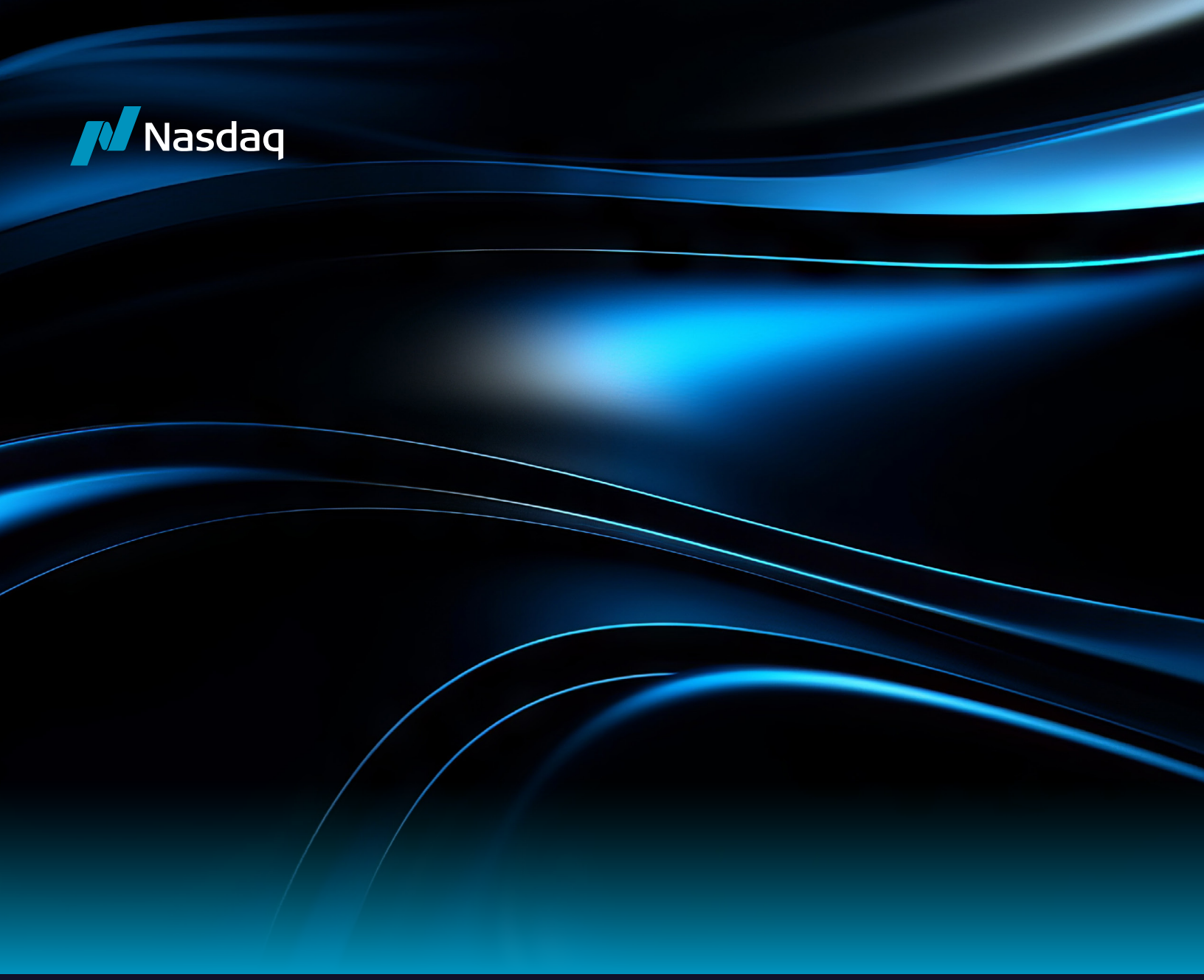

The Anatomy of Nasdaq Auction on Demand Execution Quality

A comparative analysis of periodic auction design and its impact on auction success rates and execution outcomes

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Executive Summary

We evaluate the execution quality in European periodic auction venues, focusing on Nasdaq Auction on Demand and comparing it with alternative market structures. We highlight key design differences – specifically auction triggering mechanisms and protections against order cancellations – which together aim to enhance the reliability of available liquidity and reduce opportunistic behavior. The analysis finds that Nasdaq's approach leads to higher rates of successful auctions and improved execution outcomes. It also shows that adverse price movements following auctions are smaller for Nasdaq Auction on Demand, indicating lower toxicity for participants. Finally, the paper highlights how expanding retail participation in Nasdaq Nordic@Mid dark pool enhances both liquidity and execution quality. These findings have direct implications for Nasdaq Auction on Demand, where we expect retail participation to grow in H2 2026 and beyond.

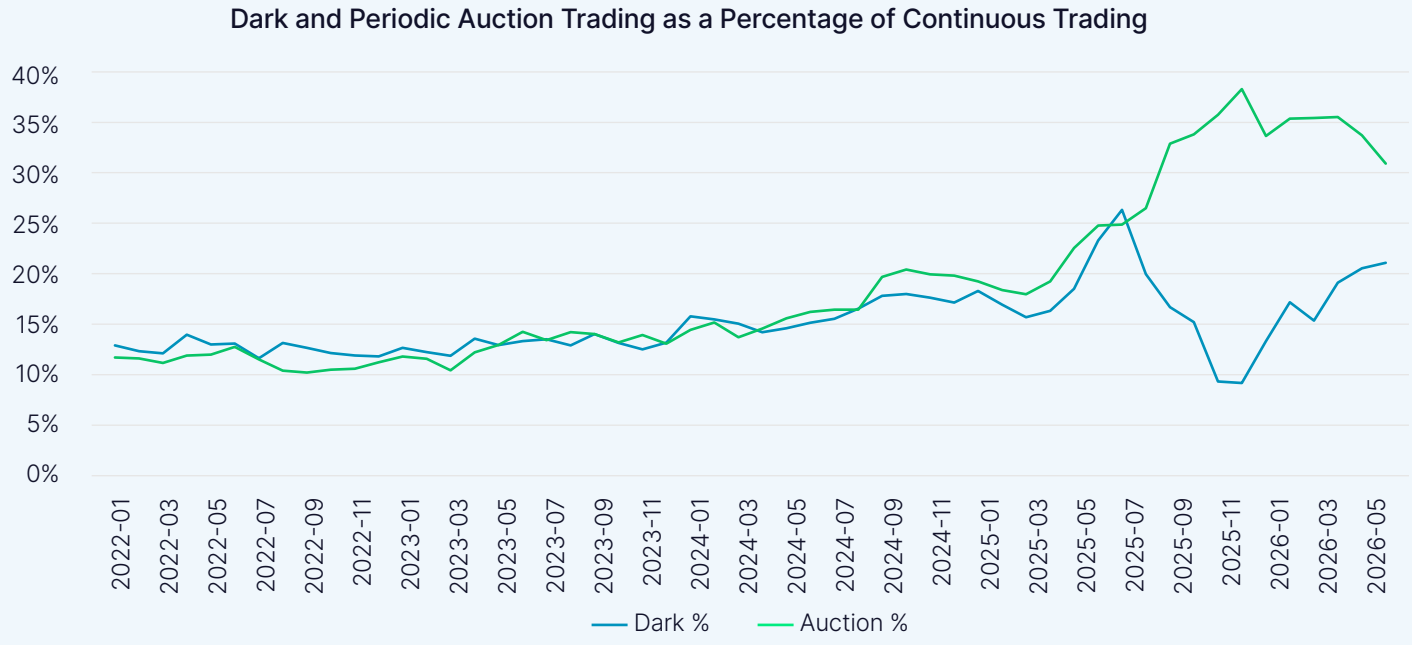
1. Introduction and Market Share Developments

This white paper evaluates execution quality across European periodic auction venues with a focus on Nasdaq Auction on Demand (AOD) for the period from Jan 2025 to Feb 2026 for constituent stocks of the OMXS30, OMXC25, and OMXH25 indices.

Background on Periodic Auctions

Periodic auctions are short-duration auctions that run independently alongside continuous limit order markets. As opposed to the limit order markets where orders are matched continuously, periodic auctions allow market participants to trade in short horizon auctions, the duration of which is randomized typically within a uniform range. In the case of Nasdaq AOD, the auctions run for a randomized duration of between 25ms and 100ms. During an auction, orders are batched, and the market operator publishes an indicative price, indicative size, and potentially imbalance information continuously. The auction uncrosses at a single price that maximizes executable volume, surplus, or other similar variables.

Across Europe, periodic auctions have grown since the implementation of MiFID II, serving as a mechanism allowing market participants to trade at (or near) the lit market midpoint while ensuring pre-trade transparency. Since the implementation of single volume caps on dark trading (replacing the double volume caps) effective Oct 2025, periodic auction activity has grown further reaching more than 30% of continuous lit trading in May 2026 (see Fig. 1).



Source: BMLL, Nasdaq Economic Research

Figure 1. Evolution of periodic auction and dark trading between Jan 2022 and May 2026

We report the evolution of Dark and Periodic Auction trading as a proportion of continuous lit trading between Jan 2022 and May 2026 for the stocks comprising the OMXS30, OMXC25, and OMXH25 indices.

2. Design Choices: Nasdaq AOD vs MTF-Operated Periodic Auctions

Nasdaq AOD auctions are triggered "on demand" once the system detects two crossing orders. This contrasts with most MTF-operated periodic auctions where the auction is triggered upon entry of first order. While that may improve the probability of a fill, the "two-crossing-orders" requirement at Nasdaq effectively delays publication of indicative price/size until two-sided liquidity is present (see Fig. 2). In addition, Nasdaq AOD mechanism operates a speed bump on cancels (and on size reductions), which essentially eliminates market participants' ability to cancel an order once it is matched against a contra order. Together, these two features help secure genuine trading interest on both sides of the market, reduce opportunistic fade risk during the call, and improve adverse selection for resting liquidity.

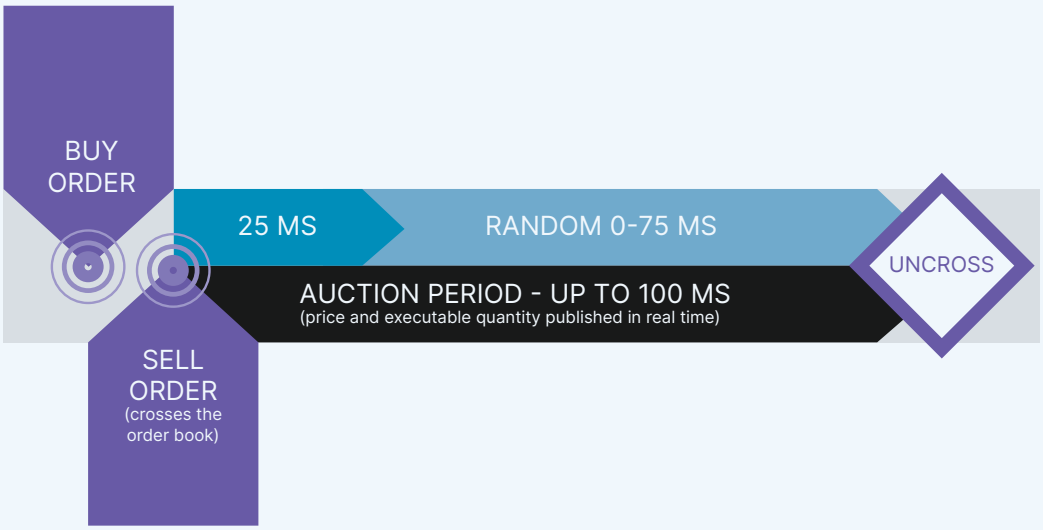
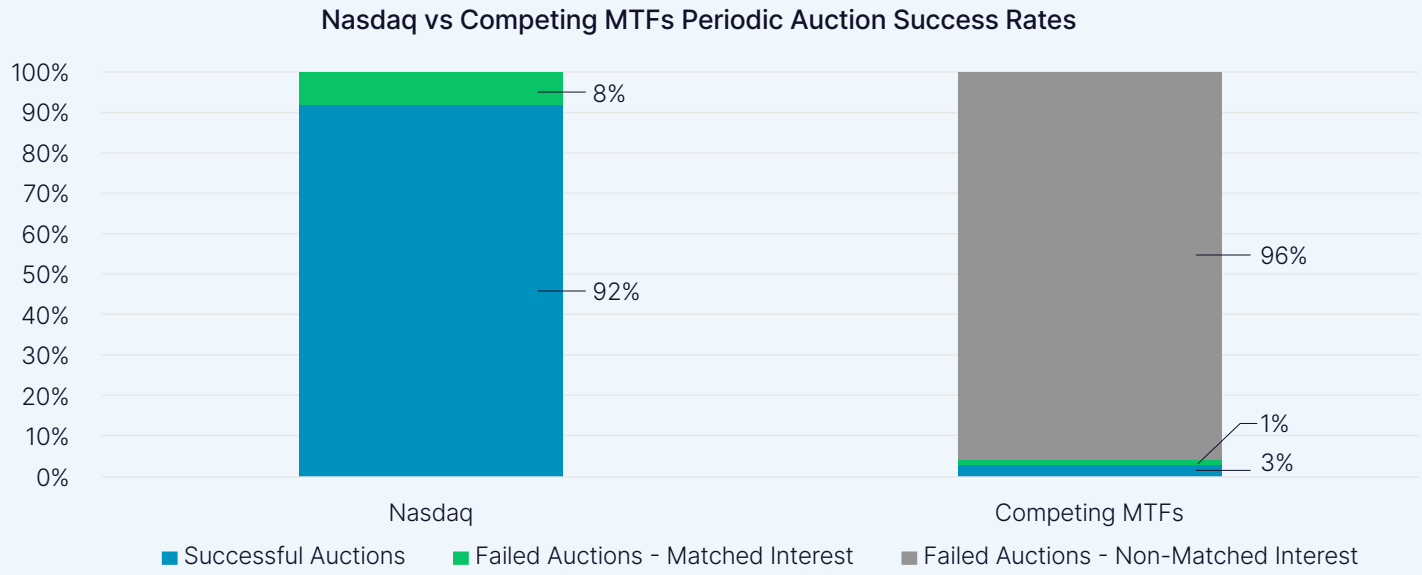


Figure 2. Infographic explaining the functioning of Nasdaq AOD

3. Outcomes: Success Rates and Toxicity

Success Rates

We measure the success rates by computing the fraction of auctions that result in a trade as a percentage of triggered auctions. For MTF-operated periodic auctions we further distinguish between auctions triggered but not matched (only a single submitted order or two contra orders that don't match) and matched interest auctions (at least 1 order on each side with crossed prices). Of all auctions triggered on MTF-operated venues, 4.3% result in matched interest and 3.1% (or 71.2% of all matched auctions) result in a trade. In contrast, 92% of all triggered auctions on Nasdaq AOD result in a trade (see Fig. 3).



Source: BMLL, Nasdaq Economic Research

Figure 3. Periodic Auction Success Rate

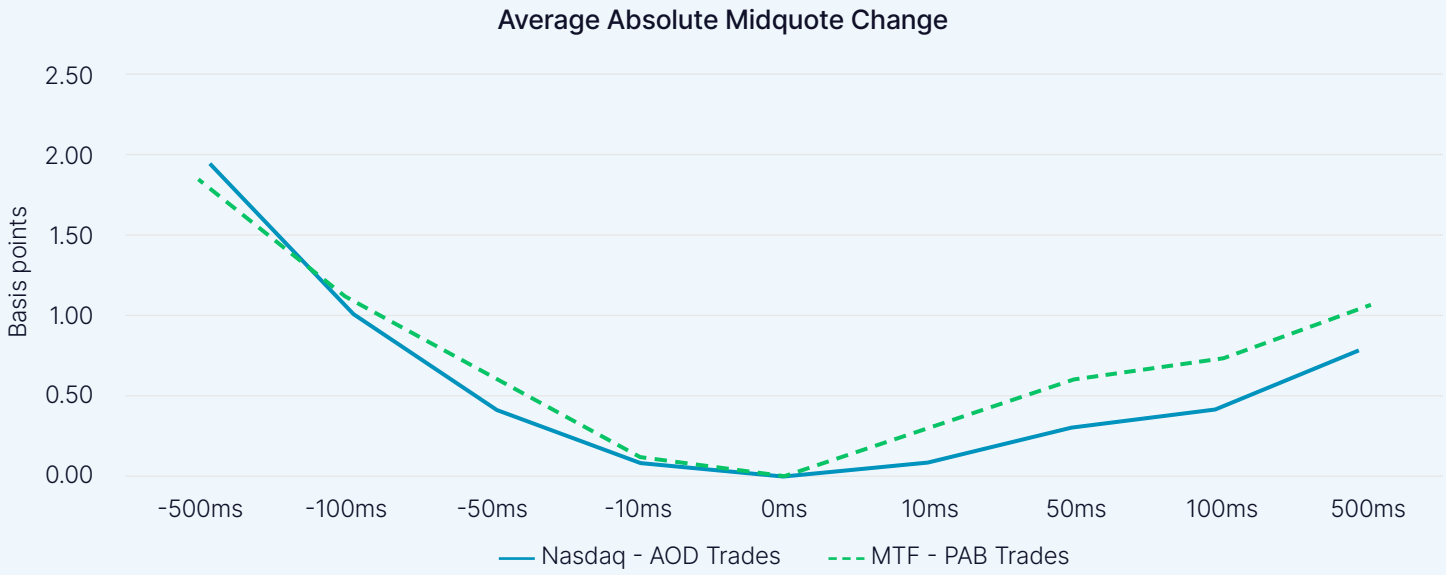
We break down all auctions triggered on MTFs and primary markets into successful and unsuccessful auctions. Auctions on MTFs typically fail either due to the presence of one-sided liquidity, two-sided but not matched liquidity, or two-sided and matched liquidity followed by order cancellation or amendment. Auctions on Nasdaq AOD are only triggered when two-sided matched liquidity is present in the auction, and both sides agree on a clearing price. The presence of speed bumps on cancelation limits individual market participant's ability to cancel after triggering an auction. Consequently, Nasdaq AOD auctions fail when price protection mechanisms are triggered or when pegged orders match with limit orders and lit prices deviate from the limit order prices.

Toxicity (Adverse Selection)

What happens to lit prices around the auction clearing? Here we compare the **absolute change** in the EBBO midpoint from 500ms before the auction clears to 500ms after the auction clears with *0ms depicting the auction clearing time*. We use the absolute change as we cannot sign individual MTF-operated periodic auctions due to the absence of individual order data. Using absolute EBBO-midpoint changes allows us to obtain a conservative estimate of adverse selection as positive and negative price changes do not cancel each other out. As most periodic auctions on Nasdaq and the MTFs clear at the EBBO-midpoint, our estimate of toxicity is closely related to, but not equal to, the markout experienced by the different counterparties. Specifically, from the point

of view of the counterparty adversely selected, -1 times *Post-Auction Average Absolute Midquote Change* should proxy for the average maximum position loss in an auction. In practice, individual market participants are likely to experience a combination of positive or negative markouts depending on their information/speed advantage, tradeoff between fills vs slippage, changes in continuous lit prices, and venue latencies.

During the auction phase there is hardly any difference in the EBBO midpoint changes across Nasdaq AOD and MTF-operated auctions. However, post-clearing the EBBO midpoint experiences a significantly larger absolute change on MTF-operated auctions as compared to Nasdaq AOD auctions. Specifically, 50ms after a Nasdaq AOD clearing, the EBBO midpoint moves on average by 0.28bps at Nasdaq vs 0.63bps for MTF-operated auctions: a difference of 2.3x. 500ms after the respective auctions clear, the EBBO midpoint changes by 0.78bps vs 1.07bps for Nasdaq AOD and MTF-operated auctions, respectively, a difference of 1.4x (see Fig. 4).



Source: BMLL, Nasdaq Economic Research

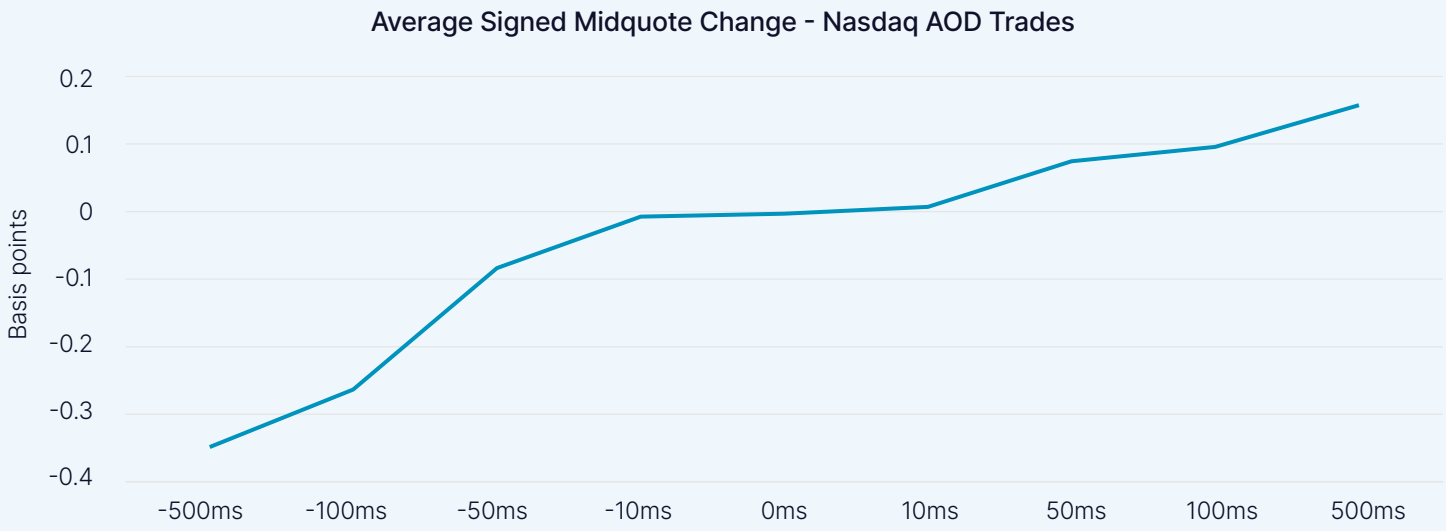
Figure 4. Average Absolute Midquote Change Around Successful Auctions

We report the average absolute change in EBBO midpoint around a successful Nasdaq AOD and MTF-operated auction (i.e., one that clears with at least 1 share). For this, we compute the absolute change in EBBO midpoint 500ms, 100ms, 50ms, 10ms before and after the auction clearing relative to the EBBO midpoint at the time of auction clearing (0ms). Specifically, for every successful auction clearing at time *t*, we compute

$$\left|PI_t^{\Delta}\right| = \left|\frac{(EBBOMid_{t+\Delta} - EBBOMid_t)}{EBBOMid_t}\right| * 10000$$

where $\Delta \in \{-500ms, -100ms, -50ms, -10ms, 0ms, 10ms, 50ms, 100ms, 500ms\}$. We then compute the weighted average of the absolute midquote change across all auctions where the auction clearing volume in euros is used as the weight. EBBO is computed using Nasdaq, CBOE, Turquoise, and Aquis quotes and local timestamps.

To further understand the toxicity in Nasdaq AOD we also separately report the signed EBBO midquote change around successful auctions. The auction is signed +1 (-1) when a buyer- (seller-) initiated order triggers the auction, i.e. it matches an existing sell (buy) order in the Nasdaq AOD book. For multiple trades in a single auction print – 6.9% of all auctions – we sign all the trades in that auction as +1 (-1) if the largest execution in the auction is buyer (seller) initiated. EBBO midpoint on average remains largely flat but moves in the direction of the aggressive leg. 0.27bps of the price movement is observed during the auction phase (within -100ms to 0ms) whereas an additional 0.17bps move is observed post execution. This contrasts with the *absolute* EBBO midpoint change which is significantly larger at 0.8bps 500ms after auction clearing (see Fig. 5). Note the difference in y-axis range between Fig. 4 and Fig. 5.



Source: Nasdaq Economic Research

Figure 5. Average Signed Midquote Change Around Successful Auctions

We report the average change in EBBO midpoint around a successful Nasdaq AOD auction (i.e., one that clears with at least 1 share). For this, we compute the change in EBBO midpoint 500ms, 100ms, 50ms, 10ms before and after the auction clearing relative to the EBBO midpoint at the time of auction clearing (0ms). Specifically, for every successful clearing of an auction at time t, we compute

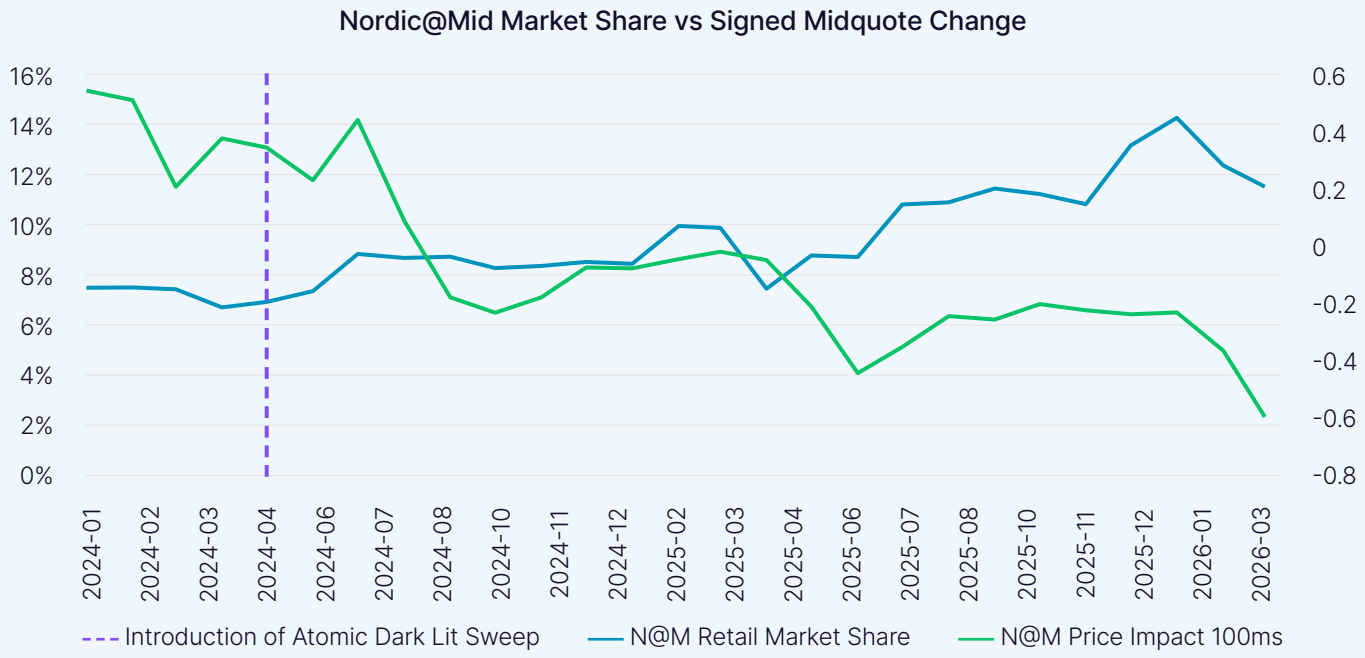
$$PI_t^{\Delta} = D_t * \frac{(EBBOMid_{t+\Delta} - EBBOMid_t)}{EBBOMid_t} * 10000$$

where Δ ϵ {–500ms, –100ms, –50ms, –10ms, 0ms, 10ms, 50ms, 100ms, 500ms}, Dt is equal to +1 if the auction is triggered by a buyer and -1 if it is triggered by the seller. We then compute the weighted average of the signed midquote change across all auctions where the auction clearing volume in euros is used as the weight. EBBO is computed using Nasdaq, CBOE, Turquoise, and Aquis quotes and local timestamps.

4. Role of Retail in Nordic@Mid and Implications for AOD

On 17 June 2026, Nasdaq enabled AOD access for Nasdaq's smart order routing strategies which are predominantly used by Nordic retail customers. Additionally, in Q4 2026 Nasdaq plans to implement a set of sweep strategies involving AOD, Nordic@Mid, and the lit book that should allow market participants to more seamlessly access lit and midpoint liquidity across the three books. We expect this move to significantly benefit retail participants by allowing them to trade at the lit midpoint even for stocks that are subject to the single volume caps on dark trading. At the same time, we expect broader market-wide positive network effects through higher symmetric contra arrivals, higher inside-spread executions, and lower toxicity for midpoint-pegged interest.

We observed a similar effect when the atomic dark-lit sweep strategy was introduced to retail clients in April 2024 allowing them to instantaneously sweep Nordic@Mid when crossing the lit market spread. Between Q1 2024 and Q1 2026, retail market share in Nordic@Mid grew from approx. 6% to 13%. Over the same period the overall signed EBBO midquote change (Δ = 100ms) declined from +0.5bps to between 0bps and -0.5bps (see Fig. 6).



Source: Nasdaq Economic Research

Figure 6. Nordic@Mid Retail Experience

We report the market share of retail transactions in Nordic@Mid on the left axis and the 100ms signed EBBO midquote change based on EBBO midpoint on the right axis. The signed EBBO midquote change for every Nordic@Mid trade at time t is computed as

$$PI_t^{\Delta} = D_t * \frac{(EBBOMid_{t+\Delta} - EBBOMid_t)}{EBBOMid_t} * 10000$$

where Δ = 100ms and D_t is equal to *+1 (-1)* if an aggressive buy (sell) order matches a passive sell (buy) order. We then compute the weighted average of the signed EBBO midquote change across all Nordic@Mid trades where the trading volume in euros is used as the weight. EBBO is computed using Nasdaq, CBOE, Turquoise, and Aquis quotes and local timestamps. In April 2024, Nasdaq introduced the atomic dark-lit sweep strategy to retail clients. This event is denoted by the purple vertical dashed line.

5. Conclusions

The growth in periodic auctions has been attributable to market participants' ability to trade at the lit midquote while ensuring pre-trade transparency, low market impact, and size-over-speed allocation. As midpoint venues broaden access, we document how increased natural flow and retail access to midpoint liquidity, combined with smart design choices can simultaneously improve the likelihood of a successful auction and reduce toxicity.

To learn more about Nasdaq AOD:

Webpage | Factsheet | Contact Nasdaq