Apr 2024 U.S. Market Structure Monthly

MICROSTRUCTURE OBSERVATIONS

- The average daily volume in US equities was 11.0B shares in April 2024, down 9% month over month (MoM) and up 6% year over year (YoY).
- Trade reporting facility (TRF) share volume as a percent of total consolidated share volume was 44.4% in March 2024, similar to levels observed over the prior few months.
- Quoted spreads in both S&P 500 and Russell 2000 stocks increased in April 2024 compared to the prior month. Excluding the first and last half hour of the trading day, the median S&P 500 stock's spread increased 14% to 5.0bps in April 2024 from 4.4bps in March 2024, while the median Russell 2000 stock's spread increased 6% to 18.9bps in April 2024 from 17.9bps the prior month.

U.S. MARKET STRUCTURE NEWS¹

Nasdaq Proposes Fee Increases for Connectivity and Co-Location

The Nasdaq Stock Market and its family of U.S. stock exchanges filed with the SEC to increase fees for connectivity and co-location services by 5.5%. In response, Virtu Financial submitted a comment letter to the SEC opposing these fee increases on the grounds that Nasdaq failed to meet its obligation under the Exchanges Act of 1934 to provide sufficiently detailed information to determine whether the proposed fees are "fair and reasonable" and not "unfairly discriminatory".

https://www.sec.gov/rules/sro/sr-nasdaq-2024-008 Virtu Nasdaq Comment Letter (04102024) (sec.gov)

Cryptocurrency Industry Groups Sue SEC Over New Dealer Rule

The Blockchain Association and the Crypto Freedom Alliance of Texas filed a lawsuit against the SEC on the Commission's new rules requiring firms that deal frequently in U.S. Treasury securities to register as broker-dealers. Adopted in February 2024, the SEC's new rules would require firms to register with the SEC as broker-dealers if they either routinely express interest in trading at the best bid or offer or derive revenue by trading on the bid or offer in U.S. Treasury securities. Despite the new rule's focus on Treasury securities, the crypto industry groups in their lawsuit said that the SEC's new standards of who is considered a dealer could potentially encompass crypto industry participants. The lawsuit seeks a declaration that the new rule is arbitrary and capricious and asks the court to vacate it entirely pursuant to the Administrative Procedure Act.

https://www.reuters.com/legal/transactional/crypto-industry-groups-sue-texas-challenge-secs-dealerrule-2024-04-23/

¹ The summaries set forth herein are qualified in their entirety by the underlying rules, filings and referenced materials.

Average Daily Market Volume



Venue Market Share

														_										
42.2%	40.2%	41.3%	44.0%	45.1%	41.7%	42.1%	43.1%	43.9%	46.5%	44.8%	41.7%	44.8%	43.0%	43.1%	45.0%	45.4%	44.1%	43.0%	43.6%	43.6%	44.0%	44.0%	43.8%	44.4%
15.8%	16.6%	16.9%	15.5%	15.6%	16.7%	16.0%	15.9%	16.4%	15.2%	15.7%	16.5%	15.5%	16.4%	17.0%	15.6%	15.1%	15.9%	15.5%	15.6%	15.3%	15.3%	15.8%	16.0%	15.6%
9.3%	9.8%		9.6%	8.8%	10.8%	10.0%	9.7%	10.2%	8.7%	9.3%	10.6%	9.3%	10.0%	10.8%	9.3%	9.1%	10.6%	10.0%	10.1%	9.9%		9.6%	10.8%	9.9%
8.4%	8.6%	8.0%	8.3%	8.2%	8.3%	8.8%	8.6%	8.4%	8.7%	8.9%	9.0%	8.8%	8.4%	8.1%	8.5%	8.9%	8.4%	9.0%	8.7%	9.4%	9.6%	9.2%	9.2%	9.8%
4.2%		4.0%	3.8%	3.6%	3.9%	4.2%	3.8%				3.4%		3.4%					3.5%	2.5%					
5.5%	5.7%	4.9%	5.1%	4.7%	5.0%	4.9%	4.9%	3.4% 4.5%	3.2% 4.4%	3.2% 4.3%	4.6%	3.4% 4.5%	4.7%	3.2% 4.2%	3.2% 4.6%	3.3% 4.5%	3.3% 4.3%	4.8%	3.5% 4.6%	3.3% 4.7%	3.6% 4.6%	3.5% 4.5%	3.4% 4.4%	3.4% 4.5%
5.7%			5.6%	6.0%	5.4%	5.5%	5.8%	5.6%	5.9%	5.9%	5.9%	6.2%		5.5%	6.0%	5.8%	5.4%	5.5%		6.0%	5.9%	5.7%	5.404	1.001
2.6%	2.7%	2.6%	2.5%	2.4%	2.4%	2.5%	2.6%	2.3%		2.4%	2.3%	2.1%	2.3%	2.1%	2.1%	2.0%	2.1%	2.3%	2.3%	1.9%	2.0%	2.1%	5.1%	4.8%
3.7%	3.9%	3.6%	3.3%	3.0%	3.0%	3.3%	3.1%	2.3%	2.4% 2.9%	3.2%	3.1%	2.1%	3.2%	3.0%	3.0%	3.0%	2.1%	3.1%	3.0%	3.0%	2.0%	2.1%	1.9% 2.5%	2.0%
2.7%	2.7%	2.5%	2.3%	2.4%	2.8%	2.7%	2.5%	2.4%	2.2%	2.4%	2.8%	2.6%	2.8%	3.0%	2.7%	2.8%	2.9%	3.4%	3.2%	2.8%	2.9%	2.7%	2.9%	3.1%
Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23	Nov 23	Dec 23	Jan 24	Feb 24	Mar 24	Apr 24
TRF	aq (Q)		NYSE (N NYSE A			inverted BZX Equiti	es (Z)	ED0			MEMX Other	(U)												

Source: Choe Global Markets

TRF Volume Breakdown

23.0%	25.4%	23.8%	23.3%	22.6%	23.8%	24.9%	24.9%	22.5%	22.8%	24.1%	25.4%	23.9%	26.1%	24.3%	24.6%	24.0%	24.8%	27.6%	26.5%	23.2%	25.6%	27.3%	25.9%	ATS OTC Non J
77.0%	74.6%	76.2%	76.7%	77.4%	76.2%	75.1%	75.1%	77.5%	77.2%	75.9%	74.6%	76.1%	73.9%	75.7%	75.4%	76.0%	75.2%	72.4%	73.5%	76.8%	74.4%	72.7%	74.1%	
April 22	May 22	Lun 22	14.00	h		0.00	Nov. 22	200		5.4.02	14 22	h= 00	New 22		1-100	Aug. 22		0.4.02	New 22	0		Ext. M.	14 04	

 Apr 22
 Mey 22
 Jun 22
 Jul 22
 Aug 22
 Sep 22
 Oct 22
 Nov 22
 Dec 22
 Jan 23
 Apr 23
 Aug 23
 Sep 23
 Oct 23
 Nov 23
 Jan 24
 Peb 24
 Mar/24

 NMS Terr 14 2 Securities, excluding Dealerweb Source: FINAR
 Sep 23
 Oct 23
 Nov 23
 Dec 23
 Jan 24
 Peb 24
 Mar/24

ATS Market Share

5.6%	16.0%	16.0%	15.3%	14.9%	16.5%	15.5%	15.2%	16.0%	15.2%	15.9%	16.6%	16.2%	15.9%	16.3%	16.7%	17.1%	17.2%	16.7%	16.1%	16.7%	16.4%	15.4%	15.4%
	8.0%	8.2%	8.2%	8.6%	9.8%	9.2%	10.1%	10.8%	10.5%	11.5%	11.8%	12.1%	11.8%	11.8%	12.0%	12.7%	13.8%	13.9%	14.1%	14.4%	14.2%	14.0%	13.7%
12.4%	12.8%	13.1%	12.2%	12.3%	11.9%	11.8%	12.3%	12.2%	12.2%	12.3%	12.1%	13.1%	12.7%	12.2%	12.4%	11.8%	11.5%	11.4%	11.7%	10.2%	10.6%	10.1%	10.0%
11.2%	11.3%	10.8%	11.6%	11.6%	10.8%	10.7%	10.7%	10.4%	10.1%	10.8%	10.0%	10.5%	11.0%	10.4%	10.6%	11.6%	11.4%	12.0%	12.1%	10.7%	10.9%	11.9%	12.5%
	9.3%	9.6%	10.4%	9.8%	10.1%	10.7%	9.6%	8.6%	8.6%	9.2%	9.5%	9.0%	9.6%	9.3%	9.3%	8.4%	8.7%	8.4%	8.5%	7.9%	8.0%	8.0%	8.4%
6.5% 4.0%	6.6%	6.7%	6.7%	6.8% 3.9%	6.6%	6.3%	6.1%	6.3%	6.3%	6.3%	7.0%	6.9%	6.9%	7.0%	6.2%	6.3%	6.6%	6.7%	7.0%	7.4%	6.8%	6.7%	6.9%
5.6%	5.7%	6.0%	5.8%	5.3%	5.3%	5.0%	5.1%	5.2%	5.4%	4.3%	4.5%	4.7%	4.5%	4.4%	4.3%	4.5%	4.6%	4.4%	4.5%	4.3%	4.3%	4.4%	4.7%
	24.2%	23.5%	23.1%	23.4%	21.9%	22.4%	22.5%	22.3%	23.0%	21.3%	19.6%	18.1%	18.4%	19.6%	19.2%	18.6%	4.6%	4.4% 17.4%	4.5% 17.3%	19.4%	18.7%	19.2%	18.5%
						4.7%	4.8%	5.0%	4.9%	4.8%	5.6%	6.0%	5.8%	5.9%	6.0%	5.9%	6.0%	5.8%	5.9%	6.3%	7.2%	7.0%	6.8%
Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23	Nov 23	Dec 23	Jan 24	Feb 24	Mar 24

OTC Non-ATS Market Share

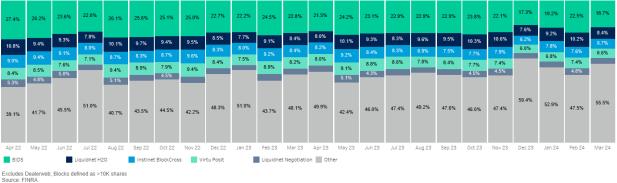
28.6%	31.0%	28.6%	30.3%	30.8%	29.0%	29.8%	30.1%	29.1%	28.5%	28.3%	28.6%	29.6%	28.2%	27.3%	28.4%	28.3%	26.7%	27.1%	26.8%	26.7%	26.2%	25.7%	25.1%	Citadel G1 Jane Street Two Sigma
11.9%	12,5%	12.6%	12.7%		13.2%	12.9%	12.3%	12.9%	13.5%		12.2%	12.2%	11.4%	10.6%	10.2%	10.3%	10.4%	10.6%	11.1%	12.0%	12.9%	12.5%	11.4%	Virtu Other
11.0%	10.6%	10.7%	11.4%	10.4%	11.5%	12.9%	11.5%	11.3%	10.9%	10.7%	12.1%	12.8%	13.1%	12.9%	13.7%	13.4%	12.4%	13.2%	12.9%	12.8%	11.4%	11.3%	11.0% 4.4%	
23.6%		23.3%			22.1%					22.8%	21.7%		22.0%	20.9%	23.7%	23.3%	22.1%	20.7%	20.1%	20.1%	20.6%	20.1%	18.0%	
	22.9%		24.6%	25.1%	22.170	21.2%	21.796	22.1%	23.1%	22.0%	21.770	21.8%	22.010		23.7%	23.310								
														25.3%			25.1%	25.3%	26.0%	24.8%	25.5%	26.5%	30.0%	
21.8%	20.2%	22.2%	18.4%	18.0%	21.6%	20.4%	21.5%	21.4%	20.5%	21.3%	22.2%	20.1%	22.2%	23.370	20.7%	21.3%	25.1%	23.379	20.010	24.0%	25.5%	20.070		
Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23	Nov 23	Dec 23	Jan 24	Feb 24	Mar 24	1

TRF Block Volume Breakdown (Shares)



OTC Block Quanti.. 📕 ATS Block Quanti..

ATS Block Volume Market Share

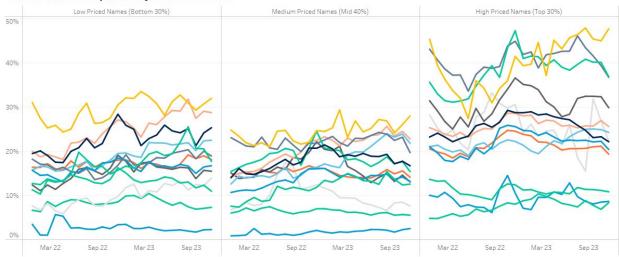


OTC (Non-ATS) Block Volume Market Share

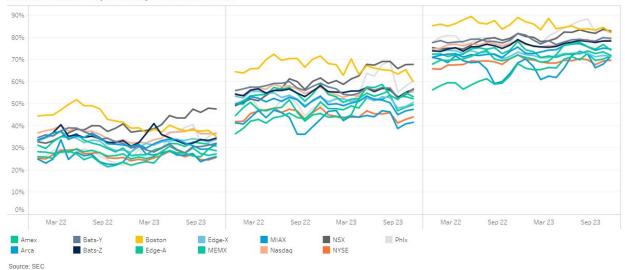
17.9%	21.4%	19.7%	22.6%	21.796	18.6%	18.6%	19.3%	21.2%	20.3%	19.0%	20.1%	22.4%	17.7%	16.8%	19.6%	19.7%	18.1%	17.496	17.8%	21.5%	18.0%	15.2%	15.9%
12.796	12.5%	12.5%		10.5%	11.296	11.5%	11.196	11.5%	12.3%	12.3%	12.2%	12.1%	10.6%	10.0%	12.7%	13.2%	11.6%	9.8%	9.1%	12.0%	11.3%	9.3%	8.3%
14.6%	7.6%	6.2%	14.696	13.5% 6.3%	6.6%	5.6%	6.2%	5.4%	4.9%	7.196	6.3%	5.9%	8.0%	7.0%	5.5%	6.5%	8.2%	9.3%	11.6%	7.8%	9.2%	11.0% 7.5%	7.3%
7.3%	7.3%	7.6%	5.0% 8.6%	8.9%	8.4%	8.4% 7.4%	8.4% 7.9%	8.9%	9.4% 6.8%	9.8%	8.8%	9.4%	8.2%	11.9%	7.996 6.8%	8.1% 5.4%	6.896 8.796	6.3% 7.1%	6.5% 7.9%	8.1%	8.4% 7.2%	8.0%	9.0%
6.496 2.396	7.5% 2.1%	10.9% 1.9%	7.5% 2.1%	6.7% 1.9%	1.8%	2.296 11.396	2.2% 9.8%	8.8% 2.5%	2.7% 10.0%	7.5% 2.5%	6.9% 2.5%	5.9% 3.2%	2.6% 10.8%	2.4% 10.4%	3.3% 11.9%	3.5%	2.896 10.796	2.3% 11.6%	2.3% 10.1%	6.796 3.496	7.2% 3.0% 9.0%	2.696 10.396	2.9%
8.7%	8.8%	9.0%	10.2%	8.9%				10.196	10.0%	9.2%	10.2%	11.6%		20.470	11.946	12.7%	10.7%			9.5%	9.0%		
30.2%	32.9%	32.1%	29.4%	32.2%	34.196	35.1%	35.1%	31.6%	33.6%	32.7%	33.0%	29.5%	35.0%	34.496	32.4%	31.0%	33.2%	36.1%	34.8%	31.0%	33.9%	36.1%	35.4%
Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23	Nov 23	Dec 23	Jan 24	Feb 24	Mar 24
Citade	el .	Virtu		Mor	gan Stanley	y 🚺 G1		Go	oldman Saci	hs 📃 T	wo Sigma		Jane Street		Other								

Blocks defined as >10K shares Source: FINRA

Hidden Trades Proportion by Price and Venue



Oddlot Trades Proportion by Price and Venue



))))))))))))))	Jun 22 195 243 190 246 198 276 276 13.5 50.4 5.7	Jul 22 188 232 181 237 197 267 13.2	Aug 22 185 228 179 234 201 265	Sep 22 183 225 184 235 201 263	Oct 22 187 232 189 245 212	Nov 22 186 226 192 248 210	Dec 22 189 231 194 250	Jan 23 194 250 199	Feb 23 218 271 214	Mar 23 235 300	Apr 23 229 300	May 23	Jun 23 226	Jul 23 222	Aug 23	Sep 23	Oct 23	Nov 23	Dec 23 243	Jan 24 247	Feb 24 240	Mar 24 240	Apr 2
0000) 0000) 0000) 0000	243 190 246 198 276 13.5 50.4	232 181 237 197 267 13.2	228 179 234 201	225 184 235 201	232 189 245 212	226 192 248	231 194	250	271			227		222			230	236	243	247	240	240	2
) 0000) 0000) 0000)	190 246 198 276 13.5 50.4	181 237 197 267 13.2	179 234 201	184 235 201	189 245 212	192 248	194			300	300												
0000 0000 0000 0000	246 198 276 13.5 50.4	237 197 267 13.2	234 201	235 201	245 212	248		199	214			298					300	301	307	306	300	295	2
) 0000 5 0000 0000	198 276 13.5 50.4	197 267 13.2	201	201	212		250			228	224	217	216			211	211	220	224	221	218	220	
0000 S 0000 0	276 13.5 50.4	267				210		257	262		283					283	286	300	300	294	283	288	
5) 0000	13.5 50.4	13.2	265	263			210	216	222	230	231	222	226	222	212		212	226	227	222	221	221	
000	50.4				274	279			283		309		304	289	288		316	331	318	314	304		
000	50.4																						
000	50.4		11.8	10.7	12.5	12.9	12.3	11.7	11.4	10.7	9.6	10.7	10.9	10.1	10.8	10.3	12.4	11.7	10.8			11.4	
		48.1	45.3	43.2	49.2	51.1	49.8	47.8	47.1	48.9	44.7	47.7	45.4	40.3	40.8	39.4	45.6	48.1	44.8	43.6	43.9	43.4	
		5.2	4.7	4.9	5.4	5.5	5.1	4.9	5.0	5.1	4.4		4.6	4.2	4.8	4.6	5.4	5.0	4.4	4.2	4.4	4.4	
	21.6	20.4	19.1		19.9	21.2	18.6	18.1	18.3	19.6	18.0	19.6	17.8	16.3	17.2	17.4	20.4	20.6	19.2	18.1		17.9	
)	3.5	3.2	2.9		3.4	3.2		3.1	3.2	3.2	3.0	3.3	3.0	2.8		3.1	3.3		2.9	2.8	2.9	3.0	
000	16.2	15.4	14.1		14.7	15.5	14.2	13.6	14.1	14.7		15.2	13.8	13.0	13.3	13.2	14.4	14.7	13.9	13.0	13.5	13.3	
e Vo	olatili	y Bps	5																				
)	21.4	20.7	15.6	17.5	20.4	17.7		14.5	13.9	14.9	12.9	13.8	14.8	14.6	12.7	12.3	16.4	13.7	12.0	13.5	13.7	13.3	
000	24.1	26.6	21.0	20.8	23.1	21.4	16.2			17.2	14.6	15.9			15.1	14.0	17.6	17.6		16.1	15.4	14.8	
)	8.3	7.5	6.2	8.6	8.1	6.8			5.9	6.7	4.9		4.8	4.6	4.9	4.1	6.2	4.9	4.3	4.6	4.8	4.6	
000	6.8	6.1	5.5	7.4	6.7	5.4	4.1		4.5	5.5	2.9			3.0	2.8	1.5		2.4	2.8	2.9		2.7	
)	9.0	7.9		9.3	8.8	7.1	6.5	6.3	6.9	7.4	5.9	6.0	5.5	5.4	5.7	5.1		5.3	5.0	5.3	5.7	5.9	
000	8.1	6.9	6.2	8.9	7.2	6.8		5.4	6.9	7.9	5.4	5.9	5.2	4.9	5.0	3.8	4.5	4.5	5.6	5.0		6.1	
V b	oy Tin	ne of	Day																				
)	1.0%	1.1%	1.0%	0.9%	0.9%	0.9%	1.1%	0.9%	1.0%	0.9%	1.1%	1.0%	1.0%	1.0%	0.9%	0.9%	0.9%	0.9%	1.0%	1.0%	1.0%	1.0%	
000	0.7%	0.7%	0.8%	0.7%				0.7%	0.7%	0.7%	0.8%	0.7%	0.6%	0.7%	0.7%	0.6%	0.6%		0.7%	0.9%	0.8%	0.8%	
)	9.4%	9.8%	9.6%	9.0%	9.0%	9.2%		8.7%	8.6%	8.5%		8.8%	8.7%	9.1%	8.4%	8.1%	8.1%	8.5%	8.0%	8.3%	8.6%	8.8%	7
000	7.6%	8.1%	8.2%		7.6%	7.5%	7.2%	7.5%		7.2%	7.3%	7.5%	7.3%	7.5%	7.3%	6.9%	6.4%	7.0%	6.9%	7.7%	7.5%		6
	19.2%	18.6%	18.8%	18.7%	18.8%	18.7%	19.0%	19.3%	19.3%	18.7%	19.4%	18.9%	18.8%	19.2%	20.3%	20.1%	19.5%		19.2%	19.1%	19.0%		19
)	19.8%		20.4%		20.0%	21.0%	20.0%		20.6%	19.9%	20.4%	19.9%	20.1%		20.8%	21.3%	20.9%	20.6%	20.1%	19.6%	20.3%	19.9%	20
000																							
		12.5%	11.9%	12.3%	11.9%	11.6%	14.7%	12.9%	12.2%	13.4%		12.9%	14.1%	13.4%	13.8%	16.3%	13.7%	14.7%	16.2%	15.3%	14.2%	14.4%	15
000	13.1%		10.00	11.40																			15
		13.1%							13.1% 12.5% 11.9% 12.3% 11.9% 11.6% 14.7% 12.9%	13.1% 12.5% 11.9% 12.3% 11.9% 11.6% 14.7% 12.9% 12.2%	13.1% 12.5% 11.9% 12.3% 11.9% 11.6% 14.7% 12.9% 12.2% 13.4%	13.1% 12.5% 11.9% 12.3% 11.6% 14.7% 12.9% 12.2% 13.4% 13.6%					13.1% 12.5% 11.9% 12.6% 14.7% 12.9% 12.2% 13.4% 13.6% 14.1% 13.4% 13.8% 16.3%		13.1% 12.5% 11.9% 12.6% 14.7% 12.9% 12.2% 13.4% 13.6% 12.9% 14.1%	13.1% 12.5% 11.9% 12.3% 11.9% 14.7% 12.9% 13.4% 13.6% 12.9% 14.1% 13.4% 13.8% 16.3% 13.7% 14.7% 16.2%	13.1% 12.5% 11.9% 12.3% 11.6% 14.7% 12.9% 13.4% 13.6% 12.9% 14.1% 13.4% 13.8% 16.3% 13.7% 14.7% 16.2% 15.3%	13.1% 12.5% 11.9% 12.3% 11.6% 14.7% 12.9% 13.4% 13.6% 12.9% 14.1% 13.4% 13.8% 16.3% 13.7% 14.7% 16.2% 15.3% 14.2%	

Median used for all metrics; One minute volatility is calculated using the difference between the high and low price within a one minute time bin, divided by that bin's VWAP Source: Virtu Financial

ABOUT VIRTU

Virtu is a leading financial services firm that leverages cutting-edge technology to provide execution services and data, analytics and connectivity products to its clients and deliver liquidity to the global markets. Leveraging its global market making expertise and infrastructure, Virtu provides a robust product suite including offerings in execution, liquidity sourcing, analytics and broker-neutral, multi-dealer platforms in workflow technology. Virtu's product offerings allow clients to trade on hundreds of venues across 50+ countries and in multiple asset classes, including global equities, ETFs, foreign exchange, futures, fixed income and myriad other commodities. In addition, Virtu's integrated, multi-asset analytics platform provides a range of pre and post-trade services, data products and compliance tools that clients rely upon to invest, trade and manage risk across global markets.

To learn more, contact your sales representative or call our desk at: **APAC** +852.2846.3592 | **CAN** +1.416.874.0800 | **EMEA** +44.20.7670.4066 | **US** +1.646.682.6199 info@virtu.com | www.virtu.com

© 2024 Virtu Financial, Inc. All rights reserved. Not to be reproduced or retransmitted without permission. These materials are for informational purposes and are not intended to be used to make trading or investment decisions, they are not intended as an offer to sell or the solicitation of an offer to buy any security or financial product, and are not intended as advice (investment, tax or legal). The information contained herein includes Virtu proprietary information and/or has been taken from sources we believe to be reliable, but we do not represent or warrant that such information is accurate or complete and it should not be relied upon as such.

Securities products and services are offered by the following subsidiaries of Virtu Financial, Inc. In the U.S., Virtu Americas LLC, member FINRA and SIPC; in Canada, Virtu Canada Corp., member Canadian Investor Protection Fund and Canadian Investment Regulatory Organization; in Europe, Virtu Europe Trading Limited, registered in Ireland No. 283940 ("VETL") (VETL is authorized and regulated by the Central Bank of Ireland), and Virtu Financial Ireland Limited, registered in Ireland No. 471719 ("VFIL") (VFIL is authorized and regulated by the Central Bank of Ireland), and Virtu Financial Ireland. The registered office of VETL and VFIL is North Dock One, Fifth Floor, 91-92 North Wall Quay, Dublin 1, Ireland, D01 H7V7; in Asia, Virtu ITG Hong Kong Limited (SFC License No. AHD810), Virtu ITG Singapore Pte Limited (CMS License No. 100138-1), and Virtu ITG Australia Limited (AFS License No. 219582)