012)
LSAP 2	12	25 - Krishnamurthy and Vissing-Jørgensen (2011) 55 - D'Amico et al. (2012) 21 - Meaning and Zhu (2011) 15 - Swanson (2011)
MEP	28	22 - Hamilton and Wu (2012) 17 - Meaning and Zhu (2012)
LSAP 3	31	60 - Engen, Laubach, and Reifschneider (2015) <sup>1</sup>

## Annex 2: June 2017 Survey of primary dealers (dated as this was before Fed announced details)

Assets		Level	Liabilities and Capital		Level
US Treasuries	25th Pctl	<b>1945</b>	Federal Reserve Notes	25th Pctl	<b>1787</b>
	Median	<b>2466</b>		Median	<b>2025</b>
	75th Pctl	<b>3107</b>		75th Pctl	<b>2440</b>
Agency MBS	25th Pctl	<b>400</b>	Reserves	25th Pctl	<b>412</b>
	Median	<b>600</b>		Median	<b>588</b>
	75th Pctl	<b>730</b>		75th Pctl	<b>850</b>
All Other Assets*	25th Pctl	<b>115</b>	Deposits in Treasury General Account (TGA)	25th Pctl	<b>250</b>
	Median	<b>200</b>		Median	<b>300</b>
	75th Pctl	<b>261</b>		75th Pctl	<b>400</b>
			Reverse Repos with Private Counterparties	25th Pctl	<b>50</b>
				Median	<b>90</b>
				75th Pctl	<b>100</b>
			Reverse Repos with Foreign Official Accounts	25th Pctl	<b>121</b>
				Median	<b>150</b>
				75th Pctl	<b>242</b>
			Other Deposits**	25th Pctl	<b>35</b>
				Median	<b>50</b>
				75th Pctl	<b>100</b>
			All Other Liabilities and Capital	25th Pctl	<b>45</b>
				Median	<b>50</b>
				75th Pctl	<b>57</b>