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Investment viewpoint

How dangerous are 0DTE options?

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The tell-tale signs are present: high trading volumes, retail investor buy-in and bloggers competing with Wall Street technicians for airtime. Is the craze for 0DTE – zero-day-to-expiry – options fomenting a meltdown on the scale of 2018's 'Volmageddon'?

Need to know

- With increased publicity and more instruments available, the 0DTE options market is surging – generating enthusiasm and fears of a severe volatility shock
- Analysing the trading activity, we believe the types of transactions and pricing patterns indicate that directional day traders are driving purchase flow, with systematic volatility sellers providing liquidity
- Before drawing parallels with the Volmageddon of 2018, which resulted in massive losses among exchange-traded products, investors should consider the structure of 0DTE options and what kind of systemic risk they create

New hype, fresh fears

The rise of 0DTE options, which are traded only on the day they expire, has surged to new highs, attracting retail and institutional investors.

Sensationalism sells, so fears and fantasies have accompanied this activity, and include parallels with the Volmageddon of 5 February 2018, when the CBOE Volatility Index (VIX) leaped 20 points and 90% of the value of short-volatility exchange-traded products got wiped out.

The market share of 0DTE options has grown (see figure 1), with volumes of those based on the S&P 500 index rising from 5% in 2016 to well over 40% by March 2023. Hype and speculation is to be expected – but are fears of rampant volatility warranted?

FIG. 1 MARKET SHARE OF S&P 500 OPTIONS BY DAYS TO EXPIRY (DTE), 2016-2022

	S&P 500 market share			
Year	Zero DTE	0-1 DTE	0-5 DTE	0-30 DTE
2016	5%	10%	23%	60%
2017	7%	12%	25%	64%
2018	8%	14%	26%	62%
2019	11%	18%	30%	63%
2020	17%	25%	39%	67%
2021	21%	31%	48%	75%
2022	37%	47%	59%	78%

Source: CBOE as at March 2023.

Retail magnet

Flows have boomed since April and May 2022, when the CBOE (Chicago Board Options Exchange) introduced 0DTE options expiring on Tuesdays and Thursdays, adding to those already coming due on Mondays, Wednesdays and Fridays. This significantly increased mechanical volume (see figure 2).

But volumes do not tell the full story about flows. Looking deeper, we notice several aspects of this trading activity – from the relative simplicity of transactions to pricing patterns – which leave a footprint that is typical of the retail-investor community:

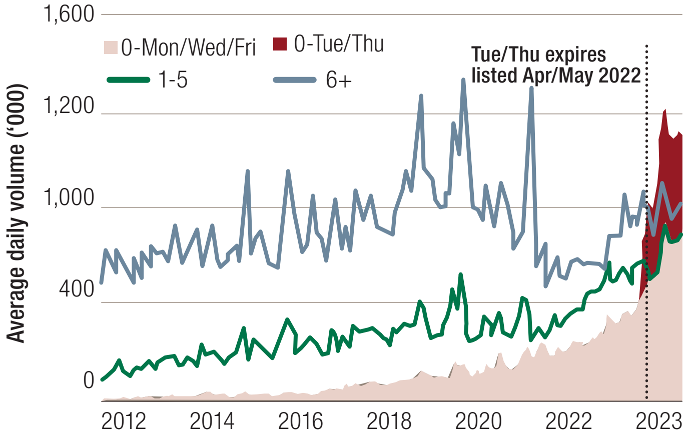
1. 0DTE options display a greater proportion of small-lot trades, compared to longer maturity options
2. Single-leg trades, such as straightforward calls or puts, represent over 50% of 0DTE options versus longer maturity options.
   In contrast, multi-leg structures involving two or more transactions are more common when time to expiry increases (see figure 3)
3. Call and put options are trading in relatively even volumes
4. Options are trading closer to ask prices in the morning, indicative of buying flows, and closer to bid prices in the afternoon, reflecting selling flows (see figure 4)

That is not to say that retail traders are the only ones using 0DTE options, but they seem to be more active here than in the other corners of the derivative markets.

Generally, 0DTE options are heavily used by day traders to implement bullish or bearish directional positions with extra leverage. Short-volatility investors absorb this flow, providing liquidity.

At the time of writing, our analysis of trading levels points to 0DTE options being fairly priced. There seems to be no large structural imbalance between supply and demand: the forces in play appear evenly matched.

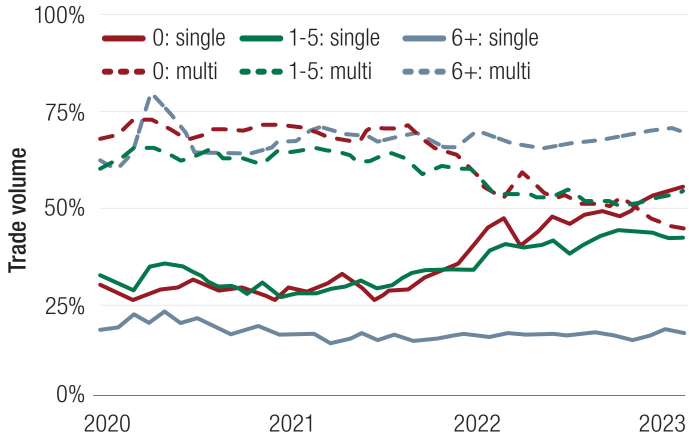
FIG. 2 AVERAGE DAILY VOLUME FOR S&P 500 OPTIONS, BY TRADING DAYS TILL EXPIRATION



Source: Bank of America Global Research as at February 2023.

FIG. 3 SINGLE VERSUS MULTI-LEG TRADES BY NUMBER OF DAYS TO EXPIRY

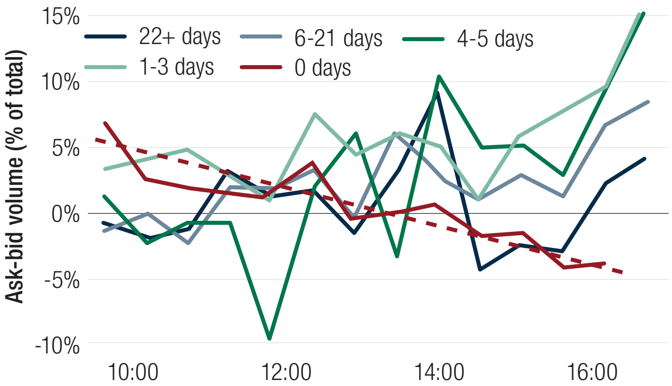
Single-leg transactions account for more than 50% of 0DTE trades



Source: Bank of America Global Research as at February 2023.

FIG 4. PROPORTION OF S&P 500 AUTO-EXECUTION PUT VOLUME, 1 JULY 2022 TO 10 JANUARY 2023

Ask minus volume trading at the bid, as a function of time of day, and by trading days till expiration



Source: Bank of America Global Research as at February 2023.

Toxic days, lethal days

Can 0DTE options occasionally create areas of unbalanced short gamma for dealers – driving volatility in the prices of underlying securities – and exacerbate a market move? Absolutely, but such a dynamic would most likely have a very limited duration and impact, in our view, for two reasons:

1. With the expiry of options imminent, this gamma is extremely localised and will disappear quickly as the market moves away from the strike price
2. 0DTE buyers tend to unwind positions when they make money rather than hold them to expiry, employing fading strategies to invest against the prevailing trend and thereby partially offsetting the momentum created by short gamma

Finally, even if an outsized market move would surely mean a (very) bad day for 0DTE option sellers, they would start the next day without any positions. This clean slate matters a lot. Having a bad day is not toxic in itself, but enduring such a day and starting the next with the same unprofitable positions certainly is. What is lethal, however, is having a bad day and beginning the next with a bad position that has doubled in size. (This, by the way, is the definition of being short convexity.)

Volmageddon 2.0?

In derivatives markets, inventory matters more than the trading flow. The warehousing of positions – where dealers hold portfolios of instruments to essentially act as counterparties to what is being traded – is what causes dislocations, distortions of parameters and ultimately an accumulation of pressure in the system. By their nature, 0DTE options do not create inventory.

This is quite different from the Volmageddon meltdown. It was caused by a slow build-up of leverage in inverse VIX exchange-traded notes (ETNs), whose performance is the exact opposite of the S&P 500 VIX Short-Term Futures Index. The CFA Institute provides a compelling summary of this episode, describing how the initial spike in volatility caused these options to fall, spurring rebalancing through VIX futures. A vicious cycle ensued, in which each move higher by the VIX triggered more losses, and further rebalancing, until 100% in value was written off.

Surely 0DTE options also have the potential to create a short gamma dynamic, in which continuous hedging can mean an investor digs their own grave if their position is big compared to the market and hence impactful. However, many stars would have to align for this to happen – in particular, a very large and rapid move, not triggered by 0DTE trading but happening at a time of significant imbalance in the 0DTE market (which is rare).

Furthermore, Volmaggedon's vicious circle was made possible by the fact that the amount of VIX futures bought by the ETN managers was very large compared to the trading volumes. In other words, it happened because the liquidity in the VIX was low compared to the size of these ETNs and their dynamic hedging needs. Comparing the dynamic hedging needs of 0DTE options with the liquidity and volumes of S&P 500 futures paints a different and much healthier picture at this stage.

Is heavy 0DTE options trading resurrecting Volmageddon? Due to a range of reasons – the instruments' one-day shelf lives, their localised impact, the lack of required inventory, the balanced state of the market and the relative greater liquidity of their underlying instrument – we believe that such a sensational outcome is unlikely. Even if they have the potential to exacerbate a market move for one day, 0DTE options do not pose a systemic risk in themselves.