Additional Public Transparency in Treasury Markets

November 2022

Treasury Charge

Additional Public Transparency

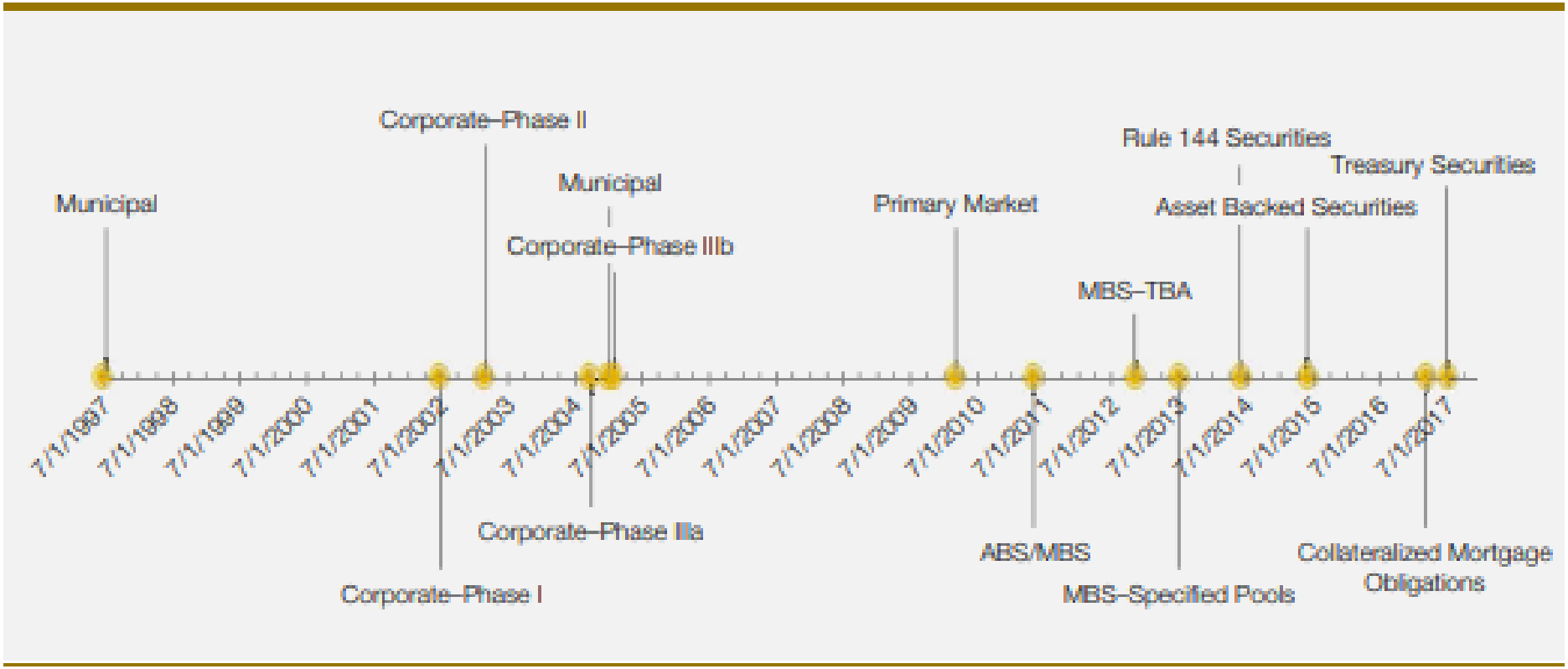
Treasury recently received public comments in response to its request for information (RFI) on additional post-trade transparency in secondary market transactions of Treasury securities. Responses were broadly supportive of efforts to incrementally increase transparency, but recommendations varied regarding the pace and extent of additional transparency. Commenters noted potential benefits, such as improving price discovery and enhanced investor confidence, and potential risks, such as increasing the cost of trading large positions in less liquid securities. Many supported steps to minimize those risks by limiting dissemination for large trades or for certain securities using trade size caps and delays as well as aggregation. They noted similar approaches used for transparency for other fixed income securities and for interest rate derivatives.

How does the Committee assess these benefits and risks of additional public transparency for post-trade transactions? What are the Committee's views on varying treatment for different security types, dissemination caps and delays, and implementation approaches? How would the Committee measure the effectiveness of additional post-trade transparency?

Agenda

US Treasuries have lagged other asset classes with dissemination rules

Regulatory Data Collection and Post-Trade Dissemination in U.S. Fixed Income Markets (1997–2017)



Timeline shows implementation of regulatory data collection and post-trade dissemination between 1997 and 2017 for U.S. municipal bonds, corporate bonds, agency debentures, asset-backed securities, mortgage-backed securities, and Treasury securities. Primary Market description – “Dealers report all U.S. agency debenture transactions, as well as primary market transactions in TRACE-eligible securities.

Source: Bessembinder , Spatt, and Venkataraman (2020) A Survey of the Microstructure of Fixed-Income Markets

Reporting and Dissemination Rules Differ Across Asset Classes

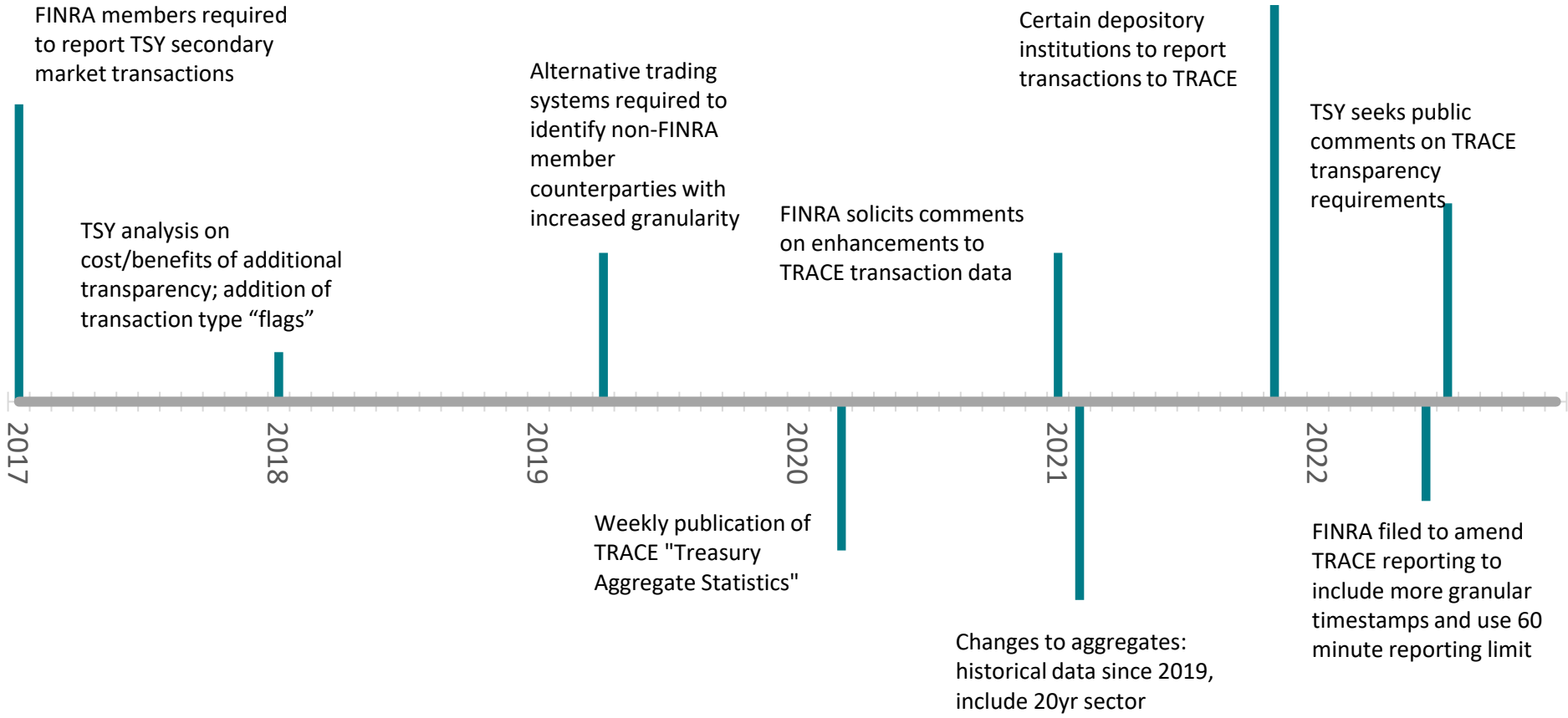
	Asset Class	Implementation / Phase-in	Reporting	Public dissemination of price and volume information	Block trade regime
Cash	**U.S. Corporate Bonds: TRACE**	**Began 2002**	**Within 15 mins**	**Immediate Dissemination**	**Volume masking in public dissemination**
		■ Phased-in 2002 – 2006, starting with dissemination of largest bonds and with longer dissemination delays ■ All bonds in scope from Jan 2006.	■ Dealers report transaction to TRACE **within 15 minutes.**		■ Investment Grade >$5m disseminated as $5m+ ■ High Yield >$1m disseminated as $1m+
	MBS TBA: TRACE	**Began 2012**	**Between 15 mins and T+1**	**Immediate Dissemination**	**Volume masking in public dissemination**
		MBS To-be-announced (TBA) transactions are included for public dissemination from Nov 2012.	■ Dealers report to TRACE between **15 minutes and T+1** depending on transaction type.	■ Public dissemination is immediate subject to certain exceptions.[2]	■ MBS TBA for Good Delivery > $25m disseminated as $25m+ ■ MBS TBA not for Good Delivery > $10m disseminated as $10m+
	Municipal Bonds: EMMA	**Began 1997**	**Within 15 mins**	**Immediate Dissemination**	**Volume masking in public dissemination**
		■ Phased-in 1997 – 2005. ■ Subject to public dissemination within 15- mins since January 2005.	■ Dealers report all transactions to EMMA **within 15 minutes.**		■ Trades >$5m are masked for 5 days in public reporting.
Non-cash	**Interest Rate Futures: CFTC Part 38**	**~2012**	**Immediate (except blocks)**	**Immediate Dissemination**	**No volume masking in public dissemination**
			■ Block trades subject to reporting determined by exchange (e.g., 5 – 15 minutes).		■ Block thresholds and reporting determined by the exchange and differ across contract type. ■ Block trades disseminated upon receipt.
	Interest Rate Swaps: CFTC Part 43[1]	**Began 2013**	**Immediate**	**Immediate Dissemination**	**Volume masking and dissemination delays**
		■ Block regime subject to multi-year phase-in, starting with lower block trade thresholds and longer dissemination delays.	■ Dealers report transaction to Swap Data Repository **"as soon as technologically practicable"**.	■ Public dissemination is immediate unless subject to a time delay (ie Blocks on 15min delay)	■ Volume masking in public dissemination, dependant on currency and maturity. ■ Dissemination delay 15-mins to 24-hours depending on underlying / counterparty type.

Source: FINRA 6700; CFTC Part 43; CFTC Part 38; CME Rule 526; MSRB G-14

[1] Revised block thresholds and notional caps will be in effect from December 4, 2023

[2] See exceptions to immediate public dissemination in FINRA 6750. Dissemination of Transaction Information https://www.finra.org/rules-guidance/rulebooks/finra-rules/6750

Treasury trade data has been collected since 2017, but transaction level data has not been publicly disseminated

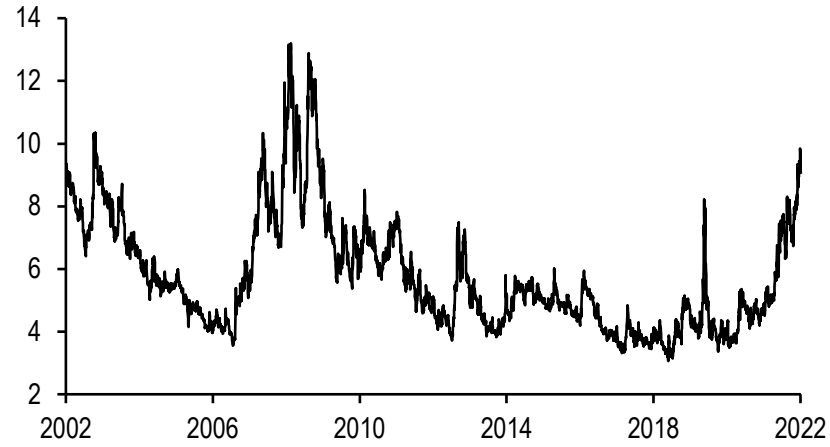


Note: Labels are at the start of the year.
Source: DEPARTMENT OF THE TREASURY (Docket No. TREAS-DO-2022-0012)

Agenda

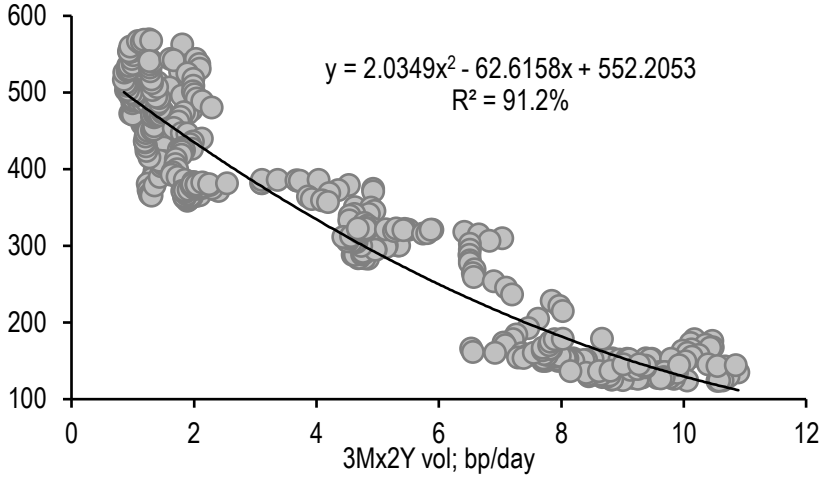
Rates volatility remains historically elevated, which is negatively impacting broad measures of Treasury market liquidity

3Mx10Y implied swaption vol; bp/day



Source: J.P. Morgan research

Duration-weighted Treasury market depth*; 1-month moving average; regressed on 3Mx2Y implied swaption vol (bp/day), regression over the 2 years; $mn 10-year Treasury equivalents



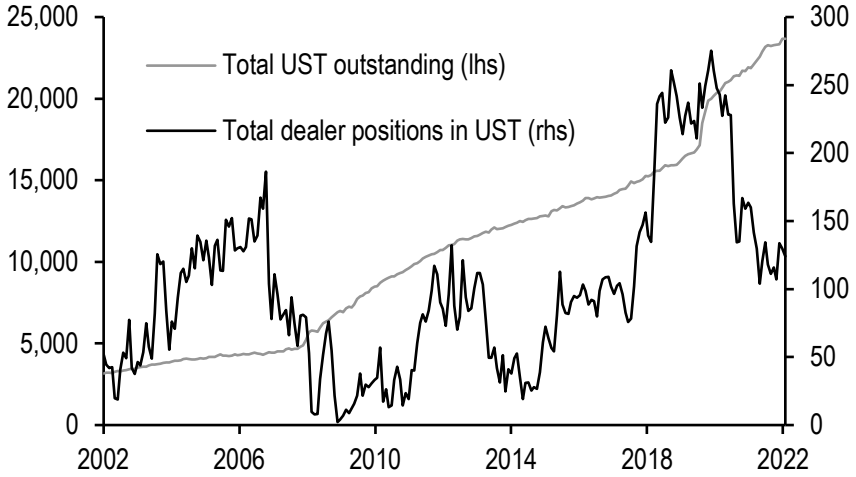
* Market depth is the sum of the three bids and offers by queue position, averaged between 8:30 and 10:30am daily. his is the sum of 2-, 5-, 10-, and 30-year depth in 10-year equivalents

Source: J.P. Morgan, BrokerTec

- Increased volatility in the treasury market typically correlates with lower market depth as we are seeing today

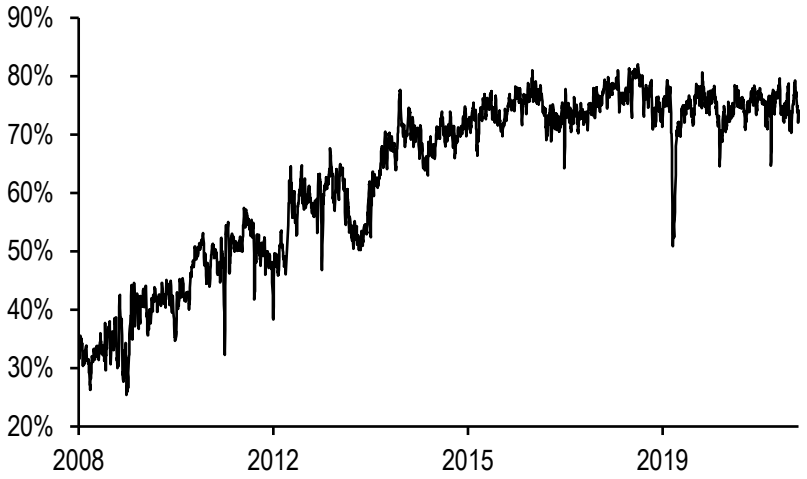
Changing Treasury market intermediation opens the door to further study transparency for Treasuries…

Total marketable US Treasury debt outstanding (lhs, $bn) versus absolute value of primary dealer positions in Treasuries (1m moving average, rhs, $bn)



Source: Federal Reserve Bank of New York

Fast* share of 10-year Treasury market depth; %**



* Orders created less than 0.3 milliseconds after the prior order book update.
** Market depth defined as the total notional available in the central limit order book (CLOB) at the best three prices, averaged across both the bid and ask stacks, see Drivers of price impact and the role of hidden liquidity, JPM research, 1/13/17. They take snapshots of the live order book for every $500mn in traded notional, and average market depth measurements from these snapshots, thus forming a volume-weighted average.
Source: J.P. Morgan research

- The Treasury market has more than doubled over the last decade, but dealer inventories and bank balance sheets in general have not kept pace in recent years. A combination of post-GFC capital and liquidity regulations, and associated changes in risk management approach, have left banks with less flexibility to absorb Treasuries in times of volatility
- Moreover, as the share of liquidity offered by more algorithmic providers has increased over the last decade, liquidity has become less resilient, declining at times of extreme stress

Agenda

Responses to RFI on Additional Transparency are mixed

27 RFI responses

(9 trade association, 4 PTF, 3 asset manager, 3 consumer group, 3 hedge fund, 2 primary dealer, and 3 other)

Possible Benefits **(cited mostly by public interest groups, hedge funds, PTFs and related trade associations)**	**Possible Risks** **(cited mostly by primary dealers, asset managers and related trade associations)**
Lower transaction costs	Negatively impact intermediation and risk transfer in less liquid segments and for large transactions
Increase liquidity (and new intermediaries)	Unlikely to boost liquidity; could decrease liquidity
Increase “market confidence”	Increase dissemination avoidance: move flows outside the U.S., incentivize smaller trading sizes
Improve risk management	Reduce participation in auction process or potential weaker pricing
Improve resilience during market stress	Harm households via holdings in mutual funds, pensions, and insurers who rely on trading quickly and in large size

- Nearly all respondents, regardless of view on benefits and risks, agreed on phased-in dissemination and block trade exemptions if there are new dissemination rules implemented
- Respondents cited U.S. corporate bond market studies to support arguments both for and against additional transparency

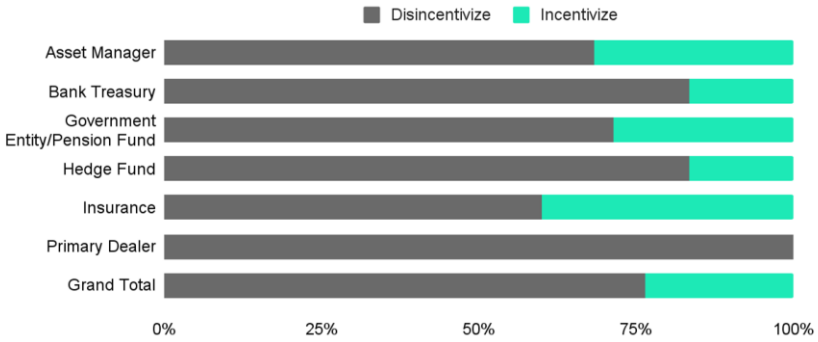
SIA Partners/SIFMA Survey Results

60 participants, 56% private firms, $68tn in combined participant AUM

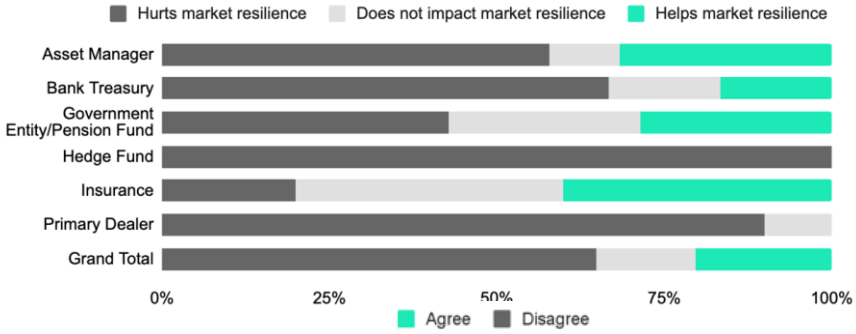
Participants (>75%) largely agreed…

- Additional transparency would disincentivize intermediation and would not help Treasury market resilience
- Volumes should be capped and transparency requirements should be different in less liquid segments
- Dissemination implementation should be phased in over time
- Do not favor shortening reporting to 60 minutes, or only support this for on-the-runs, as costs incurred could outweigh benefits

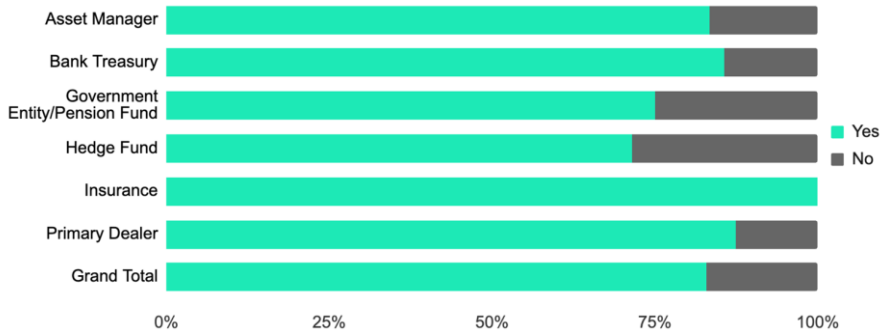
Do you believe that additional transparency would incentivize or disincentivize intermediation?



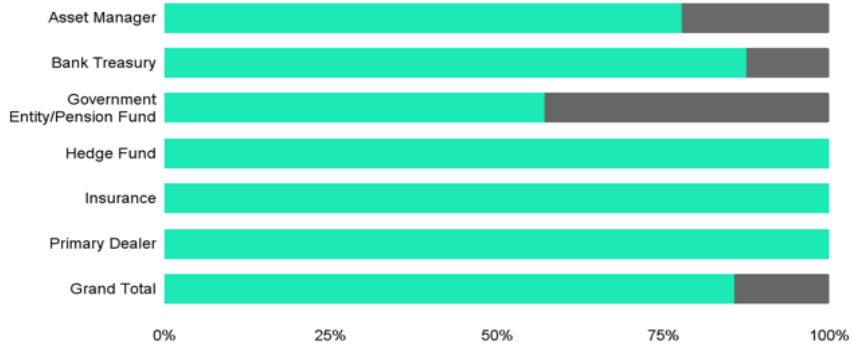
Do you believe that additional transparency would improve Treasury market resilience?



Should volumes be capped if data is disseminated at the transaction level as is done for other fixed-income securities (i.e. corporate bonds)?



Should transparency requirements be different in less liquid segments (i.e. off-the-run) than in more liquid market segments (On-the-run)?



* Source: Additional Transparency for Secondary Market Transactions of Treasury Securities- A Study on the Impact to the Market and Market Participants – October 2022. Sia Partners, was asked by SIFMA to conduct a study reviewing the Department of Treasury RFI related to transparency for U.S. Treasury products.

Post-Implementation Studies

- Market liquidity has been impacted by a number of factors over the last two decades
  - **Quantitative easing** and a period of extended low volatility
  - **Technological developments**, including electronification and high frequency trading
  - **New participants**, including algorithmic, high frequency trading firms, and ETFs
  - **Behavioral change**, including more buy and hold investment
  - **Regulatory change**, including pre/post-trade transparency, centralized trading, prudential regulations, central clearing, etc.
- Analysis of long-term trends is limited due to incomplete time series in some asset classes
- Observations on liquidity indicators in other markets may not be relevant to Treasuries in a different macro-economic and regulatory environment

Post Implementation Studies in Swaps and Futures

Swaps

- The Dodd-Frank derivatives market reforms, including pre- and post-trade transparency and centralized trading requirements, led to an improvement in liquidity metrics for IRS of between 12% and 19%, driven by an increase in competition between dealers (Benos, Payne, and Vasios 2020)

Futures

- The mean-variance frontier becomes significantly worse as order size increases, but that the frontier has improved over time. The costs of executing large orders on behalf of customers are significantly worse as order size increases (Gousgounis, Onur and Tuckman 2020)

Sources: Benos, Payne, and Vasios (2020). Centralized Trading, Transparency, and Interest Rate Swap Market Liquidity: Evidence from the Implementation of the Dodd Frank Act; Gousgounis, Onur and Tuckman (2020) Large Order Size Liquidity in Treasury Markets; Schultz and Song 2019, Transparency and dealer networks: Evidence from the initiation of post-trade reporting in the mortgage backed security market

Post-Implementation Studies: U.S. Mortgage Bonds

The U.S. Mortgage bond market transparency experience is a good proxy for Treasuries

- The introduction of post-trade transparency in the TBA market was successful at reducing transaction costs

Trading costs	Trading costs fell for investors and dealers have less need for interdealer trading (Schultz and Song 2019)
Transaction size	Implied average transaction sizes have increased (Schultz and Song 2019)
Dealer capital commitment	Dealers can commit less capital (Schultz and Song 2019)
Trading activity and turnover	Trade volume declined by almost 13% while the number of trades declined by 2.5% pre- to post-transparency (Schultz and Song 2019)
Industry concentration	Industry concentration increases as “peripheral dealers” less competitive (Schultz and Song 2019)

Sources: Schultz and Song, Transparency and dealer networks: Evidence from the initiation of post-trade reporting in the mortgage backed security market (2019)

Post-Implementation Studies: U.S. Corporate Bonds

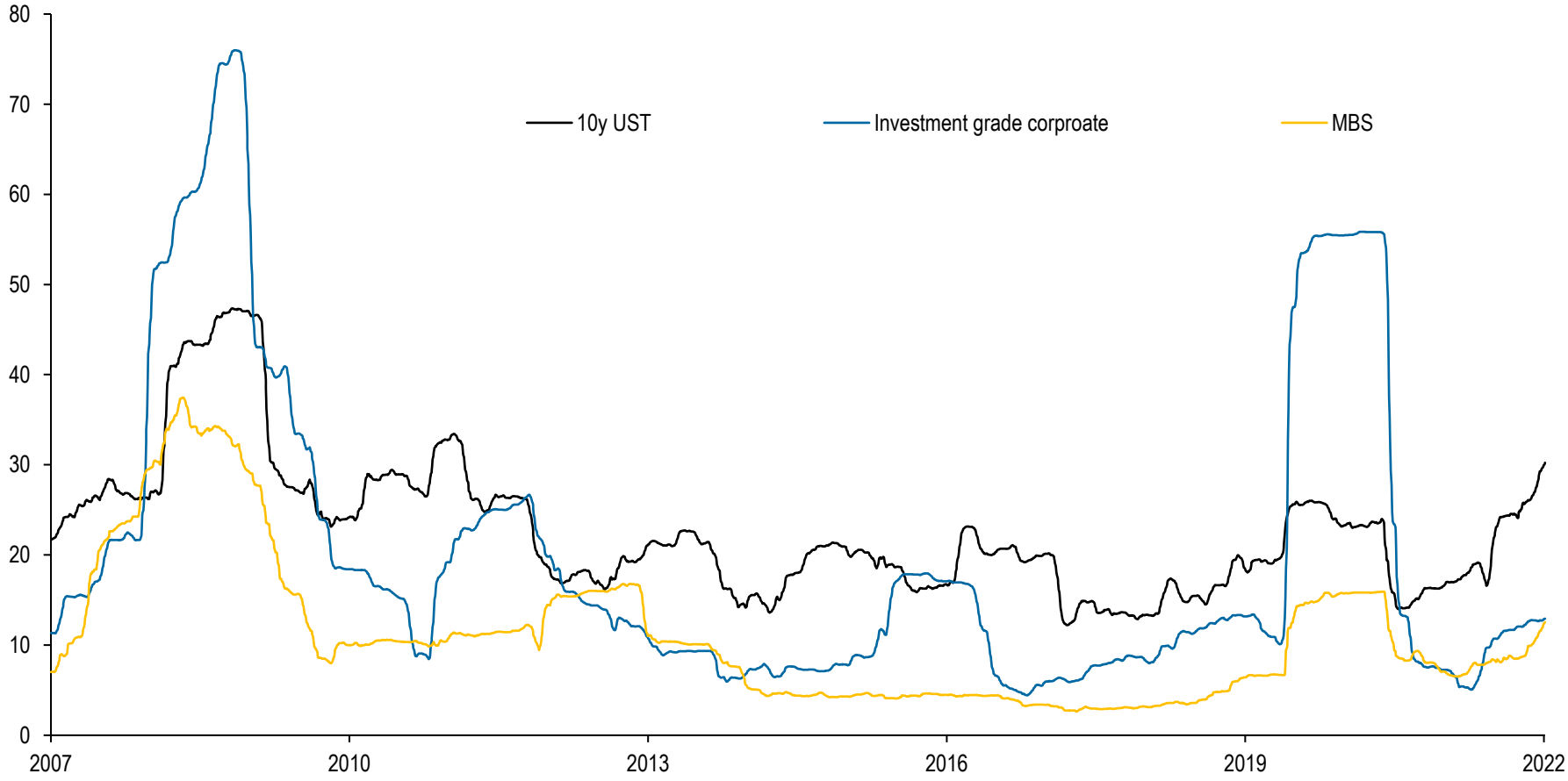
The U.S. Corporate bond market has the most extensive literature on post-implementation impacts

Transaction costs	■ For 144A bonds, transaction costs decreased following trade dissemination by approximately 10% with larger reductions observed for block transactions and bonds with lower dealer competition (Jacobsen and Venkataraman 2018). ■ Introduction of transparency through TRACE is associated with a decline in trading costs for at least some bonds (Goldstein, Hotchkiss, Sirri 2007).
Bid-ask spreads	■ Bid-ask spreads narrowed and trading costs reduced by some measures (Mizrach 2015; Asquith, Covert and Pathak 2019). ■ Except for very large trades, spreads on newly transparent bonds decline relative to bonds that experience no transparency change (Goldstein, Hotchkiss, Sirri 2007). ■ Investors have benefited from the increased transparency, through substantial reductions in the bid-ask spreads (Maxwell, Bessembinder, and Hendrik 2008).
Dealer capital commitment	■ Liquidity provision evolved away from the traditional commitment of bank-affiliated dealer capital to absorb customer imbalances (Bessembinder, Jacobsen, Maxwell and Venkataraman 2016).
Block trades	■ Participants reported that large transactions were more difficult to execute, which resulted in increased transaction costs and lower daily liquidity for investors (Greenwich Associates 2015). ■ The proportion of total volume traded in blocks of $5million or more fell by almost 15% (Mizrach 2015).
Transaction size	■ The average trade size for the 1,000 most active issues dropped almost 35% between 2007 and 2013 (Mizrach 2015).
Trading activity and turnover	■ Trading activity for some categories of bonds declined after the TRACE rules went into effect. Large trades as well as high yield trades saw the largest negative impact in trading activity (Asquith, Covert and Pathak 2019).

Sources: Jacobsen and Venkataraman 2018, Does trade reporting improve market quality in an institutional market? Evidence from 144A corporate bonds; Mizrach 2015, Analysis of Corporate Bond Liquidity; Greenwich Associates 2015, The Continuing Corporate Bond Evolution; Asquith, Covert and Pathak 2019, The Effects of Mandatory Transparency in Financial Market Design: Evidence from the Corporate Bond Market; Bessembinder, Jacobsen, Maxwell, and Venkataraman 2016, Capital Commitment and Illiquidity in Corporate Bonds; Maxwell, Bessembinder, and Hendrik 2008, Transparency and the Corporate Bond Market. Michael A. Goldstein, Edith S. Hotchkiss, Erik R. Sirri, Transparency and Liquidity: A Controlled Experiment on Corporate Bonds, The Review of Financial Studies, Volume 20, Issue 2, March 2007

Transparency appears to have limited impact in reducing volatility during times of stress

1-month delivered vol* in 10-year Treasury yields, investment grade corporate credit spreads, and 30-year current coupon MBS; bp



* 1-year standard deviation of monthly changes in yields and spreads
Source: J.P. Morgan research

Agenda

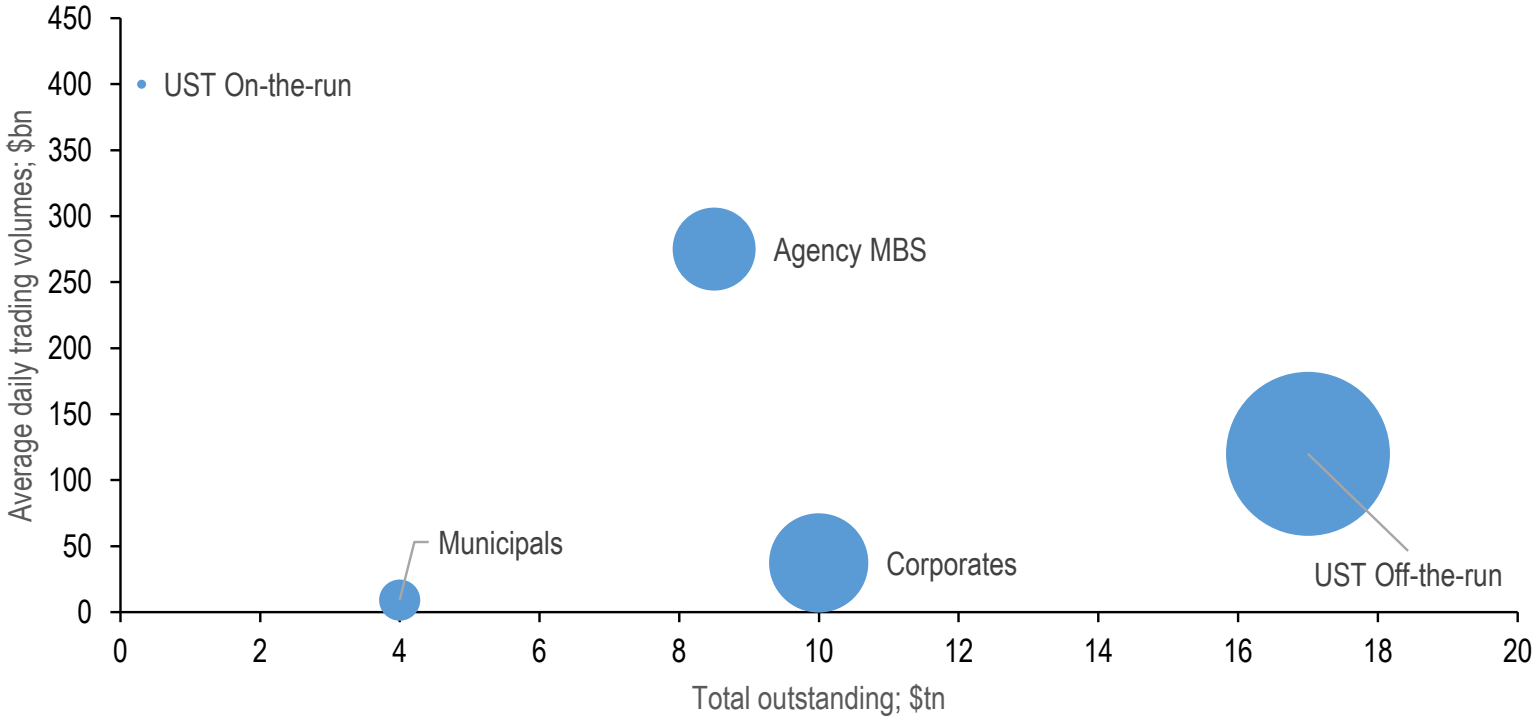
Cross-asset comparison shows the Treasury market is more highly concentrated in fewer CUSIPS, with lower direct retail ownership

	Agency MBS	Corporates	Municipals	UST On-the-run	UST Off-the-run
Total outstanding	~$8.5tn	~$10tn	~$4tn	$0.3tn	$17tn
Average daily volume (2021 average notional value)	~$275bn	~$37bn	~$9bn	~$400bn	~$120bn
Average daily transaction volume (2021 average transactions)	~10,500	~64,000 2021 IG+HY transactions	~30,000	~140,000	~17,000
Average trade size	~$25mn	~$600,000	~$300,000	~$3mn	~$7mn
Electronification	50 – 60% TBA market	30% IG 12% HY	10 – 15%	65%	35%
Number of issuers	3	~10,000	~50,000	1	1
Number of securities	~1 million	~90,000	~1 million	~7	~300
Retail Investors	4.5%	34.7%	26.4%	7.6% On-the-Run + Off-the-Run	

Source: SIFMA, MSRB Factbook, CBOE, FINRA, TRACE Factbook, Greenwich Associates, World Bank, JPM Research, U.S. Department of the Treasury
Note: All figures are approximate and indicative only; UST on- and off-the-run figures are for nominal coupons only

Off-the-run Treasuries size and trading volume are more similar to corporates, munis and Agency MBS

Average daily trading volumes in various fixed income products, ($bn); versus total outstanding by product ($tn); dot sizes scaled by total outstanding in each product



Source: SIFMA, MSRB Factbook, CBOE, FINRA, TRACE Factbook, Greenwich Associates, World Bank, JPM Research, U.S. Department of the Treasury
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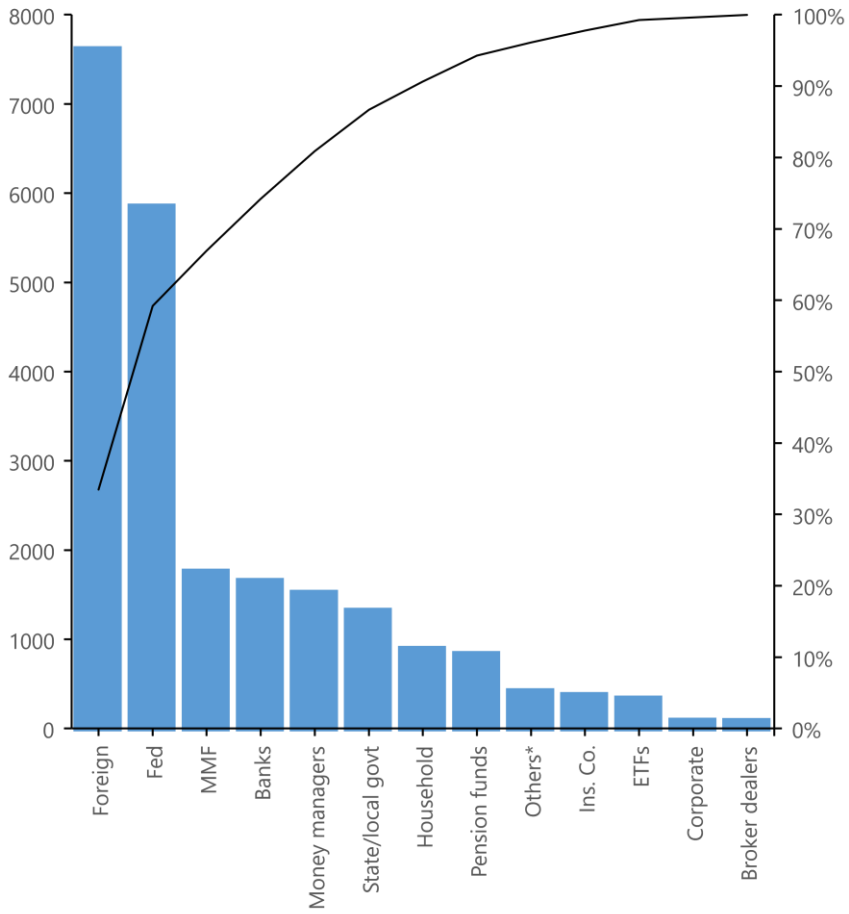
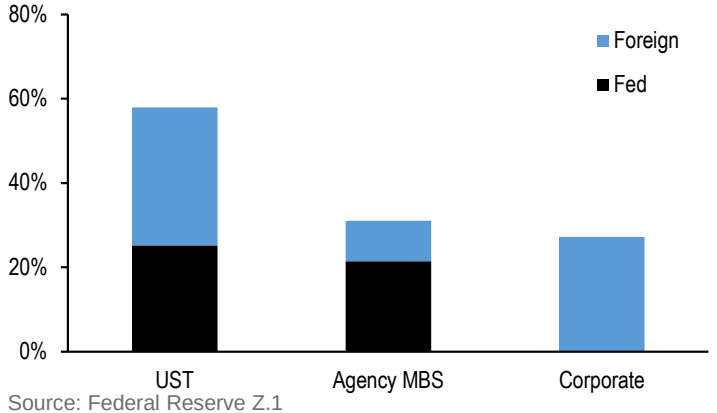
Treasuries are supported more by foreign buyers than direct retail buyers

Ownership of Treasury market by investor type ($bn lhs, % rhs)



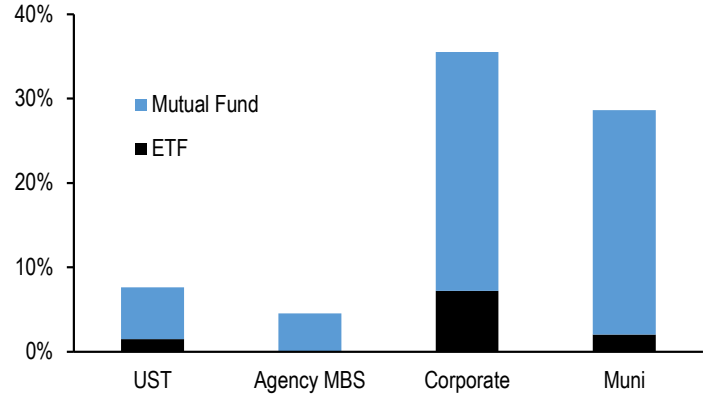
Source: Federal reserve Z.1

Federal Reserve and foreign share of US bond markets; %



Source: Federal Reserve Z.1

ETF and mutual fund share of US bond markets; %

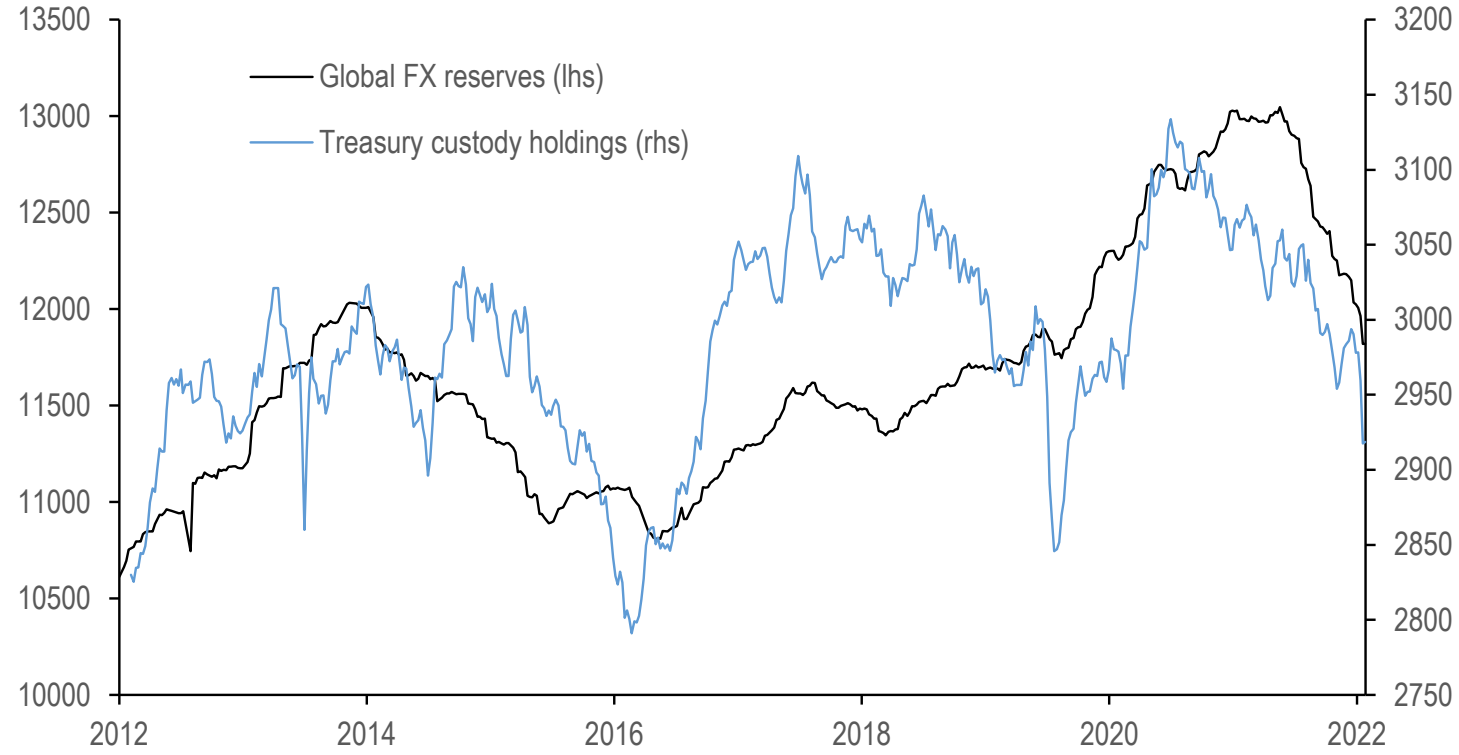


Source: Federal Reserve Z.1

- In contrast to other large US fixed income markets, the Treasury market is disproportionately held by foreign institutional investors, while retail ownership is significantly smaller
- Foreign holders tend to be concerned with the ability to execute large blocks of risk with minimal price impact

Though foreign official institutions are longer-term holders of Treasuries, there have been bouts of selling in recent years, largely in off-the-run Treasuries

Global foreign exchange reserves (lhs; $bn) versus Treasuries held in custody for foreign official and international accounts (rhs, $bn)

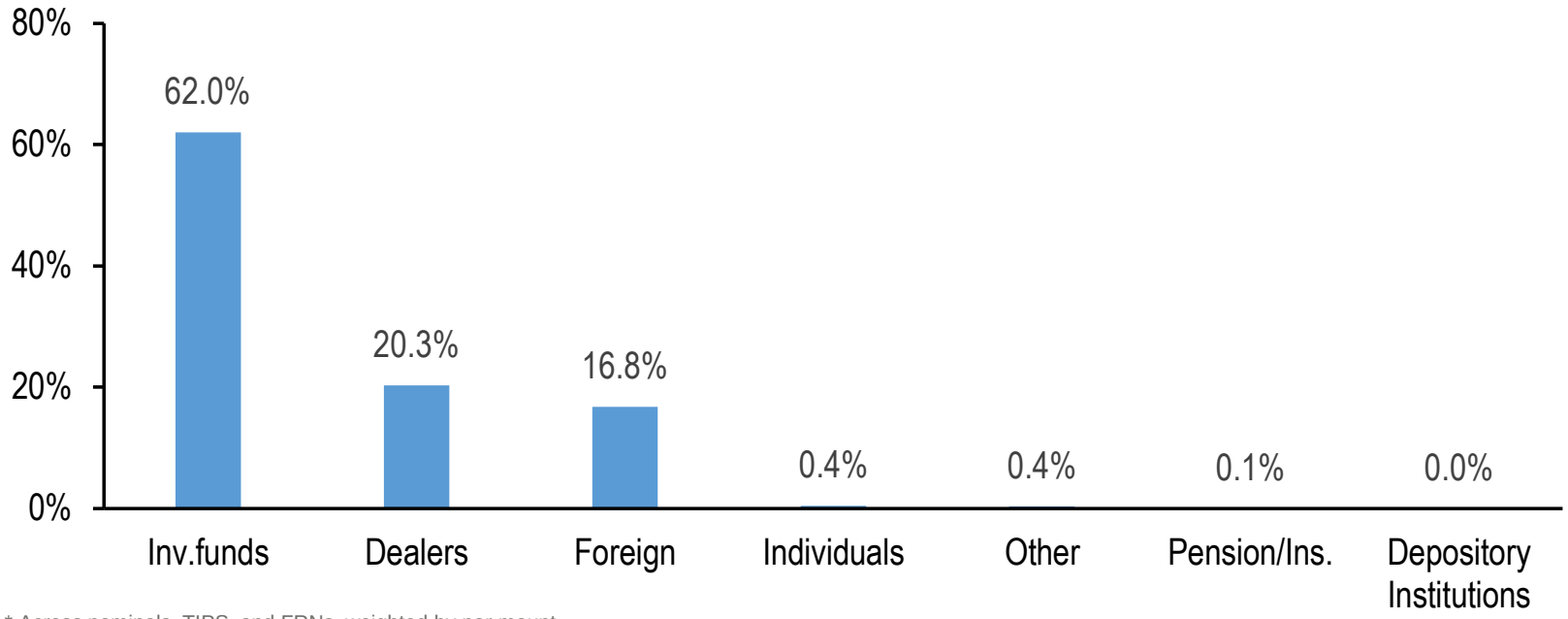


Source: Bloomberg Finance L.P., Federal Reserve

- FX reserve managers are not just buy and hold investors, but have been significant sellers of Treasuries numerous times over the last decade to intervene in currency markets or fund local needs for USD

There are three main investor types who support the auction process

Auction allotments by investor type, YTD 2022 average*; %



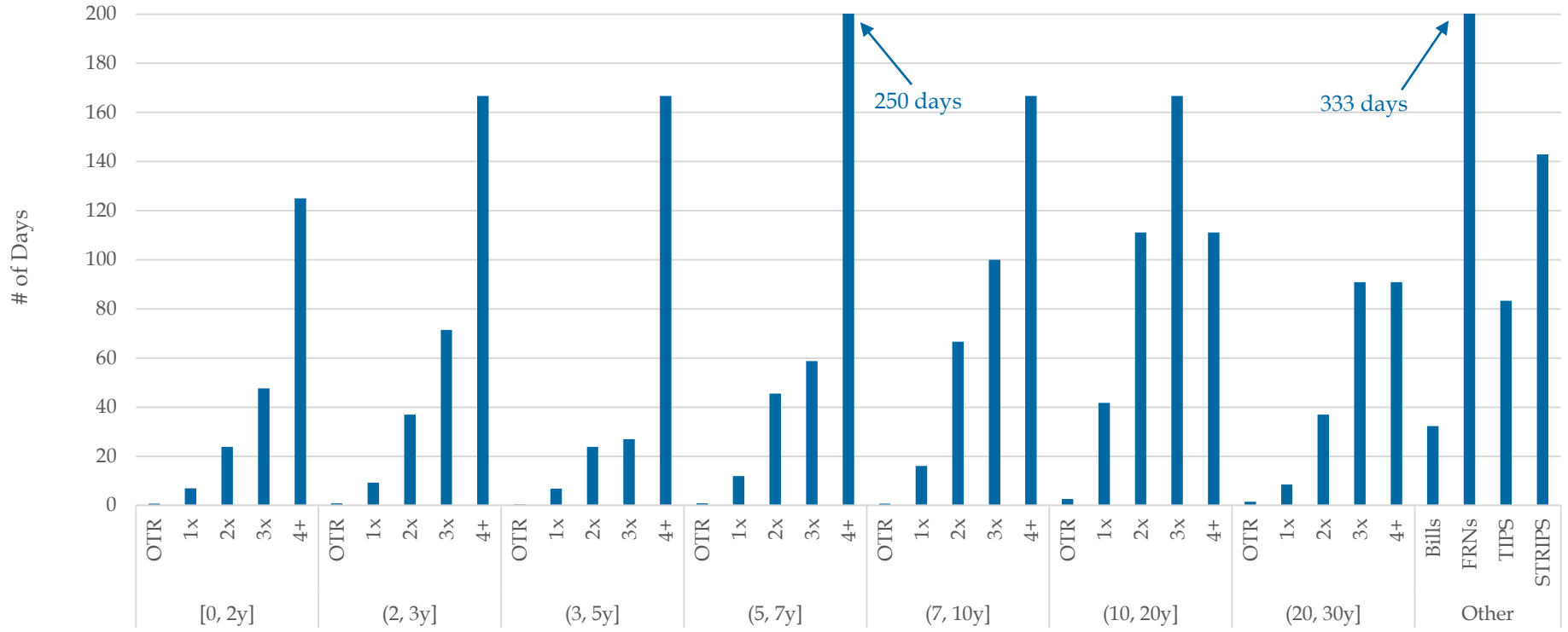
* Across nominals, TIPS, and FRNs, weighted by par mount
Source: US Treasury

- The Treasury auction process is integral to regular and predictable, cost-effective funding for Treasury
- RFI feedback from Treasury's main investors should be strongly considered to ensure strong turnout at auctions

Agenda

There is strong liquidity in on-the run securities, with significantly quicker turnover than off-the-runs, Bills, FRNs, TIPS and STRIPS…

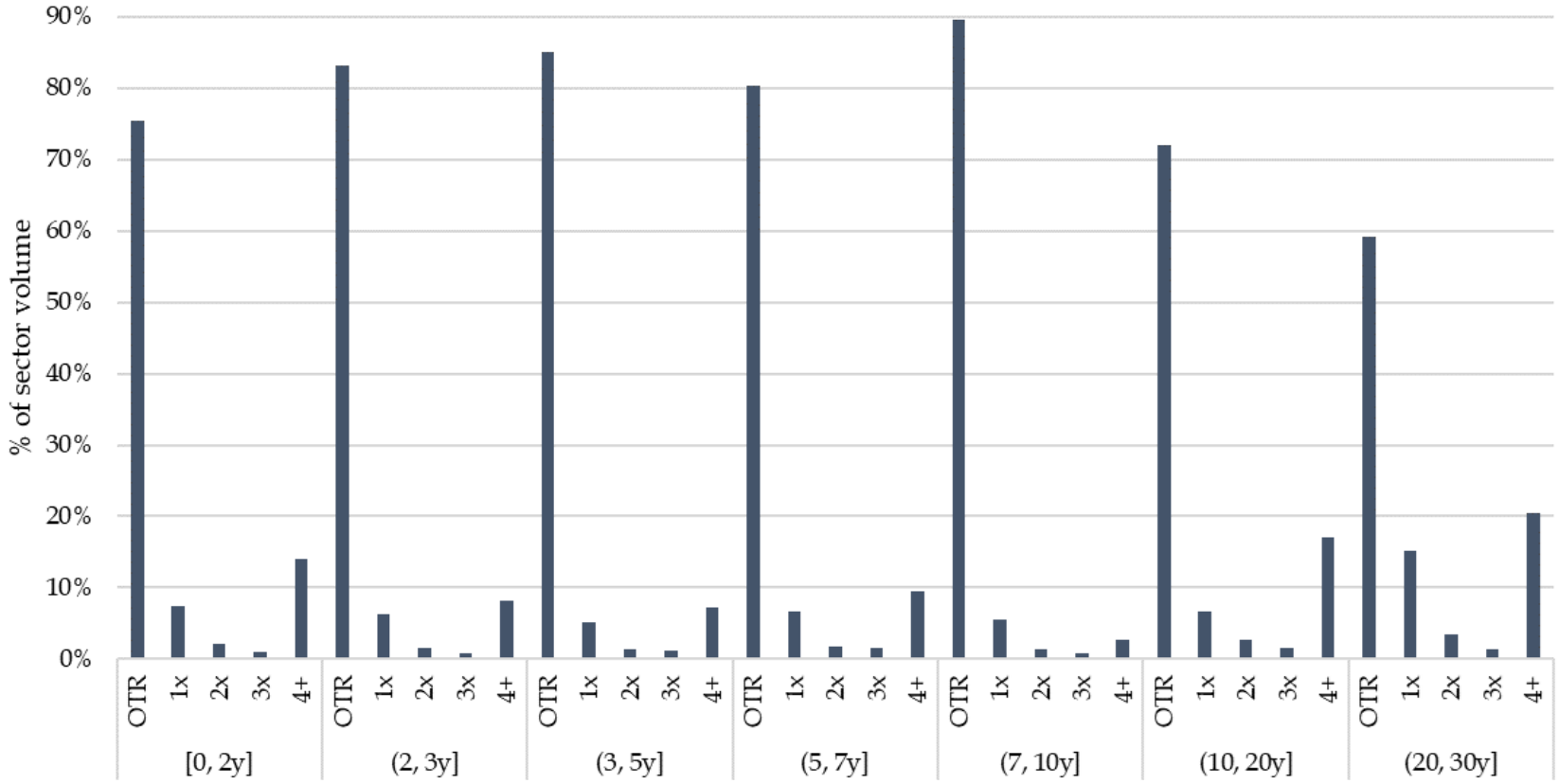
Implied full turnover in number of days
Based on average daily volumes and float amount that excludes SOMA holdings and stripped amounts in 2022



* 4+ includes all off-the-runs greater than the 3rd off-the-run
Source: FINRA TRACE, U.S. Department of the Treasury

…and on-the-run securities make up a large portion of overall Treasury trading volume…

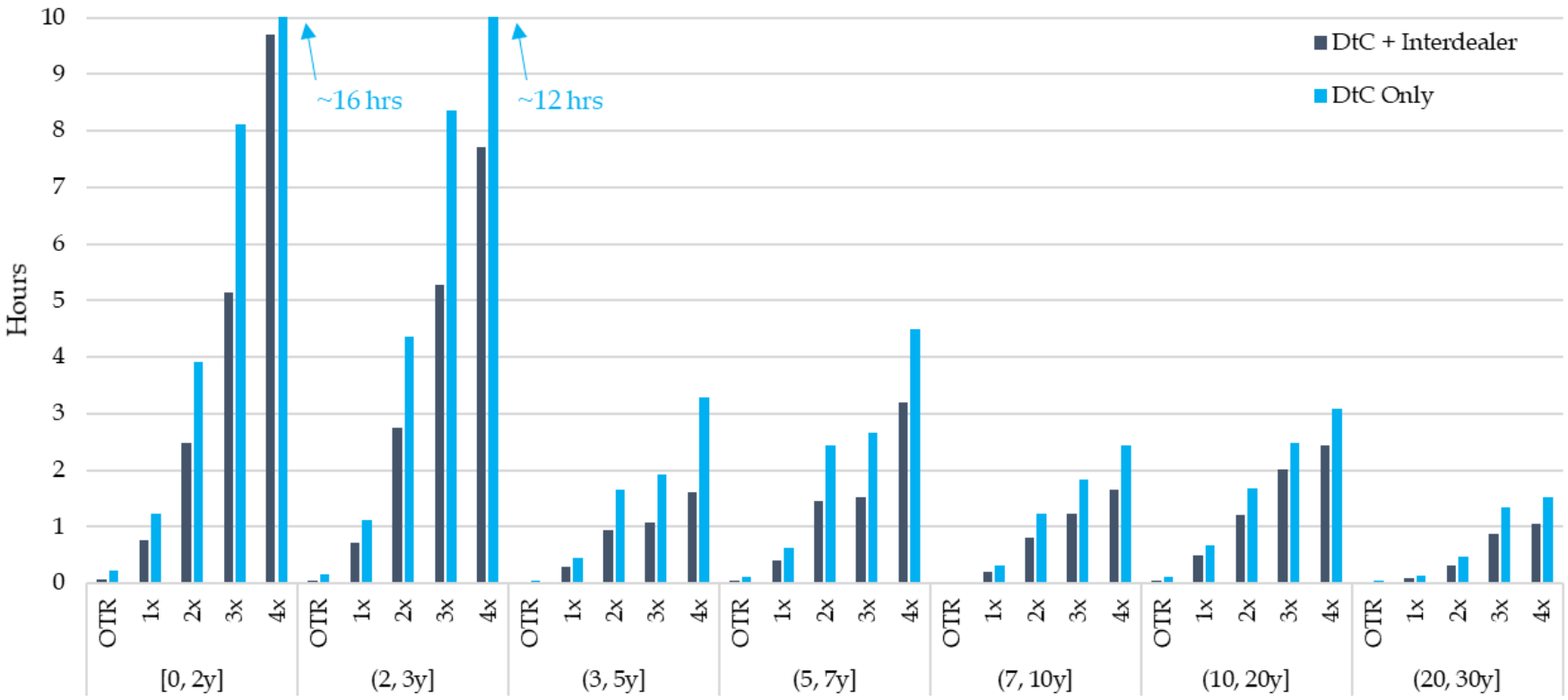
On- and off-the-run nominal coupon volumes, share of sector volume
Based on average daily volumes in DV01 in 2022



* 4+ includes all off-the-runs greater than the 3rd off-the-run
Source: FINRA TRACE, U.S. Department of the Treasury

…but the implied time to transact a significant block of duration rises sharply in more deeply off-the-run securities

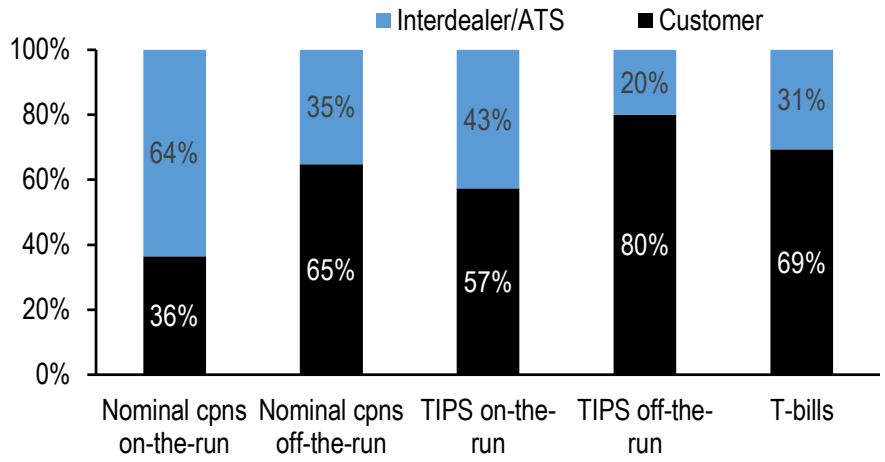
Implied hours to transact $100k DV01
By on- vs. off-the-run status; Based on average hourly volume from 8am to 4pm in 2022



* 4x is only 4th off-the-run security
Source: FINRA TRACE, U.S. Department of the Treasury

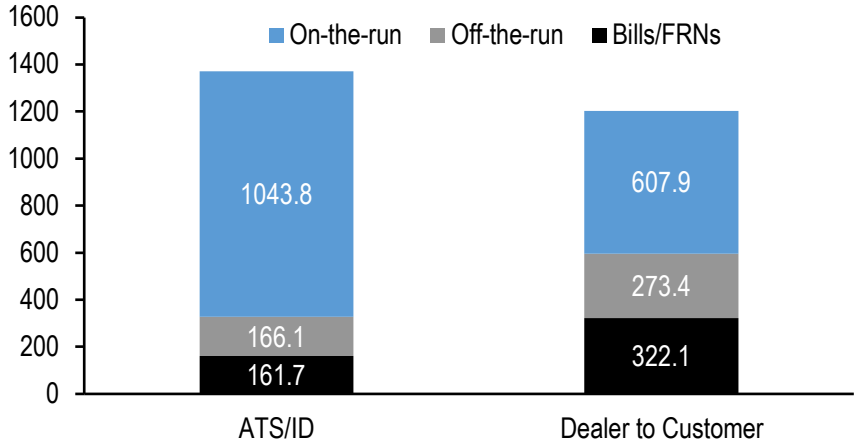
Less liquid securities are more commonly traded as Dealer to Customer (DTC)

Treasury trading volume by product type, customer vs interdealer/ATS share; %



Source: FINRA TRACE

Treasury trading volumes by counterparty, week of 7/22/22; $bn

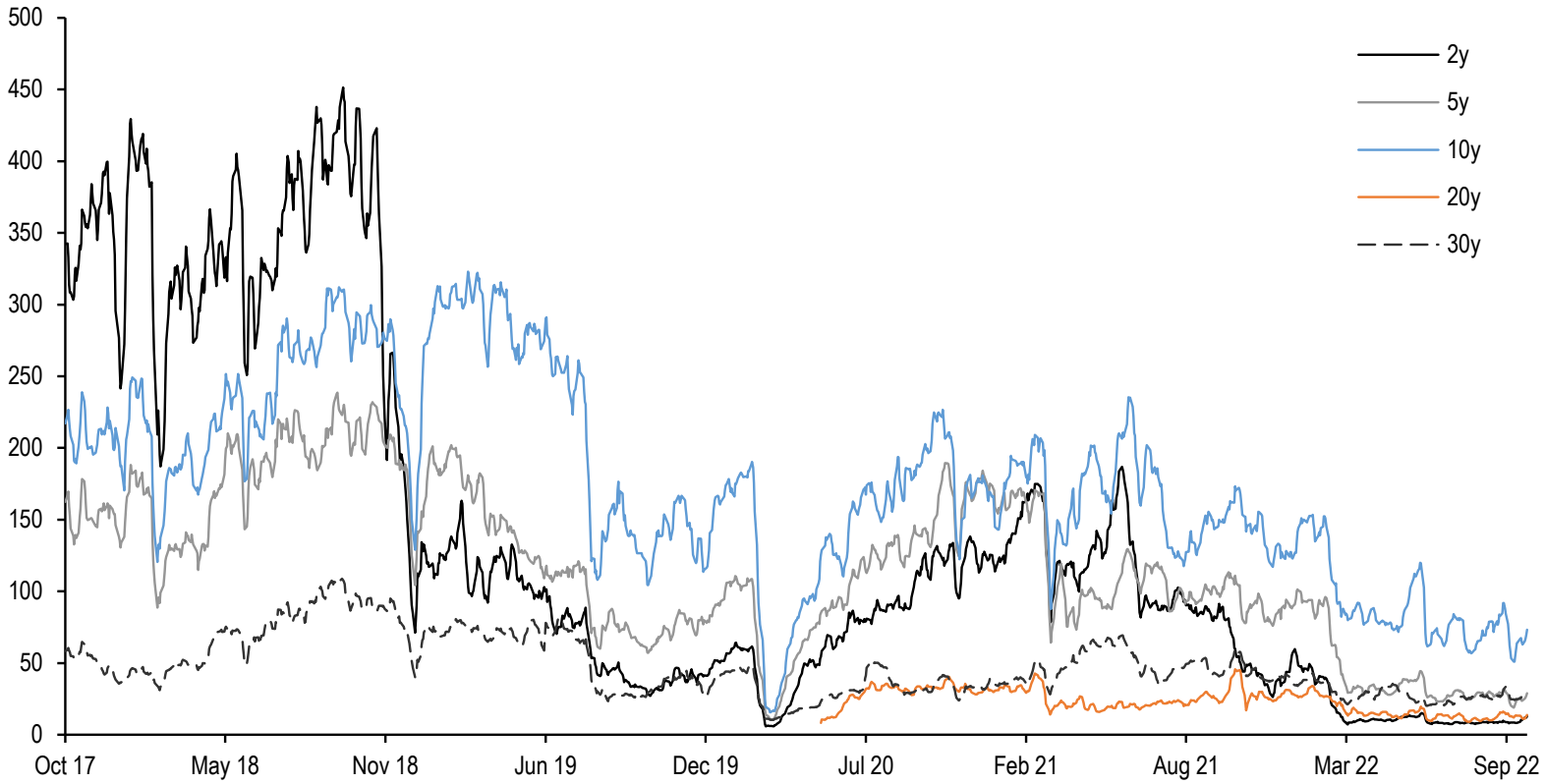


Source: FINRA TRACE, SIFMA estimates
Nominal coupons and TIPS separated into remaining years-to-maturity to include current on-the-runs. Strips included in nominal coupons off-the-run volume.

- Dealer to Customer trading represents more of the customer base who is likely to trade off-the-run securities
  - RFI feedback from this group argues against dissemination given concerns over liquidity
- ATS and interdealer market is increasingly dominated by high frequency traders who trade on-the-run securities
  - RFI feedback from this group argues in favor of additional transparency across all treasury securities to drive increased trading volumes

Treasury market liquidity is not uniformly distributed across the curve

Treasury market depth* by on-the-run tenor, 1-week moving average; $mn 10-year Treasury equivalents

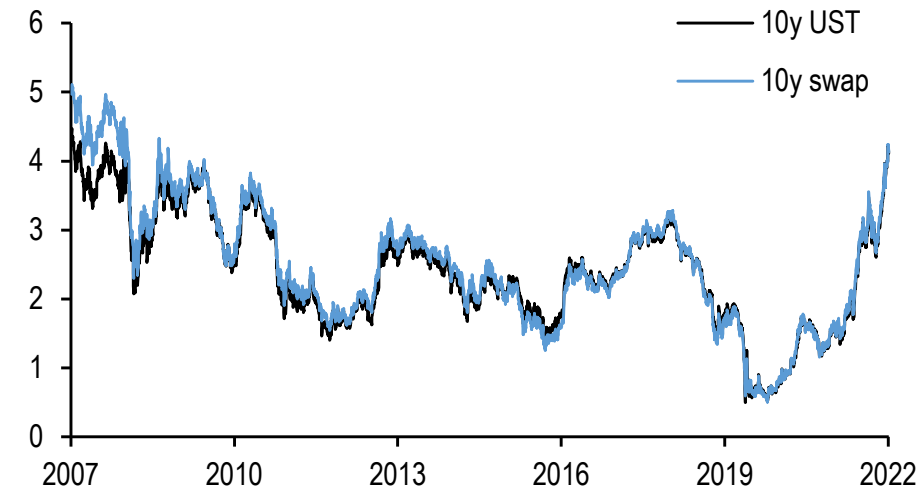


* Market depth is the sum of the three bids and offers by queue position, averaged between 8:30 and 10:30am daily.
Source: BrokerTec, J.P. Morgan research

- Liquidity across tenors differs greatly and shifts over time, making DV01 equivalents an important consideration for any proposed dissemination regime

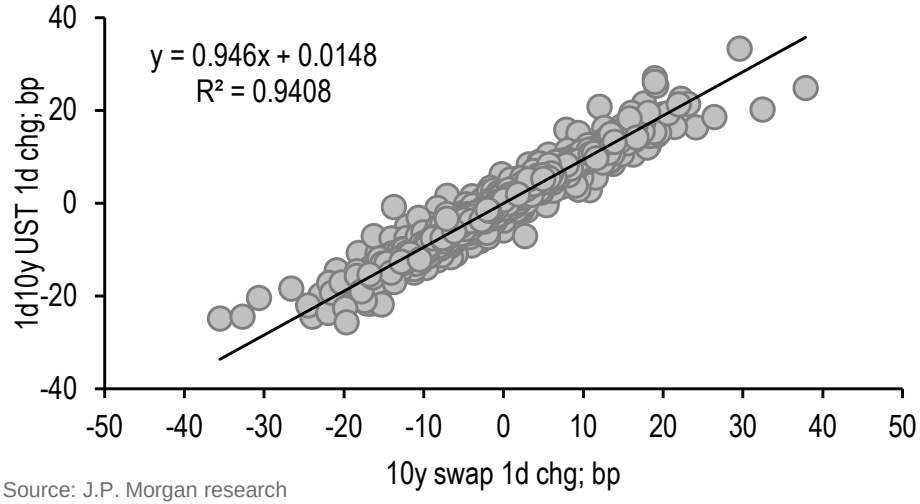
On-the-run Treasuries closely resemble swaps liquidity and price action with a high degree of correlation over the last 15 years

10-year Treasury and 10-year swap yields; %



Source: J.P. Morgan research

Daily changes in 10-year Treasury yields regressed on daily changes in 10-year swap yields (bp), regression over the last 15 years; bp

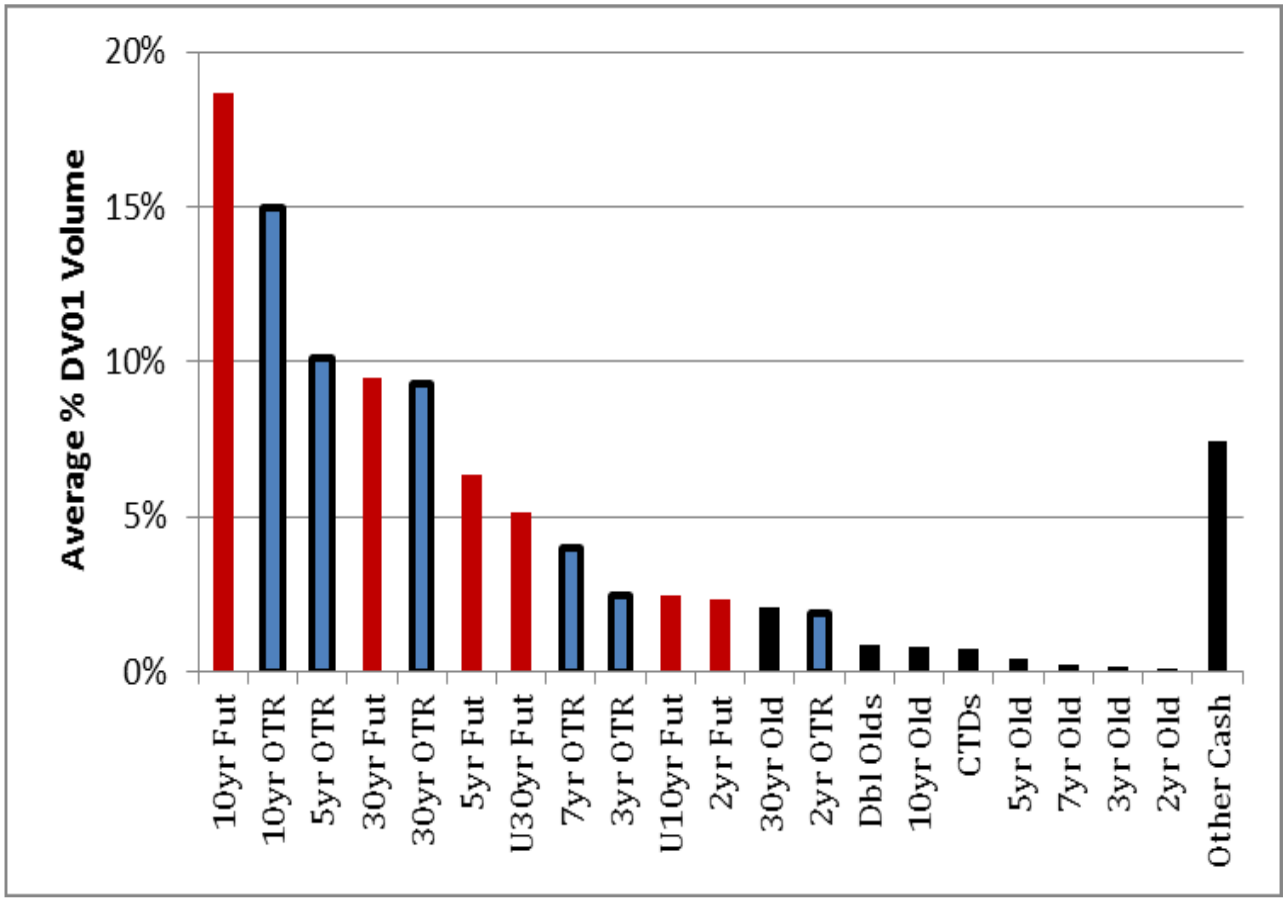


Source: J.P. Morgan research

- Given that on-the-run Treasury price action closely resembles that of swaps, the swaps reporting regime may be a good guide for on-the-run Treasuries

On-the-run Treasuries volumes also closely resemble Treasury futures

Daily traded DV01 in on-the-run Treasuries is more similar to futures than off-the-run



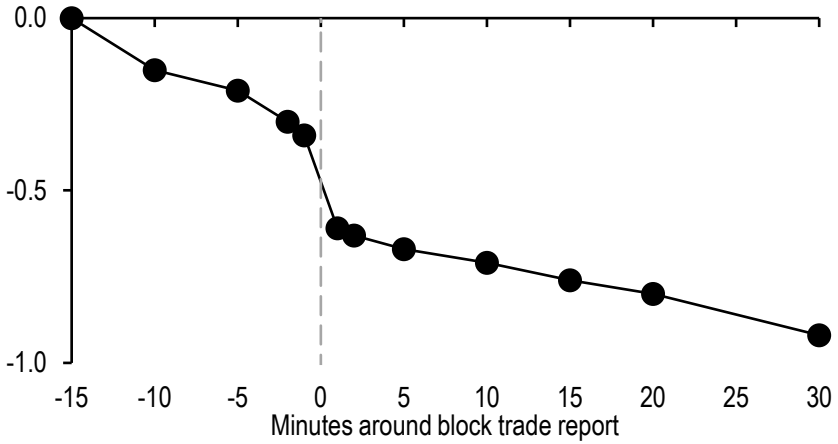
Source: Baker, McPhail, and Tuckman (2018) The Liquidity Hierarchy in the U.S. Treasury Market: Summary Statistics from CBOT Futures and TRACE Bond Data

- Given that on-the-run Treasury volumes closely resemble that of Treasury futures, the futures reporting regime may be a good guide for on-the-run Treasuries

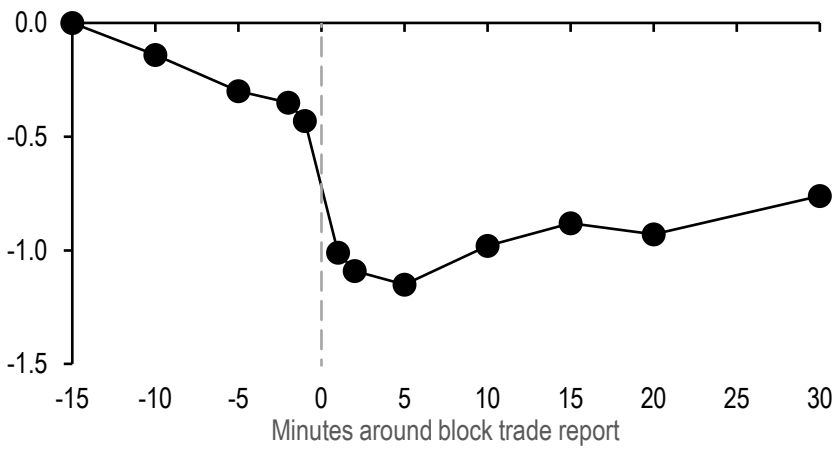
Treasury future block dissemination has price impacts

3yr average impact numbers by instrument (All Blocks in 32nds, negative means move against liquidity provider):

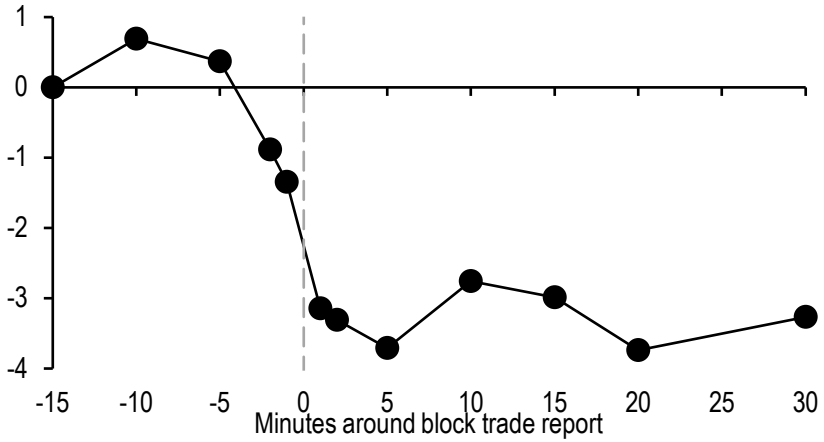
FV contract



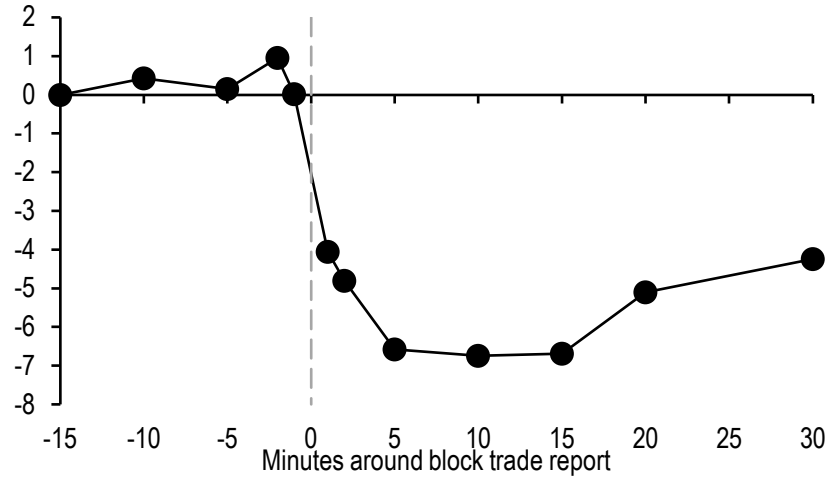
TY contract



US contract



WN contract

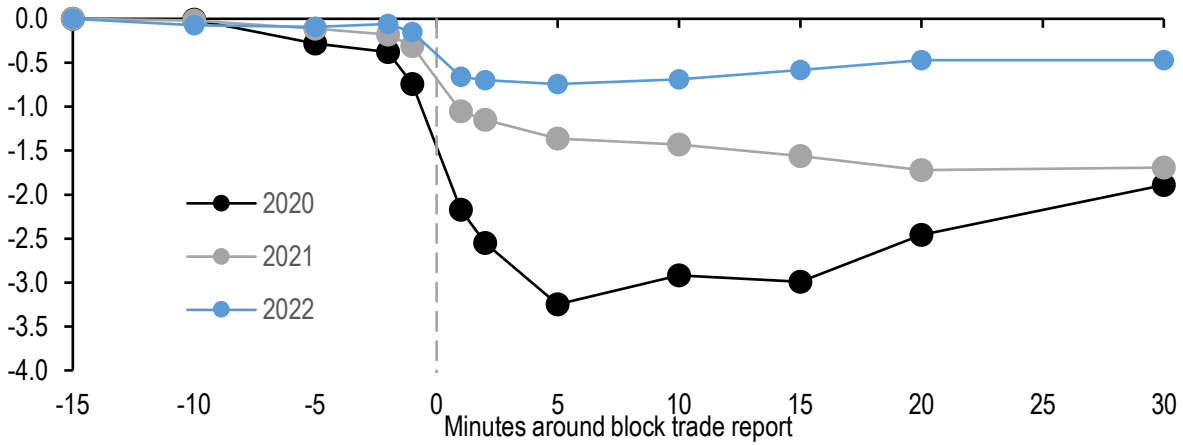


Source: TBAC member proprietary data

Treasury future block dissemination price impacts have varied over the years and is largest in times of stress

Average annual impact numbers (All Blocks in 32nds, negative means move against liquidity provider):

Average impact by years
Impact in price (in 32nds, negative is against liquidity provider):



Source: TBAC member proprietary data

Agenda

Summary of Findings

- Changing Treasury market intermediation opens the door to further study transparency for Treasuries
- While RFIs and Surveys offered mixed views on whether increased transparency will benefit liquidity and resilience, participants agreed on phased-in dissemination, dissemination delays and volume caps
- Post-trade transparency studies showed dissemination in other asset classes helped drive tighter bid/offer, but at the expense of smaller trade sizes, lower volumes and difficulty executing large transactions
- Treasury trade dissemination may enable PTFs to expand their footprint beyond on-the-runs, but they tend to pull back liquidity in times of stress
- Data shows strong parallels to Treasury futures and swaps for On-the-runs and corporate bonds and MBS for Off-the-runs, which may be used in consideration of a differentiated transparency approach

Treasury Market Summary	On-the-runs	Off-the-runs, Bills, FRNs, TIPS, STRIPS
Market resembles:	**Treasury futures and swap markets**	**Corporate and MBS markets**
Outstanding (largest amount)		✓
Volume (greatest amount)	✓	
# Securities (>300)		✓
Turnover (highest)	✓	
Daily traded DV01% (low)		✓
Common execution platform	**Alternative trading system**	**Dealer to customer**

Recommendations

1. **On-the-run securities should be subject to increased transparency and dissemination**
   - Implementation should be gradual to assess potential impacts
   - Implementation should strive to minimize operational costs to market participants
2. **On-the-run securities have similar volumes and liquidity profiles to futures and swaps**
   - Evidence from the futures market suggests that a volume cap should be applied for block trades
   - Evidence from the swaps market suggests delays should be applied for block trades
   - Block trade thresholds should be determined on a risk-adjusted basis similar to swaps thresholds (see appendix)
   - Thresholds may need to be adjusted over time as the market environment changes
   - Overnight Treasury trading has lower volume and market depth, suggesting delayed reporting, similar to other TRACE securities
3. **Impact of increased transparency and dissemination of on-the-run-securities should be assessed quantitatively and qualitatively**
   - Quantitatively against key performance indicators below – accounting for changes in market structure and the macro-environment
     - Average/median trade size
     - Trade volumes
     - Market depth
     - Price impact for varying trade sizes
     - Material changes to Treasury holdings by investor type
     - Bid/Ask spread
     - Changes to auction stats (direct vs non-direct, etc.)
   - Qualitatively through RFIs of feedback from market participants and other stake holders
   - Block sizes, caps and delays may need to be adjusted as the market changes

Recommendations

4. Off-the-runs, TIPS, STRIPS, Bills should continue to be subject to periodic aggregate disclosures

5. After assessing the impact of dissemination, incorporate observations into any evaluation of expanding to further segments

- First off-the-run securities may have enough volumes and liquidity to be evaluated for additional transparency and dissemination as part of a later implementation phase
- Further off-the-run securities, TIPS, STRIPS, Bills and FRNs should not be considered for transaction level reporting until dissemination impact is better understood

6. Continue to review other reforms that could address risk intermediation challenges

- Ensure completeness in reporting if market structure changes occur
- Examples cited in RFI responses, SIA Partners/SIFMA survey and other industry forums include:
  - Centralized Treasury and Repo Clearing
  - Adjustments to prudential requirements
  - Treasury buyback programs

Agenda

References

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- Mizrach (2015), Analysis of Corporate Bond Liquidity
- Schultz and Song (2019) Transparency and dealer networks: Evidence from the initiation of post-trade reporting in the mortgage backed security market
- SIFMA and Sia Partners (2022) Additional Transparency for Secondary Market Transactions of Treasury Securities. A Study on the Impact to the Market and Market Participants

Agenda

Appendix

TRACE volume statistics

By remaining maturity and on- vs. off-the-run status; Float excludes SOMA holdings, as well as stripped amounts for Nominals and TIPS; Jan. - Sep. 2022

Nominals		Avg. CUSIPS	Avg. Float ($B)	ADV ($B)	Turnover (%)	Implied Full Turnover (Days)
[0, 2y]	OTR	1	49	73.5	150.9	0.7
	1x	1	50	7.3	14.5	6.9
	2x	1	52	2.2	4.2	23.8
	3x	1	53	1.1	2.1	47.6
	4+	99	3,499	26.8	0.8	125.0
(2, 3y]	OTR	1	46	56.9	123.7	0.8
	1x	1	48	5.1	10.7	9.3
	2x	1	49	1.3	2.7	37.0
	3x	1	51	0.7	1.4	71.4
	4+	37	1,357	7.8	0.6	166.7
(3, 5y]	OTR	1	52	122.0	234.2	0.4
	1x	1	54	7.9	14.7	6.8
	2x	1	55	2.3	4.2	23.8
	3x	1	56	2.1	3.7	27.0
	4+	56	2,122	13.5	0.6	166.7
(5, 7y]	OTR	1	45	53.5	119.2	0.8
	1x	1	47	3.9	8.3	12.0
	2x	1	50	1.1	2.2	45.5
	3x	1	52	0.9	1.7	58.8
	4+	33	1,519	6.3	0.4	250.0
(7, 10y]	OTR	1	68	103.3	152.1	0.7
	1x	1	108	6.7	6.2	16.1
	2x	1	111	1.7	1.5	66.7
	3x	1	109	1.1	1.0	100.0
	4+	11	637	3.9	0.6	166.7
(10, 20y]	OTR	1	31	11.8	38.6	2.6
	1x	1	58	1.4	2.4	41.7
	2x	1	64	0.6	0.9	111.1
	3x	1	65	0.4	0.6	166.7
	4+	23	423	3.7	0.9	111.1
(20, 30y]	OTR	1	40	26.6	67.0	1.5
	1x	1	61	7.2	11.8	8.5
	2x	1	62	1.7	2.7	37.0
	3x	1	62	0.7	1.1	90.9
	4+	36	951	10.2	1.1	90.9
Other securities						
Bills		50	3,864	118.1	3.1	32.3
FRNs		8	572	1.5	0.3	333.3
TIPS		48	1,294	15.5	1.2	83.3
STRIPS		145	370	2.7	0.7	142.9

4+ includes all off-the-runs greater than the 3rd off-the-run

Source: FINRA TRACE; U.S. Department of the Treasury

Appendix

TRACE trade statistics, dealer-to-customer and interdealer

By remaining maturity and on- vs. off-the-run status; 8am - 4pm, Jan. - Sep. 2022; Implied trade time measures the minutes to trade a given size based on hourly volumes

		Hourly Volume ($millions)		Trade Size ($millions)				Implied Trade Time for Specified Sizes (minutes)			
Nominals		Med. Notional	Avg. Notional	Med. Notional	Avg. Notional	Med. 100k DV01	Avg. 100k DV01	Med. Notional	Avg. Notional	Med. 100k DV01	Avg. 100k DV01
[0, 2y]	OTR	6,084.5	7,026.6	1.0	3.2	528.5	528.8	0.006	0.024	5.2	4.5
	1x	355.2	733.7	8.6	35.5	550.1	551.4	1.4	2.9	92.9	45.1
	2x	94.3	233.4	10.0	30.1	580.0	581.2	6.4	7.7	369.1	149.4
	3x	32.9	119.0	7.9	25.3	610.9	611.3	14.4	12.8	1,114.7	308.2
	4x	17.0	66.3	6.0	19.0	643.9	643.9	21.1	17.1	2,266.8	582.5
(2, 3y]	OTR	5,378.8	6,776.4	1.0	2.8	357.3	374.8	0.006	0.024	4.0	3.3
	1x	223.3	521.3	5.6	32.7	368.1	367.2	1.5	3.8	98.9	42.3
	2x	49.6	138.4	8.0	26.2	381.2	381.8	9.7	11.3	461.4	165.5
	3x	15.5	74.6	7.2	23.3	394.6	393.9	27.9	18.7	1,530.1	316.6
	4x	9.1	52.7	6.0	20.7	407.2	406.1	39.6	23.6	2,685.5	462.7
(3, 5y]	OTR	11,558.8	12,763.4	1.0	2.5	218.7	225.2	0.000	0.006	1.1	1.1
	1x	358.8	793.4	6.7	32.7	222.3	222.2	1.1	2.5	37.2	16.8
	2x	119.0	241.0	10.6	28.6	230.0	228.8	5.3	7.1	116.0	57.0
	3x	69.9	218.6	11.4	33.2	232.9	232.5	9.8	9.1	199.9	63.8
	4x	30.0	149.0	11.8	27.8	239.8	238.8	23.5	11.2	479.7	96.1
(5, 7y]	OTR	3,122.7	4,738.6	1.0	2.4	162.3	171.6	0.018	0.030	3.1	2.2
	1x	145.1	403.4	10.0	39.4	163.3	162.8	4.1	5.9	67.5	24.2
	2x	35.0	115.0	8.0	24.3	166.3	166.6	13.7	12.7	285.0	86.9
	3x	18.3	111.8	8.9	29.0	171.1	170.3	29.2	15.6	562.4	91.4
	4x	8.8	54.5	6.6	22.3	175.4	174.9	44.8	24.6	1,193.3	192.4
(7, 10y]	OTR	9,275.7	9,989.8	1.0	2.2	118.2	119.5	0.006	0.012	0.8	0.7
	1x	405.4	656.1	6.7	22.5	125.1	124.2	1.0	2.1	18.5	11.4
	2x	68.9	166.7	7.0	21.0	133.0	132.7	6.1	7.5	115.8	47.8
	3x	35.0	106.5	7.0	20.2	133.2	131.4	12.0	11.4	228.1	74.0
	4x	22.9	80.5	7.9	19.9	130.1	132.9	20.7	14.8	341.1	99.1
(10, 20y]	OTR	1,005.9	1,620.6	1.0	2.4	71.8	76.7	0.054	0.084	4.3	2.8
	1x	47.0	145.4	6.1	22.6	74.1	72.4	7.8	9.3	94.6	29.9
	2x	20.2	65.1	5.7	19.7	81.6	78.9	16.8	18.2	242.2	72.7
	3x	9.5	39.3	5.0	17.2	82.4	78.7	31.5	26.3	518.8	120.3
	4x	5.6	33.7	5.0	16.3	81.1	82.3	53.9	29.0	875.1	146.3
(20, 30y]	OTR	2,402.6	2,648.5	1.0	1.9	52.8	52.7	0.024	0.036	1.3	1.2
	1x	527.2	703.3	3.0	7.7	57.3	55.4	0.3	0.7	6.5	4.7
	2x	63.8	193.5	6.4	20.1	61.3	58.7	6.0	6.2	57.6	18.2
	3x	24.1	74.4	5.4	17.9	65.6	64.2	13.4	14.4	163.0	51.7
	4x	14.1	53.9	5.0	16.6	57.0	56.9	21.2	18.5	242.1	63.4

	Hourly Volume ($millions)		Trade Size ($millions)		Implied Trade Time for Specified Sizes (minutes)	
Other securities	Med. Notional	Avg. Notional	Med. Notional	Avg. Notional	Med. Notional	Avg. Notional
Bills	149.2	377.2	7.4	30.8	3.7	5.2
FRNs	5.7	30.9	5.0	21.6	109.4	51.8
TIPS	73.5	106.2	7.9	15.3	135.5	43.2
STRIPS	6.5	11.5	12.1	21.1	1,614.9	211.9

4x is only the 4th off-the-run security. For "Other securities," calculations at the security-level then aggregated with averages or medians as noted in the header. Median and average notional trade sizes excludes trades < $1M.

Source: FINRA TRACE; U.S. Department of the Treasury

Appendix

TRACE trade statistics, dealer-to-customer

By remaining maturity and on- vs. off-the-run status; 8am - 4pm, Jan. - Sep. 2022; Implied trade time measures the minutes to trade a given size based on hourly volumes

		Hourly Volume ($millions)		Trade Size ($millions)				Implied Trade Time for Specified Sizes (minutes)			
Nominals		**Med. Notional**	**Avg. Notional**	**Med. Notional**	**Avg. Notional**	**Med. 100k DV01**	**Avg. 100k DV01**	**Med. Notional**	**Avg. Notional**	**Med. 100k DV01**	**Avg. 100k DV01**
[0, 2y]	OTR	1,958.8	2,376.5	2.0	16.2	529.7	529.8	0.060	0.408	16.2	13.4
	1x	183.4	446.0	8.2	49.8	550.1	551.7	2.7	6.7	179.9	74.2
	2x	44.3	148.1	6.7	40.6	579.7	580.8	9.0	16.4	785.4	235.3
	3x	13.8	75.3	5.0	31.5	611.2	611.4	21.7	25.1	2,654.1	487.0
	4x	6.7	40.6	5.0	23.0	643.9	643.9	44.6	33.9	5,750.2	952.3
(2, 3y]	OTR	1,769.3	2,450.3	1.8	13.6	357.4	378.1	0.060	0.330	12.1	9.3
	1x	112.7	330.6	5.6	42.9	369.7	368.3	3.0	7.8	196.8	66.8
	2x	19.9	87.6	5.5	32.7	380.4	381.3	16.7	22.4	1,146.0	261.1
	3x	6.9	47.2	5.0	27.5	394.6	394.2	43.4	35.0	3,427.6	501.5
	4x	3.9	34.5	5.0	24.9	407.2	406.1	76.4	43.3	6,221.8	706.0
(3, 5y]	OTR	4,019.6	4,495.2	1.0	7.9	218.4	222.5	0.012	0.102	3.3	3.0
	1x	211.8	508.2	7.0	42.1	223.0	222.4	2.0	5.0	63.2	26.3
	2x	56.9	139.0	8.5	32.8	230.7	229.6	9.0	14.1	243.2	99.1
	3x	29.5	121.8	9.8	38.8	233.5	233.0	19.9	19.1	474.3	114.8
	4x	14.1	72.9	8.0	29.2	240.5	239.3	34.0	24.0	1,021.3	197.0
(5, 7y]	OTR	982.2	1,682.3	1.5	12.2	164.8	179.1	0.090	0.432	10.1	6.4
	1x	76.4	258.8	10.0	48.6	162.5	162.3	7.9	11.3	127.6	37.6
	2x	13.3	68.6	5.9	30.1	166.4	166.6	26.5	26.3	748.6	145.6
	3x	8.2	64.5	5.0	31.8	172.2	171.0	36.6	29.6	1,260.1	159.0
	4x	5.3	39.2	4.1	24.3	177.8	176.0	46.4	37.3	2,012.9	269.5
(7, 10y]	OTR	3,343.1	3,609.6	1.0	6.6	117.8	118.8	0.012	0.108	2.1	2.0
	1x	216.1	392.4	5.8	27.7	126.2	124.8	1.6	4.2	35.0	19.1
	2x	36.1	108.8	5.0	24.0	134.6	134.6	8.3	13.2	224.0	74.2
	3x	18.2	71.7	5.0	23.6	133.4	131.6	16.5	19.8	440.3	110.1
	4x	11.9	54.1	5.0	22.7	126.5	131.6	25.3	25.2	639.5	146.0
(10, 20y]	OTR	420.4	705.5	1.5	8.7	71.3	76.3	0.210	0.738	10.2	6.5
	1x	29.9	107.9	7.0	26.6	74.2	72.4	14.0	14.8	148.7	40.3
	2x	11.4	48.2	6.0	22.1	83.8	80.7	31.5	27.5	439.1	100.4
	3x	6.1	31.7	5.0	19.1	82.7	78.6	49.3	36.2	814.5	148.7
	4x	4.0	26.7	5.0	18.7	81.5	82.2	75.9	42.1	1,236.6	184.7
(20, 30y]	OTR	918.3	1,045.3	1.0	4.9	52.5	52.3	0.060	0.282	3.4	3.0
	1x	314.9	446.9	3.7	9.1	57.3	55.3	0.7	1.2	10.9	7.4
	2x	34.1	123.3	6.2	25.1	61.2	58.1	10.9	12.2	107.7	28.3
	3x	13.1	51.7	6.4	23.5	83.7	69.5	29.3	27.3	382.4	80.7
	4x	6.9	37.6	5.9	20.9	57.7	57.3	51.2	33.3	500.8	91.4

	Hourly Volume ($millions)		Trade Size ($millions)		Implied Trade Time for Specified Sizes (minutes)	
Other securities	**Med. Notional**	**Avg. Notional**	**Med. Notional**	**Avg. Notional**	**Med. Notional**	**Avg. Notional**
Bills	85.0	247.2	7.5	39.9	6.1	10.0
FRNs	3.6	28.6	7.7	31.0	223.4	74.5
TIPS	36.5	62.1	9.5	19.9	201.4	60.4
STRIPS	6.7	12.0	12.9	22.5	2,789.6	270.6

4x is only the 4th off-the-run security. For "Other securities," calculations at the security-level then aggregated with averages or medians as noted in the header. Median and average notional trade sizes excludes trades < $1M.

Source: FINRA TRACE; U.S. Department of the Treasury

Appendix

TRACE trade statistics; Jan-Sep 2022

Avg. daily volume
- On-the-run ~ $430B
- Off-the-run ~ $130B

Avg. daily # of transactions
- On-the-run ~ 187k
- Off-the-run ~ 38k

Avg. transaction size
- On-the-run ~ $2.3M
- Off-the-run ~ $3.4M

On- and off-the-run figures are for nominal coupons only
Source: FINRA TRACE; U.S. Department of the Treasury

Appendix

USD Swap Reporting Thresholds

Swaps Tenors	Cap Notl (mm)	DV01
6m<=1y	1100	111
1y<=2y	460	90
2y<=5y	240	108
5y<=10y	170	139
10y<=30y	120	217
*DV01 uses current rates and longest tenor in bucket		