

January 23, 2017

Market Structure: Volume and Liquidity Update

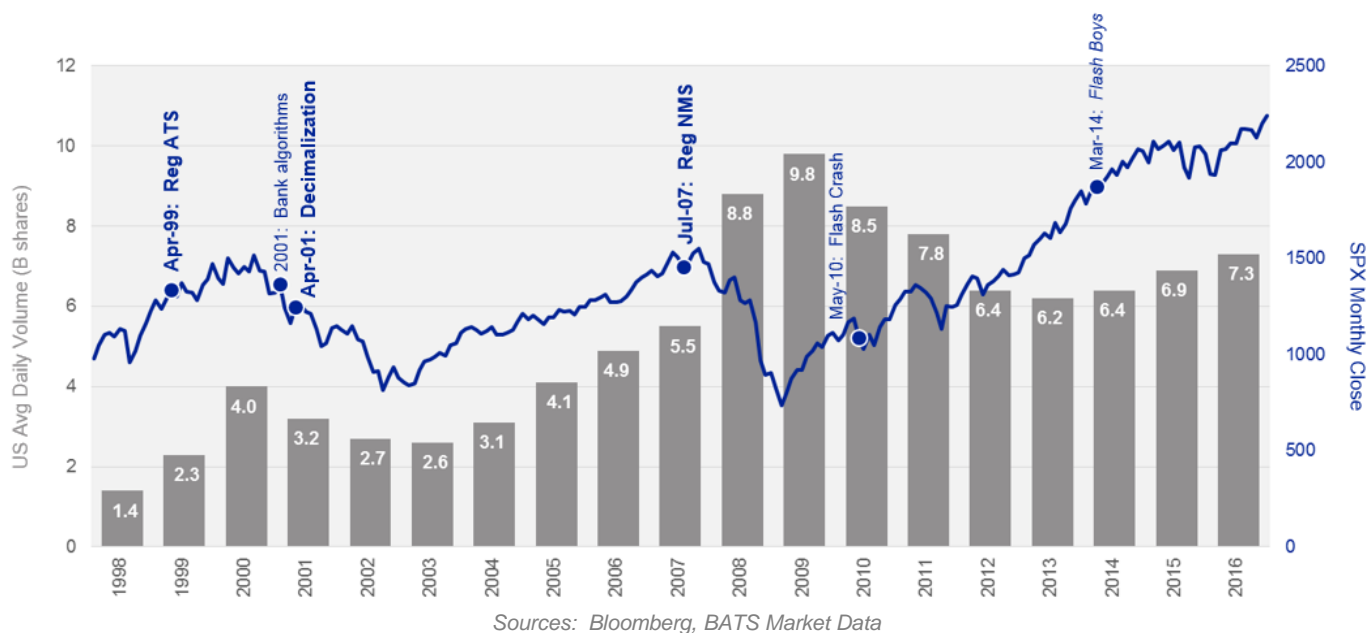
A look at trends going into 2017 – and the reasons why volume and liquidity are no longer the same thing

In this note:

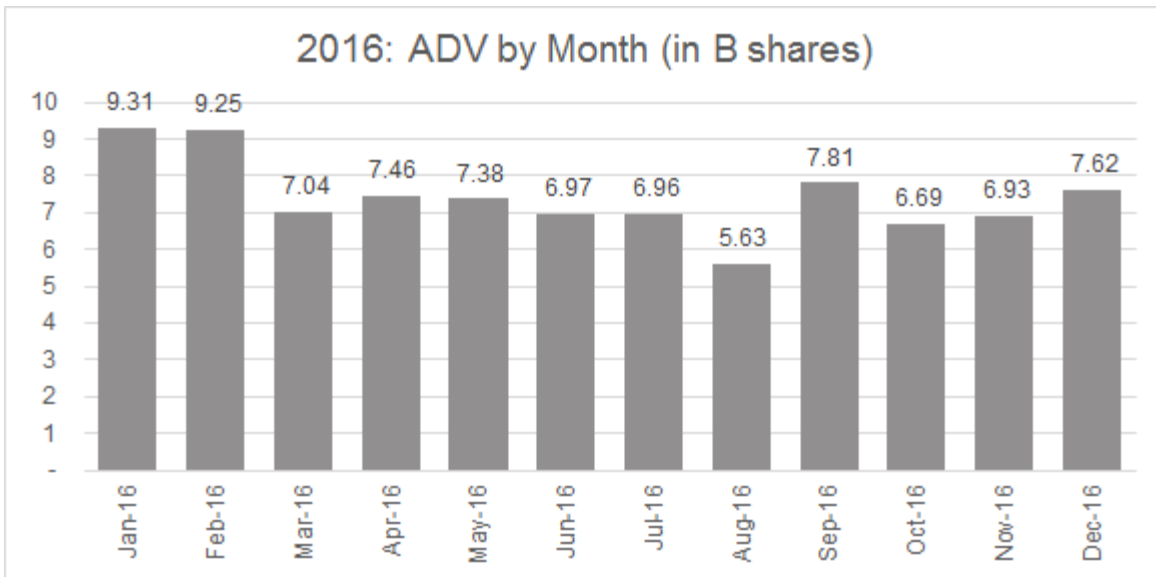
- Volumes improve in 2016... but are off to a slower start in 2017.
- 2016 growth in ETF volumes outstrips the growth in single stocks.
- Parsing out liquidity from volume – we estimate only 35% of total volume is non-HFT single stock trading.
- Exchange volumes remain fragmented, despite mergers, acquisitions and newcomers.
- Regulatory landscape has led to some shifts in dark pool volumes.

Volumes improve in 2016... but are off to a slower start in 2017

US Equities Average Daily Volumes: 1998 – 2016

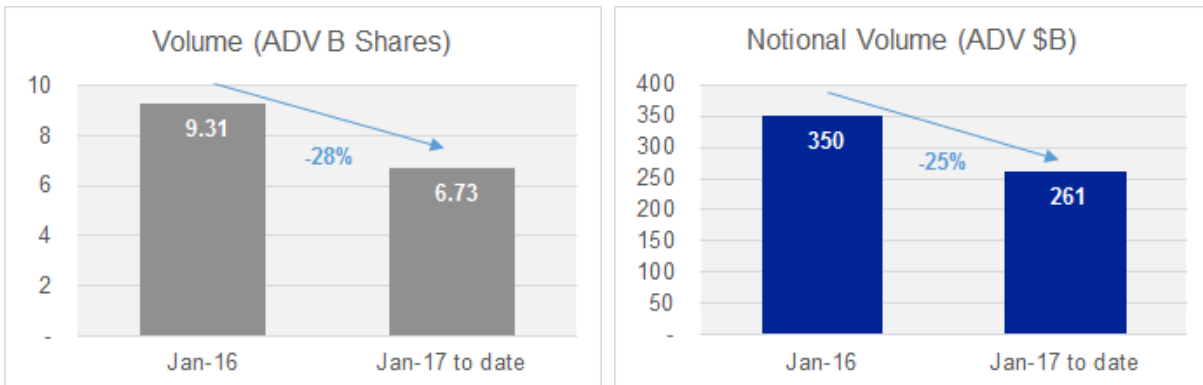


In 2016, volumes continued their steady climb from the lows of 2013. The final average of 7.3 billion shares daily volume, however, did not reflect some of the wide swings throughout the year (see below). We started off 2016 with high volatility and very high volumes (over 9 billion shares ADV in both January and February), and volumes stabilized mostly between 6 and 7 billion from there:



Sources: BATS Market Data

In comparison to the strong start to 2016, 2017 (albeit only 12 days of trading so far) has been relatively slow. This month, daily volumes have averaged 6.73 b shares, down 28% from 9.31 b shares in January 2016 (see below). Notional volumes are down 25% from January of last year.



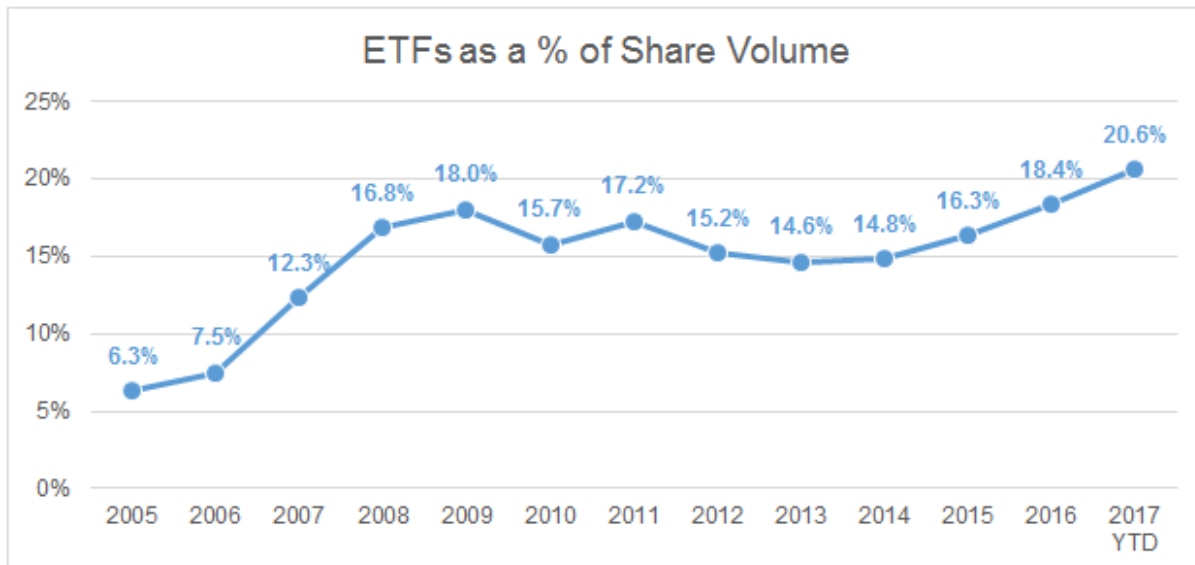
Sources: BATS Market Data, 2017 year to date data through 1/19/2017

2016 growth in ETF volumes outstrips the growth in single stocks

ETF Trends

In 2016, ETFs rose to an all-time high of 18.4% of volume. Given ETF volumes tend to be correlated with volatility, some of this increase may have been driven by the Q1 2016 volatility, and the volatility we saw around Brexit and the election. In addition, the [record inflows](#) to passive investment vehicles likely contributed.

Interestingly, despite lower volatility this month, ETF volumes have continued to grow coming into 2017. So far, ETFs have accounted for 20.6% of total volume in January 2017, albeit we are only a few weeks into the year.

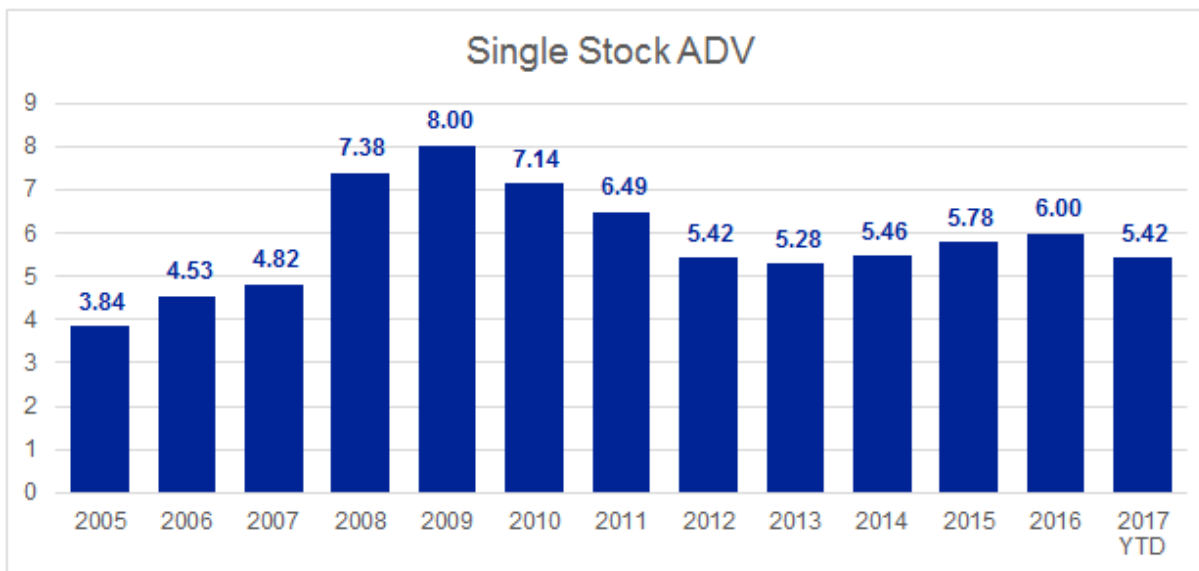


Sources: Bloomberg & BATS Market Data, 2017 year to date data through 1/19/2017

Single Stock Trends

If we strip out ETF volumes and look solely at single stock volumes over the last several years, we see slightly different trends emerge. 2016 single stock volumes were still up as compared to 2015. However, where total volumes were up 5.8% versus 2015, single stock volumes were only up 3.8%.

Looking at 2017 thus far, we have seen a sharp decline in single stock volumes. They are down nearly 10% from the 2016 average.



Sources: Bloomberg & BATS Market Data, 2017 year to date data through 1/19/2017

Top Traded Names

Looking at the top names traded in 2016, the ETF trend continues. Of the top 20 securities traded last year (in terms of notional turnover), 11 were ETFs (*highlighted below*).

Rank	Ticker	Name	Sector	2016 Notional (in B)
1	SPY	SPDR S&P500 ETF Trust	ETF	\$5,457
2	AAPL	Apple Inc	Info Tech	\$1,004
3	IWM	iShares Russell 2000 ETF	ETF	\$926
4	QQQ	Powershares QQQ Trust Series 1	ETF	\$781
5	FB	Facebook Inc	Info Tech	\$737
6	AMZN	Amazon.com Inc	Consumer Dis.	\$707
7	EEM	iShares MSCI Emerging Markets	ETF	\$601
8	GDX	VanEck Vectors Gold Miners ETF	ETF	\$470
9	MSFT	Microsoft Corp	Info Tech	\$427
10	BAC	Bank of America Corp	Financials	\$422
11	GOOGL	Alphabet Inc	Info Tech	\$376
12	VXX	iPATH S&P 500 VIX Short-Term F	ETN	\$342
13	GOOG	Alphabet Inc	Info Tech	\$341
14	EFA	iShares MSCI EAFE ETF	ETF	\$334
15	GLD	SPDR Gold Shares	ETF	\$327
16	NFLX	Netflix Inc	Consumer Dis.	\$324
17	XLF	Financial Select Sector SPDR F	ETF	\$320
18	XLE	Energy Select Sector SPDR Fund	ETF	\$298
19	TLT	iShares 20+ Year Treasury Bond	ETF	\$296
20	WFC	Wells Fargo & Co	Financials	\$282

Source: Bloomberg

Parsing out liquidity from volume – we estimate only 35% of total volume is non-HFT single stock trading

“Inaccessible Liquidity”

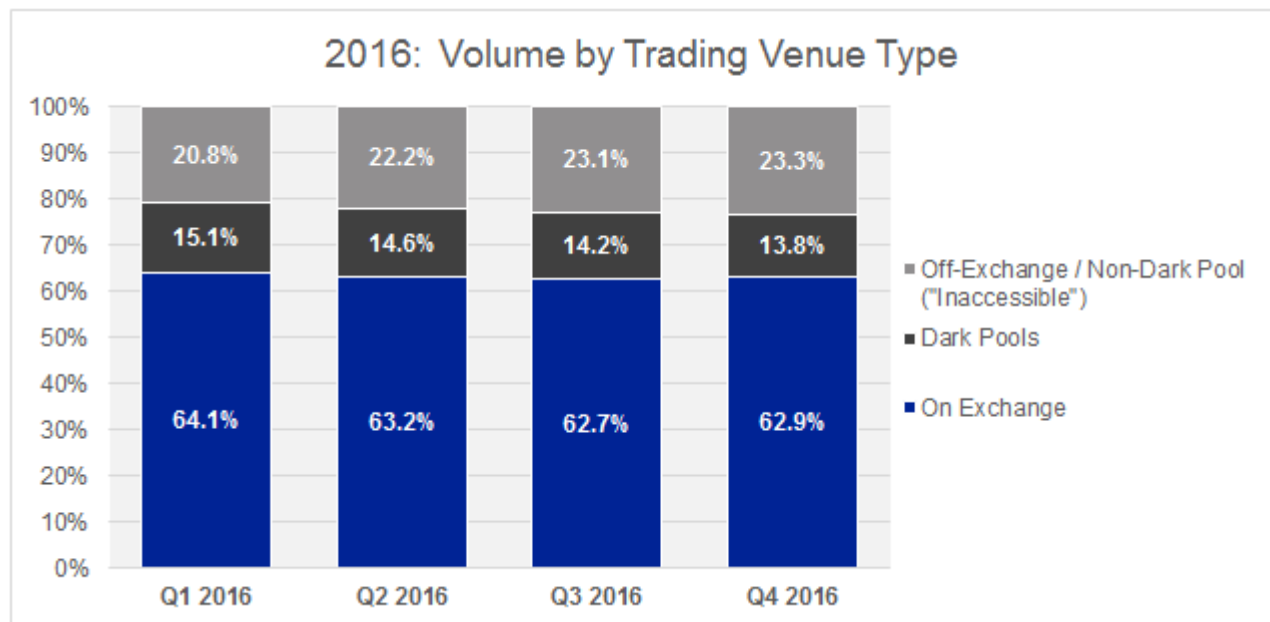
One thing we often hear from clients is that the volume they see hitting the tape doesn’t necessarily reflect how much liquidity they feel is actually available. One way of thinking about liquidity is to look at how much of the volume traded is executed on venues that institutional clients are accessing.

Most institutions primarily access registered exchanges and ATSS (dark pools) when trading through automated products like algorithms. This is the case whether the algorithms are self-directed by the client or they are entered via a sell-side trading desk. If you look at the destinations available to most buy side and sell side trading products at this point – exchanges and dark pools dominate the routing tables. When we break down volumes in the US executed by types of trading venues (*see below by quarter*), **exchanges and dark pools only make up less than 80% of volume**. So we would consider that 80% of volume truly accessible.

What makes up the other 20-23% of off-exchange but non-dark pool volume?

- **Retail / wholesale trading:** Trades by individual investors (either through discount platforms or wealth managers) are regularly sold to market makers in a practice known as “wholesaling”. Market makers often execute the trades internally, and the orders will not be sent to venues like dark pools or exchanges unless there is an excess of flow, perhaps on the buy or sell side, also known as “exhaust flow”. For this reason, we would argue that much of this flow remains “inaccessible” to most institutions.
- **Internalization engines / central risk books:** Many banks and market makers have built automated internal books that can execute trades. These can help to off-set or unwind market making risk and optimize trading across multiple desks. Internalization engines are not dark pools – their trades print to the tape, but not in a registered dark pool or on an exchange. Some clients are interacting with this flow – either manually or in an automated fashion – via IOIs or upstairs / cash desks. For this reason, we would consider this flow only partially accessible.
- **Upstairs blocks:** Many high-touch blocks (matching a buyer and a seller on a cash trading desk) also would fall in this category. These trades print to the tape – but most do not execute in a dark pool or on an exchange. These trades we would consider accessible to institutional traders executing high-touch orders, but only partially accessible to traders who are in the machines.

Because not all clients are able to access all of these types of trading – particularly when using algorithms, we have referred to it as “inaccessible”. *See 2016 inaccessible liquidity trends by quarter below.*



Sources: Bloomberg, FINRA ATS Data

We can see that retail / wholesale activity makes up a decent portion of “inaccessible liquidity” if we break down top names in the S&P 500 by the percentage of volume that traded off-exchange, but not in a dark pool (see below for the top 50 S&P 500 names). The stocks that consistently show up at the top of this list – with over 20% “inaccessible liquidity” – are names that are heavily traded by individual or retail investors. This is a trend we have consistently seen over the past several years.

Inaccessible Liquidity: S&P 500 Components Volume Traded Off-Exchange, Not in a Dark Pool (ATS) 2016 Full Year

Rank	Ticker	Name	2016 Trading				Off-Exchange Breakdown	
			Avg Price	ADV (MM Shares)	On Exchange	Off Exchange	Dark Pool	"Inaccessible"
1	CHK	Chesapeake Energy Corp	\$5.41	46.27	49%	51%	13%	37%
2	NFLX	Netflix Inc	\$100.21	12.84	53%	47%	12%	35%
3	FB	Facebook Inc	\$114.63	25.52	57%	43%	10%	33%
4	ARNC	Arconic Inc	\$19.38	1.00	52%	48%	17%	31%
5	FCX	Freeport-McMoRan Inc	\$10.01	41.58	57%	43%	14%	29%
6	AAPL	Apple Inc	\$103.60	38.44	61%	39%	11%	29%
7	FTR	Frontier Communications Corp	\$4.54	18.98	51%	49%	21%	28%
8	MU	Micron Technology Inc	\$14.24	27.03	58%	42%	15%	28%
9	NVDA	NVIDIA Corp	\$59.31	11.07	61%	39%	12%	27%
10	MNST	Monster Beverage Corp	\$47.04	3.81	67%	33%	7%	26%
11	ICE	Intercontinental Exchange Inc	\$51.70	3.66	68%	32%	6%	26%
12	WYNN	Wynn Resorts Ltd	\$88.35	3.42	62%	38%	13%	25%
13	F	Ford Motor Co	\$12.58	35.71	60%	40%	15%	25%
14	UAA	Under Armour Inc	\$45.22	5.25	61%	39%	15%	25%
15	BAC	Bank of America Corp	\$15.43	108.47	61%	39%	15%	24%
16	AMZN	Amazon.com Inc	\$680.89	4.12	60%	40%	16%	24%
17	FSLR	First Solar Inc	\$46.72	2.78	63%	37%	13%	24%
18	MRO	Marathon Oil Corp	\$12.46	22.91	62%	38%	14%	24%
19	FTV	Fortive Corp	\$51.15	0.95	52%	48%	24%	24%
20	ENDP	Endo International PLC	\$24.07	7.00	59%	41%	17%	23%
21	CMG	Chipotle Mexican Grill Inc	\$429.75	1.27	61%	39%	17%	22%
22	BYM	Bristol-Myers Squibb Co	\$60.75	9.19	63%	37%	16%	21%
23	GILD	Gilead Sciences Inc	\$84.05	10.72	67%	33%	12%	21%
24	RIG	Transocean Ltd	\$10.65	15.80	64%	36%	15%	21%
25	T	AT&T Inc	\$38.83	23.62	64%	36%	15%	21%
26	SBUX	Starbucks Corp	\$56.53	9.30	66%	34%	13%	20%
27	AAL	American Airlines Group Inc	\$37.22	9.17	67%	33%	13%	20%
28	STX	Seagate Technology PLC	\$30.16	5.85	65%	35%	15%	20%
29	WMB	Williams Cos Inc/The	\$21.80	11.43	64%	36%	16%	20%
30	CTL	CenturyLink Inc	\$27.32	6.47	64%	36%	16%	20%

Rank	Ticker	Name	2016 Trading				Off-Exchange Breakdown	
			Avg Price	ADV (MM Shares)	On Exchange	Off Exchange	Dark Pool	"Inaccessible"
31	DOW	Dow Chemical Co/The	\$51.27	6.96	67%	33%	13%	20%
32	KMI	Kinder Morgan Inc/DE	\$18.49	19.19	65%	35%	15%	20%
33	APD	Air Products & Chemicals Inc	\$139.47	1.47	64%	36%	16%	20%
34	CELG	Celgene Corp	\$106.16	4.95	64%	36%	16%	20%
35	O	Realty Income Corp	\$60.80	1.91	68%	32%	12%	20%
36	DIS	Walt Disney Co/The	\$97.30	8.13	67%	33%	13%	20%
37	VZ	Verizon Communications Inc	\$51.06	14.53	66%	34%	15%	19%
38	SWN	Southwestern Energy Co	\$10.80	16.86	64%	36%	17%	19%
39	VTR	Ventas Inc	\$63.42	2.43	67%	33%	14%	19%
40	MO	Altria Group Inc	\$63.65	6.22	70%	30%	11%	19%
41	MAA	Mid-America Apartment Communit	\$94.40	0.84	65%	35%	16%	19%
42	LKQ	LKQ Corp	\$31.81	2.20	65%	35%	16%	19%
43	LUV	Southwest Airlines Co	\$41.08	7.01	67%	33%	14%	19%
44	QCOM	QUALCOMM Inc	\$56.62	10.20	68%	32%	13%	19%
45	GM	General Motors Co	\$31.26	13.75	66%	34%	15%	19%
46	SPGI	S&P Global Inc	\$107.07	1.25	70%	30%	11%	19%
47	ABBV	AbbVie Inc	\$60.24	8.02	65%	35%	16%	19%
48	NKE	NIKE Inc	\$56.17	9.85	67%	33%	14%	19%
49	KR	Kroger Co/The	\$34.71	9.40	63%	37%	18%	19%
50	GE	General Electric Co	\$30.20	35.54	66%	34%	15%	18%

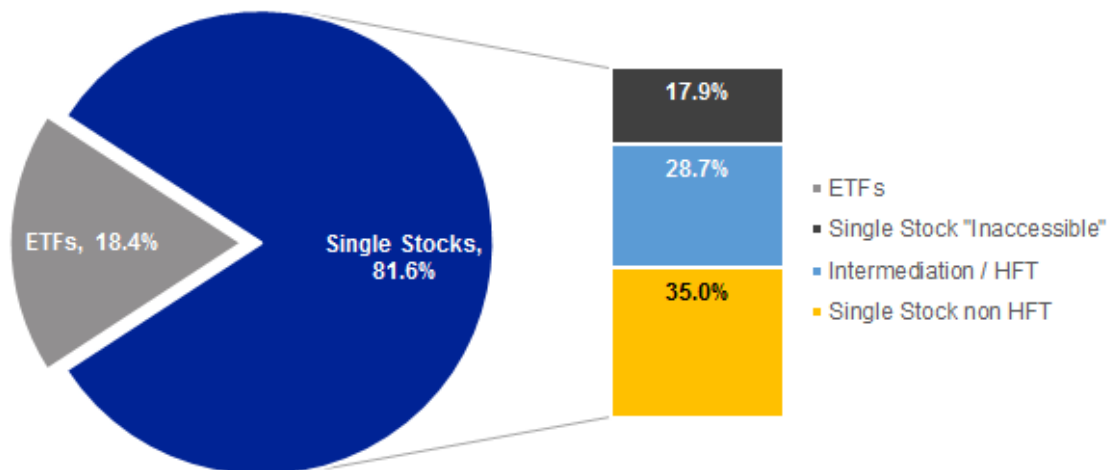
Sources: Bloomberg, FINRA ATS Data

How much volume is “real liquidity”?

We’ve had several people ask if we can parse out just how much of total volume is actually single stock liquidity. Particularly as we see systematic strategies become more prevalent, this has become a topic of interest not only for long-onlys, but also for hedge funds. While there isn’t an exact number anyone could come up with, we’ve used some of the metrics discussed above to come up with the below estimate.

- First, we removed ETF volumes, which accounted for 18.4% of volume in 2016.
- That left us with 81.6% of volume among single stocks.
- Using data from the regulator, FINRA, we pulled out what percentage of total volume in single stocks we would consider “inaccessible” – or volume that didn’t trade on exchanges or in dark pools. This accounted for 17.9% of the 81.6% of single stock volumes.
- Of the remaining 63.7% of volume, we assumed that 45% of that volume was pure intermediation (automated market making that simply buys from a seller to sell to a buyer) or high frequency trading (HFT) strategies. This assumption is based on historical rates of HFT, which have ranged between 45-55% over the past several years – depending on volumes and volatility – [according to Tabb Group](#). At 45% of 64.7% of volume (a conservative estimate), we would place intermediation / HFT in single stocks at 28.7% of total volume.
- That leaves us with 35% of volume in single stock / non-HFT. See below for the 2016 breakdown.

2016 ETF versus Single Stock Breakdown



Sources: Bloomberg, FINRA ATS Data, BATS Market Data

In 2016, the average daily volume was 7.3 billion shares. **By these estimations, that would mean only about 2.5 billion shares (35%) of total volume would be single stock non-HFT trading.**

Exchange volumes remain fragmented, despite mergers, acquisitions and newcomers

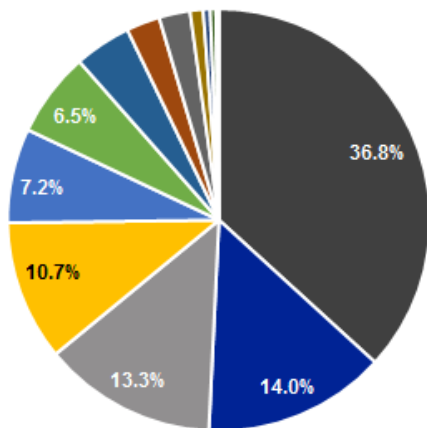
2016 Market Share by Exchange

The trends in off-exchange volume continue to be interesting, despite growing complaints from the exchanges. We saw off-exchange volume tip over 36% in 2016 (up from 35.5% in 2015), and it continues to make up the largest chunk of volume in the US. It is important to remember, however, that this volume is broken up over hundreds of broker and venues, like dark pools and internalization engines, as discussed above.

Key highlights among exchanges to note:

- The primary corporate listing exchanges – Nasdaq and NYSE – are the largest stock exchanges in the US by a significant margin. NYSE maintains a foothold of 13% of total volume, but currently only trades NYSE-listed securities. In 2017, we expect some growth here as [NYSE plans to begin trading all US-listed securities by the end of 2017](#).
- Looking beyond the top 2, we have seen a slight decline in Arca's market share (down from 11.2% in 2015), as we continue to see stories that [ETF listings have shifted from Arca](#) to Nasdaq and the upstart ETF listing venue, BATS.
- The four exchanges under the BATS ownership structure – EDGX, BATS-Z, BATS-Y and EDGA – are clustered together as the 4th through 7th largest exchanges. Together they total 20.6% of total volume.
- Other notable exchanges include the recent joiner – IEX – which fully converted to an exchange as of September 2016 and still managed to gain 0.5% of total exchange volume for the full year.
- NSX, down at the bottom, is being acquired by NYSE (a division of the Intercontinental Exchange, or ICE). Bloomberg reported that NYSE will close down the NSX order book following the acquisition, only to re-open it at a later date, presumably following some changes.
- Other notable changes in ownership include the CHX, the 3rd smallest exchange. Chinese investors are looking to purchase the exchange, but have faced some [recent criticism from lawmakers](#).

2016 Market Share by Exchange

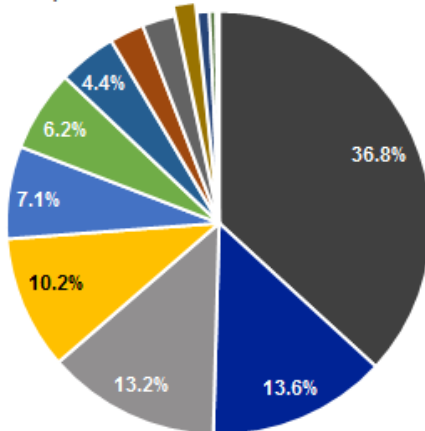


Exchange	Mkt Share	ADV	Avg Size
Off-Exchange	36.8%	2.70	347
Nasdaq	14.0%	1.03	146
NYSE	13.3%	0.98	307
NYSE Arca	10.7%	0.79	188
EDGX	7.2%	0.53	172
BATS-Z	6.5%	0.48	138
BATS-Y	4.3%	0.32	133
EDGA	2.6%	0.19	135
Nasdaq BX	2.4%	0.17	123
Nasdaq PSX	1.0%	0.07	162
IEX	0.5%	0.04	176
CHX	0.4%	0.03	3,752
NYSE Mkt	0.2%	0.02	408
NSX	0.0%	0.00	194

Source: BATS Market Data

The exchange landscape changed somewhat when IEX entered the mix later in the year, so we also provided a snapshot of the September through December market share numbers. When looking solely at the period IEX was operating as a registered exchange, it was the 9th largest exchange with 1.7% market share (*highlighted below*). The exchange also has [plans to provide corporate listings](#), which would likely boost market share as well.

Sep - Dec '16: Market Share



Exchange	Mkt Share
Off-Exchange	36.8%
Nasdaq	13.6%
NYSE	13.2%
NYSE Arca	10.2%
EDGX	7.1%
BATS-Z	6.2%
BATS-Y	4.4%
Nasdaq BX	2.6%
EDGA	2.5%
IEX	1.7%
Nasdaq PSX	0.9%
CHX	0.5%
NYSE Mkt	0.2%
NSX	0.0%

Source: BATS Market Data

Regulatory landscape has led to some shifts in dark pool volumes

2016 versus 2015 Market Share by Dark Pool

In 2016, total dark pool volumes declined by over half a percent versus 2015 – down from 15.06% in 2015 to 14.49% in 2016. Given all the focus exchanges have placed on dark pools – particularly how they are more lightly-regulated than exchanges and are harming price discovery, we thought this was an interesting trend. Regulators have taken a very close look at dark pools over the past several years – both through enforcement actions and potential new regulations. The Tick Size Pilot also placed some restrictions on off-exchange trading in certain test groups. Given the regulatory landscape and the potential for increased scrutiny, we have seen some consolidation in the dark pool landscape and certain firms de-emphasizing the business, which may have driven the decline in market share.

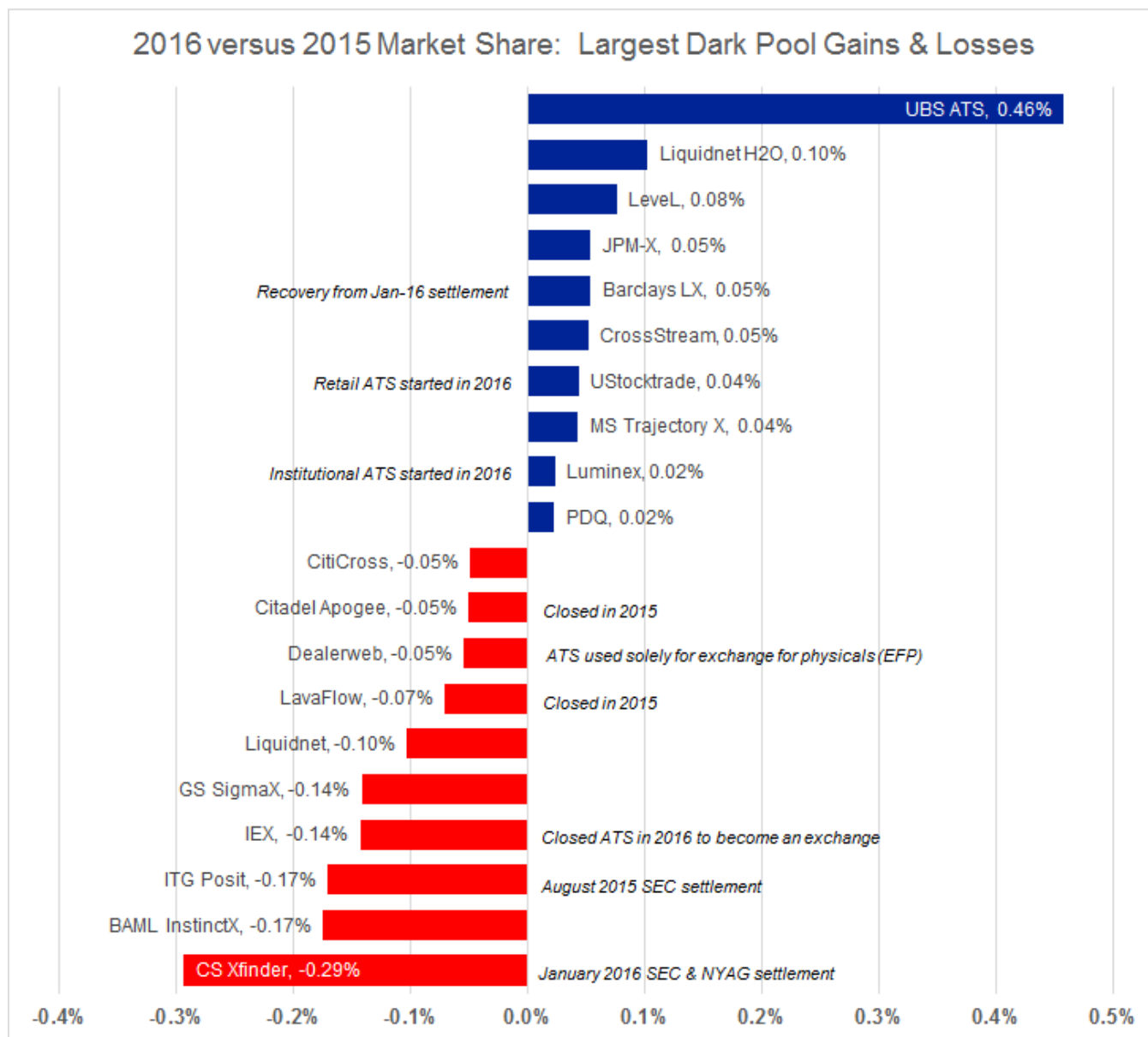
2016 versus 2015 Market Share by Dark Pool

Dark Pool	2016 Volume			2016 v. 2015	2015 Volume		
	ADV (MM Shares)	Avg Size	Market Share		ADV (MM Shares)	Avg Size	Market Share
UBS ATS	171	166	2.31%	0.5%	127	157	1.85%
CS Crossfinder	118	187	1.59%	-0.3%	129	182	1.88%
DB SuperX	88	201	1.19%	0.0%	84	188	1.22%
IEX	85	214	1.14%	-0.1%	88	229	1.28%
MS Pool	76	243	1.03%	0.0%	73	241	1.06%
JPM-X	55	233	0.74%	0.1%	48	233	0.69%
BAML Instinct X	51	216	0.69%	-0.2%	59	214	0.86%
Level	50	182	0.68%	0.1%	41	165	0.60%
Barclays LX	48	187	0.64%	0.1%	41	173	0.59%
GS SigmaX	43	186	0.58%	-0.1%	50	179	0.72%
KCG MatchIT	40	179	0.54%	0.0%	39	174	0.56%
BIDS	40	695	0.54%	0.0%	38	536	0.54%
Instinet CBX	37	230	0.50%	0.0%	34	250	0.49%
ITG Posit	27	296	0.37%	-0.2%	38	276	0.54%
CrossStream	25	451	0.34%	0.1%	20	439	0.29%
MS Trajectory Cross	16	177	0.21%	0.0%	12	171	0.17%
Convg Millennium	14	328	0.18%	0.0%	12	355	0.17%
Interactive Brokers	13	316	0.18%	0.0%	13	312	0.19%
Liquidnet H2O	12	39,632	0.16%	0.1%	4	6,663	0.06%
PDQ	11	187	0.14%	0.0%	9	178	0.12%
Dealerweb	10	420,175	0.14%	-0.1%	13	495,213	0.19%
CitiCross	10	232	0.13%	0.0%	12	220	0.18%
State Street BlockCross	8	11,786	0.11%	0.0%	7	11,437	0.10%
CS Light Pool	6	185	0.08%	0.0%	7	172	0.10%
Liquidnet	6	10,029	0.08%	-0.1%	12	40,070	0.18%
Instinet Crossing	4	4,402	0.06%	0.0%	7	2,852	0.10%
US Stocktrade	3	641	0.04%	0.0%	0	27	0.00%
Bloomberg Tradebook	2	266	0.03%	0.0%	4	251	0.06%
Luminex	2	31,099	0.02%	0.0%	0	30,733	0.00%
MS Retail Pool	2	212	0.02%	0.0%	1	320	0.01%
CitiBloc	1	17,487	0.02%	0.0%	3	25,622	0.05%
Aqua	1	10,601	0.01%	0.0%	1	10,716	0.01%
Weeden XE	0	1,310	0.00%	0.0%	0	1,599	0.00%
Rivercross	0	205	0.00%	0.0%	1	224	0.01%
BAML ATS1	0	335	0.00%	0.0%	1	338	0.02%
Barclays DirectEx	0	21,973	0.00%	0.0%	0	74,989	0.00%
Pro Securities	0	3,006	0.00%	0.0%	0	3,323	0.00%
AX Trading	0	9,467	0.00%	0.0%	0	0	0.00%
LavaFlow	0	-	0.00%	-0.1%	5	272	0.07%
Citadel Apogee	0	-	0.00%	-0.1%	3	186	0.05%
ConvergEx Vortex	0	-	0.00%	0.0%	3	215	0.04%
Jeff. JET-X	0	-	0.00%	0.0%	0	307	0.01%
Foliofn Inv.	0	-	0.00%	0.0%	0	34	0.00%
Total	1,076	217	14.49%	-0.6%	1,038	213	15.06%

Sources: FINRA ATS Data, BATS Market Data; ATS share data through 12/16/2016

Looking at the largest gains and losses in market share among individual pools (*below*), we've highlighted some notable changes:

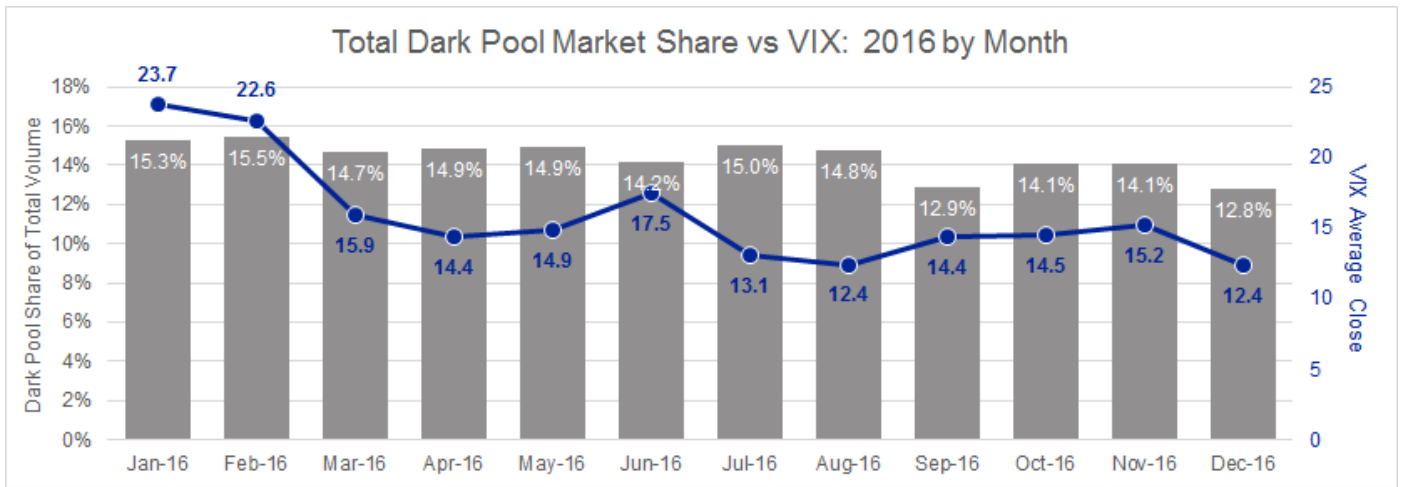
- 5 dark pools – Lava, Citadel Apogee, ConvergEx Vortex, Jefferies JET-X and Foliofn – opted to close between 2015 and 2016. As relatively smaller pools, these closures did not drive the majority of the decline in total dark pool market share year-over-year.
- IEX became a registered exchange as of September 2016, and they ceased operations of their ATS. We saw some of this dark market share disperse among other large dark pools. However, a majority of the dark volumes from IEX's ATS shifted over to their exchange. This was likely a key component in the decline in total dark pool market share.
- Notable 2016 enforcement settlements – including CS Crossfinder in January and ITG Posit in August – seemed to have impacted market share. However, if Barclay's LX's rise in market share in 2016 is any indication (following a sharp decline when initial news of the NY Attorney General's investigation into the dark pool became public in 2014), some firms seem to recover from these declines in market share over as they put the settlements behind them.



Sources: FINRA ATS Data, BATS Market Data; ATS share data through 12/16/2016

Monthly Market Share Across All Dark Pools

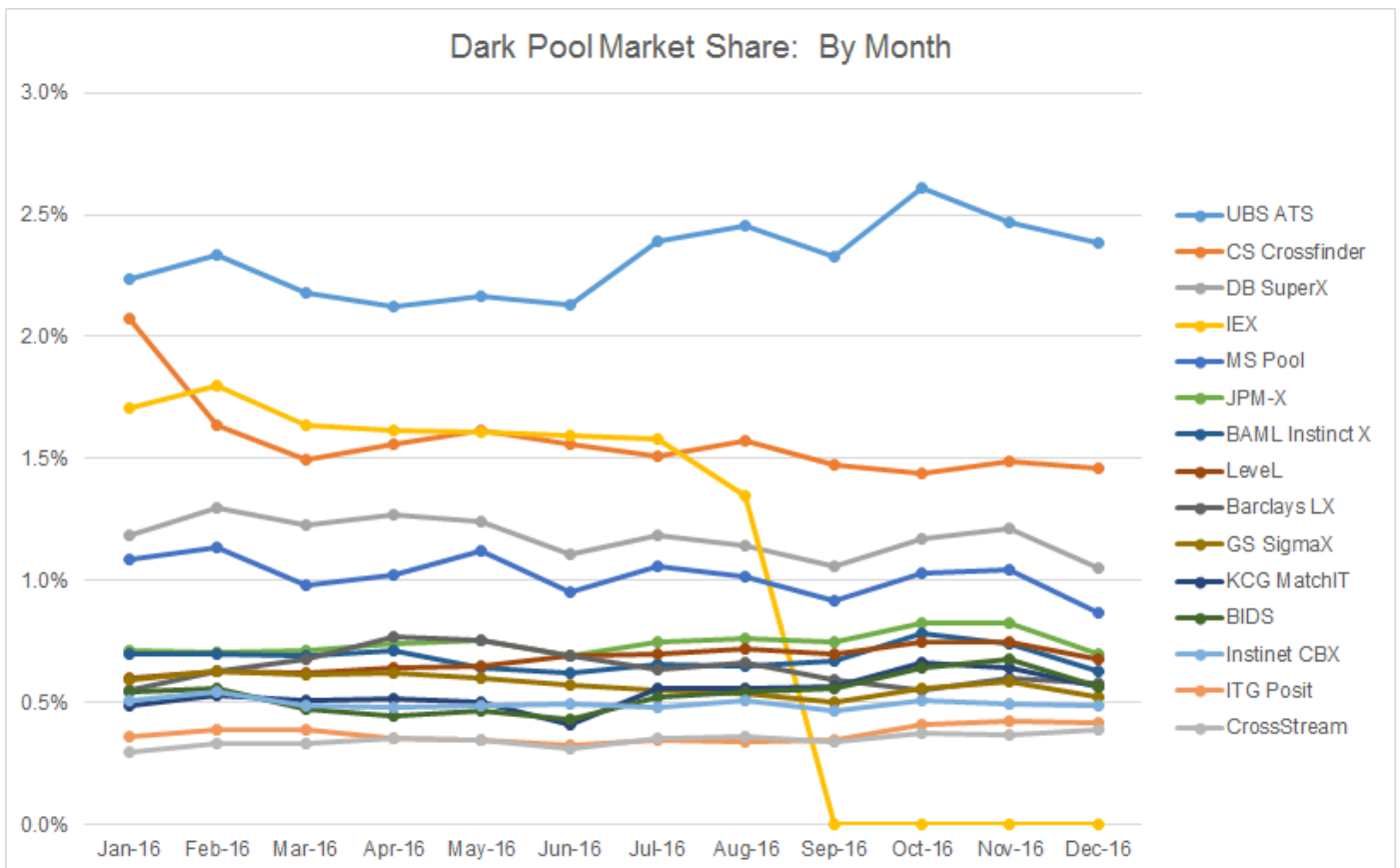
Dark pool volumes have historically tended to be inversely correlated with volatility. Typically, when volatility increases we see dark pool and off-exchange volumes as a whole decline. 2016 seems to have bucked that trend a bit. The two highest months in terms of volatility – January and February – were the highest months in terms of dark pool market share (*see below*). December 2016, the lowest month in terms of volatility, was also the lowest dark pool market share month of the year – at 12.8% of total volume. Institutional trading is a large portion of overall dark volumes, so this may be indicative of lower institutional activity.



Sources: FINRA ATS Data, BATS Market Data, Bloomberg; December ATS share data through 12/16/2016

Monthly Market Share by Pool: Top 15 Pools

We can see the decline in IEX's market share as they converted from a dark pool to an exchange (starting in August and completed in September). Interestingly, as noted above, this dark volume seemed to remain on IEX once it was an exchange. We didn't see a general dispersion of the IEX dark volumes to other dark pools. If anything, dark pool volumes declined over Q4 2016 when IEX was an exchange.



Source: FINRA ATS Data, BATS Market Data; December ATS share data through 12/16/2016

Please don't hesitate to reach out if you have any questions on this piece or any other market structure topics.

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