VOLOS

Improving 0-DTE Trading Returns By Avoiding Expensive Exits

An Intraday Transaction Cost Study Highlighting the Benefits of Cash-Settlement Using Index Options

Nan Xie | Head of Index, Volos
Jeff Corrado | Director of Operations, Volos

Transaction costs play a critical role in options trading for both institutional and retail investors. Institutional investors often incorporate transaction cost analysis into their strategy modeling and execution, as even small inefficiencies can significantly impact long-term returns.

This concern is amplified when evaluating bank-offered Quantitative Investment Strategies (QIS), as each bank employs a distinct methodology for modeling transaction costs. These modeled costs are then passed through to the client directly within the return stream of the strategy.

As part of the QIS services we provide our clients, Volos collaborates with hedge funds, pension funds, and insurers to enhance transparency and accuracy in transaction cost modeling. Specifically, **Volos works with clients to:**

- **Rebuild bank-offered QIS** within the Volos Strategy Engine (a systematic options strategy development platform) and validate that the strategies perform in the manner they are represented
- **Decompose and analyze transaction costs** using real-world pricing to ensure the fees modeled by the banks are accurate and fair
- **Provide insights** into the dynamics of bid-ask spreads, identify any market environments where excess trading costs occur, and test different trading approaches to optimize these costs

Despite their importance among institutional investors, transaction costs—and the analysis surrounding them—are rarely a focal point for retail options traders. This is surprising given the sharp rise in retail trading of same-day expiring options (commonly referred to as 0-DTE options). These strategies require at least one trade per leg per day, leading to significant trading volume—and associated transaction costs—over time. For example, a daily Short Put Spread strategy (a two-legged options-selling structure) can involve up to 1,000 options transactions per year if two options legs are entered and exited 252 trading days a year.

Despite the prevalence of such high-frequency trading strategies among retail investors, transaction costs can often remain an overlooked factor that can meaningfully impact net returns and potentially even strategy viability. **Understanding and effectively managing these costs is crucial for traders seeking to optimize performance in *any* options strategy.**

Transaction Cost Analysis Methodology

To gain deeper insight into the transaction costs associated with 0-DTE options trading, Volos analyzed the "bid-ask spread" of Nasdaq-100® index options ("NDX") during trading periods when 0-DTE traders typically enter and exit their positions. Volos observed that **while liquidity is likely the main driver determining an option bid-ask spread, a call or put being near expiry and in-the-money has also historically widened options spreads.**

Specifically, an ITM option that is close to expiry has historically exhibited more than double the bid-ask spread compared to an option expiring on a typical trading day. For investors trading NDX index options, this has offered a unique opportunity: rather than exiting an ITM position early and incurring high transaction costs, traders have been able to recognize the benefit of index options and allow the option to cash settle at expiration, reducing costs and improving overall returns.

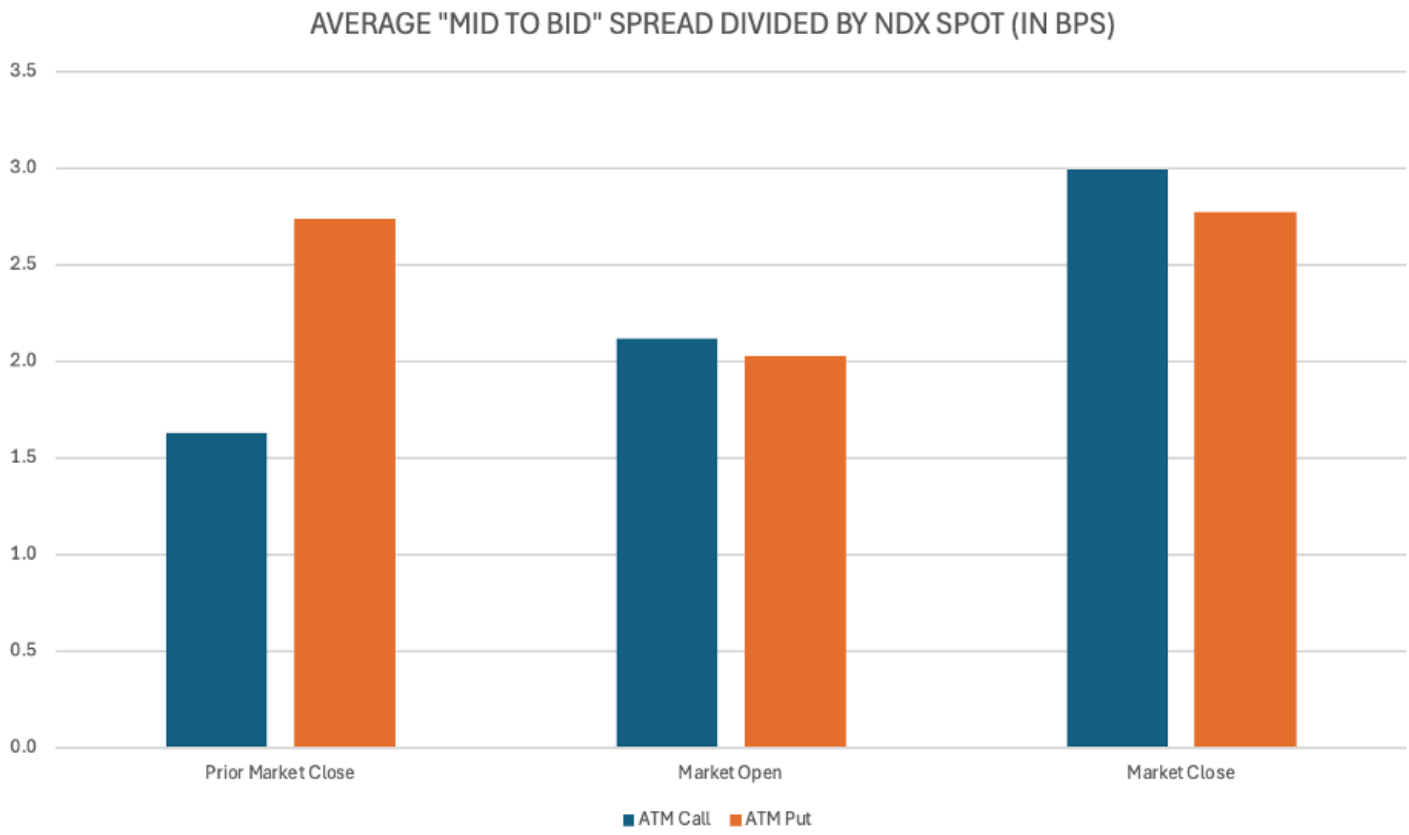
Studying NDX 0-DTE options pricing data since August, 2022, our transaction cost analysis methodology:

- **Analyzes three different "0-DTE" trading intervals** using a time-weight average price (TWAP):
  - 1: The prior trading day's market close (3:30 – 4:15 PM ET)
  - 2: The current trading day's market open (9:30 AM – 10:00 AM ET)
  - 3: The current trading day's market close (3:30 – 4:00 PM ET)

- **Selects and tracks both the at-the-money (ATM) call and put options** based on the NDX spot price at the prior trading day's market close.
- **For each TWAP interval, we calculate the average "mid to bid" spread,** which is the difference between the options bid and mid-price expressed as a percentage of NDX spot price.
    - (NDX Options Mid Price – NDX Options Bid Price) / NDX Spot Price groups and averages the "Mid to Bid" Spread into **three (3) categories:**
        - **"Down"** - when NDX falls over 25 bps (.25%) in a day
        - **"Up"** - when NDX rises over 25 bps
        - **"Flat"** - when NDX trades within a +- 25 bps range
- **Applies a 25% slippage assumption** to calculate daily transaction costs associated with entering and exiting 0-DTE NDX options. This figure is then annualized (multiplied by 252) to estimate theoretical yearly transaction costs.

Spread Analysis Reveals Trends Based On Time of Day

Figure 1: A 0-DTE NDX options trader has historically on average seen "Mid to Bid" Spreads of 1.5-3 bps depending on time of day.



Source: Volos, Nasdaq, Theta Data

Figure 1 above highlights the average "Mid to Bid" Spread for 0-DTE NDX options at the three TWAP intervals. We observe that the spread at the time of an option's exit (or roll) at market close has historically been higher than the spread at entry. This aligns with expectations: at entry, options tend to have lower spreads, making these trades relatively "cheaper" to initiate.

By contrast, spreads at exit look to be influenced by the corresponding day's returns. Traders may be more inclined to cross the mid-price and accept higher transaction costs when closing or rolling positions, particularly when options are near or in-the-money approaching expiration.

Volos could not immediately reconcile the materially higher "Mid to Bid" Spread in the ATM put options at the prior market close compared to the ATM call options, which equates to an approximate 1 bps difference. While an independent volume analysis confirmed a higher volume of call options traded relative to put options during the TWAP interval, we remain skeptical that volume alone fully explains this phenomenon.

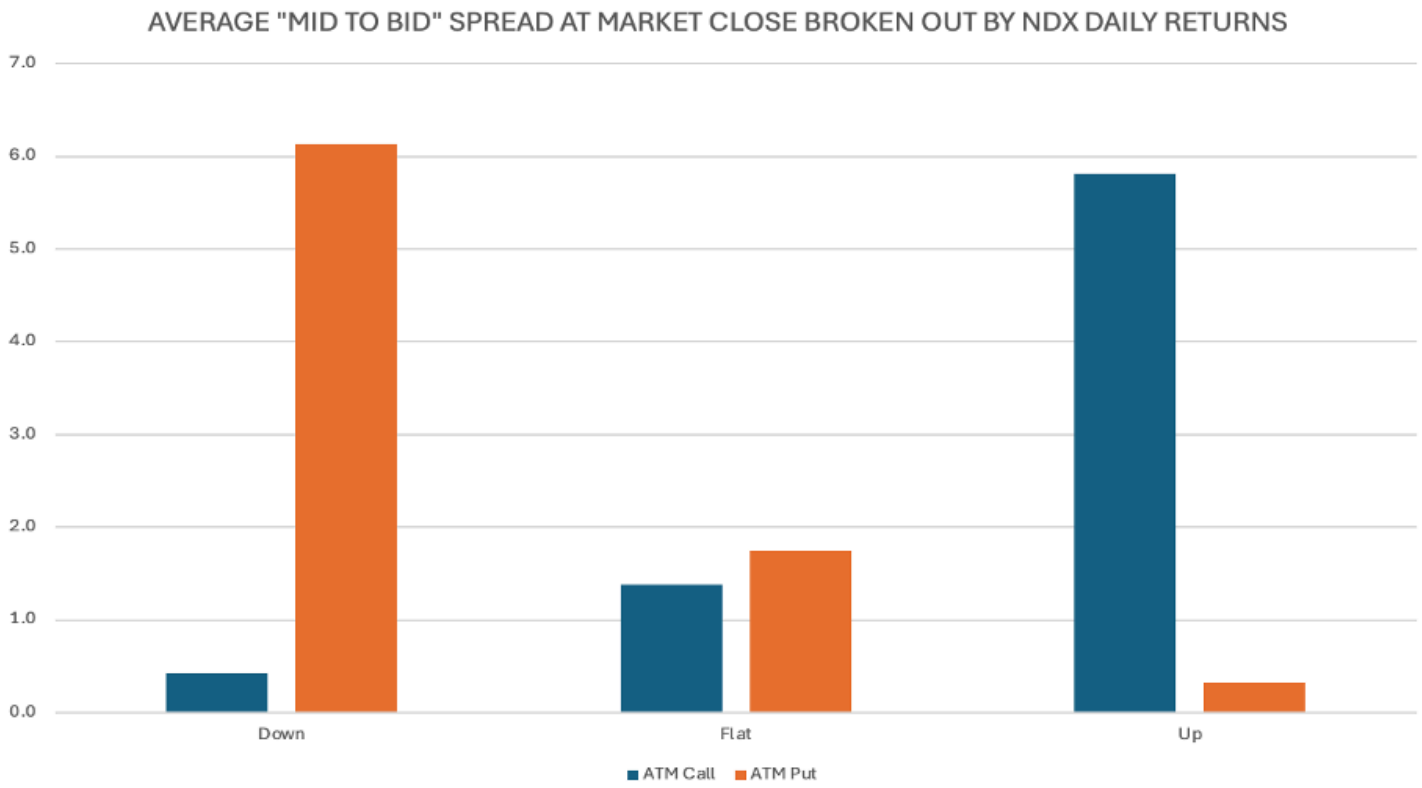
Could Retail Trading Be An Explanation?

Beyond liquidity, another driving force behind increased "Mid to Bid" spreads in ATM put options prior to market close may be the retail options trader's inclination to trade put options as opposed to calls. The 0-DTE retail trader has often been linked to options selling strategies such as selling short put spreads over a cash position. This is explained in part by the fact that selling NDX covered calls requires a substantial underlying position in the Nasdaq-100, as the notional value of an NDX contract exceeds $1.9 million at the time of writing, and so is less suited to retail trading).

By contrast, an XND or NDX short put spread can be structured with thousands of dollars in margin. Retail traders, typically trading in smaller lot sizes, may need to cross the mid-price of an option to ensure execution, thereby incurring excess transaction costs. Given their trading behavior, retail traders may be less sensitive to these costs and/or accustomed to paying them. It's possible that a retail trader exclusively trading NDX put options may even be unaware that this relationship even exists.

Understanding Trader Behavior Based On Daily Price Movement

Figure 2: Further analysis reveals that the "Mid to Bid" Spreads more than double to ~6 bps when a 0-DTE is near expiry and in the money.



Source: Volos, Nasdaq, Theta Data

We aimed to understand the factors driving the materially higher spreads observed when exiting options compared to entering them. As shown in Figure 2, it became evident that this dynamic is largely influenced by the high spreads of in-the-money (ITM) options near expiry.

For both call and put options, the "Mid to Bid" spread is close to 6 bps. This widened spread is potentially a result of decreased liquidity, as fewer market participants are willing to take the other side of an expiring ITM position.

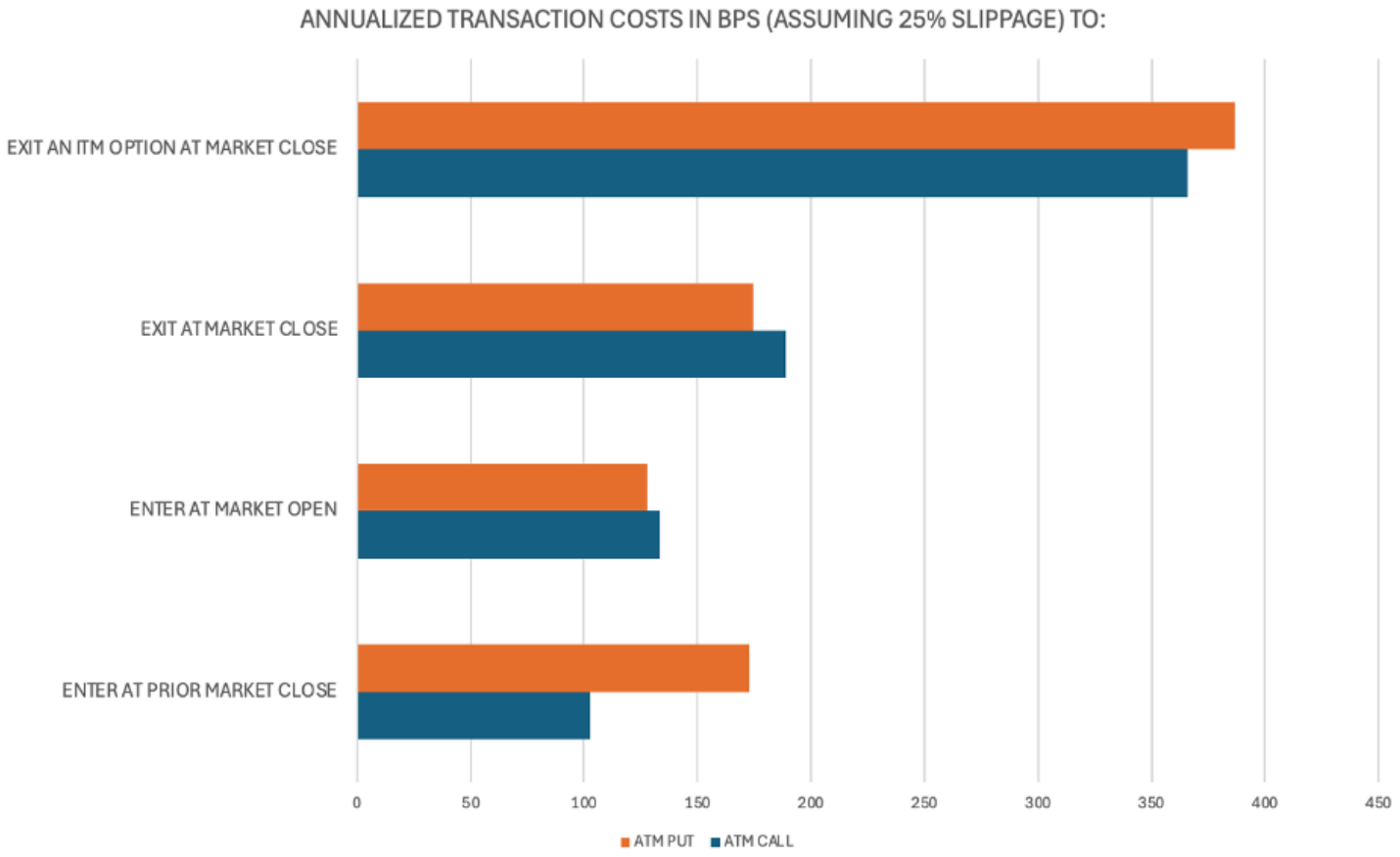
Volos highlights that these ITM call and put options represent losing trades for options sellers and winning trades for options buyers. In both scenarios, the

0-DTE options trader appears to have a higher willingness to incur transaction costs.

For the options buyer, transaction costs may be indirectly absorbed as they seek to take profits and roll their position into the next trading day. Meanwhile, the options seller, focused on exiting a losing trade, may pay little attention to the spread, ultimately accepting higher transaction costs in the process.

Quantifying Annual Entry and Exit Daily Options Trading Costs

Figure 3: A 0-DTE NDX options trader should expect roughly 300 – 350 basis points of transaction costs combined to enter and exit options 252 trading days a year. Historically, these costs have been reduced or eliminated by avoiding early exit of in-the-money options near expiry.



Source: Volos, Nasdaq, Theta Data

Using a 25% slippage assumption, we calculate the annualized transaction cost associated with:

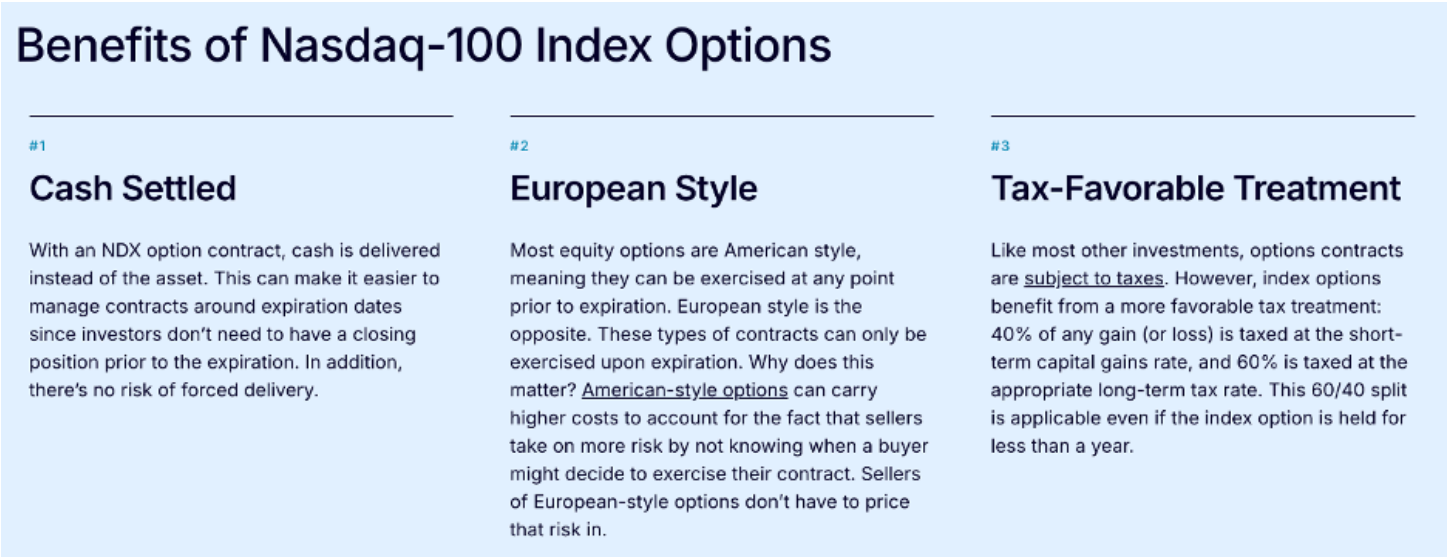
1. Entering an option at the prior market close
2. Entering an option at the market open
3. Exiting at the market close
4. Exiting an in-the-money option at the market close

As illustrated in Figure 3, 0-DTE NDX options traders have historically paid between 125 - 175 basis points per year to enter daily options trades and another 175 basis points per year to exit the trades (the combined expected range being roughly 300 - 350 bps per year to enter AND exit daily options).

Notably, similar to the trends observed in Figure 2, **the majority of transaction costs when exiting daily options arise from closing in-the-money (ITM) positions near expiration.** The annualized costs to exit an ITM option have historically exceeded 350 basis points—more than double the spread at the market close on an average trading day.

The Underappreciated Cash Settlement Benefit of Index Options

Figure 4: Index options allow the unique benefit of Cash Settlement and European Exercise. These two features combined allow for a 0-DTE trader to avoid expensive exit costs by allowing ITM options near expiry to cash settle.



Source: Nasdaq.com

Index options provide what has been a key structural advantage to help mitigate transaction costs: the cash settlement feature. NDX options traders could have historically opted to let an ITM NDX option expire, settle in cash, and then enter into their next options position the following morning rather than rolling at the prior day's close. Contrary to index options, single stock and ETF options carry the risk of physical settlement – the assignment of the underlying asset requiring a higher percentage of a trader's cash position to settle.

Nasdaq's index options website (shown in Figure 4) highlights that two differentiating features of NDX options are: 1) European-style expiration, and 2) cash (as opposed to physical) settlement. While traditional options backtesting may struggle to quantify the direct benefits of these features, a deeper analysis of intraday options pricing behavior reveals valuable insights. Specifically, **0-DTE NDX options traders have historically been able to reduce transaction costs—potentially saving hundreds of basis points per year—by strategically avoiding high-cost trading periods.**

For more information on this analysis and how Volos works with the buyside on QIS transaction cost analysis, please reach out to nan.xie@volossoftware.com.

Disclaimer

The information in this document is provided for general education and information purposes only. No statement within this document, or related documents, should be construed as a recommendation to buy or sell a security or to provide investment advice. Any index or strategy in this document (collectively, the "Indexes") are designed to represent a systematic rules-based trading strategy. In the construction of such Indexes there are certain assumptions that may not be realistic.

Volos and its employees and affiliates shall not be liable for loss or damage, direct, indirect or consequential, arising from any use of the Indexes or Strategies presented in this document

Past performance may not be indicative of future returns. The full time series of an Index contains back-tested data. The back-tested performance information is purely hypothetical and is provided in this document solely for information purposes. Back-tested performance does not represent actual performance and should not be interpreted as an indication of actual performance.

Neither Volos Portfolio Solutions, Inc. (Volos) nor any of its principals, directors, employees or representatives is providing you any investment advice through your use of our website or our software. Volos is not an investment adviser, and is not registered with the Securities and Exchange Commission or any state regulator, and this document will not make you an advisory client of, or otherwise have an advisory relationship with Volos. Volos does not endorse or recommend the purchase or sale of any securities. Volos is not a registered broker-dealer and is not regulated by the Financial Industry Regulatory Association (FINRA). Securities trading, including options trading, entails significant risk and is not appropriate for all investors. Certain complex options strategies carry additional risk. Investments in securities involve the risk of loss, including total loss of an investment.