September 2022 APAC Market Structure Monthly

Country Group Developed Markets Developing Markets Iran KOR JPN 11.8B 23.4B CHN 116.0B HKG TWN 9.8B ^{8.1B} IND 8.2B THA 3.6B SGP 0.8B AUS 5.1B NZL 0.1B © 2022 Mapbox © OpenStreetMap **Country Breakdowns**

Average Daily Turnover (Notional USD)

Hong Kong	Taiwan
China	India
Japan	Thailand
Australia	New Zealand
South Korea	Singapore



Sep 2022 AP Market Structure Monthly

MICROSTRUCTURE OBSERVATIONS

- Overall regional Average Daily Traded (ADT) in Q3 was 10-15% lower compared to Q2. September ADT in China saw a 28% decrease MoM, followed by smaller decreases in Japan, Australia to their year low levels.
- First half hour spreads during continuous trading in Hong Kong and Taiwan were up 6% and 8% to 18bps and 30bps respectively, the highest level observed since 4Q2021.
- Intraday quotesize and volatility were consistent MoM.

AP MARKET STRUCTURE NEWS

Hong Kong

Hong Kong Exchange and Clearing Limited Announced Arrangements of Market Rehearsals for Hong Kong Investor Identification Regime Throughout October 2022

HK Exchange and Clearing Limited (HKEX) announced on 23 September 2022 that three Market Rehearsals (MRs) will take place on 15 October (MR 1), 22 October (MR 2), and 29 October (MR 3), respectively. As part of the Hong Kong Investor Identification Regime (HKIDR), relevant regulated intermediaries (RRIs) will be able to validate their setup in a production environment. While a go-live date for HKIDR has not been announced, it is expected to be within 4Q 2022 to 1H 2023.

https://www.hkex.com.hk/-/media/HKEX-Market/Services/Circulars-and-Notices/Participant-and-Members-Circulars/SEHK/2022/CT13222E.pdf

HKEX released a Compliance Bulletin on Northbound Abnormal Trading Rules for Reminders and Transparency

To promote transparency and compliance culture in Stock Connect, HKEX published a Compliance Bulletin on 29 September 2022. The document contains a reminder of: (i) the major types of abnormal Northbound trading activities under Stock Connect, and (ii) the arrangements for restricting Northbound trading by Mainland investors.

https://www.hkex.com.hk/-/media/HKEX-Market/Services/Circulars-and-Notices/Participant-and-Members-Circulars/SEHK/2022/2022-Q3-Compliance-Bulletin-(English).pdf





China Securities Regulatory Commission Approved First Batch of Market Makers for Shanghai Stock Exchange's Science and Technology Innovation Board

To improve liquidity and deepen reform, China Securities Regulatory Commission (CSRC) approved the first batch of market makers for Shanghai Stock Exchange's Science and Technology Innovation Board (STAR Board) on 18 September 2022. https://www.reuters.com/markets/asia/china-securities-regulator-approves-first-batch-market-makers-star-market-2022-09-18/

Japan

Shenzhen Stock Exchange and Japan Exchange Group Launch Joint Promotional Activities

As part of their cooperation in promoting Exchange Traded Funds (ETFs) under the Japan-China ETF Connectivity scheme established in 2021, and promotional activities aimed at Japanese and Chinese investors, Japan Exchange Group, Inc. (JPX) and Shenzhen Stock Exchange (SZSE) have launched promotional activities on both exchanges' websites. https://www.jpx.co.jp/english/corporate/news/news-releases/0070/20220907-02.html

New York Stock Exchange and Tokyo Stock Exchange Announce New Partnership for Cross-Border Investment.

The Tokyo Stock Exchange, Inc. (TSE) and the New York Stock Exchange (NYSE) announced a new agreement to promote cross-border investment between Japan and the US through collaboration in product development, marketing and information sharing. https://www.jpx.co.jp/english/corporate/news/news-releases/0060/20220923-01.html

Trial Trading of Carbon Credits Begins at JPX

JPX announced on 22 September 2022 that it has started trading carbon credits on the Tokyo Stock Exchange as part of the "Technical Demonstration Project for Carbon Credit Market" commissioned by the Ministry of Economy, Trade and Industry (METI). The exchange has received applications from 145 companies, local governments, and other organizations to participate in trading carbon credits.

https://www.jpx.co.jp/english/corporate/news/news-releases/0060/20220922-01.html

JPX Listed Derivatives: Osaka Exchange and Tokyo Commodity Exchange **Commence Holiday Trading**

On 23 September 2022, JPX announced that its derivative markets, under Osaka Exchange (OSE) and Tokyo Commodity Exchange (TOCOM), had successfully launched holiday trading. As a result of globalization and overseas influences on Japanese stock markets. JPX-listed derivatives will be available for trading during national holidays.

https://www.jpx.co.jp/english/corporate/news/news-releases/0060/20220923-02.html

JPX Published Practical Handbook for English Disclosure for All Listed Companies

According to JPX, on 7 September 2022, TSE distributed electronic copies of the "Practical Handbook for English Disclosure" to all its listed companies in a bid to promote English disclosure initiatives. To assist listed companies in preparing disclosure documents, the handbook summarizes points to note and provides insight into disclosing information in English. https://www.jpx.co.jp/english/corporate/news/news-releases/0060/20220922-02.html



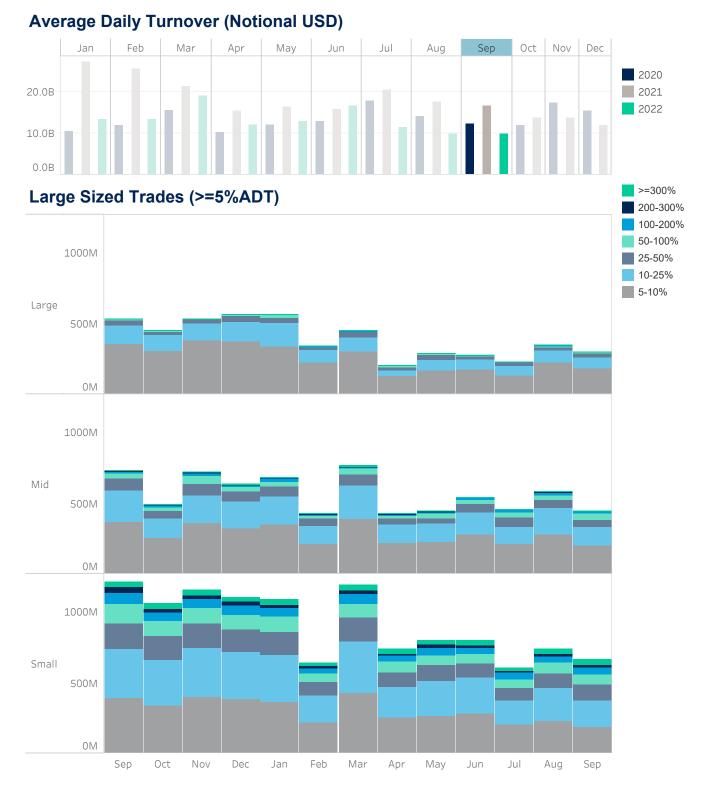
To learn more, contact your sales representative or call our desk at: **APAC** +852.2846.3592 | **CAN** +1.416.874.0800 | **EMEA** +44.20.7670.4066 | **US** +1.646.682.6199 <u>info@virtu.com</u> | <u>www.virtu.com</u>

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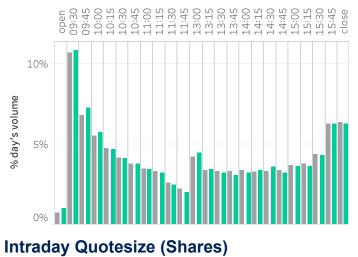
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Hong Kong



Hong Kong

Volume Curve



Intraday Spread (bps)



Intraday Volatility (bps)



Rolling 12 Months Avg September 2022

Spread Bps

10 AM

11 A M

12 PM

1 PM

2 PM

80K

60K

40K

20К 0К

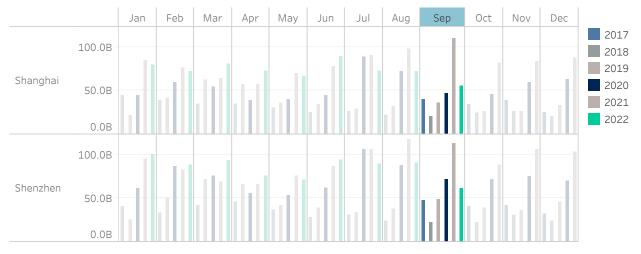
		22 Q1			22 Q2			22 Q3	
	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22
firstHalfHour	16.2	15.8	17.8	17.6	17.3	17.2	17.1	17.0	18.0
midday	11.9	12.0	13.4		13.5	13.6	13.1	13.0	13.9
lastHalfHour	11.6	11.7	12.6	12.3	13.1	13.2	12.4	12.5	13.5
firstHalfHour	ute Volatili	15.1	21.2	17.7					
	10.0	13.1	21.2	1/./	18.0	19.0	16.8	17.0	16.6
midday	6.4	6.5	9.7	8.4	18.0 7.3	19.0 7.7	16.8 7.3	17.0 7.1	16.6 7.4

Quotesize in Shares

firstHalfHour	28,480	27,737	29,034	28,977	27,325	28,776	26,961	27,359	28,423
midday	47,428	46,616	40,716	40,059	40,646		42,223	42,963	50,516
lastHalfHour	70,843	71,318	65,291	62,184	60,328	71,107		67,865	78,846

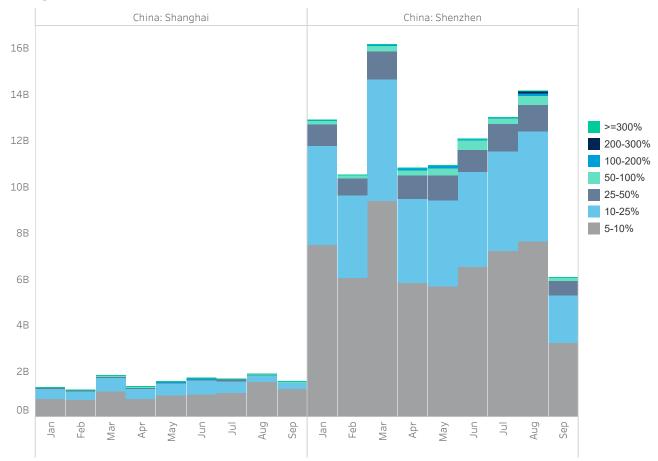
Median used for all metrics

China



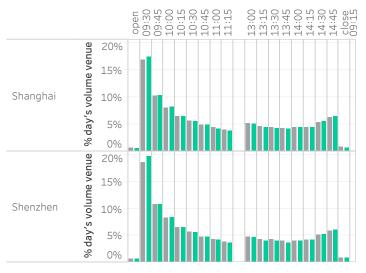
Average Daily Turnover (Notional USD)

Large Sized Trades (>=5%ADT)

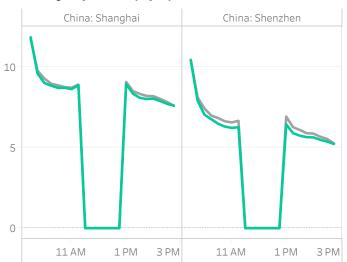


China

Volume Curve



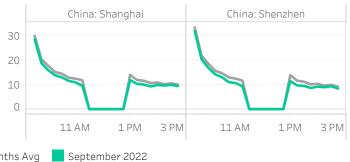
Intraday Spread (bps)



Intraday Quotesize (Shares)



Intraday Volatility (bps)



Spread Bps

				China	a: Shang	ghai							China	: Shenz	hen			
	:	22 Q1			22 Q2			22 Q3			22 Q1			22 Q2			22 Q3	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
firstHalfHour	10.0	9.9	10.9	11.1	10.9	10.3	9.9	9.7	10.2	9.0	8.3	9.1	9.9	9.0	8.5	8.6	8.3	8.6
midday	8.2	8.4	9.4	9.7	9.5	8.6	7.9	7.9	8.4	6.3	6.2	7.0	7.4	7.0	6.4	6.0	5.8	6.1
lastHalfHour	7.7	7.7	8.3	8.4	8.2	7.4	7.3	7.2	7.6	5.3	5.2	5.9	6.2	5.9	5.3	5.0	4.9	5.2

One Minute Volatility Bps

firstHalfHour	20.5	18.5	21.7	23.8	19.6	20.1	17.2	16.5	18.3	27.0	22.1	24.2	27.8	23.3	23.4	23.2	22.1	22.5
midday	8.4	7.8	10.1	11.6	9.1	10.1	7.1	6.3	7.0	11.3		11.9	13.1	10.6	11.3	9.8	8.8	8.9
lastHalfHour	7.4	6.4	8.3	9.3	6.6	7.3	6.0	5.0	6.2	8.8	7.6	8.7	9.8	7.4	8.0	7.5	6.5	7.3

Quotesize in Shares

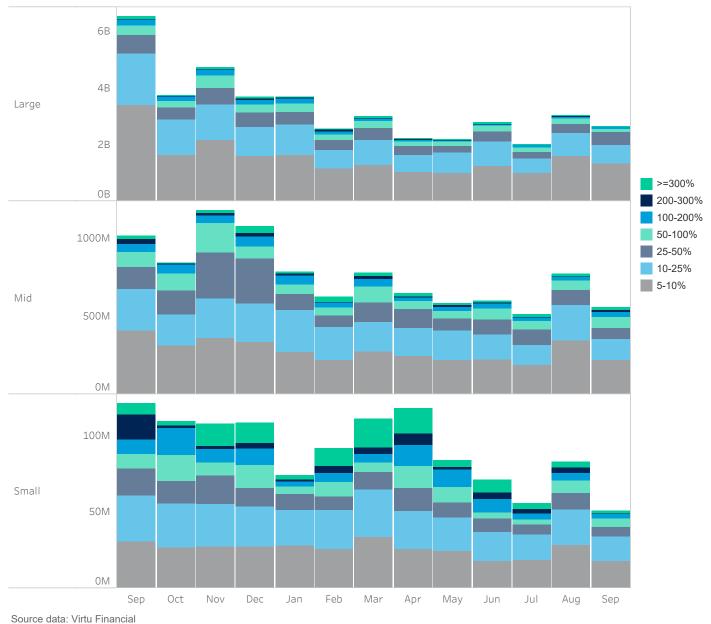
firstHalfHour	13K	13K	13K	11K	14K	14K	14K	14K	12K	4К	4K	4K	4K	5K	4K	4K	4K
midday	16K	16K	14K		15K	16K	17K	18K	15K	4K	5K	5K	5K	6К	5K	5K	5K
lastHalfHour	23K	23K	22K	19K	24K	25K	25K	28K	23K	6К	7K	7K	7K	8K	7K	8K	7K

Median used for all metrics

Japan







Japan

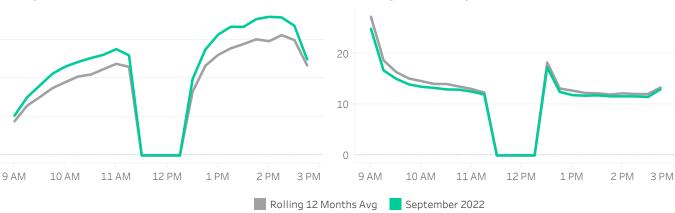
Volume Curve



Intraday Spread (bps)



Intraday Volatility (bps)



Spread Bps

ЗК

2К

1К

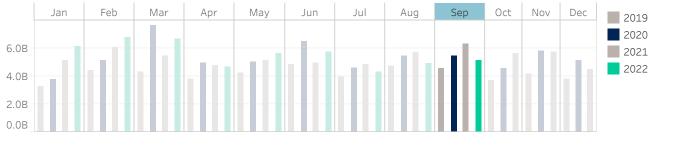
ОК

		22 Q1			22 Q2			22 Q3	
	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22
firstHalfHour	29.5	28.3	28.5		27.4	26.8	26.6	25.0	25.2
midday	23.4	22.8	22.8	22.2	22.1	21.9		21.1	21.1
lastHalfHour	21.7	21.3	21.4	20.7	20.5	20.9	20.7	20.1	20.0
One Minu	te Volatili	ty Bps							
firstHalfHour	16.5	17.1	17.5	15.3	16.7	15.4	13.3	12.4	12.4
midday	7.7	7.7	8.9		7.0				
lastHalfHour	6.3	7.1	8.0	6.3	6.2	6.0	6.0	10.8	6.8
Quotesize	e in Shares	S							
firstHalfHour	1,070	1,018	1,006	1,149	1,078	1,114	1,251	1,353	1,377
midday	2,103	2,005	2,090		2,304	2,398	2,557	2,999	2,865
lastHalfHour	2,550	2,571	2,464	2,831		2,613	2,858	3,377	3,196

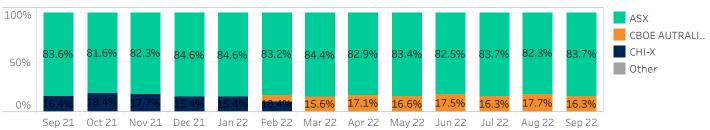
Median used for all metrics

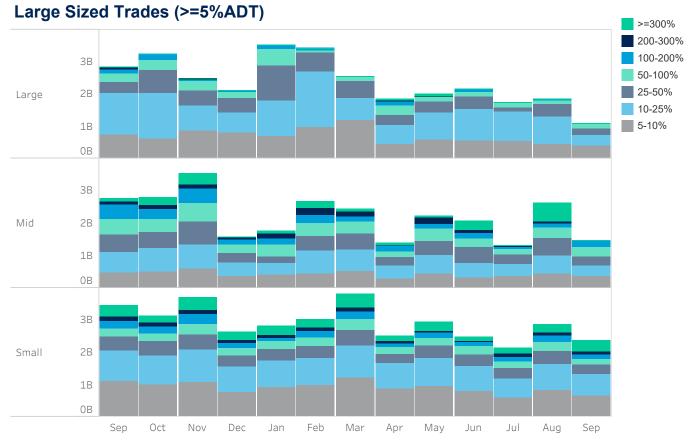
Australia

Average Daily Turnover (Notional USD)



Venue Market Share (Notional USD)

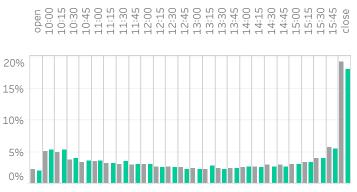




Source data: Virtu Financial

Australia

Volume Curve



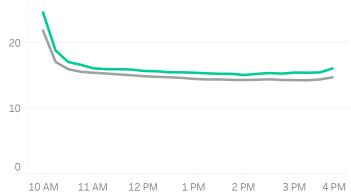
Intraday Quotesize (Shares)

12 PM

1 PM

2 PM

Intraday Spread (bps)





Rolling 12 Months Avg September 2022

4 PM

3 PM

Spread Bps

10 AM

11 A M

ОК

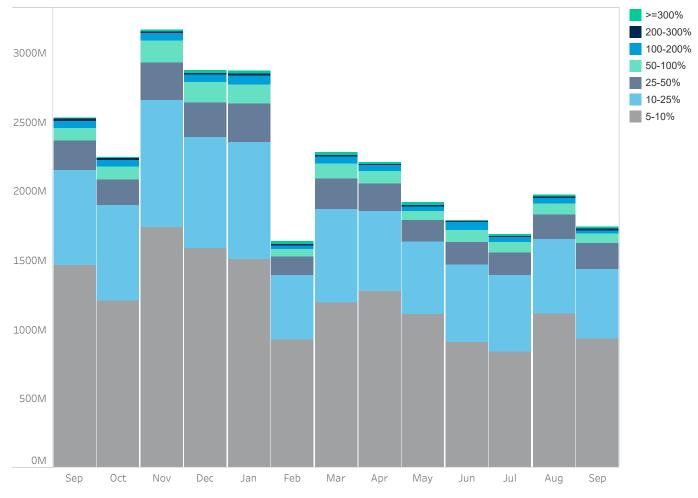
		22 Q1			22 Q2			22 Q3	
	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22
firstHalfHour	18.0	18.9	18.6	18.4	19.0	20.5	20.7	19.7	20.4
midday	14.6		15.1	14.6	14.6	16.2	15.9	14.7	15.6
lastHalfHour	14.1	14.3	14.5	14.3	14.7	16.4	16.0	14.9	15.7
One Minu	ute Volatili	ty Bps							
firstHalfHour	16.4	20.9	18.6	15.8	19.3	21.3	18.3	19.1	18.5
midday	5.4	6.2	5.2	4.2	4.7	5.3	5.0	4.7	4.8
lastHalfHour	5.0	3.9	3.7	3.1	3.6	4.0	4.0	4.2	4.1
Quotesiz	e in Share	S							
firstHalfHour	1,991	2,092	2,236	2,394	2,413	2,340	2,405	2,364	2,978
midday	3,945	4,008	4,728		5,148	5,554	5,352	5,316	6,495
lastHalfHour	8,020	8,680	9,575	9,457	9,953	9,528	9,648	9,498	10,762

Median used for all metrics

South Korea

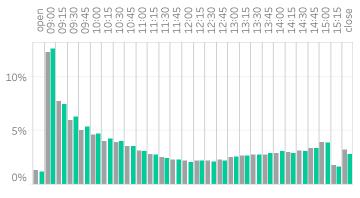






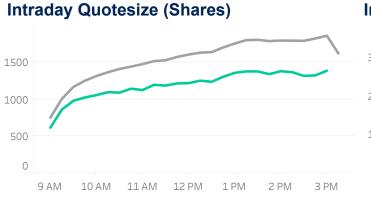
South Korea

Volume Curve

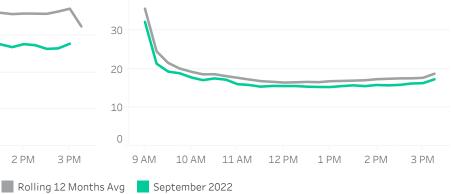


Intraday Spread (bps)





Intraday Volatility (bps)



Spread Bps

		22 Q1			22 Q2			22 Q3	
	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22
firstHalfHour	18.9	18.8	17.9	17.5	17.6	18.5	18.8	18.9	19.4
midday	17.4	17.4	17.0	16.6	16.9	17.2		17.0	17.6
lastHalfHour	17.4	17.3	17.0	16.7	16.9	17.3	17.2	17.0	17.7

One Minute Volatility Bps

midday	11.9	11.5	10.3	10.2	10.8	11.6	11.2
firstHalfHour	18.2	17.6	15.1	13.1	14.4	18.0	
lastHalfHour	13.0	13.3	25.4	23.1	25.3	13.8	12.7

Quotesize in Shares

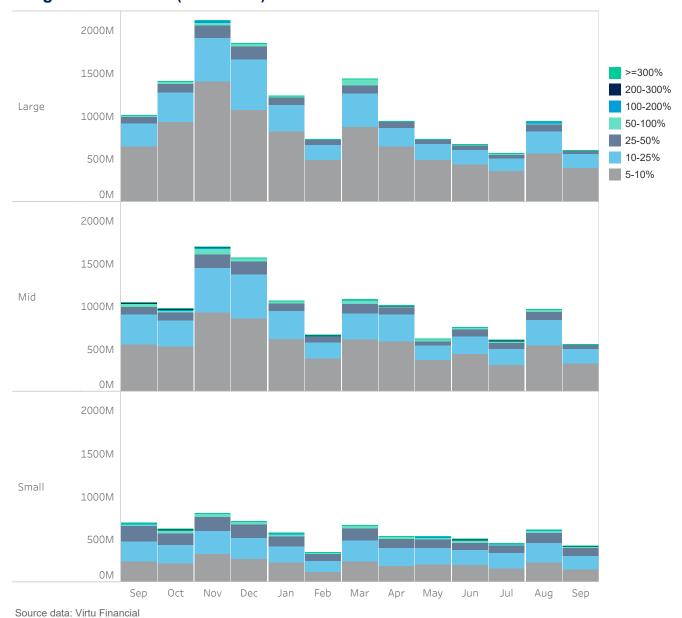
firstHalfHour	813	822	931	945	898	743	731		727
midday		1,313	1,669	1,603	1,653	1,351	1,235	1,697	1,343
lastHalfHour	1,727	1,598	1,929	1,900	1,950	1,495	1,375	1,942	1,484

Median used for all metrics

Taiwan

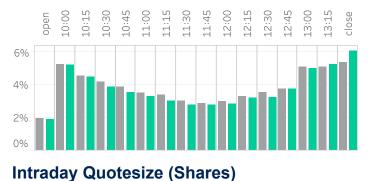
Average Daily Turnover (Notional USD) Mar Sep Jan Feb Apr May Jun Jul Aug Oct Nov Dec 2019 20.0B 2020 2021 2022 10.0B 0.0B

Large Sized Trades (>=5%ADT)

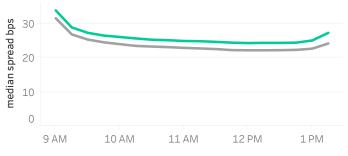


Taiwan

Volume Curve



Intraday Spread (bps)

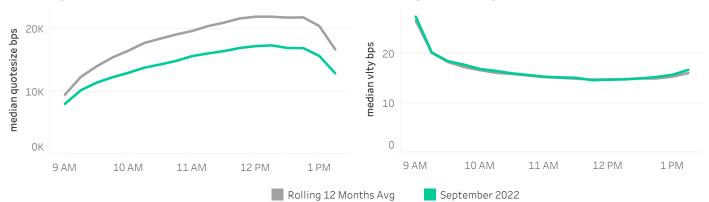


Intraday Volatility (bps)

14,454

14,115

14,114



Spread Bps

		22 Q1			22 Q2			22 Q3	
	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22
firstHalfHour	28.6	26.7	26.6	26.8	27.3	28.1	29.6	27.8	30.2
midday	22.2	21.9	21.7	22.4		23.4	24.5	23.0	24.6
lastHalfHour	22.5	22.3	22.1	23.0	24.0	24.8	25.5	23.2	25.9
firstHalfHour	ute Volatili 13.6	11.9	12.2	13.2	13.1	14.5	16.9	14.3	15.2
firstHalfHour	13.6	11.9				-	16.9	14.3	
midday	7.6	6.6	6.5	6.8	6.8	7.6	8.6	7.0	7.4
lastHalfHour	7.8	9.1	8.1	8.1	8.7	9.9	8.9	8.9	8.5
Quotesiz	e in Share	S							
firstHalfHour	12,163	11,965	12,023	11,310	10,719	10,126	9,514	10,698	9,327
midday	22,569	22,550	24,000	20,329		17,181	14,545	18,826	15,514

Median used for all metrics

21,873

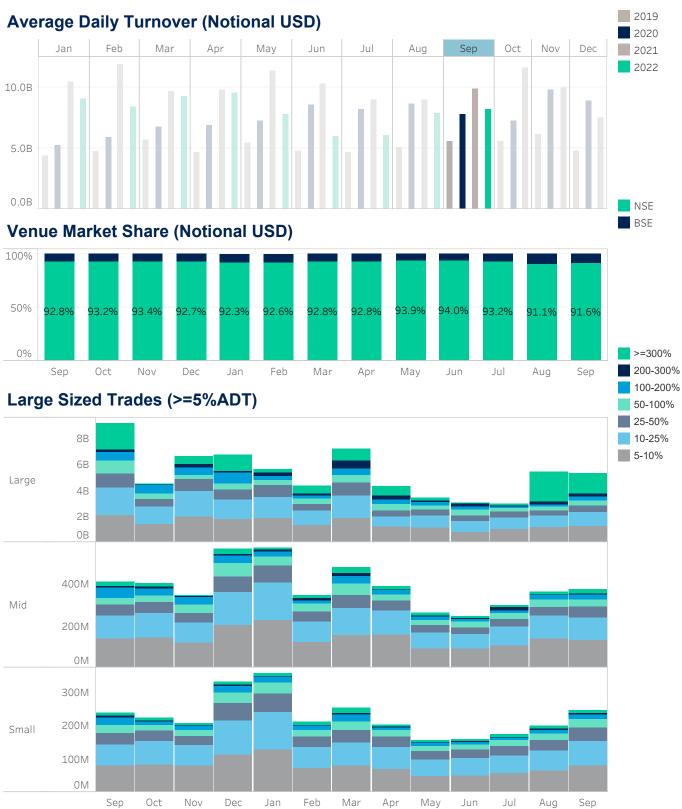
20,395

lastHalfHour

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 data: Virtu Financial

22,040

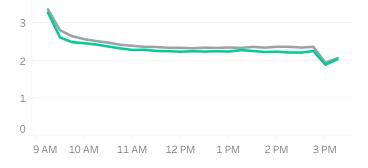
India

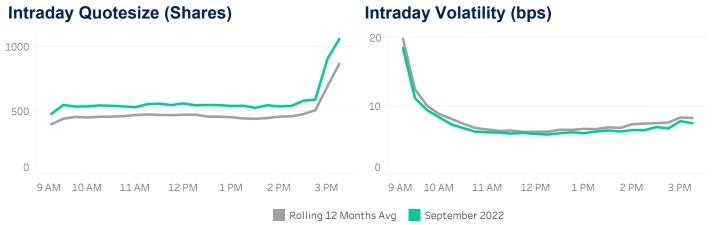


India

Volume Curve

Intraday Spread (bps)





Spread Bps

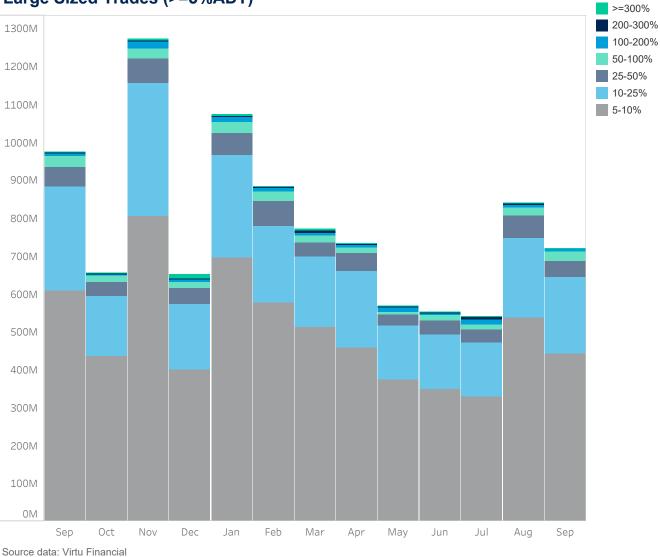
		22 Q1			22 Q2			22 Q3	
	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22
firstHalfHour	3.1	3.1	2.9	2.8	3.0	3.0	2.7	2.8	2.8
midday	2.4	2.5	2.4	2.2	2.4		2.2	2.2	2.3
lastHalfHour	2.0	2.0	2.0	1.9	2.0	1.9	1.8	1.8	1.9
	ute Volatilit	· ·	15.7	12.4	107	14.0	12.0	12.2	
firstHalfHour	14.7	16.4	15.7	13.4	16.7	14.8	12.0	12.2	12.8
midday	5.9	7.4	7.3		8.6	7.1	5.5	5.3	6.0
lastHalfHour	7.3	7.8	8.7	7.8	9.7	8.1	7.0	6.5	7.0
Quotesiz	e in Shares	6							
firstHalfHour	394	370	465	415	345	364	411	557	525
midday	451	417	478		373	393	458	590	550
lastHalfHour	736	664	783		586	672	703	879	934

Median used for all metrics

Thailand

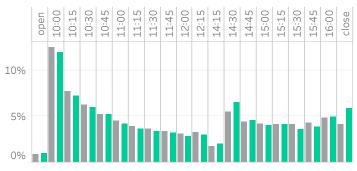






Thailand

Volume Curve



Intraday Spread (bps)





Intraday Volatility (bps)



Spread Bps

	22 Q1			22 Q2			22 Q3			
	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22	
firstHalfHour	54.5	55.2	56.2	55.8		57.5	60.1	58.1	58.8	
midday	54.3	54.9	55.6	55.4		57.1	59.9	57.9	58.8	
lastHalfHour	54.4	55.2	55.7	55.9	56.2	57.5	60.0	58.1	58.8	

One Minute Volatility Bps

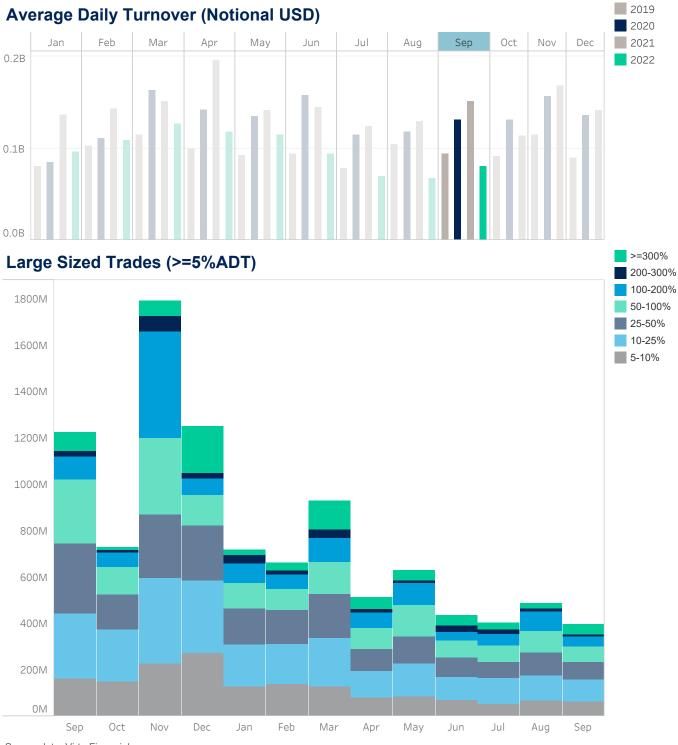
firstHalfHour	145.0	151.1	54.1	158.6	54.3	144.1	148.5	152.5	143.2
midday	152.7	158.8	152.0	157.2	155.2	173.0	142.6	155.7	149.6
lastHalfHour									

Quotesize in Shares

firstHalfHour	385,390	374,157	334,148	350,199	296,888	309,227	249,174	356,306	398,349
midday	617,268	597,117	540,531		472,504	481,812	401,100	577,313	581,460
lastHalfHour	606,051	597,584	539,031	562,618	479,643	473,218	415,479	587,211	561,127

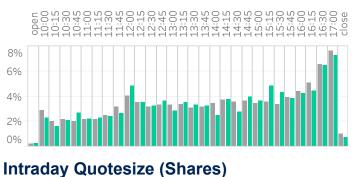
Median used for all metrics

New Zealand



New Zealand





Intraday Spread (bps)



Intraday Volatility (bps)





📕 Rolling 12 Months Avg 📃 September 2022

Spread Bps

	22 Q1			22 Q2			22 Q3		
	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22
firstHalfHour	33.3	32.2	30.8	34.0	38.6				31.4
midday	21.6	20.8	19.3	17.7		22.2	20.0	18.4	18.3
lastHalfHour	21.3	23.6	19.3	18.0	20.7	24.8	20.4	19.0	18.6

One Minute Volatility Bps

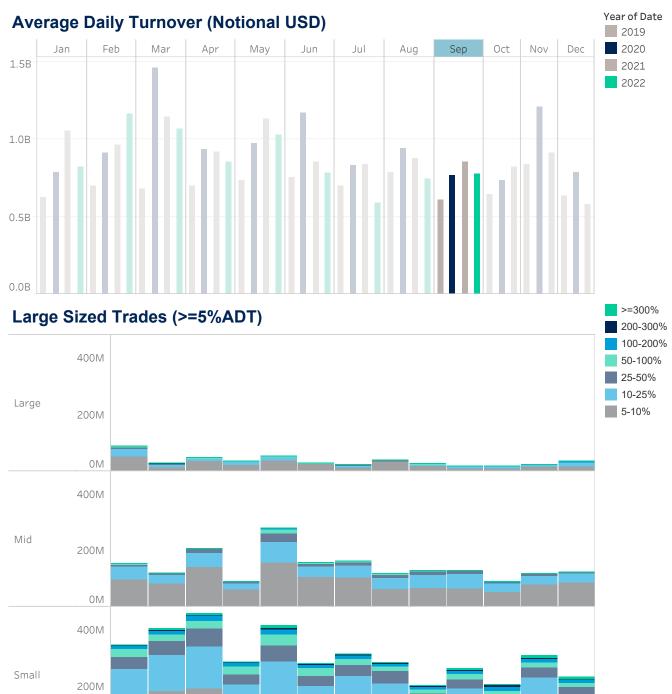
firstHalfHour	9.6	8.8	7.1	6.3	9.1				7.6
midday	4.3	4.8	4.3	3.2	3.8	3.7	3.7	3.8	4.1
lastHalfHour	3.3	4.7	4.8	3.7	5.3	5.6	4.7	4.7	4.2

Quotesize in Shares

firstHalfHour	2,843	3,412	3,092	3,044	2,841				2,664
midday	5,011		5,284	5,456	5,955	6,180	5,959	5,623	5,847
lastHalfHour	6,831	7,951	8,238	7,811	7,376	7,341	7,577	7,166	6,968

Median used for all metrics

Singapore



Source data: Virtu Financial

ОM

Sep

Oct

Nov

Dec

Jan

Feb

Mar

Apr

May

Jun

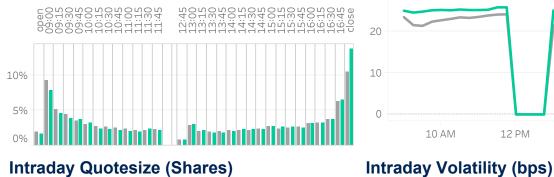
Jul

Aug

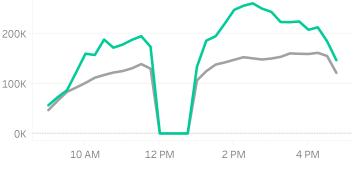
Sep

Singapore

Volume Curve



Intraday Quotesize (Shares)



Intraday Spread (bps)





Rolling 12 Months Avg September 2022

Spread Bps

	22 Q1			22 Q2			22 Q3		
	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22
firstHalfHour	22.5	21.3	21.0	20.5	22.2	22.8	23.0	19.6	22.9
midday	23.4	21.6	21.2	21.8	23.9	24.0	24.4		25.2
lastHalfHour	21.9	21.2	20.8	21.1	23.9	22.8	22.0	21.6	22.9
	2210								
One Minu	te Volatili		0.7	5.7	0.1	5.0	6.0		
		ty Bps 7.6	8.7	5.7	8.1	5.9	6.2	5.5	5.5
One Minu	te Volatili		8.7 5.0	5.7 4.5	8.1 5.8	5.9 3.9	6.2 5.1	5.5 5.4	5.5 4.5

Quotesize in Shares

firstHalfHour	57,597	62,465	51,450	48,491	66,272	58,725	49,988	61,757	71,222
midday	140,047	127,607	119,649	116,792	159,349		111,790	155,222	200,856
lastHalfHour	134,260	152,729	122,584	122,775	163,525	129,298	102,873	148,883	165,031

Median used for all metrics

Glossary

Volume curve - average of value traded during the month, per 15-minute time bin.
Intraday volatility - Median of difference between the high and low price within a one minute time bin, divided by that bin's VWAP
Spread - median of bid-ask spread of the index.
Quotesize - Median bid and ask size of all stocks in the index.

Average daily turnover - average daily value traded in the market.

Indices used:

Australia: ASX 200 Japan: TOPIX China: CSI 300 Hong Kong: Hang Seng Index Taiwan: TWSE India: NIFTY 50 Korea: MSCI Korea 25/50 Index New Zealand: MSCI New Zealand IMI 25/50 Index Singapore: MSCI Singapore Index Thailand: MSCI Thailand IMI 25/50 Index

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