

The evolution of options trading: From physical presence to digital precision



Jason Lichten
Senior Execution Trader, US Equity Options

Extract

In this piece, we take a closer look at the key structural differences between equity and options markets from exchange landscapes and pricing models to participant designations and market-data complexity. We also explore how mechanisms like flash orders and price-improvement auctions have evolved, what they mean for execution quality, and why understanding these nuances can materially shape trading outcomes.

In the face of such significant change, for buy-side firms looking to increase their exposure to US options and even those who have traded the market for decades, the learning curve is steep:

- **Greater complexity:** Options markets are structurally more complex than equities, with heavier data demands, complex pricing models, and differentiated participant treatment.
- **Greater fragmentation:** Fragmentation across 18 exchanges, various auctions formats, and flash mechanisms creates both opportunities and risks, particularly around information leakage.
- **Greater participant distinction:** The distinction between customer vs professional customer designations can materially influence queue priority, fees and trading outcomes.
- **Greater data volumes:** Options Price Reporting Authority's (OPRA) massive message volume makes the technological burden far greater than in equities.

To navigate this environment effectively, buy side firms need to understand how their brokers route orders, understand their participant designation, and use market structure knowledge to improve execution quality.

Continued on next page >>>

State of the market

Options trading once thrived on a mix of physical presence, mental agility, and a commanding voice. Traders in the pit needed the strength to secure position, the intellect to calculate theoretical values on the fly, and the speed to hedge through futures or ETFs.

Today, those attributes have been replaced by three new pillars: **speed, data, and technology**.

The transformation has been profound. Technology has reshaped the market from five bustling trading floors across the US to eighteen streamlined options exchanges concentrated in the New York–Newark–Jersey metro area^{1,3}. Despite these advancements, one constant remains: the appetite for options continues to grow. Over the past five years, US options volumes have increased by more than 100%^{2,4}, listed instruments have multiplied, and the complexity of the market has reached unprecedented levels.

Currently, industry estimates suggest that there are approximately 12 million listed strikes, 300,000 active series, and 1.6 million strikes trading on any given day.^{20,21} Yet, despite this progress, options markets remain about five years behind equities in both technology and transparency. This gap underscores deep structural differences between the two markets.

Options vs equities: divergent markets

At first glance, options and equities markets may seem similar. Both markets feature a comparable number of exchanges and a concentration of volume in primary books. However, the structural differences run deep.

A key, but often overlooked dynamic, is that equities generally behave as a lagging indicator relative to options and futures. The latter markets tend to react first, with equity price discovery trailing marginally behind.^{22,23}

The exchange landscape

- **Options:** 18 active exchanges, with two more expected in 2026 (MEMX MX2 in Q2⁵; IEX targeted for end of Q3⁶)
- **Equities:** 17 exchanges, with one additional venue expected in 2026 (Texas Stock Exchange)⁷

While the exchange count is nearly identical, the complexity of pricing models and participant treatment set these markets apart. In options, all trades print to the tape, there is no Trade Reporting Facility (TRF), and off-exchange activity is limited to a small number of Alternative Trading Systems (ATS). Currently, only four ATSs operate in listed options, with a minimal footprint estimated at 3–4 million contracts per day, compared to more than 50 million contracts reported daily by the Options Clearing Corporation (OCC).^{24,2}

¹ OCC Participant Exchanges – <https://www.theocc.com/clearance-and-settlement/participant-exchanges>

² OCC Historical Volume Statistics – <https://www.theocc.com/market-data/market-data-reports/volume-and-open-interest/historical-volume-statistics>

³ Cboe US Options Market Volume Summary – https://www.cboe.com/us/options/market_share/market/

⁴ Cboe US Options Volume Hits Record for 5th Consecutive Year, Markets Media (Jan. 2025) – <https://www.marketsmedia.com/cboe-us-options-volume-hits-fifth-consecutive-record-breaking-year/>

⁵ MEMX Receives Regulatory Approval for MX2 Options (Oct. 2025) – <https://memx.com/insights/memx-receives-regulatory-approval-for-mx2-options>

⁶ IEX Options Information Hub – <https://www.iex.io/options/resources>

⁷ Texas Stock Exchange (TXSE) – <https://www.txse.com/about-us>

²⁰ Databento: What is OPRA? (Microstructure Guide) – <https://databento.com/microstructure/opra>

²¹ Databento: Options Market Data – <https://databento.com/options>

²² Patel, Putniņš, Michayluk & Koh, "Price discovery in stock and options markets," *Journal of Financial Markets* (2020) – <https://www.sciencedirect.com/science/article/abs/pii/S1386418119303544>

²³ Chakravarty, Gulen & Mayhew, "Informed Trading in Stock and Option Markets," *Journal of Finance* (2004) – <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1540-6261.2004.00661.x>

²⁴ SEC Alternative Trading System (ATS) List – <https://www.sec.gov/foia-services/frequently-requested-documents/alternative-trading-system-ats-list>

Beyond ATSS, options markets employ on-exchange mechanisms that create a grey market, though not true dark pools. Two key examples:

- **Flash mechanisms** (largely eliminated in equities in 2010)^{8,9} A very short electronic auction, typically lasting around 100 milliseconds, designed to expose an order to market participants to seek price improvement before the order trades or routes away. The order is flashed to market participants who can respond with competing interest. This creates the potential for price improvement, but it also raises questions around information leakage.
- **Auction mechanisms:** Short exchange-run electronic auctions, typically lasting around 100 milliseconds, in which a customer order and a paired contra order are exposed to market participants. Market makers and liquidity providers can then bid for price improvement over the National Best Bid and Offer (NBBO), often with the initiator guaranteed a defined participation share. Examples include CBOE AIM (Automated Improvement Mechanism) and ISE PIM (Price Improvement Mechanism), along with several additional auctions across exchanges.¹⁰

Originally, these auctions were designed to facilitate meaningful block liquidity, often allowing brokers to expose large orders to competitive liquidity providers. Over time, they have evolved far beyond their initial purpose.

Nowadays, average auction sizes have fallen into the single-digit contract range, reflecting the growing use of auctions by wholesalers and market makers to execute retail-sized orders, typically under 10 contracts. This trend parallels the decline in average execution size in US equity ATSS, which now averages roughly 157 shares¹¹, driven by the same structural forces: more retail participation, more segmentation of order flow, and increased competition for internalization.

Although US options exchanges do not publish comprehensive auction-level volume statistics, industry data and order-flow analysis indicate that auction contract size varies widely by platform but appears overwhelmingly small in practice.

The decline in average options auction size mirrors the long-term decline in average trade size within US equity ATSS. In both cases, the shift reflects the same structural drivers: a dramatic rise in retail order flow, greater segmentation of liquidity, more aggressive internalization by wholesalers and market makers, and the proliferation of micro-execution venues.

As a result, mechanisms originally designed for institutional block-sized trading now predominantly handle much smaller orders. This parallel underscores a broader structural truth: as liquidity becomes more fragmented and competition intensifies, execution venues that once supported block sized trading now primarily facilitate smaller, retail sized orders.

Pricing models

- **Equities:** Two primary models: Make/Take and Take/Make.
- **Options:** Three models: Make/Take, Take/Make and Pro-Rata (classic).

The pro-rata pricing model in option markets introduces distinct liquidity behaviors and routing challenges that are absent in equities.

In addition, complicated fee schedules across all strikes add another level of complexity. For example, executing in penny (\$.01 incremental trades) versus non-penny names requires different considerations. Penny names were initially a pilot program established in 2007 but were permanently established in 2020.^{12,13}

Category	Average fee (per contract) ^{25,26}
Add liquidity (penny pilot)	(\$0.18)
Add liquidity (non-penny pilot)	(\$0.51)
Remove liquidity (penny pilot)	\$0.22
Remove liquidity (non-penny pilot)	\$0.29

⁸ SEC Proposed Rule: Elimination of Flash Order Exception from Rule 602 of Regulation NMS - <https://www.sec.gov/rules-regulations/2010/07/elimination-flash-order-exception-rule-602-regulation-nms>

⁹ Flash Trading, Wikipedia - https://en.wikipedia.org/wiki/Flash_trading

¹⁰ Cboe US Options Exchange Crossing Orders (AIM) - https://www.cboe.com/us/options/trading/crossing_orders/

¹¹ FINRA ATS Transparency Data Quarterly Statistics - <https://www.finra.org/filing-reporting/otc-transparency/ats-quarterly-statistics>

¹² OIC: Why Certain Options Trade in Penny Increments (Penny Pilot Program) - <https://www.optionseducation.org/news/penny-increments>

¹³ SEC Release No. 34-88532: Penny Interval Program (Apr. 2020) - <https://www.sec.gov/files/rules/sro/nms/2020/34-88532.pdf>

²⁵ Cboe Options Exchange Fee Schedule - https://www.cboe.com/us/options/membership/fee_schedule/

²⁶ NYSE American Options Fee Schedule - https://www.nyse.com/publicdocs/nyse/markets/amex-options/NYSE_American_Options_Fee_Schedule.pdf

Continued on next page >>>

Finally, options pricing for equities and ETFs are all priced differently per exchange. Fee structures can vary significantly based on instrument type and trading venue.

Fee model	Action	Equity/ETF penny (per contract)	Equity/ETF penny non-penny (per contract) ^{25,26}
Make Take	Adding liquidity	(\$0.35)	(\$0.74)
Make Take	Removing liquidity	\$0.35	\$0.64
Take Make	Adding liquidity	\$0.35	\$0.64
Take Make	Removing liquidity	(\$0.35)	(\$0.74)
Pro Rata	Adding liquidity	(\$0.07)	(\$0.41)
Pro Rata	Removing liquidity	\$0.25	\$0.12

Participant designation: Why origin codes matter

Options markets apply origin codes assigned by the OCC to classify order flow. These designations determine queue priority and the cost to execute a trade, influencing execution quality and potential trading behavior¹⁴. Key origin codes include:

- **Customer (C)**
- **Market Maker (MM)**
- **Firm (F)**

While the OCC assigns these codes at a firm level, exchanges introduce an additional layer of complexity: the **Professional Customer** designation. This designation is not an OCC category but it is imposed by exchanges when a non-broker dealer participant exceeds the 390 rule.

The 390 rule classifies a participant as a Professional Customer if they submit an average of 390 or more listed options orders per day during a calendar month. Once this threshold is exceeded, exchanges will reclassify the participant as a Professional Customer, regardless of the firm's OCC level designation. This applies to both institutional and retail accounts.

Although the Professional Customer designation originates at the exchange level, its impact is significant. It affects how orders are treated across venues and can materially influence execution outcomes. For the buy side, understanding the difference between OCC level origin codes and exchange level classifications is essential, particularly when evaluating the implications of Customer versus Professional Customer status.

Unlike equities, where participants generally operate under a uniform rule set, the options market applies differentiated treatment based on origin codes and OCC designation. This structural nuance is a defining feature of options microstructure and a major driver of the additional complexity that does not exist in equities.

¹⁴ NYSE U.S. Equity Options Market Models - <https://www.nyse.com/data-insights/us-equity-options-market-models>

²⁵ Cboe Options Exchange Fee Schedule - https://www.cboe.com/us/options/membership/fee_schedule/

²⁶ NYSE American Options Fee Schedule - https://www.nyse.com/publicdocs/nyse/markets/amex-options/NYSE_American_Options_Fee_Schedule.pdf

Continued on next page >>>

Professional Customer fee impact

Feature	Customer	Professional Customer
Definition	Market participant with standard activity levels. Not a broker-dealer	Non-broker-dealer averaging >390 listed options orders per day in a calendar month
Execution priority	Highest priority in the order book across all exchanges	Lower priority than customer, treated like other non-priority participants
Fee structure	Typically, lowest transaction fees	Subject to higher fees, often an additional \$0.25 per contract
Reporting requirement	None	Executing broker-dealer must monitor and report designation to all exchanges
Reversion	N/A	Can revert to customer after one quarter of reduced order activity
Pro Rata	Removing liquidity	\$0.25

The implications of this can be significant, especially for certain fund types. For multi-strategy funds, CTAs, and quant funds, the impact on trading costs alone can be substantial.

Example: A fund that falls into the Professional Customer category trading 100,000 contracts could face \$25,000 in additional fees, not including standard exchange fees. This does not account for the potential impact on execution cost based on loss of queue priority.

Category	Customer (Avg per contract) ^{25,26}	Pro Customer (Avg per contract including PC tax)
Add liquidity (penny pilot)	(\$0.18)	\$.13
Add liquidity (non-penny pilot)	(\$0.51)	\$.05
Remove liquidity (penny pilot)	\$0.22	\$0.48
Remove liquidity (non-penny pilot)	\$0.29	\$0.86

Market data: The industry tax across all asset classes

As a broker-dealer, consuming, parsing, and using market data represents one of the largest costs across all asset classes. Direct market-data feeds are expensive but essential for operating a high-performance equity or options router. To illustrate the scale, consider the contrast between the two consolidated feeds: the Equity SIP (Security Information Processor) versus OPRA (Options Price Reporting Authority).

- **Equity SIP:** Processes approximately 1-2 million messages per second at peak, combining quotes and trades across Consolidated Trade Association (CTA) and Unlisted Trading Privilege Plan (UTP). Sustained rates are lower, but bursts can approach capacity limits.^{27,28}
- **Options OPRA:** Handles 75-190 million messages per second during high-volatility events (e.g., April 2025), with 1 millisecond bursts exceeding 187 million messages per second. Average daily rates in 2025 hovered around 15-16 million messages per second.^{17,18}

The figures underscore a stark reality: running an options business requires 50-100 times more data consumption than equities¹⁹. The gap is driven by the explosive growth in option listings compared to Regulation National Market System (NMS) securities. During the meme-stock era, surging options activity pushed OPRA traffic to its limits, creating severe bottlenecks and prompting industry-wide reassessment of data-processing capacity. If OPRA were to go offline for any meaningful period, timely quote dissemination and trade executions would effectively come to a standstill.

¹⁷ Databento: What is OPRA? (Microstructure Guide) - <https://databento.com/microstructure/opra>

¹⁸ Options Price Reporting Authority (OPRA) Official Site - <https://www.opraplan.com/>

¹⁹ Options Price Reporting Authority, Wikipedia - https://en.wikipedia.org/wiki/Options_Price_Reporting_Authority

²⁷ Consolidated Tape Association (CTA), NYSE - <https://www.nyse.com/data/cta>

²⁸ Nasdaq: "Time is Relative: Where Trade Speed Matters" (2019) - <https://www.nasdaq.com/articles/time-relative-where-trade-speed-matters-and-where-it-doesnt-2019-05-30>

This surge in data is fueled by:

- Quote-to-trade ratios that are 10–20x higher than equities
- Increased adoption of zero-day-to-expiration (ODTE) options^{17,29}

Ultimately, the options market dwarfs equities in daily data consumption, adding immense technological complexity and effectively imposing an additional tax on the industry. For buy-side firms, this translates into tangible consequences: what you see on screen and how quickly your executing broker can process and interpret vast amounts of data are both directly impacted, introducing yet another layer of technological and operational risk.

Conclusion

The evolution of the US options market from bustling trading floors to an electronic ecosystem of eighteen exchanges, numerous price improvement mechanisms, multiple flash mechanisms and limited off-exchange venues has fundamentally reshaped how the buy-side navigates options execution.

To succeed in US options, the buy-side needs to be able to:

- Handle the structural and operational demands imposed by a market defined by speed and high trading volumes.
- Navigate the interplay between exchange landscapes, auction mechanisms, and participant designations creates a market where the how of execution can materially influence outcomes.
- Understand the pricing models for optimizing execution and controlling costs. Without fully understanding how to navigate these pricing dynamics, buy-side firms risk paying more than necessary or consistently trading at a disadvantage.

Transparency is central to solving these challenges. Understanding how your broker routes orders and the logic behind those decisions is critical. At its core, options market structure revolves around speed, access and transparency. When these elements converge, complexity becomes an opportunity rather than a barrier.

For buy-side firms looking to expand or optimize their presence in US options, the path forward is clear: invest the time to understand market structure dynamics, pricing models, the use of market data and interrogate the systems and decisions that sit between your order and the market. Those who do will not only navigate the nuances of this rapidly evolving ecosystem but will be positioned to turn them into an advantage.

¹⁷ Databento: What is OPRA? (Microstructure Guide) – <https://databento.com/microstructure/opra>

²⁹ Cboe S&P 500 Options (SPX) – ODTE Data – https://www.cboe.com/tradable_products/sp_500/spx_options/

For more information, please contact

optionssales@liquidnet.com

