



SIFMA Insights

US Equity Market Structure Analysis

Analyzing the Meaning Behind the Level of Off-Exchange Trading Part II

December 2021

Key Takeaways

In our second report analyzing off-exchange trading levels, we go deeper into publicly available data to break down off exchange by ATS and OTC venues. We believe the current market structure works well and the retail investor has never had it better – \$0 commissions, mobile access to trading platforms, research/education materials available at no charge from retail brokers, etc. – earning \$11B in price and size improvement in 2020. Yet, current conversations overlook or underestimate many factors, such as the competition for order flow is a hunger game, driven by execution quality. We highlight the following:

- 2016 to 2020: total volumes increased 50.0% vs. off-exchange volumes +69.4%, a 19.4 pps differential
- Volume breakout: (2017-2019) exchange 65.0%, ATS 12.6%, OTC 22.4%; (2020) exchange 61.6% (-3.4 pps), ATS 11.3% (-1.3 pps), OTC 27.1% (+4.7 pps)
- Transaction breakout: (2017-2019) exchange 77.6%, ATS 12.5%, OTC 9.9%; (2020) exchange 73.5% (-4.1 pps), ATS 10.7% (-1.8 pps), OTC 15.8% (+5.9 pps).

Please see other reports in the SIFMA Insights equity market structure series: [Analyzing the Meaning Behind the Level of Off-Exchange Trading](#) and [Why Market Structure and Liquidity Matter](#).



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For further details and additional information on the functioning of capital markets, please see the SIFMA Insights Market Structure Primer Series:

- [Global Equity Markets Primer](#)
- [Primary, Secondary & Post-Trade Markets Primer](#)
- [Global Capital Markets & Financial Institutions Primer](#)
- [Sector-Specific Primers: Electronic Trading; US Equity Capital Formation & Listings Exchanges; US Equity; US Multi-Listed Options; US ETFs; and Evolution of the Fintech Narrative](#)

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Executive Summary

Discussions continue about the increased level of off-exchange trading as a percent of total equity volumes in the U.S. (YTD 43.9%; + 2.4 pps to 2020, +6.6 pps to 2019). In our first report analyzing off-exchange trading levels, we looked at alternative views of measuring off-exchange trading – as a percent of notional value or trade count and levels by tape – showing the variances in growth rates by metric. We noted that the percent of off-exchange trading is a function of market structure, and the optimal level of off-exchange trading is the actual amount in that given time period.

This report goes deeper into the publicly available FINRA data to break down off exchange volumes across ATS and OTC venues. We highlight the following:

- From 2016 to 2020, total consolidated equity volumes increased 50.0%, while off-exchange volumes increased 69.4%, a 19.4 pps differential. The differential was less on a compound annual growth rate basis at 2.7 pps: total volumes increased 8.4%, while off-exchange volumes increased 11.1%.
- In 2020, the Y/Y growth trend for off-exchange outpaced that for both market and on-exchange volumes, a shift from historical patterns of declining or growing less than on exchange and the total market, increasing the differential between off- and on-exchange trading Y/Y growth rates.
- The pattern between off-exchange volumes and volatility (VIX) also shifted in 2020. When the VIX increased 90.1% Y/Y, off-exchange volumes increased 74.5% Y/Y versus only a 46.0% increase for on-exchange volumes. Despite high volatility, trades moved off-exchange.
- For volumes from 2017 to 2019, the breakout among trading venues averaged: exchange 65.0%, ATS 12.6%, OTC 22.4%. This shifted in 2020 to: exchange 61.6% (-3.4 pps), ATS 11.3% (-1.3 pps), OTC 27.1% (+4.7 pps).
- For transactions from 2017 to 2019, the breakout among trading venues averaged: exchange 77.6%, ATS 12.5%, OTC 9.9%. This shifted in 2020 to: exchange 73.5% (-4.1 pps), ATS 10.7% (-1.8 pps), OTC 15.8% (+5.9 pps).
- Transaction growth outpaced dollar volume growth by: exchange 13.0 pps, ATS 3.7 pps, OTC 93.2 pps. More transactions are being executed in lower value stocks, an indicator of greater retail flow
- From 4Q19 to 3Q21, while exchange trading as a percent of total market volumes declined 4.7 pps and ATS declined 1.5 pps, OTC venues grew 6.2 pps. The growth in OTC levels corresponds to volume increases. Looking at 2Q20 when the OTC level reached the 30s, OTC venues grew as a percent of total by 5.6 pps from 4Q19 (essentially the average historical level) to 2Q20. During the same time, ADV grew 82.9%.
- We also provide a list of ATS and OTC venues

While there have been many comments on equity market structure this year, we believe the system works well. Additionally, retail investors have never had it better – \$0 commissions, access to trading platforms, research/education materials available for free from their retail broker, etc. We believe the current conversations overlook or underestimate many factors, including:

- The competition for order flow is a hunger game, driven by execution quality. As retail brokers route their order flow based on execution quality metrics, the competition is centered around this one concept: who will perform better (i.e. provide best ex) for my clients' order flow? Executing firms need to prove their worth day in and day out. Our current market structure provided retail investors \$3.6 billion in price improvement in 2020. This figure increases to \$11.0 billion when you add in size improvement as well (liquidity providers may price improve orders by improving the price versus the National Best Bid and Offer, or NBBO, or offering more shares than the displayed size available).
- Market participants also provide risk controls and protections for their clients during the order routing and execution processes. Without this buffer, retail brokers would have increased execution risk, which could shift costs to their clients.
- Costs are a barrier to entry for consolidators and market makers alike, requiring financial strength and operational resiliency supported by an enormous technology footprint. Firms with scale can deploy new technologies safely and smartly to meet real time market needs given the current market environment.

We encourage readers to visit our first note in the series [Analyzing the Meaning Behind the Level of Off-Exchange Trading](#) for trends in off-exchange volumes and alternative views of analyzing them, as well as the companion piece on market structure, [Why Market Structure and Liquidity Matter](#).

Historical Market Landscape

Listed U.S. equities are traded on one of the 16 national securities exchanges or on an off-exchange trading venue. Clients will have different demands based on timing, costs, anonymity, etc. The routing broker must therefore balance the likelihood of certainty of execution against potential price or size improvement, potential slippage for larger sized institutional orders, and other transaction costs when determining the path of the trade. The venue choices for off-exchange trading include:

- Alternative trading systems – ATS anonymously match customer trades and are, therefore, an important source of market liquidity.
- Over-the-Counter venues – OTC venues entail a network of market makers and broker dealers trading as principal, including wholesalers/consolidators who execute retail flow.

We note that off-exchange trades are still reported to the consolidated tape – as soon as practical but not later than 10 seconds – and, in accordance with FINRA requirements, must take place at the best price reasonably available, typically at or inside the bounds of the current national best bid and best offer (NBBO) in accordance with Reg NMS Order Protection Rule (Rule 611).

Market Landscape

Looking at the historical market landscape utilizing FINRA data for trading of all Regulation National Market System (Reg NMS) stocks, we note that the data in the table below is the aggregate of all shares traded for the listed year, i.e. aggregate volumes (not average daily volume or ADV). The level of off-exchange trading averaged 36.9% from 2016 to 2019. The average for the whole time series was 37.8%, with the increase driven by the 2020 elevated level of 41.5%.

From 2016 to 2020, total consolidated equity volumes increased 50.0%, while off-exchange volumes increased 69.4%, a 19.4 pps differential. The percent of off-exchange trading grew from 36.7% to 41.5%, +4.8 pps. The differential between total market volume growth and off-exchange volumes was less on a compound annual growth rate basis. Total volumes increased 8.4%, while off-exchange volumes increased 11.1%, a 2.7 pps differential.

While the off-exchange level increased greater than total market volumes, all segments, including on-exchange trading, exhibited significant and unusual increases. Looking at year-over-year changes, each segment historically showed a similar pattern in growth trends: 9-11% decline in 2017, 8.5-12% increase in 2018, 1-5% decline in 2019. The trends for on-exchange growth were stronger than that for the market and off-exchange: on-exchange Y/Y decline was greater than the market and off-exchange in 2017 and 2019; the on-exchange increase was greater than the market and off-exchange in 2018.

This pattern shifted in 2020.

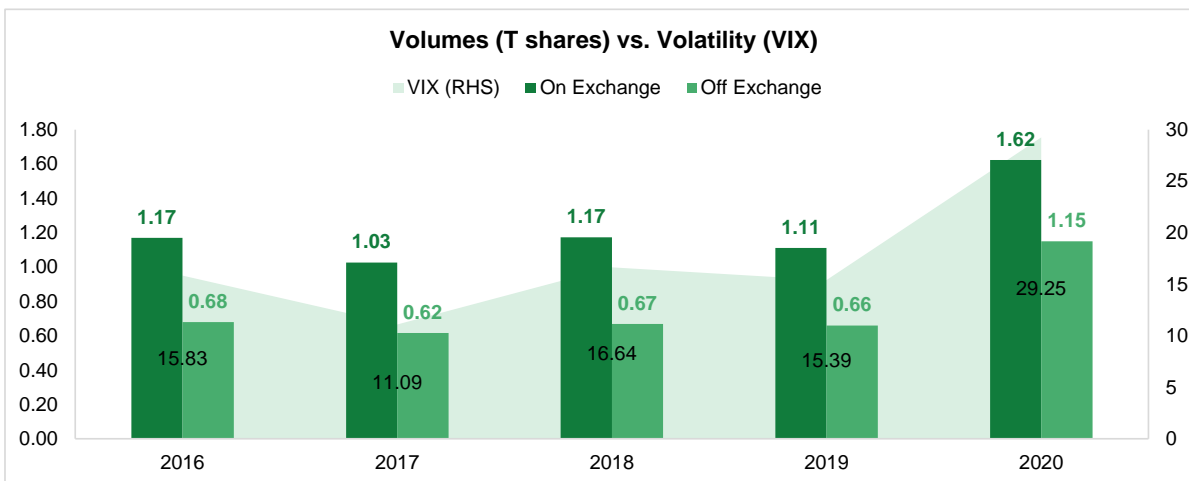
Last year, the Y/Y growth trend for off-exchange outpaced that for both market and on-exchange volumes. Now off-exchange volume growth – which historically both declined or grew less than on exchange and the total market – outpaced on exchange and the total market, increasing the differential between off- and on-exchange trading Y/Y growth rates.

Trading of All NMS Stocks

	2016	2017	2018	2019	2020	Average	Change	CAGR
Consolidated Volume (T shares)								
Total	1.8	1.6	1.8	1.8	2.8	2.0	50.0%	8.4%
On-Exchange	1.2	1.0	1.2	1.1	1.6	1.2	38.7%	6.8%
Off-Exchange	0.7	0.6	0.7	0.7	1.2	0.8	69.4%	11.1%
OE % Total	36.7%	37.5%	36.3%	37.2%	41.5%	37.8%	4.8	
Y/Y Change								
Total		-11.1%	12.1%	-3.8%	56.6%			
On-Exchange		-12.3%	14.3%	-5.3%	46.0%			
Off-Exchange		-9.2%	8.5%	-1.4%	74.5%			
OE % Total (pps)		0.8	-1.2	0.9	4.3			
Off vs. On Differential		(3.0)	5.8	(3.9)	(28.5)			

Sources: FINRA (citing UTP Trade Data Feed, Consolidated Tape System), SIFMA estimates
 NOTE: OTC includes all FINRA facilities (FINRA/Nasdaq TRFs, FINRA/NYSE TRF, FINRA Alternative Display Facility); differences in historical series reflect changes in underlying data

The pattern between off-exchange volumes and volatility (VIX) also shifted in 2020. Typically, trades move back onto exchanges during periods of high volatility, as traders search to improve price discovery (and vice versa during lower volatility periods). Yet, in 2020, when the VIX increased 90.1% Y/Y, off-exchange volumes increased 74.5% Y/Y versus only a 46.0% increase for on-exchange volumes. Despite high volatility, trades moved off-exchange. To be fair, part of the increase was driven by floor closures early on in the year. Market participants also attribute the increase to: increased fragmentation after adding three new equity exchanges in September 2020; people became accustomed to the higher level of the VIX and therefore learned to execute efficiently off exchange under these conditions; and the growth in retail trading, which is often executed off exchange.



Source: Bloomberg, FINRA, SIFMA estimates

Shifting Patterns

So what has changed to interrupt the historical pattern? We next look at trading of all NMS stocks by venue: exchanges, alternative trading systems (ATS), and over-the-counter (OTC) venues. We note that the data in the table below is the statistical average of daily dollar volumes (notional; differs from traditional ADV as not dividing by the number of trading days) and transactions for the listed year.

For volumes (left side of the table), from 2017 to 2019, the breakout among trading venues averaged: exchange 65.0%, ATS 12.6%, OTC 22.4%. This shifted in 2020 to: exchange 61.6% (-3.4 pps), ATS 11.3% (-1.3 pps), OTC 27.1% (+4.7 pps). Each segment posted substantial 2017 to 2020 growth rates, ranging from +50% to almost +120%, as well as very high CAGRs, ranging from around 11% to 21.5%.

For transactions (right side of the table), from 2017 to 2019, the breakout among trading venues averaged: exchange 77.6%, ATS 12.5%, OTC 9.9%. This shifted in 2020 to: exchange 73.5% (-4.1 pps), ATS 10.7% (-1.8 pps), OTC 15.8% (+5.9 pps). Each segment posted substantial 2017 to 2020 growth rates, ranging from +54% to over +200%, as well as very strong CAGRs, ranging from around 11% to 33%.

Trading of All NMS Stocks by Venue Type

	2017	2018	2019	2020	Change	CAGR		2017	2018	2019	2020	Change	CAGR
Avg. Daily Volume (\$B)							Avg. Daily Transactions (# M)						
Exchange	176.0	235.4	209.1	296.3	68.4%	13.9%	Exchange	23.8	28.5	28.3	43.1	81.4%	16.1%
ATS	36.3	43.9	39.8	54.4	49.9%	10.6%	ATS	4.1	4.5	4.4	6.3	53.5%	11.3%
OTC Venues	59.8	79.3	74.3	130.4	118.1%	21.5%	OTC Venues	3.0	3.6	3.6	9.3	211.3%	32.8%
Total	272.1	358.6	323.2	481.1	76.8%	15.3%	Total	30.8	36.6	36.4	58.7	90.3%	17.4%
% Total							% Total						
Exchange	64.7%	65.6%	64.7%	61.6%	-3.1		Exchange	77.1%	77.8%	77.8%	73.5%	-3.6	
ATS	13.3%	12.2%	12.3%	11.3%	-2.0		ATS	13.3%	12.2%	12.2%	10.7%	-2.6	
OTC Venues	22.0%	22.1%	23.0%	27.1%	5.1		OTC Venues	9.7%	10.0%	10.0%	15.8%	6.2	
Y/Y Change - Volume							Y/Y Change - Transactions						
Exchange	33.8%	-11.2%	41.7%				Exchange	20.0%	-0.6%	52.2%			
ATS	20.9%	-9.3%	36.7%				ATS	9.2%	-1.0%	42.1%			
OTC Venues	32.6%	-6.3%	75.5%				OTC Venues	22.3%	-0.2%	155.1%			
Total	31.8%	-9.9%	48.9%				Total	18.8%	-0.6%	61.2%			
Y/Y Change - % Total							Y/Y Change - % Total						
Exchange	1.0	-0.9	-3.1				Exchange	0.8	0.0	-4.4			
ATS	-1.1	0.1	-1.0				ATS	-1.1	0.0	-1.4			
OTC Venues	0.1	0.9	4.1				OTC Venues	0.3	0.0	5.8			

Source: FINRA, SIFMA estimates

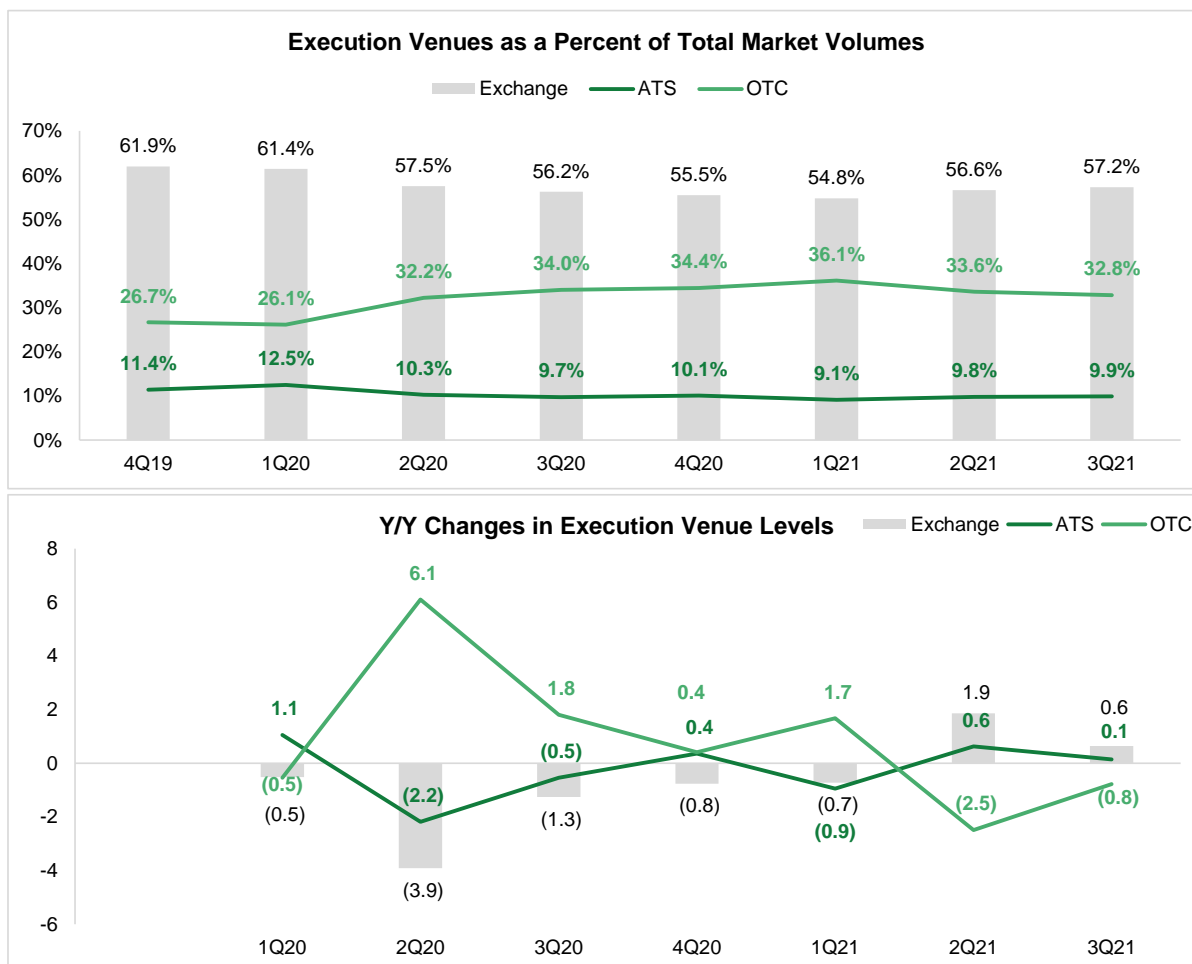
Let's break that down. Transaction growth outpaced dollar volume growth by (total 2017 to 2020 change): exchange 13.0 pps, ATS 3.7 pps, OTC 93.2 pps. On each type of venue, albeit to varying degrees, more transactions are being executed in lower value stocks. This can be an indicator of greater retail flow, as retail investors tend to trade in lower price stocks. OTC venues had the largest differential in growth rates, implying traders or wholesale purchasers of retail order flow are seeing better market opportunities to execute retail flow on these venues. However, we reiterate from our last analysis that all off-exchange trading is not 100% retail. These volumes also include block (trade size 10,000+ shares) and other institutional trades, including bank capital commitment as part of institutional trades.

A Look at Off-Exchange Trading Venues

Breaking Down Venue Types

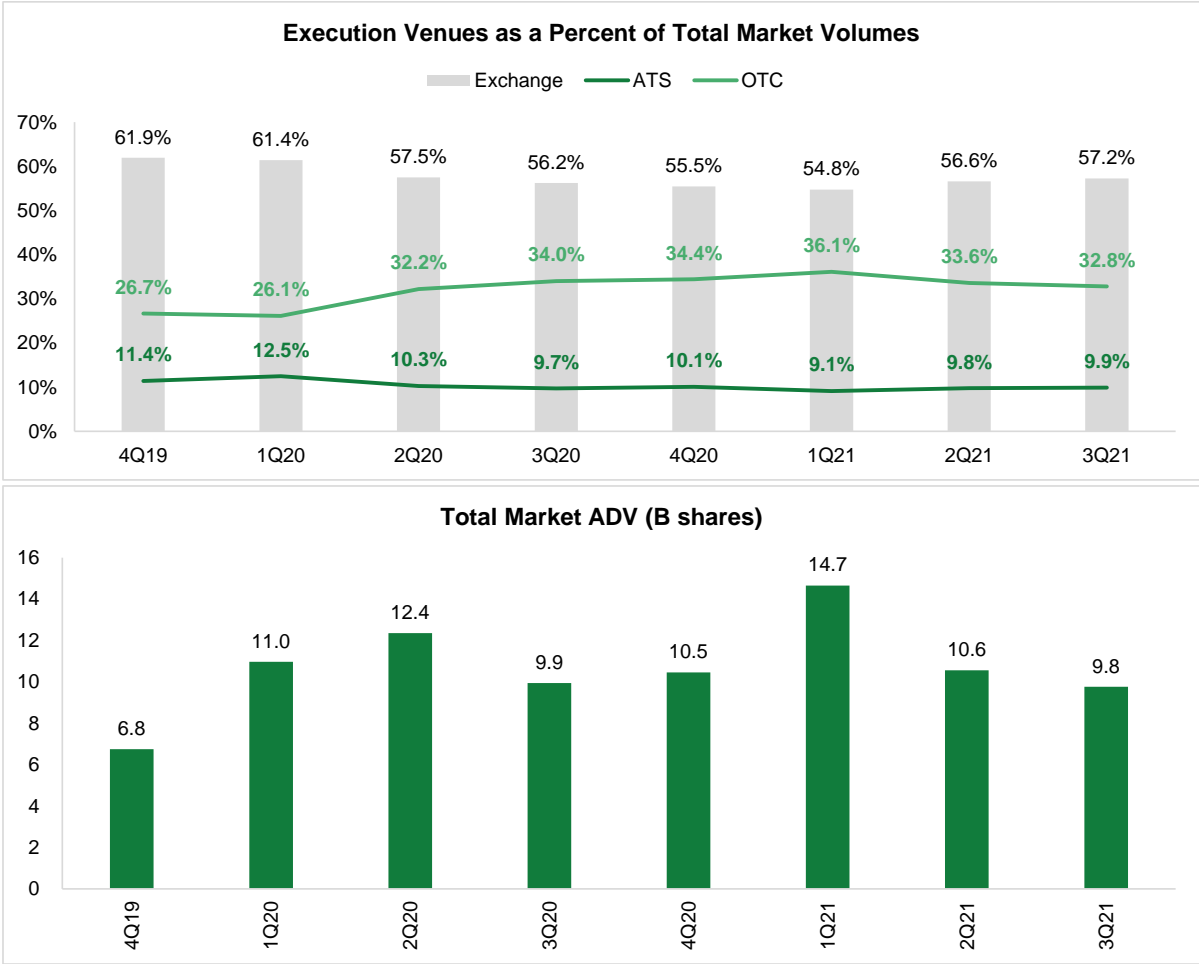
Turning again to FINRA data, we look at recent trends in how volumes breakout across venues in U.S. equity markets. While the publicly available data does not provide for a long time series, we do note that the series does capture what is commonly cited as the start of the growth in retail investor trading, when the retail brokers took commissions to \$0 in the fall of 2019.

From 4Q19 to 3Q21, while exchange trading as a percent of total market volumes declined 4.7 pps and ATS declined 1.5 pps, OTC venues grew 6.2 pps. Off-exchange trading on OTC venues is now around one-third of total volumes, with over half of volumes still being executed on exchanges. The big jump in OTC venues occurred in 2Q20 – the peak of the COVID-driven market turmoil – when the level moved from 26.1% to 32.2%, +6.1 pps. It remains in the low 30s.



Source: FINRA, Cboe Global Markets, SIFMA estimates

We thought it would be interesting to look at the same execution venue breakout chart against total market volumes. You can see the spike in OTC levels corresponding to volume increases. Looking at 2Q20 when the OTC level reached the 30s, OTC venues grew as a percent of total by 5.6 pps from 4Q19 (essentially the average historical level) to 2Q20. This compares to declines of 4.4 pps for on exchange and 1.1 pps for ATS. During the same time, ADV grew 82.9%.



Source: FINRA, Cboe Global Markets, SIFMA estimates

Alternative Trading Systems (ATS)

To generate a proxy list for ATS, we use the FINRA ATS transparency data for trading of Reg NMS stocks. We note that ATS are regulated by the SEC for their execution of exchange listed stocks under Regulation ATS, and, in 2018, the SEC adopted Form ATS-N to create greater public disclosure about certain ATS, i.e. increase transparency.

The number of ATS has remained stable over the last several years, currently at 33 as of 3Q21. Looking at the venue count since 4Q19, we highlight the following and list the venues below:

- Average 32
- Maximum 33
- Minimum 31

Name	MPID	Name	MPID
UBS ATS	UBSA	CODA	CODA
SIGMA X2	SGMT	INSTINET BLOCKCROSS	BLKX
CROSSFINDER	CROS	DEALERWEB	DLTA
JPM-X	JPMX	MS RPOOL (ATS-6)	MSRP
LEVEL ATS	EBXL	CBX	ICBX
MS POOL (ATS-4)	MSPL	LIQUIDNET H2O ATS	LQNA
IBKR ATS	IATS	LIQUIDNET NEGOTIATION ATS	LQNT
THE BARCLAYS ATS	LATS	LUMINEX ATS	LMNX
BIDS ATS	BIDS	CITIBLOC	CBLC
INTELLIGENT CROSS LLC	INCR	USTOCKTRADE SECURITIES, INC.	USTK
VIRTU MATCHIT ATS	KCGM	AQUA	AQUA
INSTINCT X	MLIX	INSTINET CROSSING	XIST
SUPERX ATS	DBAX	XE	PJCX
MS TRAJECTORY CROSS (ATS-1)	MSTX	TZERO ATS, LLC	PROS
CROSSSTREAM	XSTM	BOATS	BLUE
POSIT	ITGP	STIFEL X	STFX
JPB-X	JPBX		
TOTAL	33		

Source: FINRA (as of 2Q21, list may vary each quarter)

Note: Sorted by total shares traded from largest to smallest. Some firms operate more than one ATS to satisfy different customer trading preferences.

Over-the-Counter (OTC) Venues

There are multiple OTC venues executing trades for exchange listed stocks. To generate a proxy list, we use the FINRA OTC (Non-ATS) block data download (aggregated trade data in NMS stocks reported to the FINRA equity trade reporting facilities: Alternative Display Facility and Trade Reporting Facilities). We do note that not all of these transactions, and therefore not all of these venues, involve customer trades, as some of these venues may have executed only proprietary trades.

The number of OTC venues has also remained stable over the last several years. However, the number of venues is multiples of ATS, currently at 212 as of 3Q21. Looking at the venue count since 4Q19, we highlight the following and list the venues below:

- Average 210
- Maximum 224
- Minimum 202

Name	Name	Name
A.G.P. / ALLIANCE GLOBAL PARTNERS	CANACCORD GENUITY LLC	ELEVATION, LLC
ACS EXECUTION SERVICES, LLC	CANTOR FITZGERALD & CO.	EVERCORE GROUP L.L.C.
AEGIS CAPITAL CORP.	CAPITAL INSTITUTIONAL SERVICES, INC.	EXANE, INC.
ALLEN & COMPANY LLC	CELADON FINANCIAL GROUP LLC	FBN SECURITIES, INC.
ALPACA SECURITIES LLC	CHARLES SCHWAB & CO., INC.	FIRST BALLANTYNE, LLC
ALTERNATIVE EXECUTION GROUP	CHURCHILL CAPITAL USA, INC.	FIS BROKERAGE & SECURITIES SERVICES LLC
AMERICAN CAPITAL PARTNERS, LLC	CIBC WORLD MARKETS CORP.	FLOW TRADERS U.S. INSTITUTIONAL TRADING LLC
AMERICAN ENTERPRISE INVESTMENT SERVICES INC.	CITADEL SECURITIES LLC	FLOW TRADERS U.S. LLC
AMERICAN VETERANS GROUP, PBC	CITIGROUP GLOBAL MARKETS INC.	FOG EQUITIES LLC
AXOS CLEARING LLC	CJS SECURITIES, INC.	G1 EXECUTION SERVICES, LLC
B. RILEY SECURITIES, INC.	CLARKSONS PLATOU SECURITIES, INC.	GFI SECURITIES LLC
BARCLAYS CAPITAL INC.	CLEAR STREET LLC	GLENDALE SECURITIES, INC.
BAY CREST PARTNERS, LLC	CLEARPOOL EXECUTION SERVICES, LLC	GMS GROUP
BCP SECURITIES, LLC	CLSA AMERICAS, LLC	GOLDMAN SACHS & CO. LLC
BERENBERG CAPITAL MARKETS LLC	COLLIERS SECURITIES LLC	GTS SECURITIES LLC
BGC FINANCIAL, L.P.	COMHAR CAPITAL MARKETS, LLC	GUGGENHEIM SECURITIES, LLC
BMO CAPITAL MARKETS CORP.	COMPASS POINT RESEARCH & TRADING, LLC	HILLTOP SECURITIES INC.
BNP PARIBAS SECURITIES CORP.	COWEN AND COMPANY	HOLD BROTHERS CAPITAL LLC
BNY MELLON CAPITAL MARKETS, LLC	CRAIG-HALLUM CAPITAL GROUP LLC	HOVDE GROUP, LLC
BOENNING & SCATTERGOOD, INC.	CREDIT SUISSE SECURITIES (USA) LLC	HRT EXECUTION SERVICES LLC
BOFA SECURITIES, INC.	D.A. DAVIDSON & CO.	HSBC SECURITIES (USA) INC.
BOK FINANCIAL SECURITIES, INC.	DAIWA CAPITAL MARKETS AMERICA INC.	HUATAI SECURITIES (USA), INC.
BROAD STREET CAPITAL MARKETS, LLC	DASH FINANCIAL TECHNOLOGIES LLC	I-BANKERS SECURITIES, INC.
BROWNSTONE INVESTMENT GROUP, LLC	DEUTSCHE BANK SECURITIES INC.	ICAP CORPORATES LLC
BTG PACTUAL US CAPITAL, LLC	DRIVEWEALTH INSTITUTIONAL LLC	IMC FINANCIAL MARKETS
BTIG, LLC	DRIVEWEALTH, LLC	IMPERIAL CAPITAL, LLC
C. L. KING & ASSOCIATES, INC.	E D & F MAN CAPITAL MARKETS INC.	INCAPITAL LLC
C6 CAPITAL SECURITIES LLC	E*TRADE SECURITIES LLC	INSTINET, LLC
CABRERA CAPITAL MARKETS, LLC	EDWARD JONES	INTERACTIVE BROKERS LLC

Source: FINRA (as of June 2021, list may vary each month)

Note: Some firms operate more than one ATS to satisfy different customer trading preferences.

A Look at Off-Exchange Trading Venues

Name	Name	Name
ITAU BBA USA SECURITIES, INC.	NATIXIS SECURITIES AMERICAS LLC	STEPHENS
J.P. MORGAN SECURITIES LLC	NEEDHAM & COMPANY, LLC	STIFEL, NICOLAUS & COMPANY, INCORPORATED
J.V.B. FINANCIAL GROUP, LLC	NOMURA SECURITIES INTERNATIONAL, INC.	STOCKPILE INVESTMENTS, INC.
JANE STREET CAPITAL, LLC	NORTHERN TRUST SECURITIES, INC.	STONEX FINANCIAL INC.
JANE STREET EXECUTION SERVICES, LLC	NORTHLAND SECURITIES, INC.	SUSQUEHANNA FINANCIAL GROUP, LLLP
JANNEY MONTGOMERY SCOTT LLC	ODEON CAPITAL GROUP LLC	SVB LEERINK LLC
JEFFERIES LLC	OLD MISSION MARKETS LLC	TD AMERITRADE CLEARING, INC.
JMP SECURITIES LLC	OLIVETREE FINANCIAL, LLC	TD SECURITIES (USA) LLC
JONESTRADING	OPPENHEIMER & CO. INC.	THE BENCHMARK COMPANY, LLC
JOSEPH GUNNAR & CO. LLC	OSCAR GRUSS & SON INCORPORATED	THE VERTICAL GROUP
JWTT INC.	OTA LLC	THEMIS TRADING LLC
KEEFE, BRUYETTE & WOODS, INC.	PAULSON INVESTMENT COMPANY LLC	TJM INVESTMENTS, LLC
KEPLER CAPITAL MARKETS, INC.	PENSERRA SECURITIES, LLC	TOURMALINE PARTNERS, LLC
KEYBANC CAPITAL MARKETS INC.	PIPER SANDLER & CO.	TRADITION SECURITIES AND DERIVATIVES LLC
LADENBURG THALMANN & CO. INC.	PNC INVESTMENTS	TRC MARKETS LLC
LAKE STREET CAPITAL MARKETS, LLC	PRECISION SECURITIES, LLC	TRUIST SECURITIES, INC.
LEK SECURITIES CORPORATION	PUMA CAPITAL, LLC	TUDOR, PICKERING, HOLT & CO. SECURITIES, LLC
LIBUCKI & CO., LLC	QUATTRO M SECURITIES INC.	TULLETT PREBON FINANCIAL SERVICES LLC
LIQUIDNET, INC.	R. F. LAFFERTY & CO., INC.	TWO SIGMA SECURITIES, LLC
LPL FINANCIAL LLC	R. SEELAUS & CO., LLC	UBS FINANCIAL SERVICES INC.
LPS CAPITAL LLC	R.W.PRESSPRICH & CO.	UBS SECURITIES LLC
LUMINEX TRADING & ANALYTICS LLC	RAYMOND JAMES & ASSOCIATES, INC.	UNITED FIRST PARTNERS LLC
MACQUARIE CAPITAL (USA) INC.	RBC CAPITAL MARKETS, LLC	USCA SECURITIES LLC
MARKET SECURITIES, LLC	REDBURN (USA) LLC	VANGUARD MARKETING CORPORATION
MAXIM GROUP LLC	ROBERT W. BAIRD & CO. INCORPORATED	VELOCITY CLEARING, LLC
MCAP LLC	ROBINHOOD SECURITIES, LLC	VIRTU AMERICAS LLC
MESIROW FINANCIAL, INC.	ROSENBLATT SECURITIES INC.	WALL STREET ACCESS
MIZUHO SECURITIES USA LLC	ROTH CAPITAL PARTNERS, LLC	WALLACHBETH CAPITAL LLC
MKM PARTNERS LLC	SAFRA SECURITIES LLC	WATERMILL INSTITUTIONAL TRADING LLC
MOMENTUM INDEPENDENT NETWORK INC.	SAGETRADER, LLC	WEDBUSH SECURITIES INC.
MONNESS CRESPI HARDT & CO., INC.	SAMI BROKERAGE LLC	WELLINGTON SHIELDS & CO., LLC
MORGAN STANLEY	SANFORD C. BERNSTEIN & CO., LLC	WELLS FARGO CLEARING SERVICES, LLC
MORGAN STANLEY & CO. LLC	SANTANDER INVESTMENT SECURITIES INC.	WELLS FARGO SECURITIES, LLC
MORGAN WILSHIRE SECURITIES, INC.	SCOTIA CAPITAL (USA) INC.	WILLIAM BLAIR
MUFG SECURITIES AMERICAS INC.	SEAPORT GLOBAL SECURITIES LLC	WILLIAM O'NEIL SECURITIES
MURIEL SIEBERT & CO., INC.	SG AMERICAS SECURITIES, LLC	WILLIAMS TRADING LLC
NASDAQ EXECUTION SERVICES, LLC	SIDOTI & COMPANY, LLC	WILSON-DAVIS & CO., INC.
NATALIANCE SECURITIES, LLC	SIEBERT WILLIAMS SHANK & CO., LLC	WOLVERINE EXECUTION SERVICES, LLC
NATIONAL FINANCIAL SERVICES LLC	SRT SECURITIES LLC	XP INVESTMENTS US, LLC
NATIONAL SECURITIES CORPORATION	STATE STREET GLOBAL MARKETS, LLC	XTELLUS CAPITAL PARTNERS, INC.
		XTX EXECUTION SERVICES LLC

Source: FINRA (as of June 2021, list may vary each month)

Note: Some firms operate more than one ATS to satisfy different customer trading preferences.

Putting It All Together

The path of a trade can end with execution on exchange or off exchange, either on an ATS or OTC venue for many reasons. (And a trade may be executed on multiple venues; an exchange may route to another exchange, an algo could result in child orders executing on multiple venues, etc.) It is important to note that different market participants will have different demands based on their or their clients' trading strategies. Traders, therefore, choose a venue by balancing pricing, timing, costs, anonymity, etc. For example, institutional investors prefer to make block trades off exchange to ensure pre-trade anonymity and potential price stability. As such, a one-size-fits-all market structure would not be optimal.

There have been many comments on equity market structure this year by regulators, in particular as to how market structure and participants in the execution of a trade treat retail investors. Some of these comments appear to imply a hierarchy of trading venues (exchanges > ATS > OTC) and that we should force more trading on to exchanges instead of ATS or OTC venues. The data suggest a different view – that our ecosystem of complementary and competitive venues provides choices that offer unique benefits to investors. We believe the system works well and that the transparency available today enables participants to constantly evaluate their order routing and executions for optimal performance.

Additionally, retail investors have never had it better – \$0 commissions, mobile access to trading platforms, research/education materials available at no charge from retail brokers, etc. That said, one can always strive for greater progress. And market participants do just this. This includes adapting new technologies to achieve operational efficiencies, searching for new ways to transact and, generally, sculpting market structure to maximize efficiencies.

Reg NMS created a connected and protected market that enables liquidity formation and a starting point for best execution. As to execution venues and their role when measuring market quality, we believe many factors are being overlooked or underestimated. First of all, we note that all executable trades are reported to the consolidated tape, including those performed off exchange. Next, and importantly, we believe some are underestimating the competitive hunger games that exist out there for market participants who compete for order flow. Also overlooked are benefits provided by consolidators and market makers, particularly in the handling of retail order flow. We review these concepts below.

Competition: Best execution – price improvement, size improvement, certainty of execution – is the driver of this hunger game, and market participants compete vigorously. As retail brokers route their order flow based on execution quality metrics, the competition is centered around this one concept: who will perform better (i.e. provide best ex) for my clients' order flow? Executing firms receive daily report cards on their performance and how they rank versus peers. Consolidators must prove their worth day-in and day-out, and retail brokers hold executing venues' feet to the fire on these objective metrics.

This competition not only provides price improvement to investors but also contributes to the price discovery process in general. Further, the competition for these orders fuels continuous improvements, as market participants search for ways to provide better service to their customers in order to win more order flow. Under our current market structure, including the segmentation of order flow, retail investors received \$3.6 billion in price improvement as measured under the Rule 605 filings. This figure increases to \$11.0 billion when you add in size improvement

and other orders not captured by current Rule 605.¹ (Size improvement is another way that liquidity providers may price improve orders when trading as market maker by offering more shares than the displayed size available at the NBBO.²)

Risk Management: Consolidators also provide crucial services to retail firms to enhance risk controls and protections (ex: assuming execution and counterparty risk) for clients during the execution process. (We also note that sometimes the order isn't routed as the market maker internalizes it.) Without these firms acting as a buffer between the retail broker and the final execution venue, retail brokers would have to connect to several dozen destinations instead of the dozen or so they connect to today. The significant investments required and the overhead associated with maintaining the technology infrastructure required to connect to the entire market is cost prohibitive for many small brokerages. Such a requirement would necessarily reduce broker competition for retail investors, likely leading to fewer services and higher costs for retail investors. The concept of comparative advantage suggest that each firm should perform those activities they do best – for a retail brokerage that translates to asset protection, education, client facing platforms with embedded risk management, and customer service to resolve more complex needs.

By routing flow through consolidators, not only do consolidators meet retail firms obligation to secure best ex for their clients but also a enable a transfer of risk. If something happens with the trade (ex: a technology issue occurs after the retail firm routes the order and an immediate 'out' is given to retail), the consolidator assumes responsibility and takes on the risk. As such, the current order routing model protects retail brokers and their customers.

Scale: With very low margins in the equities business, costs are a barrier to entry for consolidators and market makers alike. As such, economies of scale – cost advantages experienced when production becomes efficient, as costs are spread out over a larger amount of goods – comes into play. Firms must handle an incredible breadth of stock coverage, connect to all exchanges (currently 16; fees are associated with connectivity), purchase market data to meet regulatory requirements, and hold capital against their positions. This requires financial strength as well as an enormous technology footprint, as firms must build out and maintain their technology. Firms with this scale can deploy new technologies safely and smartly to meet real time market needs given the current market environment. A benefit to all types of investors.

¹ Source: Virtu Financial (as of FY20)

² Ex: An order is placed to buy 1,000 shares of XYZ stock currently quoted at \$25.30, and the NBBO reflects that only 500 shares are available at that price. If the order were routed to the market venue showing those 500 shares for sale, the entire order may not be filled. Size improvement occurs when a liquidity provider honors the NBBO price and fills the additional 500 shares at \$25.30. (Source: Schwab)

Appendix: Terms to Know

EMS	Equity Market Structure
NMS	National Market System
Reg NMS	Regulation National Market System
SIP	Security Information Processor
PFOF	Payment For Order Flow
Tick Size	Minimum price movement of a stock
CAT	Consolidated Audit Trail
SRO	Self Regulatory Organization
FINRA	Financial Industry Regulatory Authority
SEC	Securities and Exchange Commission
ADV	Average Daily Trading Volume
Algo	Algorithm (algorithmic trading)
ATS	Alternative Trading System
Best Ex	Best Execution
BPS	Basis Points
CLOB	Central Limit Order Book
D2C	Dealer-to-Client
D2D	Dealer-to-Dealer
Dark Pool	Private trading venues, not accessible by the public
ECN	Electronic Communication Network
ETP	Electronic Trading Platforms
HFT	High-Frequency Trading
IDB	Inter-Dealer Broker
IOI	Indication of Interest
MM	Market Maker
OTC	Over-the-Counter
SI	Systematic Internaliser
Bid	An offer made to buy a security
Ask, Offer	The price a seller is willing to accept for a security
Spread	The difference between the bid and ask price prices for a security, an indicator of supply (ask) and demand (bid)
NBBO	National Best Bid and Offer
Locked Market	A market is locked if the bid price equals the ask price
Crossed Market	A bid is entered higher than the offer or an offer is entered lower than the bid
Opening Cross	To determine the opening price of a stock, accumulating all buy and sell interest a few minutes before the market open
Closing Cross	To determine the closing price of a stock, accumulating all buy and sell interest a few minutes before the market close
Order Types	
AON	All or none; an order to buy or sell a stock that must be executed in its entirety, or not executed at all
Block	Trades with at least 10,000 shares in the order
Day	Order is good only for that trading day, else cancelled
FOK	Fill or kill; must be filled immediately and in its entirety or not at all
Limit	An order to buy or sell a security at a specific price or better
Market	An order to buy or sell a security immediately; guarantees execution but not the execution price
Stop	(or stop-loss) An order to buy or sell a stock once the price of the stock reaches the specified price, known as the stop price

Appendix: SIFMA Insights Research Reports

Monthly Market Metrics and Trends: www.sifma.org/insights-market-metrics-and-trends

- Statistics on volatility and equity and listed options volumes
- Also highlights an interesting market trend

SIFMA Insights Market Structure Primers: www.sifma.org/primers

- Capital Markets Primer Part I: Global Markets & Financial Institutions
- Capital Markets Primer Part II: Primary, Secondary & Post-Trade Markets
- Electronic Trading
- US Capital Formation & Listings Exchanges
- US Equity
- US Multi-Listed Options
- US ETF
- US Fixed Income
- SOFR: The Transition from LIBOR
- The Evolution of the Fintech Narrative

SIFMA Insights Equity Market Structure Analysis Series:

- Analyzing the Meaning Behind the Level of Off-Exchange Trading
- Why Market Structure and Liquidity Matter

SIFMA Insights: www.sifma.org/insights

- Market Structure Survey: Volatility, Volumes, Market Levels & Retail Investor Participation
- SPACs versus IPOs
- A Look Back at 2020 Market Structure Themes
- US Capital Formation's 2020 Journey
- Market Structure Download: Post-Election Update
- Market Performance Around US Presidential Elections
- Market Volatility Around US Presidential Elections
- Market Structure Download
- A Deeper Look at US Listed Options Volumes
- The Cboe Trading Floor Reopened – Revisiting Volume Data
- NYSE Goes All Electronic – What Does It Mean?
- The NYSE Trading Floor Reopened – Revisiting Market Share Data
- COVID-19 Related Market Turmoil Recap: Part I (Equities, ETFs, Listed Options & Capital Formation)
- 2020, the Year of the SPAC
- The 2020 Market Madness
- The VIX's Wild Ride
- The 10th Anniversary of the Flash Crash

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