Treasury Presentation to TBAC

Office of Debt Management

Fiscal Year 2015 Q3 Report

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Section I:
Executive Summary

Highlights of Treasury's August 2015 Quarterly Refunding Presentation to the Treasury Borrowing Advisory Committee (TBAC)

Receipts

- Budget receipts in the April-June quarter have been stronger overall than during the equivalent period last year, reflecting continuing economic growth.

Outlays

- Medicare and Medicaid costs increased $74 billion through June. Medicaid increased $42 billion, mostly due to provisions of the Affordable Care Act (ACA) that increased enrollment in Medicaid. Medicare increased $32 billion due to an expansion of drug coverage as defined by the ACA.
- Social Security Administration payments (+$29 billion) were mostly driven by the 1.69% cost-of-living adjustment for calendar year 2015.

Net Nonmarketable Borrowing

- Net nonmarketable borrowing declined during the April-June quarter. This decline is due in large part to Treasury's closing the SLGS window.

Sources of Financing in Fiscal Year 2015 Q4

- Treasury is forecasting net marketable borrowing of $127 billion with an end-of-September cash balance of $225 billion. Based on the current auction schedule, Treasury is over financed by $44 billion through the end of September 2015.

Projected Net Marketable Borrowing

- Between FY 2016-2018, Treasury's borrowing need estimates could rise notably relative to current issuance calendar depending on what the Federal Reserve does with maturing Treasury securities held in the SOMA portfolio:
  - If the Fed redeems their Treasury holdings, Treasury could be underfinanced by an amount between $508 billion (CBO) to $848 billion (OMB)
  - If the Fed reinvests all maturing securities, Treasury is only projected to be underfunded by approximately $175 billion between 2016 and 2018, with the bulk of the shortfall occurring in 2017.

Bid-to-Cover Ratios (BTC)

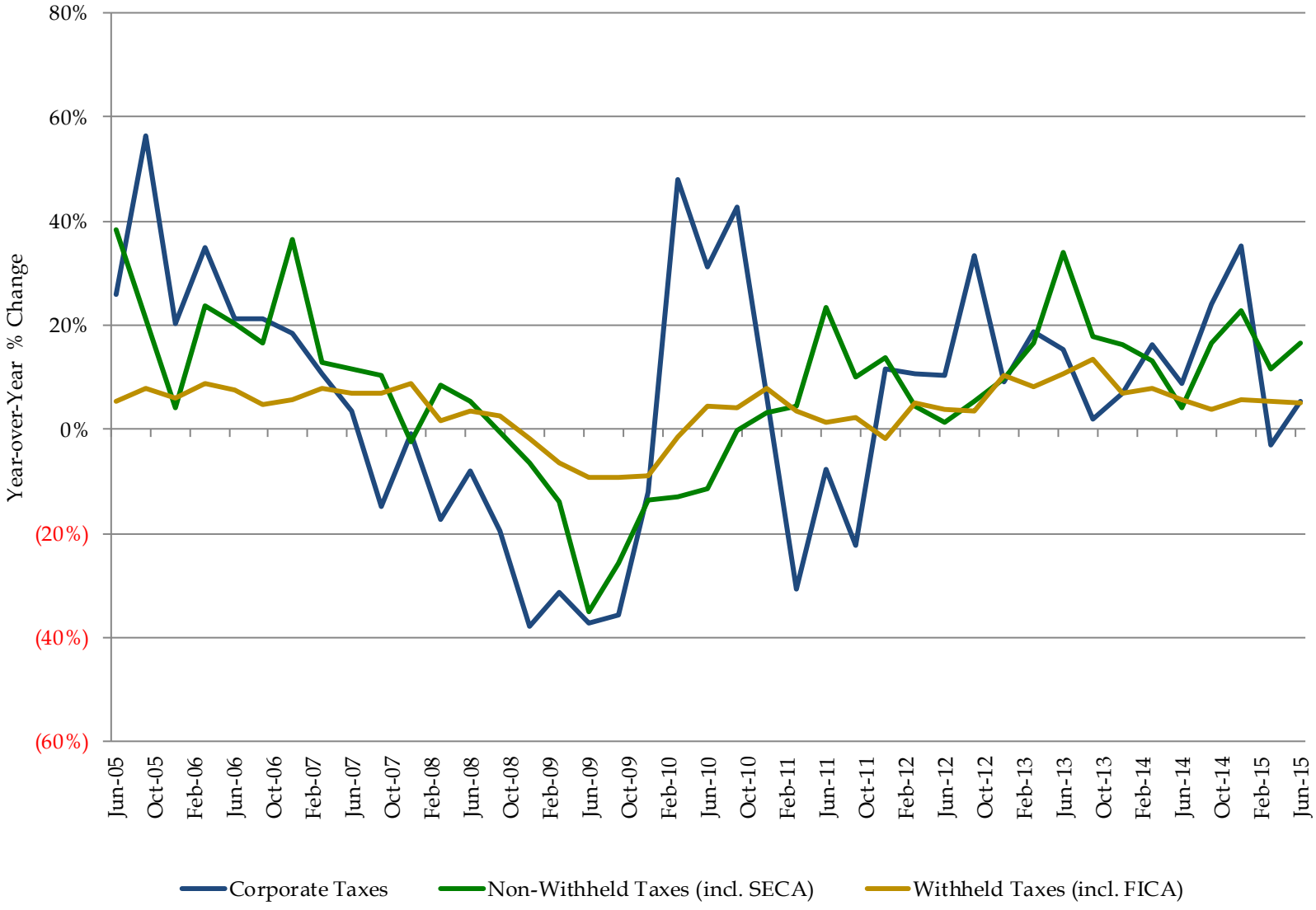
- BTC ratios in FRNs have settled into a 3.5x-4.5x range, which is in-line with BTC ratios for bills. BTC ratios in nominal coupons and TIPS are also in line with recent levels.

Investor Class Allotments

- Investment fund awards continue to increase, particularly in short coupons (2-, 3- and 5-year) and TIPS, but have declined in bills recently.
- Foreign awards have increased in bills and long coupons (7-, 10- and 30-year), but have decreased in short coupons.
  - In aggregate, however, foreign awards are broadly within their multi-year range.

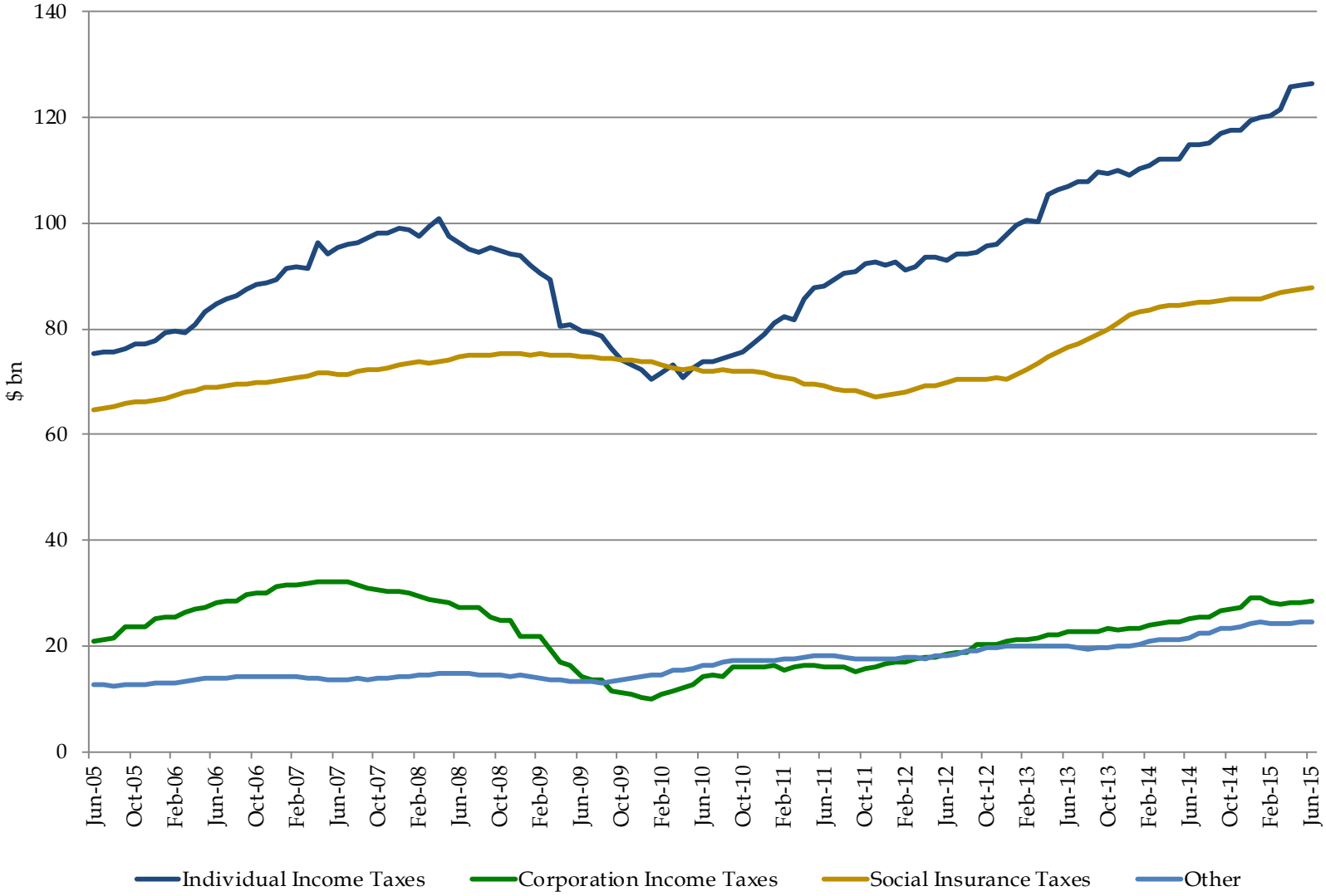
Section II: Fiscal

Quarterly Tax Receipts



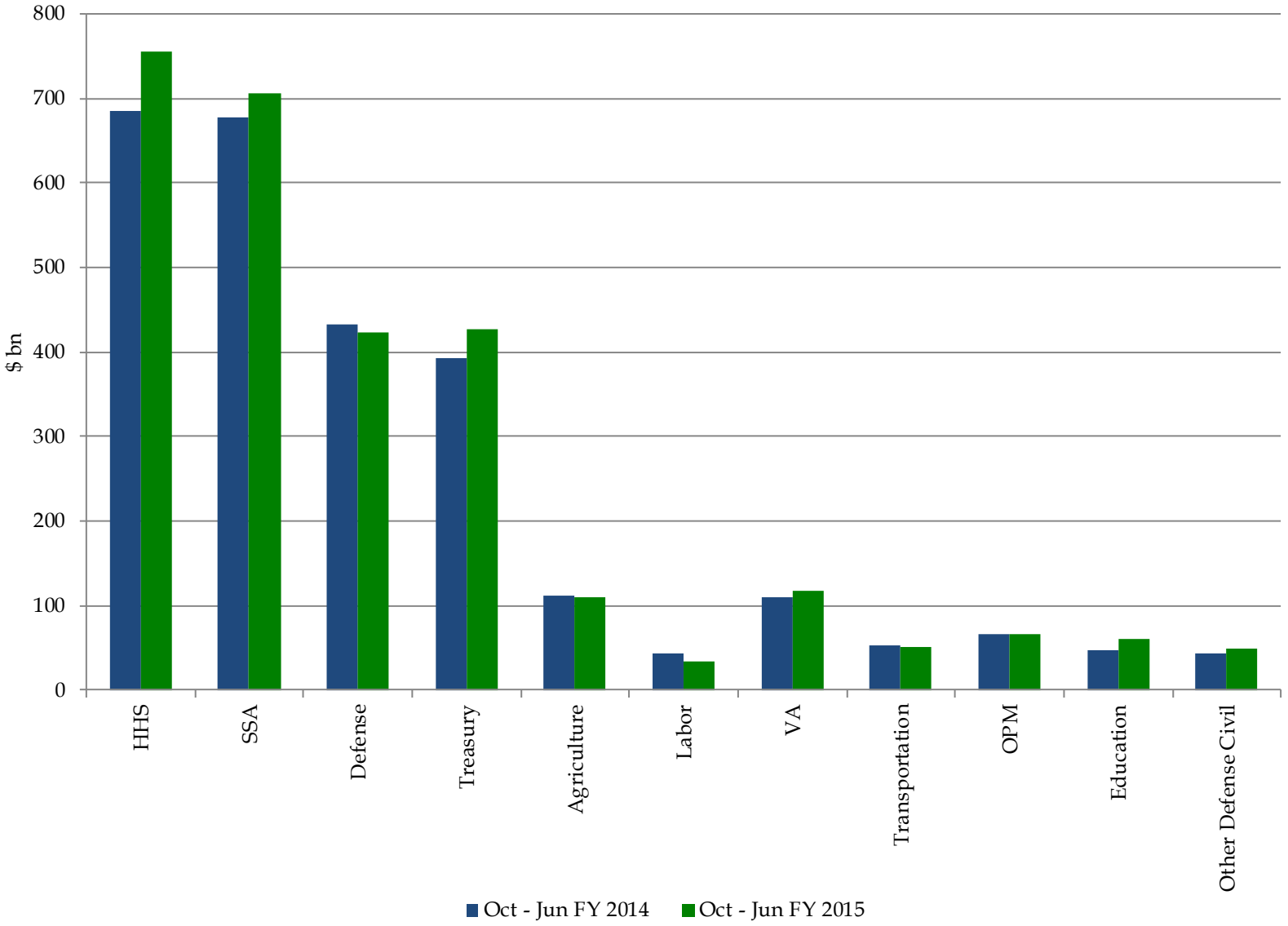
Source: United States Department of the Treasury

Monthly Receipt Levels
(12-Month Moving Average)



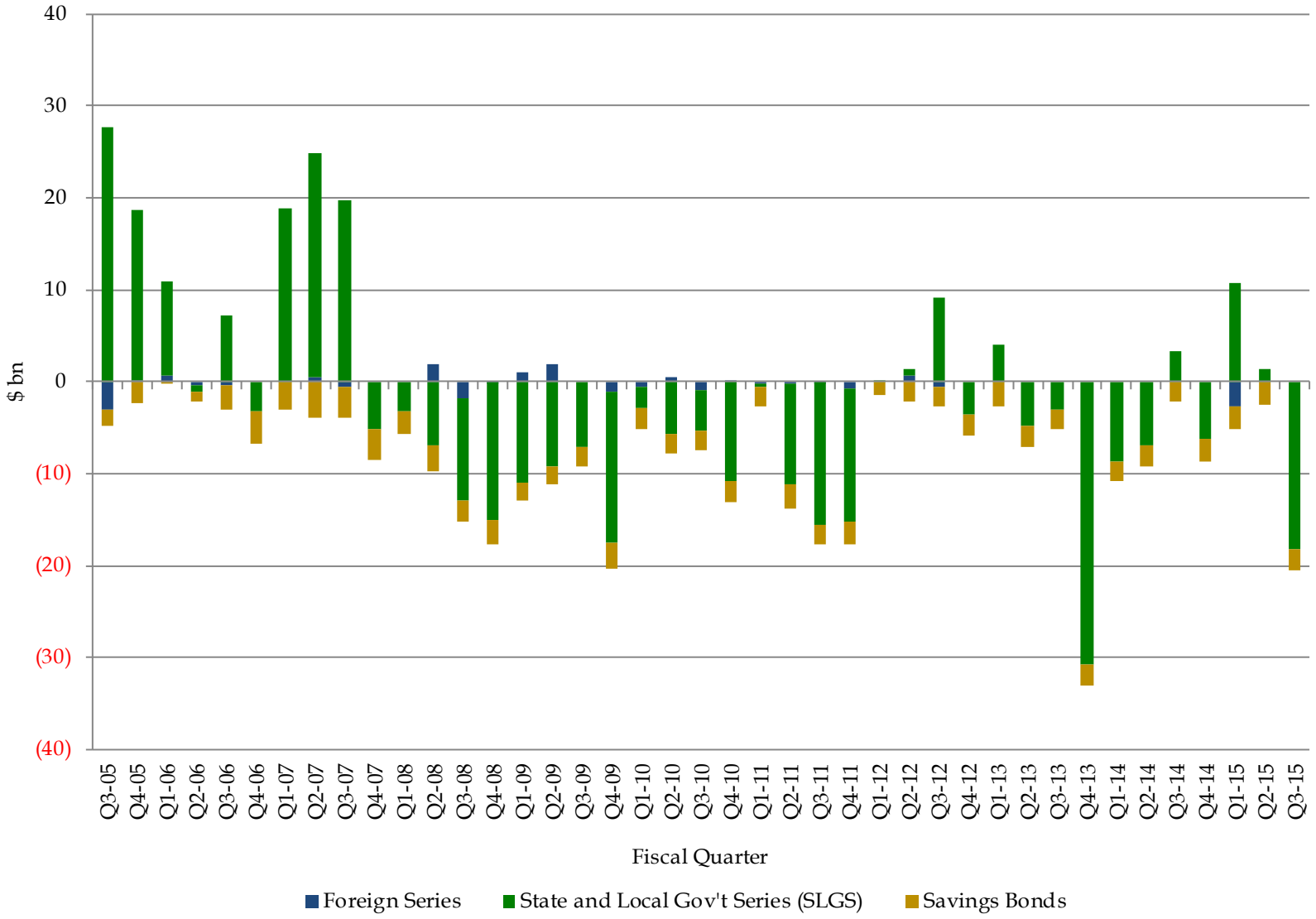
Individual Income Taxes include withheld and non-withheld. Social Insurance Taxes include FICA, SECA, RRTA, UTF deposits, FUTA and RUIA. Other includes excise taxes, estate and gift taxes, customs duties and miscellaneous receipts.
Source: United States Department of the Treasury

Eleven Largest Outlays



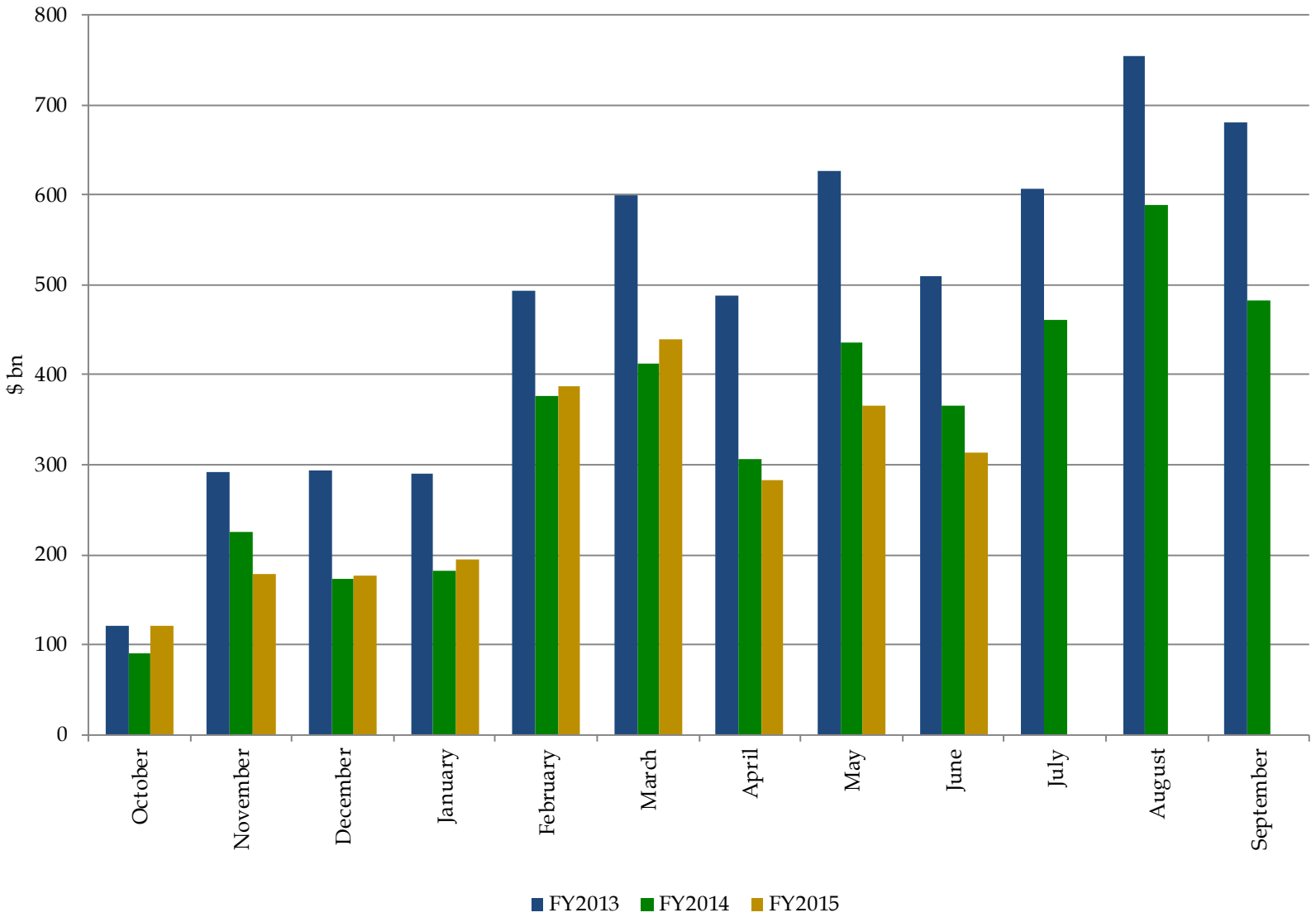
Source: United States Department of the Treasury

Treasury Net Nonmarketable Borrowing



Source: United States Department of the Treasury

Cumulative Budget Deficits by Fiscal Year



Source: United States Department of the Treasury

FY 2015-2017 Deficits and Net Marketable Borrowing Estimates

In $ billions

	Primary Dealers[1]	OMB MSR[2]	CBO[3]	CBO[4]	OMB[5]
FY 2015 Deficit Estimate	460	455	486	486	583
FY 2016 Deficit Estimate	482	429	380	455	474
FY 2017 Deficit Estimate	507	436	401	455	463
FY 2015 Deficit Range	420-532				
FY 2016 Deficit Range	375-571				
FY 2017 Deficit Range	375-696				
FY 2015 Net Marketable Borrowing Estimate	551	631	595	586	726
FY 2016 Net Marketable Borrowing Estimate	558	563	469	531	602
FY 2017 Net Marketable Borrowing Estimate	580	567	488	531	596
FY 2015 Net Marketable Borrowing Range	330-650				
FY 2016 Net Marketable Borrowing Range	390-730				
FY 2017 Net Marketable Borrowing Range	430-730				
Estimates as of:	Jul-15	Jul-15	Mar-15	Mar-15	Feb-15

[1]Based on primary dealer feedback on July 27, 2015. Estimates above are averages.

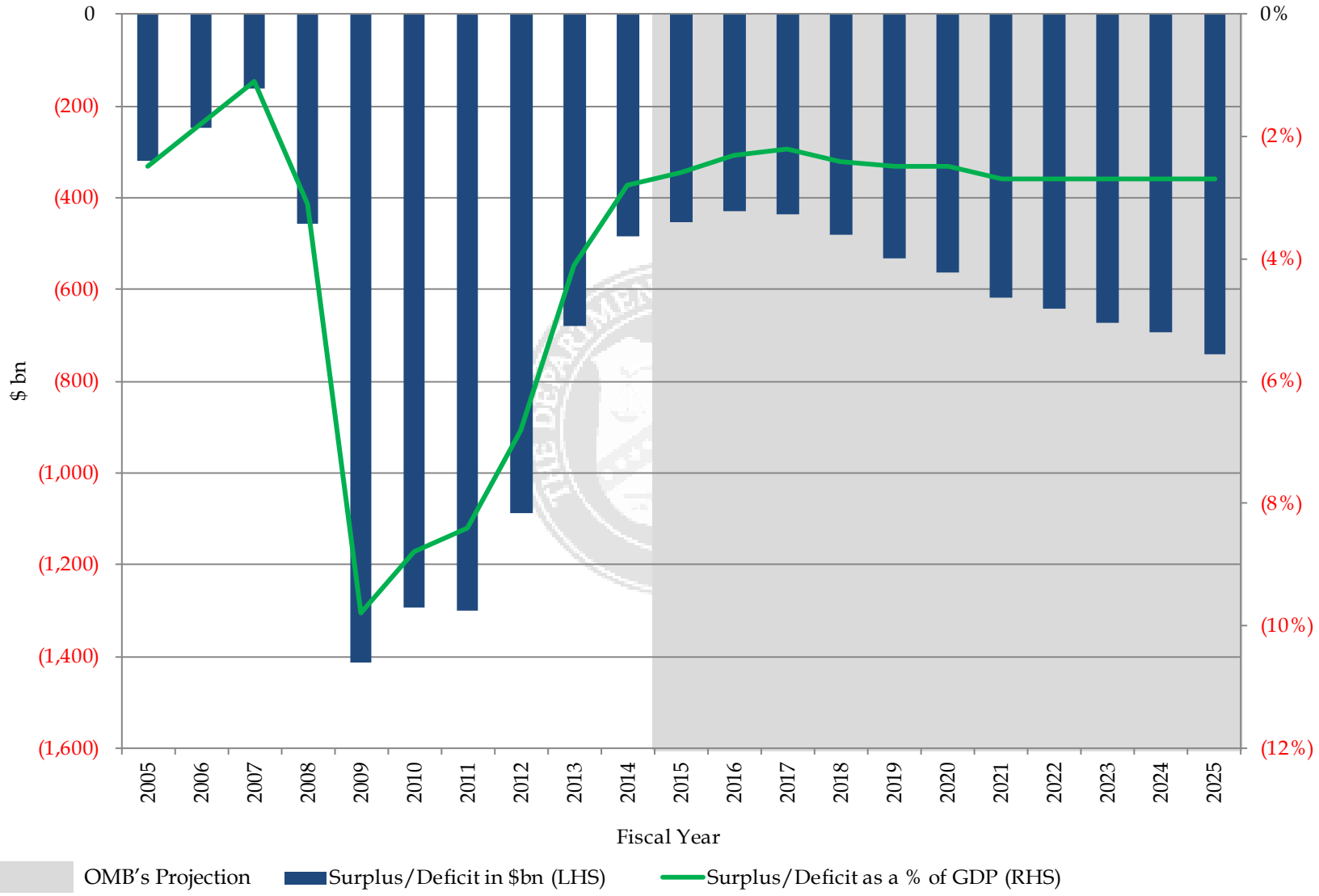
[2]Table S-11 of OMB's "Fiscal Year 2016 Mid-Session Review"

[3]Table 1 and 3 of CBO's "An Analysis of the President's 2016 Budget"

[4]Table 1 and 3 of CBO's "Updated Budget Projections: 2015 and 2025"

[5]Table S-13 of OMB's "Fiscal Year 2016 Budget of the US Government"

Budget Surplus/Deficit



Projections are from Table S-1 of OMB's "Fiscal Year 2016 Mid-Session Review"

Section III: Financing

Assumptions for Financing Section (pages 13 to 19)

- Portfolio and SOMA holdings as of 6/30/2015.
- SOMA redemptions until and including June 2021. These assumptions are based on Chairman Bernanke's June 2013 press conference.
- Assumes announced issuance sizes and patterns constant for Nominal Coupons, TIPS, and FRNs as of 6/30/2015, while using an average of ~1.4 trillion of Bills outstanding.
- The principal on the TIPS securities was accreted to each projection date based on market ZCIS levels as of 6/30/2015.
- No attempt was made to match future financing needs.

Sources of Financing in Fiscal Year 2015 Q3

April - June 2015	
Net Bill Issuance	(83)
Net Coupon Issuance	140
Subtotal: Net Marketable Borrowing	57
Ending Cash Balance	254
Beginning Cash Balance	100
Subtotal: Change in Cash Balance	154
Net Implied Funding for FY 2015 Q3*	(98)

Security	April - June 2015 Bill Issuance			Fiscal Year-to-Date Bill Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
4-Week	440	470	(30)	1,389	1,414	(25)
13-Week	312	326	(14)	950	983	(33)
26-Week	312	351	(39)	989	959	30
52-Week	100	100	(0)	250	238	12
CMBs	30	30	0	30	30	0
Bill Subtotal	1,194	1,277	(83)	3,608	3,624	(16)

Security	April - June 2015 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
2-Year FRN	41	0	41	123	0	123
2-Year	78	105	(27)	240	315	(75)
3-Year	73	106	(34)	223	310	(88)
5-Year	105	123	(18)	315	381	(65)
7-Year	87	0	87	261	0	261
10-Year	67	34	32	199	94	104
30-Year	42	0	42	126	11	116
5-Year TIPS	18	23	(5)	34	23	11
10-Year TIPS	13	0	13	54	24	30
30-Year TIPS	7	0	7	23	0	23
Coupon Subtotal	531	391	140	1,598	1,157	441

Total	1,725	1,668	57	5,206	4,781	425

*Assumes an end-of-June 2015 cash balance of $254 billion versus a beginning-of-April 2015 cash balance of $100 billion. By keeping the cash balance constant, Treasury arrives at the net implied funding number.

Sources of Financing in Fiscal Year 2015 Q4

July - September 2015	
Assuming Constant Coupon and Average Bill Issuance Sizes as of 6/30/2015*	
Net Bill Issuance	2
Net Coupon Issuance	169
Subtotal: Net Marketable Borrowing	171
Treasury Announced Estimate: Net Marketable Borrowing**	127
Implied: Decrease in FY 2015 Q4 Net Issuances	(44)

Security	July - September 2015 Bill Issuance			Fiscal Year-to-Date Bill Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
4-Week	442	426	16	1,831	1,840	(9)
13-Week	312	312	0	1,262	1,295	(33)
26-Week	312	326	(14)	1,301	1,285	16
52-Week	75	75	0	325	313	12
CMBs	0	0	0	30	30	0
Bill Subtotal	1,141	1,139	2	4,749	4,763	(14)

Security	July - September 2015 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
2-Year FRN	41	0	41	164	0	164
2-Year	78	102	(24)	318	417	(99)
3-Year	72	96	(24)	295	406	(112)
5-Year	105	111	(6)	420	492	(72)
7-Year	87	0	87	348	0	348
10-Year	66	32	34	265	127	138
30-Year	42	4	38	168	15	154
5-Year TIPS	16	0	16	50	23	27
10-Year TIPS	28	21	7	82	44	38
30-Year TIPS	0	0	0	23	0	23
Coupon Subtotal	535	366	169	2,133	1,523	610

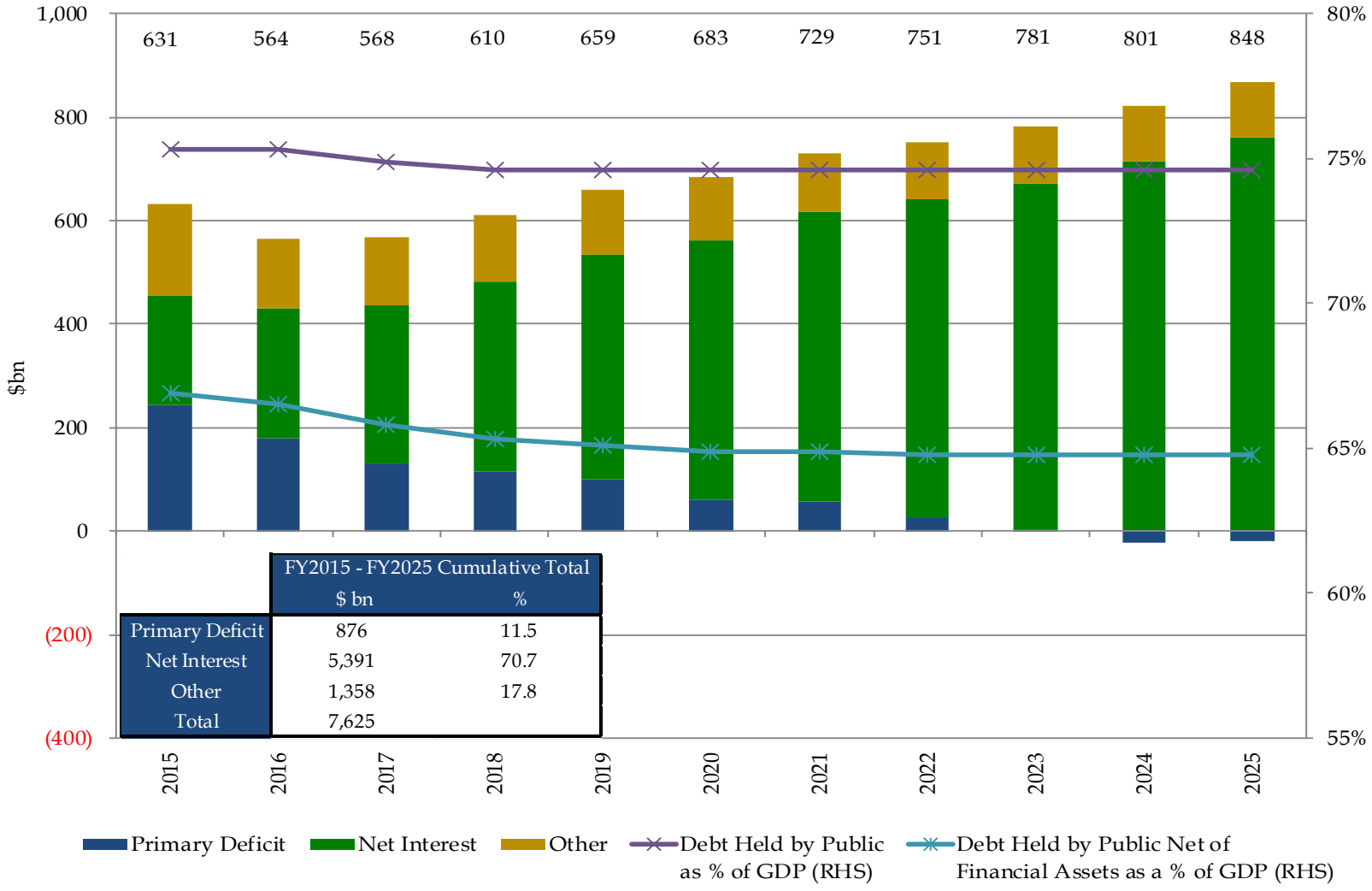
Total	1,676	1,505	171	6,882	6,286	596

*Keeping announced issuance sizes and patterns constant for Nominal Coupons, TIPS, and FRNs as of 6/30/2015, while using an average of ~1.4 trillion of Bills outstanding.

**Assumes an end-of-September 2015 cash balance of $225 billion versus a beginning-of-July 2015 cash balance of $254 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

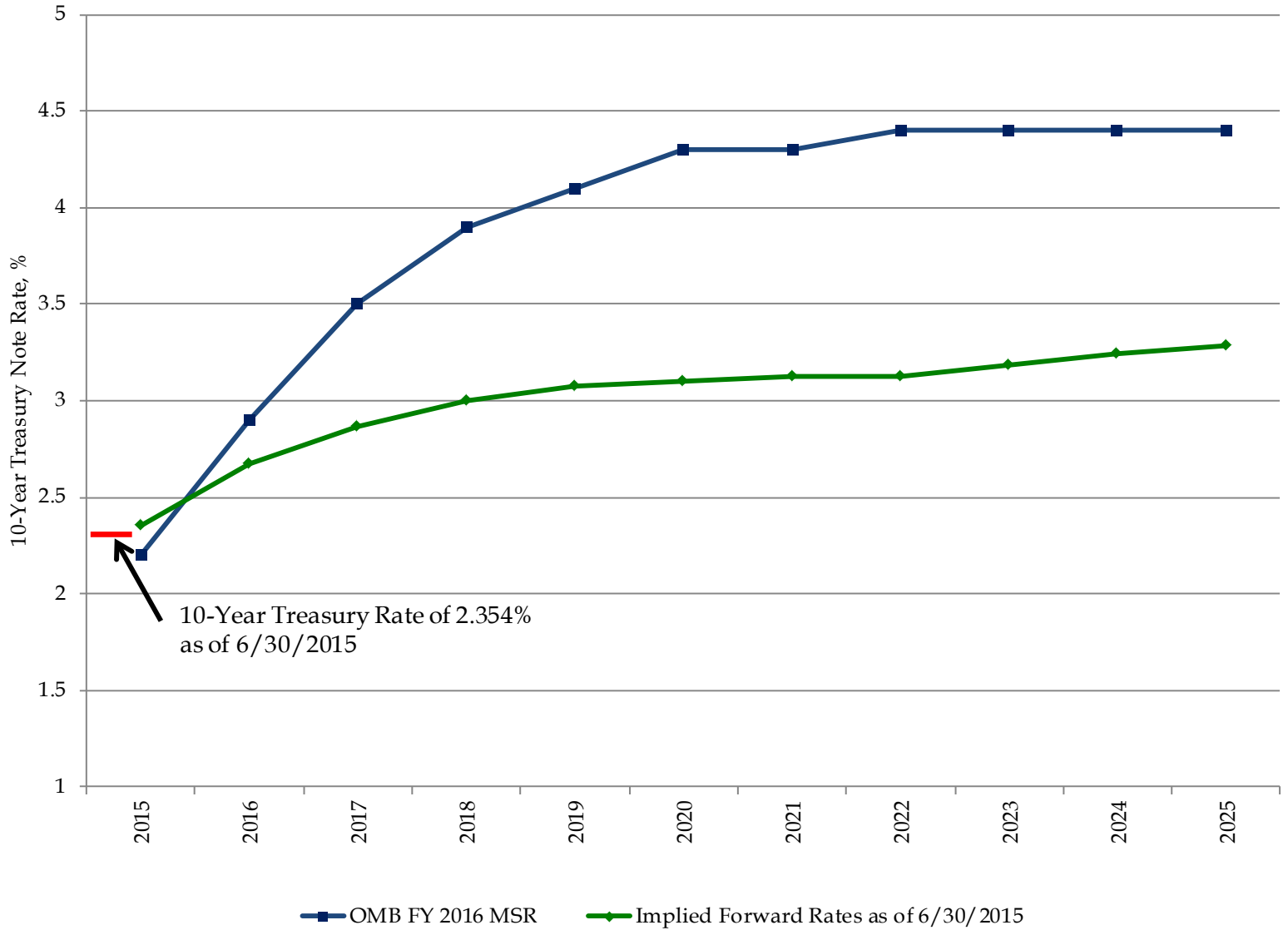
OMB's Projection of Borrowing from the Public



	FY2015 - FY2025 Cumulative Total $ bn	%
Primary Deficit	876	11.5
Net Interest	5,391	70.7
Other	1,358	17.8
Total	7,625	

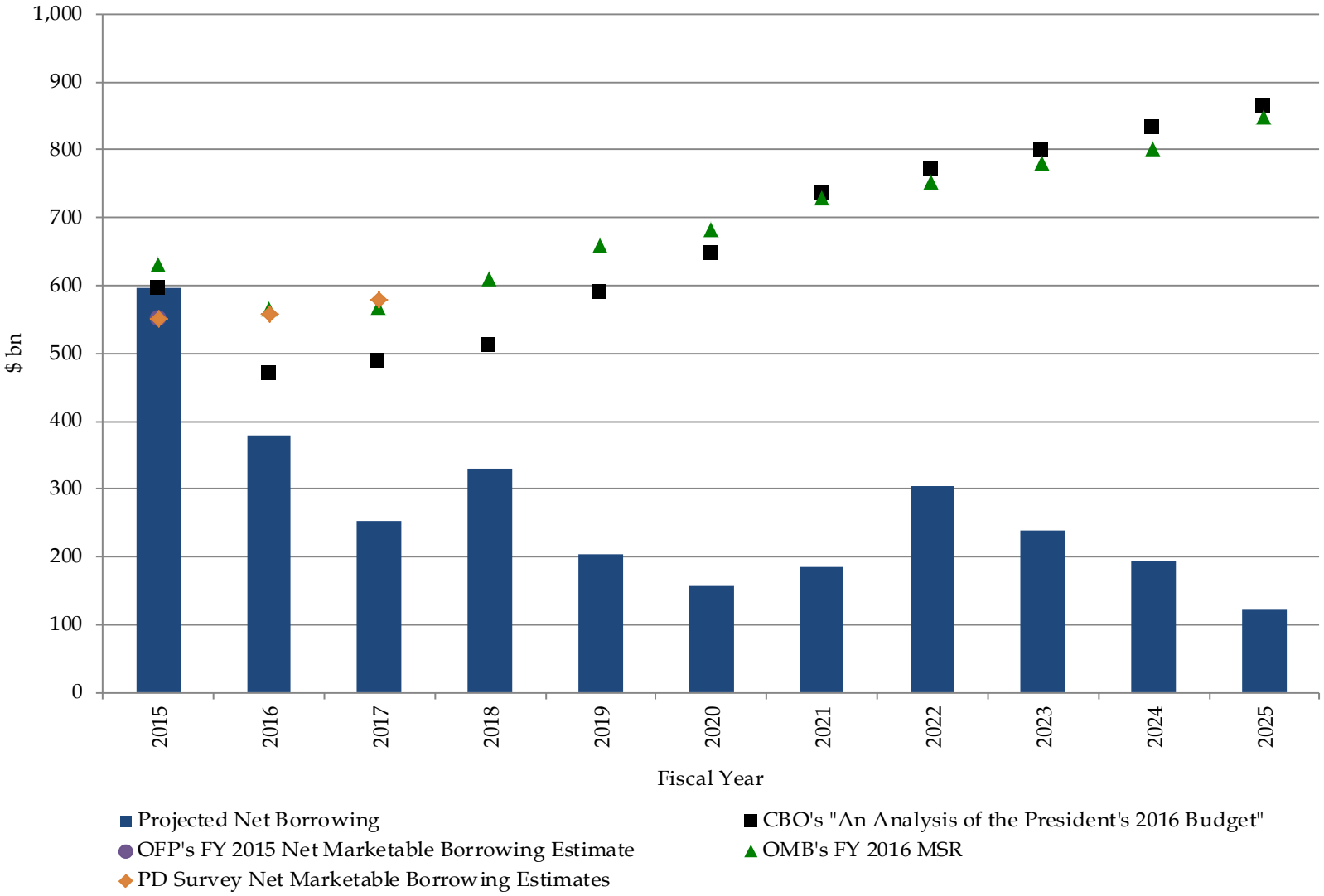
OMB's projections of net borrowing from the public are from Table S-11 of the "Fiscal Year 2016 Mid-Session Review." Data labels at the top represent the change in debt held by the public in $ billions. "Other" represents borrowing from the public to provide direct and guaranteed loans.

Interest Rate Assumptions: 10-Year Treasury Note



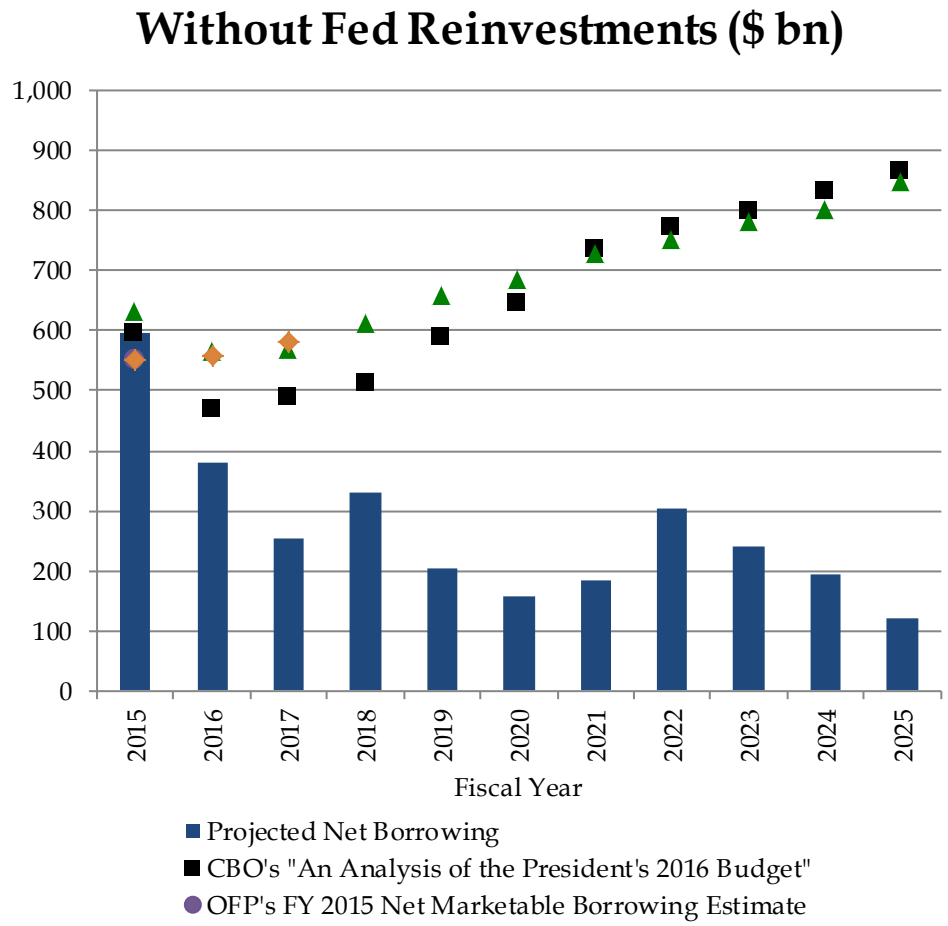
OMB's economic assumption of the 10-Year Treasury Note rates are from Table 2 of the "Fiscal Year 2016 Mid-Session Review." The forward rates are the implied 10-Year Treasury Note rates on June 30 of that year.

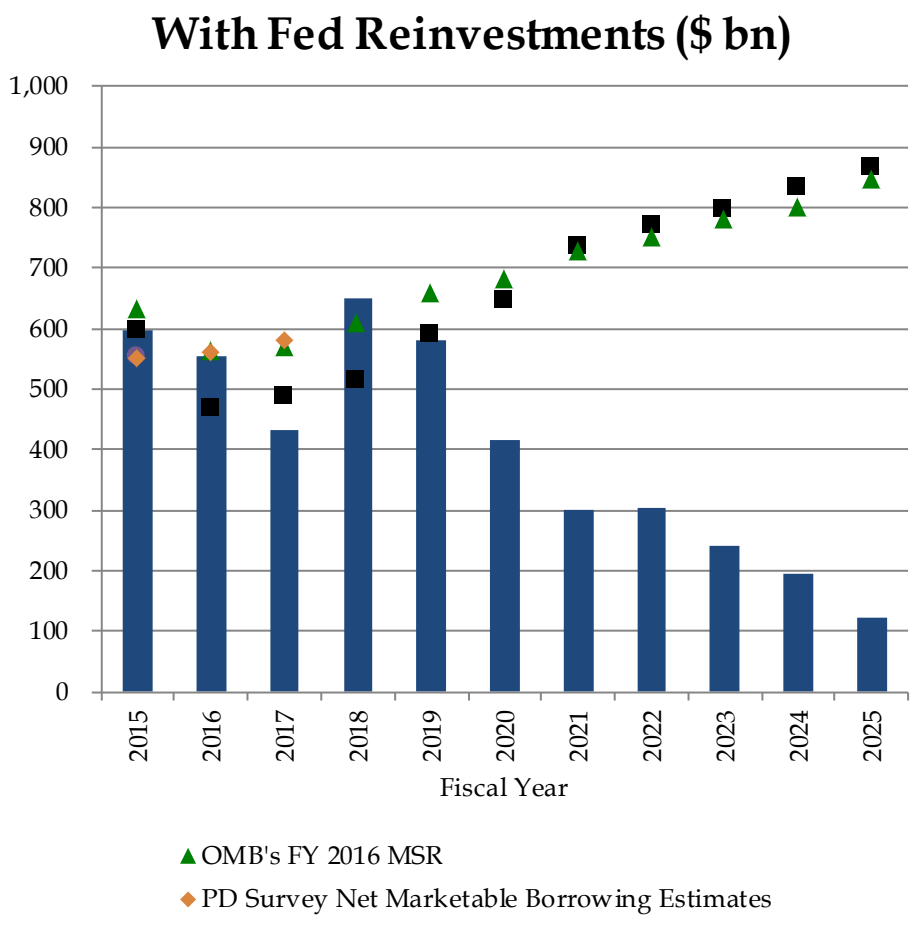
Projected Net Borrowing Assuming Constant Future Issuance



Treasury's primary dealer survey estimates can be found on page 9. OMB's projections of net borrowing from the public are from Table S-11 of the "Fiscal Year 2016 Mid-Session Review." CBO's estimates of the borrowing from the public are from Table 1 and 3 of "An Analysis of the President's 2016 Budget ." See table at the end of this section for details.

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





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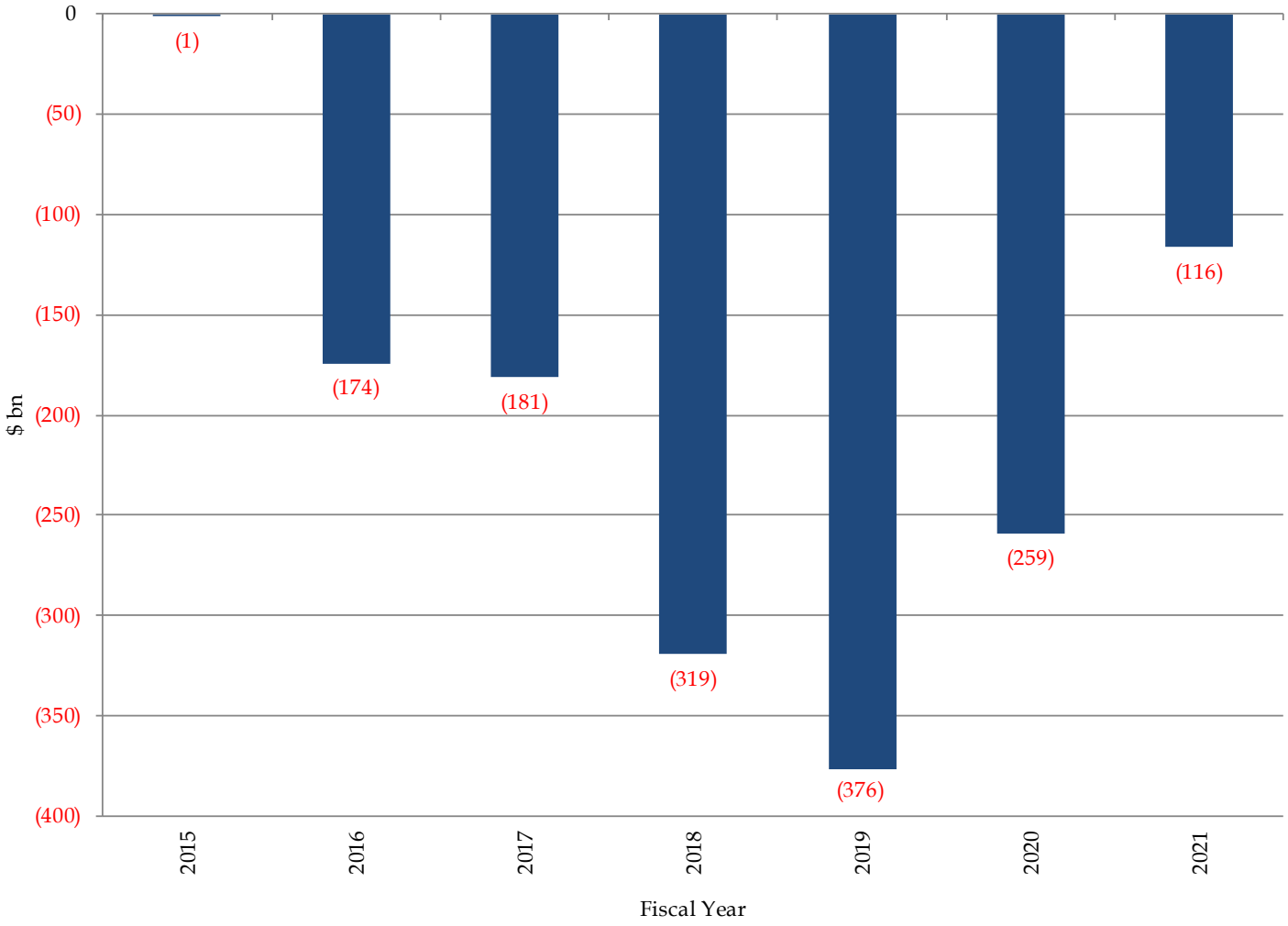
Additional Funding Gap Assuming No SOMA Roll



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 2016 Mid-Session Review	CBO's "An Analysis of the President's 2016 Budget"	Primary Dealer Survey
2010	(204)	869	783	35	0	1,483			
2011	(311)	576	751	88	0	1,104			
2012	139	148	738	90	0	1,115			
2013	(86)	86	720	111	0	830			
2014	(119)	(92)	669	88	123	669			
2015	(14)	(282)	640	88	164	596	552*	595	551
2016	0	(173)	442	69	41	380	564	469	558
2017	0	(73)	256	70	(0)	252	568	488	580
2018	0	28	238	65	0	331	610	512	
2019	0	35	104	66	0	204	659	588	
2020	0	(0)	119	39	0	158	683	646	
2021	0	15	157	14	0	186	729	735	
2022	0	72	231	2	0	305	751	770	
2023	0	43	195	2	0	240	781	798	
2024	0	2	192	1	(0)	195	801	832	
2025	0	(33)	200	(44)	(0)	122	848	865	

*OFP's FY 2015 Net Marketable Borrowing Projection

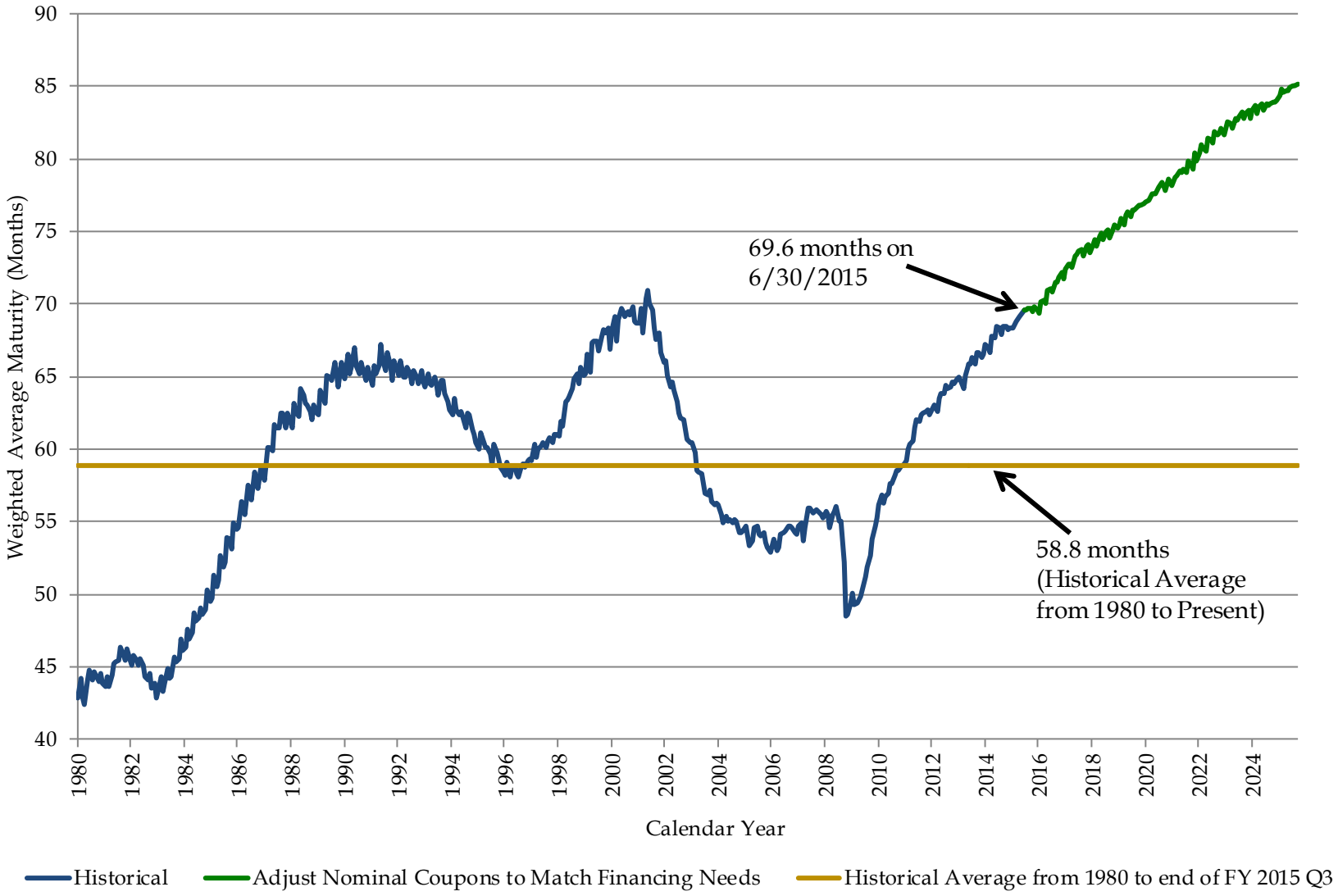
Treasury's primary dealer survey estimates can be found on page 9. OMB's projections of net borrowing from the public are from Table S-11 of the "Fiscal Year 2016 Mid-Session Review." CBO's estimates of the borrowing from the public are from Table 1 and 3 of "An Analysis of the President's 2016 Budget ."

Section IV:
Portfolio Metrics

Assumptions for Portfolio Metrics Section (pages 22 to 27) and Appendix

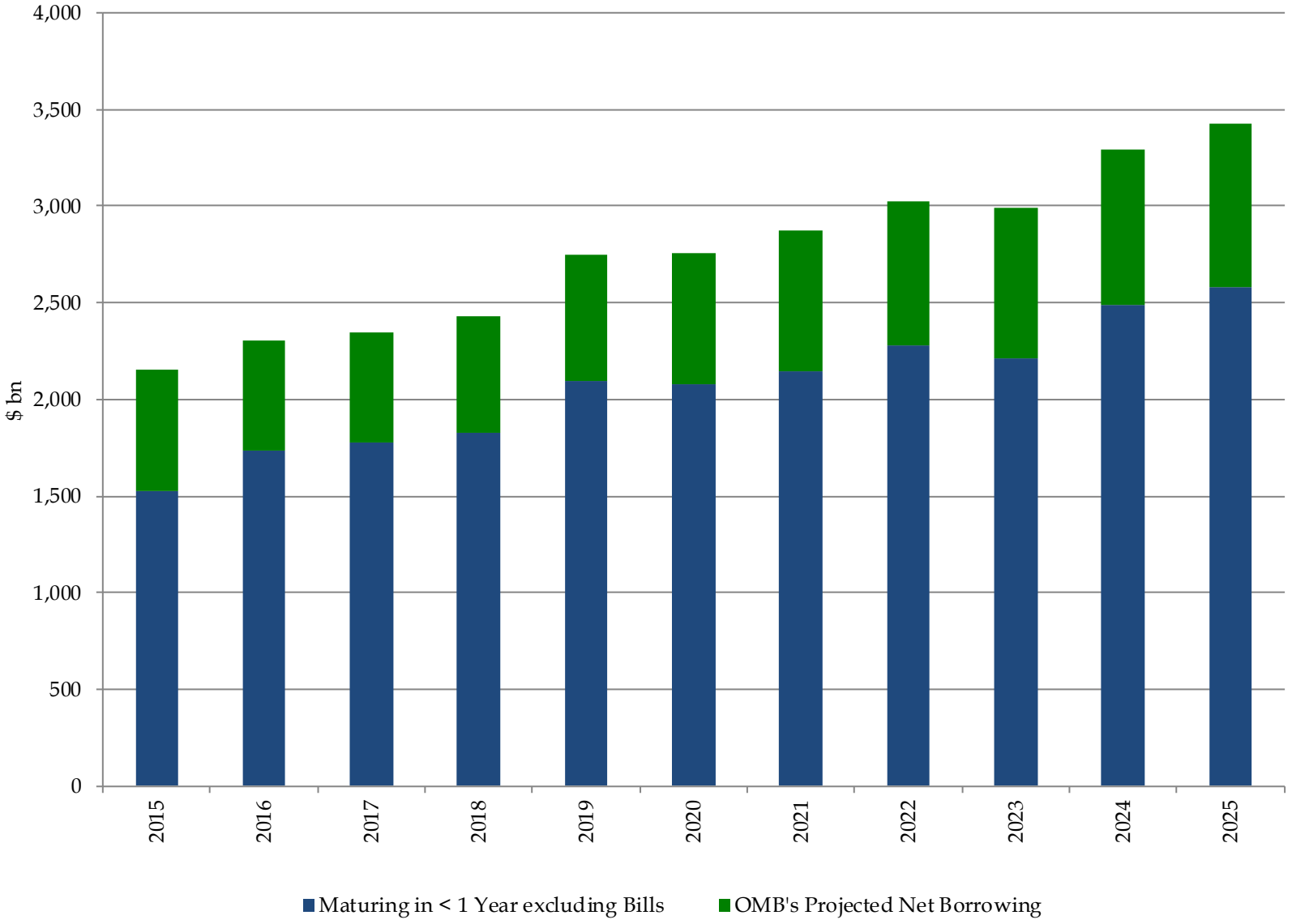
- Portfolio and SOMA holdings as of 6/30/2015.
- SOMA redemptions until and including June 2021. These assumptions are based on Chairman Bernanke's June 2013 press conference.
- To match OMB's projected borrowing from the public for the next 10 years, Nominal Coupon securities (2-, 3-, 5-, 7-, 10-, and 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 6/30/2015.
- OMB's estimates of borrowing from the public are Table S-11 of the "Fiscal Year 2016 Mid-Session Review."

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 Gross Borrowing excluding Bills for Fiscal Year



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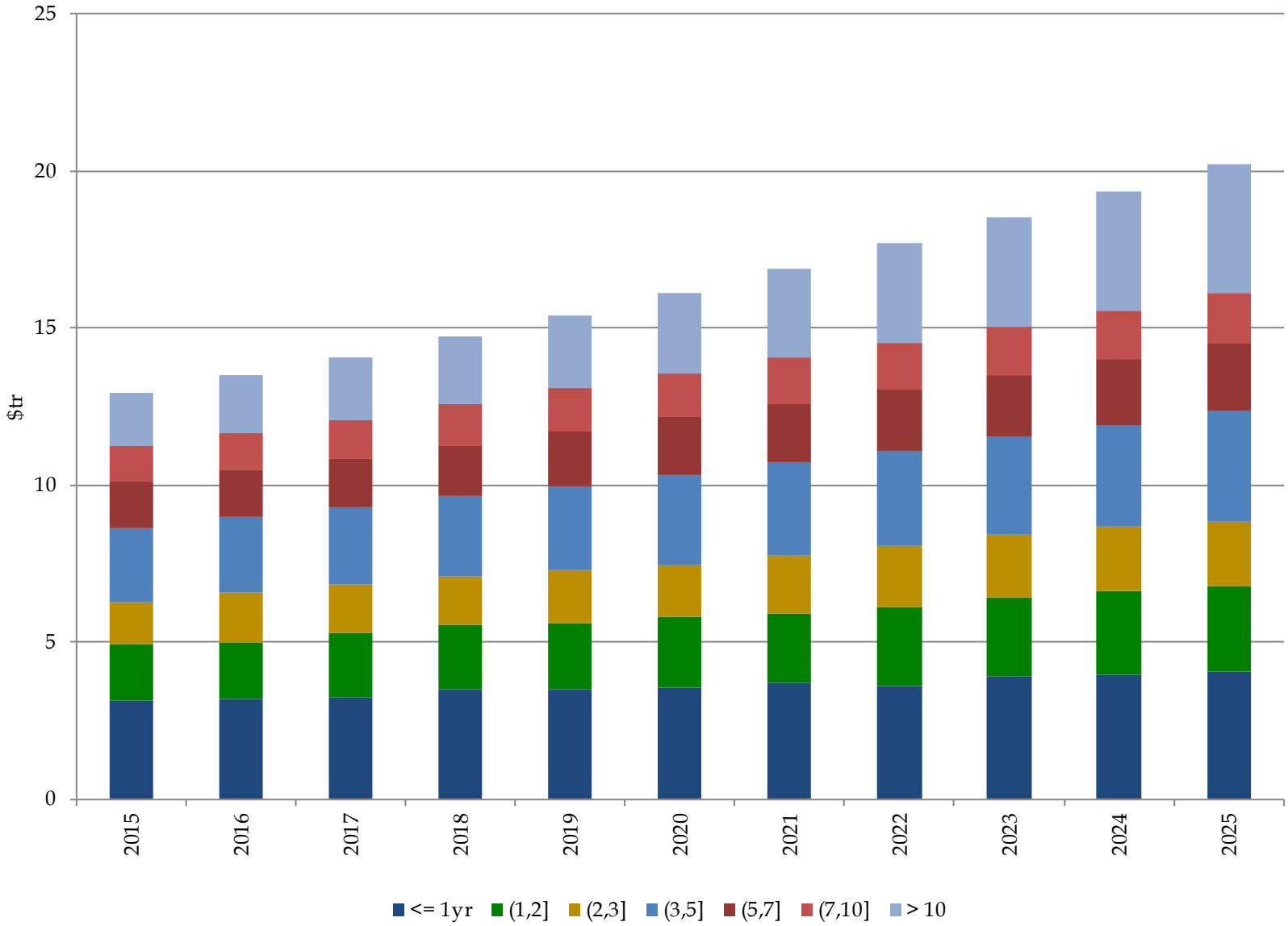
Projected Maturity Profile from end of Fiscal Year



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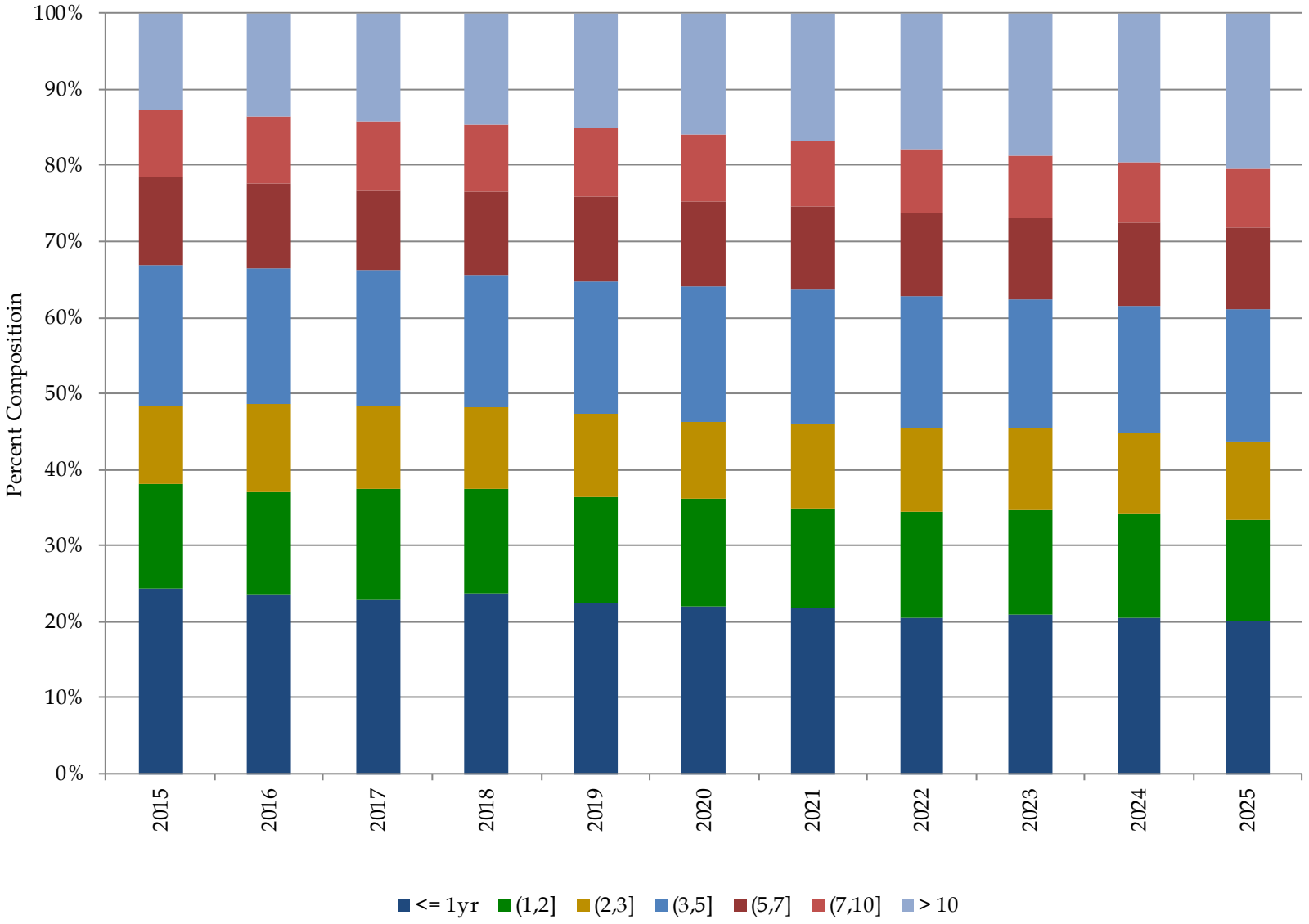
Recent and Projected Maturity Profile, $ billions

End of Fiscal Year	<= 1yr	(1,2]	(2,3]	(3,5]	(5,7]	(7,10]	> 10	Total	(0,5]
2007	1,606	639	341	545	267	480	557	4,434	3,130
2008	2,152	711	280	653	310	499	617	5,222	3,796
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	3,136	1,779	1,342	2,389	1,484	1,125	1,657	12,912	8,646
2016	3,177	1,821	1,556	2,418	1,508	1,186	1,825	13,491	8,972
2017	3,220	2,060	1,540	2,493	1,507	1,258	2,005	14,083	9,313
2018	3,489	2,041	1,579	2,548	1,594	1,313	2,157	14,720	9,657
2019	3,474	2,146	1,686	2,668	1,713	1,398	2,325	15,409	9,972
2020	3,545	2,273	1,645	2,876	1,801	1,413	2,571	16,124	10,339
2021	3,674	2,211	1,886	2,962	1,855	1,466	2,835	16,889	10,733
2022	3,611	2,487	1,939	3,067	1,932	1,494	3,148	17,678	11,104
2023	3,888	2,532	1,995	3,109	1,989	1,518	3,469	18,500	11,524
2024	3,974	2,644	2,031	3,251	2,117	1,545	3,782	19,344	11,900
2025	4,046	2,716	2,082	3,528	2,154	1,578	4,132	20,235	12,371

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 43).

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]
2007	36.2	14.4	7.7	12.3	6.0	10.8	12.6	58.3	70.6
2008	41.2	13.6	5.4	12.5	5.9	9.6	11.8	60.2	72.7
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	24.3	13.8	10.4	18.5	11.5	8.7	12.8	48.5	67.0
2016	23.5	13.5	11.5	17.9	11.2	8.8	13.5	48.6	66.5
2017	22.9	14.6	10.9	17.7	10.7	8.9	14.2	48.4	66.1
2018	23.7	13.9	10.7	17.3	10.8	8.9	14.7	48.3	65.6
2019	22.5	13.9	10.9	17.3	11.1	9.1	15.1	47.4	64.7
2020	22.0	14.1	10.2	17.8	11.2	8.8	15.9	46.3	64.1
2021	21.8	13.1	11.2	17.5	11.0	8.7	16.8	46.0	63.5
2022	20.4	14.1	11.0	17.4	10.9	8.5	17.8	45.5	62.8
2023	21.0	13.7	10.8	16.8	10.8	8.2	18.7	45.5	62.3
2024	20.5	13.7	10.5	16.8	10.9	8.0	19.5	44.7	61.5
2025	20.0	13.4	10.3	17.4	10.6	7.8	20.4	43.7	61.1

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 43).

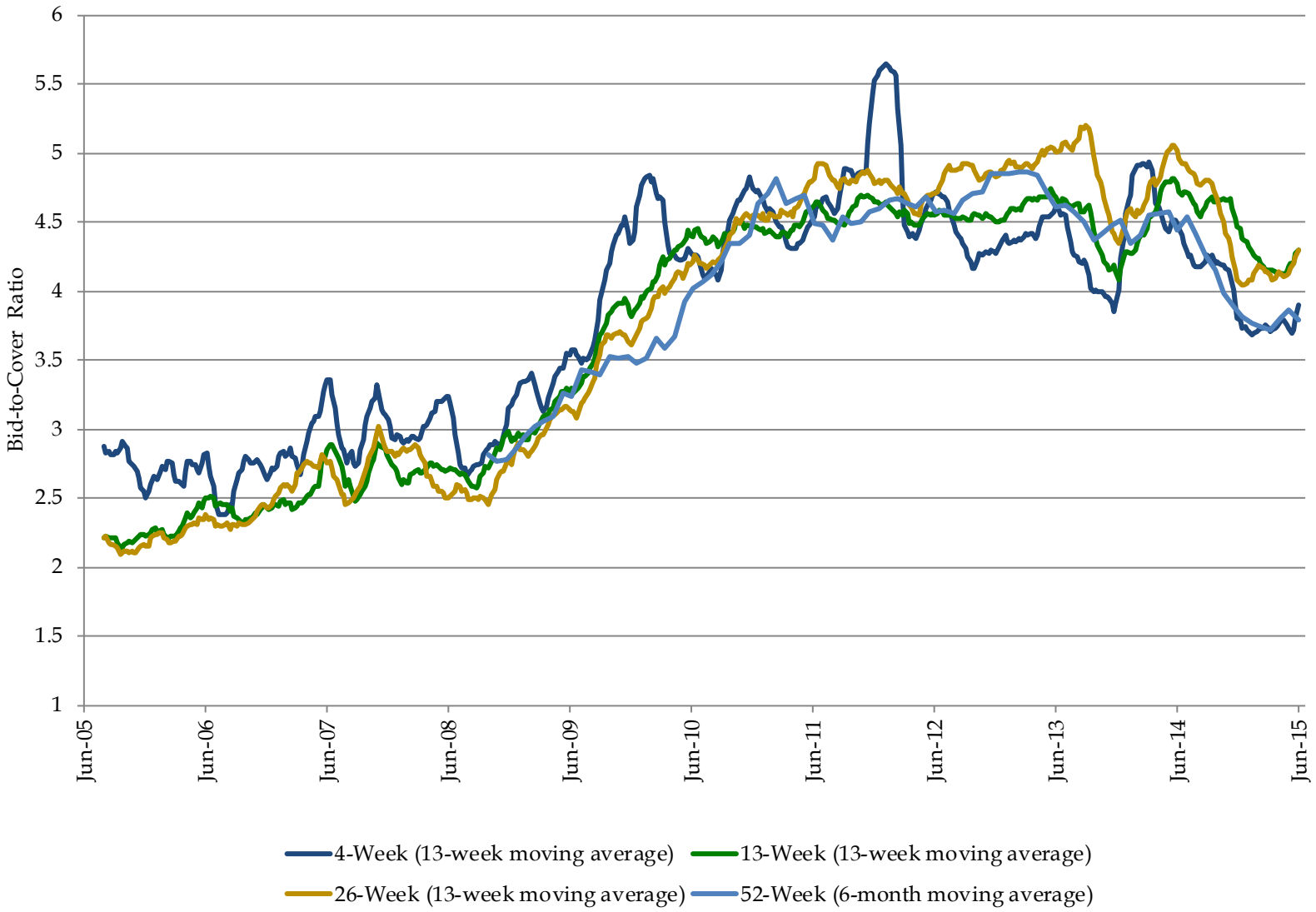
Section V: Demand

Summary Statistics for Fiscal Year 2015 Q3 Auctions

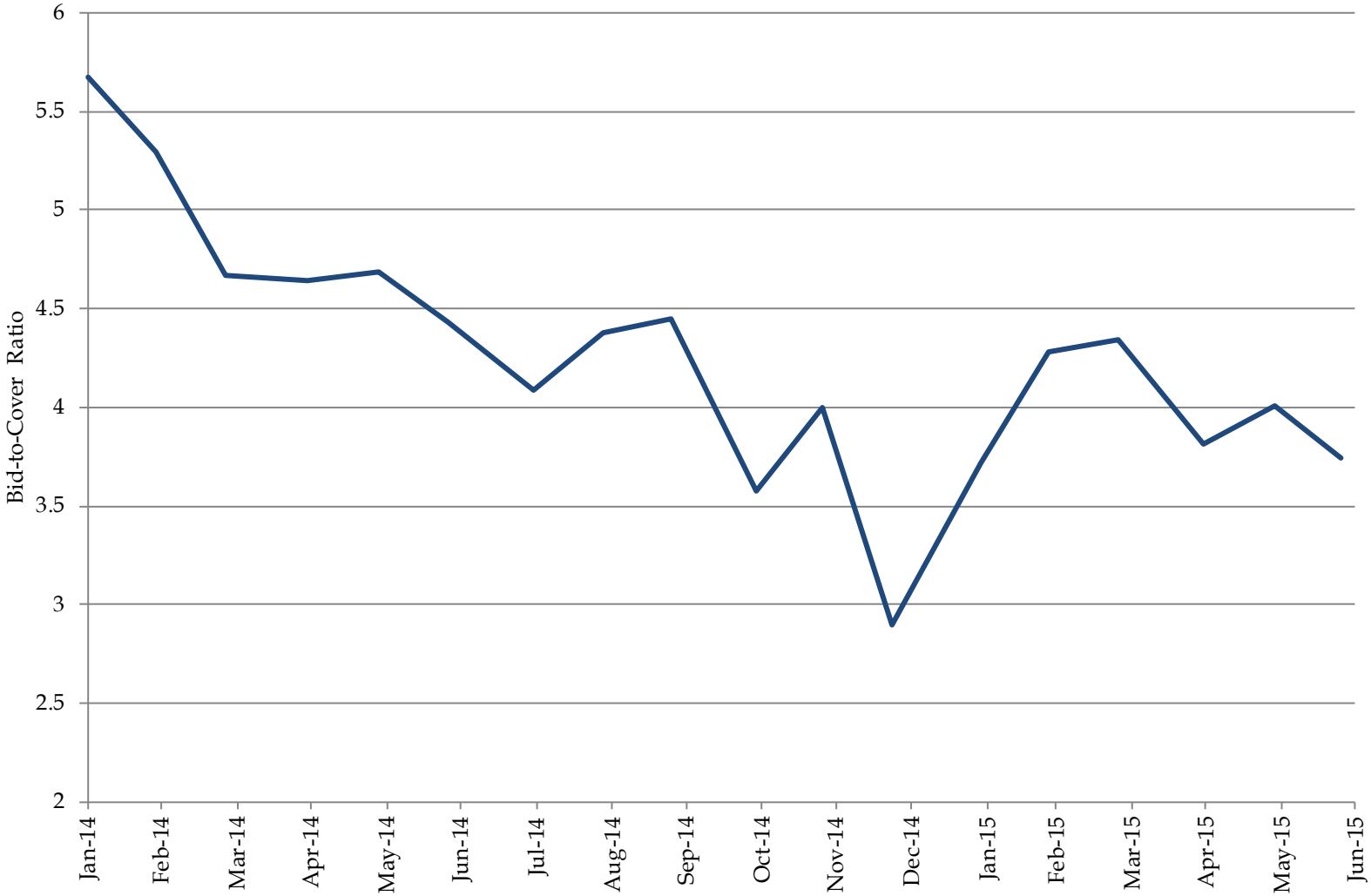
Security Type	Term	Stop Out Rate (%)*	Bid-to-Cover Ratio*	Competitive Awards ($bn)	% Primary Dealer*	% Direct*	% Indirect*	Non-Competitive Awards ($bn)	SOMA Add Ons ($bn)	10-Year Equivalent ($bn)**
Bill	4-Week	0.009	3.9	424.2	70.8	5.1	24.1	3.3	0.0	3.7
Bill	13-Week	0.017	4.3	303.1	71.3	6.6	22.1	4.8	0.0	8.7
Bill	26-Week	0.088	4.3	300.9	51.0	5.4	43.6	4.2	0.0	17.5
Bill	52-Week	0.263	3.8	73.9	57.7	4.8	37.5	0.4	0.0	8.4
Bill	CMBs	0.050	3.9	30.0	84.6	6.3	9.2	0.0	0.0	0.1
Coupon	2-Year	0.627	3.3	77.3	41.7	14.0	44.3	0.4	0.1	17.5
Coupon	3-Year	0.997	3.3	71.3	38.3	10.8	50.9	0.2	0.5	24.2
Coupon	5-Year	1.550	2.5	104.7	34.2	7.0	58.8	0.1	0.1	56.9
Coupon	7-Year	1.954	2.4	87.0	32.9	12.2	54.9	0.0	0.1	64.1
Coupon	10-Year	2.209	2.7	65.9	26.7	14.4	58.9	0.1	0.5	67.0
Coupon	30-Year	2.935	2.3	42.0	37.8	10.9	51.3	0.0	0.4	95.6
TIPS	5-Year	-0.335	2.3	18.0	32.3	6.3	61.5	0.0	0.1	10.1
TIPS	10-Year	0.358	2.3	13.0	28.4	4.5	67.1	0.0	0.0	13.8
TIPS	30-Year	1.142	2.5	7.0	24.9	4.3	70.8	0.0	0.0	20.7
FRN	2-Year	0.073	3.9	41.0	42.3	1.3	56.4	0.0	0.1	0.0
Total Bills		0.050	4.1	1,132.1	65.2	5.6	29.2	12.7	0.0	38.4
Total Coupons		1.608	2.8	448.0	35.1	11.3	53.6	1.0	1.8	325.3
Total TIPS		0.174	2.3	37.9	29.6	5.3	65.1	0.1	0.1	44.6
Total FRNs		0.073	3.9	41.0	42.3	1.3	56.4	0.0	0.1	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.

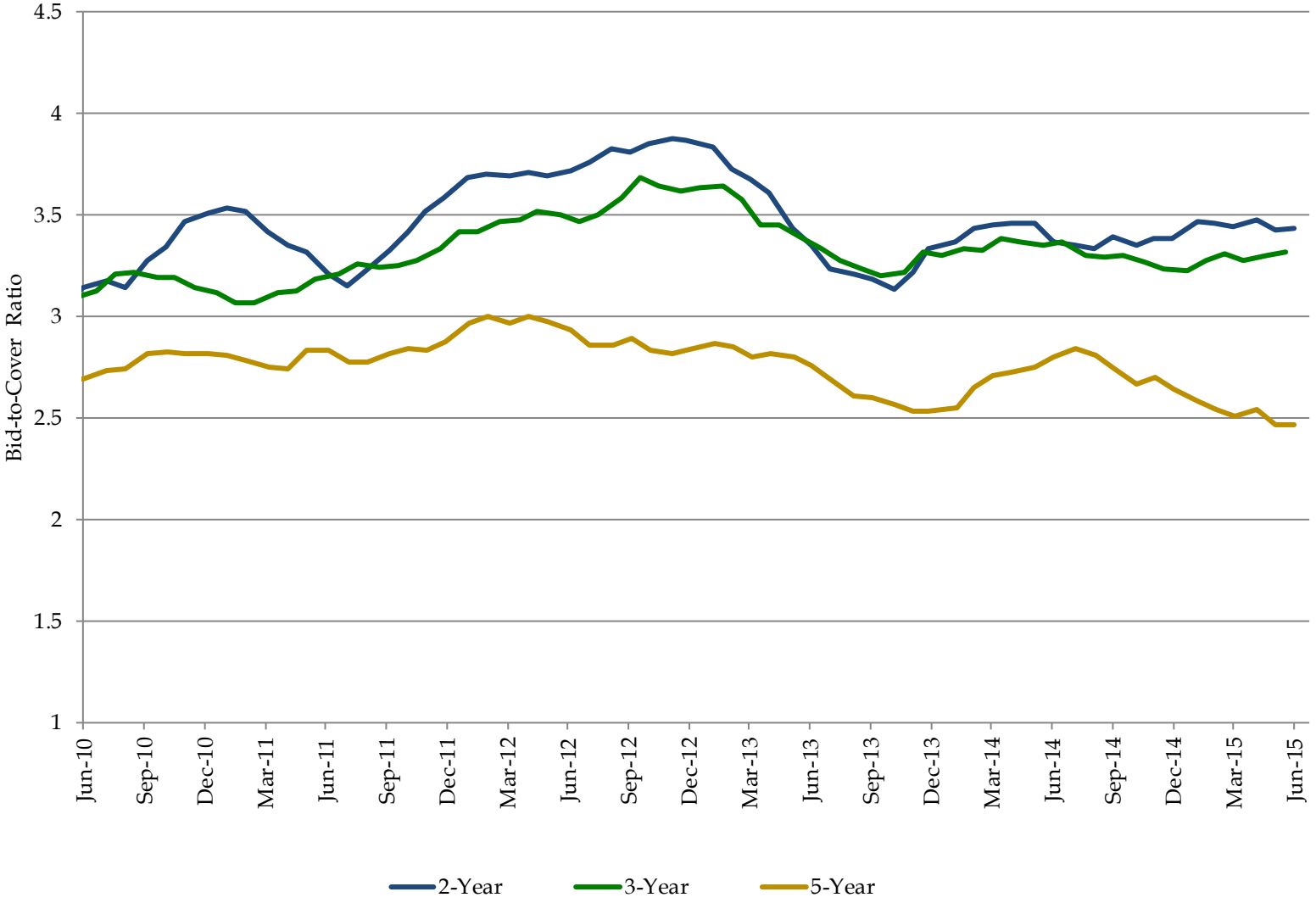
Bid-to-Cover Ratios for Treasury Bills



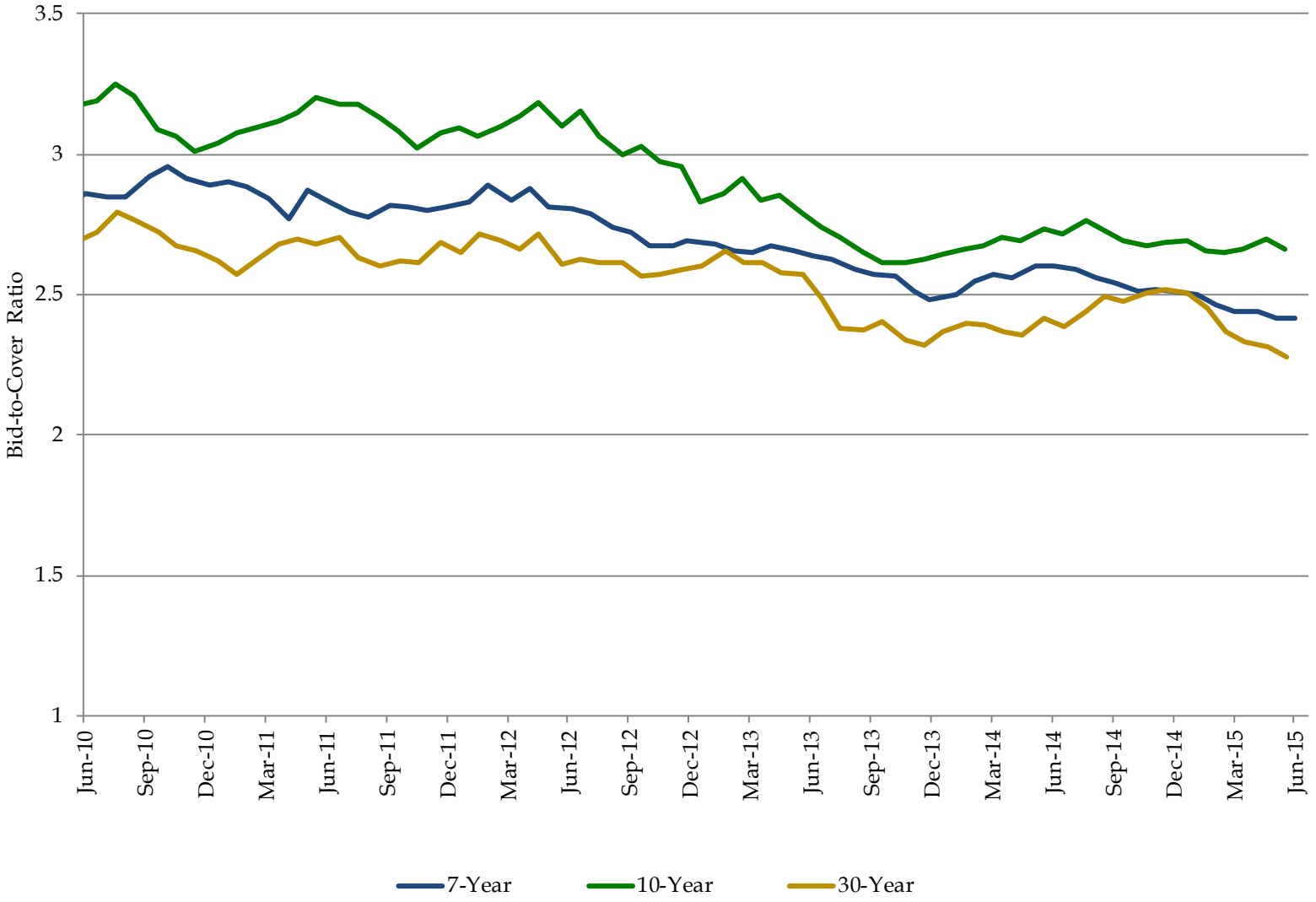
Bid-to-Cover Ratios for FRNs



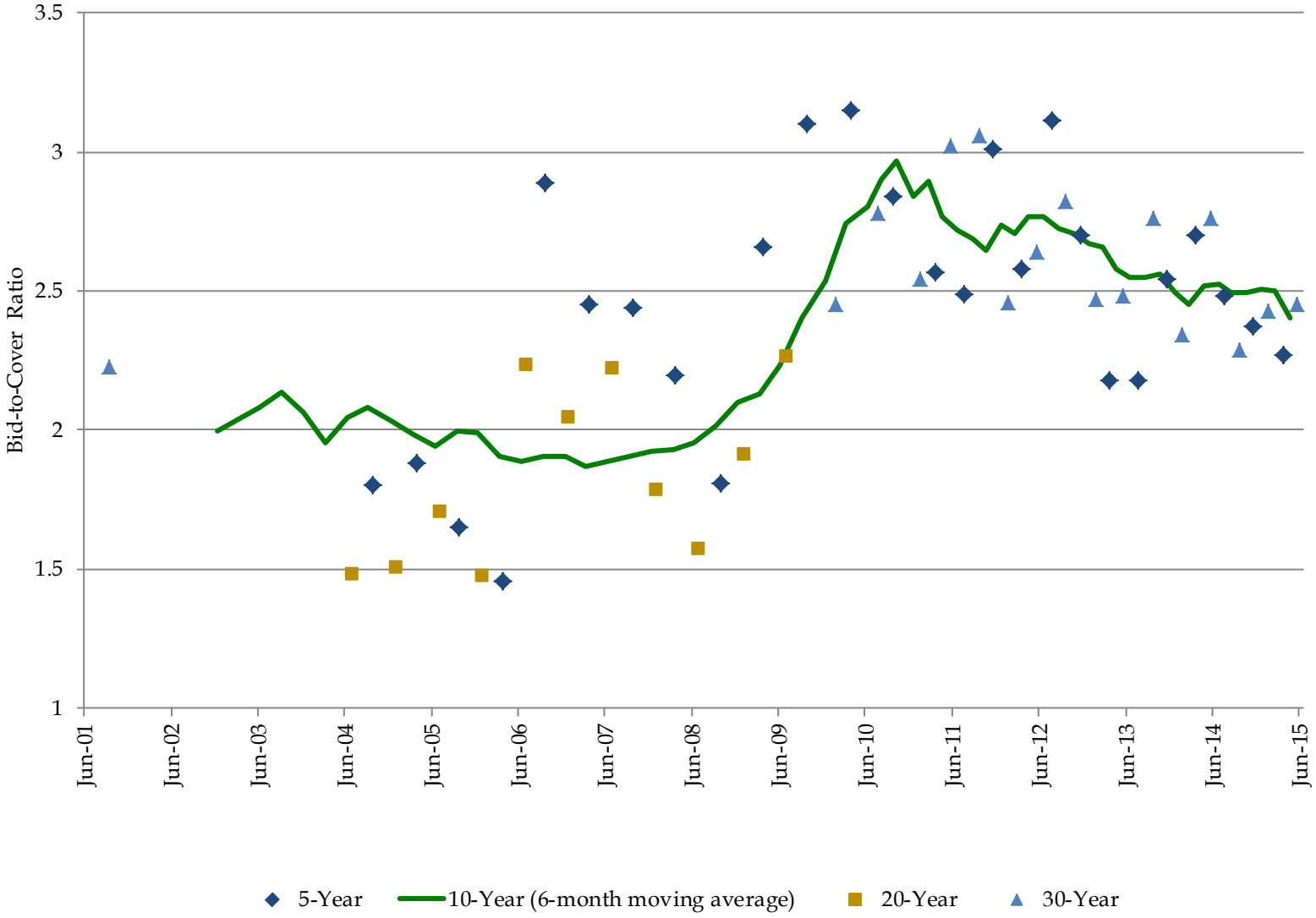
Bid-to-Cover Ratios for 2-, 3-, and 5-Year Nominal Securities (6-Month Moving Average)



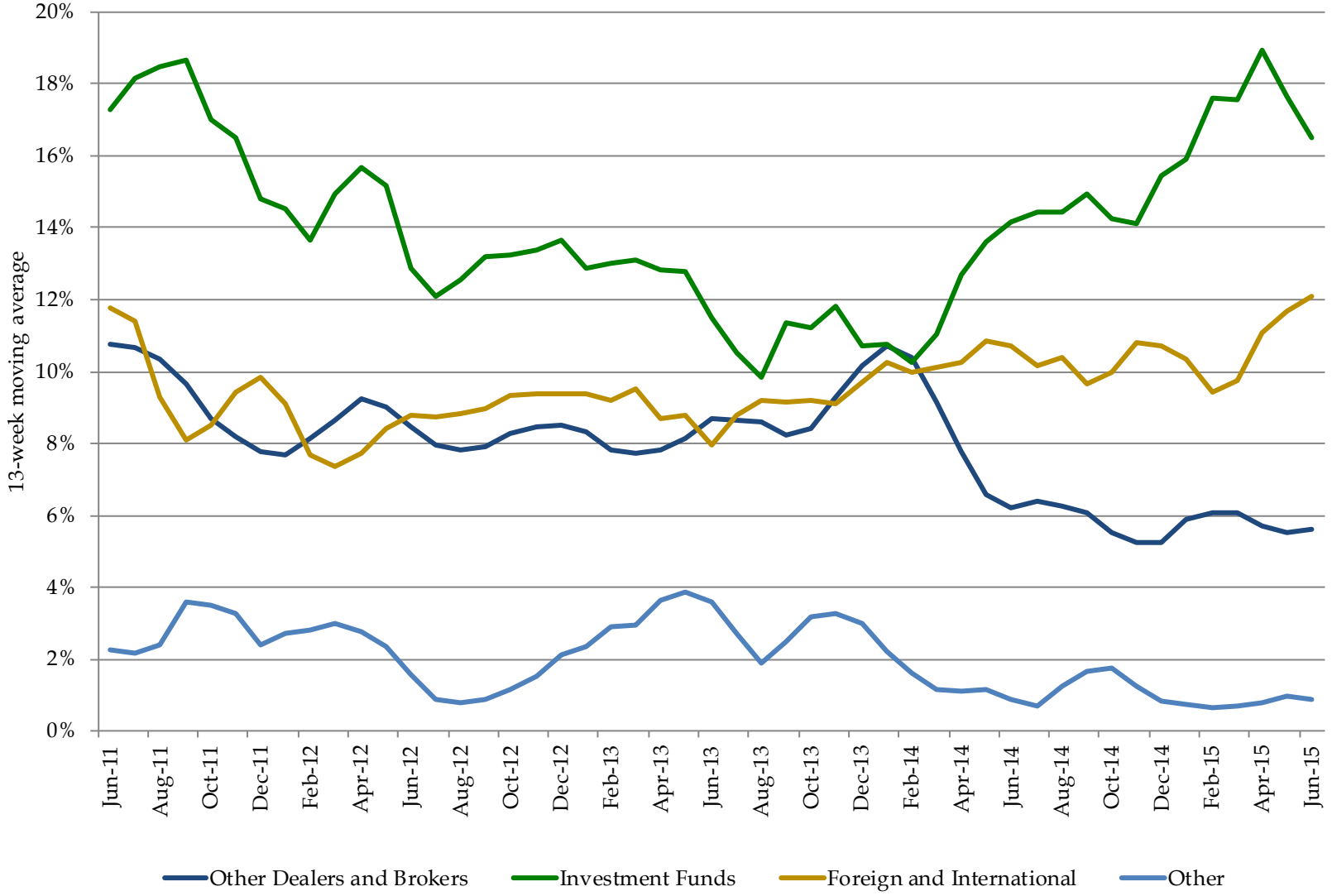
Bid-to-Cover Ratios for 7-, 10-, and 30-Year Nominal Securities (6-Month Moving Average)



Bid-to-Cover Ratios for TIPS

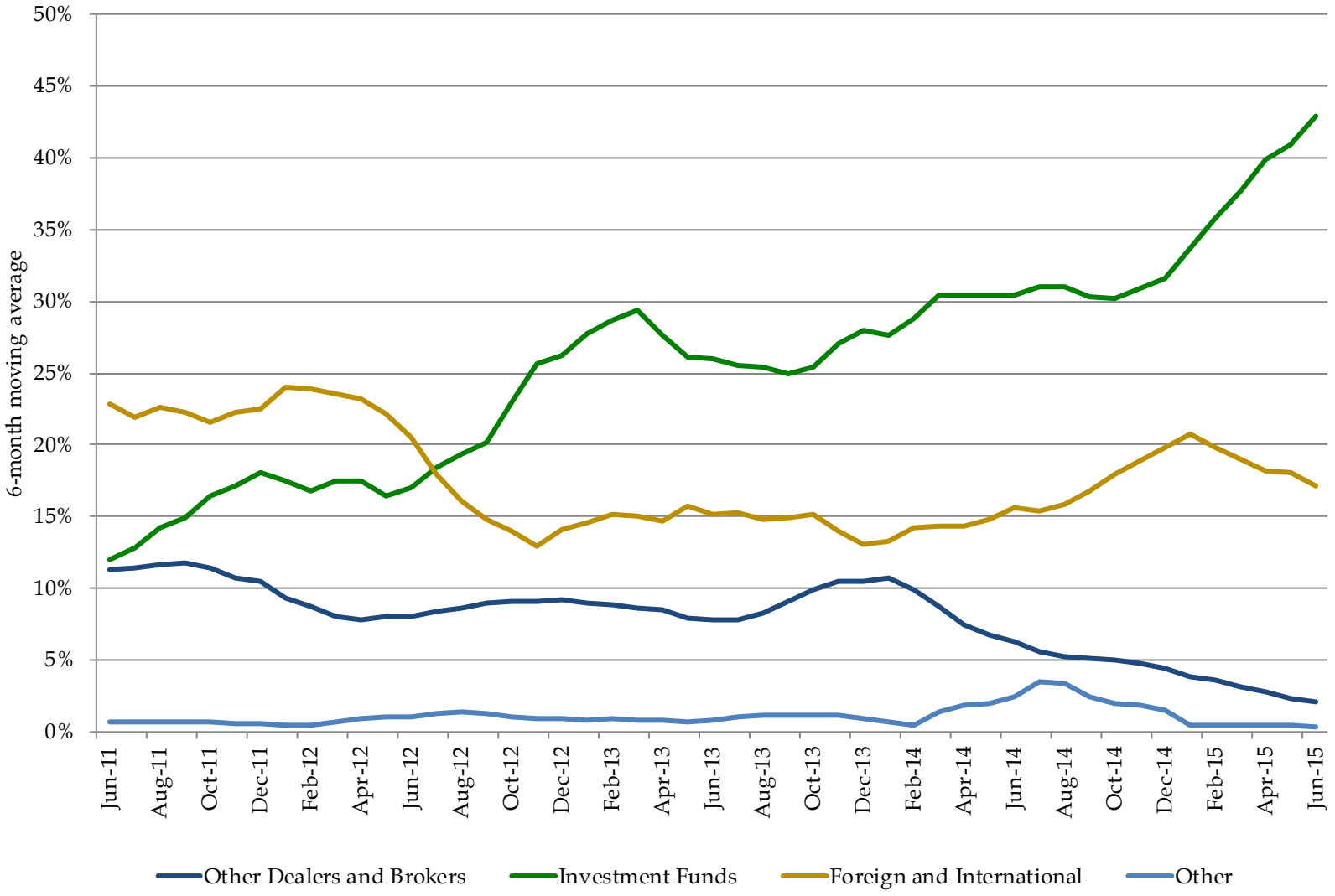


Percent Awarded in Bill Auctions by Investor Class (13-Week Moving Average)



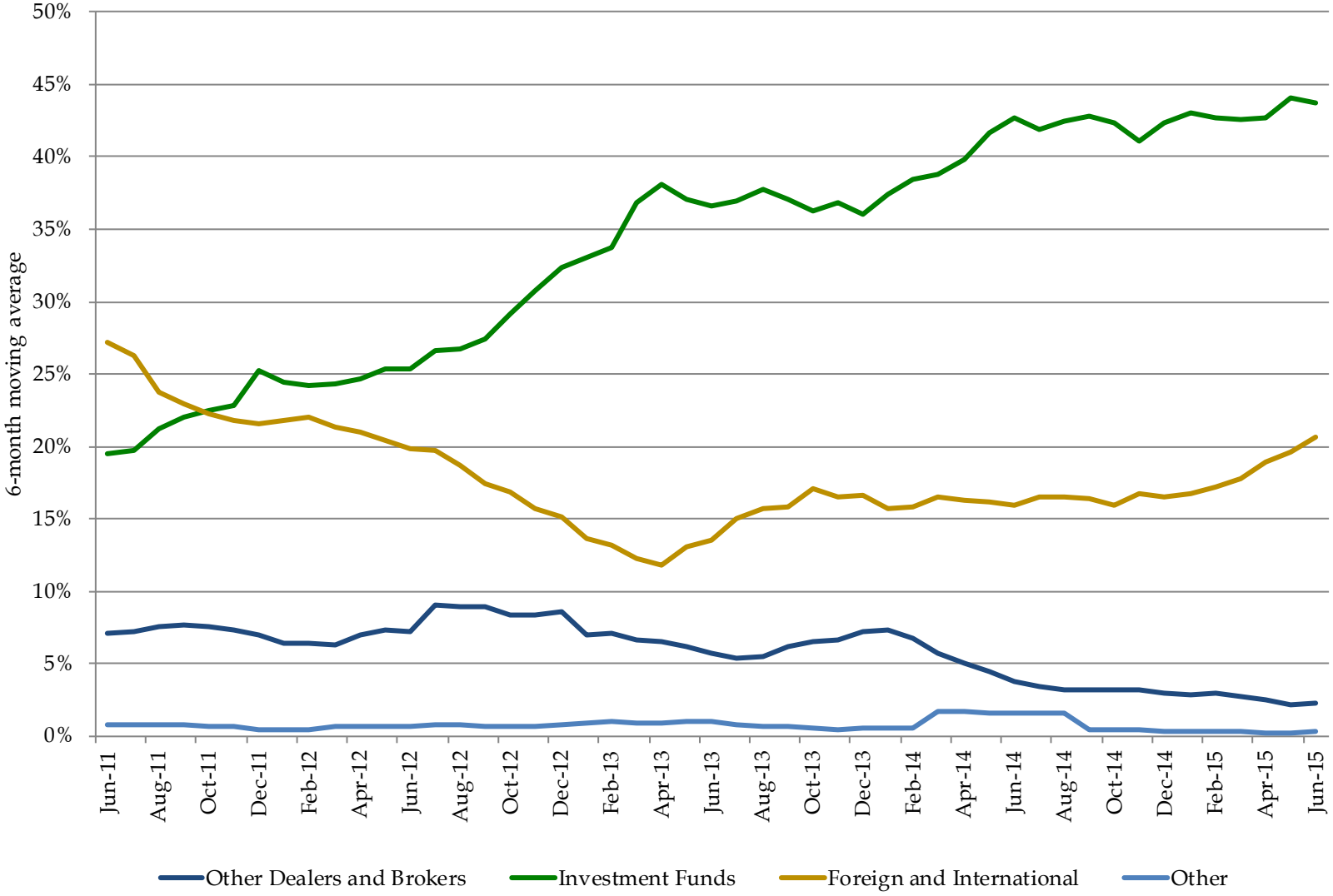
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 2%, which include Depository Institutions, Individuals, Pension and Insurance.

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



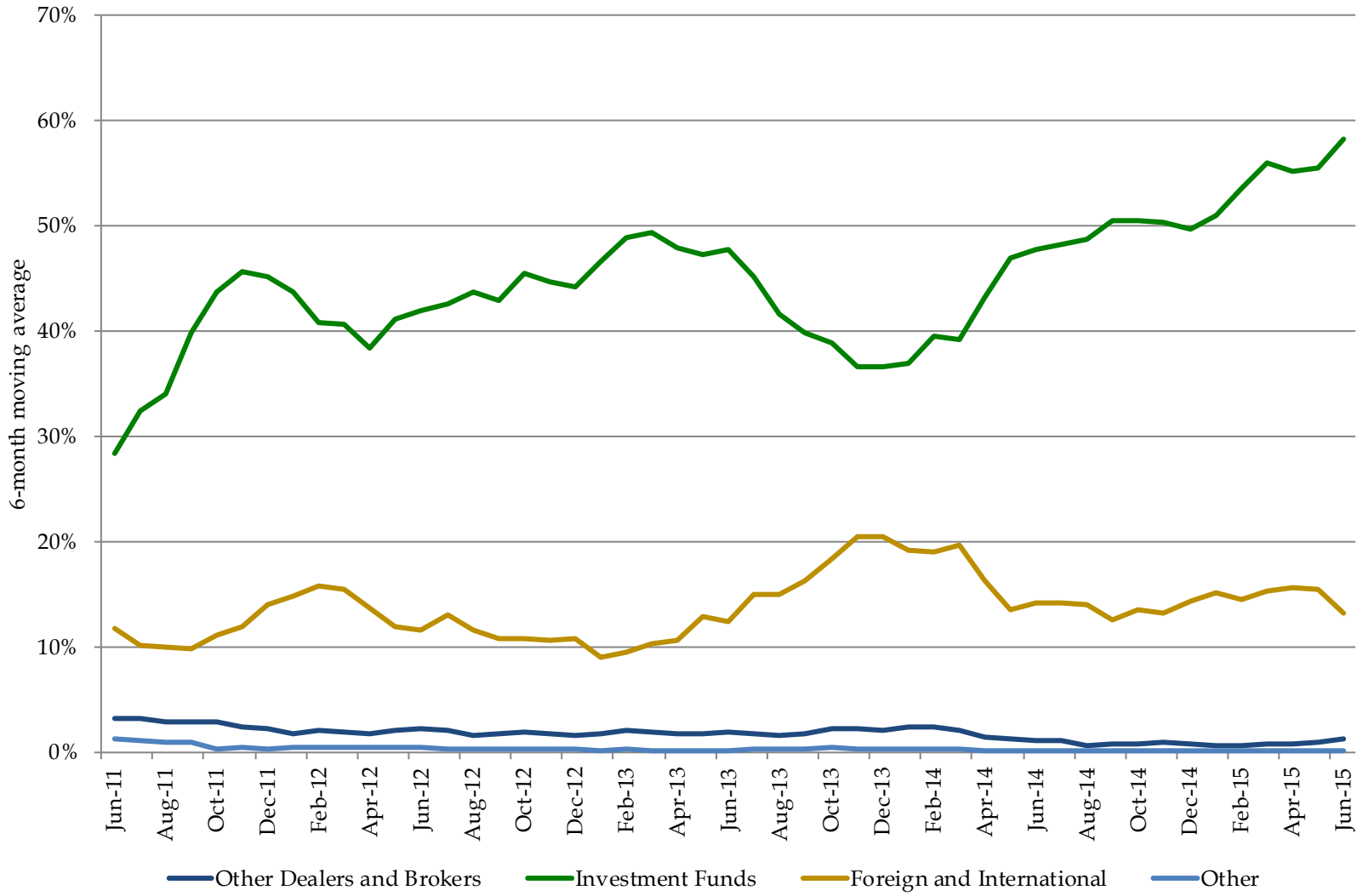
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 2%, which include Depository Institutions, Individuals, Pension and Insurance.

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



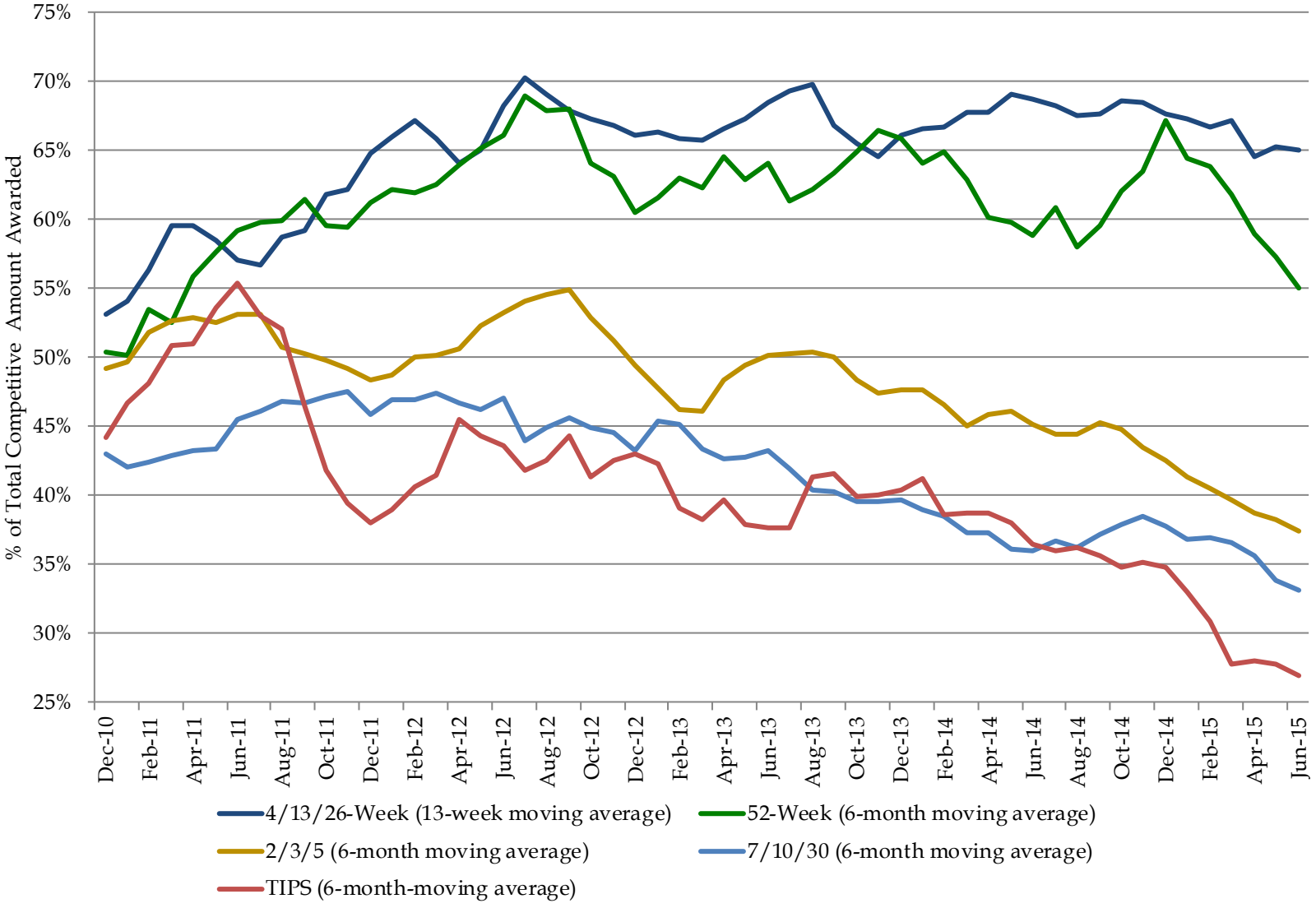
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 2%, which include Depository Institutions, Individuals, Pension and Insurance.

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



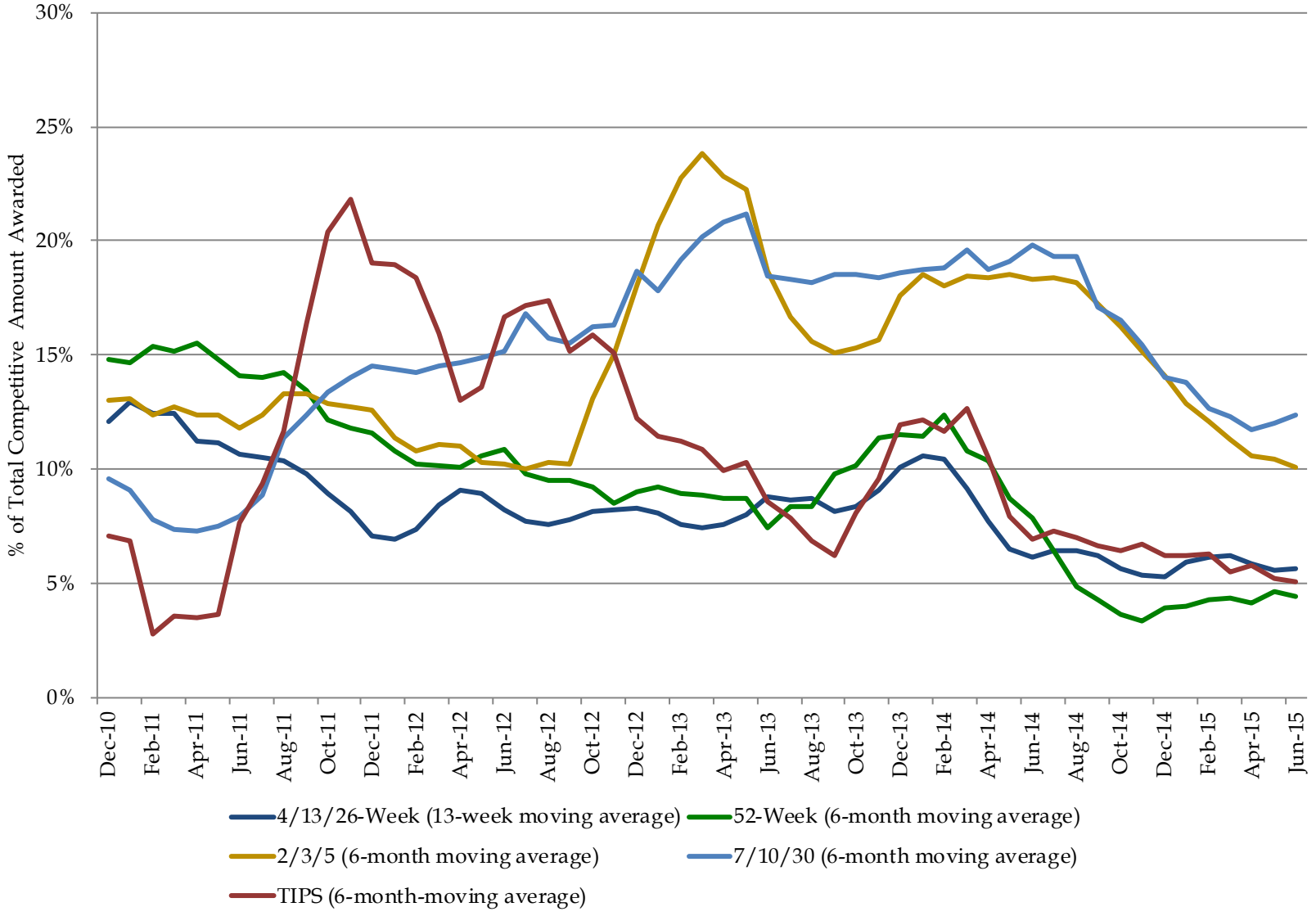
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 2%, which include Depository Institutions, Individuals, Pension and Insurance.

Primary Dealer Awards at Auction



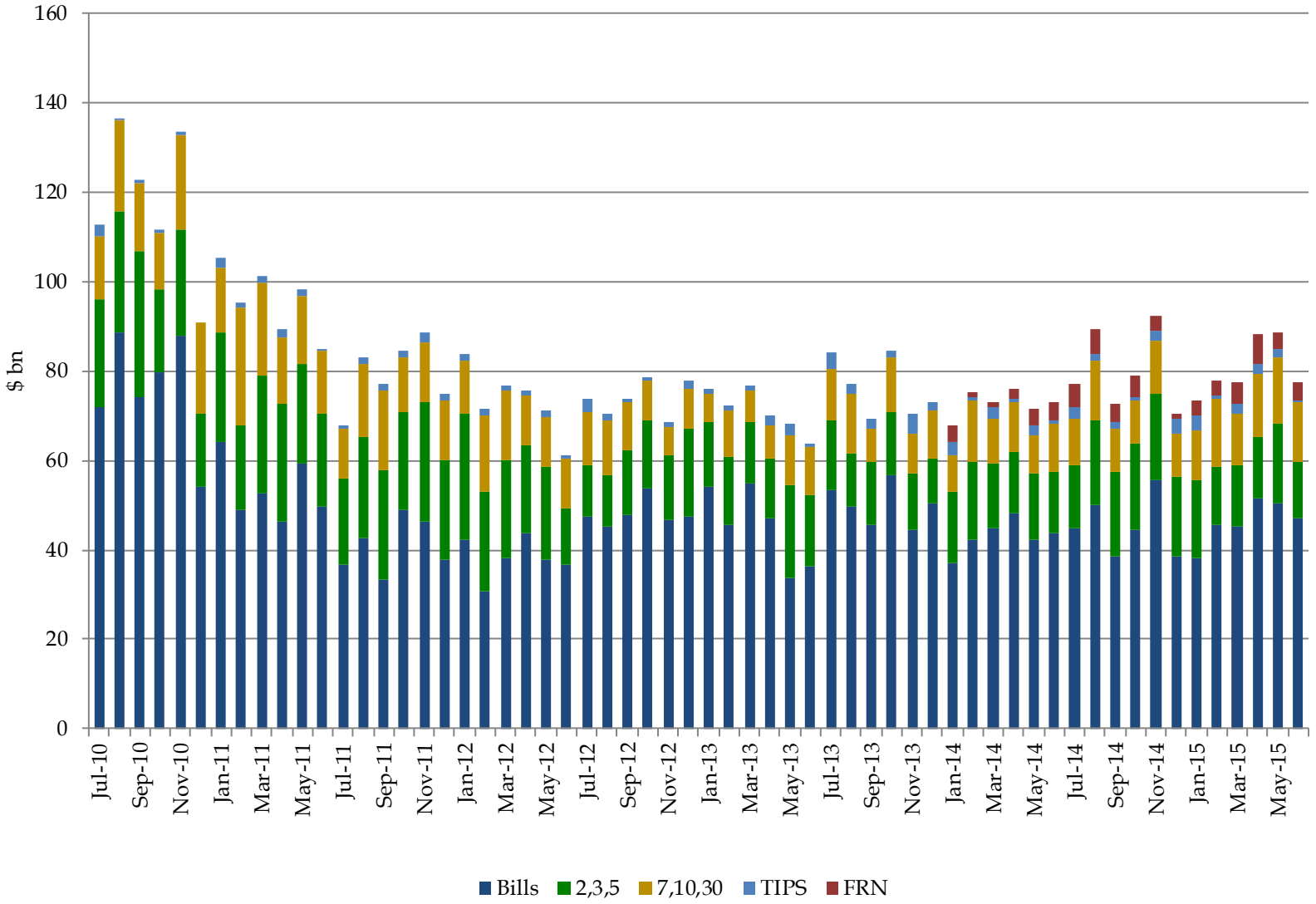
Excludes SOMA add-ons.

Direct Bidder Awards at Auction



Excludes SOMA add-ons.

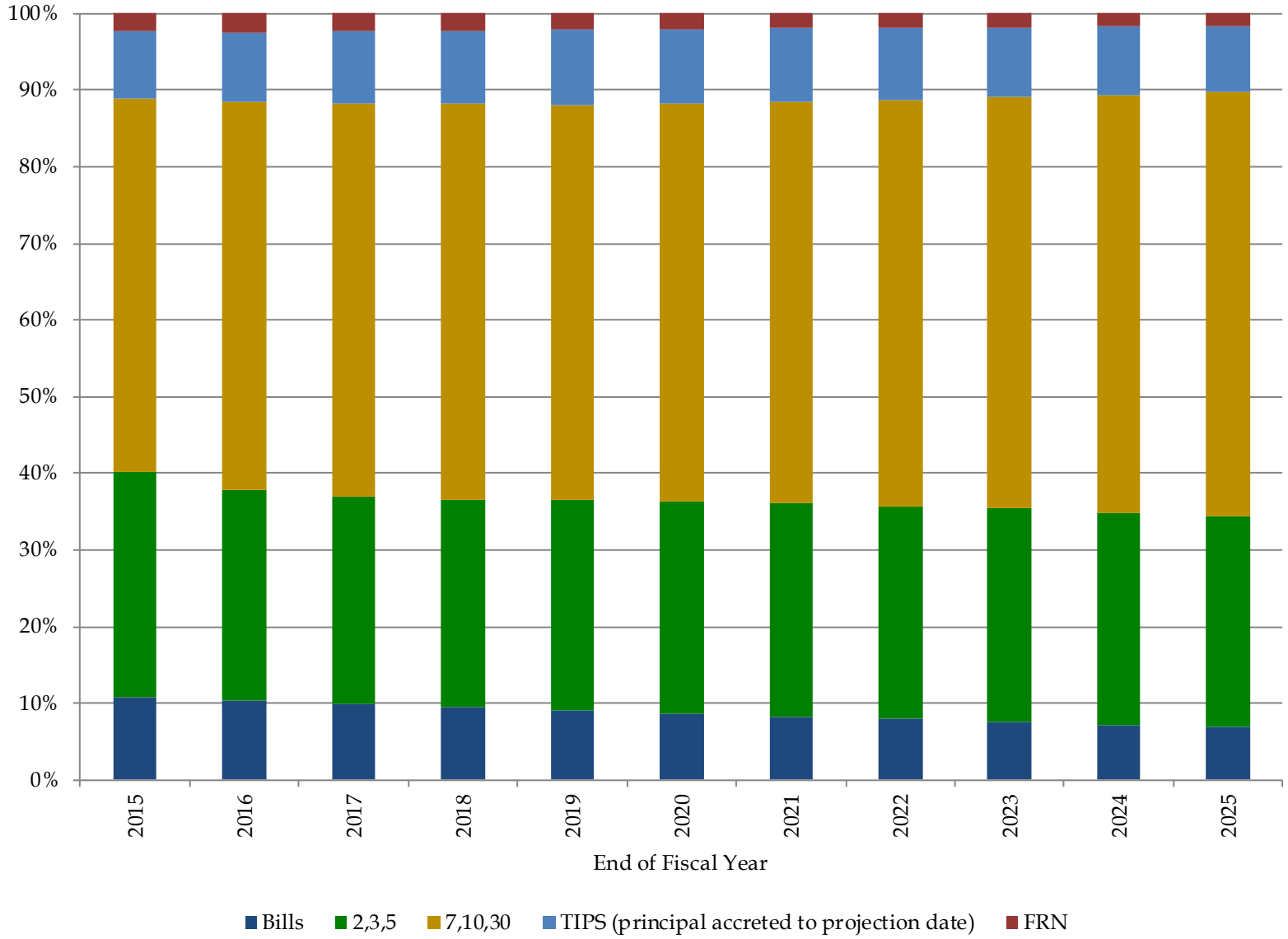
Total Foreign Awards of Treasuries at Auction, $ billions



Foreign includes both private sector and official institutions.

Appendix

Projected Portfolio Composition by Issuance Type, Percent



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
2007	21.6	38.9	29.2	68.1	10.3	0.0
2008	28.5	34.5	26.9	61.4	10.0	0.0
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	10.8	29.4	48.8	78.2	8.8	2.2
2016	10.4	27.6	50.6	78.2	9.0	2.4
2017	9.9	27.1	51.3	78.4	9.3	2.3
2018	9.5	27.1	51.7	78.7	9.5	2.2
2019	9.1	27.5	51.6	79.1	9.7	2.1
2020	8.7	27.8	51.8	79.6	9.7	2.0
2021	8.3	27.9	52.3	80.2	9.6	1.9
2022	7.9	27.8	53.1	80.8	9.4	1.9
2023	7.6	27.8	53.7	81.5	9.2	1.8
2024	7.2	27.7	54.4	82.1	9.0	1.7
2025	6.9	27.6	55.3	82.8	8.6	1.6

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.

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	4/9/2015	0.015	3.83	29.7	69.7	5.8	24.5	0.3	0.0	0.3
4-Week	4/16/2015	0.015	4.02	29.7	65.2	4.9	29.9	0.3	0.0	0.3
4-Week	4/23/2015	0.015	4.01	29.8	60.3	6.4	33.3	0.2	0.0	0.3
4-Week	4/30/2015	0.000	4.25	28.9	65.3	4.4	30.3	0.3	0.0	0.3
4-Week	5/7/2015	0.000	3.83	29.7	79.9	4.1	16.0	0.3	0.0	0.3
4-Week	5/14/2015	0.010	3.95	39.7	63.5	5.1	31.4	0.3	0.0	0.3
4-Week	5/21/2015	0.015	3.38	44.8	78.2	6.1	15.6	0.2	0.0	0.4
4-Week	5/28/2015	0.010	3.35	43.8	75.8	5.3	18.9	0.2	0.0	0.4
4-Week	6/4/2015	0.005	3.51	34.7	82.0	4.9	13.1	0.3	0.0	0.3
4-Week	6/11/2015	0.005	3.79	34.7	60.5	5.1	34.5	0.3	0.0	0.3
4-Week	6/18/2015	0.000	4.64	24.8	80.1	6.2	13.7	0.2	0.0	0.2
4-Week	6/25/2015	0.000	4.80	24.0	69.7	2.8	27.5	0.2	0.0	0.2
4-Week	7/2/2015	0.015	3.73	29.7	67.8	3.8	28.4	0.3	0.0	0.3
13-Week	4/9/2015	0.020	4.23	23.7	74.2	6.4	19.4	0.3	0.0	0.7
13-Week	4/16/2015	0.025	4.07	23.4	61.1	5.1	33.8	0.4	0.0	0.7
13-Week	4/23/2015	0.025	4.21	23.6	77.4	10.8	11.8	0.4	0.0	0.7
13-Week	4/30/2015	0.020	4.31	22.8	65.8	7.9	26.2	0.4	0.0	0.7
13-Week	5/7/2015	0.015	4.13	23.5	77.7	5.9	16.4	0.4	0.0	0.7
13-Week	5/14/2015	0.020	4.43	23.4	61.3	3.4	35.4	0.4	0.0	0.7
13-Week	5/21/2015	0.015	4.40	23.6	73.7	4.7	21.6	0.3	0.0	0.7
13-Week	5/28/2015	0.015	4.70	22.7	69.4	5.5	25.1	0.3	0.0	0.7
13-Week	6/4/2015	0.010	4.49	23.5	69.6	4.1	26.3	0.3	0.0	0.7
13-Week	6/11/2015	0.015	4.29	23.6	79.3	7.9	12.8	0.4	0.0	0.7
13-Week	6/18/2015	0.010	4.57	23.5	75.1	9.2	15.7	0.4	0.0	0.7
13-Week	6/25/2015	0.010	4.16	22.6	68.8	10.0	21.2	0.4	0.0	0.7
13-Week	7/2/2015	0.015	3.96	23.2	73.2	4.9	21.8	0.4	0.0	0.7
26-Week	4/9/2015	0.095	4.05	23.2	66.2	9.7	24.1	0.3	0.0	1.3
26-Week	4/16/2015	0.105	4.32	23.2	42.6	4.9	52.5	0.3	0.0	1.3
26-Week	4/23/2015	0.090	4.49	23.1	54.1	6.3	39.6	0.3	0.0	1.3
26-Week	4/30/2015	0.095	4.61	22.9	36.2	1.0	62.8	0.3	0.0	1.4
26-Week	5/7/2015	0.070	3.94	23.1	57.2	9.3	33.4	0.3	0.0	1.3
26-Week	5/14/2015	0.085	4.25	23.3	41.0	3.4	55.6	0.4	0.0	1.4
26-Week	5/21/2015	0.080	4.51	23.4	40.8	3.4	55.8	0.3	0.0	1.3
26-Week	5/28/2015	0.085	4.45	22.7	58.7	1.6	39.8	0.3	0.0	1.3
26-Week	6/4/2015	0.070	4.58	23.3	48.7	4.8	46.4	0.3	0.0	1.3
26-Week	6/11/2015	0.080	4.49	23.4	47.9	4.6	47.4	0.3	0.0	1.3
26-Week	6/18/2015	0.100	4.19	23.4	67.4	7.0	25.5	0.3	0.0	1.3
26-Week	6/25/2015	0.080	4.29	22.7	47.8	7.5	44.7	0.4	0.0	1.3
26-Week	7/2/2015	0.110	3.84	23.2	54.3	5.8	39.9	0.3	0.0	1.3
52-Week	4/30/2015	0.245	4.11	24.5	51.1	1.9	47.0	0.1	0.0	2.8
52-Week	5/28/2015	0.255	3.78	24.6	57.1	6.6	36.3	0.2	0.0	2.8
52-Week	6/25/2015	0.290	3.44	24.8	64.9	5.9	29.3	0.1	0.0	2.8
CMBs	6/3/2015	0.050	3.86	30.0	84.6	6.3	9.2	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	4/30/2015	0.540	3.30	25.7	47.3	14.6	38.1	0.2	0.1	5.9
2-Year	6/1/2015	0.648	3.40	25.8	40.5	17.2	42.3	0.1	0.0	5.8
2-Year	6/30/2015	0.692	3.28	25.8	37.2	10.1	52.6	0.1	0.0	5.8
3-Year	4/15/2015	0.865	3.25	23.8	39.5	11.1	49.4	0.1	0.0	8.0
3-Year	5/15/2015	1.000	3.34	23.8	35.7	11.6	52.7	0.1	0.5	8.3
3-Year	6/15/2015	1.125	3.33	23.7	39.6	9.7	50.7	0.1	0.0	8.0
5-Year	4/30/2015	1.380	2.56	35.0	33.2	5.6	61.2	0.0	0.1	19.2
5-Year	6/1/2015	1.560	2.46	34.8	31.6	10.0	58.5	0.1	0.0	18.8
5-Year	6/30/2015	1.710	2.39	34.8	37.9	5.6	56.6	0.1	0.0	18.9
7-Year	4/30/2015	1.820	2.44	29.0	33.0	12.8	54.1	0.0	0.1	21.7
7-Year	6/1/2015	1.888	2.49	29.0	34.2	12.0	53.8	0.0	0.0	21.2
7-Year	6/30/2015	2.153	2.38	29.0	31.5	11.9	56.6	0.0	0.0	21.3
10-Year	4/15/2015	1.925	2.62	21.0	32.2	9.3	58.5	0.0	0.0	21.0
10-Year	5/15/2015	2.237	2.72	24.0	18.9	20.9	60.2	0.0	0.5	25.1
10-Year	6/15/2015	2.461	2.74	21.0	30.0	12.1	57.9	0.0	0.0	21.0
30-Year	4/15/2015	2.597	2.18	13.0	41.8	7.0	51.3	0.0	0.0	30.4
30-Year	5/15/2015	3.044	2.20	16.0	38.0	11.1	50.8	0.0	0.4	36.7
30-Year	6/15/2015	3.138	2.54	13.0	33.6	14.4	52.0	0.0	0.0	28.5
2-Year FRN	4/30/2015	0.074	3.81	15.0	36.9	0.4	62.7	0.0	0.1	0.0
2-Year FRN	5/29/2015	0.069	4.01	13.0	48.5	2.3	49.2	0.0	0.0	0.0
2-Year FRN	6/26/2015	0.076	3.74	13.0	42.5	1.2	56.4	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	4/30/2015	(0.335)	2.27	18.0	32.3	6.3	61.5	0.0	0.1	10.1
10-Year TIPS	5/29/2015	0.358	2.33	13.0	28.4	4.5	67.1	0.0	0.0	13.8
30-Year TIPS	6/30/2015	1.142	2.45	7.0	24.9	4.3	70.8	0.0	0.0	20.7

*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.

The Meaning and Implications of “Regular and Predictable” (R&P) as a Tenet of Debt Management

August 2015

TBAC Charge

A pillar of Treasury's debt management policy has been to operate in a "regular and predictable" manner. However, as a precise definition of "regular and predictable" has not been provided, the meaning of "regular and predictable" is subject to interpretation.

We would like the Committee to comment on the meaning of "regular and predictable" and its implication for debt managers' ability to alter auction sizes. At what point does the added flexibility of moving these auction sizes violate the Treasury's fundamental paradigm of "regular and predictable?"

Outline

- **Debt Management Goals and History of R&P**
- **Current Operating Environment**
- **Benefits and Potential Opportunity Costs of R&P**
- **Boundaries of R&P Framework**
- **Conclusion**

Treasury's Debt Management Goals

- **To fund the deficit and refinance maturing debt at the lowest cost to taxpayers over time**

- **Manage Treasury's cash flows in an uncertain environment**
  - Uncertain net financing needs
  - Uncertain auction demand conditions
  - Uncertain market liquidity, in light of recent regulatory and market micro-structure changes
  - Uncertain economic and financial market outlook
  - Uncertain Federal Reserve policies going forward

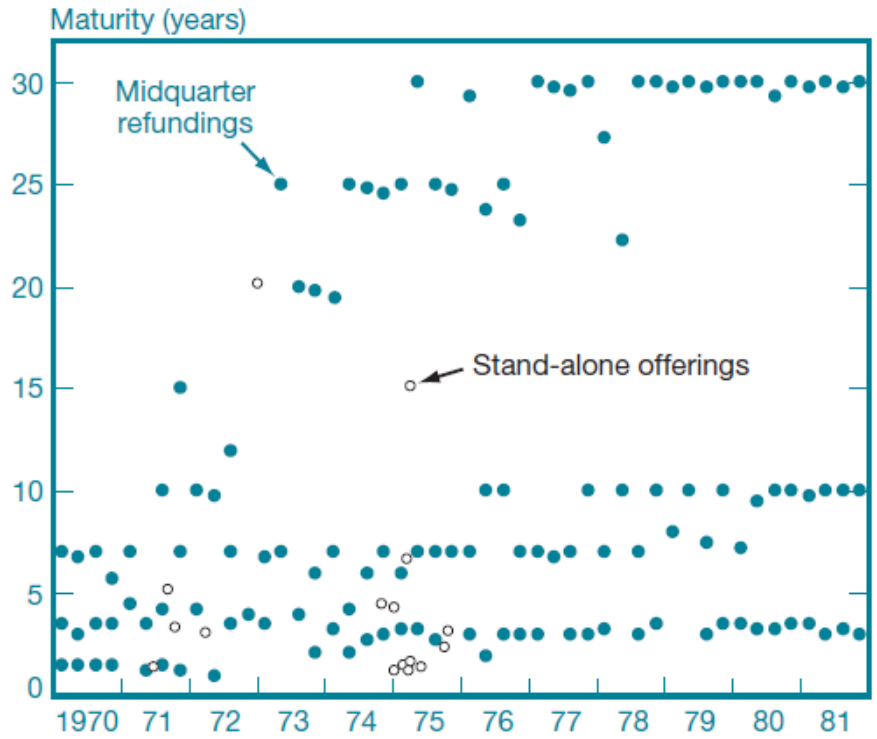
- **Manage the risk profile of outstanding debt**

In the Mid-1970s, Treasury Began Transitioning to an R&P Auction Framework

- Analysis by Garbade[1] shows that up until the mid-1970s, Treasury exercised more tactical discretion in the timing, maturity, and size of new issues in response to perceived market opportunities, unforeseen variations in its cash needs, or to manage the WAM of its outstanding securities
- By the mid-1970s, the costs of tactical discretion in terms of generating potential market disruptions came more into focus, tilting the debate in favor of adopting a more "regular and predictable" auction process
  - The size of the deficit to be financed increased significantly
  - The tactical and discretionary issuance left market participants unprepared and collided with private sector issuance of securities with similar credit ratings and tenors (i.e. close substitutes)

U.S. Treasury Issuance[1]

1970 - 1981



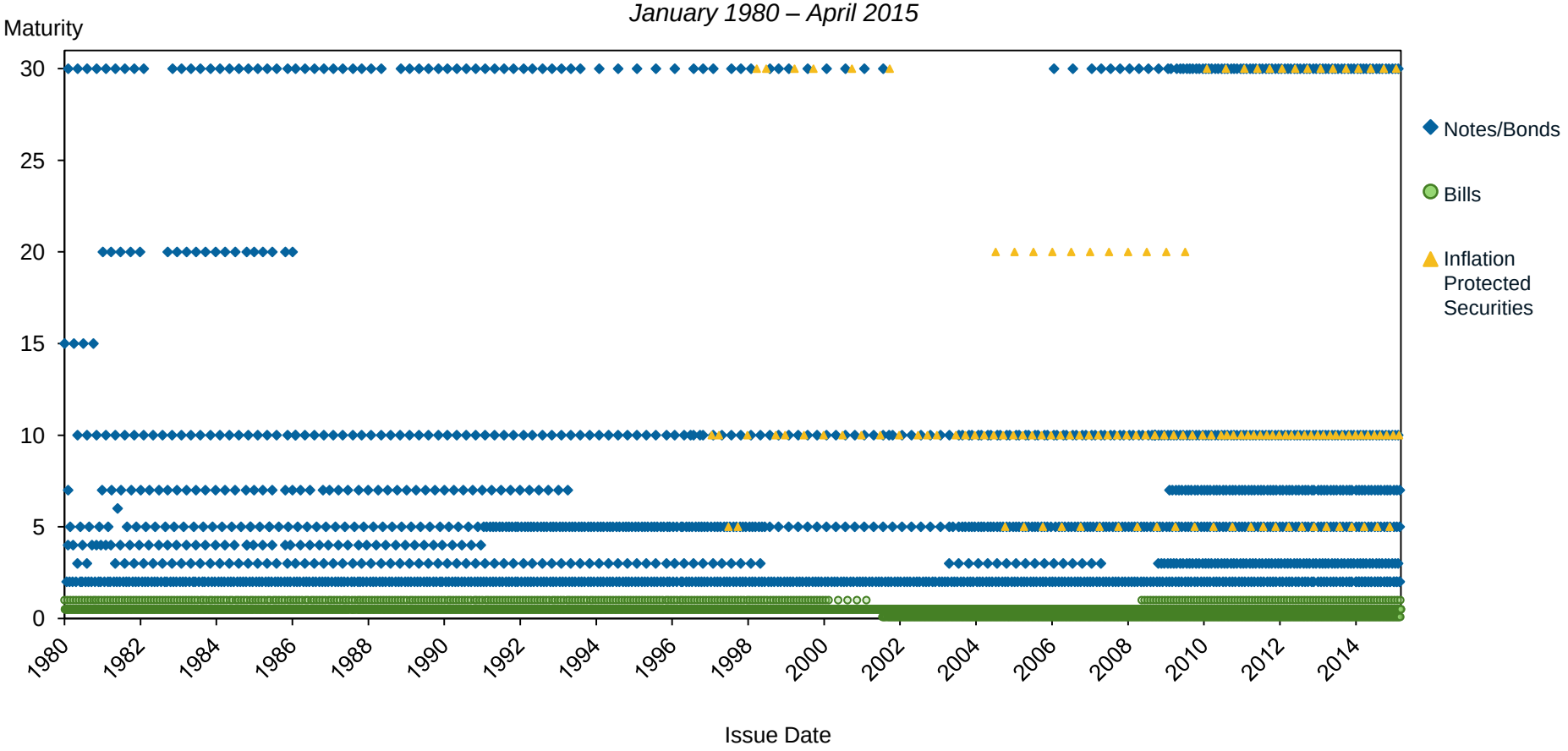
1. Kenneth D. Garbade, "The Emergence of 'Regular and Predictable' as a Treasury Debt Management Strategy," FRBNY Economic Policy Review, March 2007.

Since the Transition, Treasury Has Adhered to an R&P Auction Framework

- **Regular auctions with a set schedule—standardized communication process around the size of auctions**
- **As much forward guidance regarding future auction sizes as is feasible**
  - Generally communicated as part of the Quarterly Refunding announcement
- **Much longer lead times in communicating decisions to introduce or eliminate particular maturities or instruments**
  - Generally, lead times of anywhere from one quarter to several years

U.S. Treasury Issuance—Regular and Predictable

January 1980 – April 2015



Source: U.S. Treasury.

Treasury's Current Operating Environment

- Potential variability in budget deficits
- Sizeable stock of outstanding debt to roll over
- Potential structural changes in investor demand over time
- Changes in the financial regulatory environment and market structure that affect market liquidity and auction demand conditions
- Federal Reserve decisions in terms of policy rates and its balance sheet going forward
- Constraints periodically posed by the debt ceiling

Treasury needs to retain enough flexibility within its current R&P framework to be able to adjust to these uncertain conditions over time

Benefits and Potential Opportunity Costs of R&P

Benefits of the current R&P framework

- Lowers Treasury borrowing costs
- Provides a reliable liquid benchmark curve that benefits other markets, e.g. corporate bonds and Treasury derivatives (futures & options)
- Helps reduce rollover risk by spreading out maturities in a predictable fashion

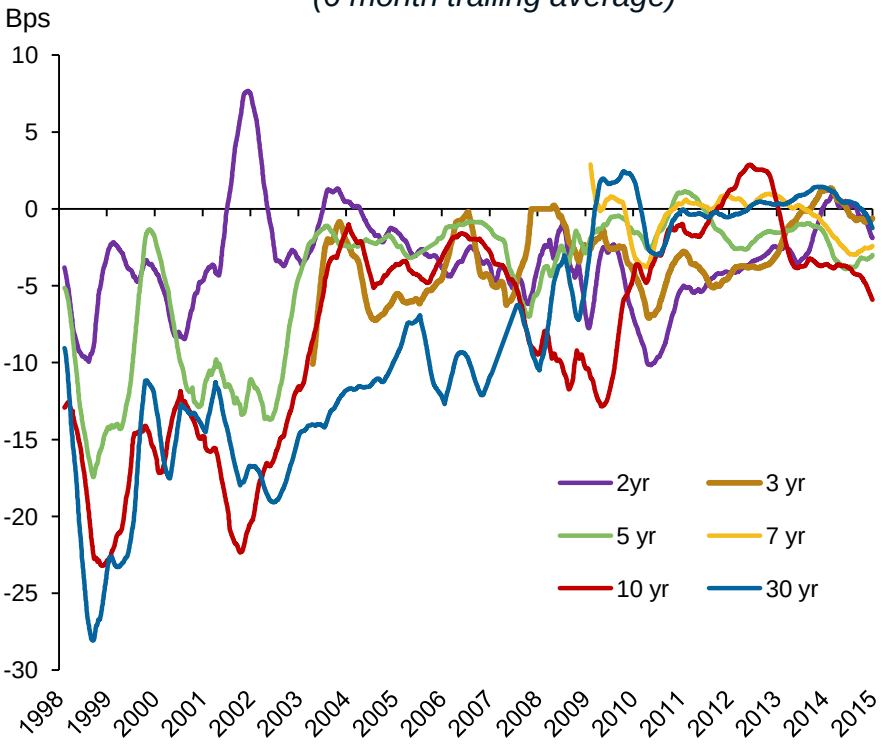
Potential opportunity cost of retaining the current R&P framework

- Prevents Treasury from quickly reacting to
  - Breakdowns in market functioning
  - Potential relative value opportunities
  - Structural dislocations in the curve driven by market segmentation
  - Possible market timing opportunities

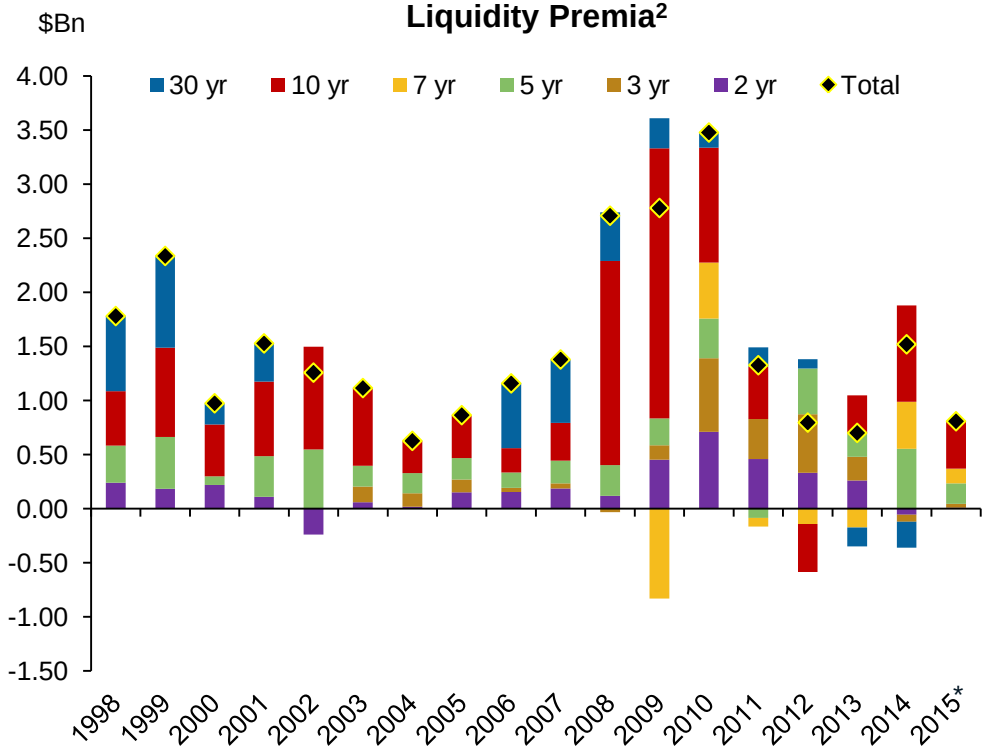
Following an R&P Framework Has Lowered Treasury Borrowing Costs

- Removes uncertainty, allowing investors to plan for future issuance
- Encourages broad-based auction participation
- **Treasury has saved an estimated $27 billion[1] since 1998 by capturing liquidity premia for on-the-runs**
  - Although liquidity premia has tended to narrow over this period, given the sharp increase in Treasury's gross borrowing needs since 2008, the dollar amount of savings has remained significant

Liquidity Premia[2]
(6 month trailing average)



Treasury's Estimated Savings from Liquidity Premia[2]

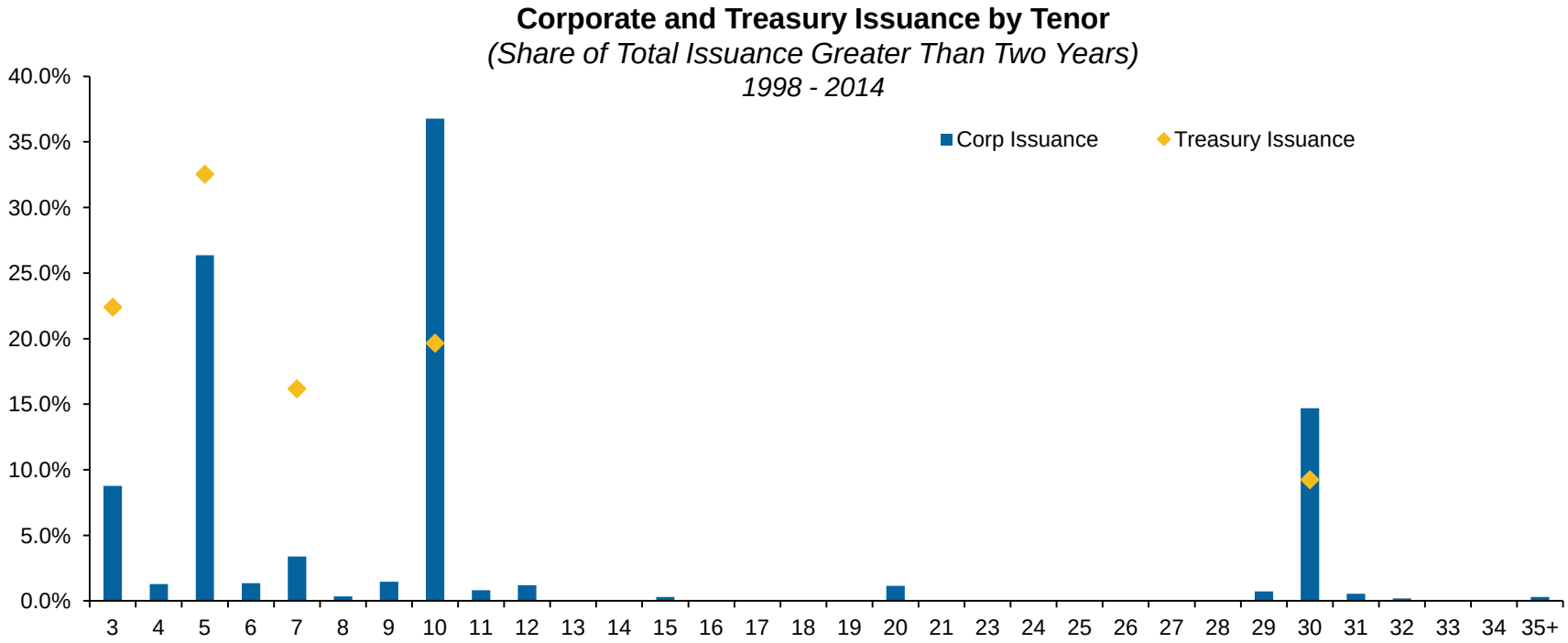


1. Committee participant's estimate.
2. Richness of on-the-run Treasury versus fourth old.
Source: Committee participant's models.

* Year-to-date as of April 2015.

R&P Framework Creates Positive Externalities

- **Provides a reliable liquid benchmark curve that benefits other markets, e.g. corporate bonds and Treasury derivative markets**
  - Availability of liquid benchmark Treasuries, which R&P enables, provides a basis for hedging interest rate risk and pricing credit risk
- **Dependence of these markets on a liquid Treasury benchmark curve creates structural demand for on-the-run Treasuries that at least partly accounts for their liquidity premia**
  - Maintaining R&P Treasury issuance will help retain on-the-run Treasuries as the benchmark for other markets, enabling the Treasury to continue to benefit from their richness
- **Treasury might benefit from exploring the possibility of issuing at additional maturities that match corporate funding needs**
  - Some corporate issuers have recently found it effective to issue at maturities between 10 and 30 years, suggesting Treasury might benefit from introducing another benchmark maturity in this range

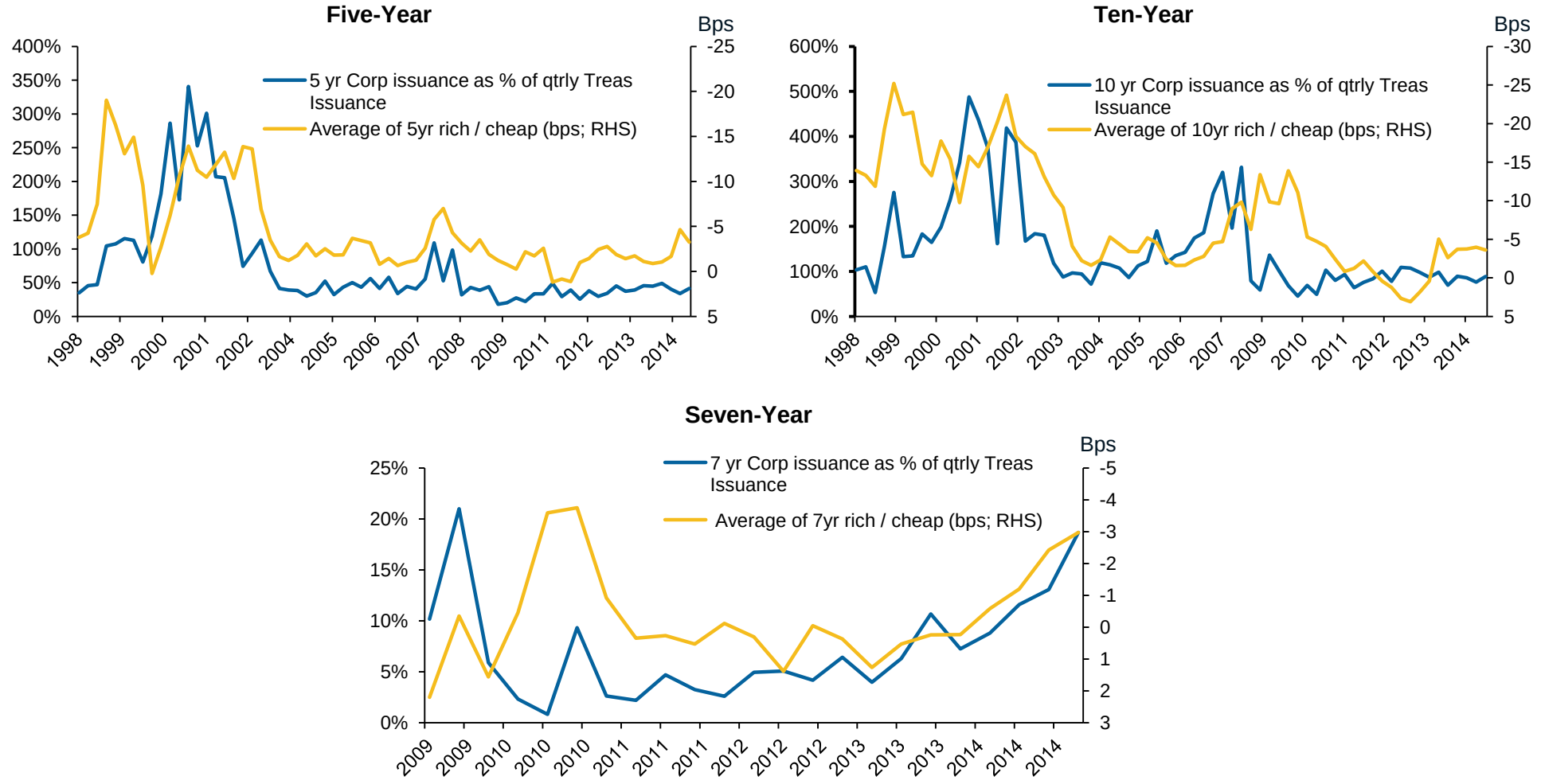


Source: Barclays.

R&P Framework Creates Liquid Benchmarks for Private Sector Issuance

- Corporate issuers prefer to price off of liquid benchmark issues
- Ultimately enhances Treasury on-the-run liquidity premia
- A mutually beneficial relationship exists between corporate issuance and on-the-run Treasuries—both parties benefit

Quarterly Corporate Issuance (as % of Treasury Issuance) Compared to Liquidity Premia[1]

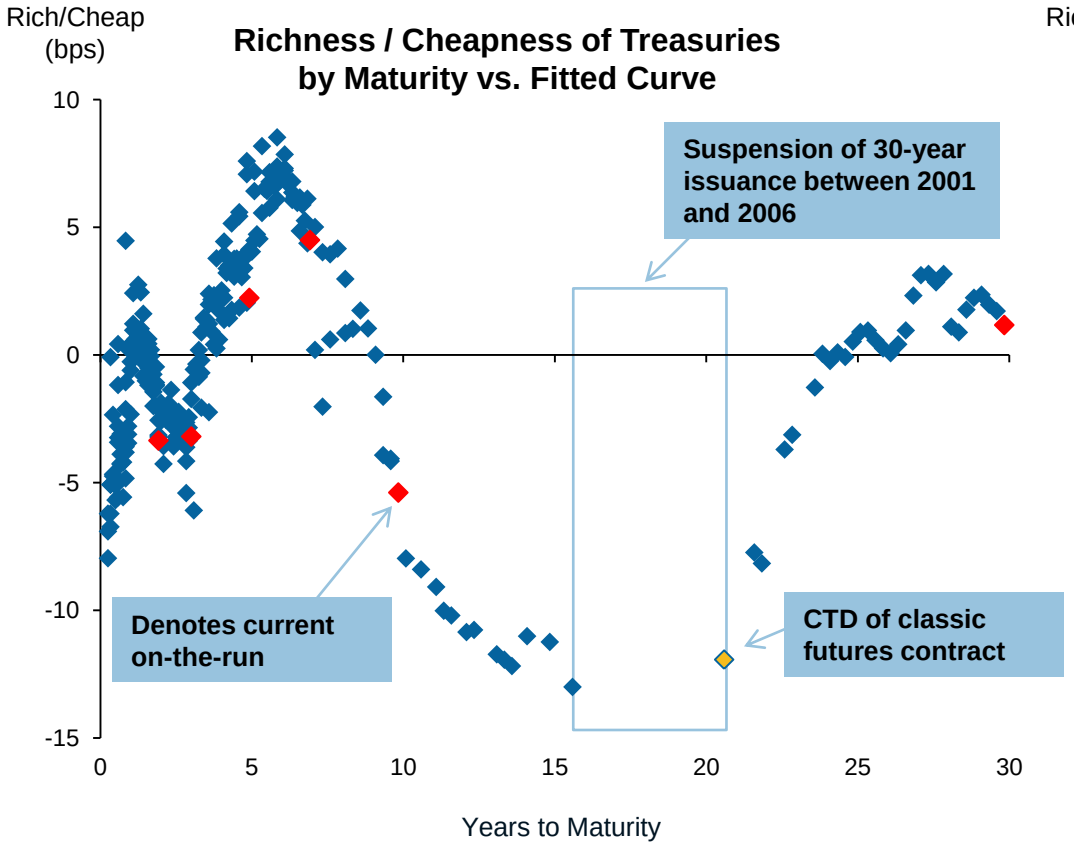


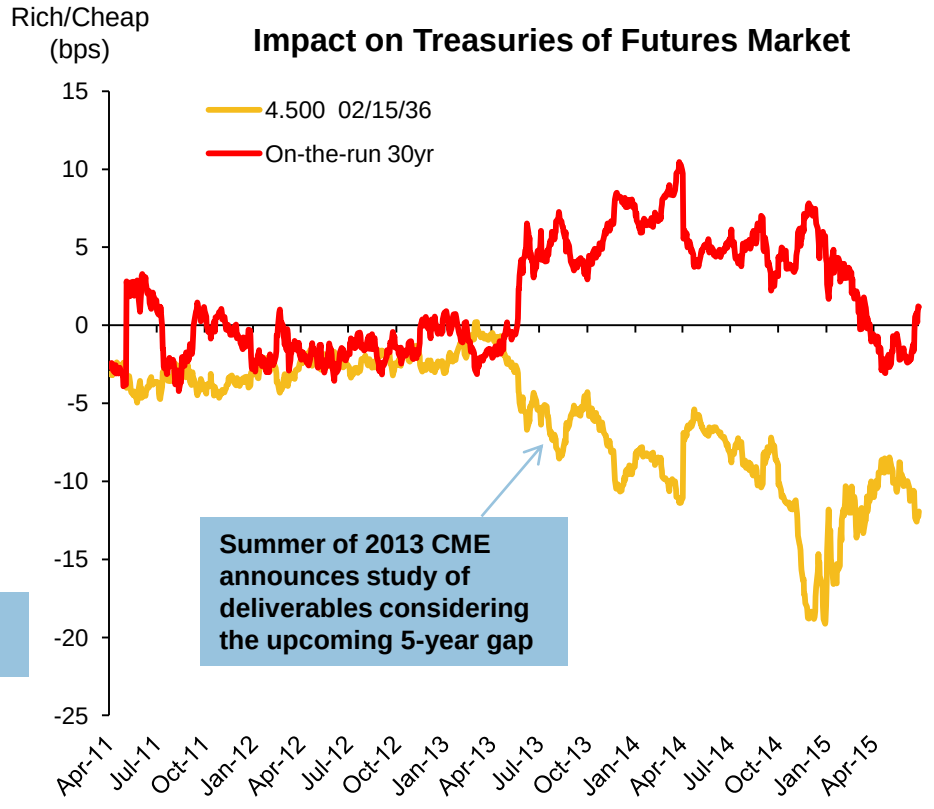
1. Richness of on-the-run Treasury versus fourth old.
Source: Committee participant's models.

R&P Helps Maintain A Full Curve of Liquid Benchmark Issues

Suspension of 30–year issuance in 2001 illustrates the unintended consequences of deviating from R&P

- **Budget surpluses at the time reduced financing needs, leading first to reduced auction sizes and finally a suspension of 30-year issuance**
  - Market participants were aware suspension was possible, but were nonetheless surprised by the announcement in October 2001
- **Looking beyond the market's immediate reaction to the suspension, the full implications and costs of suspending 30-year issuance were not apparent until years later, despite resumed issuance in 2006**
  - The Treasury curve currently has a gap in the 15- to 20-year part of the curve
  - Delivery requirements for futures contracts were consequently forced to be modified as deliverables became limited due to the 5 year gap in 30-year issuance—issuance gap created substantial richness for off-the-run securities that are cheapest to deliver for settlement of futures contracts
- **This effect has reduced the liquidity premia that Treasury is capturing from 30-year Treasury issuance**





As of July 24, 2015. Source: Committee participant's models.

Potential Opportunity Costs of Retaining Current R&P

Monetizing substantial market dislocations

- Treasury has occasionally deviated from R&P when markets have suffered from severe illiquidity (e.g. reopening of several Treasury issues in 2008)
  - Can serve a valuable purpose by restoring market function and by ensuring sustained confidence and liquidity for Treasury securities

Extracting value from rich parts of the curve

- R&P issuance does not capture demand dynamics that create richness at certain parts of the curve
  - Given the efficiency of markets and Treasury's sizable gross issuance needs, it is extremely difficult for Treasury to extract relative value from tactical opportunities in the market
  - However, persistent dislocations driven by market segmentation or shifting preferred habitats of market participants over time may provide opportunities for the Treasury to modulate issuance gradually and transparently

Responding to changes in term premia

- Yields on longer-dated securities tend to include term premia, therefore raising their ex-ante costs as a source of funding when compared to shorter-dated securities
  - However, trying to reduce this cost would require taking views and timing the markets, which is difficult to do sustainably over the long-run
  - There is a substantial variation in approaches and resulting estimates of term premia embedded in the curve

Responding to changes in inflation risk premia

- TIPS securities have embedded inflation risk premia that, at times, could be significantly undervalued given the market environment
  - Maintaining static issuance when risk premia may be undervalued could potentially be a cost to Treasury
  - Gauging investor demand along with embedded inflation premia could be one area of modulation (size relative to nominal coupon issuance) within the R&P framework

Attempts at market timing could damage credibility of the auction process and increase uncertainty for market participants, potentially resulting in higher borrowing costs over the long run

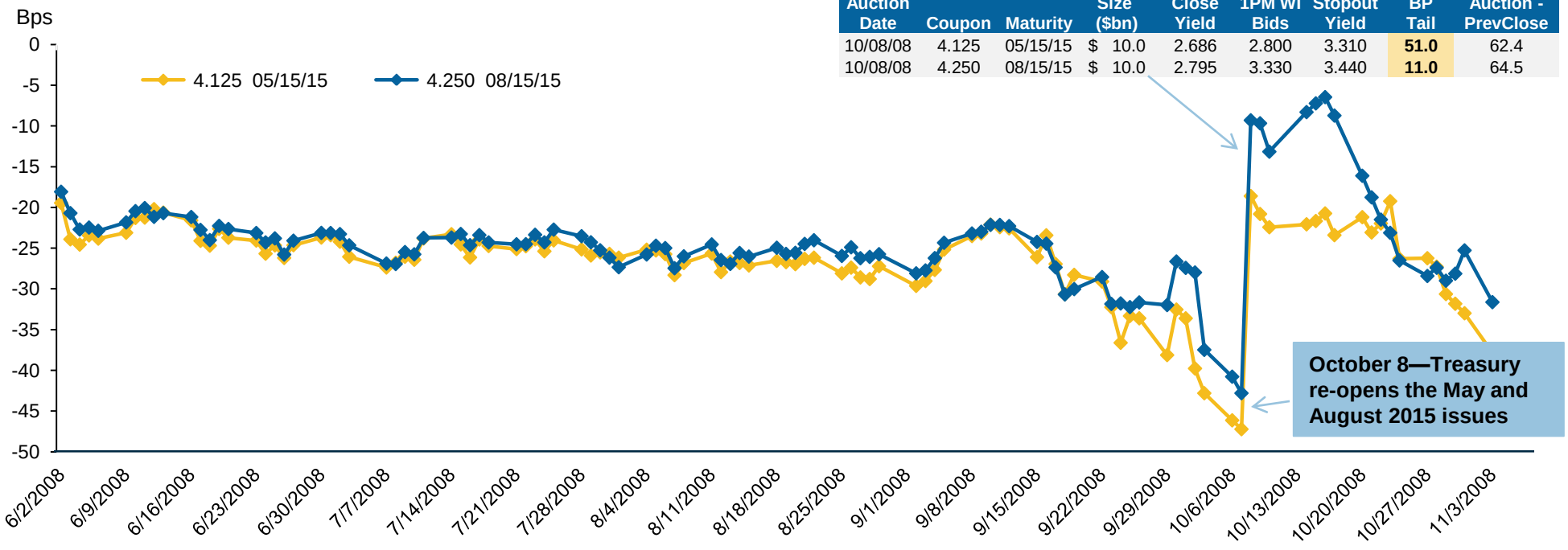
2008 Reopening of Several Treasury Issues Alleviated Market Dislocations

Illustrates Difficulties Treasury Faces In Capturing Relative Value Opportunities

- **Several Treasury issues were experiencing a substantial shortage of supply in 2008; Treasury announced reopenings of these issues which provided much-needed liquidity to alleviate the severe squeezes**
  - Treasury was able to alleviate severe strain and restore a well-functioning market by deviating from its usual R&P framework
- **However, the market priced in the impact almost instantaneously after the announcement, eliminating the richness of those securities ahead of the actual reopening**
  - Treasury was not able to extract any benefit from the market-driven relative value opportunity as the market re-priced the securities before the reopening

Richness/Cheapness vs. Fitted Curve

Auction Date	Coupon	Maturity	Size ($bn)	10/07/08 Close Yield	1PM WI Bids	Stopout Yield	BP Tail	11:30am Auction - PrevClose
10/08/08	4.125	05/15/15	$ 10.0	2.686	2.800	3.310	**51.0**	62.4
10/08/08	4.250	08/15/15	$ 10.0	2.795	3.330	3.440	**11.0**	64.5



Source: Committee participant's models.

Boundaries Within Which the Treasury Can Deviate From the Current R&P Framework

- **Five parameters potentially to modulate**
  - Size
  - Frequency
  - Maturity
  - Instrument (Bills, Coupons, TIPS, Floating Rate Notes)
  - Lead-time in notifying market

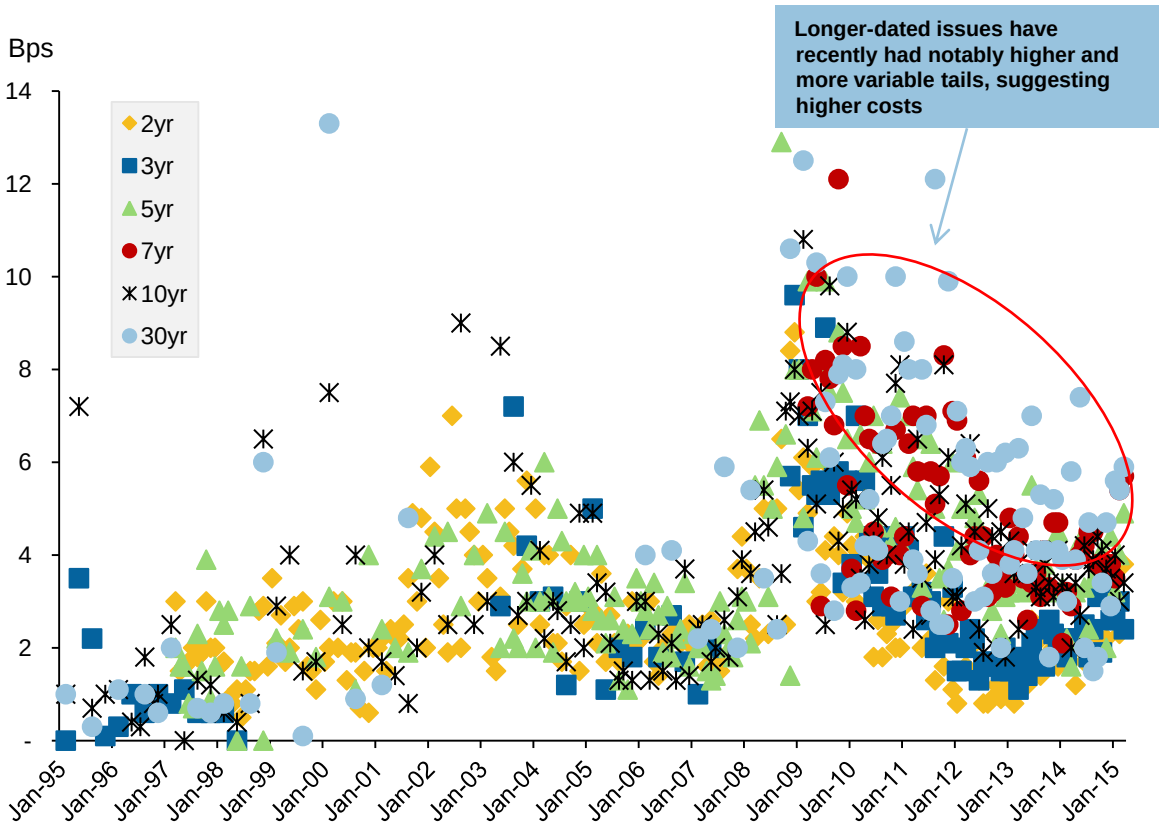
- **Considerations when Treasury is contemplating potential changes in any of these parameters**
  - Auction tails provide insights into market depth and the potential for variance in auction sizes
  - Sufficient communication is critical for keeping any changes in auction parameters within the bounds of R&P
  - Primary Dealers play an important role and constraints need to be appropriately considered
  - Monetary policies particularly with respect to Fed balance sheet management
  - Sustainability of demand across all interest rate cycles

- **Adopting a formulaic approach is unlikely to generate persistent benefits to the Treasury and could possibly raise Treasury borrowing costs by introducing greater complexity and thus uncertainty into the auction process**

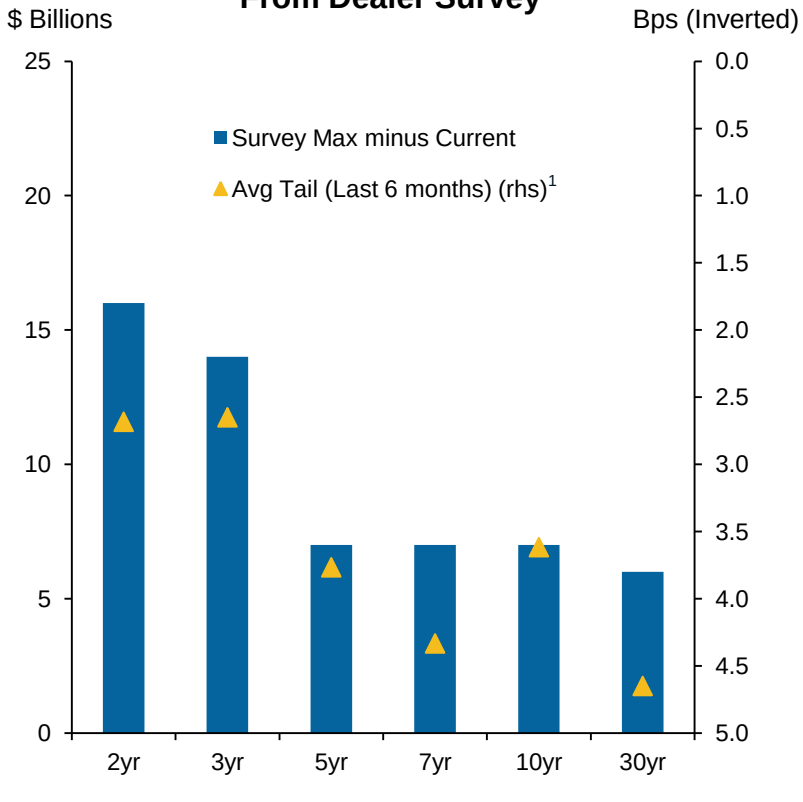
Auction Tails May Provide Insight for Modulating Auction Sizes

- Auction price tails, as measured by allotted yield minus median yield, can provide guidance on market depth, identifying parts of the curve that can absorb greater supply as well as the potential cost of increasing issuance at certain parts of the curve
  - Persistently elevated tails may be a good way to identify market segmentation, and assess opportunities to modulate size while still remaining within the bounds of R&P
- Other metrics that may be useful in identifying market segmentations and modulating auction sizes include: persistent richness / cheapness of certain parts of the curve and inflation breakeven levels
- In addition, available float of deliverable bonds into futures contracts can provide guidance on the lower bound for issue sizes
- Dealer surveys are useful in gaining insight on market's ability to absorb variations in auction sizes—recent survey seems to indicate greater potential for increasing 2 year and 3 year auction sizes, consistent with the auction tail analysis

U.S. Auction Tails[1]



Potential Increase in Auction Size From Dealer Survey[2]



1. Source: Bloomberg. Allotted yield minus median yield, as of March 31, 2015.
2. Source: U.S. Treasury. Primary Dealer Auction Size Perspectives for March 19, 2015.

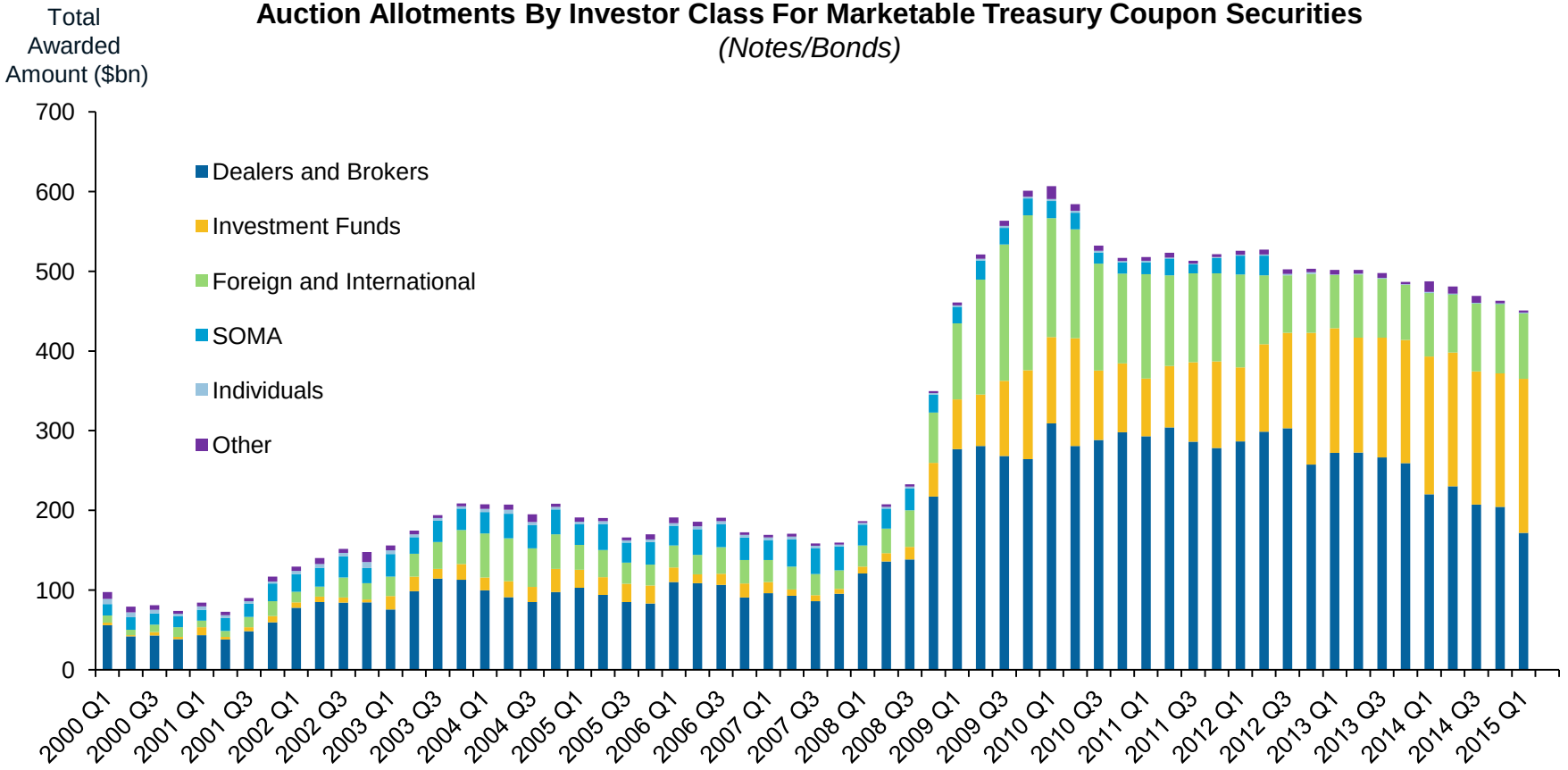
Treasury Communications is a Critical Parameter

- **Treasury can generally modulate most auction parameters as long as sufficient lead time and transparency are provided**
  - Encourages widespread participation and better enables primary dealer participation in the auction process
- **Treasury should continue its current practice of providing as much lead time as possible**
  - Communication lead time should be commensurate with the magnitude of the change
- **Treasury should continue its current communication practices, including:**
  - As much transparency and lead-time as possible in announcing auction sizes and, to the extent possible, providing guidance as to whether and how current auction sizes are likely to change over time
  - Alterations to any of the other auction parameters—e.g. frequency, introduction or elimination of new maturities or instruments—requires sufficient lead-time for adequate study and discussion with market participants
  - To the extent possible, communicate broad medium- to longer-term objectives to market participants, e.g. medium-term goals regarding the WAM or desired maturity/instruments composition of outstanding debt
  - Communication tools can help market participants better digest potential changes in issuance thereby lowering cost to Treasury

Altering the Current R&P Framework Can Affect the Primary Dealer System

- **Primary dealers are the ultimate liquidity providers during auctions; they are required to bid a pro rata share of each auction**
- **However, they operate under capital and other balance sheet constraints**
  - While primary dealer allotments have declined recently, they are still running at levels that are substantially greater than pre-crisis levels
- **A reasonable degree of R&P is necessary given the requirements of the primary dealer system**

Auction Allotments By Investor Class For Marketable Treasury Coupon Securities
(Notes/Bonds)

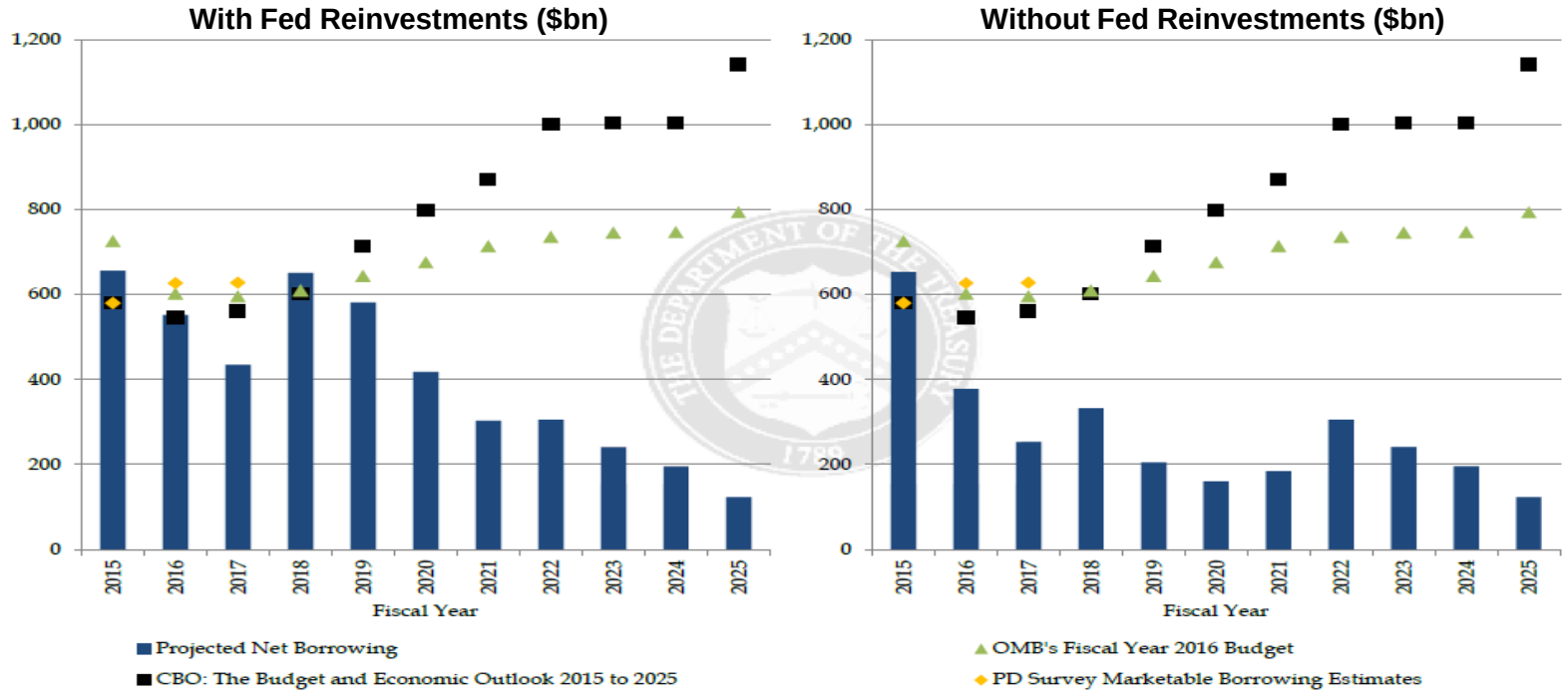


Source: U.S. Treasury.

Treasury's R&P Framework Given Monetary Policy Uncertainty

- **Providing the market with the stability of the current R&P framework may be particularly important in light of the uncertainty regarding Fed policies going forward**
  - The Fed's current policy is to reinvest maturing Treasury securities at auction
  - While Fed balance sheet policies going forward are uncertain, the Fed has indicated it intends to reduce its securities holdings "in a gradual and predictable manner primarily by ceasing to reinvest repayments of principal on securities held in the SOMA"[1]
- **If the Fed's pace of reinvestments changes over time, the Treasury would need to adjust its auctions to offset**
  - In this case, the Treasury might find it advantageous over time gradually—and with as much transparency as possible—to alter the sizes of existing auctions, or even introduce/change maturities
- **Similarly , if the Fed were to decide to outright sell any of its Treasury holdings, these sales could possibly compete for the same investor base as that of Treasury auctions**

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



1. Federal Reserve "Policy Normalization Principals and Plans," September 2014.
Source of graphs: U.S. Treasury.

Conclusions

- **R&P has been an important and beneficial pillar of Treasury Debt Management**
  - Ultimately the current R&P framework has helped reduce Treasury borrowing costs—estimated $27 billion[1] since 1998
  - The current R&P framework also provides a public good by benefiting other markets (corporate and futures markets)
- **Tighter financial regulations and constrained balance sheets, large amounts of outstanding Treasury debt requiring rollover, changing market structure, and an uncertain path of Fed policy make R&P even more important today**
- **Some degree of flexibility over time is necessary to manage funding needs**
  - Flexibility is required to deal with uncertain funding needs and respond to structural changes in auction demand, market segmentations, and repair market malfunctions
  - It appears to be impractical for the Treasury to attempt to capture relative value or market timing opportunities
- **Flexible boundaries around the concept of R&P include:**
  - First Order Tool: Modulating **size** should be the primary tool (both across maturities and instruments),
  - Second Order Tool: **Frequency** of issuance should be kept more constant over the short term, requiring longer advance notice to market participants of potential changes
  - Third Order Tool: New **instruments** or additional **maturities** can be introduced over a longer-period of time to address market segmentation after careful study and discussion with market participants
  - R&P is not exclusive to issuance; it should also apply to buyback programs
  - In all cases, providing the market with sufficient **lead time** commensurate with the magnitude of the contemplated change is important, except in rare instances when speed and timeliness are essential, e.g. in repairing severe market malfunctions
- **There should be less flexibility in adopting any change that would interfere with maintaining a full curve of liquid, benchmark maturities**

1. Committee participant's estimate.

U.S. Treasury Borrowing Advisory Committee

Presentation to Treasury

August 4, 2015

TBAC charge #2: Long-term issuance

Noting that long-term interest rates have declined to levels not seen since the 1960's, many observers have suggested that Treasury issue more long-term debt, relative to short-term debt, in order to protect the government against higher interest costs in the future.

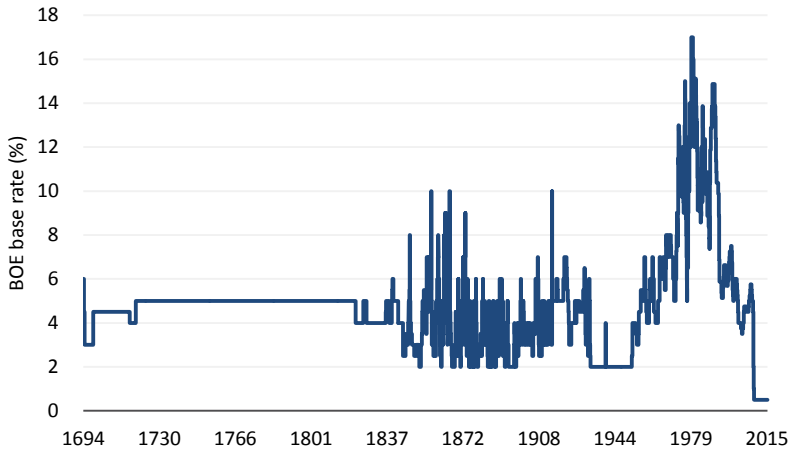
We would like the Committee to comment on this consideration as part of Treasury's broader debt issuance strategy. Please elaborate on how this fits within Treasury's mandate to fund the government at the lowest cost over time and maintain a "regular and predictable" debt issuance schedule. What are the potential benefits and risks?

Previous TBAC meetings have considered similar questions

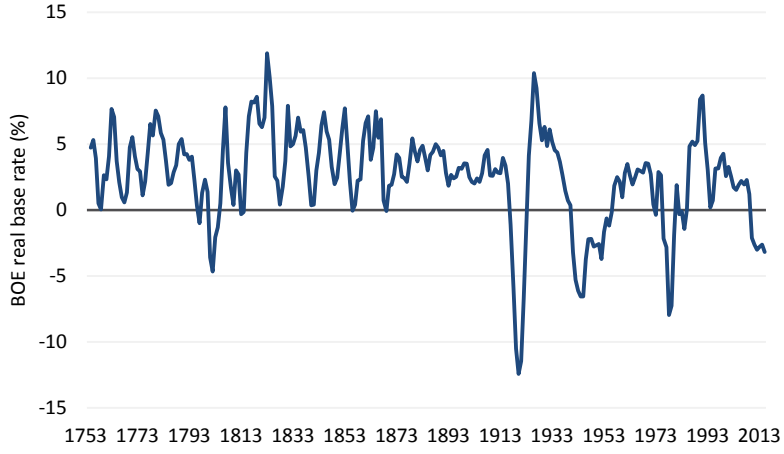
- Feb 2011: Issuing 50y coupon bonds does not lengthen duration significantly
- Aug 2011: The term premium has been positive since the 1980s, implying the lowest cost strategy would be to borrow at the short end and avoid paying the term premium
- Aug 2011: The benefits of extension do not come for free. Historical analysis suggests that shorter term funding has at many times been both cheaper and the volatility costs have not been high
- Aug 2011: Previous periods of local low points in interest rates would not have provided dramatic benefit to an extension of average maturity
- Feb 2012: With interest rate risk premium currently near all time lows, savings [from FRN] are likely to be marginal
- Feb 2015: WAM does not fully capture the structure and risks of Treasury's portfolio; the Treasury should publish other metrics to better reflect roll-over and concentration risk, and consider the portfolio WAM both gross and net of financial assets

Interest rates are low by historical standards

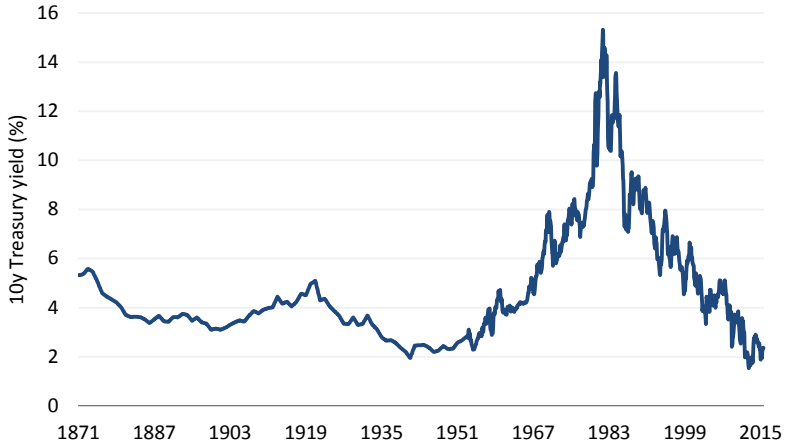
BOE base rates (1694-2015)



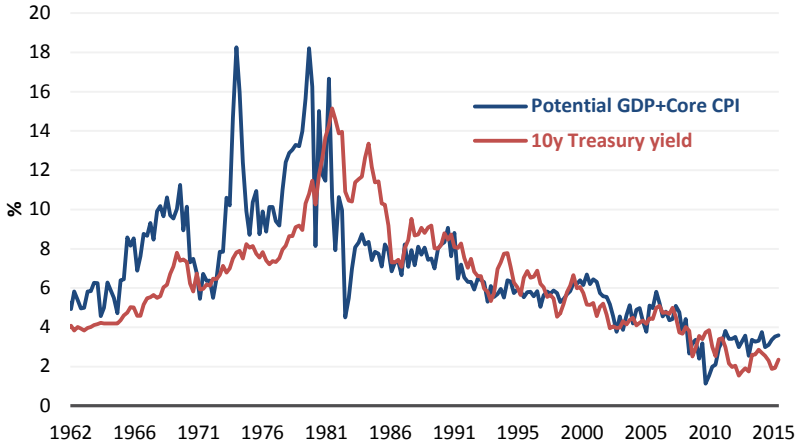
BOE real base rates (1753-2015)



10-year Treasury yields (1871-2015)

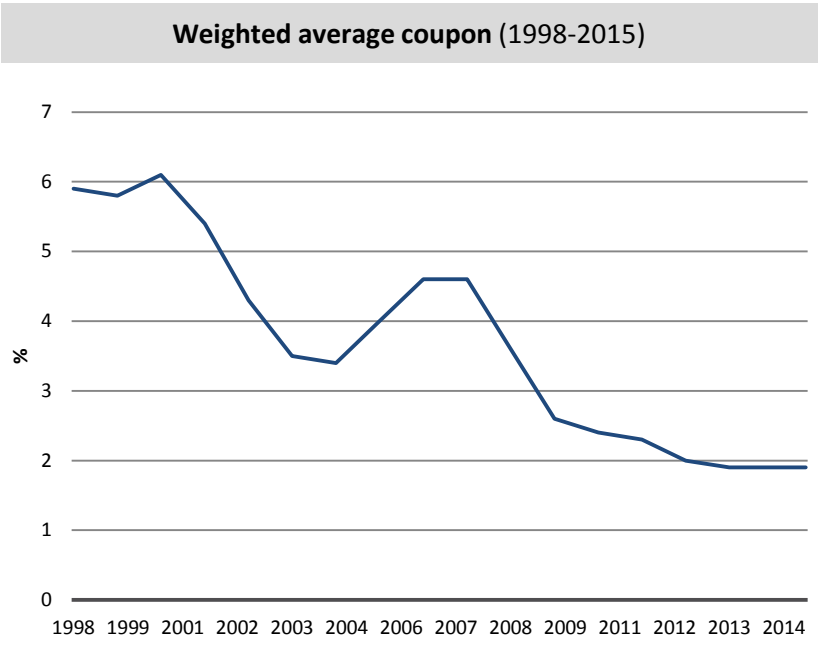


US nominal potential GDP vs. 10Y nominal Tsy yield (1962-2015)



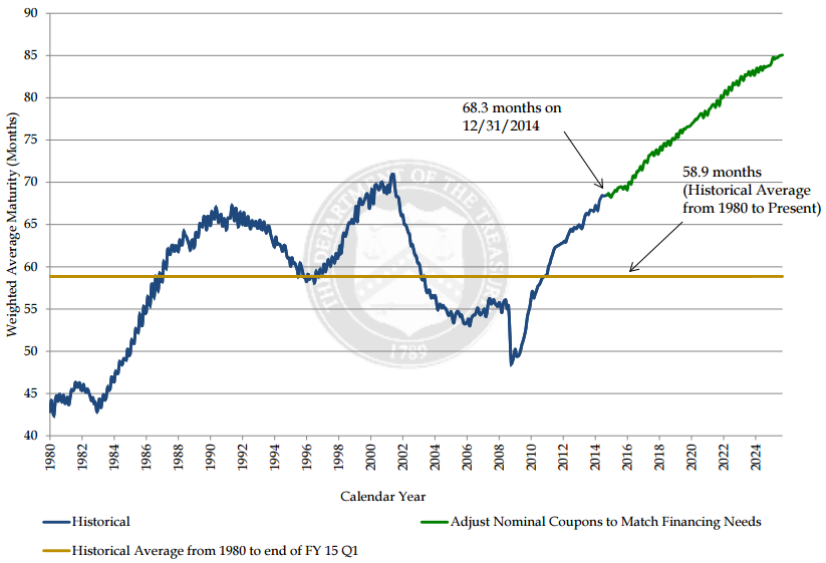
Current Treasury issuance is skewed towards the belly of the curve

	Treasury						TIPS			FRN	Total
	2y	3y	5y	7y	10y	30y	5y	10y	30y	2y	
Jan-15	26	24	35	29	21	13		15		15	178
Feb-15	26	24	35	29	24	16			9	13	176
Mar-15	26	24	35	29	21	13		13		13	174
Apr-15	26	24	35	29	21	13	18			15	181
May-15	26	24	35	29	24	16		13		13	180
Jun-15	26	24	35	29	21	13			7	13	168
Jul-15	26	24	35	29	21	13		15		15	178
Aug-15	25	23	35	29	24	16	16			13	181
Sep-15	24	22	35	29	21	13		13		13	170
Oct-15	24	22	35	29	21	13				15	159
Nov-15	24	22	35	29	24	16		13	7	13	183
Dec-15	24	22	35	29	21	13	16			13	173
Total	303	279	420	348	264	168	50	82	23	164	2101
% Distribution	14%	13%	20%	17%	13%	8%	2%	4%	1%	8%	100%
2010	487	449	472	373	275	175		73	15	0	2320
% Distribution	21%	19%	20%	16%	12%	8%		3%	1%	0%	100%

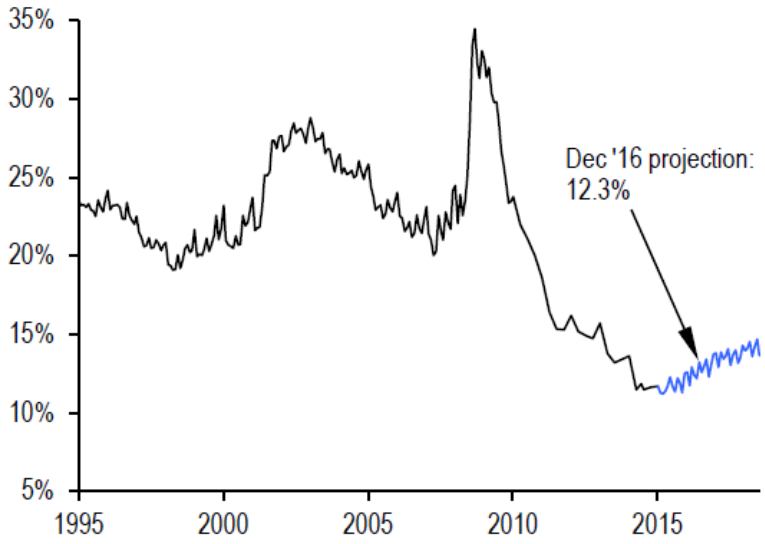


WAM has increased in recent years as the proportion of bills outstanding has declined

Average maturity of outstanding marketable Treasuries



Bills outstanding as % of marketable Treasuries outstanding



Footnote: for projections, we assume that coupon sizes remain unchanged, and that FY15 deficits total $470bn

Factors that influence Treasury yields and borrowing costs

Primary drivers

- Trend GDP growth
- Inflation
- Term premium
- Debt sustainability
- FX reserve status of the USD (50% of the debt stock is held by foreigners)

Secondary drivers

- Liquidity premium
- Transparency and predictability of issuance (homogeneity of supply / benchmark issuance)
- Broad investor base (domestic and foreign)
- High turnover; liquid repo and derivatives markets
- Primary dealer network (incentives provided to PDs when issuing debt)
- Regulatory environment

Factors that influence the optimal maturity of borrowing

Factors influencing optimal maturity

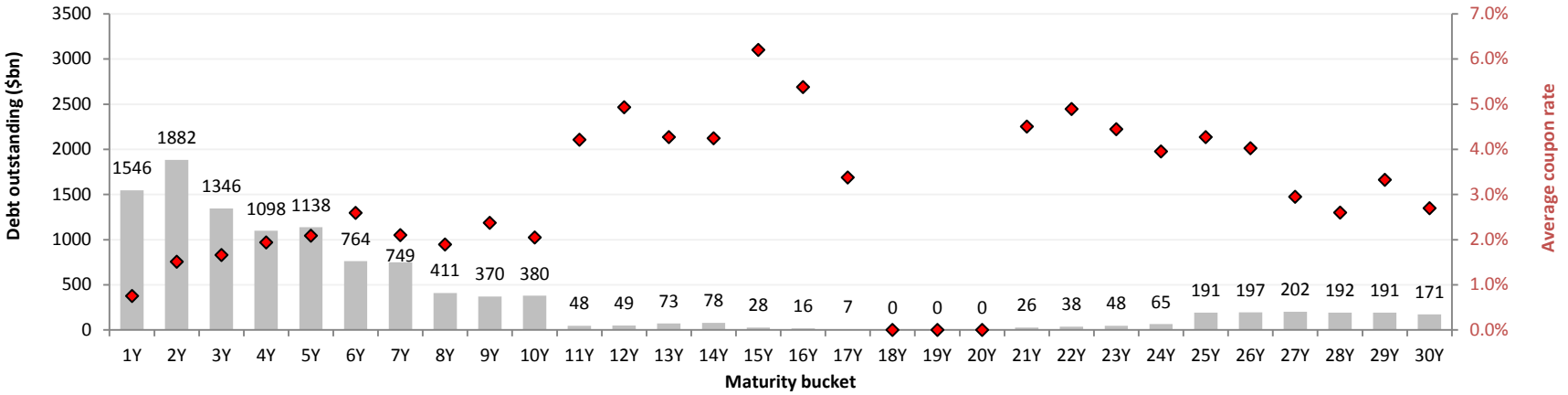
- Shape of the yield curve
- Term premium in the curve
- Matching revenues with expenses (correlation of government receipts with interest rates)
- Asset / liability matching

When should we consider extending the average maturity of debt?

- Real interest rates are low
- Term premium and/or liquidity premium is low
- Correlation between GDP growth (tax receipts) and interest rates is low…
- …or rates follow growth with a lag (i.e. probability of being in a low growth and high interest rate environment is high)
- Asset-side of the Treasury balance sheet holds long maturity assets

Maturity and issuance profile of Treasuries

Current outstanding Treasuries ($bn) and weighted average cost of funds (by maturity)



Current issuance pattern ($bn)

	Treasury						TIPS			FRN	Total
	2s	3s	5s	7s	10s	30s	5s	10s	30s	2s	
Jan-15	26	24	35	29	21	13		15		15	178
Feb-15	26	24	35	29	24	16			9	13	176
Mar-15	26	24	35	29	21	13		13		13	174
Apr-15	26	24	35	29	21	13	18			15	181
May-15	26	24	35	29	24	16		13		13	180
Jun-15	26	24	35	29	21	13			7	13	168
Jul-15	26	24	35	29	21	13		15		15	178
Aug-15	25	23	35	29	24	16	16			13	181
Sep-15	24	22	35	29	21	13		13		13	170
Oct-15	24	22	35	29	21	13			7	15	166
Nov-15	24	22	35	29	24	16		13		13	176
Dec-15	24	22	35	29	21	13	16			13	173
Total	303	279	420	348	264	168	50	82	23	164	2101
% Distribution	14%	13%	20%	17%	13%	8%	2%	4%	1%	8%	100%

Issuance pattern under two scenarios (%)

	Distribution of gross issuance						
	2s	3s	5s	7s	10s	30s	Total
#2: uniform issuance	17%	17%	17%	17%	16%	16%	100%
#1: current pattern	22%	13%	22%	17%	16%	9%	100%
Difference	-5%	4%	-5%	0%	0%	7%	0%

	Annual gross issuance ($bn)						
	2s	3s	5s	7s	10s	30s	Total
#2: uniform issuance	357	357	357	357	336	336	2101
#1: current pattern	467	279	470	348	346	191	2101
Difference	-110	78	-113	9	-10	145	0

We include nominals, TIPS and FRNs in this table

Simulate cost of funds and weighted average maturity of Treasury debt over the next 30 years

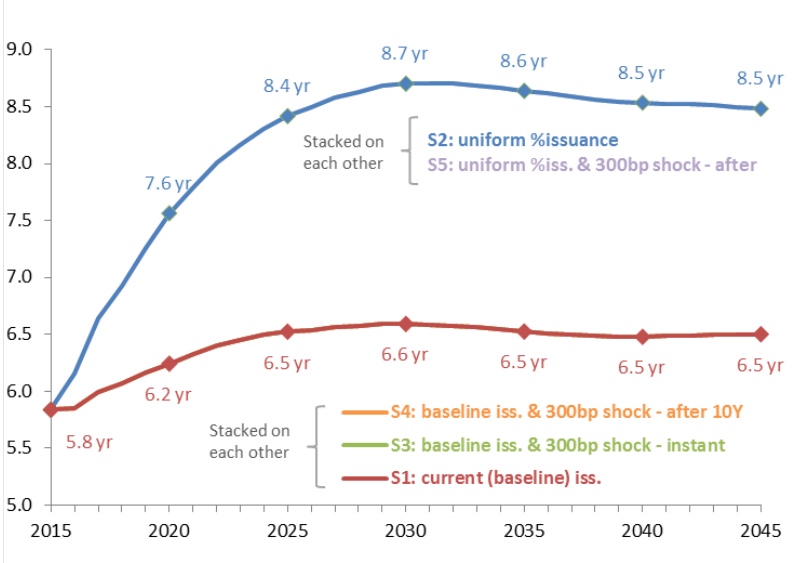
- Assumptions:
  - Interest rates increase by 100bp/year in 1Y, and 25bp/year in 30Y sector (other maturities are linearly interpolated)
  - Interest rates peak at 3%, 3.75% and 4% in bills, 10Y and 30Y sectors, respectively. Term premium settles at 100bps.
  - Ratio of bills to total Treasury debt outstanding remains constant through time
  - No rate impact from changing issuance pattern

- Scenarios:
  - **Scenario 1 (baseline):** %issuance in a specific maturity remains constant through time (23%, 15%, 21%, 16%, 16% and 9%).
  - **Scenario 2:** %issuance is uniform (17%, 17%, 17%, 17%, 16%, 16%).
  - **Scenario 3:** %issuance in a specific maturity remains constant through time, but rates are shocked instantaneously higher by 300bp relative to the base case outlined above.
  - **Scenario 4:** %issuance in a specific maturity remains constant through time, but rates are shocked higher *after 10 years* by 300bp relative to the base case outlined above.
  - **Scenario 5:** %issuance is uniform, but rates are shocked higher *after 10 years* by 300bp relative to the base case outlined above.

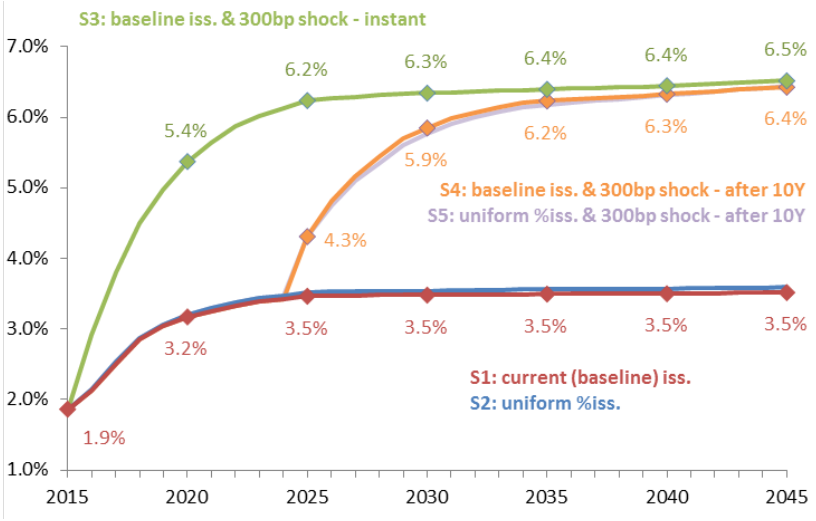
- Output: Projected "Weighted average cost of funds (WAC)" and "Weighted average maturity of outstanding debt stock (WAM)" over time

Uniform issuance extends WAM by 2 years without significantly increasing cost

Average maturity (WAM; years)



Cost of funds (WAC)



Takeaways:

- Uniform issuance results in roughly a 2Y maturity extension
- Much of the extension happens during the first 10 years

Takeaways:

- Uniform issuance increases the cost of debt very marginally (relative to current issuance)
- When rates are shocked, about 80% of the shock gets incorporated into the cost of funds within 5 years
- Cost of issuing longer maturity debt is currently low but insurance benefits appear to be marginal

Benefits and cost of extending debt maturity

Benefits

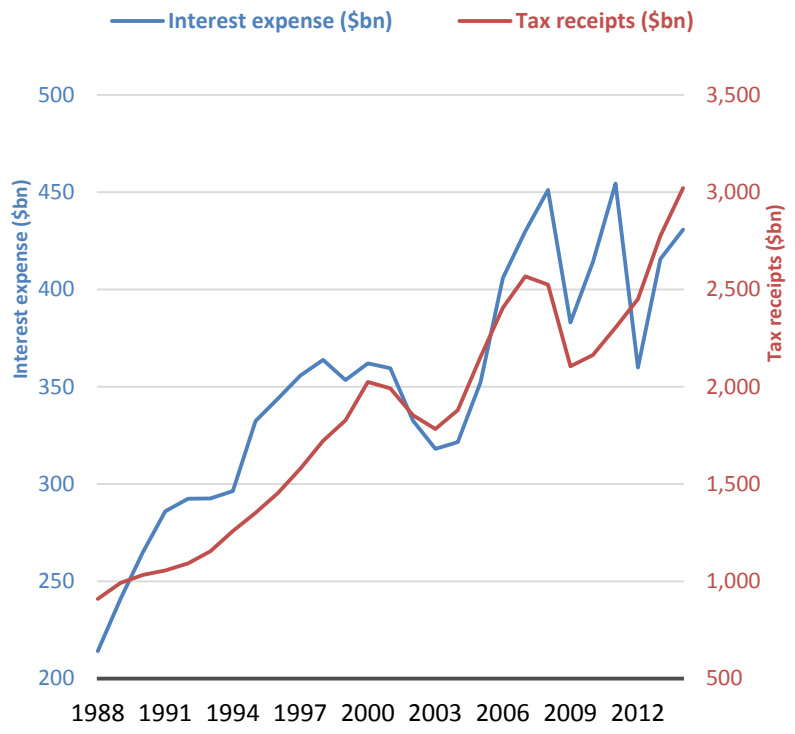
- Mitigates volatility of borrowing costs over time
- Reduces rollover risk
    - Higher cash balances will alleviate this problem
- Addresses ALM mismatch with long-maturity student loan assets held by Treasury

Cost

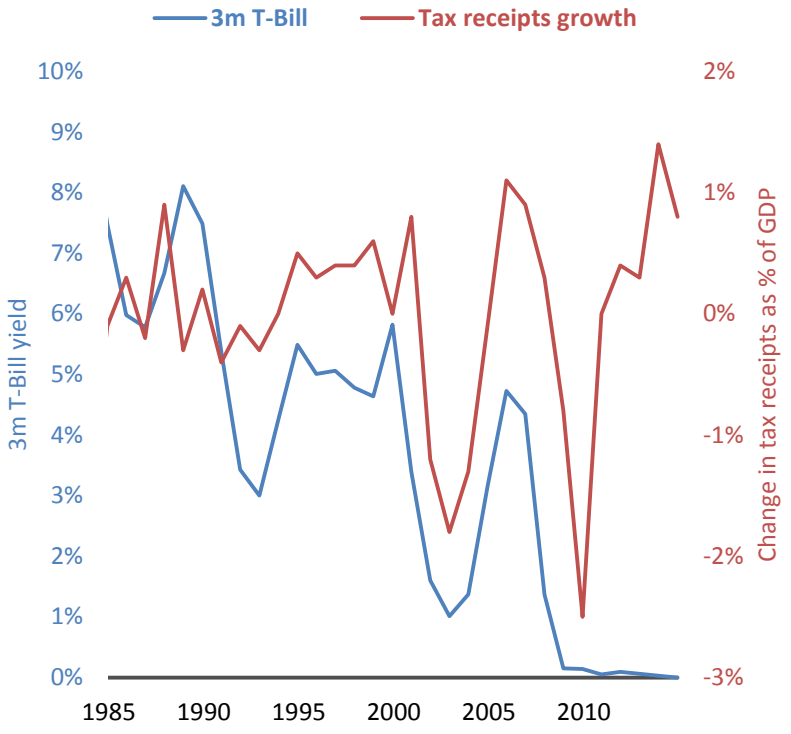
- May be expensive depending on term premium and/or liquidity premium
- Higher rates are generally accompanied by an improving economy; so tax receipts may offset interest costs of short-maturity issuance.
    - This suggests that extending maturity makes most sense when chances of stagflation are high
- Economic theory suggests that nominal interest rates should converge towards nominal GDP growth rates, and short maturity debt allows interest expense to converge more quickly towards changing nominal growth rates

Treasury receipts are correlated with front end rates

Tax receipts and interest expense

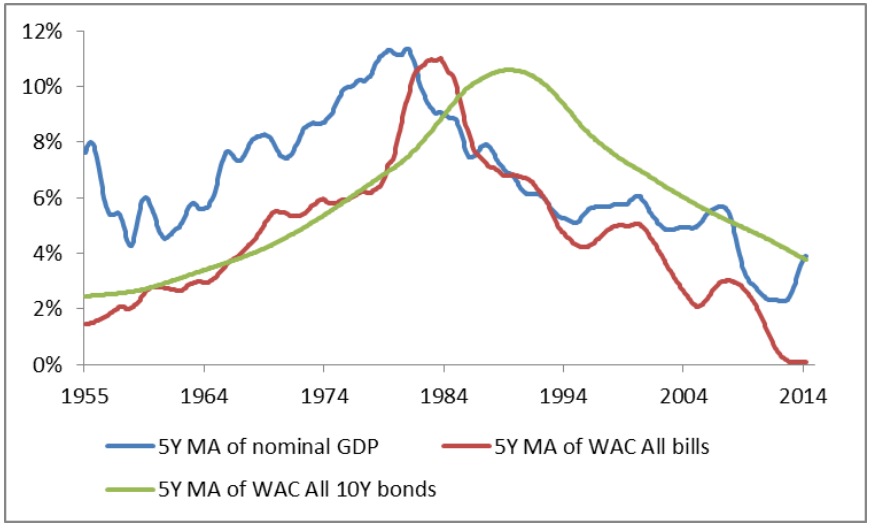


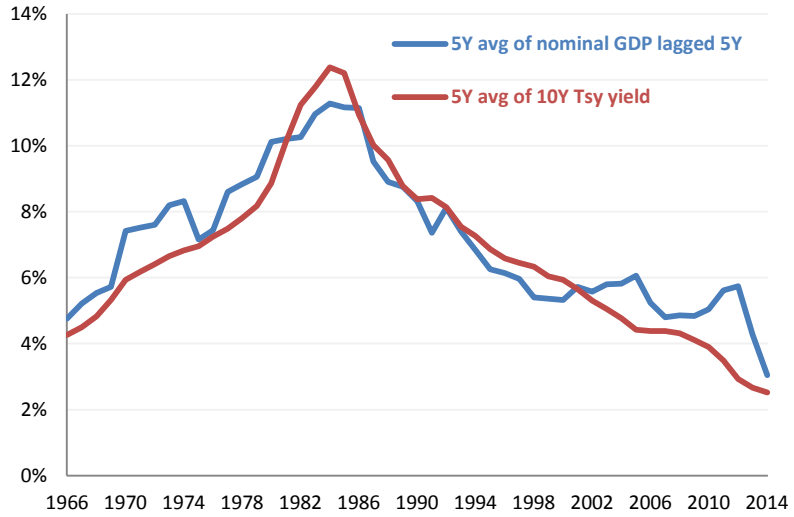
Growth in tax receipts and 3-month T-Bill yield



Historically, bill funding is more closely aligned with nominal GDP growth than 10Y Tsy funding costs since only 10% of the Tsy stock rolls over in a given year

Nominal GDP vs. 10Y Treasury yield

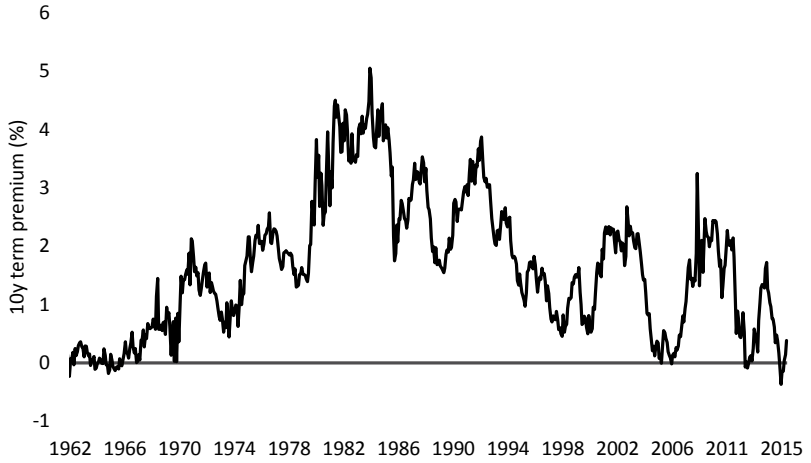




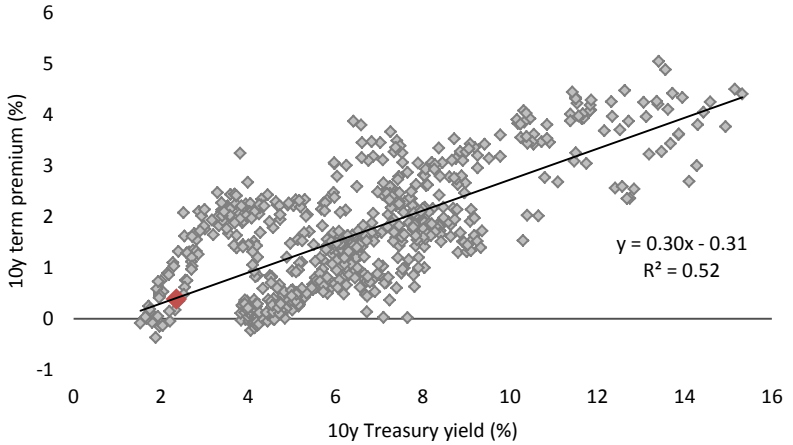
Footnotes: 1) We take 5Y MA of all series to eliminate noise in the data. 2) WAC of 10Y Tsy bonds is computed by taking the average of 10Y Tsy yields over the past 10 years under the assumption that 10% of the outstanding debt stock is rolled every year.

Negative term premia would suggest that it is cheaper to issue intermediate debt, while low long term premia reflect low cost of protection against higher rates

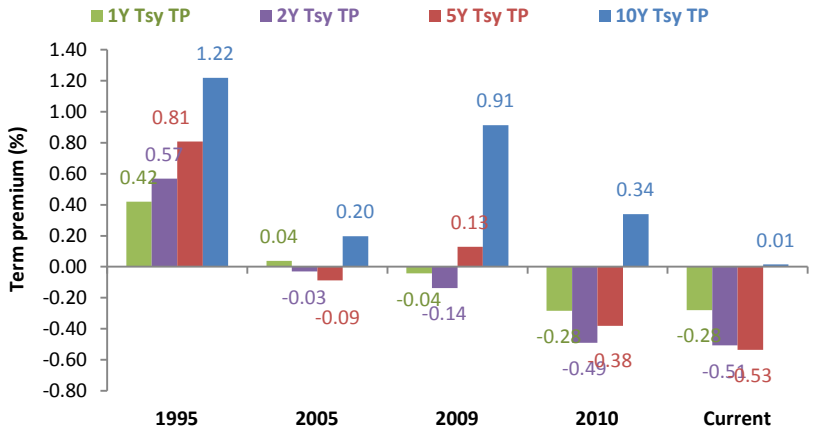
10-year ACM term premium (1961-2015)



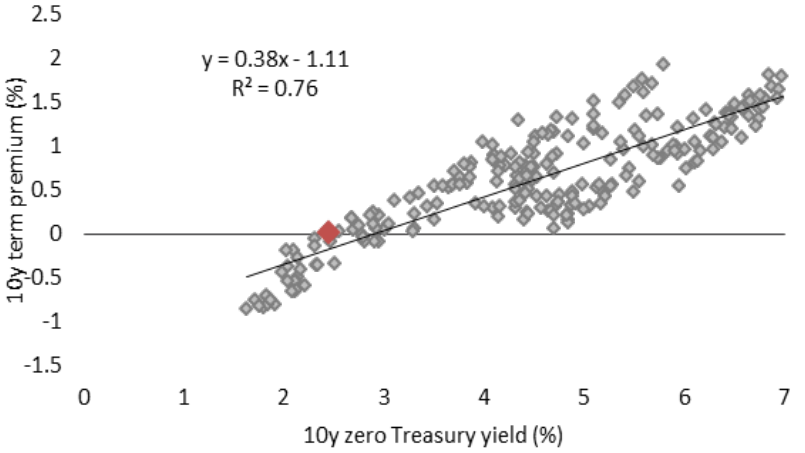
10-year ACM term premium vs. yield (1961-2015)



Kim-Wright term premium (past 20 years)



Kim-Wright term premium vs. 10-year yield (past 20 years)

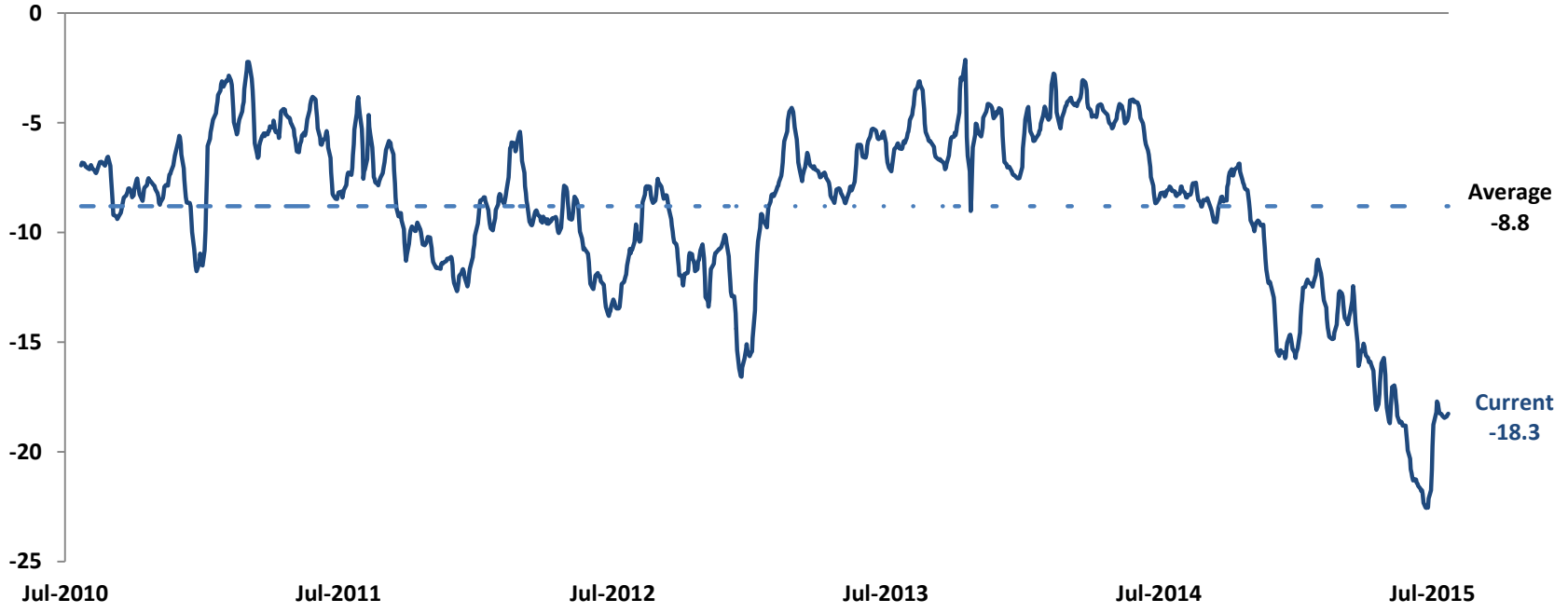


- Caveat: It is difficult to estimate term premia because it is 1) time varying, and 2) hard to distinguish between expectations of drift to forwards vs. term premium

Treasury Bills offer “liquidity premium” over same maturity Notes and Bonds

- Liquidity premium may be quantified as
  - The yield spread between bill and short-maturity bonds, or
  - The spread between hot-run and off-the-run bonds
- Eurodollar futures are all highly liquid at the front end, and so should boast only “term premium”

5-day average of richness/cheapness of bill yield relative to a Treasury par fitted curve;
averaged over 1M, 3M and 6M hot-run bills; past 5Y; bp



Simulations of 1Y and 1Yx1Y rates to test the likelihood of capturing term premium

Calibration inputs used to match averages of the past 20Y; 1Y vs 1Yx1Y swap rate

	Levels as of 6 July 2015*		Calibration inputs**	
	1Y	1Yx1Y	1Y	1Yx1Y
No. of simulations			5000 yrs	
Starting yield	0.48%	1.21%	0.50%	1.25%
20Y average yield	3.13%	3.67%	3.10%	3.66%
20Y SD of 251-day chg in yield	1.28%	1.11%	1.27%	1.14%
20Y correl of 251-day yield changes	85%		84%	
Drift of 1Y to 1Yx1Y forward over 251-days			1%	
Mean reversion			5%	5%

- Number of simulations: 5,000 years
- Assumptions
  - Zero lower bound does not apply
- Inputs
  - Drift of 1Y rate towards the 1Yx1Y forward (0% - 100%)
  - Mean reversion of 1Y and 1Yx1Y rates (5% constant) towards their past 20Y average
  - SD of 251-day change in 1Y and 1Yx1Y rates to match their past 20Y average
  - Correlation between 251-day change in 1Y and 1Yx1Y rate to match the past 20Y average
- Outputs
  - Average and SD of interest savings resulting from issuing 1Y paper vs. 2Y paper over 5,000 years
  - Probability that issuing 1Y paper will result in interest cost saving relative to issuing 2Y paper, over any 30Y period

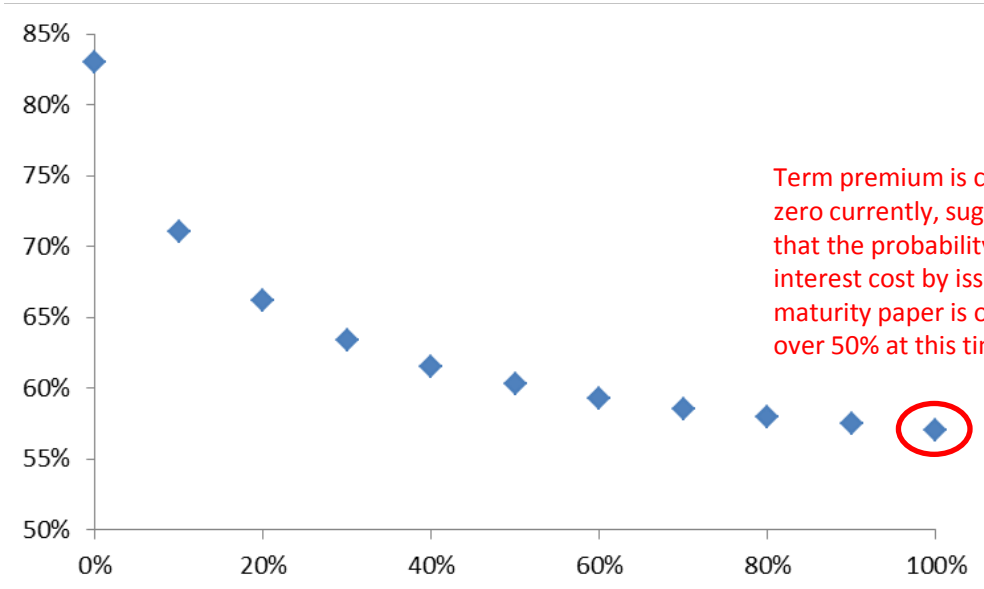
The probability of saving on interest costs over any 30 year period quickly declines as the drift of 1Y rates towards 1Yx1Y forwards increases

Simulated probability that issuing 1Y paper rather than 2Y paper will save Treasury issuance costs over the next 30 years vs. % drift of 1Y rates towards 1Yx1Y forwards

A higher number argues for issuing shorter maturity

Y-axis:
Probability that issuing 1Y paper will result in interest cost saving relative to issuing 2Y paper, over any 30Y period

A lower number argues for issuing longer maturity



Term premium is close to zero currently, suggesting that the probability of saving interest cost by issuing short-maturity paper is only a tad over 50% at this time

X-axis: drift of 1Y towards 1Yx1Y forwards over the next year*

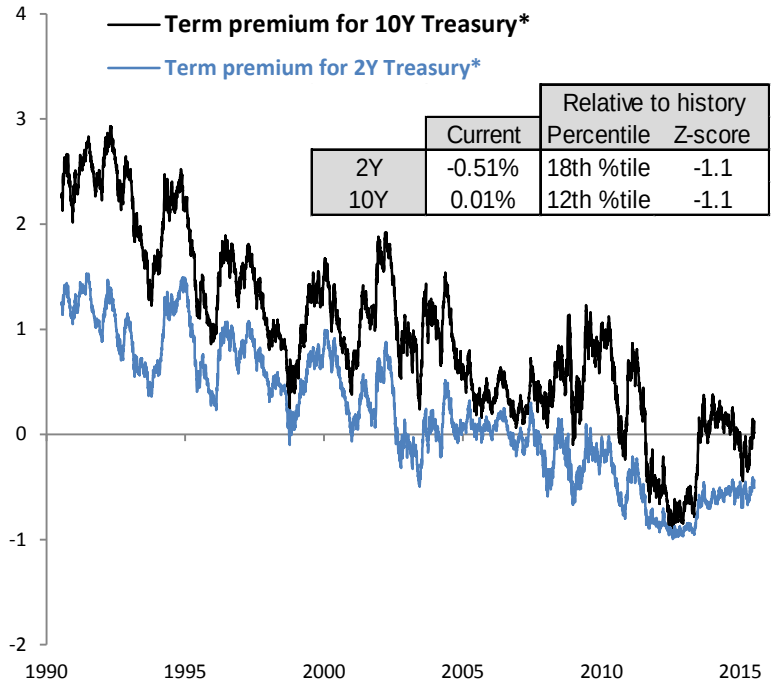
100% term premium ← → Zero term premium

* For example, if 1Y and 1Yx1Y are currently at 3% and 3.5%, then a 20% drift suggests that one-year from now, the 1Y rate will have a mean of 3% + (3.5% - 3%) * 20% = 3.10%

Note: Contrary to intuition, the probability of saving interest cost by issuing short maturity paper is slightly higher than 50% even with zero term premium in the curve (100% drift). This is because of mean reversion in rates, which ensures that average rates in the simulation don't get too far out of line with observed 20Y average rates.

These simulation results suggest there is a benefit to issuing short term debt, however, it is not as large as it has been historically

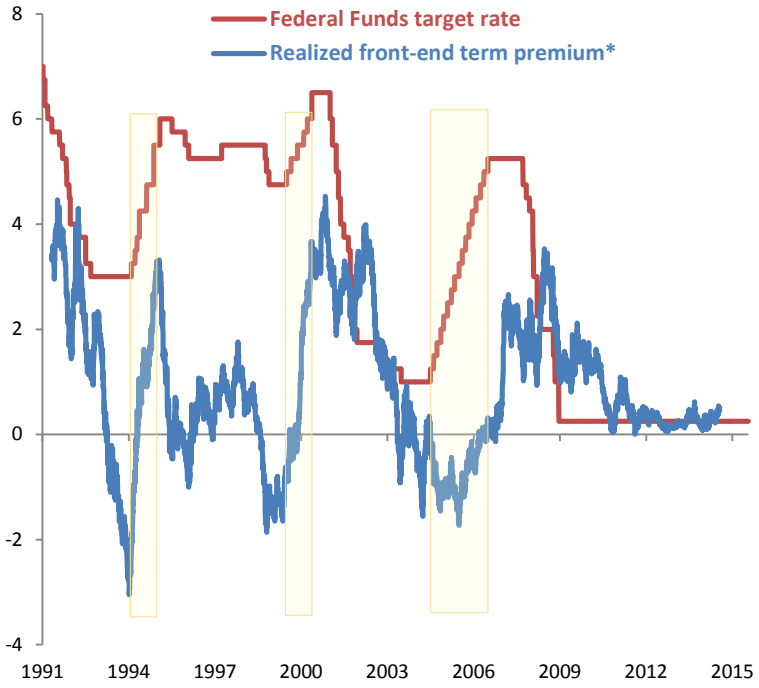
2Y Treasury term premium*



	Current	Relative to history Percentile	Z-score
2Y	-0.51%	18th %tile	-1.1
10Y	0.01%	12th %tile	-1.1

*Footnote: term premium is calculated by Don Kim and Jonathan Wright's paper *An Arbitrage-Free Three-Factor Term Structure Model and the Recent Behavior of Long-Term Yields and Distant-Horizon Forward Rates*

Realized front-end term premium* around the start of Fed tightening regimes is typically negative



*Footnote: realized front-end term premium is defined as 1Yx1Y swap rate minus realized 1Y rate after one-year

Summary and conclusions

- Interest rates are low on a historical basis, both on an absolute basis and relative to inflation and growth, and term premia are very low or negative across the yield curve.
- Higher short-term interest rates will lead to greater debt service burden, although the strong correlation between Treasury Bill yields and tax receipts helps alleviate the problem.
- Our simulations suggest that Treasury can extend WAM substantially while incurring only modest additional cost. However, insurance benefits are also low. Simulations also suggest a reduced probability of savings by issuing short.
- In the current interest rate environment intermediate issuance captures the lowest absolute term premia but longer maturities have comparable relative term premia.
- More work should be done on an asset liability framework for managing government debt and the durability of liquidity premium in the front end going forward.

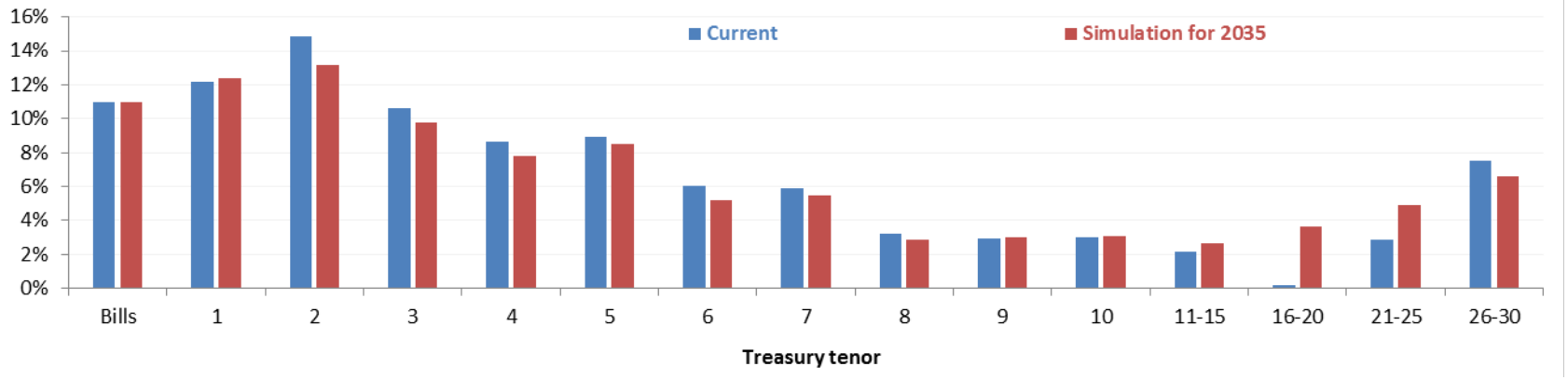
Appendix

Simulation parameters

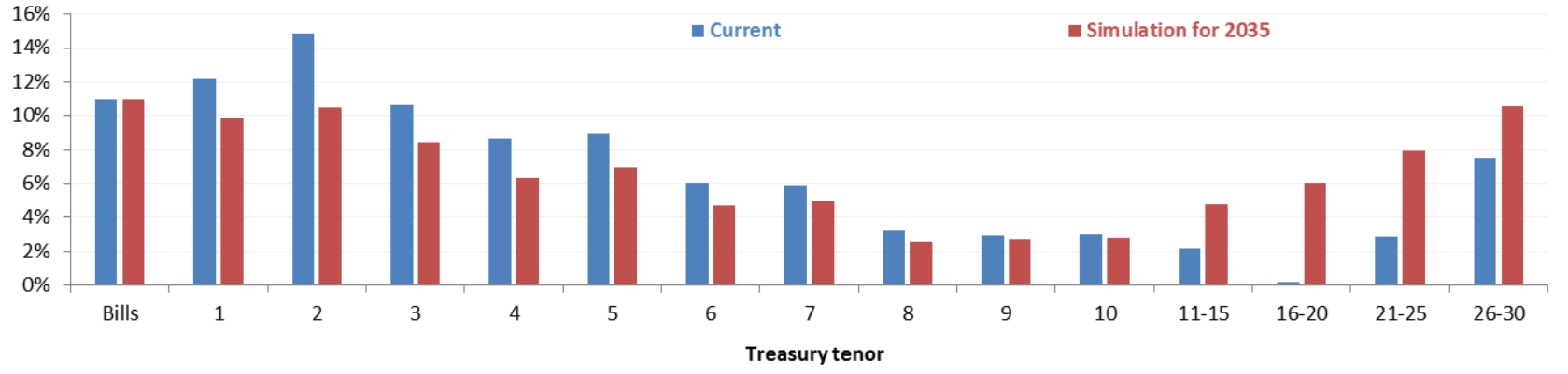
- Simulate cost of funds and weighted average maturity over the next 75 years (we only show progression over the next 30 years)
- Methodology / assumptions:
  - Interest rates increase by 100bp/year in 1Y, and 25bp/year in 30Y sector (other maturities are linearly interpolated)
  - Interest rates peak at 3%, 3.75% and 4% in bills, 10Y and 30Y sectors, respectively
  - Gross issuance in a given year = Treasuries rolling out of the 1Y bucket + CBO projections of deficit + $120bn student issuance per year (growing at a constant 3%/year)
  - Now split the gross issuance into seven maturity buckets: Bills, 2Y, 3Y, 5Y, 7Y, 10Y, and 30Y
  - First determine net issuance in Bills.
    - Assumption: Ratio of bills to Treasuries outstanding remains constant through time
    - Bills outstanding at time T+1 = Bills outstanding at time T + (Net deficit) * (Ratio of bills to total Treasuries outstanding at time T)
  - Next, determine gross issuance in the 2Y, 3Y, 5Y, 7Y, 10Y and 30Y sectors
    - **Scenario 1 (baseline):** %issuance in a specific maturity remains constant through time (23%, 15%, 21%, 16%, 16% and 9%).
    - **Scenario 2:** %issuance is uniform (17%, 17%, 17%, 17%, 16%, 16%).
    - **Scenario 3:** %issuance in a specific maturity remains constant through time, but rates are shocked instantaneously higher by 300bp relative to the base case outlined above.
    - **Scenario 4:** %issuance in a specific maturity remains constant through time, but rates are shocked higher *after 10 years* by 300bp relative to the base case outlined above.
    - **Scenario 5:** %issuance is uniform, but rates are shocked higher *after 10 years* by 300bp relative to the base case outlined above.
- Output: Projected "Weighted average cost of funds (WAC)" and "Weighted average maturity of outstanding debt stock (WAM)" over time

Simulated maturity distribution of outstanding debt for current vs. uniform issuance patterns

Scenario #1: %issuance in a specific maturity remains constant through time

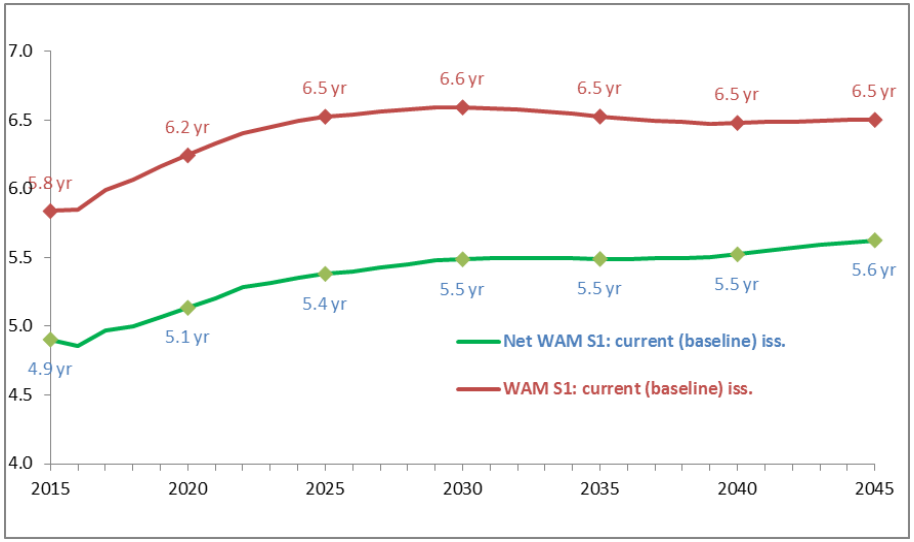


Scenario #2: % issuance is uniform

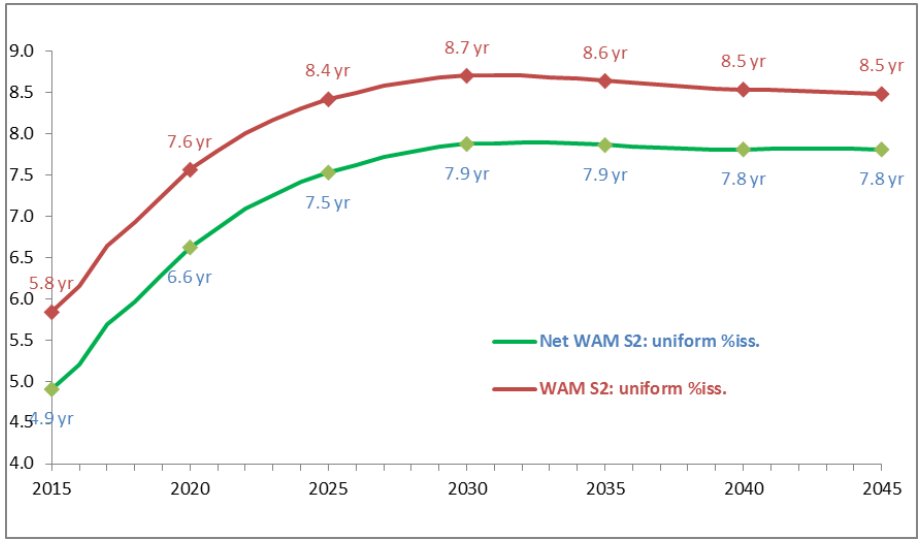


Student loan assets on the Treasury balance sheet reduce the WAM by around 1 year

Gross & net maturity (years) for baseline scenario



Gross & net maturity (years) for uniform %issuance scenario



Assumptions

- Student loan assets are currently at $1.175tn with net issuance of $120bn in 2016
- Net issuance grows by 3% per year indefinitely