

# Treasury Presentation to TBAC



# Office of Debt Management



Fiscal Year 2020 Q2 Report

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# Section I: Executive Summary



# Highlights of Treasury's May 2020 Quarterly Refunding Presentation to the Treasury Borrowing Advisory Committee (TBAC)

## Receipts and Outlays through Q2 FY2020

- Total receipts were \$1,604 billion, which is \$96 billion (6%) higher compared to the same period last year. Receipts were 14.6% of GDP, compared to 14.2% of GDP for the same period last year.
- Total outlays were \$2,347 billion, which is \$149 billion (7%) higher than the comparable period last year. Outlays were 21.4% of GDP, compared to 20.7% of GDP for the same period last year.

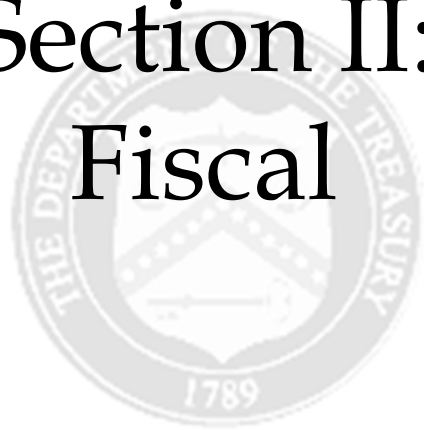
## Projected Net Marketable Borrowing (FY2020)

- Treasury's Office of Fiscal Projections (OFP) currently forecasts a net privately-held marketable borrowing need of \$2,999 billion for Q3 FY2020, with an end-of-June cash balance of \$800 billion. For Q4 FY2020, OFP forecasts a net privately-held marketable borrowing need of \$677 billion assuming end-of-September cash balance of \$800 billion. Privately-held marketable borrowing excludes rollovers (auction "add-ons") of Treasury securities held in the Federal Reserve's System Open Market Account (SOMA) but includes financing required due to SOMA redemptions. Secondary market purchases of Treasury securities by SOMA do not directly change net privately-held marketable borrowing but, all else equal, when the securities mature and assuming the Fed does not redeem any maturing securities would increase the amount of cash raised for a given privately-held auction size by increasing the SOMA "add-on" amount.

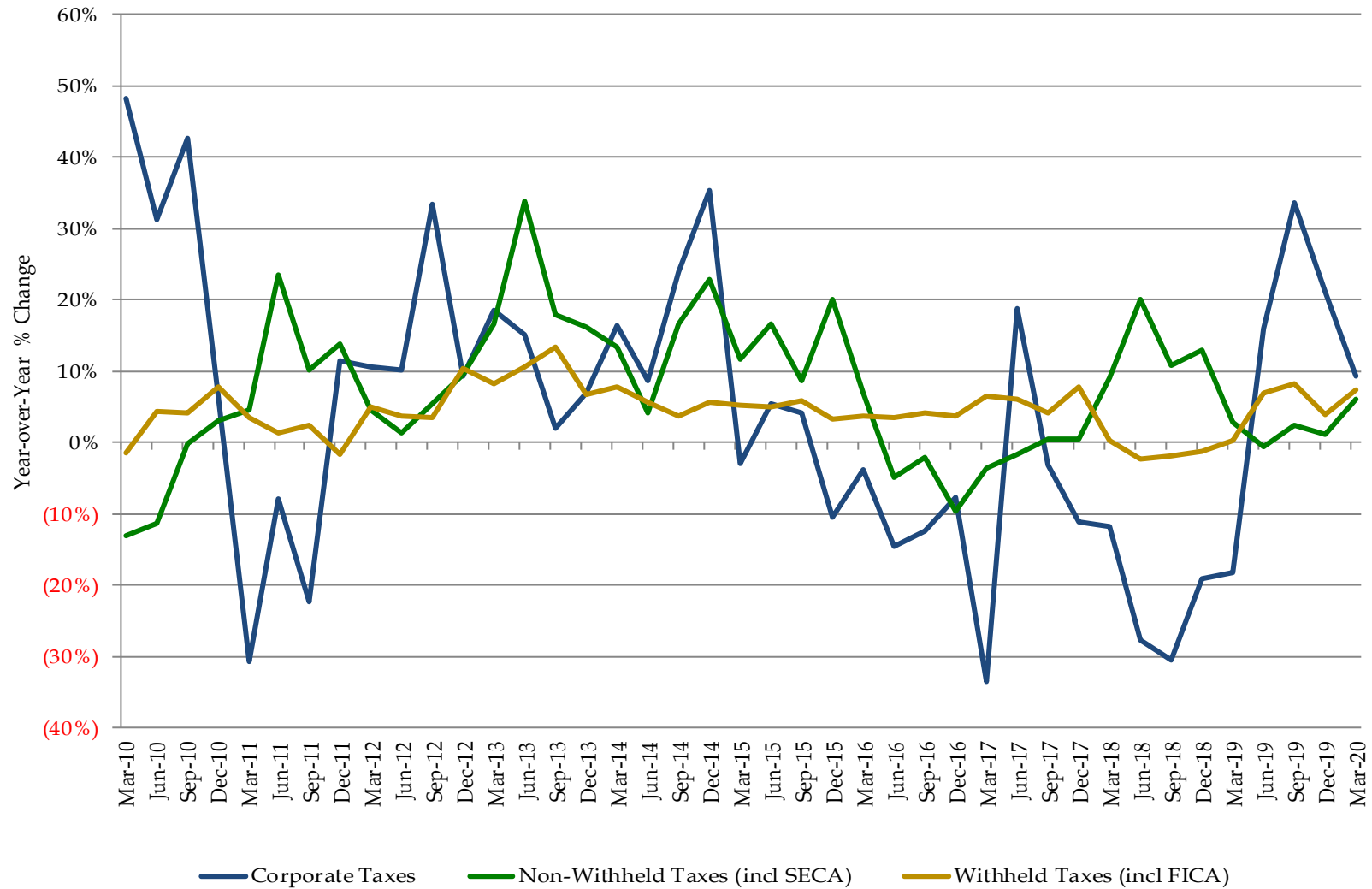
## Demand for Treasury Securities

- Bid-to-cover ratios for all securities were largely stable over the last quarter.
- High demand for Treasury bills with about \$1.4 trillion of net issuance since 3/31/2020.
- Foreign demand increased modestly.

## Section II: Fiscal

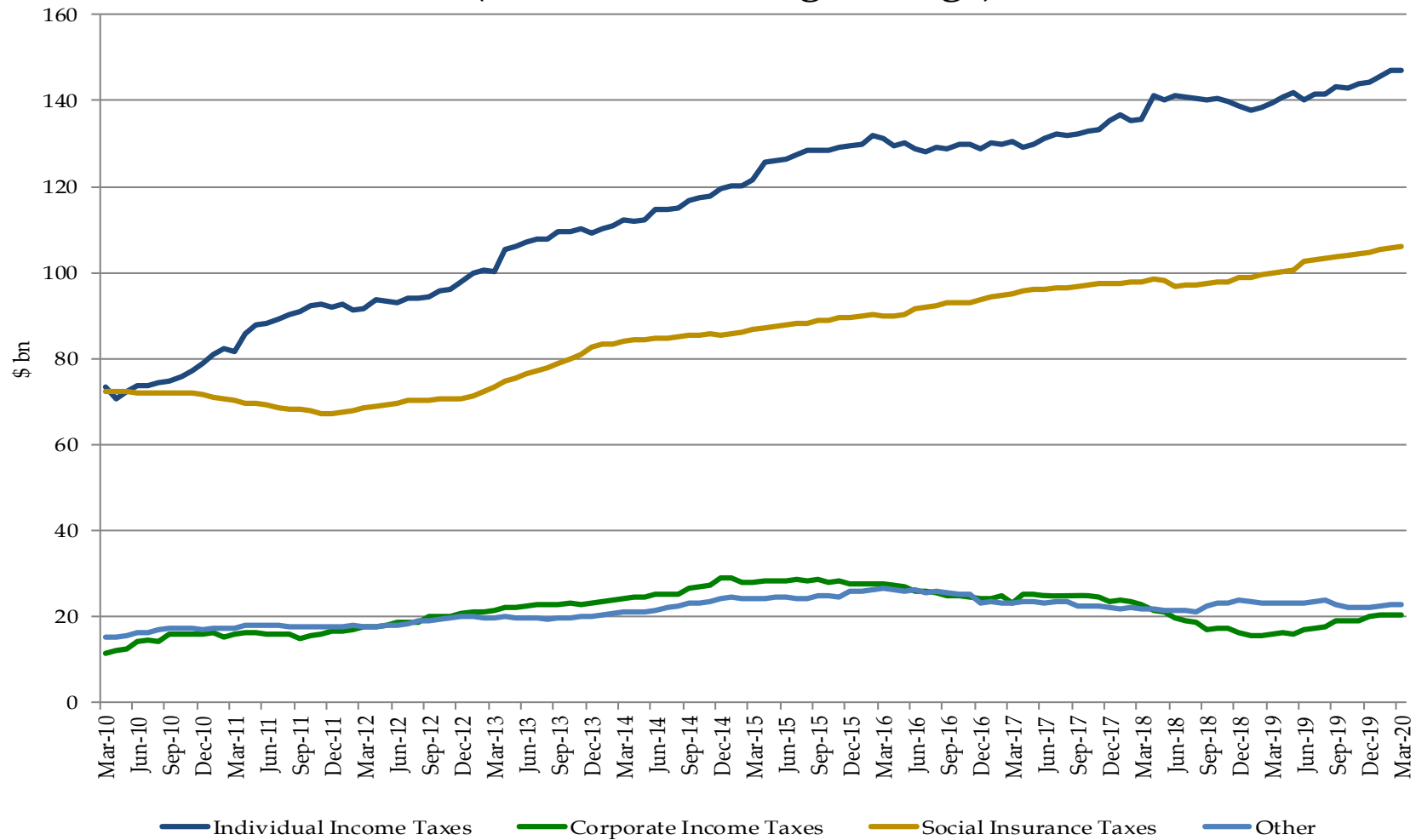


## Quarterly Tax Receipts



Source: United States Department of the Treasury

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

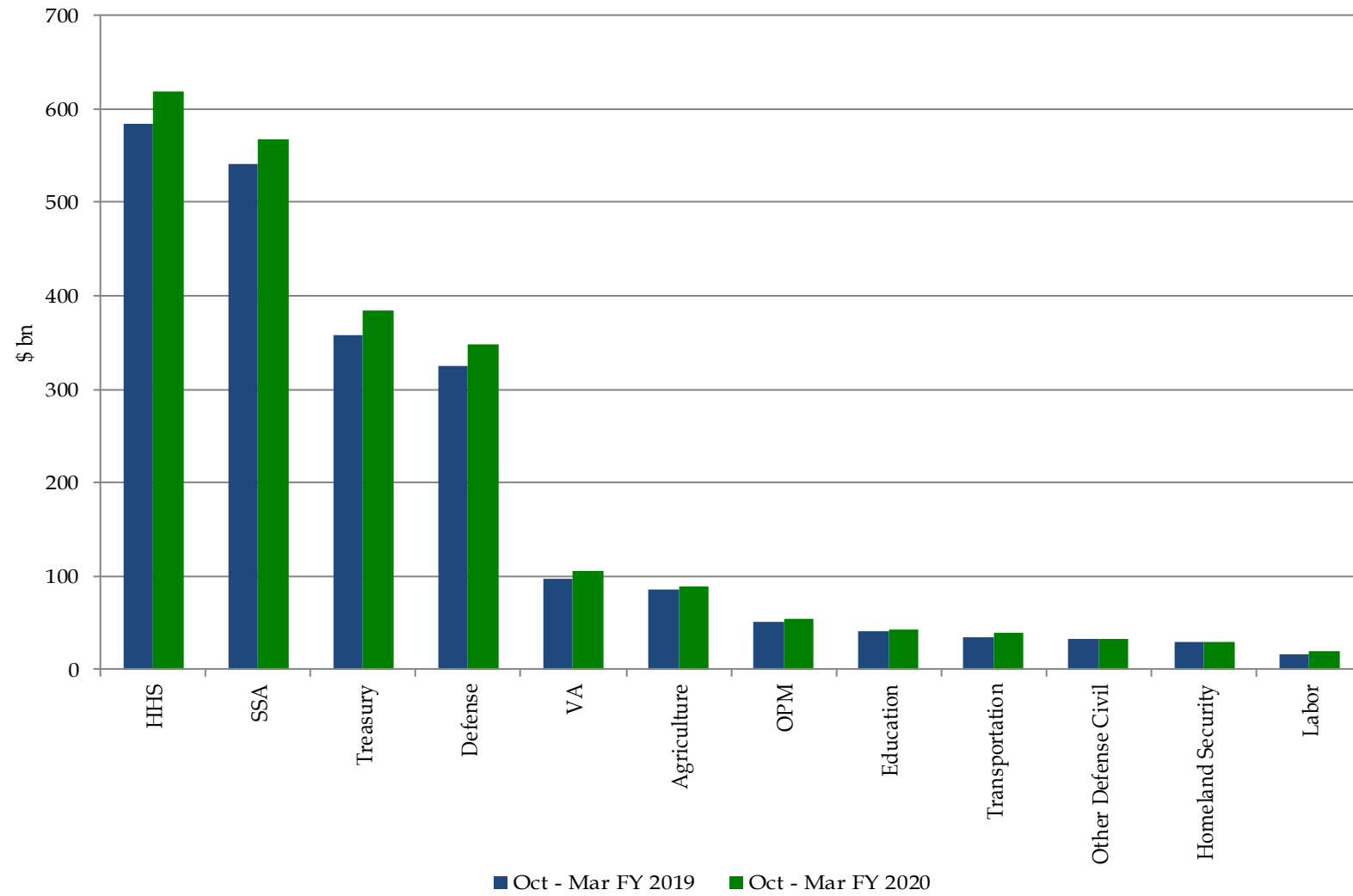


Individual Income Taxes include withheld and non-withheld. Social Insurance Taxes include FICA, SECA, RRTA, UTF deposits, FUTA and RUIA. Other includes excise taxes, estate and gift taxes, customs duties and miscellaneous receipts.

Source: United States Department of the Treasury

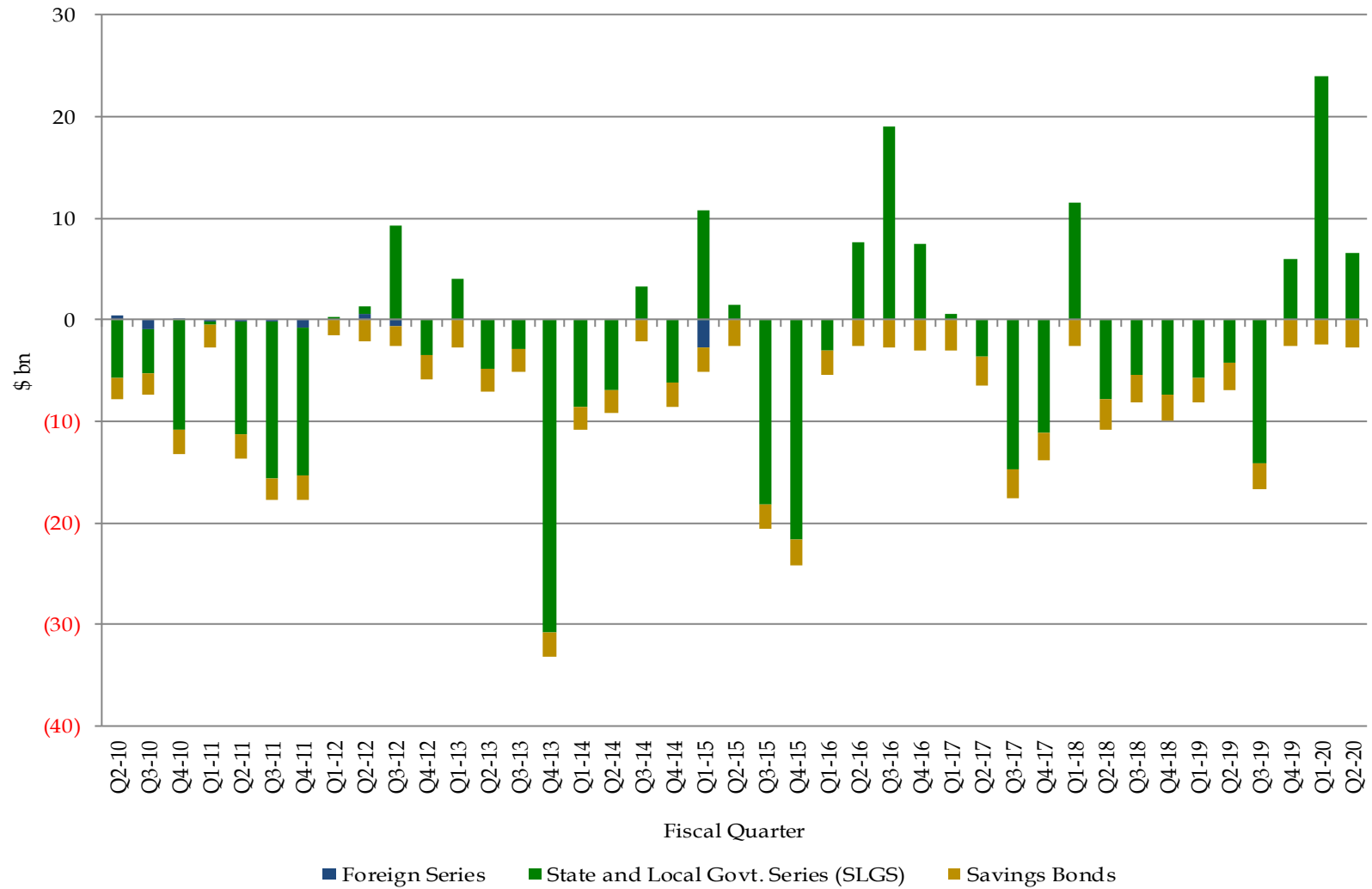


## Largest Outlays



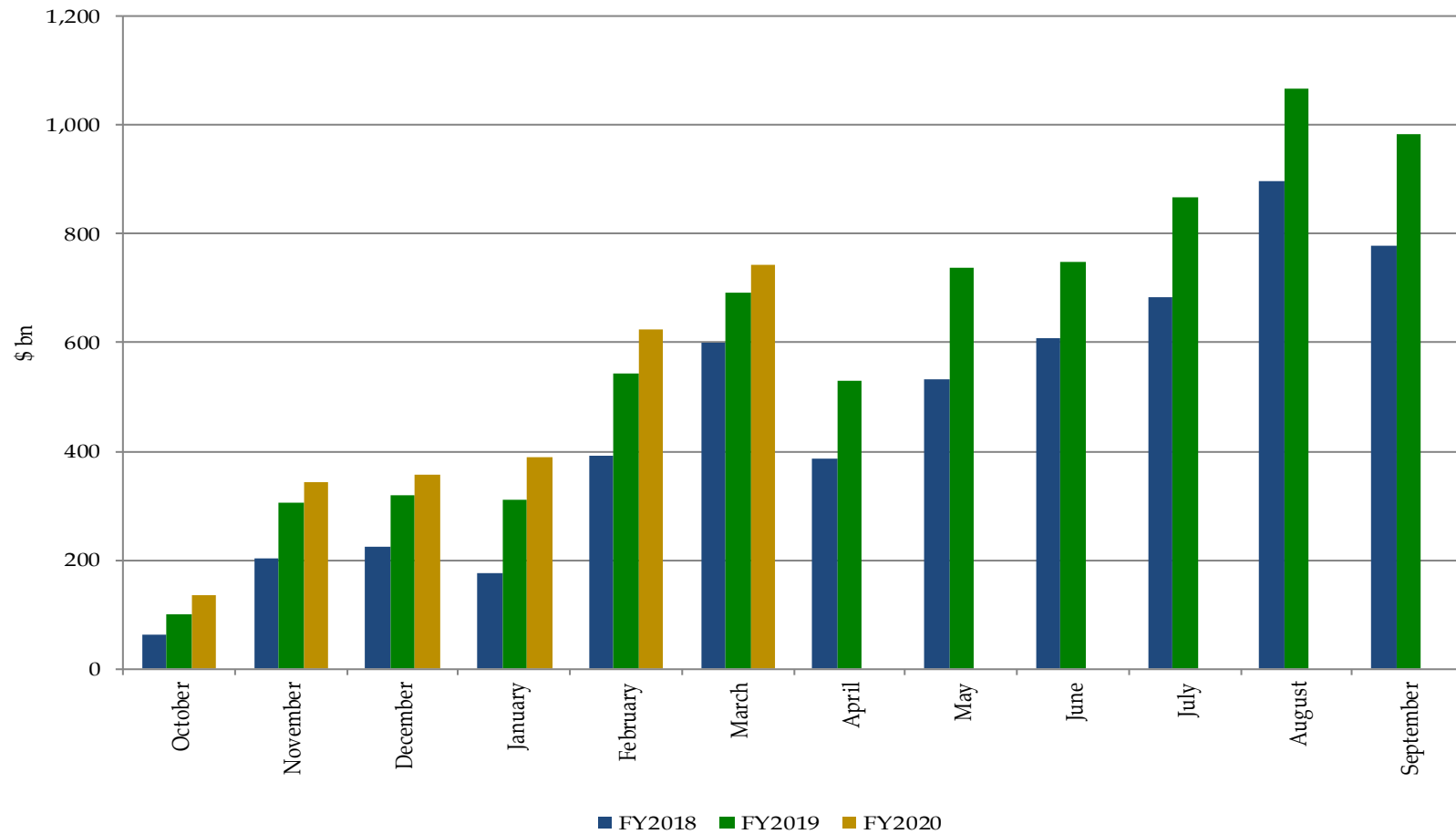
Source: United States Department of the Treasury

## Treasury Net Nonmarketable Borrowing



Source: United States Department of the Treasury

## Cumulative Budget Deficits by Fiscal Year



Source: United States Department of the Treasury

### **FY 2020-2022 Deficits and Privately-Held Net Marketable Borrowing Estimates\*, in \$ billions**

	Primary Dealers <sup>1</sup>	OFP <sup>2</sup>	CBO <sup>3</sup>
FY2020 Deficit Estimate	3,659		3,700
FY2021 Deficit Estimate	2,002		2,100
FY2022 Deficit Estimate	1,350		
FY2020 Deficit Estimate Range	2,600-4,425		
FY2021 Deficit Estimate Range	1,400-2,994		
FY2022 Deficit Estimate Range	1,100-2,200		
FY2020 Privately-Held Net Marketable Borrowing Estimate	3,700	4,483	
FY2021 Privately-Held Net Marketable Borrowing Estimate	2,100		
FY2022 Privately-Held Net Marketable Borrowing Estimate	1,313		
FY2020 Privately-Held Net Marketable Borrowing Range	2,550-4,850		
FY2021 Privately-Held Net Marketable Borrowing Range	1,300-3,000		
FY2022 Privately-Held Net Marketable Borrowing Range	720-2,300		
Estimates as of:	Apr-20	May-20	Apr-20

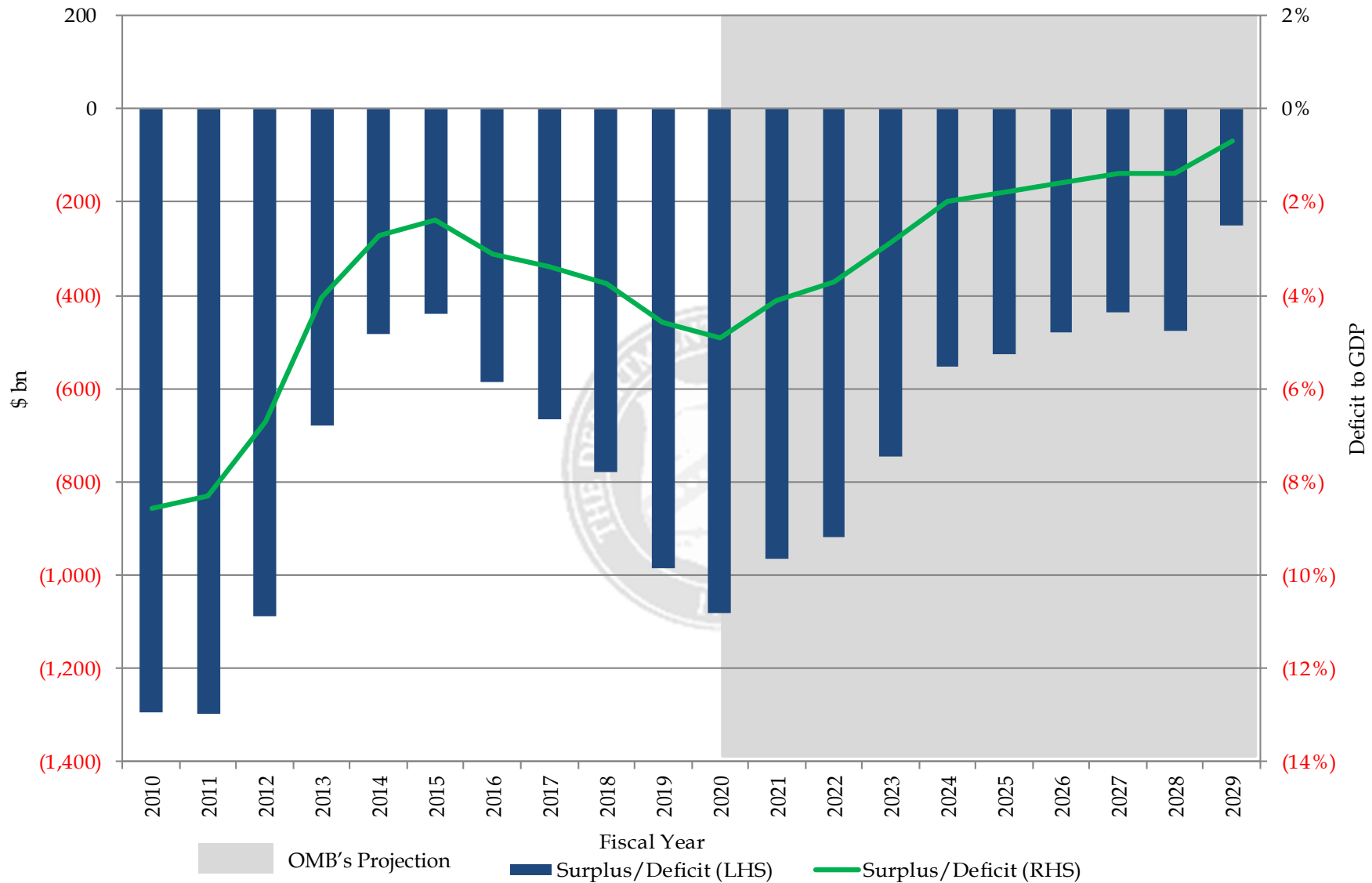
<sup>1</sup>Estimates represent the medians from the primary dealer survey in April 2020. The FY2020 net borrowing estimates are normalized with an assumption of end-of-September 2020 cash balance of \$800 billion.

<sup>2</sup>Treasury's Office of Fiscal Projections (OFP) borrowing estimates announced on May 4, 2020.

<sup>3</sup>CBO FY2020 and FY2021 deficit estimates are from CBO's blog "CBO's Current Projections of Output, Employment, and Interest Rates and a Preliminary Look at Federal Deficits for 2020 and 2021," April 24, 2020 @ <https://www.cbo.gov/publication/56335>.

\*Privately-held marketable borrowing excludes rollovers (auction "add-ons") of Treasury securities held in the Federal Reserve's System Open Market Account (SOMA) but includes financing required due to SOMA redemptions. Secondary market purchases of Treasury securities by SOMA do not directly change net privately-held marketable borrowing but, all else equal, when the securities mature and assuming the Fed does not redeem any maturing securities, would increase the amount of cash raised for a given privately-held auction size by increasing the SOMA "add-on" amount.

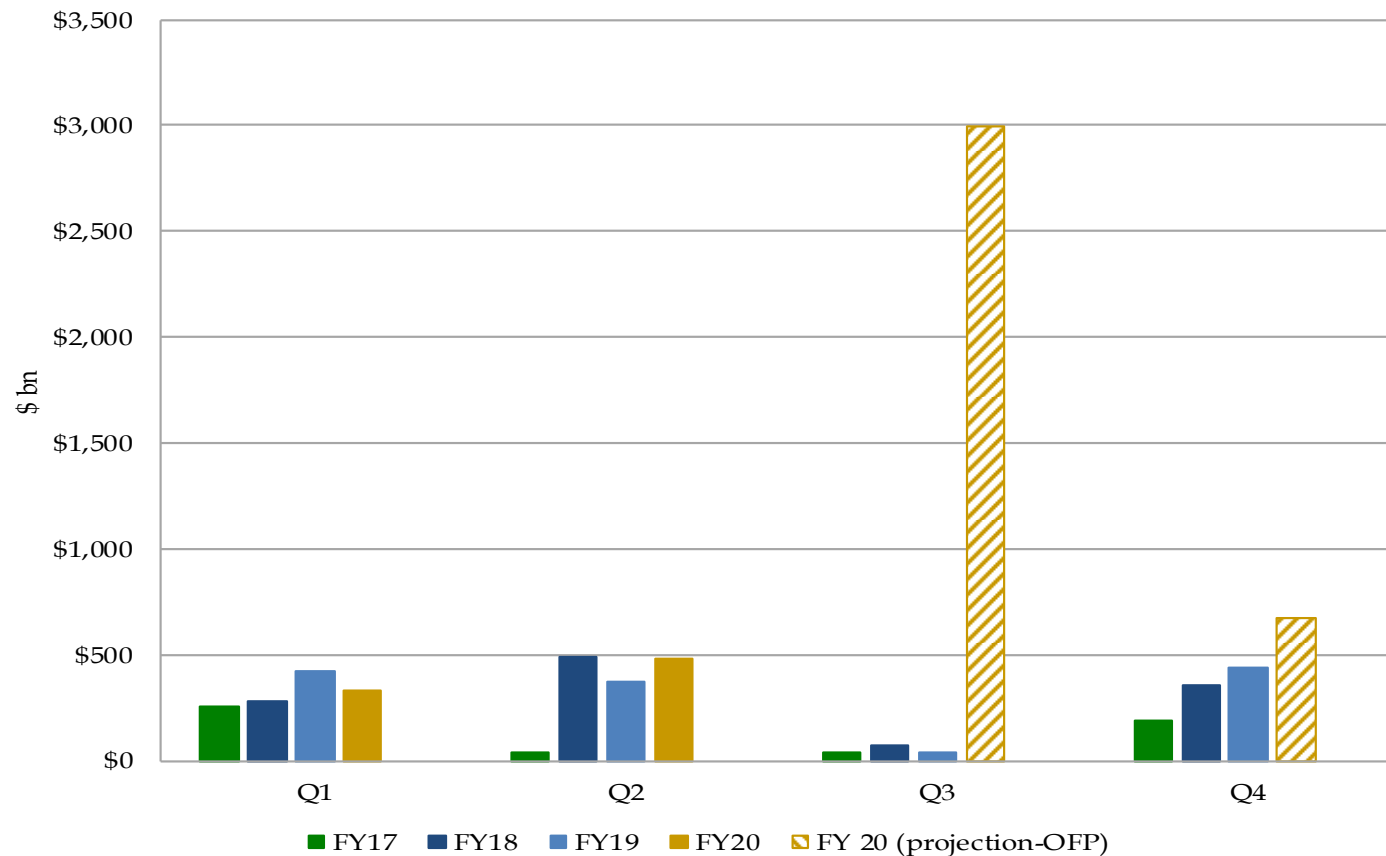
## Budget Surplus/Deficit\*



Projections are from OMB's Table S-10 of "A Budget for America's Future, Fiscal Year 2021," February 2020.

**\*OMB projections reflect pre-CARES Act forecasts and will be updated when new projections become available.**

## Privately-Held Net Marketable Borrowing Outlook\*



\* Privately-held marketable borrowing excludes rollovers (auction “add-ons”) of Treasury securities held in the Federal Reserve’s System Open Market Account (SOMA) but includes financing required due to SOMA redemptions. Secondary market purchases of Treasury securities by SOMA do not directly change net privately-held marketable borrowing but, all else equal, when the securities mature and assuming the Fed does not redeem any maturing securities, would increase the amount of cash raised for a given privately-held auction size by increasing the SOMA “add-on” amount.

# Section III: Financing



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

- Portfolio and SOMA holdings as of 03/31/2020.
- Estimates assume private announced issuance sizes and patterns remain constant for nominal coupons, TIPS, and FRNs given changes made before the May 2020 refunding, while using total bills outstanding of ~\$2.66 trillion.
- The principal on the TIPS securities was accreted to each projection date based on market ZCIS levels as of 03/31/2020.
- No attempt was made to account for future financing needs.





## Sources of Privately-Held Financing in FY20 Q2\*^

January - March 2020	
Net Bill Issuance	241
Net Coupon Issuance	236
Subtotal: Net Marketable Borrowing	477
Ending Cash Balance	515
Beginning Cash Balance	404
Subtotal: Change in Cash Balance	111
Net Implied Funding for FY20 Q2**	366

Security	January - March 2020 Bill Issuance			Fiscal Year-to-Date Bill Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
4-Week	600	539	61	1,260	1,253	7
8-Week	545	477	68	1,080	1,015	65
13-Week	567	567	0	1,140	1,096	44
26-Week	489	496	(7)	1,008	966	42
52-Week	104	96	8	186	174	12
CMBs	150	40	110	165	55	110
Bill Subtotal	2,455	2,214	241	4,839	4,558	280

Security	January - March 2020 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
	Gross	Maturing	Net	Gross	Maturing	Net
2-Year FRN	56	45	11	112	86	26
2-Year	120	83	37	240	134	106
3-Year	114	72	42	228	144	84
5-Year	123	105	18	246	235	11
7-Year	96	60	36	192	118	74
10-Year	75	44	31	150	80	70
30-Year	51	3	48	102	3	99
5-Year TIPS	0	0	0	32	0	32
10-Year TIPS	26	21	5	38	21	17
30-Year TIPS	8	0	8	8	0	8
Coupon Subtotal	669	433	236	1,348	821	527

Total	3,124	2,647	477	6,187	5,380	807
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\*Privately-held marketable borrowing excludes rollovers (auction “add-ons”) of Treasury securities held in the Federal Reserve’s System Open Market Account (SOMA) but includes financing required due to SOMA redemptions. Secondary market purchases of Treasury securities by SOMA do not directly change net privately-held marketable borrowing but, all else equal, when the securities mature and assuming the Fed does not redeem any maturing securities, would increase the amount of cash raised for a given privately-held auction size by increasing the SOMA “add-on” amount.

^An end-of-March 2020 cash balance of \$515 billion versus a beginning-of-January 2020 cash balance of \$404 billion. By keeping the cash balance constant, Treasury arrives at the net implied funding number.

## Sources of Privately-Held Financing in FY20 Q3\*

April - June 2020	
Assuming Constant Coupon Issuance Sizes**	
Treasury Announced Net Marketable Borrowing***	2999
Net Coupon Issuance	249
Implied Change in Bills	2750

Security	April - June 2020 Coupon Issuance			Fiscal Year-to-Date Coupon Issuance		
	Gross	Maturing^	Net	Gross	Maturing	Net
2-Year FRN	62	49	13	174	135	39
2-Year	126	96	30	366	230	136
3-Year	120	71	49	348	215	133
5-Year	129	103	26	375	338	37
7-Year	105	61	44	297	179	118
10-Year	78	31	47	228	111	117
30-Year	54	2	52	156	5	151
5-Year TIPS	32	55	(23)	64	55	9
10-Year TIPS	12	0	12	50	21	29
30-Year TIPS	0	0	0	8	0	8
Coupon Subtotal	718	469	249	2,066	1,291	775

\* Privately-held marketable borrowing excludes rollovers (auction "add-ons") of Treasury securities held in the Federal Reserve's System Open Market Account (SOMA) but includes financing required due to SOMA redemptions. Secondary market purchases of Treasury securities by SOMA do not directly change net privately-held marketable borrowing but, all else equal, when the securities mature and assuming the Fed does not redeem any maturing securities, would increase the amount of cash raised for a given privately-held auction size by increasing the SOMA "add-on" amount.

\*\* Keeping announced issuance sizes and patterns constant for nominal coupons, TIPS, and FRNs based on changes made before the May 2020 refunding.

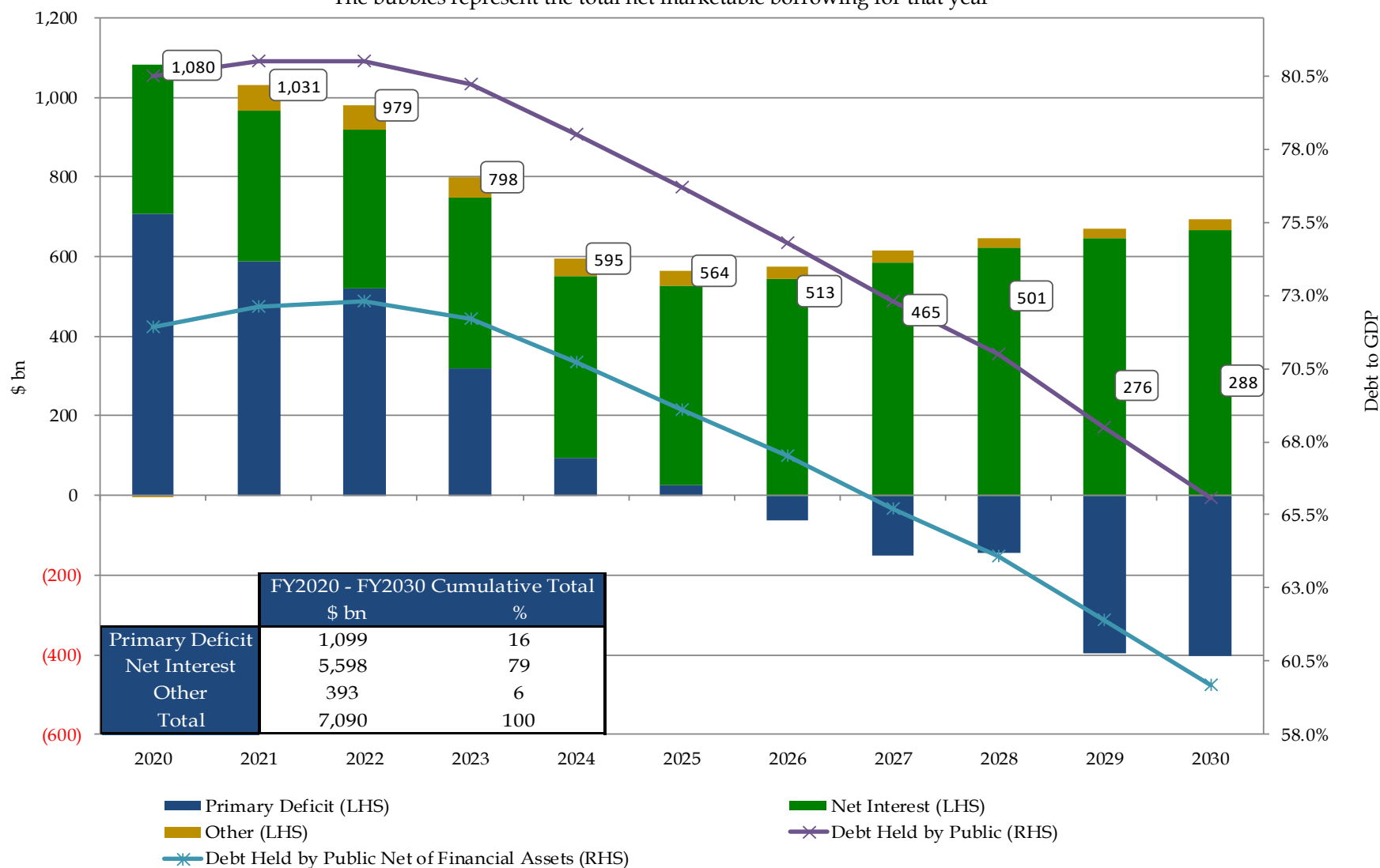
\*\*\* Assumes an end-of-June 2020 cash balance of \$800 billion versus a beginning-of-April 2020 cash balance of \$515 billion.

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

^ Maturing amounts could change based on future Federal Reserve purchases.

## OMB's Projection of Borrowing from the Public\*

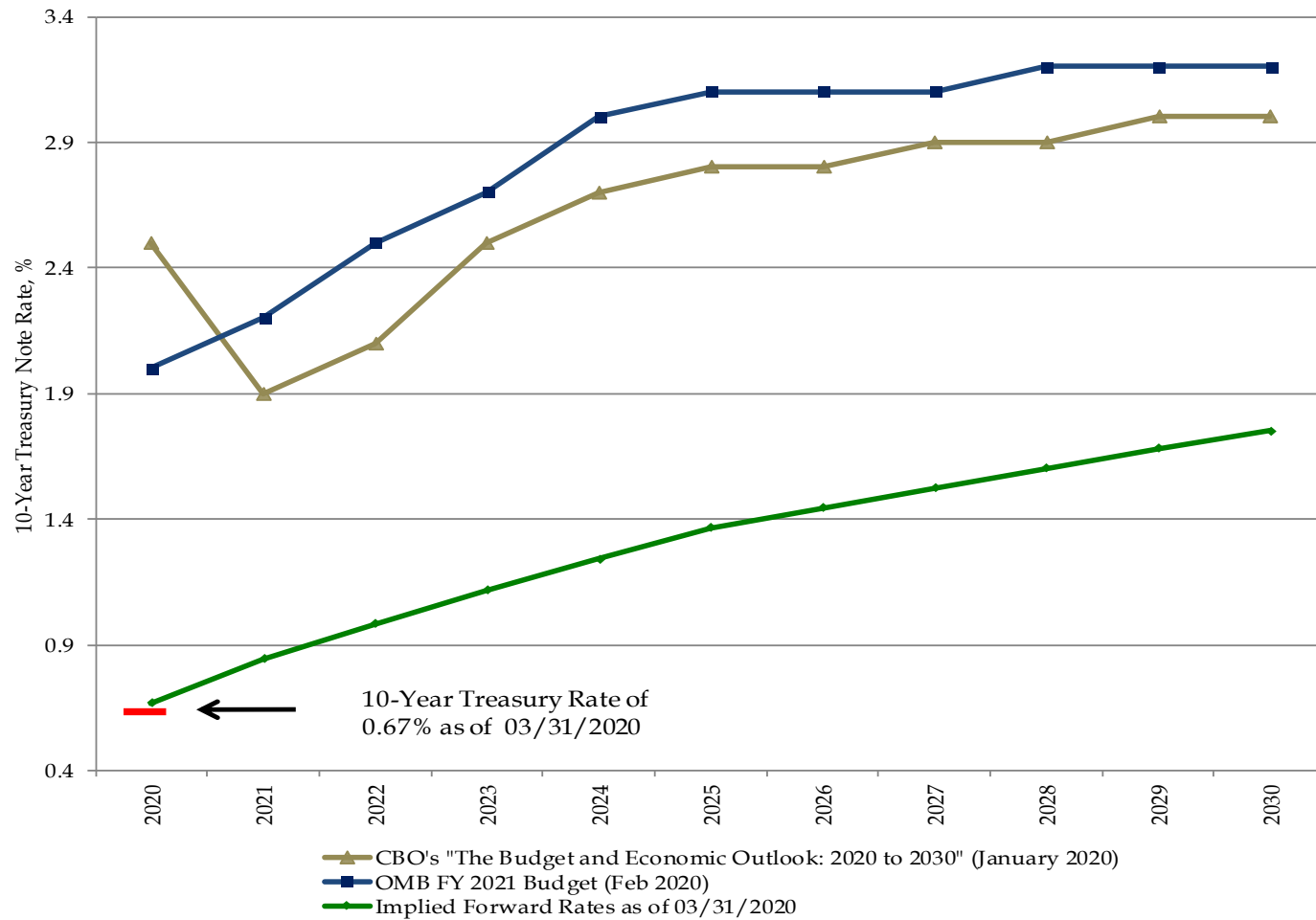
The bubbles represent the total net marketable borrowing for that year



OMB's projections of the change in debt held by the public (borrowing) are from Table S-10 of "A Budget for America's Future, Fiscal Year 2021," February 2020. "Other" represents borrowing from the public to provide direct and guaranteed loans.

**\*OMB projections reflect pre-CARES Act forecasts and will be updated when new projections become available.**

## Interest Rate Assumptions: 10-Year Treasury Note\*

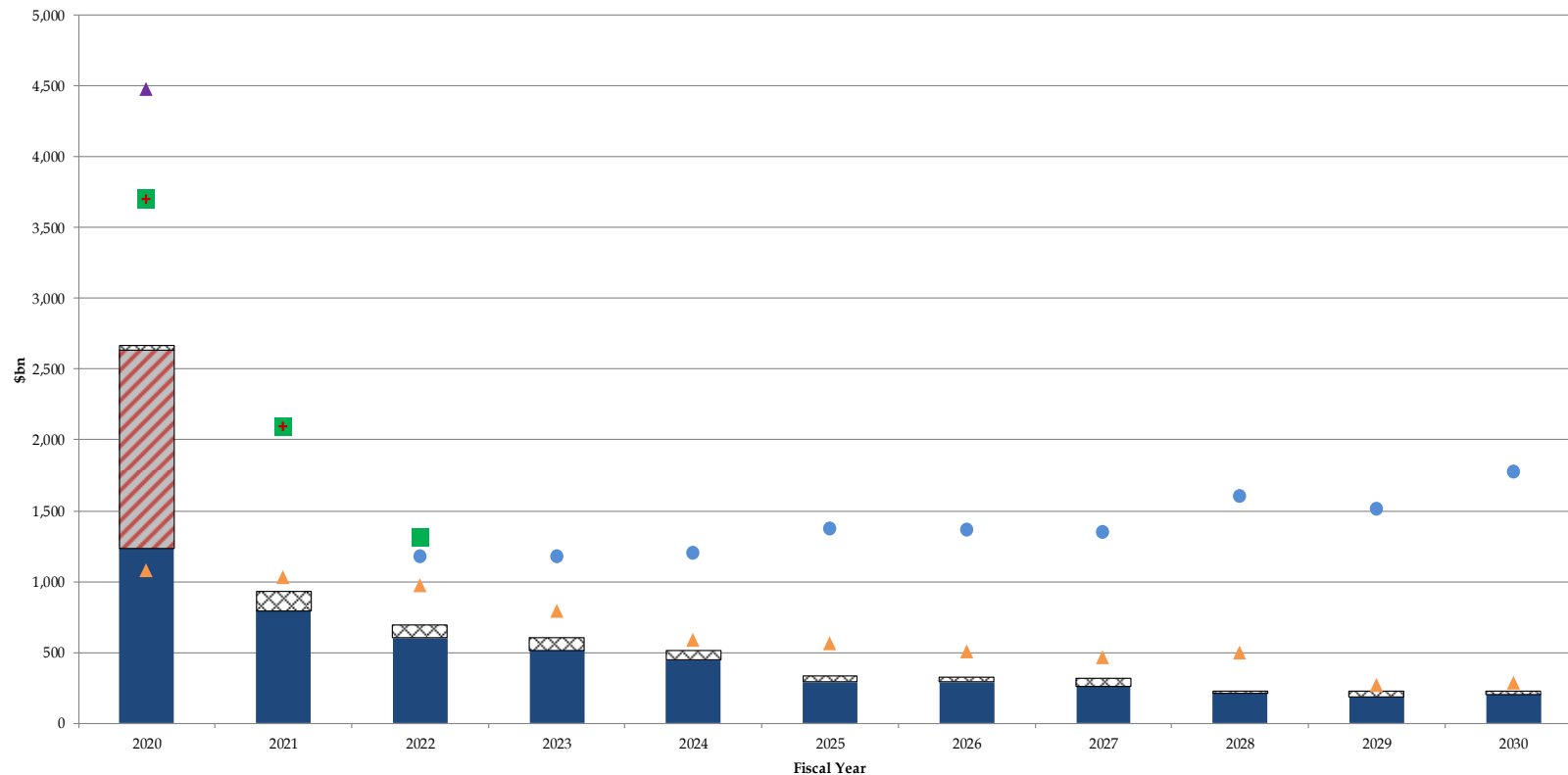


OMB's economic assumption of the 10-Year Treasury note rates reflect the calendar year average from Table S-9 of OMB's "A Budget for America's Future, Fiscal Year 2021," February 2020. CBO's economic assumption 10-Year Treasury note rates reflect the fiscal year average from Table B-2 of CBO's "The Budget and Economic Outlook: 2020 to 2030," January 2020. The forward rates are the implied 10-Year Treasury note rates on March 31, 2020.

**\*Both OMB and CBO projections reflect pre-CARES Act forecasts and will be updated when new projections become available.**

# Projected Privately-Held Net Marketable Borrowing

## Assuming Private Coupon Issuance & Total Bills Outstanding Remain Constant as of 3/31/2020\*



- ▨ Fed Purchases from 4/1/20 to 5/1/20
- Projected Privately-Held Net Marketable Borrowing
- PD Survey Cash Balance Adjusted Privately-Held Net Marketable Borrowing Estimates, April 2020
- CBO's "The Budget and Economic Outlook: 2020 to 2030" January 2020 (current law) for FY2021 to FY2030
- ▨ Increase in Bills Outstanding between 4/1/20 and 5/5/20
- ▲ OMB's FY2021 Budget, February 2020
- ▲ OFP's FY2020 Net Marketable Borrowing Estimate, May 2020
- + COVID-19 outbreak adjusted CBO deficit estimates for FY2020 and FY2021, April 2020

Treasury's latest primary dealer survey median estimates can be found on page 11, FY2020 median estimate is normalized with an assumption of end-of-September 2020 cash balance of \$800 billion. OMB's projections of the change in debt held by the public are from Table S-10 of "A Budget for America's Future, Fiscal Year 2021," February 2020. CBO's current law budget projections of the change in debt held by the public for FY2022 to FY2030 are from 1-2 of CBO's "The Budget and Economic Outlook: 2020 to 2030," January 2020.

\* Privately-held marketable borrowing excludes rollovers (auction "add-ons") of Treasury securities held in the Federal Reserve's System Open Market Account (SOMA) but includes financing required due to SOMA redemptions. No adjustments are made for open-market outright purchases.

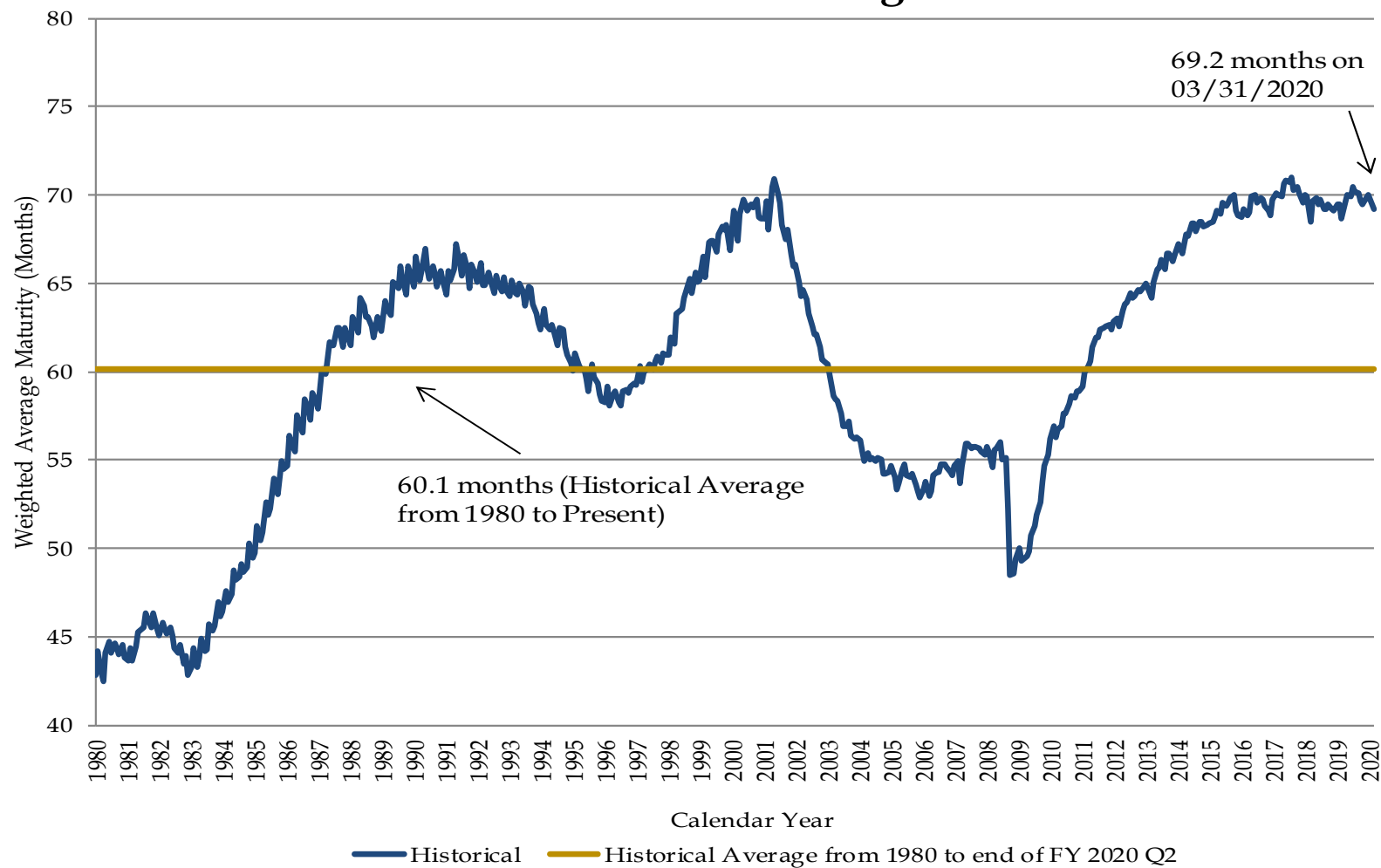
For FY2020 and FY2021, COVID-19 outbreak adjusted CBO projections are deficit estimates, which can be found in CBO's blog "CBO's Current Projections of Output, Employment, and Interest Rates and a Preliminary Look at Federal Deficits for 2020 and 2021," April 24, 2020 @ <https://www.cbo.gov/publication/56335>.

**Both OMB and CBO projections before April 2020 reflect pre-CARES Act forecasts and will be updated when new projections become available.**

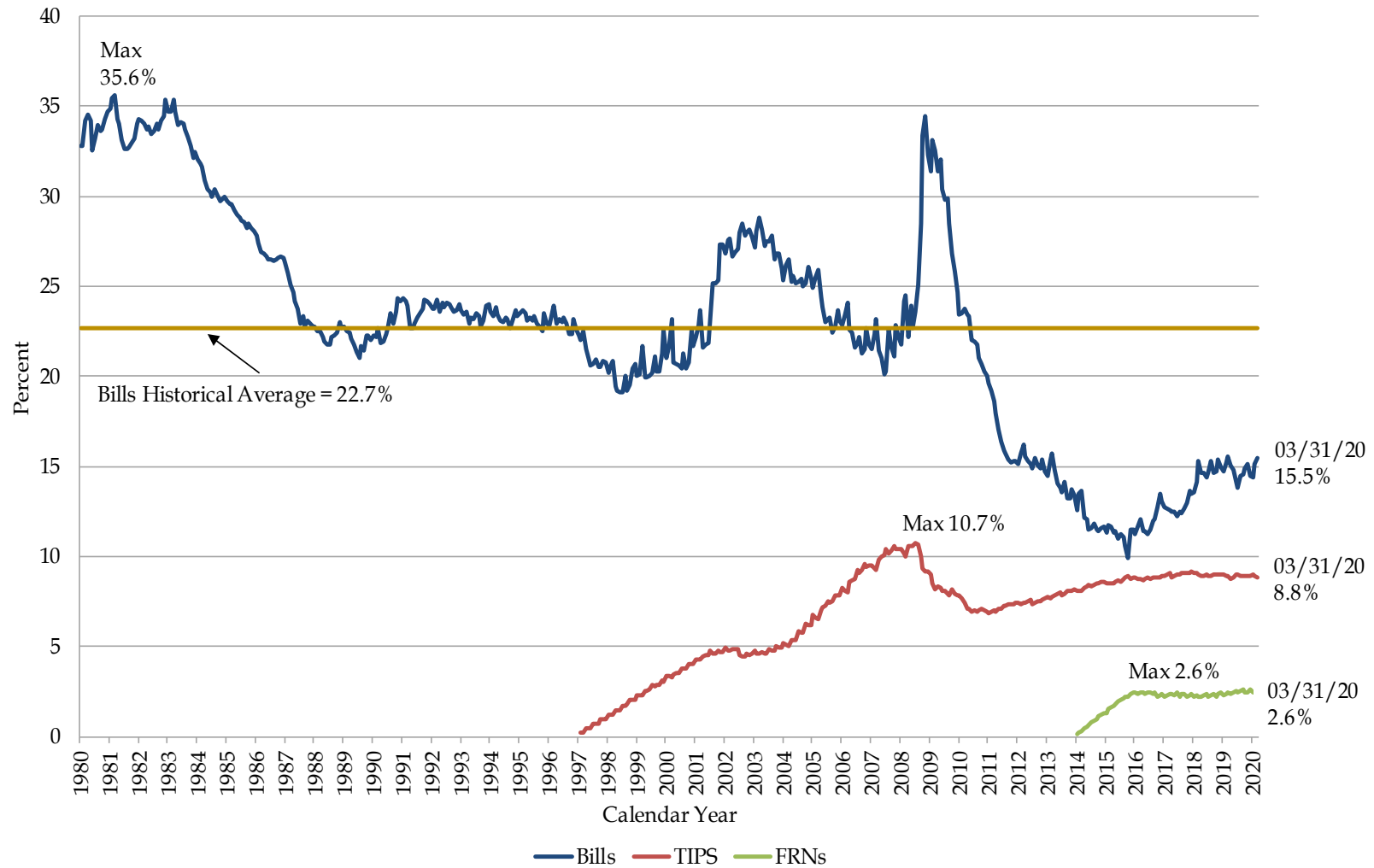
# Section IV: Portfolio Metrics



## Historical Weighted Average Maturity of Marketable Debt Outstanding

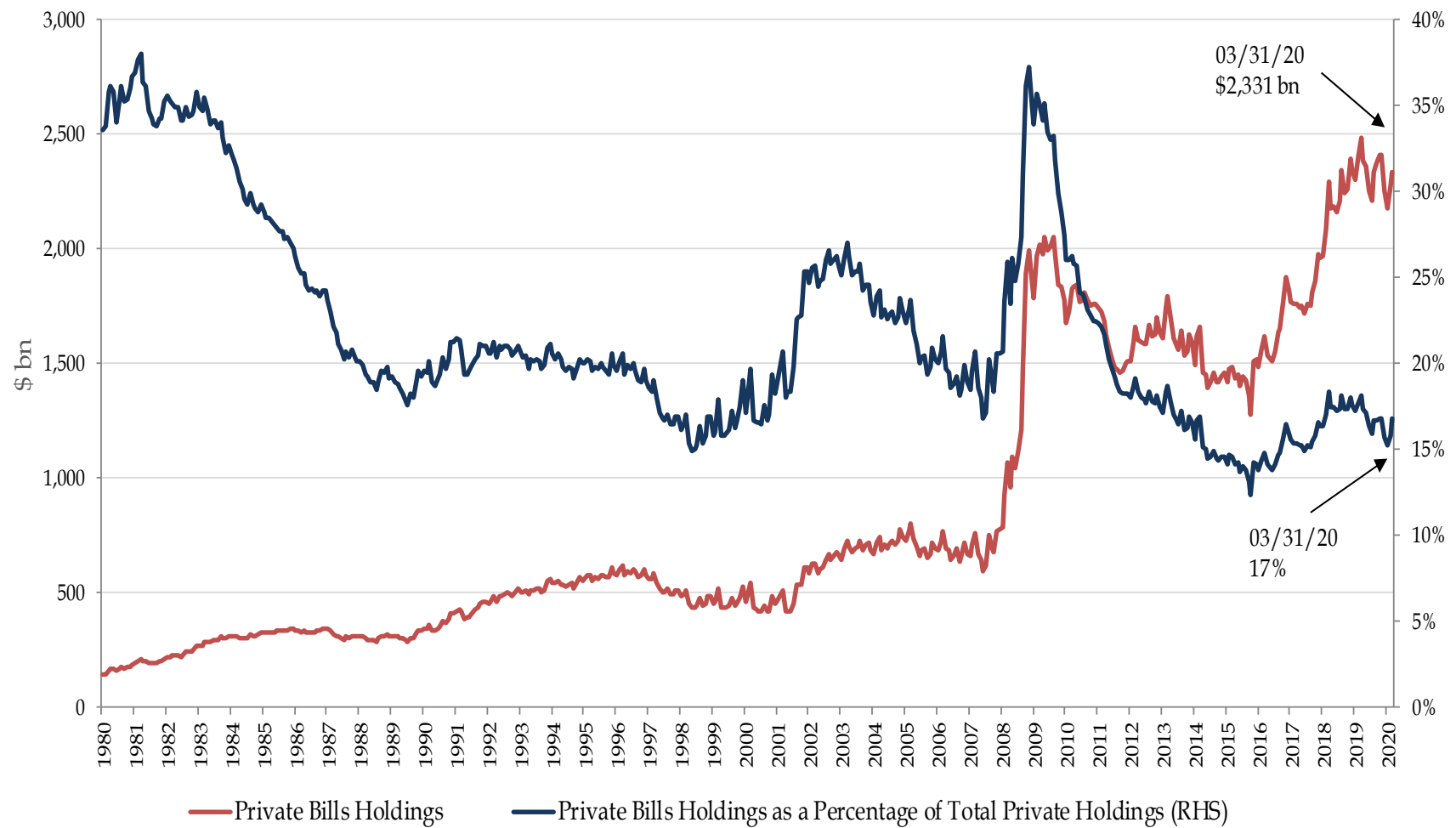


## Bills, TIPS & FRNs Outstanding as a Percent of Marketable Debt Outstanding

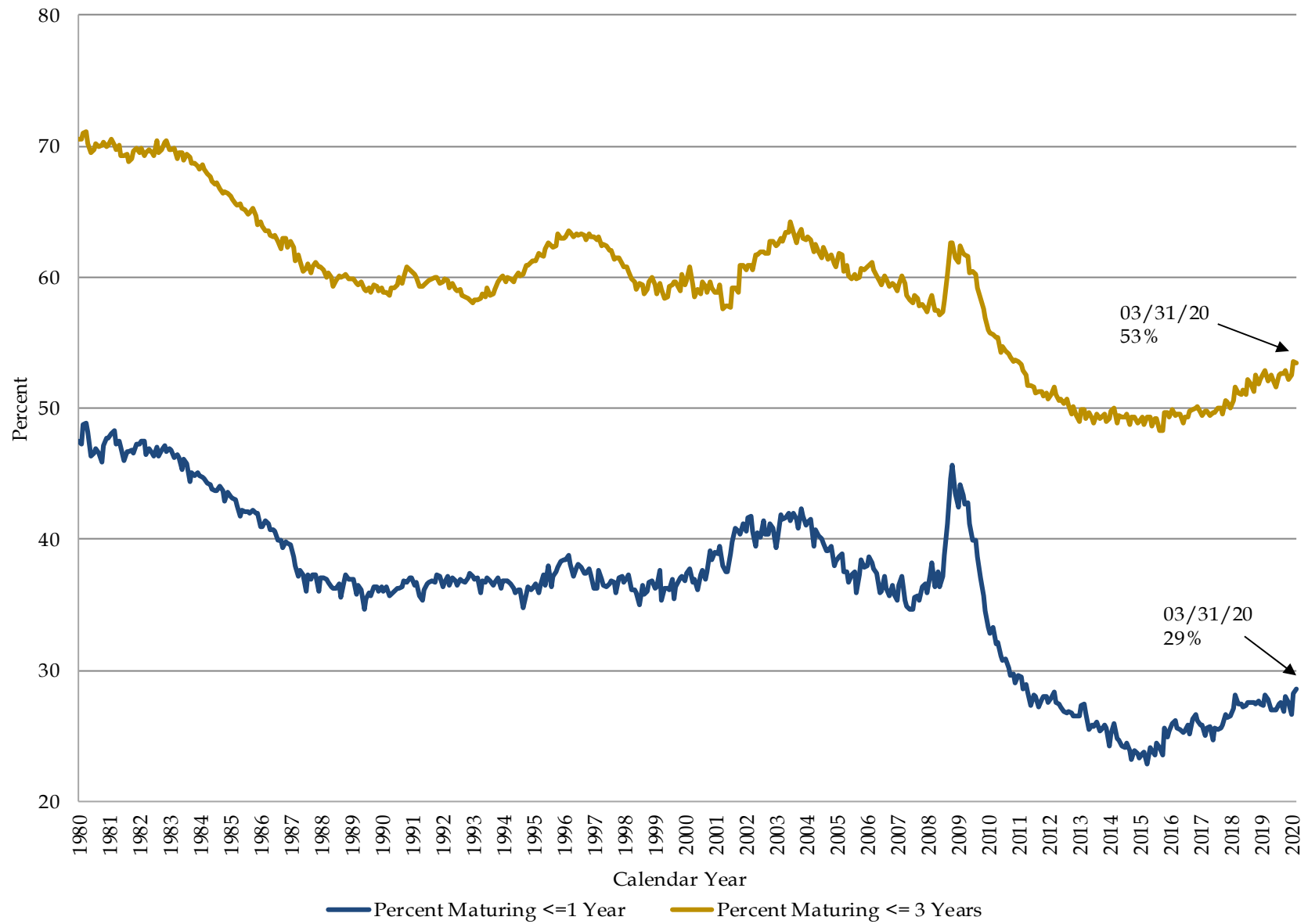




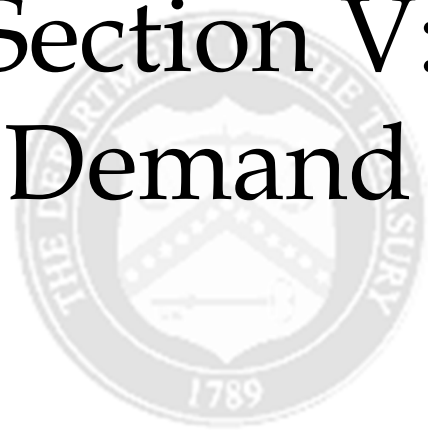
## Private Bills Holdings as a Percentage of Total Private Holdings



## Treasury Maturity Profile History



# Section V: Demand



## Summary Statistics for Fiscal Year 2020 Q2 Auctions

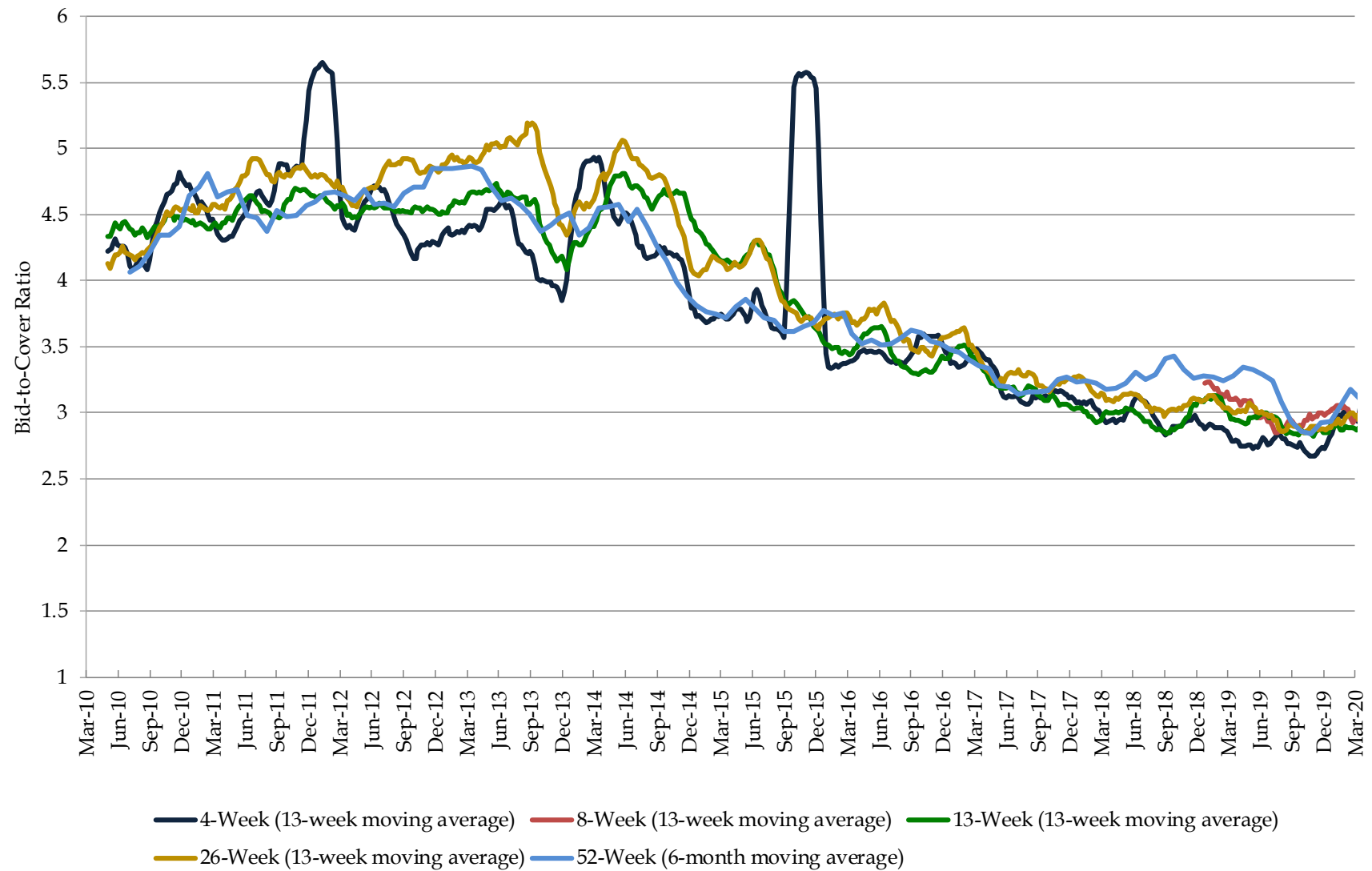
Security Type	Term	Stop Out Rate (%)*	Bid-to-Cover Ratio*	Competitive Awards (\$bn)	% Primary Dealer*	% Direct*	% Indirect*	Non-Competitive Awards (\$bn)	SOMA "Add-Ons" (\$bn)	10-Year Equivalent (\$bn)**
Bill	4-Week	1.105	3.1	572.9	49.9	4.6	45.5	27.1	25.1	5.2
Bill	8-Week	1.135	3.0	535.0	50.2	4.7	45.0	10.0	22.5	9.5
Bill	13-Week	1.079	2.8	557.7	48.2	6.6	45.2	18.3	18.7	16.2
Bill	26-Week	1.068	2.9	479.0	52.6	5.5	41.9	16.0	16.1	27.8
Bill	52-Week	1.007	3.2	76.4	58.8	2.8	38.3	1.6	2.1	8.7
Bill	CMB	0.472	2.9	254.9	46.7	2.9	50.5	0.1	0.0	3.6
Coupon	2-Year	1.008	2.5	119.3	37.0	12.9	50.2	0.7	15.6	29.3
Coupon	3-Year	1.174	2.4	113.8	39.3	12.8	47.9	0.2	18.2	43.0
Coupon	5-Year	1.044	2.4	122.9	30.0	12.1	57.9	0.1	15.9	74.0
Coupon	7-Year	1.166	2.5	96.0	25.7	13.1	61.1	0.0	12.4	79.8
Coupon	10-Year	1.454	2.5	75.0	27.3	13.4	59.3	0.0	12.8	89.2
Coupon	30-Year	1.916	2.4	51.0	19.9	15.6	64.5	0.0	9.0	148.2
TIPS	10-Year	0.333	2.3	25.9	17.4	14.0	68.6	0.1	3.1	31.4
TIPS	30-Year	0.261	2.4	8.0	14.8	11.5	73.7	0.0	0.0	25.0
FRN	2-Year	0.177	2.9	56.0	51.5	1.5	46.9	0.0	2.1	0.0

Total Bills	1.030	3.0	2,475.9	50.1	5.0	44.9	73.1	84.6	71.0
Total Coupons	1.213	2.5	577.9	31.3	13.1	55.6	1.1	83.9	463.5
Total TIPS	0.316	2.3	33.9	16.8	13.4	69.8	0.1	3.1	56.4
Total FRN	0.177	2.9	56.0	51.5	1.5	46.9	0.0	2.1	0.0

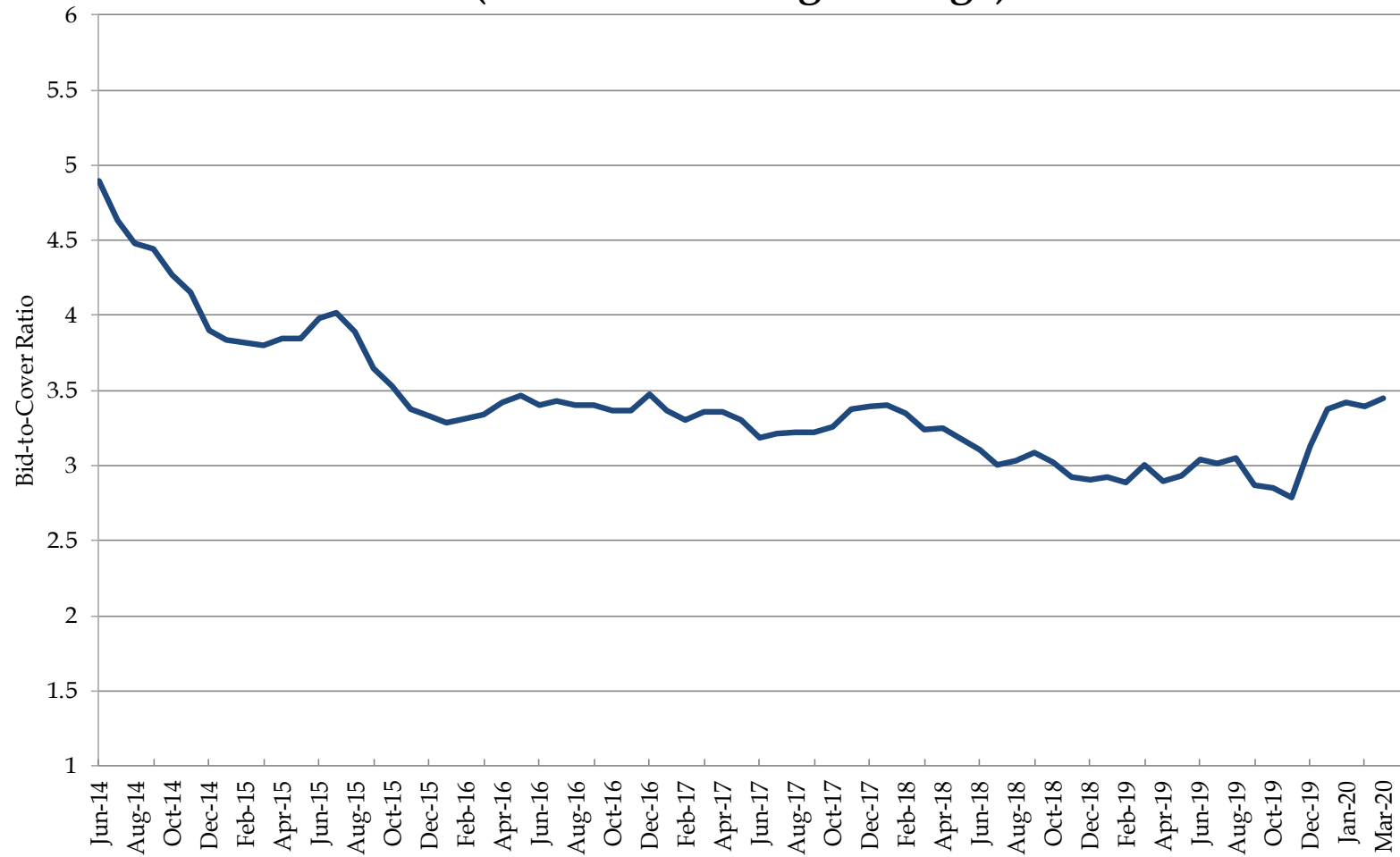
\*Weighted averages of Competitive Awards. FRNs are reported on discount margin basis.

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

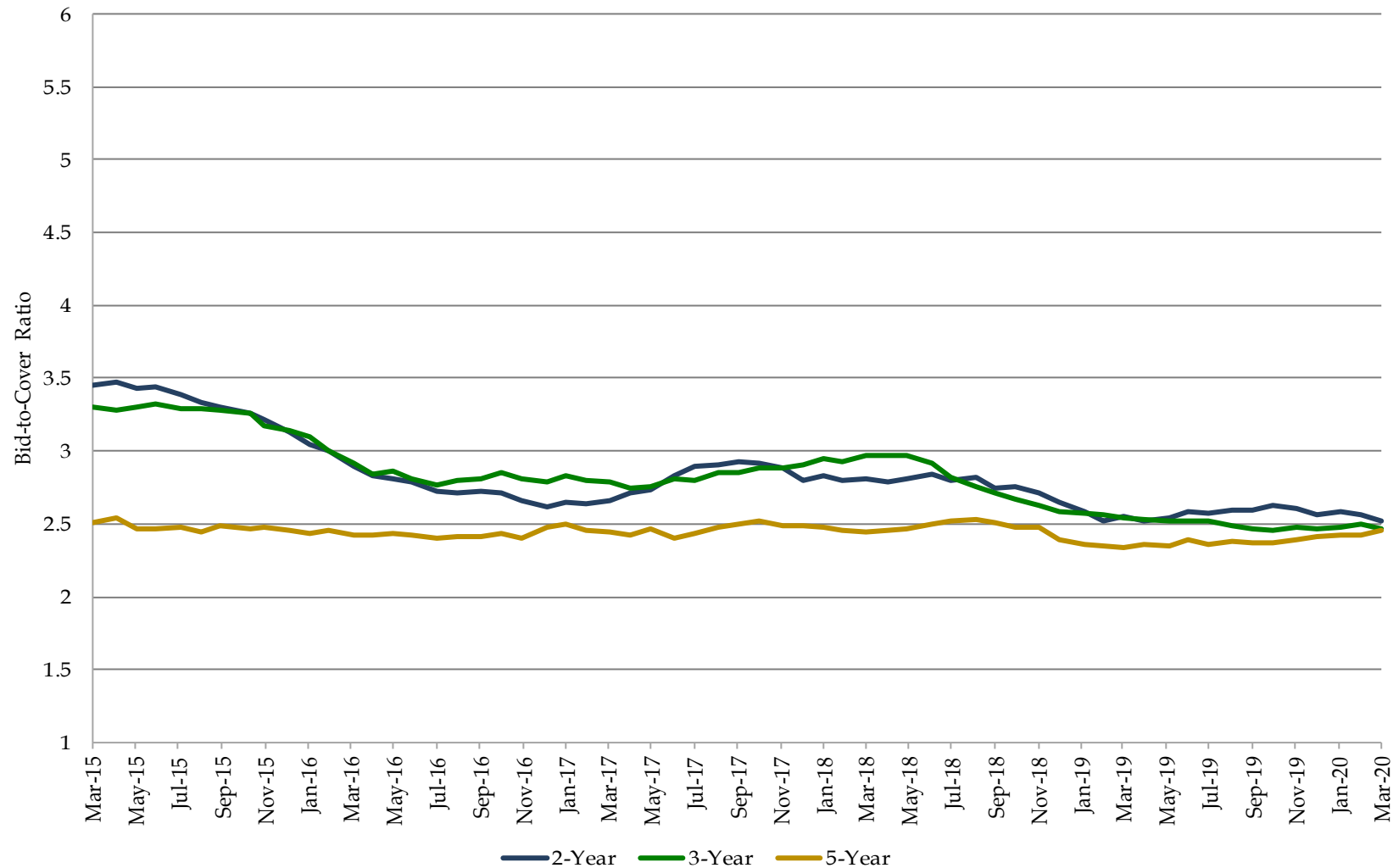
## Bid-to-Cover Ratios for Treasury Bills



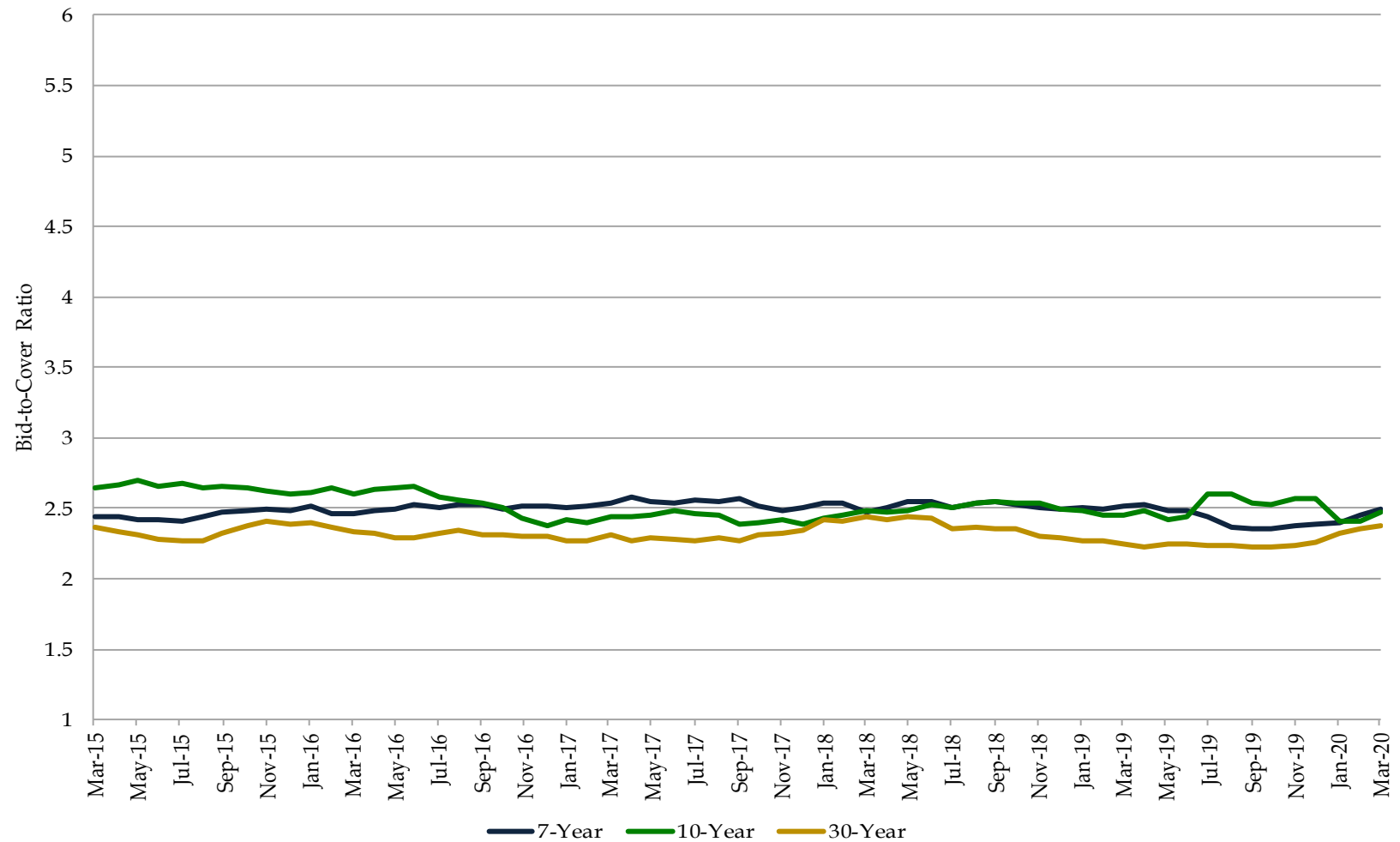
## Bid-to-Cover Ratios for FRNs (6-Month Moving Average)



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

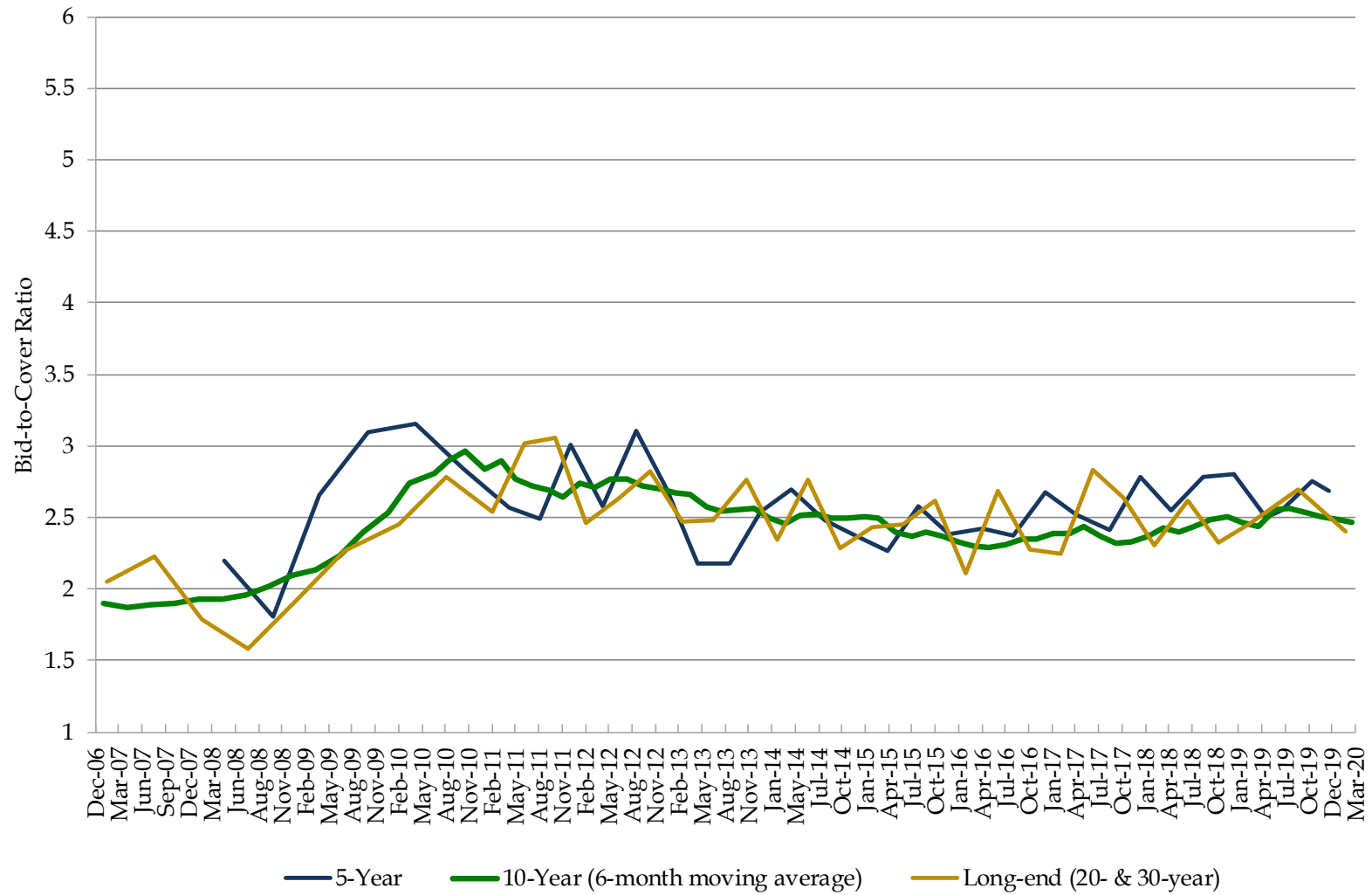


## Bid-to-Cover Ratios for 7-, 10-, and 30-Year Nominal Securities (6-Month Moving Average)

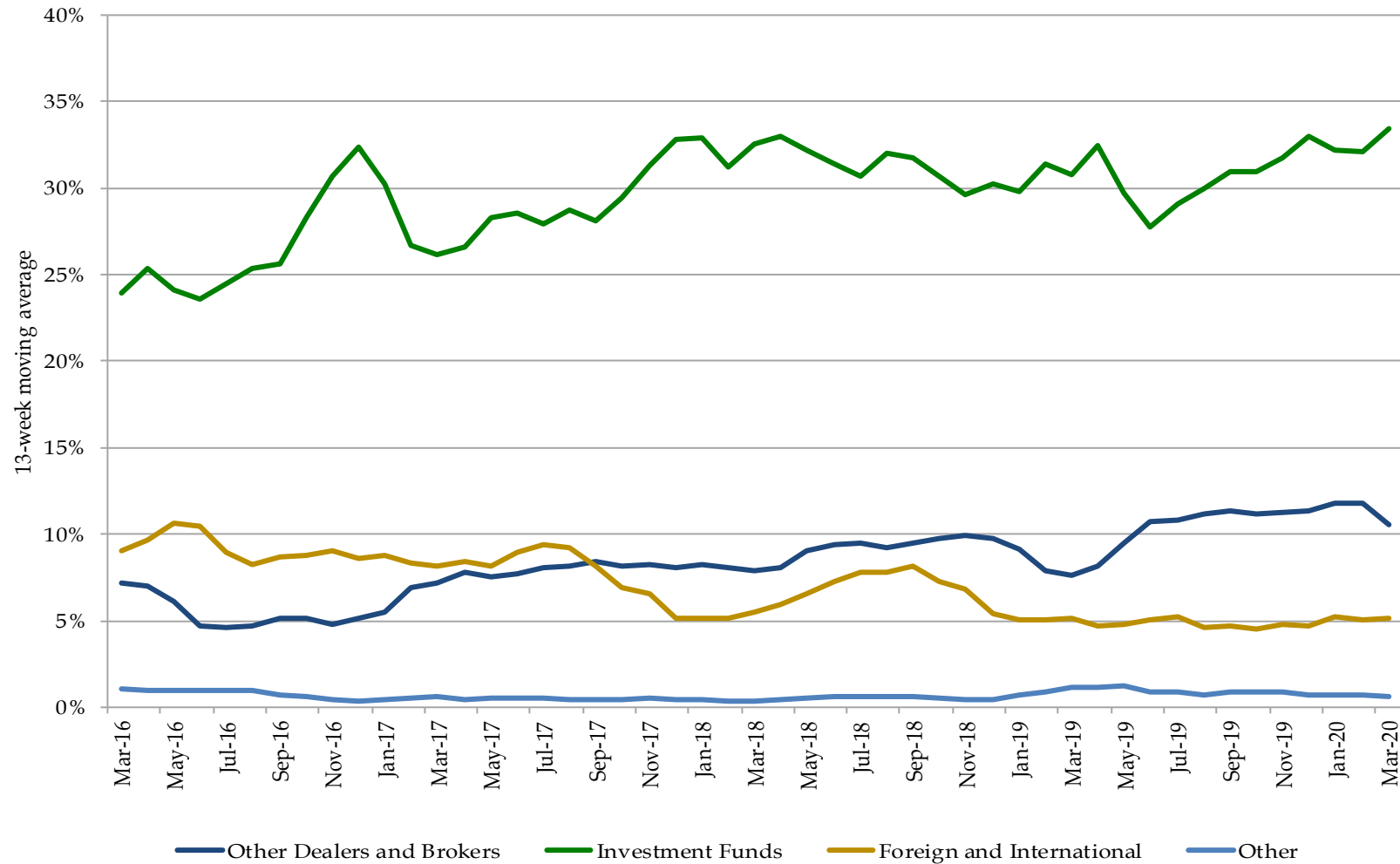




## Bid-to-Cover Ratios for TIPS

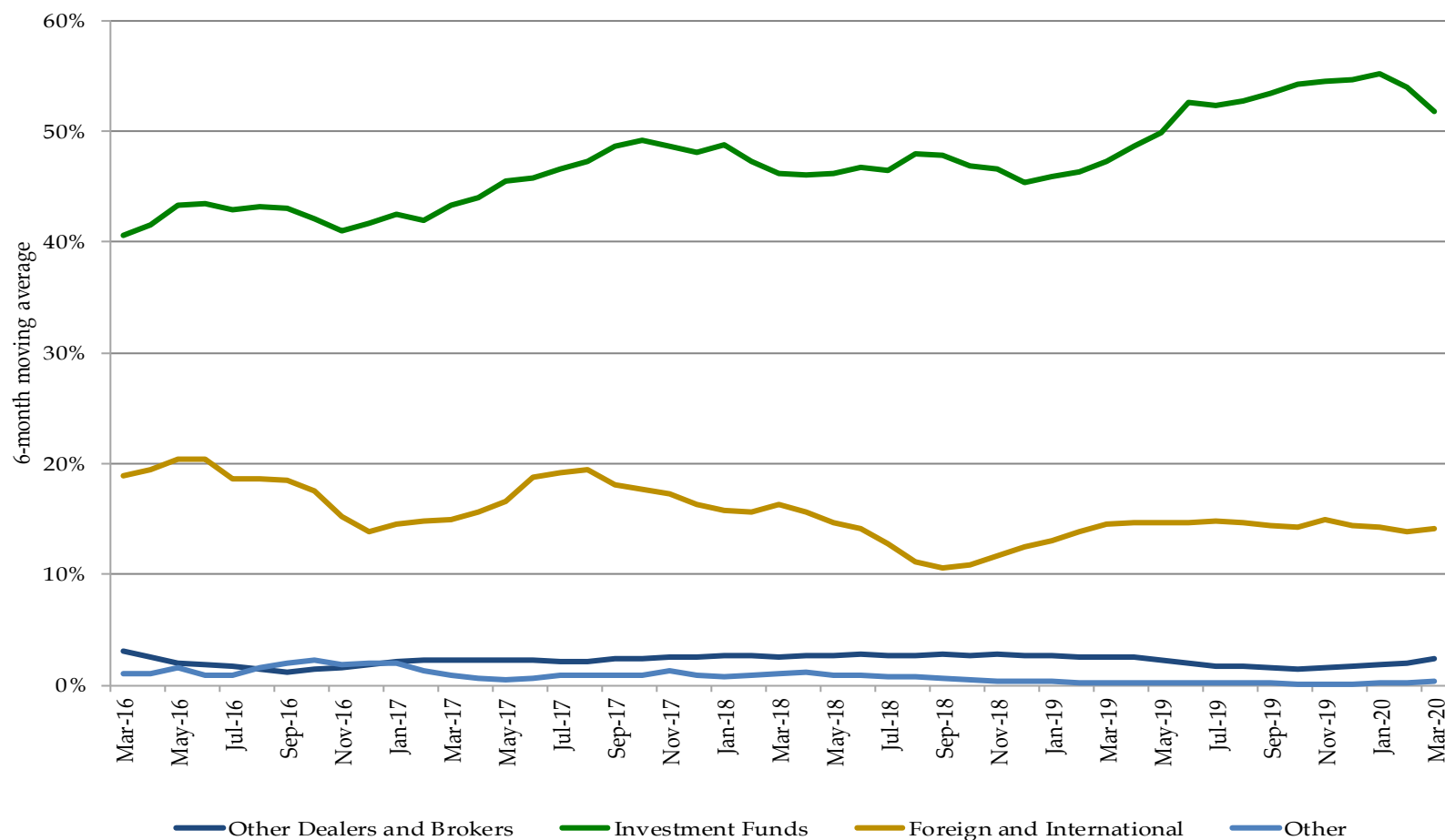


## Percent Awarded in Bill Auctions by Investor Class (13-Week Moving Average)



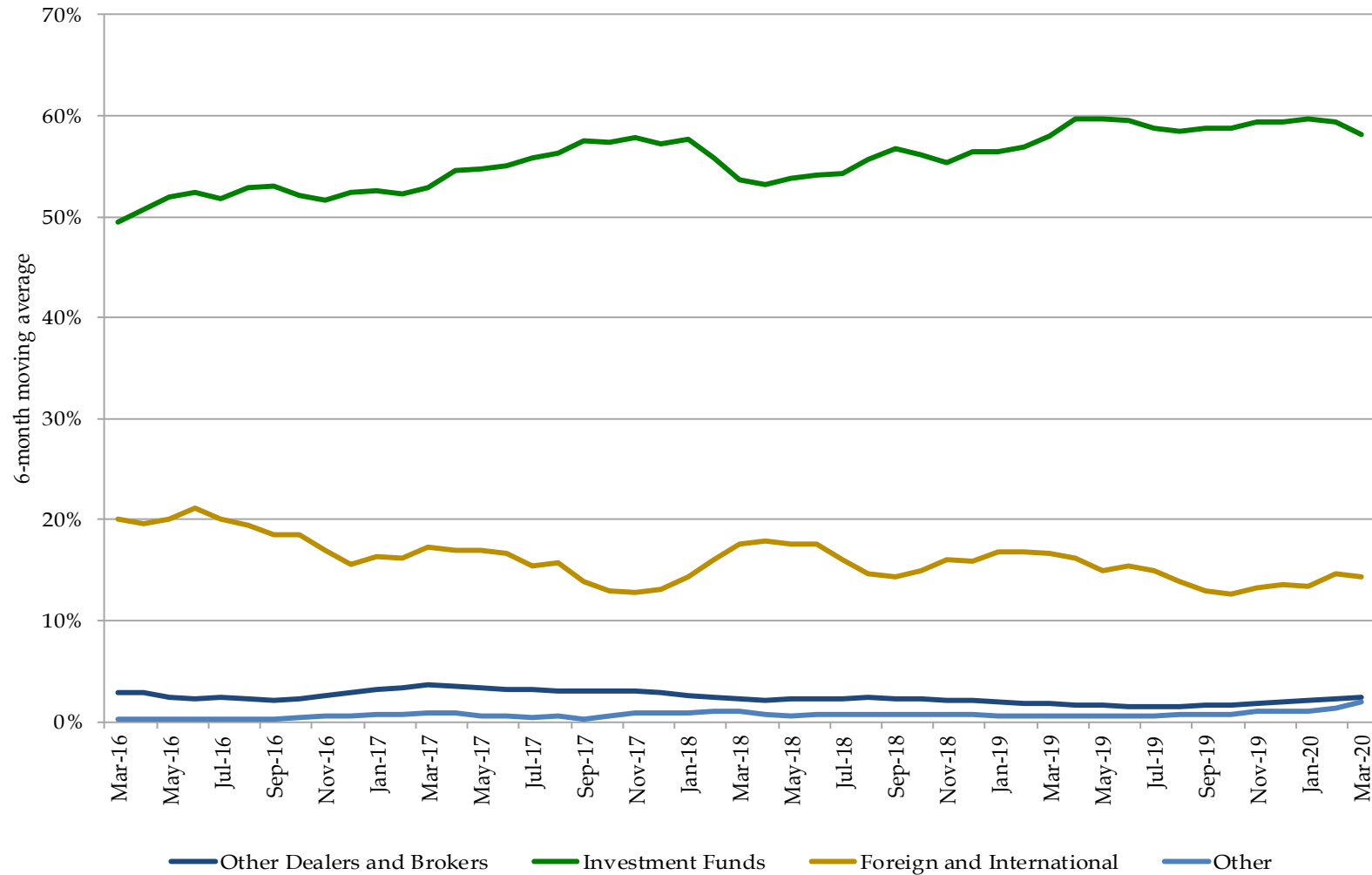
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



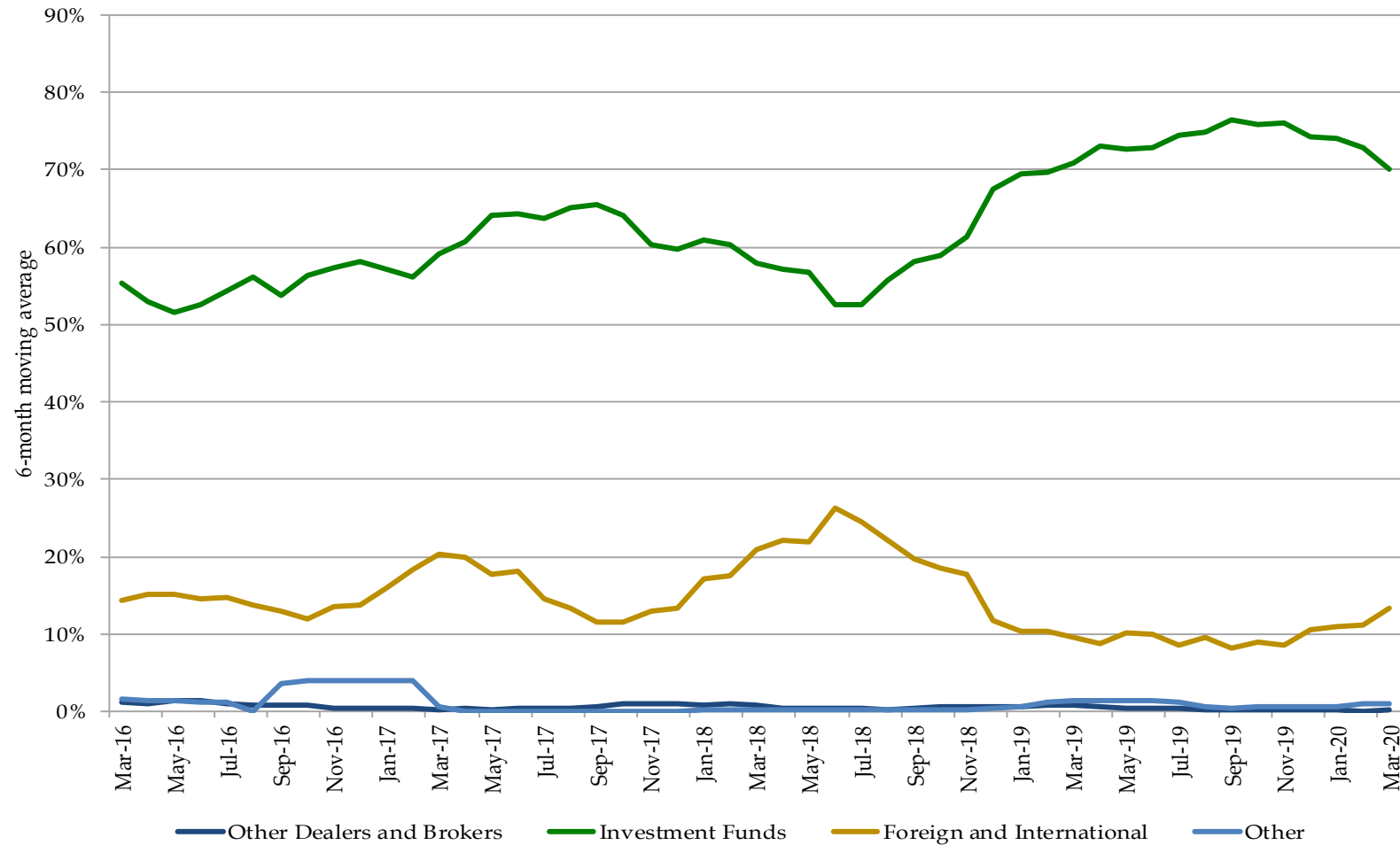
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



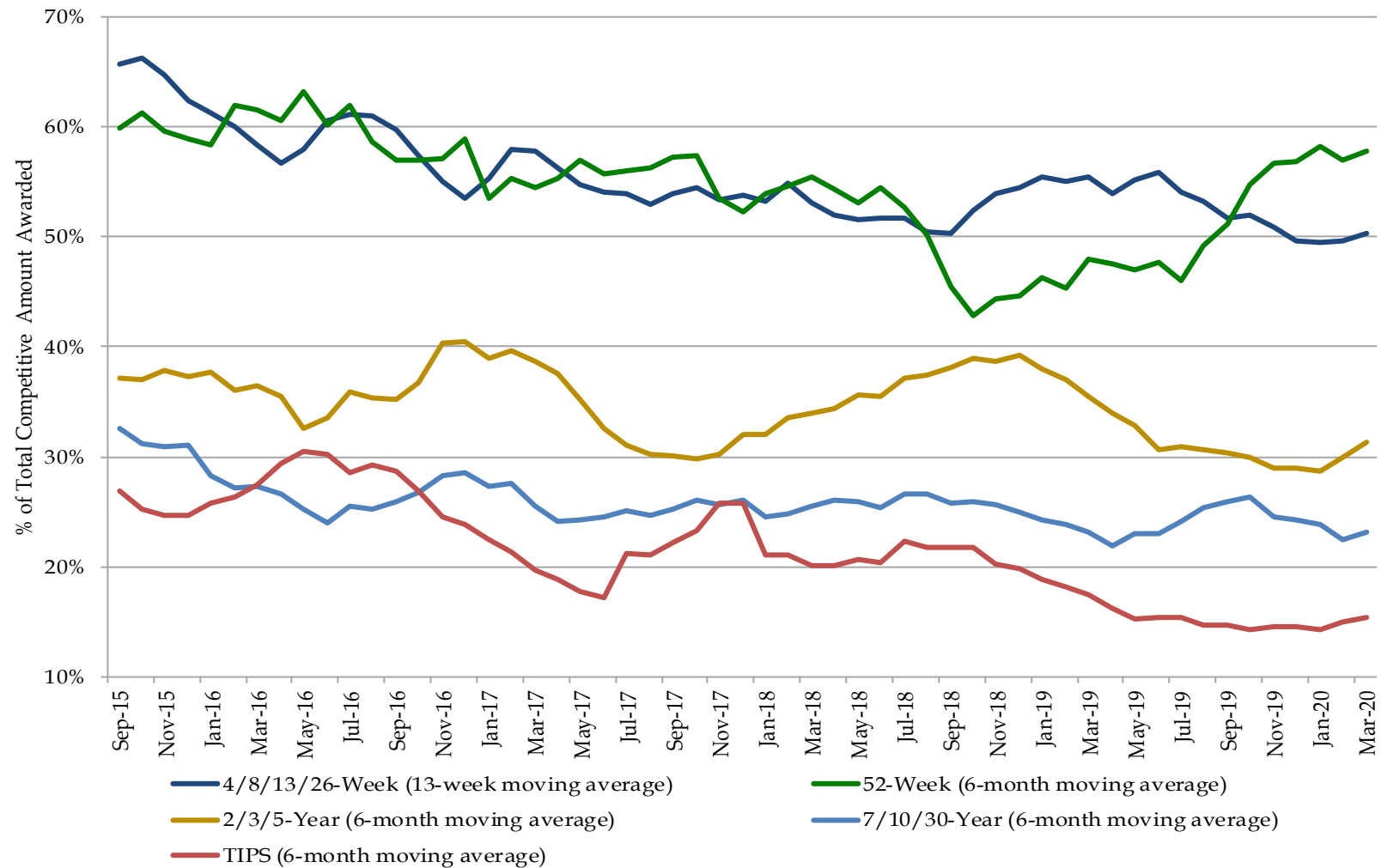
Excludes SOMA add-ons. The "Other" category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

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



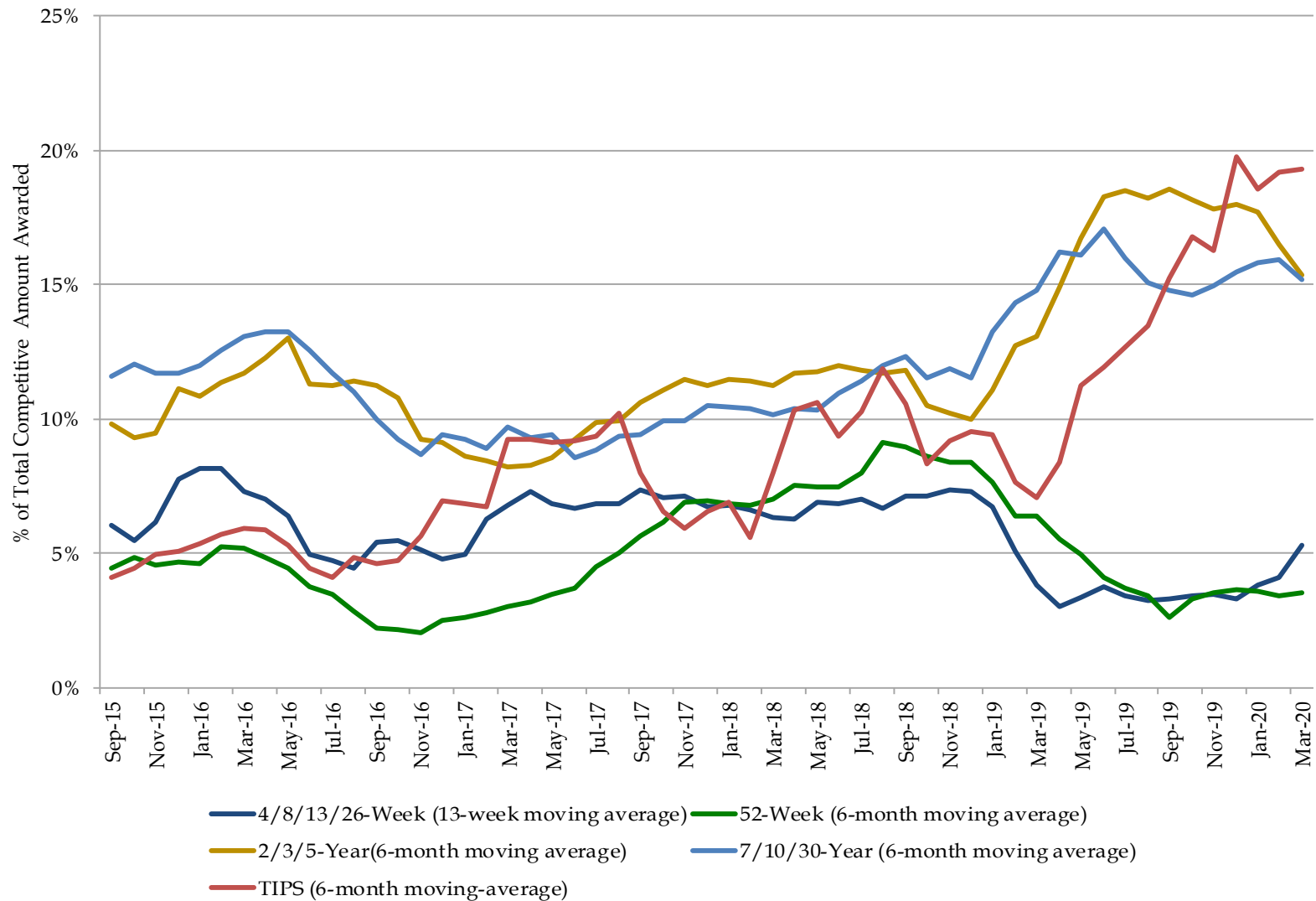
Excludes SOMA add-ons. The “Other” category includes categories that are each less than 5%, which include Depository Institutions, Individuals, Pension and Insurance.

## Primary Dealer Awards at Auction



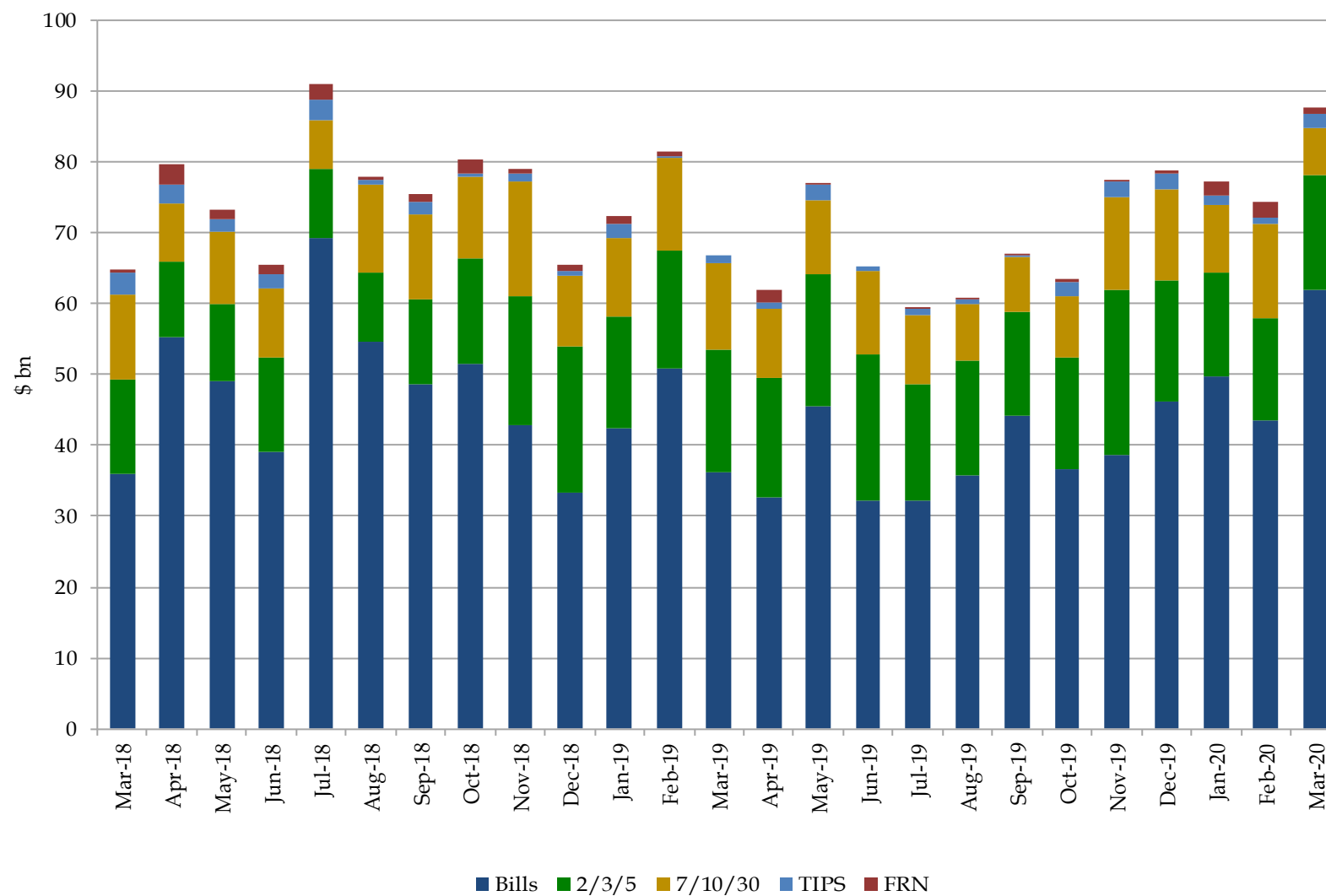
Competitive Amount Awarded excludes SOMA add-ons.

## Direct Bidder Awards at Auction



Competitive Amount Awarded excludes SOMA add-ons.

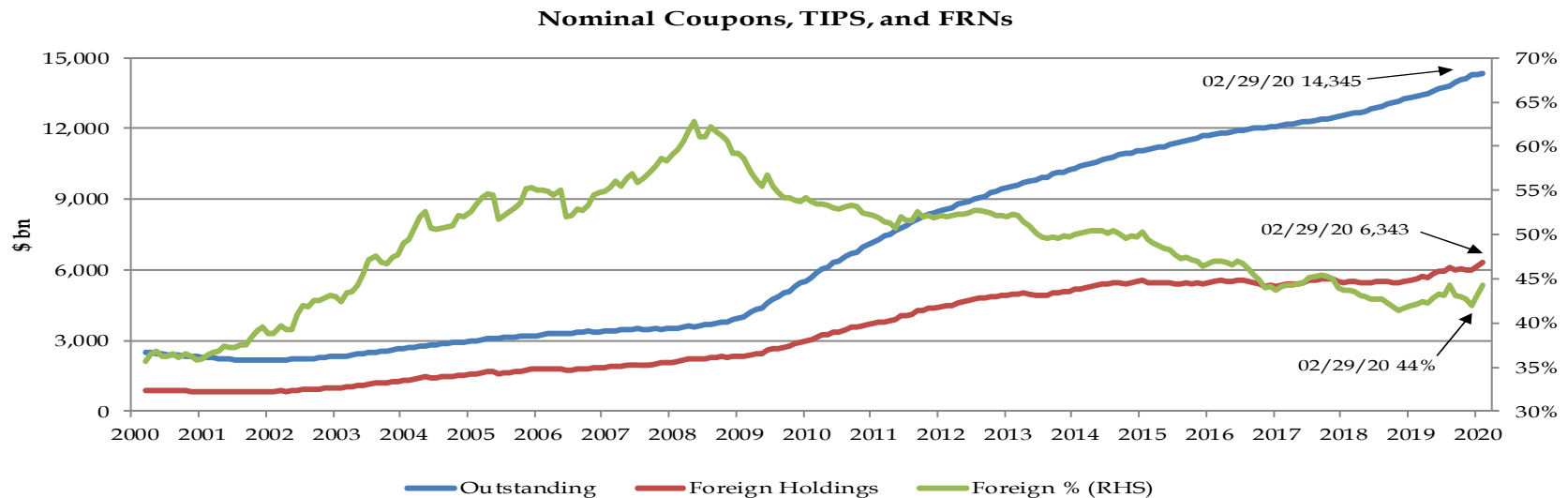
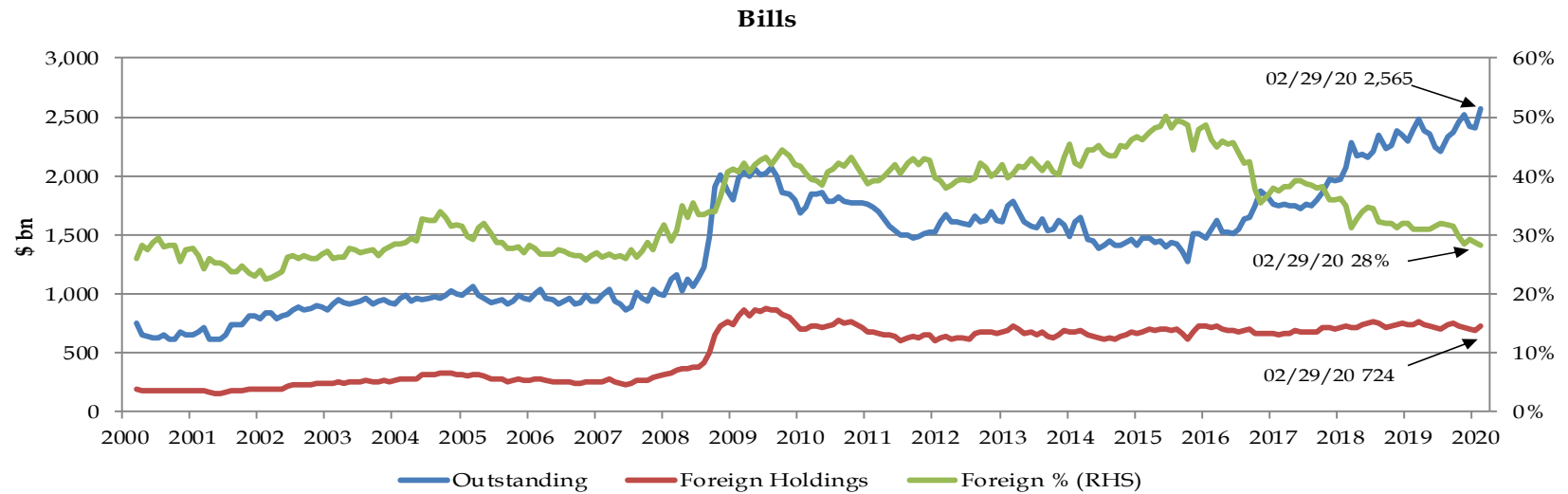
## Total Foreign Awards of Treasuries at Auction, \$ billions



Foreign includes both private sector and official institutions.



# Total Foreign Holdings



Source: Treasury International Capital (TIC) System.

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



# Appendix

**Projected Privately-Held Net Marketable Borrowing  
Assuming Private Coupon Issuance & Total Bills Outstanding  
Remain Constant as of 3/31/2020\***

<b>Fiscal Year</b>	<b>Bills</b>	<b>2/3/5</b>	<b>7/10/30</b>	<b>TIPS</b>	<b>FRN</b>	<b>Historical/Projected Net Borrowing Capacity</b>
2015	(53)	(282)	642	88	164	558
2016	289	(107)	515	58	41	795
2017	155	(66)	378	51	(0)	519
2018	438	197	493	45	23	1,196
2019	137	498	534	51	59	1,280
2020	280	384	489	45	37	1,236
2021	0	402	358	33	2	795
2022	0	157	418	26	2	602
2023	0	218	277	22	0	516
2024	0	131	279	34	0	444
2025	0	7	307	(24)	0	291
2026	0	0	295	(5)	0	290
2027	0	0	265	(3)	0	262
2028	0	0	234	(22)	0	212
2029	0	0	216	(26)	0	190
2030	0	0	203	1	0	204

Projections reflect only SOMA rollovers at auction of principal payments of Treasury securities. No adjustments are made for open-market outright purchases and subsequent rollovers.

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

Bills										
Issue	Settle Date	Stop Out Rate (%)*	Bid-to-Cover Ratio*	Competitive Awards (\$bn)	% Primary Dealer*	% Direct*	% Indirect*	Non-Competitive Awards (\$bn)	SOMA "Add Ons" (\$bn)	10-Year Equivalent (\$bn)**
4-Week	1/7/2020	1.500	3.31	33.0	36.1	2.1	61.8	2.0	0.1	0.3
4-Week	1/14/2020	1.490	3.38	32.7	37.5	2.8	59.8	2.3	2.2	0.3
4-Week	1/21/2020	1.505	3.21	33.1	43.3	2.4	54.3	1.9	1.6	0.3
4-Week	1/28/2020	1.500	3.10	37.9	37.7	2.0	60.3	2.1	1.5	0.4
4-Week	2/4/2020	1.545	2.69	42.9	63.0	5.6	31.4	2.1	0.6	0.4
4-Week	2/11/2020	1.540	3.04	48.3	44.2	1.8	54.0	1.7	3.6	0.5
4-Week	2/18/2020	1.560	2.75	48.1	55.3	2.9	41.7	1.9	2.3	0.4
4-Week	2/25/2020	1.575	2.69	47.9	54.4	2.9	42.7	2.1	2.4	0.4
4-Week	3/3/2020	1.530	2.59	47.4	63.6	7.2	29.2	2.6	0.5	0.4
4-Week	3/10/2020	0.925	2.66	47.4	63.8	6.2	30.0	2.6	3.2	0.4
4-Week	3/17/2020	0.395	2.51	48.6	54.0	4.6	41.3	1.4	3.1	0.4
4-Week	3/24/2020	0.030	2.91	47.7	41.8	11.9	46.4	2.3	2.7	0.4
4-Week	3/31/2020	0.000	4.74	57.8	44.3	4.5	51.3	2.2	1.4	0.5
8-Week	1/7/2020	1.515	3.15	33.8	47.8	2.4	49.8	1.2	0.1	0.6
8-Week	1/14/2020	1.515	2.99	34.1	61.8	3.2	35.0	0.9	2.2	0.6
8-Week	1/21/2020	1.530	3.20	34.4	49.0	3.4	47.6	0.6	1.6	0.6
8-Week	1/28/2020	1.540	2.82	39.5	56.1	4.7	39.1	0.5	1.5	0.7
8-Week	2/4/2020	1.550	3.01	43.7	49.3	2.8	47.8	1.3	0.6	0.8
8-Week	2/11/2020	1.550	3.06	44.5	54.4	4.1	41.5	0.5	3.2	0.8
8-Week	2/18/2020	1.565	2.93	44.5	51.4	3.4	45.2	0.5	2.0	0.8
8-Week	2/25/2020	1.570	2.77	44.5	47.6	2.8	49.6	0.5	2.1	0.8
8-Week	3/3/2020	1.500	2.71	43.7	58.0	5.3	36.8	1.3	0.5	0.7
8-Week	3/10/2020	0.820	2.73	44.8	58.2	4.0	37.8	0.2	2.8	0.8
8-Week	3/17/2020	0.290	2.97	39.8	34.4	2.3	63.3	0.2	2.5	0.7
8-Week	3/24/2020	0.030	2.99	39.0	38.5	16.6	44.9	1.0	2.2	0.7
8-Week	3/31/2020	0.000	3.77	48.8	46.4	6.2	47.3	1.2	1.2	0.9

\*Weighted averages of competitive awards.

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

Bills										
Issue	Settle Date	Stop Out Rate (%)*	Bid-to-Cover Ratio*	Competitive Awards (\$bn)	% Primary Dealer*	% Direct*	% Indirect*	Non-Competitive Awards (\$bn)	SOMA "Add Ons" (\$bn)	10-Year Equivalent (\$bn)**
13-Week	1/9/2020	1.520	2.94	40.4	48.0	4.4	47.6	1.6	0.6	1.2
13-Week	1/16/2020	1.530	2.87	40.6	51.9	4.9	43.2	1.4	3.0	1.2
13-Week	1/23/2020	1.530	3.00	40.8	46.6	11.8	41.7	1.2	0.8	1.2
13-Week	1/30/2020	1.530	2.66	43.0	58.0	6.1	35.9	2.0	0.6	1.3
13-Week	2/6/2020	1.550	2.57	43.7	57.8	5.8	36.4	1.3	0.7	1.3
13-Week	2/13/2020	1.550	3.01	43.5	52.8	3.9	43.3	1.5	1.3	1.3
13-Week	2/20/2020	1.545	2.91	43.6	51.9	4.5	43.6	1.4	0.7	1.2
13-Week	2/27/2020	1.505	2.88	43.0	47.2	4.7	48.1	2.0	1.0	1.2
13-Week	3/5/2020	1.155	3.02	44.0	35.1	6.2	58.6	1.0	2.7	1.3
13-Week	3/12/2020	0.390	2.74	41.2	42.1	14.5	43.4	0.8	1.8	1.2
13-Week	3/19/2020	0.290	2.58	40.4	51.0	3.2	45.8	1.6	1.4	1.2
13-Week	3/26/2020	0.000	3.11	44.0	20.7	12.9	66.4	1.0	2.0	1.3
13-Week	4/2/2020	0.085	2.52	49.5	61.9	4.1	34.1	1.5	2.2	1.4
26-Week	1/9/2020	1.520	3.09	34.6	42.3	4.4	53.2	1.4	0.5	2.0
26-Week	1/16/2020	1.530	2.98	34.6	52.9	5.6	41.5	1.4	2.5	2.1
26-Week	1/23/2020	1.520	3.20	34.9	44.1	11.2	44.7	1.1	0.7	2.0
26-Week	1/30/2020	1.535	2.76	37.2	70.3	5.8	24.0	1.8	0.5	2.2
26-Week	2/6/2020	1.520	2.77	37.7	60.3	6.6	33.0	1.3	0.6	2.2
26-Week	2/13/2020	1.510	3.56	37.6	39.3	1.6	59.1	1.4	1.1	2.2
26-Week	2/20/2020	1.510	3.09	37.8	45.9	4.2	49.9	1.2	0.6	2.1
26-Week	2/27/2020	1.440	3.02	38.0	48.5	5.6	45.9	1.0	0.8	2.1
26-Week	3/5/2020	1.010	3.11	38.2	43.3	3.2	53.5	0.8	2.3	2.2
26-Week	3/12/2020	0.400	2.60	35.4	72.5	5.9	21.6	0.6	1.5	2.0
26-Week	3/19/2020	0.300	2.78	34.8	47.9	2.9	49.2	1.2	1.2	2.0
26-Week	3/26/2020	0.080	2.50	37.5	66.2	12.8	21.0	1.5	1.7	2.2
26-Week	4/2/2020	0.100	2.72	40.7	50.4	2.2	47.4	1.3	1.8	2.4
52-Week	1/30/2020	1.490	3.36	25.3	56.4	3.0	40.5	0.7	0.4	2.9
52-Week	2/27/2020	1.270	3.56	25.6	55.2	2.2	42.6	0.4	0.6	2.8
52-Week	3/26/2020	0.260	2.53	25.4	64.9	3.3	31.8	0.6	1.2	2.9
CMB	2/13/2020	1.555	3.45	30.0	62.6	2.3	35.0	0.0	0.0	0.5
CMB	2/20/2020	1.585	2.71	40.0	63.0	4.6	32.4	0.0	0.0	0.2
CMB	3/24/2020	0.050	3.03	20.0	72.1	16.5	11.4	0.0	0.0	0.5
CMB	3/31/2020	0.025	2.88	60.0	38.5	0.9	60.6	0.0	0.0	0.7
CMB	4/1/2020	0.070	2.87	45.0	33.0	1.1	65.9	0.0	0.0	0.9
CMB	4/2/2020	0.080	2.79	60.0	37.8	0.8	61.5	0.0	0.0	0.7

\*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	1/31/2020	1.440	2.65	39.8	30.2	20.7	49.1	0.2	4.1	9.7
2-Year	3/2/2020	1.188	2.45	39.7	44.5	9.3	46.2	0.3	6.0	9.8
2-Year	3/31/2020	0.398	2.36	39.8	36.2	8.6	55.2	0.2	5.4	9.8
3-Year	1/15/2020	1.567	2.45	38.0	35.8	16.7	47.5	0.0	1.2	12.7
3-Year	2/18/2020	1.394	2.56	37.8	38.0	18.1	43.9	0.2	16.9	18.0
3-Year	3/16/2020	0.563	2.20	38.0	44.0	3.7	52.3	0.0	0.0	12.2
5-Year	1/31/2020	1.448	2.33	41.0	26.1	13.9	60.0	0.0	4.2	24.3
5-Year	3/2/2020	1.150	2.46	41.0	28.7	9.8	61.5	0.0	6.2	24.7
5-Year	3/31/2020	0.535	2.53	41.0	35.3	12.6	52.1	0.0	5.5	24.9
7-Year	1/31/2020	1.570	2.37	32.0	24.7	17.2	58.0	0.0	3.3	26.1
7-Year	3/2/2020	1.247	2.49	32.0	23.9	13.1	63.0	0.0	4.8	26.7
7-Year	3/31/2020	0.680	2.76	32.0	28.6	9.1	62.4	0.0	4.3	27.0
10-Year	1/15/2020	1.869	2.45	24.0	28.7	16.1	55.2	0.0	0.8	24.7
10-Year	2/18/2020	1.622	2.58	27.0	23.9	14.8	61.3	0.0	12.0	40.5
10-Year	3/16/2020	0.849	2.36	24.0	29.8	9.2	61.0	0.0	0.0	24.0
30-Year	1/15/2020	2.341	2.54	16.0	19.1	17.9	63.0	0.0	0.5	39.1
30-Year	2/18/2020	2.061	2.43	19.0	19.1	19.4	61.5	0.0	8.4	69.1
30-Year	3/16/2020	1.320	2.36	16.0	21.6	8.9	69.5	0.0	0.0	40.1
2-Year FRN	1/31/2020	0.154	3.23	20.0	48.6	1.7	49.6	0.0	2.1	0.0
2-Year FRN	2/28/2020	0.160	2.49	18.0	70.1	1.3	28.6	0.0	0.0	0.0
2-Year FRN	3/27/2020	0.220	2.91	18.0	36.2	1.5	62.3	0.0	0.0	0.0

TIPS										
Issue	Settle Date	Stop Out Rate (%)*	Bid-to-Cover Ratio*	Competitive Awards (\$bn)	% Primary Dealer*	% Direct*	% Indirect*	Non-Competitive Awards (\$bn)	SOMA "Add Ons" (\$bn)	10-Year Equivalent (\$bn)**
10-Year TIPS	1/31/2020	0.036	2.33	14.0	15.4	11.4	73.2	0.0	1.4	17.1
10-Year TIPS	3/31/2020	0.680	2.32	12.0	19.7	17.0	63.3	0.0	1.6	14.4
30-Year TIPS	2/28/2020	0.261	2.40	8.0	14.8	11.5	73.7	0.0	0.0	25.0

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

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

# TBAC Presentation to Treasury

## TBAC Charge

*Recent events have suddenly and dramatically affected financial markets. Please comment on the evolution of liquidity conditions, both in Treasury market and broader financial markets. What are the primary factors currently driving interest rates, the shape of the yield curve, and relative demand for different maturities? Are these factors structural or temporary? How has the policy response affected liquidity conditions to date, and what other policy measures should be considered?*



## Executive summary

- Covid-19 brought about a “perfect storm” for financial markets. As the virus spread around the world in February and March, and economic activity began to fall, a large and urgent precautionary cash raise ensued, accompanied by aggressive deleveraging and risk reduction among investor portfolios.
- This resulted in both very high safe haven demand for Treasury bills and substantial liquidity demand evident in the large volume of selling of off-the-run nominal Treasury securities, Treasury Inflation-Protected Securities (TIPS), and Agency Mortgage-Backed Securities (MBS). The acute demand for dealer balance sheet capacity, when those balance sheets already maintained high levels of Treasury debt, also contributed to deteriorating market functioning across a range of securities. Altogether, these forces temporarily impaired the market for Treasury debt, historically the deepest, most liquid market in the world.
- The broad policy response – monetary, fiscal, and regulatory - has been substantial and has generally improved market functioning. In addition, the policy response has sought to cushion the economic blow and support eventual recovery.
- The challenge ahead for the Treasury securities market is to facilitate the large and rapidly rising deficit financing needs associated with the fiscal policy response to the virus-related economic disruption, and to do so without a decline in market functioning nor unduly high interest rates for Treasury debt. We review the historical sources of demand for US Treasury debt, using the 2008 to 2010 increase in issuance as an example for understanding the potential relative demand for Treasury debt issuance in the coming months.

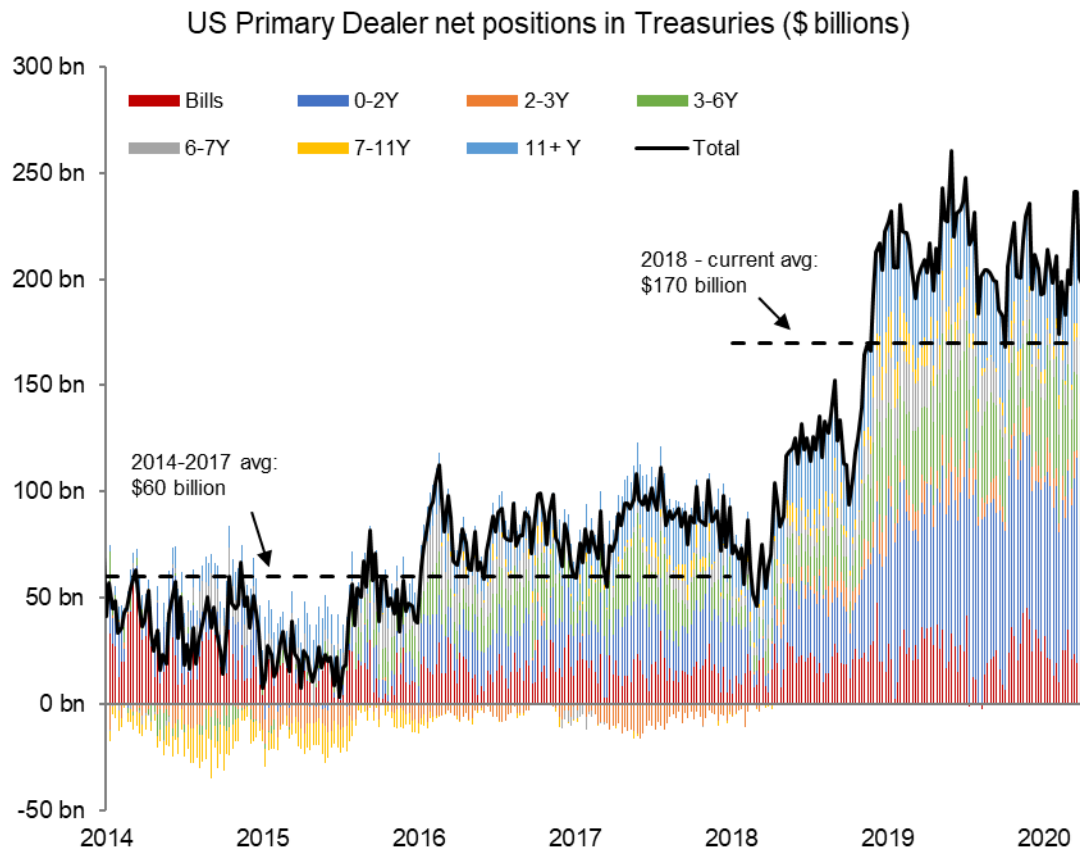


# The evolution of liquidity conditions in US Treasury and broader financial markets

# US Primary Dealer holdings of Treasury securities

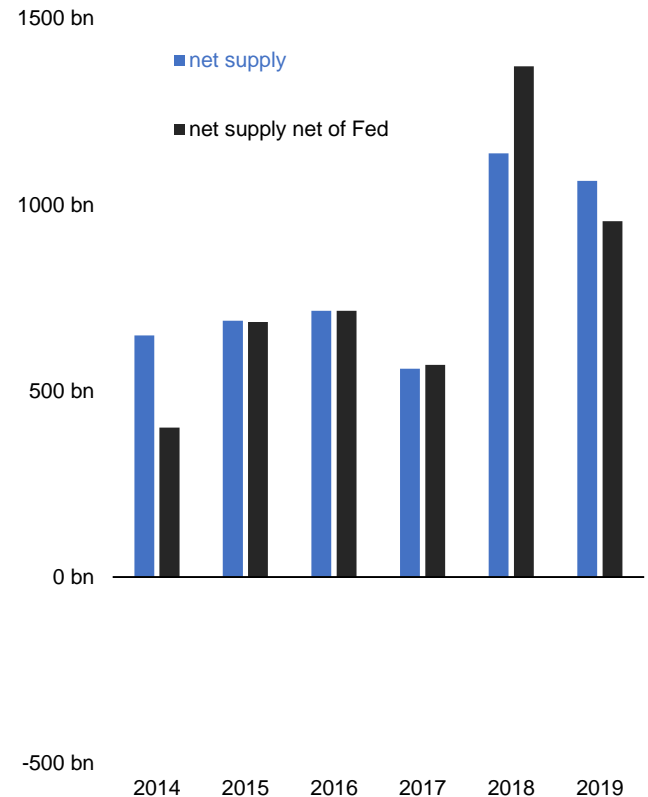
- Average weekly Primary Dealer holdings increased significantly over the past two years and remained relatively elevated in early 2020. A variety of factors contributed to the rise in holdings including passage of the 2017 Tax Cuts and Jobs Act, the 2018 supplemental budget agreement, and the subsequent increase in net Treasury supply as a result of the Fed's redemptions in 2018. Changes in relative demand among investors may have also contributed to rising holdings, as well as Primary Dealer willingness to facilitate client demand for leverage.

US Primary Dealer holdings of Treasuries



Source: Federal Reserve Bank of New York; data as of 04/23/2020

Treasury net supply net of Fed's holdings

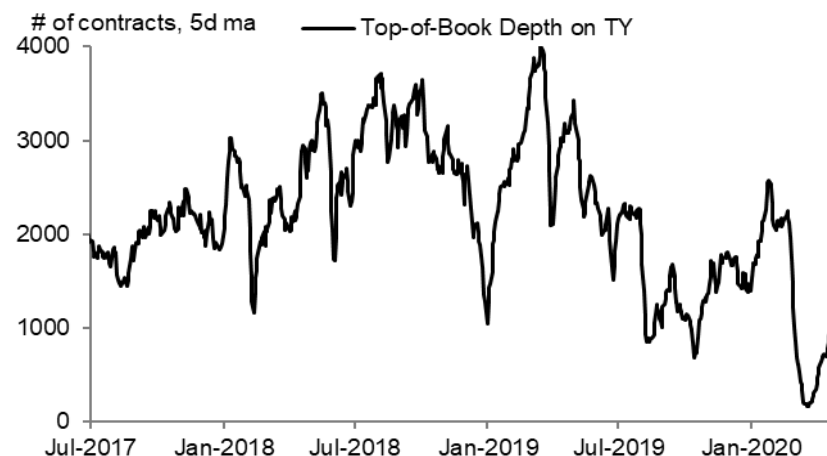


Source: Haver; Fed; data as of Dec 2019

# Market functioning has periodically come under pressure since 2018

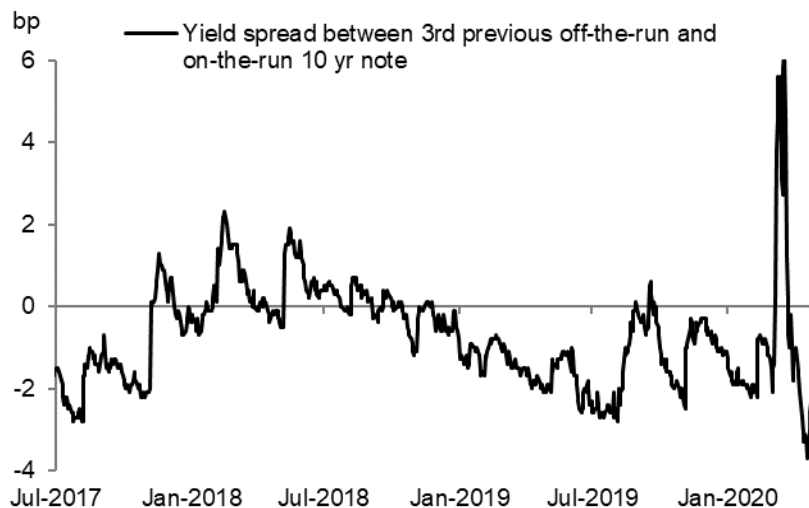
- The last two years have been punctuated by periodic episodes of impaired market functioning attributable to some related and some unrelated factors.
- Treasury futures market depth declined by 50% or more on several occasions over this period, partially influenced by Proprietary Trading Firms' (PTF) response to rising volatility.
- Spreads between on-the-run and off-the-run Treasury securities have abruptly widened several times and quarter-end funding pressures were evident with increased frequency through 2019, both likely related to dealer balance sheet capacity.
- February through April 2020 represented a severe episode of impaired market functioning with extreme observations of these factors and others such as bid-ask spread for Treasury debt.

## Market depth saw several episodes of decline



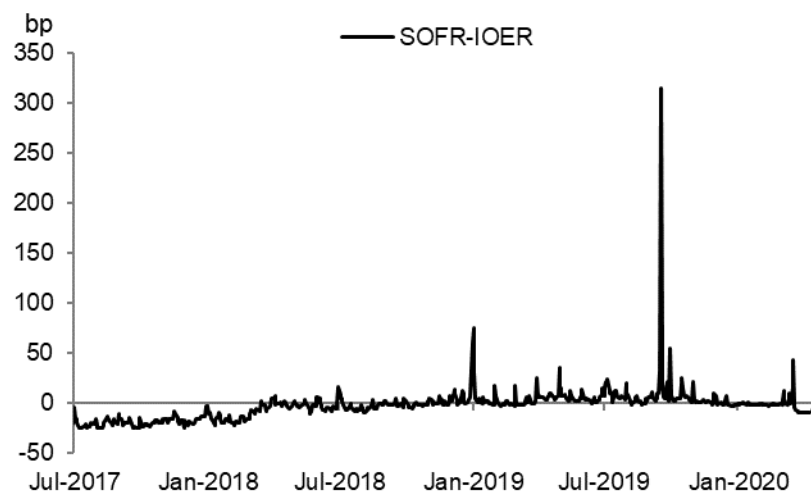
Note: Measures the average of the amount bid and the amount offered in the top of book (best bid/offer) for the TY futures contract. Source: Goldman Sachs Group Inc, Goldman Sachs Global Investment Research; data as of 04/28/2020.

## Spread between on-the-run and off-the-run widened



Source: JPMorgan Dataquery; data as of 04/27/2020

## Spread between SOFR and IOER spiked

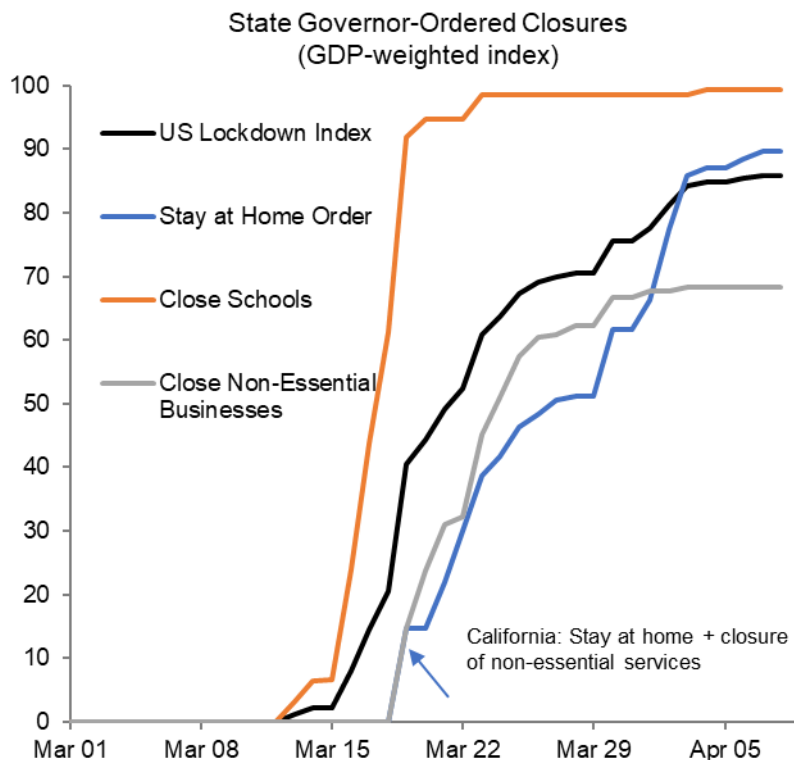


Source: New York Fed and Haver Analytics; data as of 04/27/2020

# Covid-19 represented a “perfect storm” for financial markets

- Early 2020 market conditions were robust with the Fed's Treasury bill purchases stirring debate about reserve expansion, a healthy outlook for global growth, and broad financial asset prices appreciating in a low volatility environment.
- On January 23<sup>rd</sup>, the city of Wuhan, China was locked down, restricting travel. On the weekend of February 23<sup>rd</sup>, the outbreak in Italy demonstrated how rapidly the virus was spreading to other continents.
- As the Covid-19 outbreak spread across the United States, more states declared shelter-in-place orders, creating significant disruption to the everyday lives of millions.

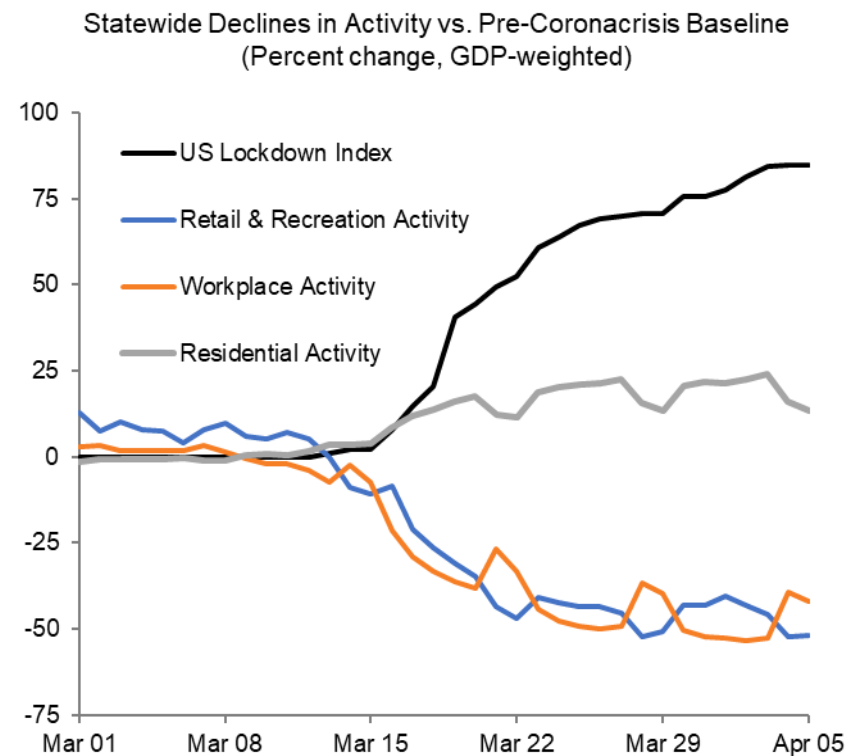
## Most states are on lockdown



Source: National Governors Association, University of Washington IMHE, and Goldman Sachs Global Investment Research. Data as of 04/15/2020.

Note: It is a measure of the GDP-weighted share of the country that has shut schools, closed non-essential businesses, and issued stay-at-home orders

## Many everyday activities have been interrupted

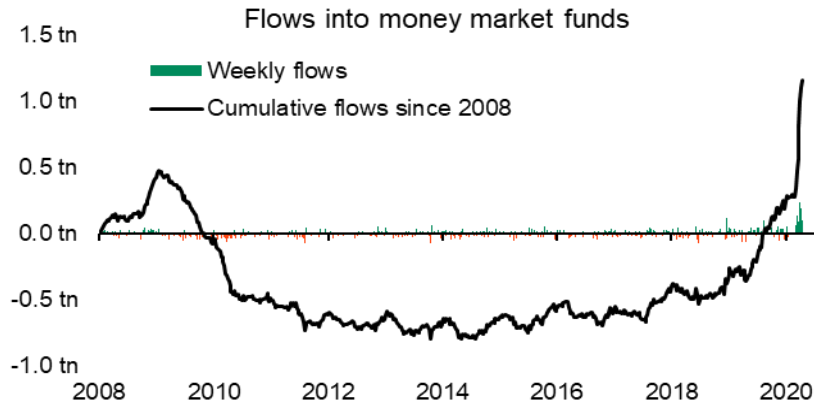


Source: Goldman Sachs Global Investment Research, National Governors Association, University of Washington IMHE, and Google. Data as of 04/15/2020

# The introduction of shelter-in-place policies motivated a large precautionary cash build

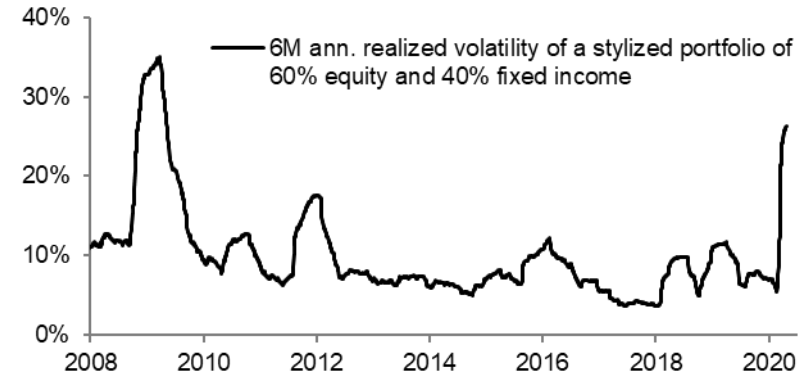
- Investors, businesses, and households raised cash amid substantial uncertainty as shelter-in-place policies were introduced.
- Rising financial market volatility led to aggressive (voluntary and involuntary) deleveraging by investors as volatility-based risk measures sharply increased. Margin requirements and repo lending conditions tightened significantly.
- Demand for overseas dollar funding rose substantially.

## Flows into money market funds surged



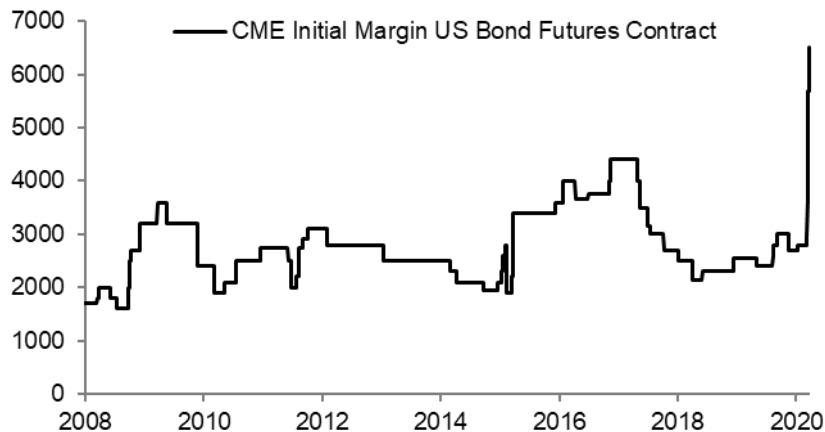
Source: EPFR; data as of 04/15/2020

## Volatility spiked in balanced portfolios



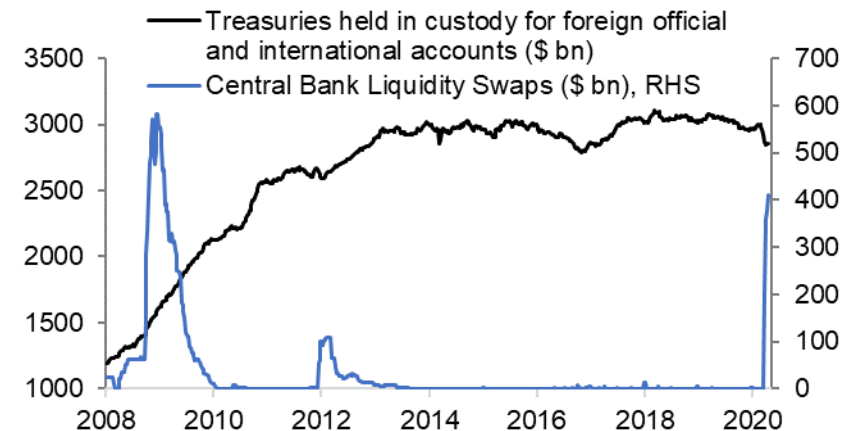
Source: Bloomberg; as of 04/27/2020. Used a stylized portfolio that consists of 60% S&P 500 and 40% Bloomberg Barclays US Aggregate index. Realized annualized volatility is calculated using daily total return over a 6M rolling window.

## Higher margin requirements led to involuntary deleveraging



Source: CME Group; data as of 03/20/2020

## Demand for dollar funding rose

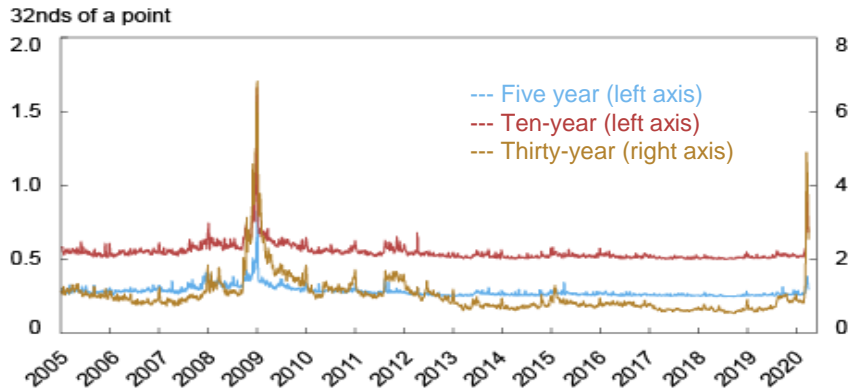


Source: Federal Reserve Board and Haver Analytics; data as of 04/23/2020

# Treasury market functioning became impaired

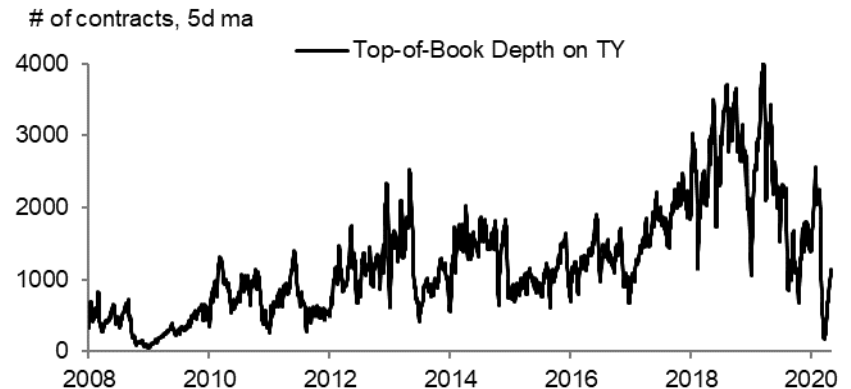
- The widespread, heightened investor demand for cash resulted in acute demand for dealer balance sheet capacity, contributing to wider bid-ask spreads, on-the-run/off-the-run spreads, and declining market depth.
- Treasury market volumes expanded significantly, with heightened investor demand for Treasury bills coinciding with large selling of off-the-run nominal Treasuries and TIPS.
- The increasing number of market participants “teleworking” from remote locations may have contributed to impaired market functioning.

## Treasury bid-ask spread at their widest since the crisis



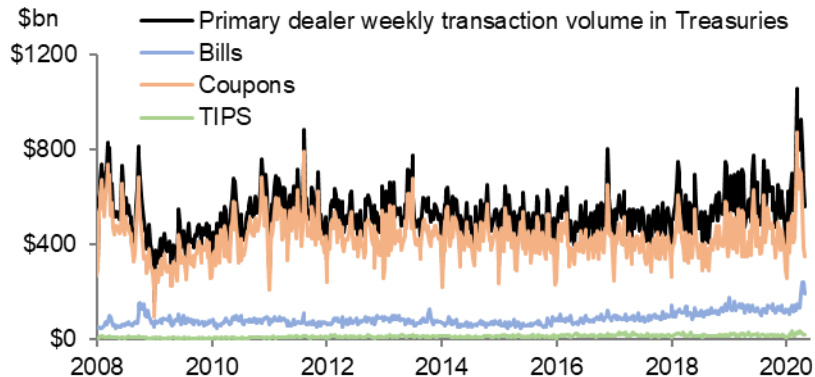
Source: Michael Fleming and Francisco Ruela (NY Fed) calculations, based on data from BrokerTec; as of 04/17/2020

## TY top-of-book depth declined



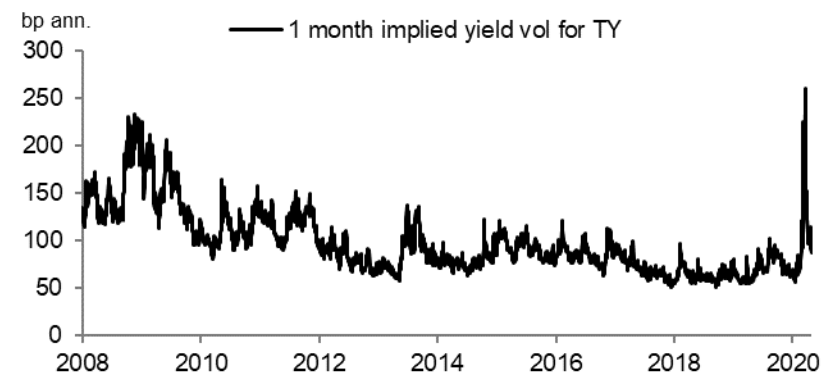
Note: Measures the average of the amount bid and the amount offered in the top of book (best bid/offer) for the TY futures contract. Source: Goldman Sachs Group Inc, Goldman Sachs Global Investment Research; data as of 04/28/2020.

## Treasury volume was robust



Note: Shows Primary Dealer Weekly Transaction Volume in bills, coupons, and TIPS. Source: New York Fed; data as of 04/22/2020.

## TY implied yield vol surged

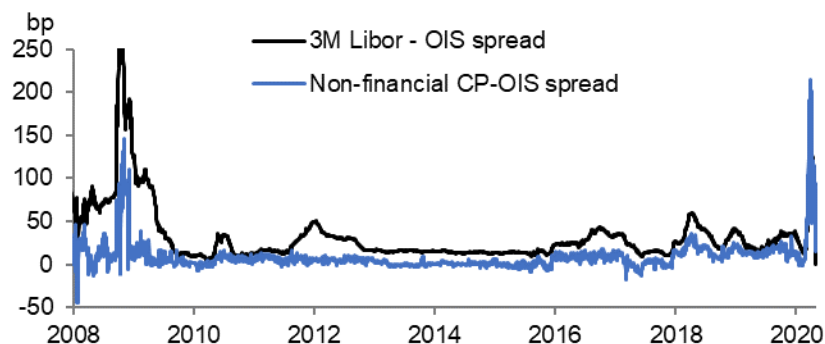


Source: Bloomberg; data as of 04/28/2020

# Risk premiums rose in many markets

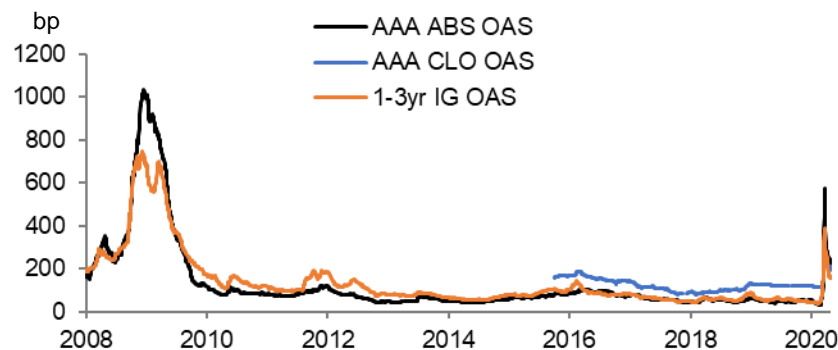
- High quality short duration credit instruments declined in price as prime money market funds liquidated securities.
- Agency mortgage spreads moved wider as levered mortgage sector investors reduced risk.
- Impaired Treasury market functioning contributed to rising risk premia in other securities that are priced based upon a spread to Treasury yields, or that use Treasury yields as the discount rate.
- The S&P 500 suffered the most rapid 35% decline in post war history (23 sessions) from a record high valuation on February 19<sup>th</sup>, triggering frequent circuit breaker market suspensions during this period.

## Stress in funding and front-end markets



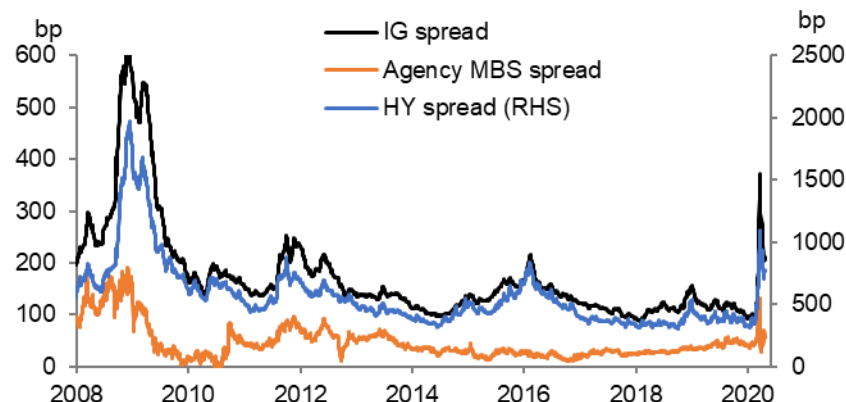
Source: Bloomberg, Federal Reserve Board and Haver Analytics; data as of 04/28/2020

## Widening in high quality short duration credit spreads



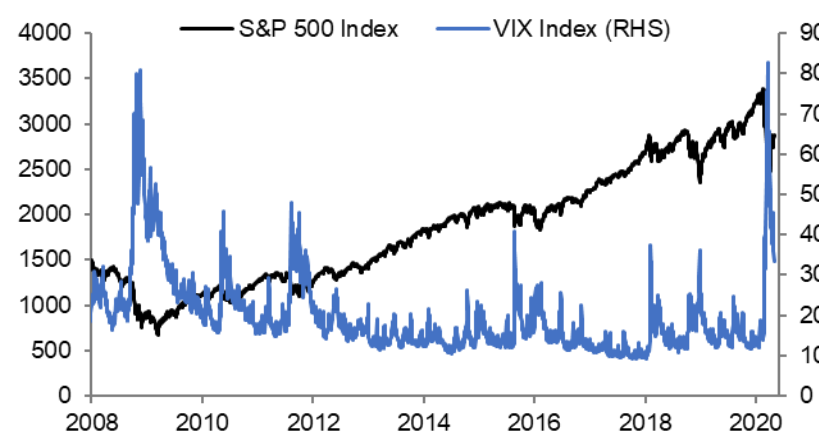
Source: Bloomberg and Bank of America; data as of 04/28/2020

## Widening in corporate and agency MBS spreads



Source: Bloomberg; data as of 04/28/2020. IG spread shows the spread of Bloomberg Barclays US Aggregate Corporate Index, and HY spread shows the spread of Bloomberg Barclays US Corporate High Yield Index. MBS spread shows the spread of Bloomberg Barclays US MBS Index.

## VIX spiked to levels last seen in GFC



Source: Bloomberg; data as of 04/28/2020





# Policy responses

## Substantial, targeted, and coordinated policy response

- The Fed reduced short term interest rates to 0.0 - 0.25% on March 15<sup>th</sup> and indicated the Federal Open Market Committee (FOMC) expects to *“maintain this target range until it is confident that the economy has weathered recent events and is on track to achieve its maximum employment and price stability goals.”*<sup>1</sup>
- From mid-March through today, the Federal Reserve has directly purchased from dealers nearly \$2 trillion of Treasury securities and Agency MBS to improve market functioning.
- A number of new targeted funding facilities were introduced by the Fed in conjunction with the Treasury Department via the Federal Reserve’s 13(3) authority. The breadth of actions was significant and specifically targeted to address funding stresses negatively impacting the provision of credit to real economy.
- In addition, the Fed announced multiple supervisory and regulatory adjustments in conjunction with other financial sector oversight agencies.
- Lastly, Congress delivered substantial fiscal policy support focused on providing relief for lost income to households and small to medium sized businesses.

<sup>1</sup> From the March 15, 2020 Federal Open Market Committee Statement, available here: <https://www.federalreserve.gov/monetarypolicy/files/monetary20200315a1.pdf>

# Policy actions have improved market functioning and constructed a policy safety net that reduces tail risks for financial markets and the real economy

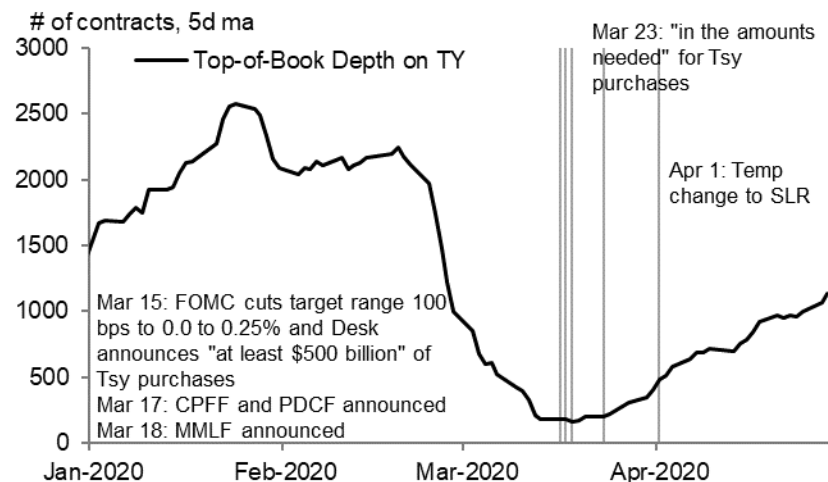
Operation	Announced	Implemented
<b>Technical operations to aid market functioning:</b>		
Treasury purchases to include coupons	13-Mar	13-Mar
Treasury purchases: “at least \$500 billion”	15-Mar	16-Mar
MBS purchases: “at least... \$200 billion”	15-Mar	16-Mar
Treasury and MBS purchases: “in the amounts needed”	23-Mar	23-Mar
CMBS purchases	23-Mar	27-Mar
<b>Facilities for liquidity:</b>		
Commercial Paper Funding Facility (CPFF)	17-Mar	14-Apr
Primary Dealer Credit Facility (PDCF)	17-Mar	20-Mar
Money Market Mutual Fund Liquidity Facility (MMLF)	18-Mar	23-Mar
Primary Market Corporate Credit Facility (PMCCF)	23-Mar	
Secondary Market Corporate Credit Facility (SMCCF)*	23-Mar	
Term Asset-Backed Securities Lending Facility (TALF)	23-Mar	
Paycheck Protection Program Liquidity Facility (PPPLF)	6-Apr	16-Apr
Municipal Liquidity Facility (MLF)	9-Apr	
<b>Actions to support real economy:</b>		
Fed cut policy rate by 50bp to 1.0 – 1.25%	3-Mar	3-Mar
Fed cut rate by 100bp to the zero lower bound	15-Mar	15-Mar
Main Street Business Lending Program (MSNLF, MSELF)	23-Mar	
Appraisal guidance for real estate transactions	14-Apr	17-Apr
<b>Other actions:</b>		
Extending dollar swap lines	15-Mar	15-Mar
Encouraging use of Discount Window	15-Mar	15-Mar
FIMA repo facility	31-Mar	6-Apr
Temporary change to Supplementary Leverage Ratio Rule	1-Apr	1-Apr
<b>Fiscal policy actions:</b>		
Coronavirus Preparedness and Response Supplemental Appropriations Act		6-Mar
Families First Coronavirus Response Act		18-Mar
Coronavirus Aid, Relief, and Economic Security Act (CARES Act)		27-Mar
Paycheck Protection Program and Health Care Enhancement Act		24-Apr

- Treasury liquidity conditions have improved following the mid-March Fed announcements to cut rates to zero, expand Treasury purchases, and introduce the CPFF, MMLF, and PDCF. As of end of April, both Treasury bid-ask spread and estimated Treasury yield fitted error (an aggregate measure for dislocations in Treasury securities across the curve) have largely normalized. Treasury market depth has recovered about half of the decline relative to pre-Covid-19 levels.
- Stress in the commercial paper (CP) space took some time to calm. Upon the initial announcement of the CPFF on March 17<sup>th</sup>, CP-to-OIS spread continued to widen, but started to show signs of stabilization in late March, and has now reversed most of the widening. LIBOR-OIS spread started to tighten in April and has retraced roughly 2/3 of the March widening.
- March 23<sup>rd</sup> announcements for TALF, PMCCF, SMCCF, and expanding Treasury and MBS purchases “in the amounts needed” marked the widest observation in IG and HY corporate spreads. Since then, IG and HY corporate spreads have tightened and retraced roughly 60% and 50% of the widening respectively. MBS spreads reached the widest observation on March 19<sup>th</sup> and tightened meaningfully in the second half of March following substantial purchases by the Fed.

Note: Comments above reflect market levels as of end of April

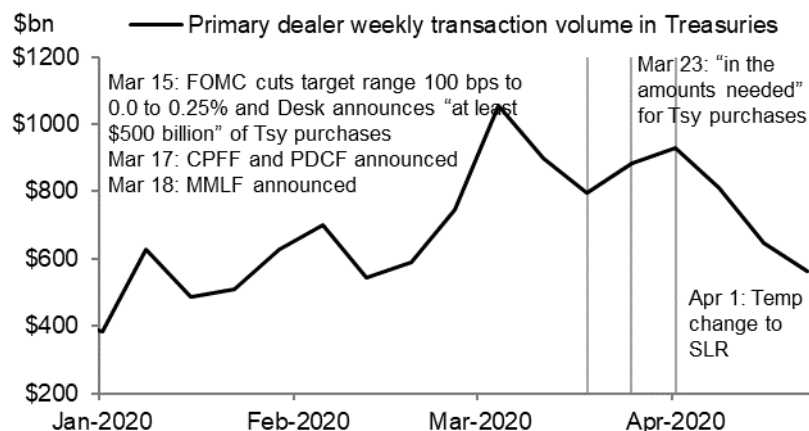
# Treasury market functioning has improved

## TY top-of-book has partially recovered



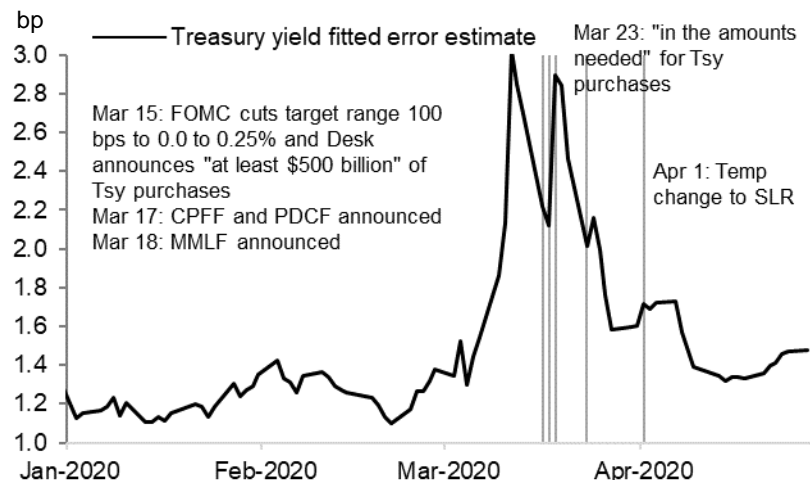
Note: Measures the average of the amount bid and the amount offered in the top of book (best bid/offer) for the TY futures contract. Source: Goldman Sachs Group Inc, Goldman Sachs Global Investment Research; data as of 04/28/2020.

## Treasury trading volume back to normal levels



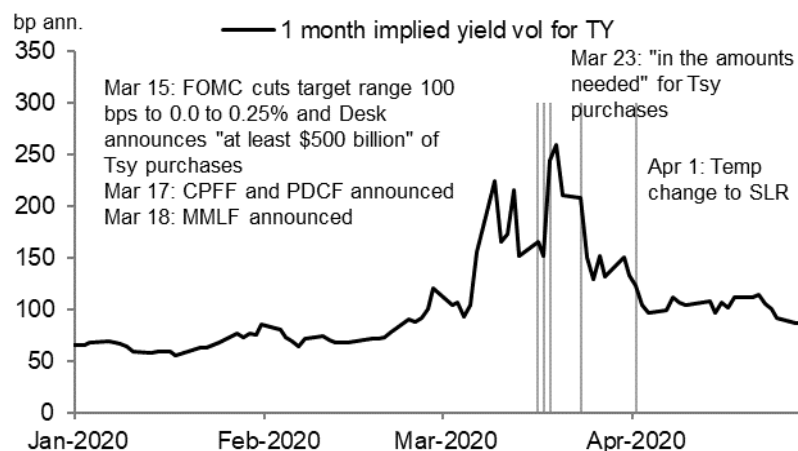
Note: Shows Primary Dealer Weekly Transaction Volume in bills, coupons, and TIPS. Source: New York Fed; data as of 04/22/2020.

## Treasury yield fitted error close to fully recovered



Source: J.P. Morgan; data as of 04/27/2020. It's a measure of the aggregate yield error of all individual bonds relative to the par fitted curve constructed by J.P. Morgan.

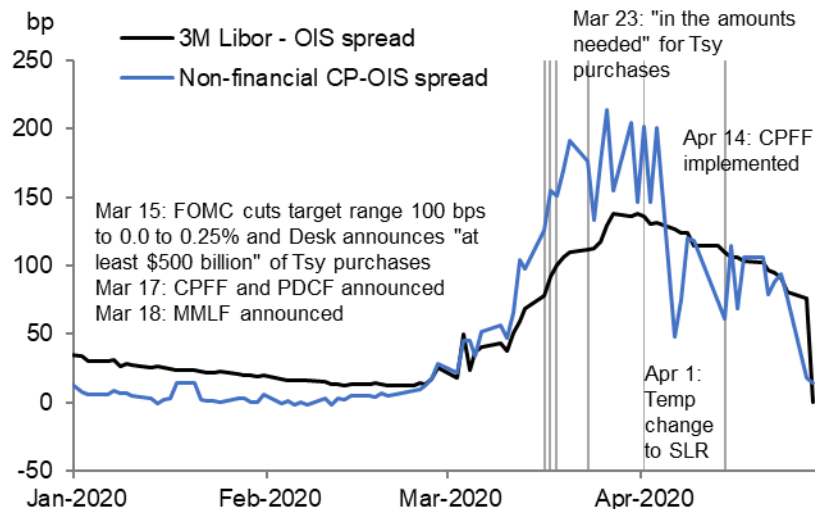
## 1 month implied yield vol has fully recovered



Source: Bloomberg; data as of 04/28/2020

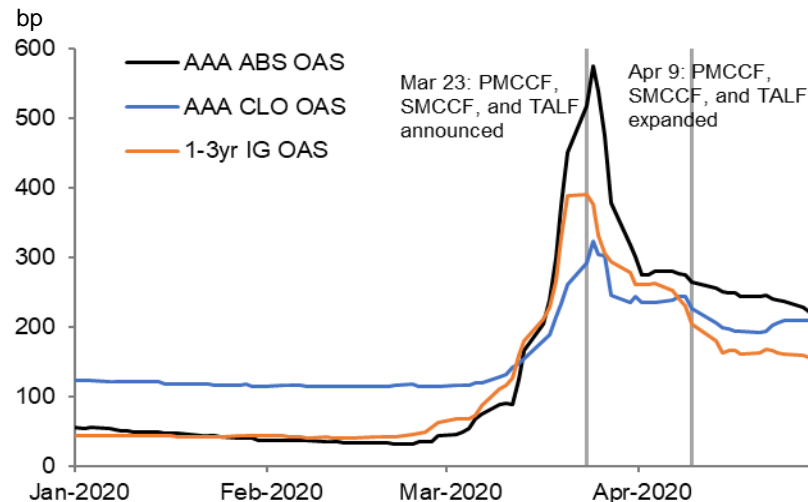
# Other markets have also repaired by varying degrees

## (CP-OIS) spread and (LIBOR-OIS) spread



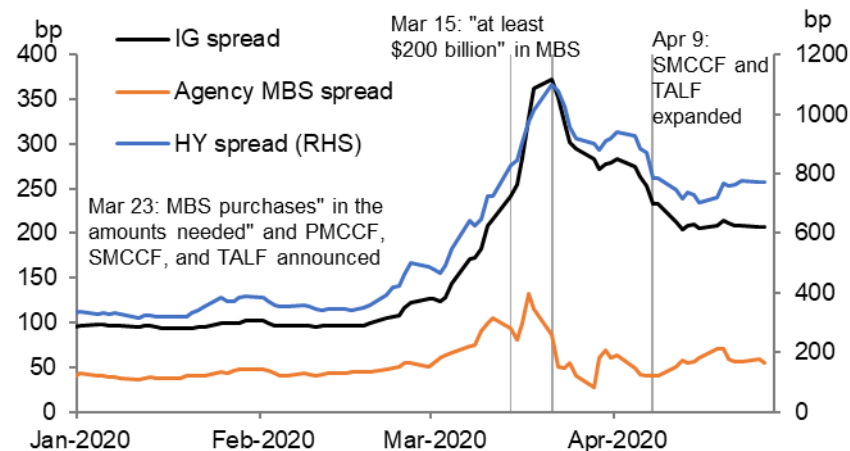
Source: Bloomberg, Federal Reserve Board and Haver Analytics; data as of 04/28/2020

## Front-end high quality credit instruments



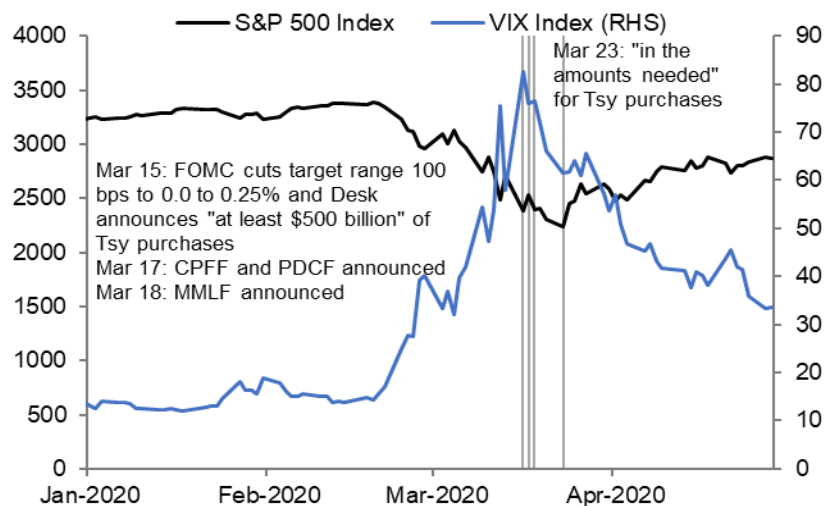
Source: Bloomberg and Bank of America; data as of 04/28/2020

## Corporate and agency MBS spreads




Source: Bloomberg; data as of 04/28/2020. IG spread shows the spread of Bloomberg Barclays US Aggregate Corporate Index, and HY spread shows the spread of Bloomberg Barclays US Corporate High Yield Index. MBS spread shows the spread of Bloomberg Barclays US MBS Index.

## S&P 500 and VIX



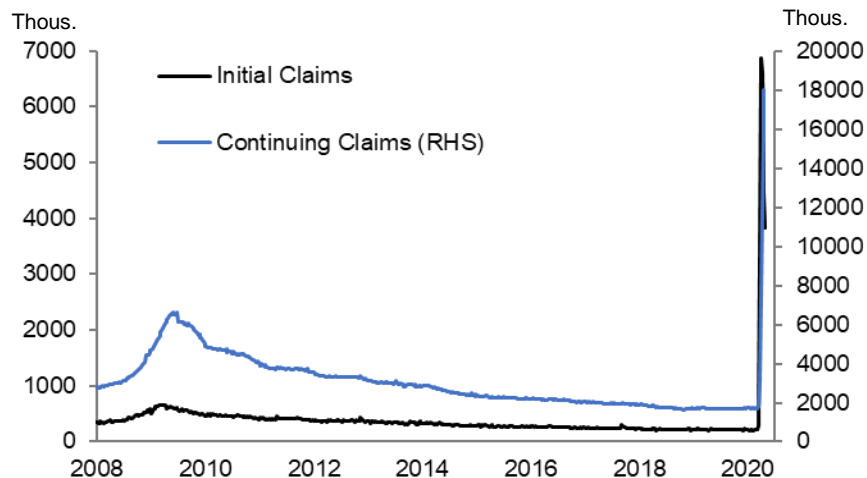
Source: Bloomberg; data as of 04/28/2020



Factors impacting the level of interest rates, the shape of the yield curve, and relative demand

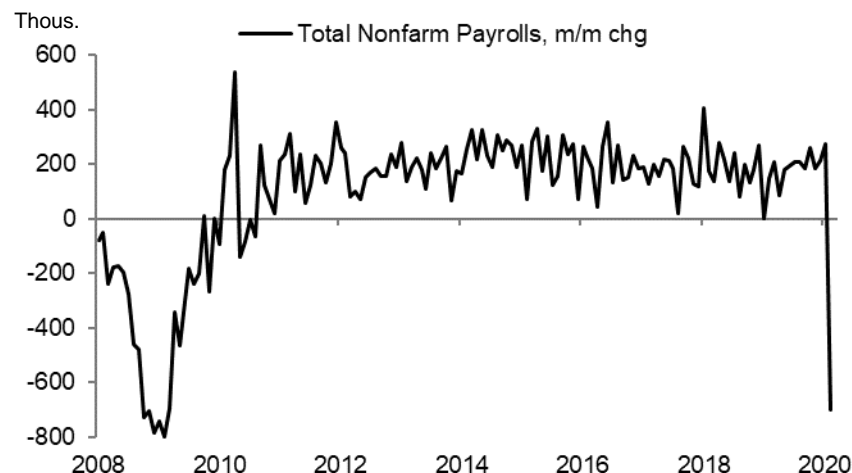
# US economic activity deteriorated sharply

## Initial and Continuing Claims have surged in recent weeks



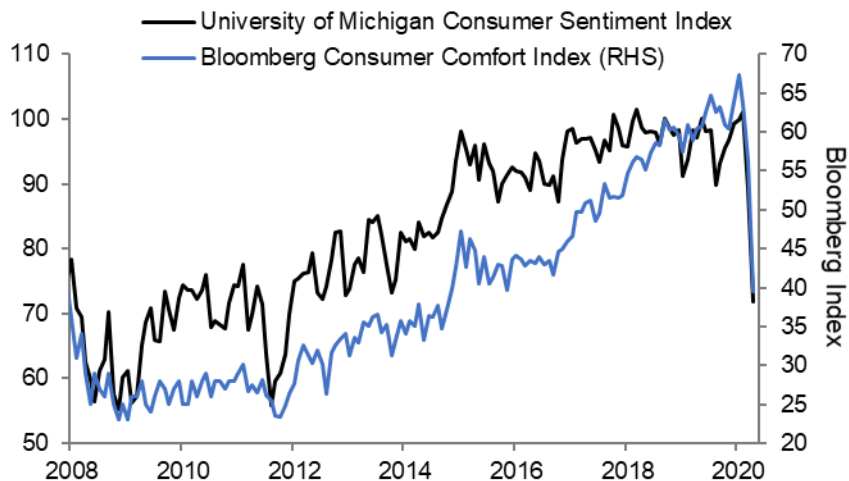
Source: Department of Labor and Haver Analytics; data as of 04/30/2020

## Total Nonfarm Payrolls fell sharply in March 2020



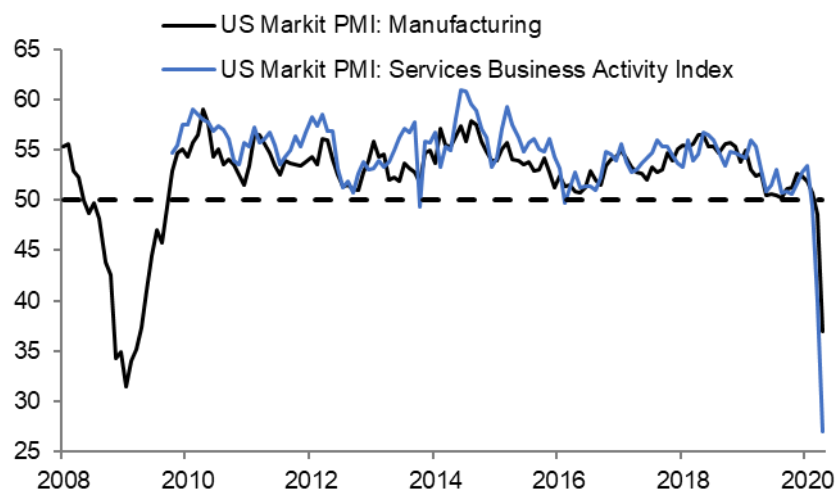
Source: Bureau of Labor Statistics and Haver Analytics; data as of March 2020

## Consumer sentiment falling sharply



Source: University of Michigan, Bloomberg, and Haver Analytics; data as of April 2020

## PMI points to significant disruption in economic activity



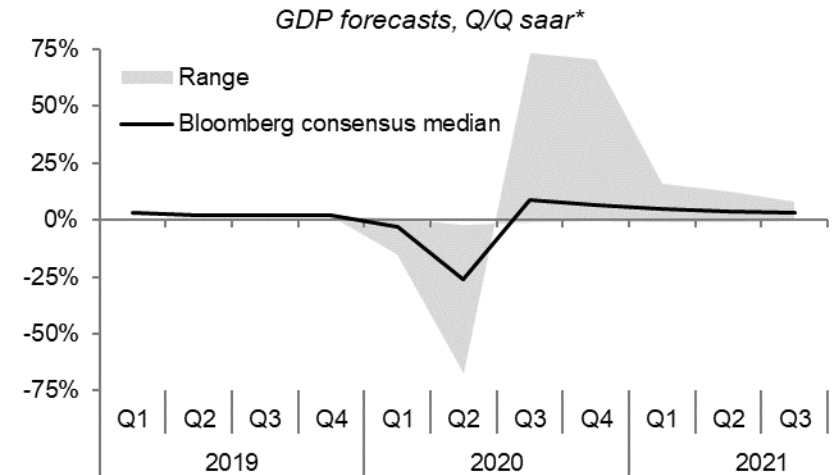
Source: IHS Markit and Haver Analytics; data as of April 2020

# The economic outlook has been revised down significantly

## The economy is expected to enter a recession

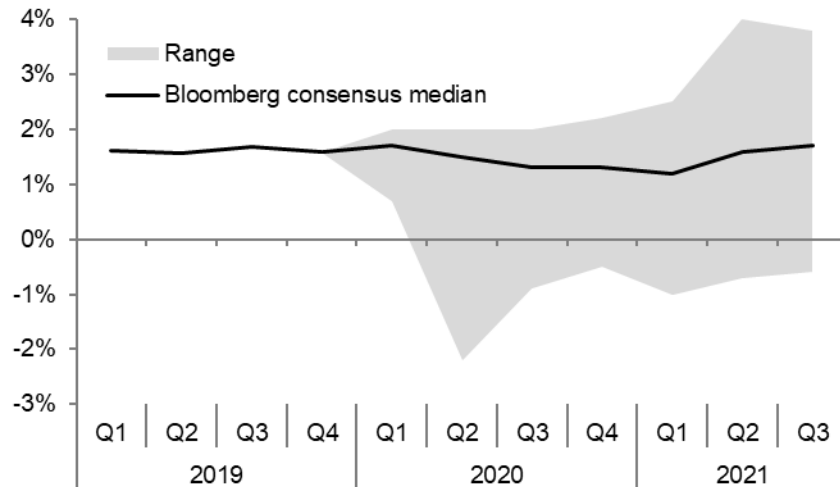
- Following the Covid-19 outbreak and subsequent actions to flatten the virus infection curve, large parts of economies around the world have shut down.
- Growth outlooks have been revised sharply lower. The Bloomberg median now expects a -26% Q/Q annualized decline in US real GDP in 2020 Q2.
- The median unemployment rate projection expects an increase to 12.8% in Q2, and is expected to remain relatively elevated at the end of next year.
- Inflation forecasts were revised down and the distribution of outlooks is skewed to the downside.
- The timing and pace of re-opening remain highly uncertain.

## GDP expected to contract meaningfully in Q2

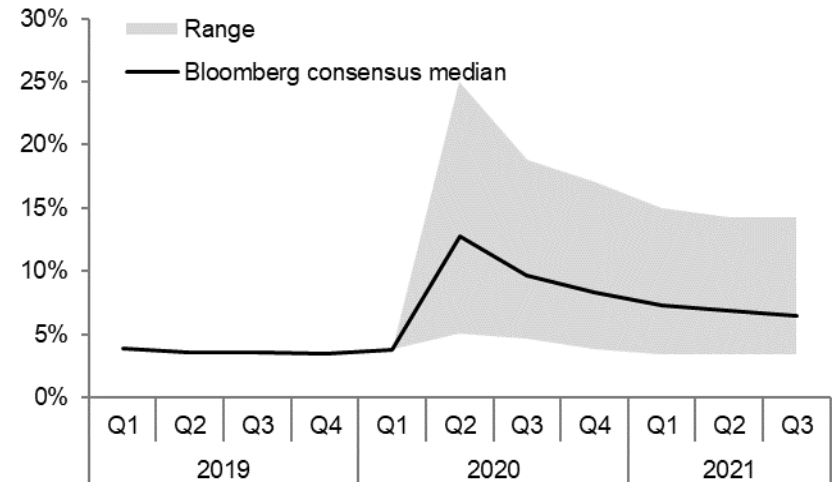


\*SAAR: Seasonally Adjusted Annual Rate

## Inflation forecasts skewed to the downside



## Unemployment rate expected to surge in Q2



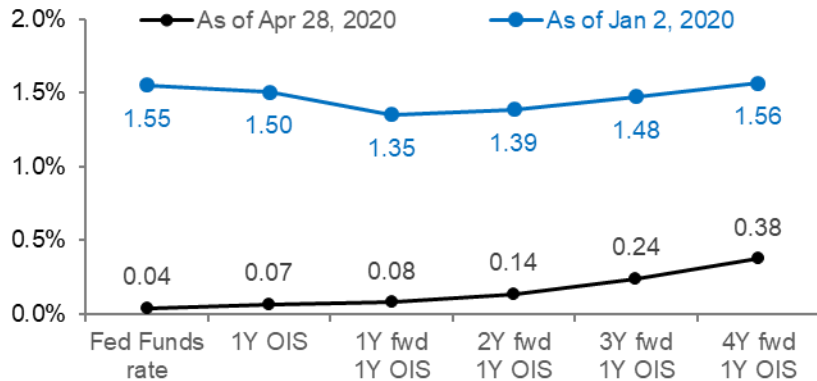


# Monetary policy expectations

- Market pricing and survey expectations reflect the Fed's current forward guidance combined with the downgraded economic outlook, which together indicate that an accommodative policy stance will remain necessary for an extended period of time.
- Market-based inflation expectations have declined with the growth outlook and term premium has remained low.

## Market pricing

### Forward OIS rate term structure



Source: Bloomberg; data as of 04/28/2020

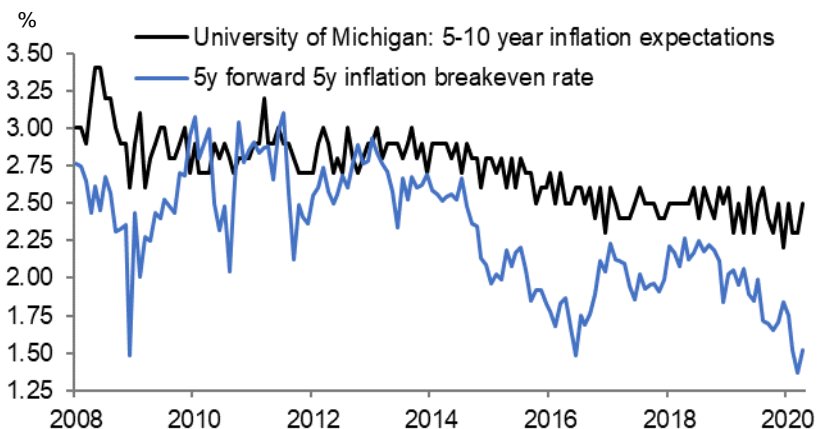
## Survey expectations

From a Bloomberg survey\* of economists:

When will the FOMC lift the target federal funds range off the ZLB?	Percentage of responses
By end of 2020	3%
H1 2021	10%
H2 2021	13%
H1 2022	16%
H2 2022	6%
2023 or later	52%

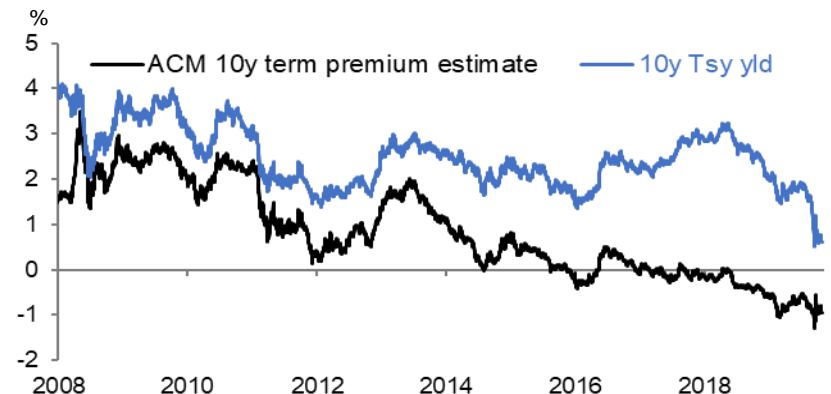
Source: Bloomberg; data as of 04/24/2020. \*Note: A Bloomberg survey of 31 economists that was conducted from April 20 to April 23, 2020

## Inflation expectations have declined



Source: Bloomberg; data as of 04/24/2020.

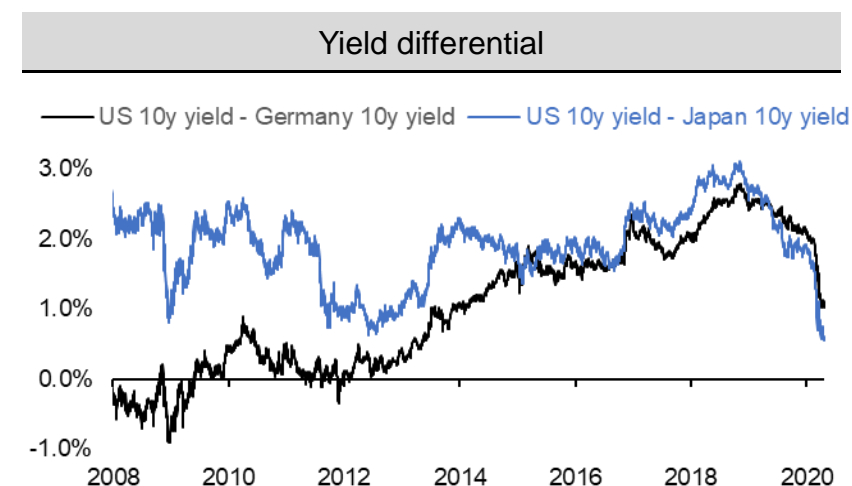
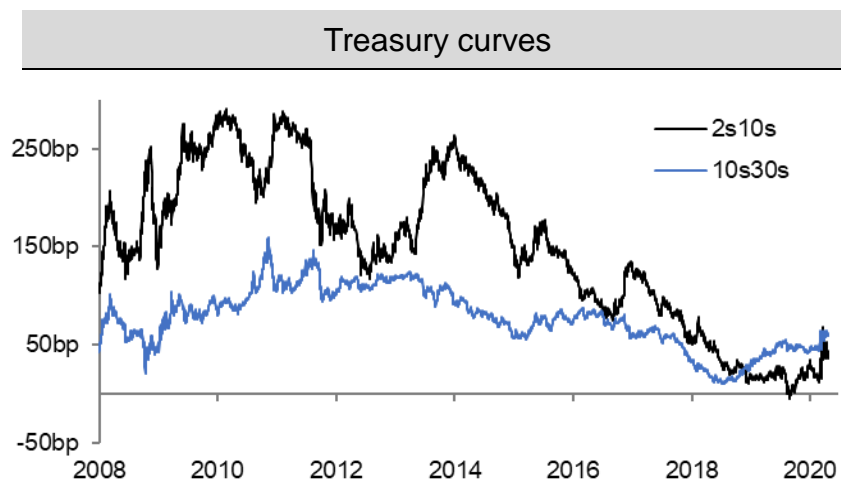
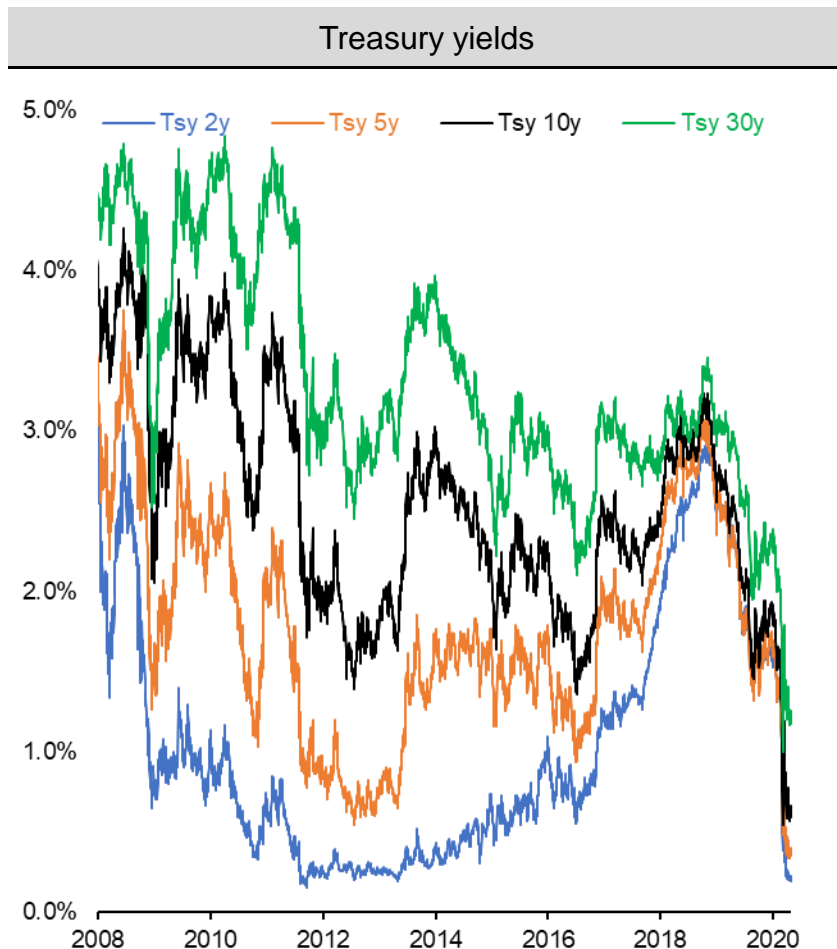
## Term premium remains low



Source: Bloomberg; data as of 04/28/2020. Note: Estimate for 10-year Treasury term premium is from the New York Fed based on methodology developed by New York Fed economists Tobias Adrian, Richard Crump, and Emanuel Moench (or "ACM"). 19

# Treasury debt yields and curve slope

- The level of nominal yields is quite low by historical comparison and the slope of the nominal yield curve is relatively flat, in line with lower expectations for the path of policy rates, low inflation expectations and low term premium.
- US Treasury yields remain higher than other developed market rates but the differential has narrowed as German and Japanese sovereign bond yields have been relatively stable, already at very low or negative levels.



Source: Bloomberg; data as of 04/28/2020

# Treasury issuance is expected to rise following the fiscal response to Covid-19

- Given the severity of the shock to growth and income, Congress and the administration have delivered substantial fiscal policy support to cushion the economic blow and support recovery.
- The fiscal response points to the FY 2020 deficit nearly tripling relative to prior estimates, the Congressional Budget Office (CBO) projects \$3.7tn deficit in FY 2020 and \$2.1tn in FY 2021.
- With increased financing needs as implied by those deficit projections, Treasury issuance is expected to grow significantly over the months ahead.

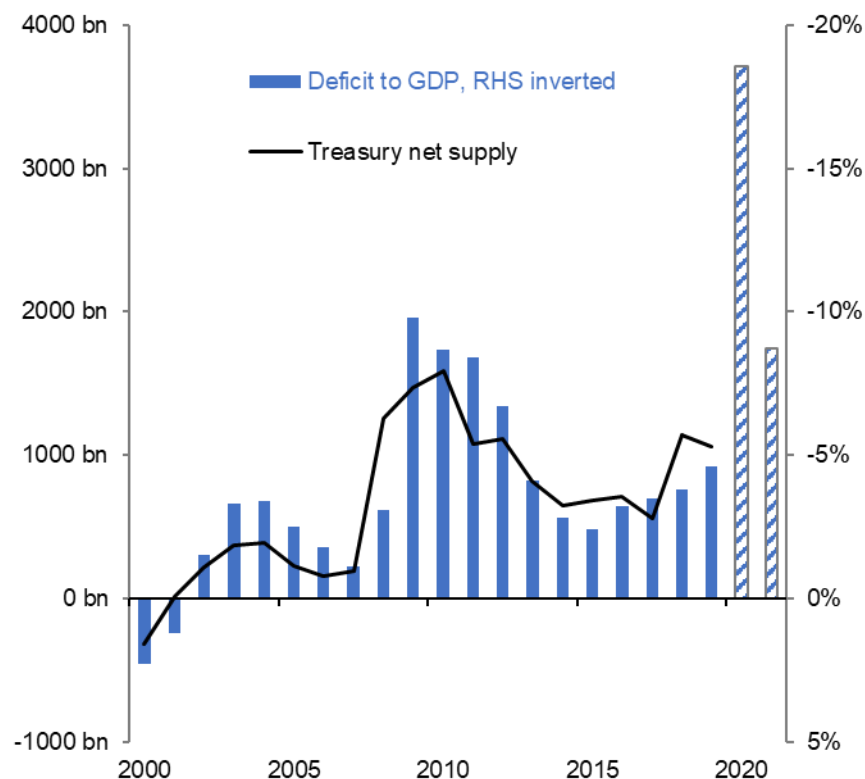
## Federal deficit expected to grow to \$3.7tn given recent policies

Legislation:	FY2020	FY2021
CBO Deficit, prior projection <sup>1</sup>	1,073	1,002
Families First Act <sup>2</sup>	135	57
CARES Act <sup>2</sup>	1,606	450
PPP & HCE Act <sup>2</sup>	435	43
Lost revenue <sup>3</sup>	475	550
<b>Subtotal</b>	<b>3,723</b>	<b>2,101</b>

Notes: numbers are \$, in billions. FY ends Sept 30.

Sources: 1. CBO March 2020 budget update (prior to Covid-19 outbreak) 2. CBO scoring of FFA, CARES Act, PPP and Health Care Enhancement Act, and April 24 budget update (CBO56335) 3. Estimated based upon the April 24 budget update (CBO56335).

## Treasury net supply will grow substantially



Source: Haver Analytics; data as of December 2019. Note: Treasury net supply computed as annual change in marketable Treasury securities held by the public

# Identifying buyers of increased Treasury issuance

- Total Treasury debt outstanding grew by approximately \$14 trillion since 2008. Roughly 1/3 of that was absorbed by foreign investors with the remaining 2/3 absorbed by domestic investors. Over the past two years, foreign investors' demand has slowed and domestic investors took an increased share with households the largest source of recent demand.\*
- The 2008-2010 period may provide helpful context as marketable Treasury debt outstanding nearly doubled in those three years (\$4.5tn to \$8.9tn). Foreign investors and domestic households together absorbed roughly 70% of the net issuance over those three years, 45% and 25% respectively. Money market funds along with brokers and dealers bought a meaningful amount of Treasuries in 2008 as issuance ramped higher, subsequently becoming net sellers in the following two years.
- Given the fiscal response to Covid-19, the FY2020 deficit projection has increased significantly, pointing to a large and rapid increase in Treasury net supply. We review each of these buyer bases in turn in an attempt to discern where the marginal demand may exist to absorb increased Treasury issuance.

## Annual Treasury net purchase, breakdown by investor type

Aggregated from the Fed's Z.1 Flows of Funds transaction data (F.210 table):

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Sum ('08 to '19)		Sum (2018&19)	
Net purchase of Tsy	56	282	423	403	347	219	271	1,302	1,506	1,645	1,138	1,181	858	736	724	843	447	1,411	1,177	12,968	100%	2,588	100%
Foreign investors	19	161	276	367	245	150	165	712	554	740	355	590	423	314	43	(108)	308	115	181	4,227	33%	295	11%
Domestic investors	36	119	147	37	102	69	105	591	951	905	782	591	434	422	682	951	139	1,296	996	8,740	67%	2,292	89%
Household	(98)	(94)	(29)	(27)	(172)	(103)	(139)	290	498	282	(106)	145	(142)	(200)	327	101	(41)	613	322	2,088	16%	935	36%
Fed	40	78	37	51	26	35	(38)	(265)	301	245	642	59	550	237	(16)	(13)	(22)	(243)	100	1,575	12%	(143)	-6%
State & local govt	19	27	25	30	134	67	61	(98)	45	16	(58)	34	31	5	7	74	(9)	(62)	(45)	(61)	0%	(107)	-4%
Banks <sup>1</sup>	(20)	41	5	(27)	(7)	1	10	(21)	95	102	(47)	88	(28)	192	38	122	(37)	124	125	754	6%	249	10%
Insurance <sup>2</sup>	1	47	5	20	15	(4)	(58)	14	52	24	16	(2)	(8)	21	6	32	33	(21)	(15)	151	1%	(36)	-1%
Pension <sup>3</sup>	36	8	47	57	63	49	33	70	115	127	110	148	123	113	56	170	34	427	193	1,686	13%	620	24%
Money mkt funds	49	4	(11)	(30)	(15)	(6)	97	409	(176)	(72)	110	14	38	(72)	53	312	(95)	171	163	855	7%	334	13%
Mutual funds & ETF <sup>4</sup>	(8)	9	17	26	28	8	11	7	124	140	42	99	(60)	206	169	105	215	128	158	1,335	10%	286	11%
Brokers & dealers	15	(28)	55	(73)	(14)	4	98	212	(116)	(14)	66	67	(72)	(92)	16	36	22	139	(73)	192	1%	66	3%
Other <sup>5</sup>	2	27	(5)	10	43	20	29	(29)	14	55	8	(59)	2	11	25	11	39	21	68	166	1%	89	3%

### Market levels for reference (annual average)

2Y Tsy yield (avg, %)	3.8	2.6	1.6	2.4	3.8	4.8	4.4	2.0	0.9	0.7	0.4	0.3	0.3	0.4	0.7	0.8	1.4	2.5	2.0
10Y Tsy yield (avg, %)	5.0	4.6	4.0	4.3	4.3	4.8	4.6	3.6	3.2	3.2	2.8	1.8	2.3	2.5	2.1	1.8	2.3	2.9	2.1
2s10s Tsy curve (avg, bp)	120	199	237	190	44	-2	27	165	230	250	232	151	203	208	145	100	93	38	16

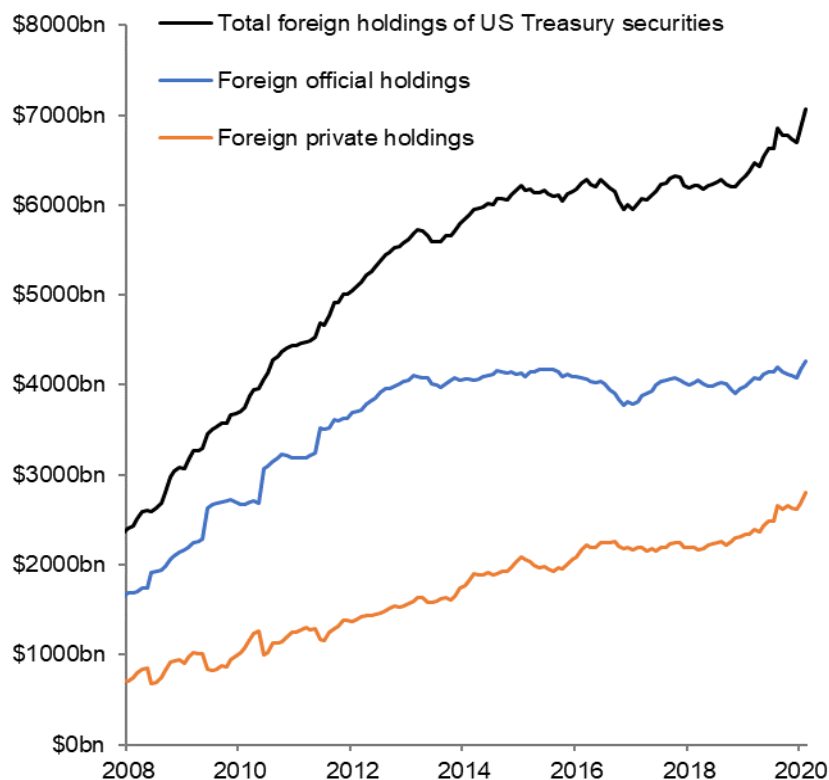
Source: Flows of Funds transaction data in F.210 table. Note: 1) Sum of U.S.-chartered depository institutions, foreign banking offices in US, banks in US-affiliated areas, and credit unions. 2) Sum of property-casualty insurance companies and life insurance companies. 3) Sum of private pension funds, state and local govt retirement funds, and federal govt retirement funds. 4) Sum of mutual funds, close-end funds, and exchange-traded funds. 5) Includes nonfinancial corporate business, nonfinancial noncorporate business, government-sponsored enterprises, ABS issuers, and holding companies.

\*Over the past two years pension was the 2<sup>nd</sup> largest source of demand but roughly 2/3 of the pension purchase was by Federal govt retirement funds which primarily hold non-marketable Treasury securities.

# Foreign Investors

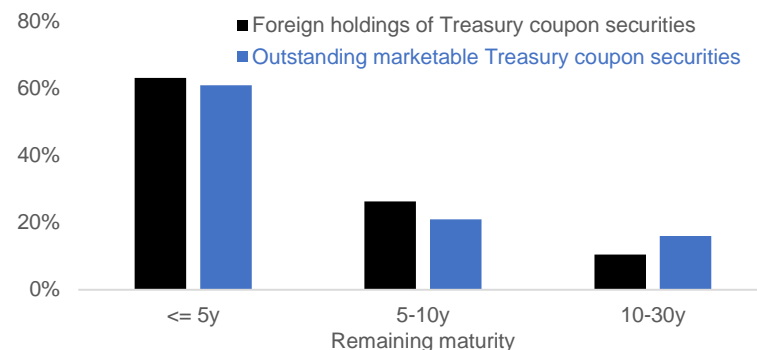
- Foreign official demand has remained relatively stable in recent years, following a period of strong growth in the years after the financial crisis.
- Foreign private investor demand has been steady despite minimal FX-hedged yield pickup from Treasury securities. Of note, demand for intermediate to longer maturity US credit products has been reasonably robust.
- Foreign holdings of Treasury coupon securities are concentrated in front-end and belly maturities, with over 60% of the holdings maturing within 5 years.
- Foreign investors (official and private) would need to substantially increase the recent pace of purchases to replicate their share of purchases from the 2008-10 experience.

Foreign holdings of Treasury securities



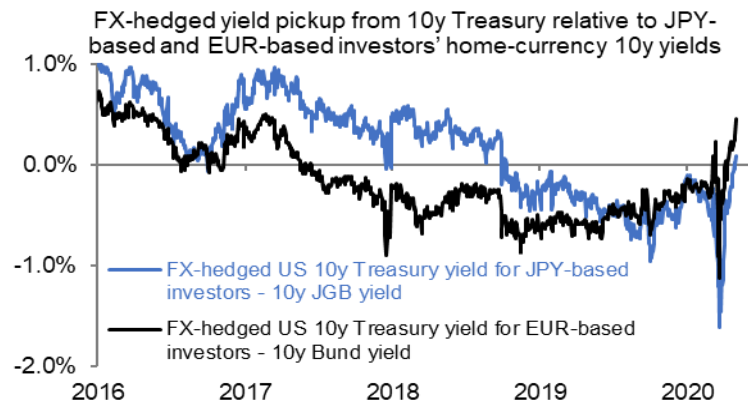
Source: TIC data and Haver Analytics; data as of February 2020

Maturity structure of foreign-held Treasury coupon securities



Source: TIC data; maturity structure as of June 2019

FX-hedged yield pickup of 10y Treasuries

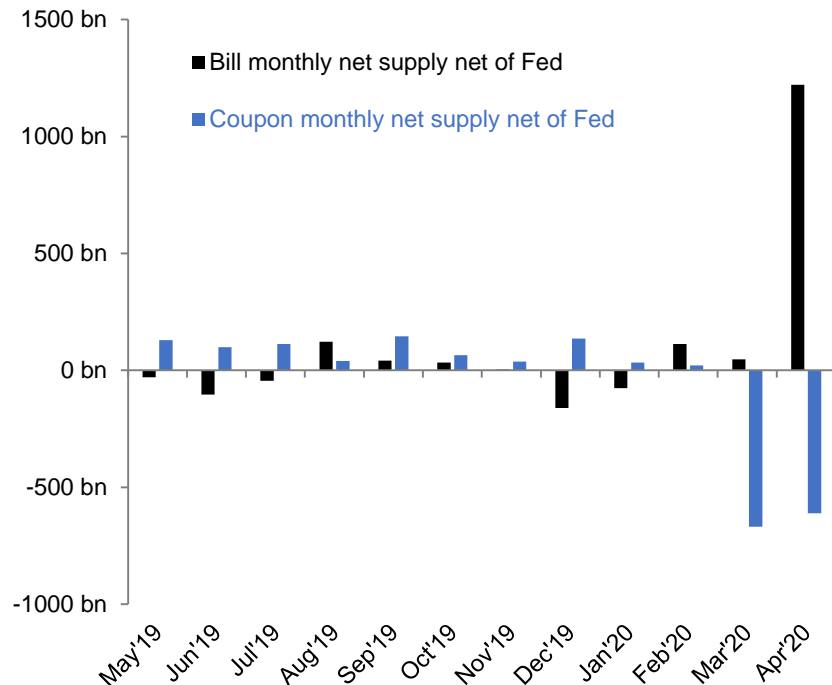


Source: Bloomberg; data as of 04/28/2020

# Brokers and Dealers

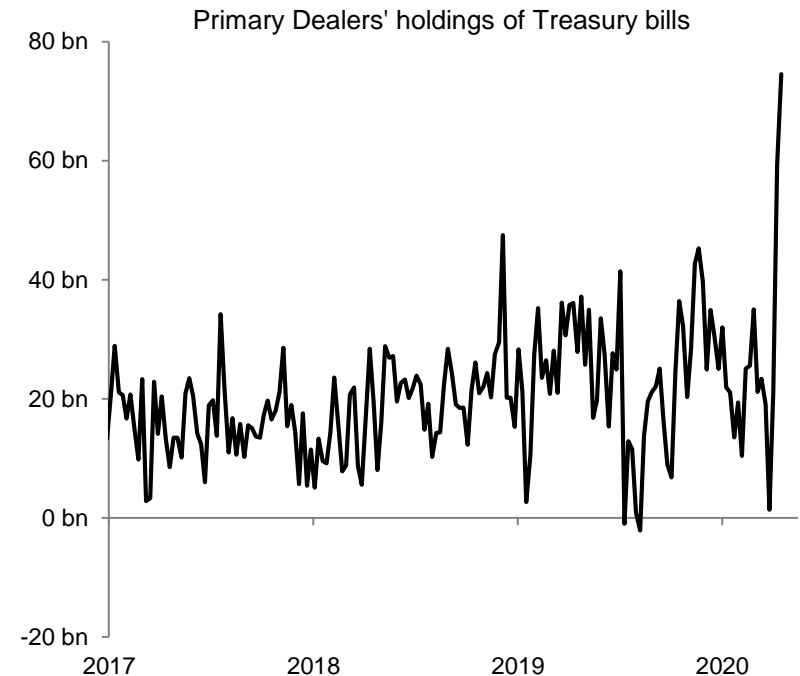
- Brokers and dealers are historically the initial absorption mechanism for unexpected increases in Treasury issuance.
- Brokers and dealers purchased roughly 15% of Treasury issuance in 2008, a substantial increase in share of purchases relative to their historical average. Their holdings declined in 2009-2010 as securities matured or were intermediated to other investors.
- The Fed's purchases of roughly \$1.5 trillion Treasury securities since mid-March have created a substantial net negative supply of Treasury coupon securities net of Fed purchases.
- Recent Treasury bill supply has been robust, generating a significant positive net supply of Treasury bills net of Fed purchases. As a result, dealer holdings of Treasury bills have increased sharply.

Treasury net supply net of Fed's purchase



Source: Haver Analytics and Federal Reserve. April 2020 supply estimate from Morgan Stanley

Primary Dealers' inventory of T-Bills

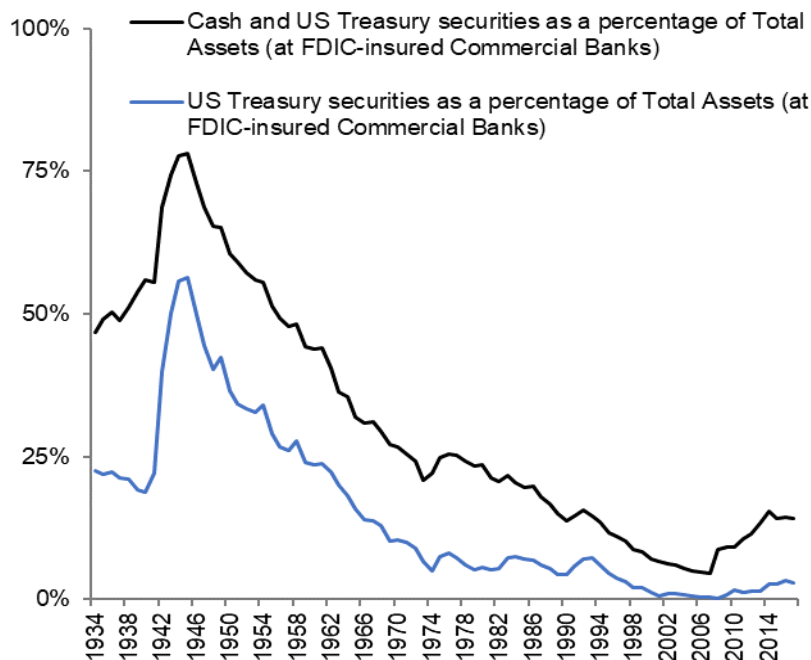


Source: New York Fed and Bloomberg; data as of April 2020

# Domestic Banks

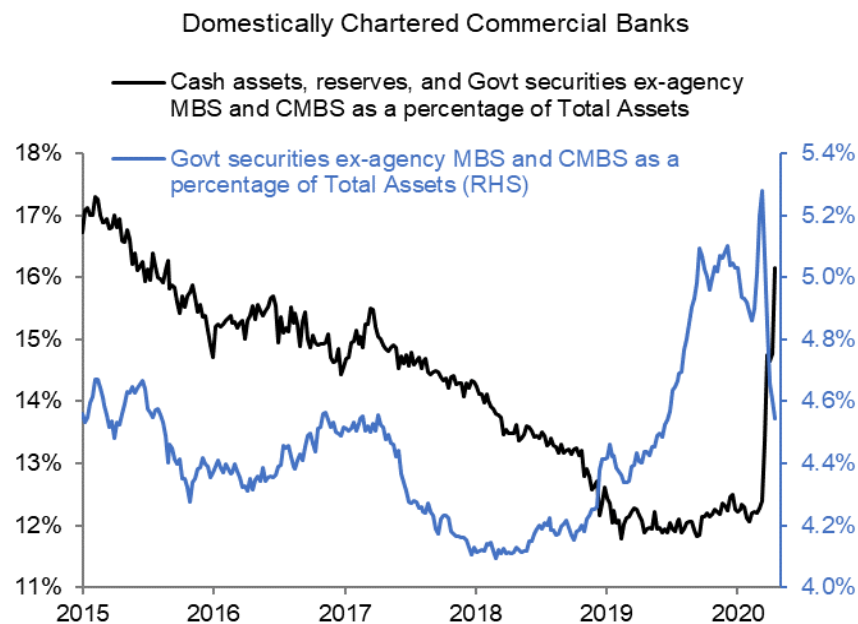
- In 2008 to 2010, banks played a modest role in absorbing the increase in Treasury issuance. However, during the 1940's "Wartime Finance" era, banks played an important role in absorbing Treasury debt issuance, and holdings rose to over 50% of insured commercial bank assets, even while the Treasury and the Fed cooperated to cap Treasury yields.
- More recently, Treasury holdings have represented a small share of bank assets. As the Fed's recent open market operations (OMO) and lending efforts have added substantial reserves to the banking system, the composition of bank assets has changed meaningfully. Conditional upon leverage constraints and the yield spread to funding costs, banks represent a potential source of demand for Treasury bills and shorter maturity Treasury debt.
- The Fed temporarily exempted Treasuries and reserves from its supplementary leverage ratio (SLR) rule on April 1<sup>st</sup>, saying, "restrictions that accompany this balance sheet growth may constrain the firms' ability to continue to serve as financial intermediaries and to provide credit to households and businesses. The change to the supplementary leverage ratio will mitigate the effects of those restrictions and better enable firms to support the economy."

## In WWII, bank holdings of Treasuries rose sharply



Source: Federal Deposit Insurance Corporation and Haver Analytics; data as of 08/29/2019

## Reserves and Govt securities changing bank assets



Note: Cash assets includes vault cash, cash items in process of collection, balances due from depository institutions, and balances due from Federal Reserve Banks.

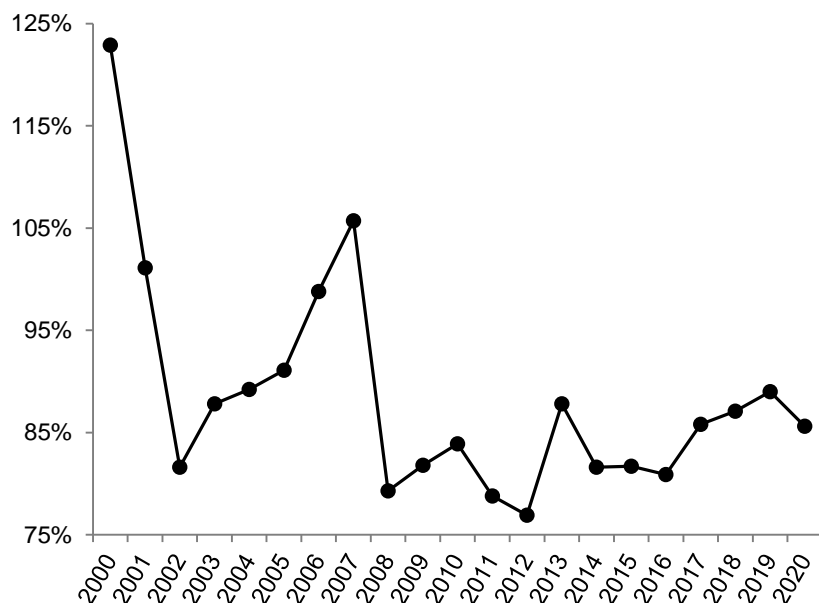
Source: Federal Reserve Board and Haver Analytics; data as of 04/24/2020

# Domestic Corporate Pensions

- Demographic trends point to continued steady demand for intermediate to longer maturity Treasuries from defined contribution plans.
- The de-risking trend among domestic defined benefit corporate pension plans seems likely to continue. The majority of those plans are actively executing or considering a de-risking glide-path that increases the fixed income allocation. The Treasury allocation is typically concentrated in longer maturities.
- Pension plans' recent share of purchases has increased, and that demand can be less price sensitive conditional upon other factors.

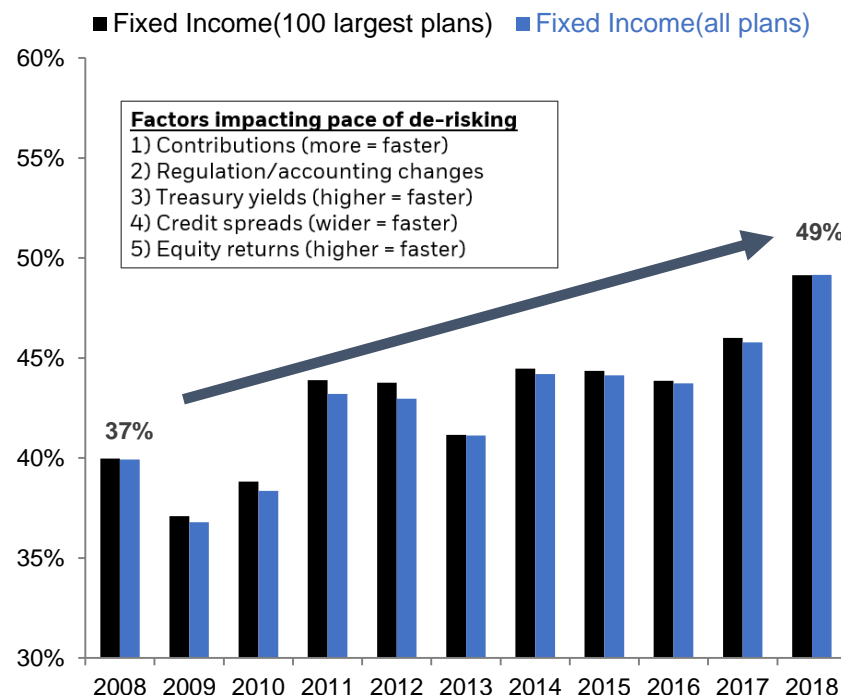
## Funded ratio

The funded ratio of the largest 100 corporate defined benefit pension plan sponsors



## Steady rise of fixed income allocation

Fixed income allocation



Source: Milliman 2019 Corporate Pension Funding Study

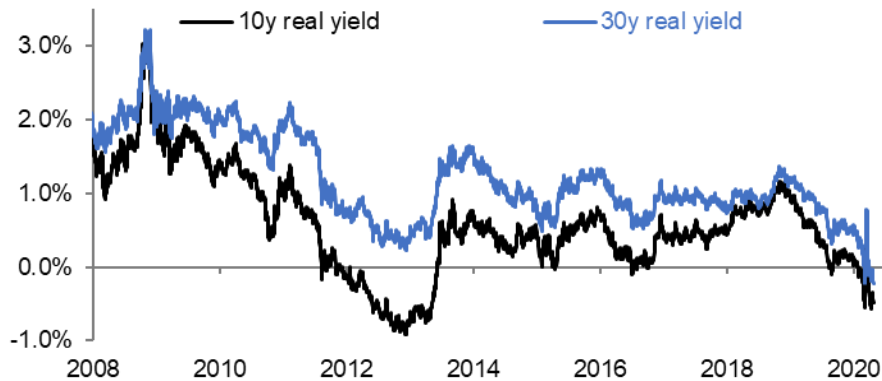
Source: Milliman 2019 Corporate Pension Funding Study



# Domestic Households

- Households represented a large source of demand for Treasury issuance in the 2008-2010 period although nominal and real interest rates were significantly higher during that time.
- Price appreciation potential has declined as a consequence of lower rates, unless Treasuries trade with negative yields.
- The probability of a negative annual mark-to-market return in the US Treasury Aggregate Bond index is again above 40%, similar to the post-GFC period of aggressive monetary policy forward guidance. Household demand stalled during the 2011-2014 period.
- The stock-bond correlation remains negative, but hedge effectiveness of Treasuries declines as price appreciation potential is reduced.

## Real yields

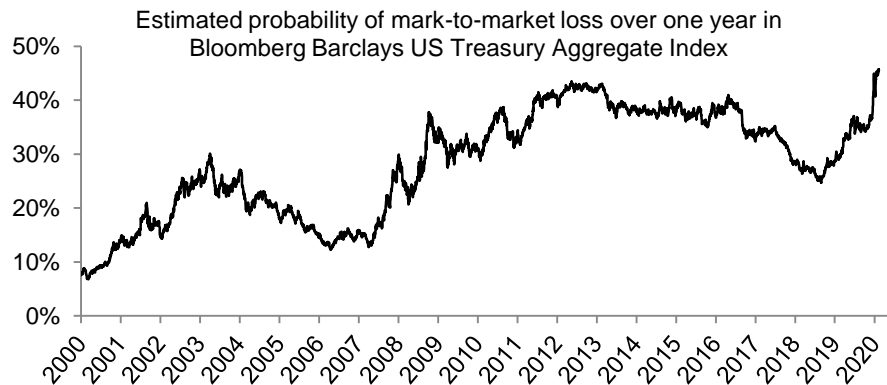


## Price return potential calculation

	Estimated price return if yield goes to zero	
	As of 4/28/2020	As of 06/30/2009
2y Tsy	0%	2%
5y Tsy	2%	13%
10y Tsy	6%	34%
30y Tsy	33%	109%
Tsy Agg	4%	14%

Source: Bloomberg, JPMorgan Dataquery; Price return estimate is calculated using the modified duration and convexity for on-the-run Treasuries and the Bloomberg Barclays US Aggregate Treasury Index.

## Estimated probability of mark-to-market loss over one year



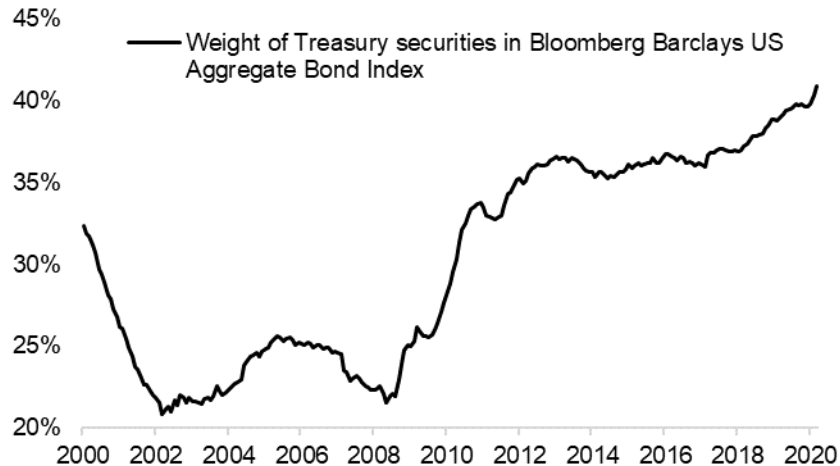
## Correlation of bond and equity returns



# Domestic Investment Funds

- For US fixed income mutual funds and ETFs that are benchmarked to various aggregate bond indices, the weight of Treasuries in the benchmark plays an important role in their Treasury allocation. The share of Treasuries in US Aggregate Bond index has been increasing over the past few years, and may increase further with rising Treasury issuance.\*
- The pace of bond fund inflows has been robust for a decade, a significant source of demand for intermediate maturities. Investment funds will need to maintain their share of purchases at current valuations to replicate the 2008-2010 experience.

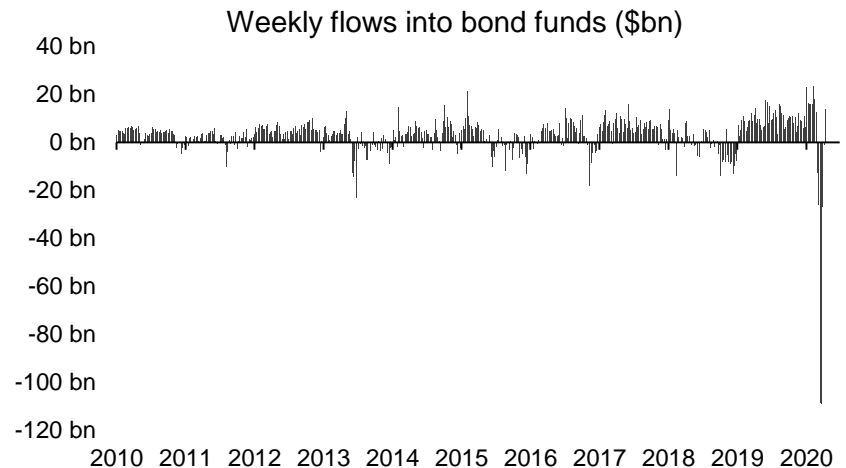
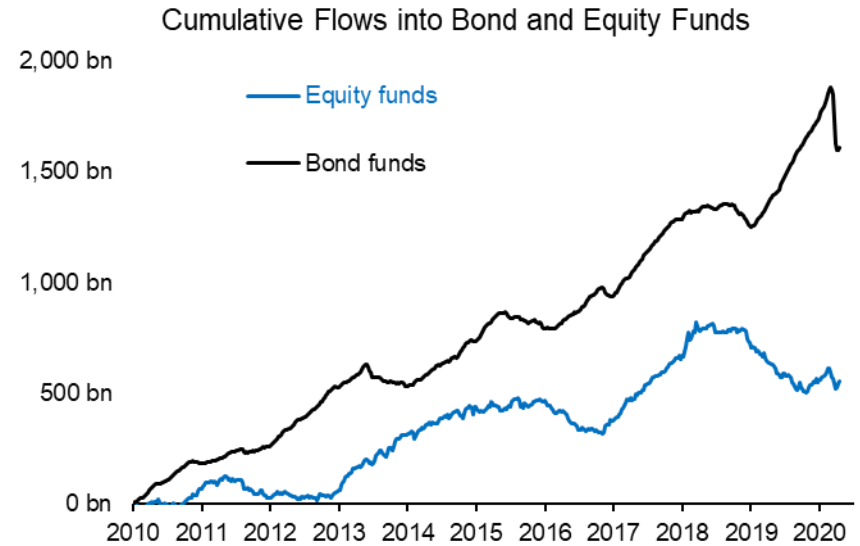
## Share of Treasuries in US Aggregate Bond Index



Source: Bloomberg, data as of 04/28/2020

\*Note: weight is based on the amount of outstanding Treasuries (excluding Fed's holdings) with maturity  $\geq 1$  year

## Flows into bond and equity funds

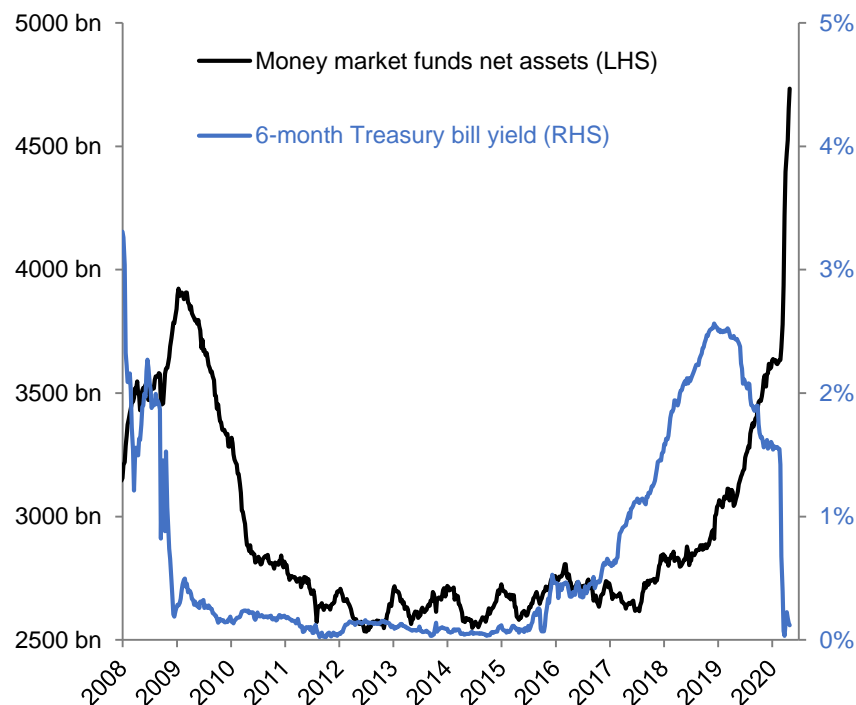


Source: EPFR, data as of 04/15/2020

# Money Market Funds

- As of Q4 2019, 28% of assets held by money market funds were Treasury securities (17% in Treasury bills and 11% in Treasury front-end coupon securities).
- Money market funds have seen large inflows in the past two months, in part a result of the precautionary cash build. The three-month Treasury bill yield followed expectations for the policy rate lower, and traded negative in late March amid increased demand.
- Looking back at the 2008-2010 experience, money market funds saw strong inflows in the financial crisis, and they absorbed a meaningful share of the increase in Treasury bills outstanding in 2008. In 2009-2010 they experienced outflows as bill yields remained near zero.
- One notable development in recent years is that as a result of the money market fund reform, there has been a shift from prime money market funds to government money market funds, suggesting that an increased share of inflows will be invested in Treasuries.

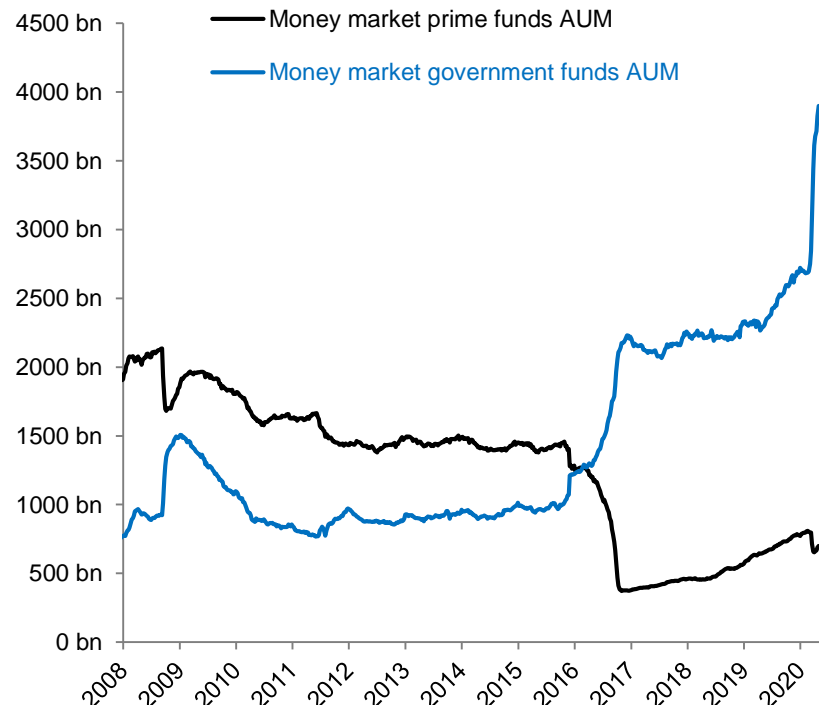
Money market funds AUM vs Treasury bill yield



Source: ICI, Bloomberg; data as of 04/29/2020

\*Note: Based on Flows of Funds holdings data as of Q4 2019.

Money market prime funds vs government funds AUM

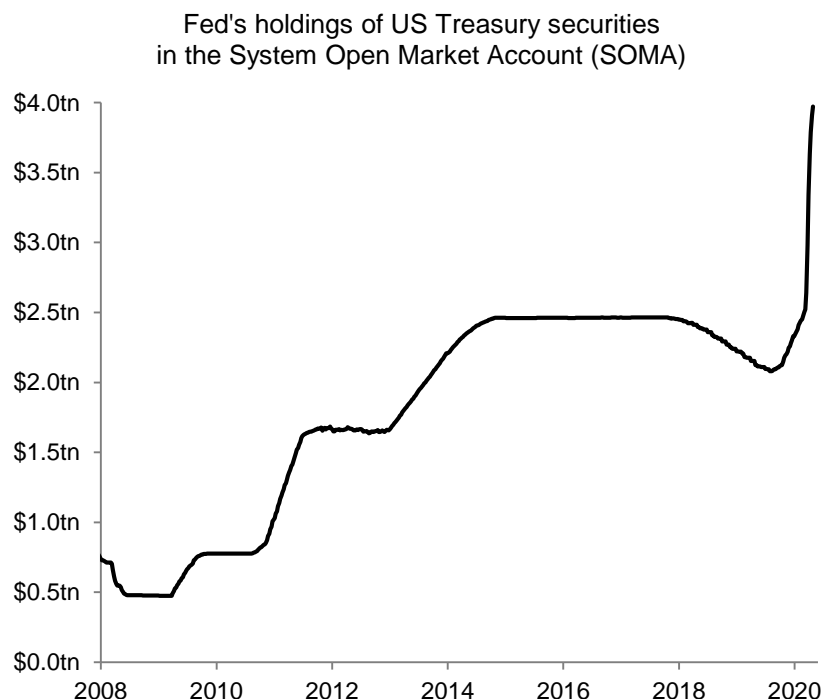


Source: ICI, Bloomberg; data as of 04/29/2020

# The Federal Reserve

- The Fed has committed to maintain market functioning and support the recovery to full employment and target inflation.
- The Fed demonstrated the elastic nature of its balance sheet throughout the 2008-2014 period, maintaining a relatively large share of Treasury purchases to reinforce accommodative financial conditions.
- Since mid-March, the Fed has once again demonstrated this elasticity by purchasing roughly \$1.5 trillion Treasury securities and close to \$600 billion MBS. The pace of Treasury purchase has gradually slowed from \$75 billion/day (\$375 billion/week) to \$8 billion/day (\$40 billion/week\*). Nonetheless, the recent pace of OMO's significantly exceeds the pace of Treasury purchases seen in LSAP/ QE programs over the past decade.

## Fed's Treasury holdings increased sharply in recent weeks

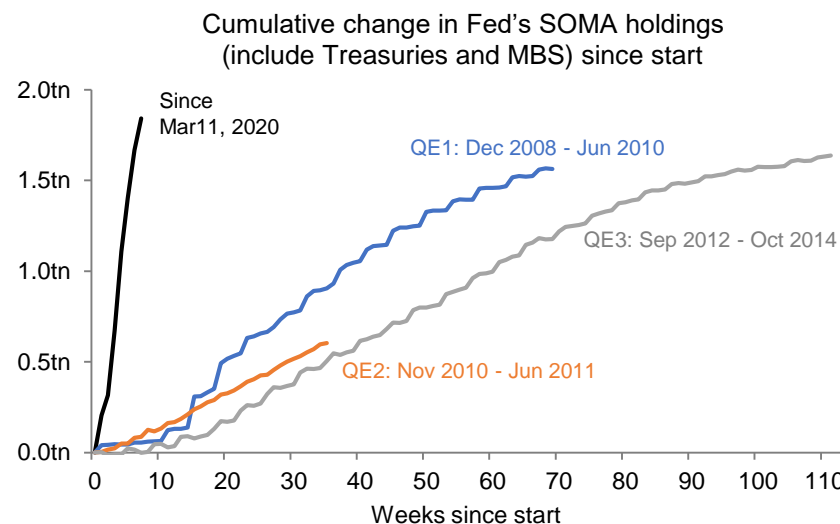


Source: Federal Reserve Board and Haver Analytics; data as of 04/30/2020

\*Note: based on New York Fed's announcement on 05/01/2020

## Recent purchase pace compared to prior QEs

		Total purchased (\$ bn)	
		Tsy securities	Agency MBS
QE1	Dec 2008 to Mar 2010	\$300	\$1,250
QE2	Nov 2010 to Jun 2011	\$600	
QE3	Sep 2012 to Oct 2014	\$790	\$823
OMO	Mar 13, 2020 to Now	\$1,469	\$594



Source for table: Federal Reserve Bank of New York; data as of 04/28/2020

Source for graph: Federal Reserve Board and Haver Analytics; data as of 04/23/2020

# Conclusions

- Q1 2020 witnessed a “perfect storm” with respect to market functioning as the Covid-19 virus spread around the world. Real economic activity collapsed in many countries, and substantial uncertainty exists with respect to the timing and pace of recovery.
- An urgent precautionary cash build led to acute demand for dealer balance sheet capacity, contributing along with other factors to an eventual impairment of Treasury market functioning.
- The broad policy response – monetary, fiscal and regulatory - has been substantial, targeted and coordinated. Actions taken have improved market functioning and reduced tail risks for financial markets and the economy.
- Treasury borrowing needs are now rising rapidly as a consequence of the fiscal policy response. CBO projects deficits of \$3.7 trillion and \$2.1 trillion in FY 2020 and 2021 respectively.
- The challenge ahead is to establish a regime that allows large deficit financing needs to be met without a decline in market functioning nor unduly high interest rates for Treasury debt. A review of the 2008-2010 period may be instructive as outstanding Treasury debt doubled during this time.
- Questions for consideration:
  - Will foreign investors maintain their share of Treasuries outstanding as issuance grows in the future?
  - What additional facilities or regulatory changes may be necessary to support primary dealers absorbing Treasury issuance similar to the 2008 observation?
  - Are there regulatory adjustments that could encourage domestic banks to hold more Treasuries without crowding out lending activities?
  - Could potential changes in market structure improve the durability of liquidity provision across the range of Treasury securities during periods of elevated volatility?
  - Will the outlook for growth and inflation improve such that nominal interest rates move higher without negatively impacting financial conditions, thereby attracting increased demand for Treasuries among more price sensitive domestic buyers?