



SPOTGAMMA

# CBOE's ODTE Report

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& the "Inverse Volmegeddon"

September 8th, 2023

## TLDR:

- 6 Months ago 0DTE Volmegeeddon hype was overdone
- Today sentiment is shifting to fully discounting the potential impact of 0DTE, as the focus is on the “gamma impact” while ignoring potential “delta impact”



7 months ago ★

## Are ODTE Options Creating the Next 'Volmageddon?'

By *Gunjan Banerji*

In February 2018, two volatility exchange-traded products collapsed during a surge in stock-market turbulence in an episode that became known as [Volmageddon](#).

The blow-up rippled through the stock market and fueled further selling.

JPMorgan Chase's Marko Kolanovic says that one-day options—such options are often known as “ODTE” options, which stands for zero days to expiration—are stoking similar risks.

“While history doesn't repeat, it often rhymes,” Mr. Kolanovic wrote in a note to clients on Wednesday. The selling of such options “is having a similar impact on markets.”

- Mr. Kolanovic estimates that around \$1 trillion worth of such options changes hands each day, suppressing intraday volatility.
- However, if there is a large market move, Mr. Kolanovic says traders looking to hedge or cover their positions may exacerbate volatility.

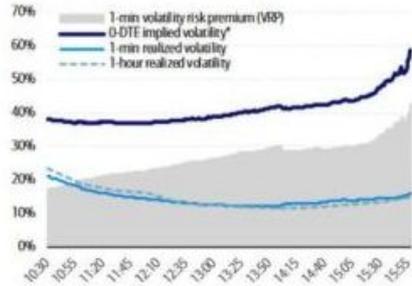
“If there is a big move when these options get in the money, and sellers cannot support these positions, forced covering would result in very large directional flows,” Mr. Kolanovic wrote in a note.

Read more about the growing popularity of one-day options [here](#).

*Only a few months ago...*

FEB 23 2023 (EDIT)

# No, 0DTE Will Not Result In “Volmageddon:” BofA Derivative Gurus Respond To Kolanovic

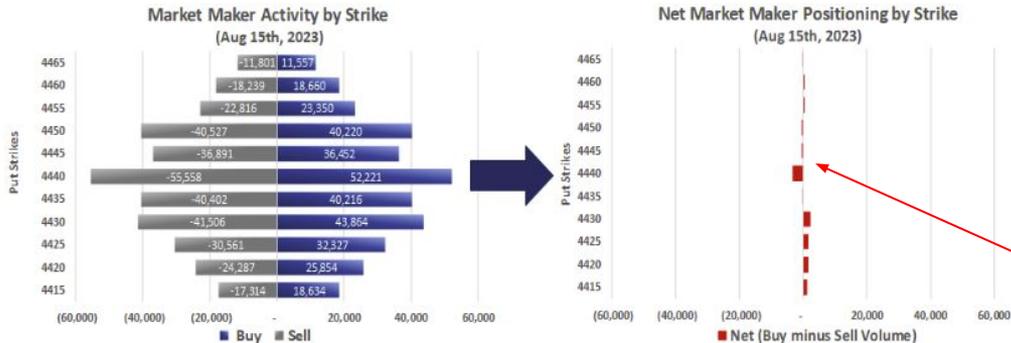


0DTE is not Volmageddon 0DTE is likely not Volmageddon per BOFA, and for that to happen you would need a major 0DTE flow imbalance. This is exactly what SpotGamma laid out to members on our Feb 2nd Q&A, here. Courtesy of ZeroHedge Wednesday, Feb 22, 2023 – 05:25 PM One week ago, JPMorgan’s Marko Kolanovic, [...]

## High Volume ≠ High Risk

Most of the concern around SPX ODTE options arise because of their massive volume - averaging over 1.23m contracts (\$500bn notional) a day in 2023. While the numbers may sound big, it's important to emphasize that volume doesn't equate to risk. High notional doesn't necessarily mean market makers on the other side of the trade will need to do a lot of hedging. What matters is the *balance* of the volume between buys vs. sells, not the total size of the volume. To simplify, if 100k contracts trade on a particular strike and 50k was customers buying and the other 50k was customers selling, then despite ~\$50bn notional trading on that line, the amount market makers need to buy/sell in S&P futures to hedge is actually...zero. Because the flow is perfectly balanced, market makers are left with net zero gamma risk despite the large volume in the options.

### Exhibit 3: High Gross Volume...But Very Little Net Exposure for Market Makers (Aug 15<sup>th</sup> Example)



Source: Cboe

So just how balanced is the customer flow in reality? While many commentators have tried to estimate that (to varying degrees of success), it's important to point out those are just estimates based on assumptions. Since 98% of the volume in SPX ODTE options are traded electronically, most outside observers have very little visibility into the exact breakdown of the volume. However, at Cboe®, we do. As the exchange where all SPX options are traded, we can see for every transaction whether it's customer or market maker, buy or sell, opening or closing. As a result, we are able to get an accurate sense of market maker positioning by tracking their net position (long minus short) at each strike. What we find is that the flow is, in fact, remarkably balanced between buy vs. sell. Take Aug 15<sup>th</sup>, for

Volume != risk ✓

It's about balance ✓

Are all MM's perfectly balanced? Or did MM "A" trade it all?

If we buy 50k at 10AM & Sell 50k at 3pm MM's show as balanced in this plot...

*SG theory is that a lot of ATM 0DTE is hedging flow, we're asking the CBOE to break down the 0DTE volume by transaction type (Cust, BD, MM, etc)*

exact breakdown of the volume. However, at Cboe®, we do. As the exchange where all SPX options are traded, we can see for every transaction whether it's customer or market maker, buy or sell, opening or closing. As a result, we are able to get an accurate sense of market maker positioning by tracking their net position (long minus short) at each strike. What we find is that the flow is, in fact, remarkably balanced between buy vs. sell. Take Aug 15<sup>th</sup>, for

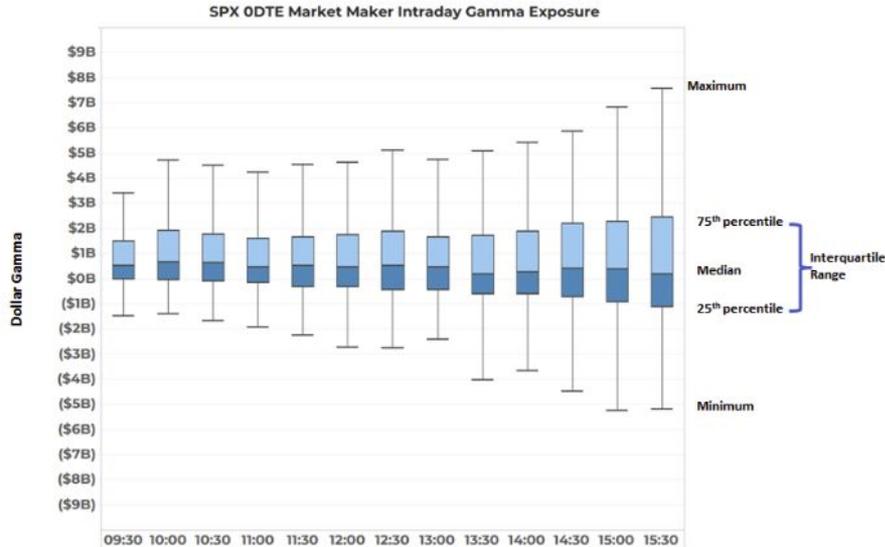
*Again we'd highlight the 0DTE is likely opened in the AM, and closed in the PM. That would balance buy vs sell...*

## Market Maker Gamma Analysis:

Once we have an accurate measure of market maker's net positioning for each strike, we can calculate an aggregate net gamma number. That number will tell us how much market makers' delta exposure in ODTE options will change in response to a 1% move in the SPX index – and as a result, how much potential buying or selling in S&P futures they may need to do in order to stay hedged. The bigger the number, the higher the potential impact.

So, just how big do the numbers get? The chart below shows you the range of market maker net gamma positioning throughout the day, taken in 30-min increments over the past year. The boxes tell you the interquartile range from the 25<sup>th</sup> to 75<sup>th</sup> percentile of the data (i.e. the middle 50% of the observations over the past year) with the median represented by the horizontal bar in the middle of the box. The “whiskers” extend to the min/max of 1.5x the interquartile range (anything beyond that would be considered outliers).

**Exhibit 4: Market Maker Gamma Exposure Throughout the Day**



Source: Cboe

*On an average day, it doesn't matter much, but this is a business of tails, and the range of that gamma exposure is rather large.*

*What about the deltas?*

# 0DTE GAMMA vs Delta

## Customer buys a call:

9:45AM SPX @ 4460: 4460 0DTE Call has Delta = .54 Gamma = 0.017

*MM sells the call, and MM buy 54 delta. Has to buy a bit more as SPX rises.*

3:15PM SPX @ 4490: 4460 0DTE Call has Delta = .95 Gamma = 0.0

*MM is short the call, vs 95 delta. No Gamma risk :)*

## Customer sells the call:

3:30 PM SPX @ 4490: 4460 0DTE Call has Delta = .95 Gamma = 0.0

*MM is long 95 delta vs no call. They must sell that delta!*

## A few key observations:

1) On average, market maker positioning is fairly de minimis, with net gamma exposure ranging from \$170mm to \$670mm throughout the day. To put that number in context, S&P futures trade around \$400bn a day, so we're talking about potential hedging flows that make up between 0.04% to 0.17% of the daily S&P futures liquidity. As we

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Volatility Insights  
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outlined in our ODTE [white paper](#), the customer activity in ODTE options tends to be very balanced because investors use them for a variety of purposes ranging from hedging to yield harvesting, tactical leverage to systematic trading. Unlike the meme stock craze during the pandemic era, we do not see customers trading ODTE options predominantly for speculative purposes and thus leaving market makers short a lot of gamma. Nor is the product overrun by option sellers as has been suggested. We believe the balanced nature of the flow is a key reason why volumes in ODTE options have remained robust through different market cycles (SPX index -19% in 2022 vs. +17% this year) as well as different volatility regimes (VIX® index in the 20-30 range last year vs. sub-20 this year).

2) While the net gamma range grows wider as the day progresses (which makes sense as gamma increases the closer an option gets to expiry), there is no evidence that market maker positioning grows to be outsized relative to other market participants. The median net gamma at 3:30pm is just +\$173mm with the typical range from -\$1.1bn to +\$2.4bn (25<sup>th</sup> to 75<sup>th</sup> percentile readings). Even if we focus on the “whiskers” on the box plot, the range of -\$5bn to +\$7.7bn represents just 1.3% to 1.9% of the S&P futures daily notional volume. Hardly the tail wagging the dog.

It's worth noting that this analysis is only for market maker positioning in SPX ODTE options. Market makers may have offsetting positions in other expiries, or other equivalent products (e.g. E-mini or SPY ODTE options). They may also be hedging their ODTE positions with other ODTE options, rather than with linear instruments such as futures.

*Gamma exposure is typically “de minimis” but delta exposure, particularly into the close could matter if there is a large ODTE unwind.*

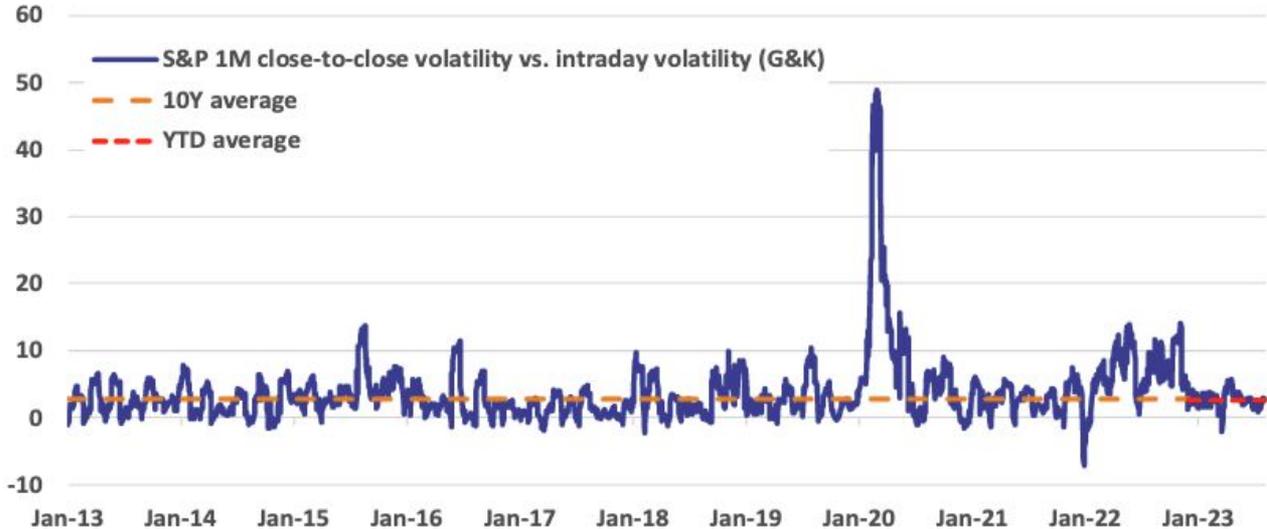
*ES futures trade \$400bn per day, but an imbalance of exposure is likely going to be hedged within minutes.*

*Executing 2% of daily futures volume in 10 minutes would likely move markets.*

**Assessing S&P Intraday Volatility**

Last, but not least, another way we can gauge the potential market impact of ODTE options is to look at the intraday behavior of the SPX index itself, to see if there have been any notable changes in intraday volatility since zero-day options have become more popular.

**Exhibit 5: S&P “close-to-close” volatility vs. intraday volatility (1M)**



*SG concurs, which is why we suspect ODTE flow is heavily used in hedging.*

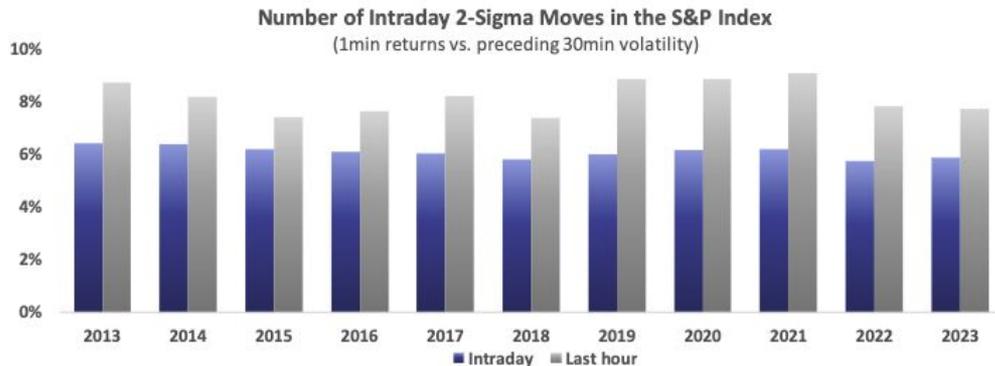
Source: Cboe

The conclusion, as you can see in the chart above, is no. The difference between S&P close-to-close realized volatility versus intraday realized volatility is currently right in line with historical averages. The YTD average spread of 2.7 vol pts is exactly the same as the 10-year average (Exhibit 5).

Moreover, if we examine SPX intraday price action for gap moves that could be indicative of large market maker hedging flows, we find no increase in frequency of such gap moves over the past year since the proliferation of ODTE trading. Specifically, we look at the frequency of 2-sigma moves over a 1min window (i.e. 1min return compared to preceding 30min realized volatility), which will capture sudden jumps in the SPX index. If we're seeing more "gappy" moves – particularly in the last hour – that could be a sign of option gamma hedging having a disproportionate impact on the market. However, as you can see in the chart below, there has been no uptick in intraday gap moves in the S&P over the past year, either during the trading day or in the last hour going into the close. This is consistent with our market maker positioning analysis above which showed that despite high notional volume in ODTE options, market maker net exposure is fairly negligible, and hence we're not seeing any disruptive market impact from the growth in ODTE trading.

*No discernible change in volatility, which we agree with & why we suspect ODTE flow is heavily used in hedging.*

#### Exhibit 6: Frequency of Gap Moves in S&P Index Unchanged Over Past Year



Source: Cboe

# Goldman Sachs Blames Zero-Day Options for Fueling S&P 500 Selloff

- Impact further amplified when market liquidity is worsening
- UBS study shows zero-day options play a role in stock dynamics

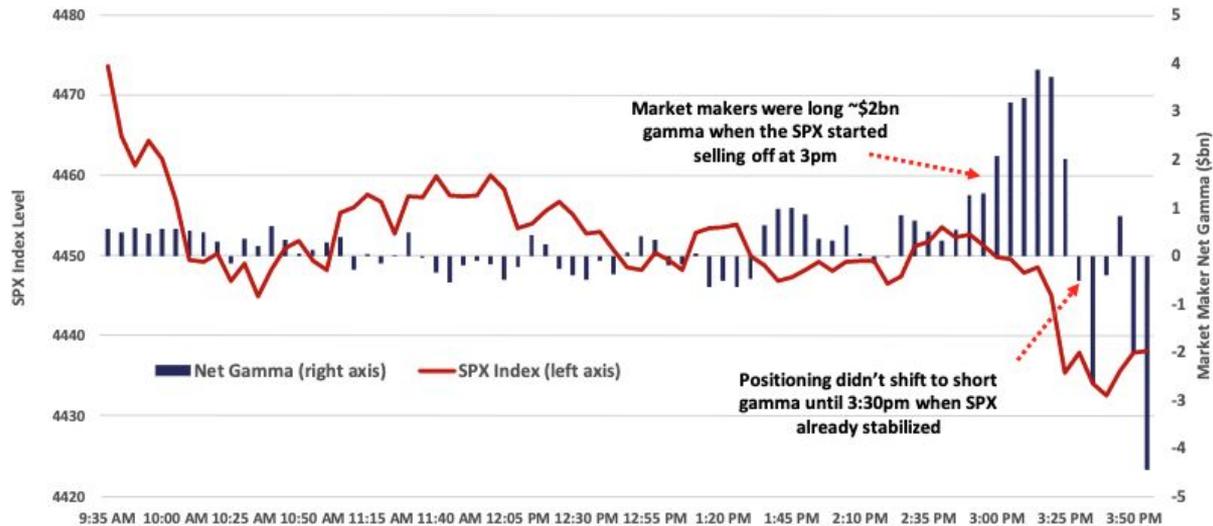
By [Lu Wang](#)  
August 16, 2023 at 1:22 PM EDT

Market Extra

# Wall Street blamed zero-day option traders for a sudden stock-market selloff. But a BofA team says they got it wrong.

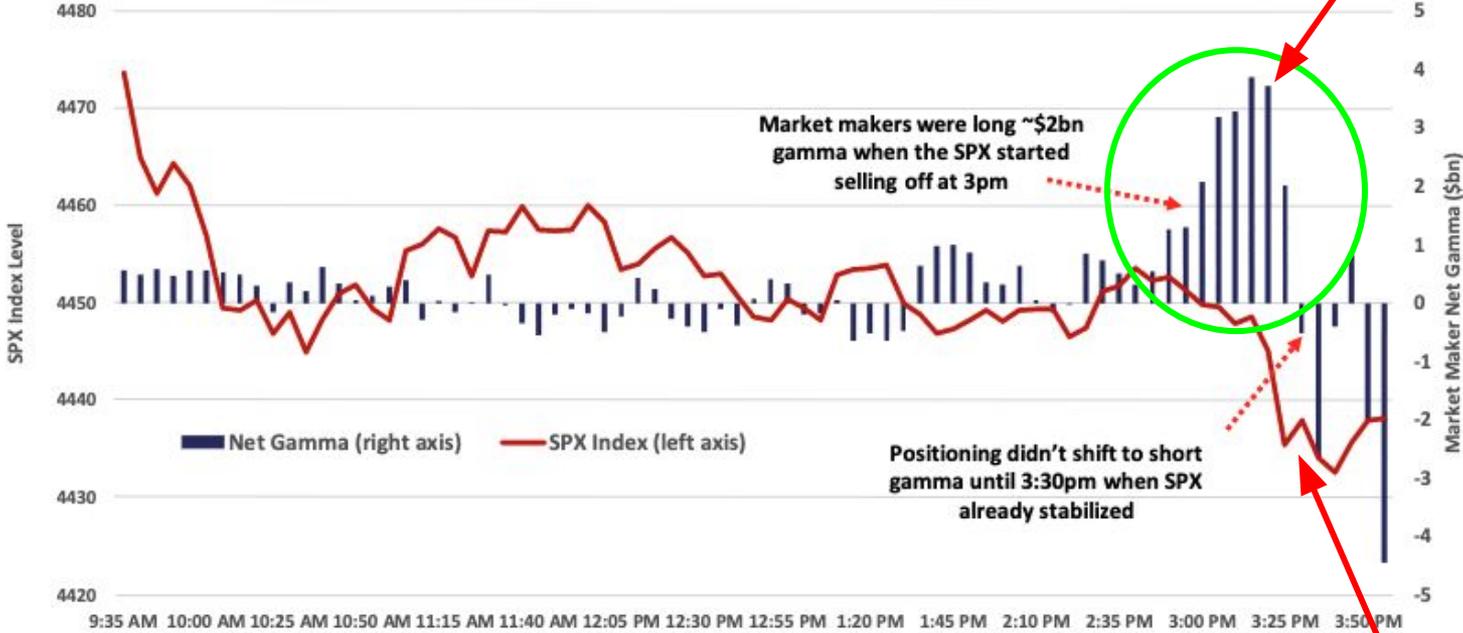
Last Updated: Aug. 23, 2023 at 8:02 a.m. ET  
First Published: Aug. 22, 2023 at 5:48 p.m. ET

**Exhibit 7: Intraday Market Maker Gamma Positioning on August 15<sup>th</sup> 2023**



Source: Cboe

**Exhibit 7: Intraday Market Maker Gamma Positioning on August 15<sup>th</sup> 2023**



Highest exposure of the day...

Biggest move of the day...

Source: Cboe

# Founder's Note: Thu, August 17, 2023 at 7:00 AM ET

"This is the example from yesterday. The most traded option line yesterday in the US market was the *SPXW 8/15/23 4440 puts* traded 99,000 contracts or \$45B billion notional. At 3:18pm the delta on this option was ~10% (cost \$.70 cents), by 3:40pm the delta on this option increased to ~80% (cost \$9.00), resulting in substantial delta from market makers!"

Yesterdays 0DTE% volume was 49%, which, while high, is on the lower end of the past few weeks. However, that understates it's impact.

This is the HIRO flowbreakdown from yesterday, and as you can see the flow was fairly flat until 2:30 PM (first red arrow). Then around 2:30 the negative delta options flows picked up, and that flow persisted until ~3:45PM. The critical insight here is that the lines displaying 0DTE flow (teal) and All Expiration flow (purple) almost perfectly overlay, which tells us that the bulk of yesterday's orderflow was 0DTE.

*Our HIRO Indicator measures Delta!*

HIRO Chart, Wednesday, August 16, 2023



# APPENDIX

# Much Ado About ODTEs: Separating Fact From Fiction

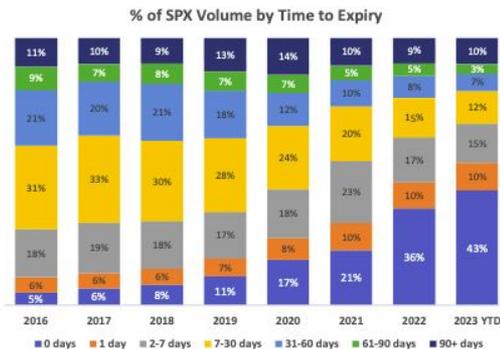
## Evaluating the Market Impact of SPX ODTE Options

Trading in zero days to expiry options, so called ODTEs, have exploded in popularity in recent years – rising from 5% of SPX® options volume in 2016 to over 40% since the introduction of Tue/Thu expiries last year (Exhibit 1). In recent weeks, that share has grown even more, averaging 50% in August (Exhibit 2).

As volumes have increased, so have concerns around the market impact of these products. Specifically, the fear is that market makers hedging these options could become outsized relative to the underlying S&P market, and therefore option “gamma hedging” (explained below) may be exerting undue influence on the market. Over the past year, commentators have blamed ODTEs for everything from [exacerbating](#) intraday volatility to [suppressing](#) it, with estimates for market maker positioning ranging from “[record short](#)” to [long \\$50bn](#) gamma in SPX alone. What’s behind these often [contradictory](#) headlines, and crucially, who is right?

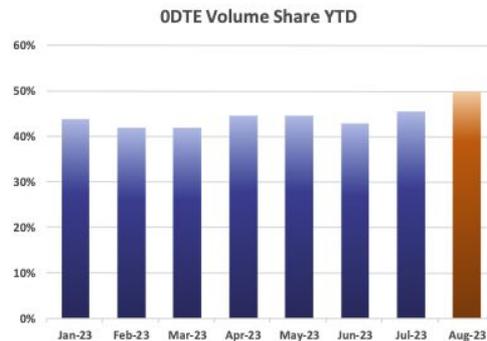
*As an aside, there are also massive ODTE volumes in SPY, QQQ & ES futures options.*

Exhibit 1: Zero-Day Options Have Become More Popular



Source : Cboe

Exhibit 2: ODTE Made Up 50% of SPX Option Volumes in Aug



Source : Cboe