Zero Day Options (0DTE)

The High-Stakes World of Same-Day Expirations

SUBMITTED BY

AMOL SHARMA – 23358004

eMASTERS QFRM

MBA 907 – ASSIGNMENT 1

INDEX

1. INTRODUCTION

In the fast-paced world of finance, where every second counts and opportunities emerge and vanish in the blink of an eye, a new frontier has come to the fore. Zero Day Options (0DTE), a niche but burgeoning corner of the derivatives market that promises quick returns and adrenaline-fueled action has garnered significant attention from industry leaders and analysts alike.

Highlighted prominently in esteemed publications such as Bloomberg and the Financial Times, 0DTE options have emerged as a subject of intrigue and analysis, particularly among quantitative finance and risk management professionals. Characterized by their rapid expiration and potential for swift gains, these options represent a unique facet of the financial landscape, one that demands both strategic acumen and risk management prowess.

A summary of five contemporary news articles introduces this phenomenon succinctly: -

I. Bloomberg: “What Are Zero-Day Stock Options? Why Do They Matter?”
   i. Traditionally, options were used exclusively by Wall Street experts. Covid-19 induced pandemic ushered retail investors into the arena and positions began getting opened and closed at a faster pace. More than 40% of the S&P 500’s trading volume is made up of zero-day-to-expiry (24 hours) options (0DTE). Subsequent volatility fluctuations raise concern among some market participants that the zero-day options can wield an outsize influence on the larger equity marketplace akin to tail wagging the dog.
   ii. 0DTE can be used for speculation and hedging. They are cheaper as there is lower probability that they’d be worth something by expiry, making it an ideal instrument to bet on short-term volatility in the underlying asset.
   iii. ODTE became huge among retail investors as a convenient way of gambling during meme-stock era in 2021(A meme stock refers to the shares of a company that have gained viral popularity due to heightened social sentiment). It gained traction for trading on stock indexes after Cboe Global Markets Inc. (CBOE), in 2022, added Tuesday and Thursday expiration options for the S&P 500, expanding existing products to cover each weekday. Meanwhile, rival CME Group Inc. also launched e-mini S&P 500 weekly options and broadened them to cover every day of the week. By the third quarter of 2022, such 0DTE contracts accounted for more than 40% of the S&P 500’s total options volume,

almost doubling from six months earlier.

iv. In 2022, as the US Federal Reserve pushed through the fastest interest-rate increases in decades, professional investors jumped on these high-risk, fast-trigger options deals, which in turn fuelled market volatility. There were intraday reversals in the S&P 500 at a rate not seen since the global financial crisis of 2008. A JPMorgan study from November found that retail market orders accounted for only 5.6% of the total short-dated options volume of the S&P 500.

v. Institutional investors are interested as 0DTE act as tools to balance exposure and otherwise hone strategies designed to harvest fleeting profits by darting in and out of positions. It comes in handy for fund managers too as the easiest ways to play catch-up when stocks rebound.

vi. Downside is if profits are huge, so are the losses. For example, on Oct. 28,2022 when the S&P 500 jumped more than 2% to close above 3,900, calls expiring that day with a strike at 3,850 surged to $45.80 from $2.90 — a stunning gain of 1,479%. On the other hand, puts maturing the next session with an exercise price of 3,750 tumbled 97% to 65 cents, after having more than doubling to $24.27 during the previous day.

vii. Their rise has meant more volatility in the markets. 0DTE options add to equity volatility making the task of figuring out the market's collective thinking on the economy a futile exercise, especially on days when key data like inflation are released. The market's increased worry is reflected in these contracts, but it is not reflected in the Cboe Volatility Index, or VIX, which is based solely on S&P 500 options with 23 to 37 days to expiration.

II. Financial Times: "Europe poised for arrival of 'zero-day' options"

i. Eurex, the derivatives exchange run by Deutsche Börse, will offer daily options that track the widely-followed Euro Stoxx 50 equity index from August 2023.

ii. Their rapid emergence has prompted concern that they trigger daily bursts of activity which could be causing sharp sell-offs in equities late in the trading day.

iii. People are hopeful that the new options could provide a much-needed boost to the European options market, which has struggled for growth in recent years.

iv. The rapid growth in the US has stoked worries among some analysts and regulators, who fear the way dealers hedge the contracts they sell could

exacerbate intraday stock market swings and increase market volatility. CBOE argued in a paper that the concerns were 'valid in theory' but in practice the 'risk is minimal because investors do not all tend to trade in the same direction.'

v. Executive at Eurex said rising global interest rates have fueled the boom in short-term options as markets were driven by uncertainty over how long global central banks will keep interest rates elevated as they try to stamp out inflation. Role of macroeconomic data like unemployment, CPI, factory output, anything that gives an indication of where central banks might either pause rate increases or increase rates has become super relevant to trading strategies and hedging portfolios.

III. Financial Times: "Nasdaq bets on boom in 'zero day' options with new contracts"

i. Trading in 0DTE is spreading to Treasury and commodity markets, as Nasdaq and other exchange groups try to replicate a boom that has transformed trading in US stock indices, a latest sign that exchange groups are confident that zero-day trading will become a longer-term trend across different assets.

ii. Investors are clamouring for a specified product that expires on the same day as the event itself when they are seeking to precisely control their exposure.

iii. Exchanges and market makers have pushed back against claims that zero-day trading could cause volatility and have disputed the popular image of it as a market dominated by retail gambling arguing that 0DTE service all type of investors. There are lots of use cases and all evidence points to risk profile being contained due to deep liquid ecosystem.

IV. Bloomberg: "Wall Street Quants Warm Up to Zero-Day Options Amid Trading Boom"

i. Almost all large Investment Banks have jumped on the bandwagon of 0DTE by either building new trades around them or using them as an alternative in existing strategies.

ii. The on-boarding by quants is the latest sign of acceptance for a breed of options that have boomed in the two years since their wider introduction. Part of it is simply down to the virtuous cycle of liquidity. As trading flourished, professional investors were bound to jump in. Now they're being offered bespoke strategies using 0DTEs for everything from low-cost bets on volatility to portfolio diversification.

iii. There is a view that, with ODTE, there is minimal risk of being caught out by unfavorable overnight market moves. Consider a trade that sells volatility on a monthly basis, making it vulnerable to big market swings over a relatively long period. 0DTEs let users short vol on a daily basis, at a proportionally smaller size. That way, it can achieve similar returns but with smaller ups and downs.

iv. The flurry of new products is expanding the list of use cases while potentially diluting concerns that 0DTEs' proliferation threatens market stability and risks reprising past disasters. CBOE argues that as trading flows spread out, the peril of a one-sided market is lessened.

v. Zero-day options emerged as products tailor-made for 2023's markets, their uptake driven by traders trying to navigate incessant volatility amid an uncertain economy and evolving central bank policy.

vi. The deep pool of liquidity has lured users of all kinds, from market makers that flock to zero-day options to balance books to exchange-traded funds that sell them for premium income. Now, evidence is building that model-driven shops are capitalizing on the craze, too.

V. Bloomberg: "Wall Street Brokers Are Coming for the Hot Retail-Options Trade"

i. Despite being blamed for fueling stock volatility and dismissed as the latest case of market speculation gone too far, Wall Street brokers are unleashing new strategies to ride the relentless boom in 0DTE options.

ii. As money managers of all stripes navigate a stock market swinging on new economic data one minute and the latest monetary-policy speculation the next, the securities industry is conjuring up ways to tap into institutional and retail demand for the 0DTE options.

iii. Due to its cheapness, interest in 0DTE options is increasing day by day among investors with many stories of profits 'when things play out in your favor'.

iv. While online brokers are known for zero commissions, most of them do charge a contract fee ranging from 50 cents to 65 cents. Based on S&P 500 0DTE volume of 330 million contracts last year, brokers likely generated almost $70 million in revenues, assuming retail accounts for 35% of the order flows and the contract fee is 60 cents.

v. The trading boom is raising questions whether the industry's risk-management infrastructure is equipped to monitor leveraged-up investors trading 0DTEs,

given losses can rack up in a volatile market without being detected right away.

The articles highlight important features related to 0DTEs like increased volatility fluctuations in underlying assets, limited timeframe to react, increased risk, concerns regarding lack of liquidity, the mismatch between speculative, impulsive decision-making and a well-thought-out trading strategy. Also, due to their recent popularity and short-term nature, models pricing Zero Day Options are work in progress.

2. DOES 0DTE OPTIONS TRADING INCREASE VOLATILITY?

The growth of 0DTE option trading, led by retail investors, has raised concerns about the impact of 0DTE options on market volatility, potentially leading to a reduction in market efficiency. Recently, evidence has starting to stack up that the craze for 0DTE is altering how underlying assets behave. The idea is that the surge in trading of these tools — essentially side bets — has become so big that it's affecting the broader market.

Brogaard, Han and Won (2023), in their recent paper, argues that: -

- An increase in 0DTE options trading results in higher market volatility. This finding is consistent with the view that more uninformed or speculative options trading can increase the volatility of the underlying assets by transmitting additional noises in the market.
- The higher volatility could arise either when the market quickly incorporates information or when the market captures more noise. The authors hypothesize that 0DTE options trading is harmful to the price efficiency of the market. This is because if the increased volatility stems from an investor's noise trading or speculative trading behavior, it induces greater noise into the price, potentially destabilizing the price efficiency of the market.
- Because of 0DTE options' speculative trading characteristics, such as no overnight risk and a quick profit or loss realization, noise traders or speculative investors favor 0DTE options trading, and it drives more pronounced results than other short-term expiration options. The authors find that the impact of 0DTE options trading on market volatility is stronger and more significant than that of other short-term expiration options.
- Based on their findings, the authors concluded that a one standard-deviation increase in the traded volume of 0DTE options led to a jump of almost 14% in the S&P 500's daily volatility.

These results add a new twist to an intense Wall Street debate over whether uptake of the options has the potential to destabilize the $44 trillion American equity landscape. Bloomberg News mentions analysts such as JPMorgan quant guru Marko Kolanovic warning that their popularity risks reprising past disasters such as the '2018 Volmageddon episode' (the February 2018 spike in volatility that wiped out short

volatility strategies), while others see just another example of doomsayers stirring up fear over the latest market evolution.

Among those with contrarian views are strategists at Bank of America. According to them:-

- Investor positioning in hot derivative-powered trades — like S&P 500 contracts that expire within 24 hours — looks less threatening to the wider marketplace compared with the mania that led up to the 2018 volatility rout.
- Given short-term options are used in so many different strategies, if one investing style were to falter, the shock to the broader equity market would likely be manageable.
- The rise of 0DTE options since mid-2022 has been often blamed for amplifying moves in underlying assets. By BofA's estimate, such contracts now make up 40% to 45% of the index's daily trading volume on average, up from 21% in 2021.
- In Kolanovic's view, the risk involves options dealers, who take the other side of trades and must buy and sell stocks to keep a market-neutral stance. On a big down day, such intraday selling would reach $30 billion, his model showed.
- BofA disagrees. The extreme investor positioning emboldened the 2018 "Volmageddon" episode, where everyone was betting on a decline in volatility that left the market vulnerable to a violent reversal. Back then, the main culprits were exchange-traded products designed to pay investors the inverse of equity volatility. Right now, the ingredients for a market shock, such as extremely one-sided positioning, are largely absent.
- They tracked order flows over the day and found that traders tend to buy options in the morning and dump them in the afternoon. The pattern applies to bullish and bearish contacts alike, again suggesting it's not a one-way market. Whether it's calls or puts, owning S&P 500 options during one-hour intraday intervals would have made money, according to the bank's study. That's adding an incentive for investors to place wagers in both directions, as opposed to leaning one way that potentially exposes the market to trauma.

On September 8, 2023 CBOE, in a post titled 'Volatility Insights: Much Ado About 0DTEs - Evaluating the Market Impact of SPX 0DTE Options', concluded that despite the huge notional volume that is being traded in SPX 0DTE options on a daily basis, actual net exposure for

market makers is fairly minimal, with average net gamma ranging from 0.04% to 0.17% of the daily S&P futures liquidity. There is also no discernible market impact from 0DTE option trading, with SPX index intraday volatility and price patterns in line with historical averages. This is largely due to the balanced nature of 0DTE trading, with both institutional and retail investors finding a diverse range of use cases for the product.

The salient features of the post are: -

- Trading 0DTEs 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).

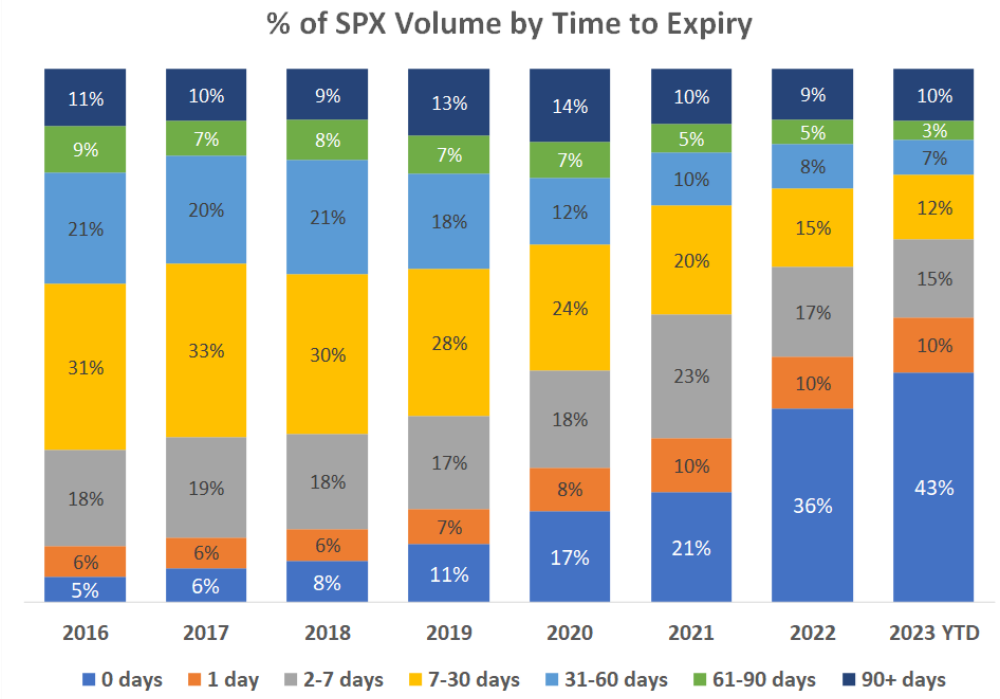


Exhibit 1: Zero-Day Options Have Become More Popular [Source: CBOE]

- 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" may be exerting undue influence on the market.

  (Gamma refers to the change in the option delta as the underlying asset price changes. In the context of market makers delta-hedging their options positions, gamma is how much they will need to adjust their delta hedge as the underlying moves around. In this case, how much they will have to buy or sell in S&P futures in response to a 1% move in the SPX index)

- Over the past year, commentators have blamed 0DTEs 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.

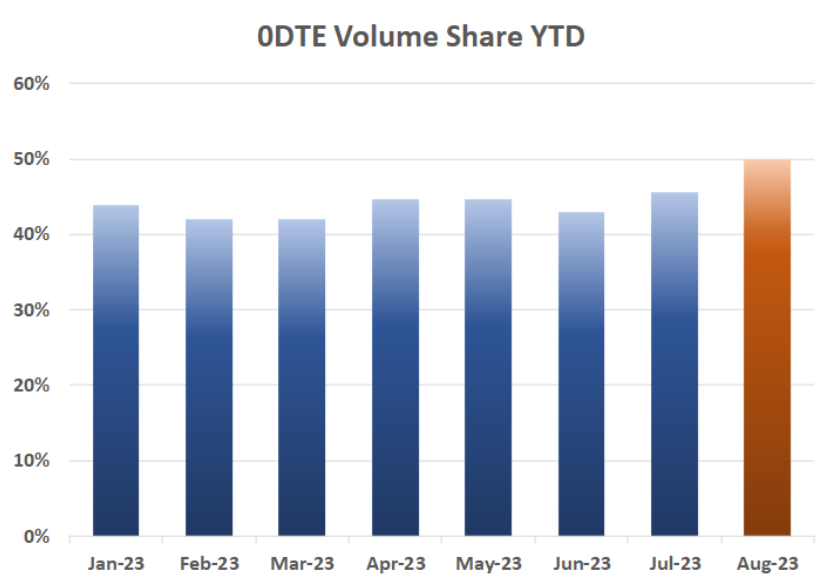


Exhibit 2: 0DTE Made Up 50% of SPX Option Volumes in August 2023 [Source: CBOE]

- When it comes to market maker net gamma positioning, there are two aspects to consider. The first is the magnitude - the greater the number, the greater the potential market impact of the option hedging activity. The second is the sign. Being long gamma means that market makers would be hedging in the opposite direction of the market move – if SPX index rallies, market makers have to sell futures, and if SPX index falls, market makers have to buy – and thus the hedging activity has the potential to dampen market moves. Being short gamma means market makers would be hedging in the same direction of the market move – if SPX index rallies, market makers have to buy more futures, and if it falls, market makers have to sell – and thus have the potential to exacerbate market moves.
- Most of the concern around SPX 0DTE options arise because of their massive volume - averaging over 1.23m contracts ($500bn notional) a day in 2023. While the numbers are big, CBOE emphasizes 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.

- Pointing to market maker positioning by tracking their net position (long minus short) at each strike, CBOE's customer flow data shows that the flow is remarkably balanced between buy vs. sell.
- Unlike the meme stock craze during the pandemic era, CBOE does not see customers trading 0DTE options predominantly for speculative purposes and thus leaving market makers short a lot of gamma. Nor is the product overrun by option sellers.
- While the net gamma range grows wider as the day progresses, there is no evidence that market maker positioning grows to be outsized relative to other market participants.
- Another way to gauge the potential market impact of 0DTE 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. As seen from chart in Exhibit 3, the answer is no. The difference between S&P close-to-close realized volatility versus intraday realized volatility is currently right in line with historical averages.

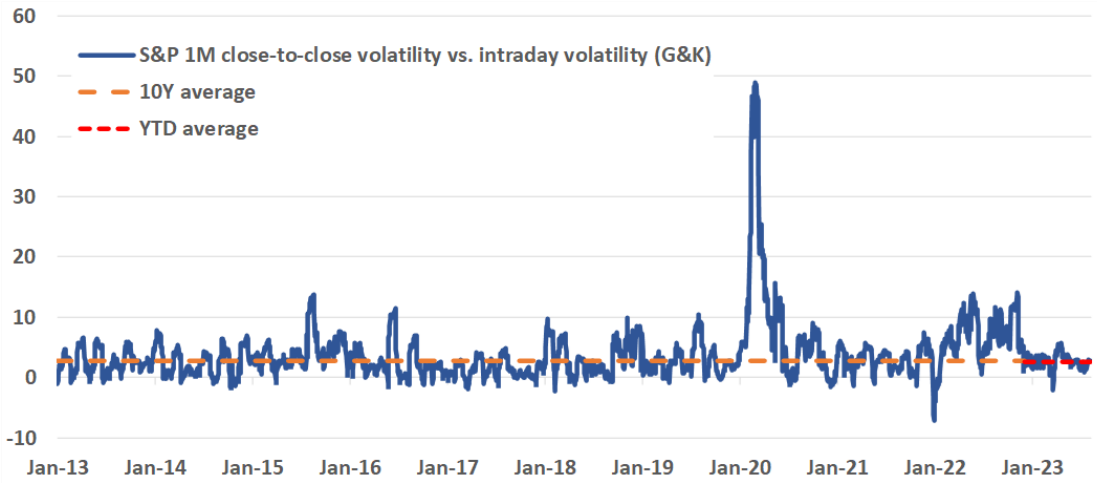


Exhibit 3: S&P "close-to-close" volatility vs. intraday volatility (1M)

3. VIX1D INDEX

Cboe Global Markets, Inc. (CBOE), the world's leading derivatives and securities exchange network, launched Cboe 1-Day Volatility Index (VIX1D) on 24th April 2023. The VIX1D Index has been designed to account for the compressed measurement of expected volatility over a single day and differs from the VIX Index in ways to account for this. It was launched as a way of distilling the price impact of a trading boom in 0DTE options (introduced partly in response to the swift migration to short-dated options contracts — activity that is not captured by its older counterparts).

Its working has confused some traders. Reviewed in June 2023, the highlights include: -

- The index behaving in a decidedly un-volatile way. Like clockwork every day since its creation in late April, the Cboe One-Day Volatility Index has opened lower, dropping 3.2 points on average from its previous close.
- Its constant pattern of falling at the open over the past 32 sessions is raising questions over its efficacy as a sentiment indicator. One theory is of the view that this is happening because of the peculiar way of how the VIX1D is calculated — specifically, that the particularly fleeting options underlying it lose significant value due to the time difference between the close and open of trading.
- Veterans insist that VIX1D is not to be watched all day, just where it closes. The closing levels of the VIX1D are a meaningful indicator of the price of one-day SPX options, which have become one of the most heavily traded areas of the derivatives market.
- One input in the calculation of options-derived volatility indexes is time decay. For VIX, the math on pricing is based on the amount of time left — on the clock, regardless of whether exchanges are open or closed — until expiration. The methodology for VIX1D is different. It only includes business time. The issue is, when a trading session starts, the calculation doesn't recognize that no business time has passed since the previous close. Instead, unless something major happens overnight, options contracts expiring that afternoon typically get marked down right away simply because they're less valuable when maturity is closer. And that feeds into an instant drop in the one-day VIX.
- Around the market's open, the calculation is derived from contracts mostly maturing in that session. And as the day goes on, its pricing tilts toward derivatives expiring over the next 24 hours. As a result, the range of strikes in contracts that still have value is

smaller at 9:30 a.m. than at 4 p.m. That's another factor behind the VIX1D's tendency to fall at the open.

- The exchange deliberately chose a different time element for the one-day gauge because it's intended to capture activity in a period where 0DTE trading is most intense.

Research into its efficacy and biases is still a work in progress. Nonetheless, the VIX1D Index has the potential to provide useful information to investors tracing near-term event risk, investor sentiment and SPXW options prices.

4. PRICING 0DTES OPTIONS

Models pricing 0DTE options are still in their nascent stages of development. Two recent research papers shed some light on this issue: -

I. Bandi, Fusari and Renò (2023): -

- Their objective was to value 0DTEs, a process which is important for the buy side in order to understand fair values, for the sell side to hedge risks and for regulators to assess systemic implications.
- They presented novel closed-form pricing formulae that accurately capture the 0DTE implied-volatility surface.
- The authors argued that tilting the conditional distribution of the return process over short horizons is central to the effective pricing (and hedging) of 0DTEs. They achieve tilting by invoking local Edgeworth-like expansions around the Gaussian distribution. The expansions add - locally - skewness (through continuous leverage) and kurtosis (through, e.g., the volatilityof-volatility), the contribution to skewness and kurtosis delivered by volatility jumps being empirically unimportant. The end result is accurate replication of both the implied volatility skew and convexity at-the-money, near at-the-money and beyond.
- The proposed valuation method is of independent interest because it is based on local expansions of the characteristic function of the price process, and - in fact - generally applicable to the pricing of any financial instrument with short-tenor payoffs.

II. Almeida, Freire and Hizmeri (2024): -

- The authors explored the asset pricing implications of the new 0DTE option market. These options contain valuable information about investors' risk preferences and risk premia over the intra-daily horizons for which the options expire. The authors extract this information from different perspectives and document a number of new stylized facts.
- Most of the equity premium arises as compensation for market returns between -5% and 0%, where positive returns contribute negatively to the equity premium.
- The average returns of calls, puts and different option strategies that are long in volatility are highly negative, which is consistent with the high variance risk premium we document over the day. Surprisingly, the total intraday variance risk premium is mainly attributed to the compensation for bearing positive return variation risk.

- Direct estimates of the pricing kernel projection onto market returns reveal pronounced nonmonotonicities, especially around the at-the-money region
- 0DTE options present severe violations of stochastic dominance bounds, and thus can be seen as mispriced in the sense that they do not reflect the risks implied by the time series of intra-day market returns under risk-averse preferences
- The variance risk premium negatively predicts market returns over the day, which is mainly driven by the negative relation between future returns and the compensation for variation risk in positive market returns.

5. RETAIL TRADERS LOVE 0DTE OPTIONS... BUT SHOULD THEY?

According to the Financial Industry Regulatory Authority (FINRA), between January 2022 and 2023, the number of opening 0DTE options positions increased approximately 60%, and for retail customers, the number of opening 0DTE options positions during the same period jumped a bit higher—approximately 75%.

So, why would a trader consider an option with a short life span? Here are some possible reasons as observed:

- 0DTEs expire just after the market close, limiting overnight market risk.
- 0DTE options are potentially less expensive compared to options with more days to expiration, or DTE (premiums can be in cents for 0DTEs versus dollars for longer-DTE options). They have a low cost of entry, as the premiums are typically cheap due to the short time value.
- The 0DTE market tends to exhibit little difference between the bid and ask price of each option—also known as a tight spread. Tight spreads can help limit trading costs in 0DTE options.
- They offer a high leverage effect, meaning that a small amount of money can control a large amount of exposure to the underlying asset. One of the distinctive advantages of 0DTE options lies in the sphere of capital efficiency. With an exceptionally short duration, these options enable traders to earmark a diminutive proportion of their capital, contrasting markedly with the demands of conventional options.
- They allow traders to capitalize on intraday price movements and volatility spikes, which can be driven by news events, earnings reports, or market sentiment. One of the biggest draws of Zero-Day Options trading is the ability to leverage swift market movements in virtually any direction. With careful strategy and timing, astute traders can take advantage of even the smallest fluctuations, turning them into considerable profit margins. Another compelling aspect of Zero-Day Options trade is its potential for significant returns. In many cases, the return on investment can be far greater than that of traditional stock trading, making it an enticing venture for potential investors.
- They provide flexibility and variety, as traders can choose from different strike prices and strategies, such as buying calls or puts, selling covered or naked options, or creating spreads or combinations.

- Trading Zero-Day Options is not without its risks, but it does offer enhanced risk management capabilities in comparison to other investment channels. Knowing your maximum potential loss upfront allows for comprehensive risk management strategies. While Zero-Day Options trading does involve a degree of risk, this is often overshadowed by the significant potential for profitability. With the right strategies and enough persistence, traders can optimize their profits through well-timed transactions.
- Time decay, colloquially referred to as theta, represents an essential element within the realm of option greeks. This element plays a pivotal role in determining the pricing of options. Legacy options typically see a decrease in value as the passage of time takes its toll. However, this impact of time decay is substantially mitigated in the case of zero-days-to-expiration options.

Another view is that retail investors exhibit a marked inclination towards high-risk assets that resemble lottery tickets, and they have discovered an ideal asset class to meet this need in the form of options that expire on the same day, known as 0DTE options. These options now account for over 75% of all S&P 500 option trades initiated by retail investors. Platforms like Reddit and other online sites advocate the use of 0DTE options as an uncomplicated strategy for realizing rapid gains.

Beckmeyer, Branger and Gayda (2023) argue that 0DTE options are on average not a lucrative investment vehicle for retail traders. The authors concluded that: -

- The recent surge in retail options trading has been facilitated by exchange-related developments advocated by the CBOE and affiliated special interest groups to attract more retail interest in S&P 500 index options.
- The authors confirmed that CBOE's proposals have led to lower effective spreads for retail investors and showed that the associated benefits only partially offset the high risks inherent in 0DTE options positions, which many retailers favor over options with longer maturities.
- Since the introduction of daily expirations, retail investors have incurred significant losses on their 0DTE trades, which amount to $350,000 per day, or a total of more than $125 million, a conservative estimate as the authors disregarded potential commissions paid to brokers, as well as regulatory and clearing fees.

- Retail investors on average lose on single option positions, as well as on multi-leg positions that are designed to limit the required margin to be posted, or allow for a dedicated bet on the volatility of the underlying index. At the same time, it is shown that the bulk of multi-leg option trades are indeed profitable, and overshadowed by a few but very significant outliers.

It's essential for retail investors to carefully consider the risks involved and ensure they have the knowledge, experience, and risk management skills necessary to navigate this complex and volatile market effectively.

6. TRADING MECHANICS OF ZERO-DAY OPTIONS

6.1 How do 0DTE options work?

Zero-days-to-expiration (0DTE) options have a unique mechanics set that differentiates them from traditional options. These options are traded and settled within the same day, allowing traders to capitalize on short-term market movements.

The concept of expiration plays a crucial role in the value and trading strategy of 0DTE options. Given their short lifespan, these options are highly time-sensitive and can experience rapid changes in value as the expiration time approaches.

When trading 0DTE options, it is important to understand that the underlying asset's price movements heavily influence its value. As expiration nears, the sensitivity of these options to market fluctuations increases significantly. This high-risk, high-reward nature makes them appealing to traders seeking immediate results.

Settlement of 0DTE options typically occurs at the end of the trading day, where the options are either exercised or expire worthless. It is essential to closely monitor the market and make timely decisions when trading these options due to their limited time frame.

6.2 What happens if the option isn't exercised before it expires?

Option buyers are not bound to fulfill the contract. If it is not acted upon by the specified date, the option simply expires. In this case, the buyer would walk away empty-handed and lose whatever sum was paid to the writer (the premium) for the opportunity presented.

6.3 Are Zero Days to Expiration (0DTE) Options Profitable?

Selling and buying options at zero days to expiration can be extremely lucrative or costly. The stakes are high at this late stage, and a lot can happen in a day.

There are mixed opinions about this type of investment strategy. When buying an option on the last day before expiry, there's lots of pressure for the predicted move to happen fast. 0DTE options should be reserved for high-conviction trades only and be hedged accordingly just in case things don't go according to plan.

For option writers, 0DTE trading is generally much more popular. There are many people out there who swear by this strategy, claiming that it's possible to make potentially large profits without taking on much risk by selling options that expire within a day.

7. POPULAR STRATEGIES USED BY 0DTE OPTION TRADERS

Success in trading zero expiry options hinges heavily on the effective identification of the underlying asset. The fluctuating intraday dynamics of an asset, noted for its volatility, should be the cornerstone of your selection process. Stocks, indices, and exchange-traded funds (ETFs) often feature dominantly among coveted choices.

To successfully trade zero days to expiration (0DTE) options, a comprehensive risk management strategy and a firm grasp of prevailing market sentiment are imperative.

To mitigate potential losses and optimize profits, a trader should actively manage their 0DTE options. This requires maintaining a clear focus on both potential profit margins and impending loss thresholds. By implementing controlled measures and constant monitoring, a trader can successfully trade in the options market.

The most popular strategy used by 0DTE option traders is to sell an iron butterfly or iron condor, according to Option Alpha.

Lots of traders try to take advantage of the last day of action. Their goal is to collect premium, and they have the edge of time being on their side and the ability to set the strike price.

The strategy here is to open the position in the morning, hold it until the desired premium has been collected, and then either repurchase the option for a lower price before the end of the day or let it expire. If all goes to plan, the trader makes a quick profit.

7.1 Some Trading Strategies used in 0DTE Options

- **Premium Decay**

  When purchasing an option, you pay the person selling it (the other party in the trade) for the privilege of giving you the right to buy the underlying asset at the specified strike price. That payment or charge is known as the premium. Usually, options which are more likely to be exercised command higher premiums. That means that those “in the money” are more expensive than those “out of the money.”

It also generally means that the cost of an option steadily decays as it moves closer to the expiration date and rapidly decays on the last day.

- **0DTE Options and Theta Decay, the importance of timing in Trading Zero-day Options**

  The relationship between zero-days-to-expiration (0DTE) options and theta decay is crucial for traders engaging in this strategy. Theta decay refers to the rate at which the value of an option decreases over time, particularly as it approaches its expiration date. In the case of 0DTE options with a concise time frame, theta decay becomes a critical factor to consider.

  Traders utilizing 0DTE options must be aware of theta decay, which can greatly impact their positions. As these options have no time value left on the expiration day, their value is solely determined by the intrinsic value based on the stock price. This means that any decline in the stock price can result in rapid losses, amplifying the risk associated with this trading strategy.

  However, traders can also use theta decay to their advantage. By correctly predicting short-term price movements and executing timely trades, they can benefit from the accelerated decay of extrinsic value as the option nears expiration. This allows them to potentially profit from quick price fluctuations and make gains within a single trading day.

0DTE option traders typically opt for tickers with high daily volume and more frequent expiration cycles. Classic examples include ETFs that track the S&P 500, the Nasdaq 100, or the Russell 2000.

Stop-loss orders should be used to prevent catastrophic losses.

7.2 What are the risks and challenges of trading 0DTE options?

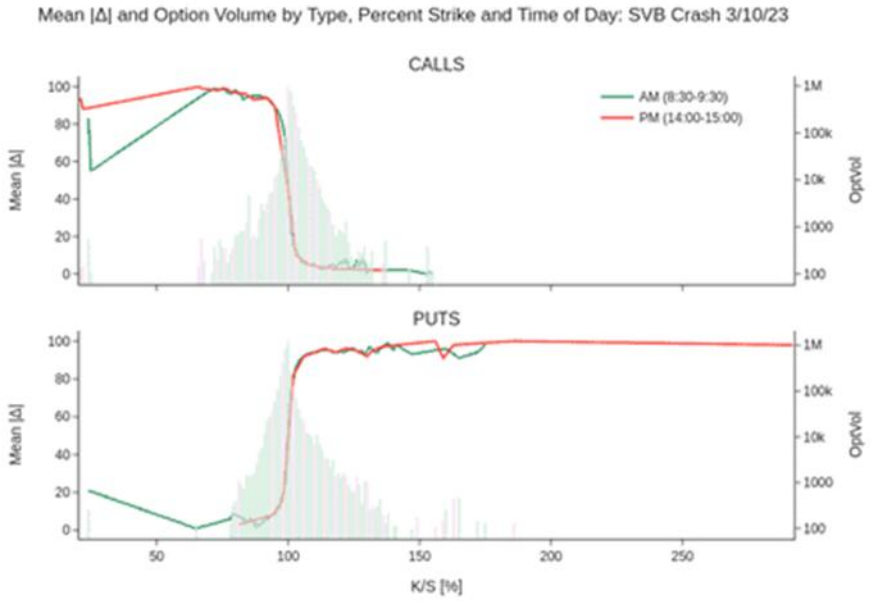
While 0DTE options can offer potentially high returns in a brief time span, they also come with significant risks and challenges that traders need to be aware of:

- The extremely low probability of success, as the underlying asset needs to move in the desired direction by a large enough magnitude within a narrow time. Otherwise, the option will expire worthless, and the buyer will lose the entire premium paid.
- 0DTE options expose traders to unlimited losses if they sell options without owning the underlying asset or another offsetting option, as the seller has an obligation to

deliver or buy the underlying asset at the strike price if the buyer exercises the option. Opting for zero-day expiry options poses a significant liquidity risk. As the expiration date approaches, trading volume often declines, which can potentially lead to difficulty in buying or selling these options.

- They require constant monitoring and quick, real-time decision-making, as the price and value of 0DTE options can change rapidly and unpredictably throughout the day. One of the notorious risks associated with zero-day options is the increased susceptibility to extreme price movements. These drastic swings, both up and down, can lead to significant losses for uninformed investors.
- In embracing a zero-day options trading tactic, it's crucial to assess your risk tolerance. This process requires an in-depth understanding of potentially divergent outcomes, thus emphasizing the importance of evaluating all aspects prior to moving forward with your 0DTE options trading plan. This form of financial dealings demands a clear comprehension of risk acceptance level and the understanding of how varied outcomes might materialize, based on your predetermined asset and strike price. Remember that every action taken should be underpinned by judicious assessment and strategic planning.
- Another considerable risk tied to these options is what's termed as "gamma risk". This refers to the risk that comes with the highest rate of change in option's delta, which is most pronounced as the expiration date approaches.
- The time decay phenomenon becomes notably accelerated in the final hours of an options contract. This decay, which denotes the reduction in the value of an option over time, can significantly lessen the potential profits from a zero-day expiry option.

These factors can influence the pricing and availability of 0DTE options, making them more difficult to trade profitably. To illustrate these observations, Spiderrock plotted the average Delta per strike moneyness profile (approximately the probability that the option will expire profitably) together with traded option volume grouped by calls and puts at the start and end of the trading session using historical option data:



[Image sourced from Spiderrock]

The binary shape of the Delta Greek clustered either around zero or one, indicating that options lost most of their time value except some lower strike regions (OTM puts and ITM calls) where certain names (some ETFs including KRE containing the regional banks and other names) where the options have unexpected time value left. In the opening hour, there is also a significant volume of speculative calls (with a percent strike greater than 120%) and protective or "fear" expressing puts (percent strike between 80% and 90%) trading.

7.3 Viability of 0DTE for Long Term Investments

The concept of Zero Days to Expiration (0DTE) options is typically associated with a concise dealing timeline; they usually cater to traders who harbor short-term objectives and prefer dealing in swift, quick-moving markets. Their function, which hinges on a short lifeline, is quite contrary to a long-term investment approach as these options reach their expiration within the same trading day they are bought or inked.

8. REGULATORY CONCERNS

Recently, an article published in Financial Times titled “Boom in zero-day options draws regulatory attention”, highlighted the observations made by US Derivatives Regulator. The main points raised are: -

- The US derivatives regulator, the Commodity Futures Trading Commission (CFTC), is investigating the impact of extremely short-dated options contracts on market volatility, following concerns raised by analysts.
- Zero-day options contracts, which expire on the same day they are purchased, have become increasingly popular, particularly since the onset of the coronavirus pandemic, with about 45% of S&P 500 options volume attributed to single-day options.
- Proponents argue that zero-day options provide investors with the flexibility to make targeted bets or hedge risks around specific events, such as economic data releases or central bank meetings. However, analysts have cautioned that the proliferation of these contracts may be exacerbating market volatility.
- The CFTC is internally assessing the participants in the zero-day options market, potential risks, and systemic issues. Transparency regarding market participants is seen as crucial for market integrity.
- While the flexibility of short-term options has been favoured by investors amid market volatility, regulatory attention has increased following comparisons to the 2018 options market disruption known as "Volmageddon".
- Reports from JPMorgan suggested that a buildup of one-way bets on volatility-linked products could lead to significant market declines, with the unwinding of zero-day options bets potentially magnifying downturns.
- Most zero-day trading focuses on contracts tied to the S&P 500 and is facilitated by CBOE Global Markets, the largest options exchange globally. The exchange has defended its contracts, stating that they are traded by a diverse range of investors and often involve hedging strategies.
- Some market participants argue that concerns about zero-day options are based on misunderstandings and that increased trading volume provides liquidity, reducing market risk. Regulatory discussions are ongoing, with a focus on understanding the issue rather than immediate regulatory action.

9. MARKET DYNAMICS

How are 0DTE options changing the market dynamics?

The growing popularity of 0DTE options among retail traders has been impacting the overall market dynamics and behavior. Some of the effects include:

- Increasing volatility and volume in both the options and stock markets, especially during the last hour of trading when most 0DTE options expire. This can create feedback loops and self-fulfilling prophecies as traders react to price movements and try to close their positions before expiration.
- Creating arbitrage opportunities and hedging pressures for institutional investors and market makers, who can exploit price discrepancies and imbalances between different markets and instruments. For example, some hedge funds have been using 0DTE options to bet on large moves in individual stocks or sectors ahead of earnings announcements or other catalysts.
- Challenging traditional valuation models and assumptions, as 0DTE options introduce new sources of uncertainty and noise into the market. For example, some analysts have argued that 0DTE options have distorted the implied volatility surface and skew of certain indices or stocks, making them appear more expensive or cheap than they really are.

10. IMPLICATIONS FOR BUSINESS AND ECONOMY.

Trading Activity in 0DTE Options

The traded activity in these options increased significantly in the last year. Given below are the top 10 names traded on the day of the Silicon Valley Bank crash (3/10/23), grouped by option type and overlaid with a relatively conservative proxy of the retail option volume component (the Green line-symbol trace) based on the internalized and small options trades executed electronically:

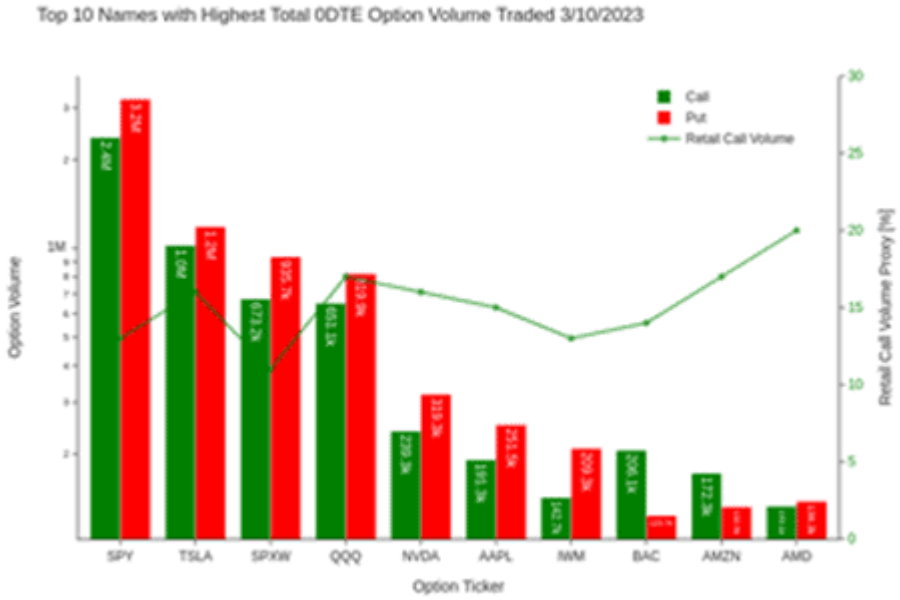


Image Source: Spider Rock

Even if data reflects only one day, some of the trends recognized are typical in the current environment. There was bullish sentiment among traders for some of the names that belong to the "meme" subset (TSLA, BAC, AMZN, AMD) that are correlated with a higher contribution of the retail traders. Overall, the 0DTE option trading volume is dominated by the index options (SPY, SPXW, QQQ) and TSLA. Although the institutional traders and market makers are responsible for most of the trading volume, the retail traders have a strong contribution of up to 20% of the volume in the "behavioral" names (BAC, AMZN, AMD) that are most frequently mentioned in the Reddit groups.

By midyear 2023, zero-days-to-expiration (0DTE) options strategies had grown to more than 40% of all options trades tied to the S&P 500 index (SPX), according to a midyear report by

Bloomberg. That explosive growth came less than a year after daily expiration trading began in the SPX and other major indexes. However, 0DTE trading has drawn scrutiny from some who believe it's making underlying assets and markets in general more volatile.

0DTE options trading has entered the mainstream in recent years and is a popular premium collecting strategy.

CBOE, the world's largest options exchange, introduced weekly SPX options that expire on Fridays in 2005. In 2016, the exchange listed SPX weeklies that expire on Wednesdays. By 2022, CBOE had introduced weekly options with expirations on every trading day of the week. Now, qualified option traders can trade 0DTE SPX options (and options on a handful of ETFs that track the major indexes) every market day.

11.CONCLUSION

While Zero Day Options (0DTE) present both opportunities and challenges, a balanced approach is essential to ensure the integrity and stability of financial markets. Allowing trade in 0DTE options while closely monitoring increased volatility, risk management practices, and exchange-related concerns such as margin requirements is crucial. As the popularity of 0DTE options grows, the involvement of institutional investors is expected to increase, leading to further research and development in this field, including advancements in pricing models and risk assessment methodologies. By maintaining a vigilant stance on market dynamics and fostering transparency and accountability among market participants, regulators can facilitate the responsible expansion of 0DTE options trading, harnessing their potential benefits while mitigating associated risks. Ultimately, a well-regulated and informed marketplace for 0DTE options can contribute to the efficiency and resilience of the broader financial ecosystem.

REFERENCES: -

- Bloomberg – "What Are Zero-Day Stock Options? Why Do They Matter?" (2023, February 25). https://www.bloomberg.com/news/articles/2023-02-25/what-are-zero-day-stock-options-why-do-they-matter-quicktake
- Asgari, N., & Megaw, N. (2023, August 23). Europe poised for arrival of 'zero-day' options. Financial Times. https://www.ft.com/content/03aff5ea-b6ff-4494-83e4-b3862887f399
- Megaw, N. (2023, November 26). Nasdaq bets on boom in 'zero day' options with new contracts. Financial Times. https://www.ft.com/content/a0d3b763-44c1-497b-b1e4-70d0b8def87d
- Bloomberg – "Wall Street Quants Warm Up to Zero-Day Options Amid Trading Boom" (2023b, December 27). https://www.bloomberg.com/news/articles/2023-12-27/wall-street-quants-warm-up-to-zero-day-options-amid-trading-boom
- Bloomberg – "Wall Street Brokers Are Coming for the Hot Retail-Options Trade" (2024, February 21). https://www.bloomberg.com/news/articles/2024-02-21/zero-day-options-boom-is-catching-attention-of-wall-street-brokers
- Bloomberg "Zero-Day Options Are Reordering the Way the Stock Market Behaves" (2023b, May 18). https://www.bloomberg.com/news/articles/2023-05-18/zero-day-options-are-reordering-the-way-the-stock-market-behaves
- Brogaard, J., Han, J., & Won, P. Y. (2023). How does zero-day-to-expiry options Trading affect the volatility of underlying assets?. Available at SSRN 4426358.
- Bloomberg "Bank of America Says Options-Driven 'Volmageddon 2.0' Warning Is Overblown" (2023a, February 22). https://www.bloomberg.com/news/articles/2023-02-22/bofa-says-options-driven-volmageddon-2-0-warning-is-overblown
- Volatility Insights: Much AdO about 0DTEs - Evaluating the market Impact of SPX 0DTE Options. (n.d.). https://www.cboe.com/insights/posts/volatility-insights-evaluating-the-market-impact-of-spx-0-dte-options/
- Bloomberg "Wall Street's New Fear Gauge Is Trading in Curiously Stable Way" (2023d, June 7). https://www.bloomberg.com/news/articles/2023-06-07/wall-street-s-new-fear-gauge-is-trading-in-curiously-stable-way
- What the VIX and VIX1D indices attempt to measure and how they differ. (n.d.). https://www.cboe.com/insights/posts/what-the-vix-and-vix-1-d-indices-attempt-to-measure-and-how-they-differ/

- Bandi, Federico M. and Fusari, Nicola and Renò, Roberto, 0DTE Option Pricing (July 7, 2023). ESSEC Business School Research Paper No. 2023-03, Available at SSRN: https://ssrn.com/abstract=4503344
- Almeida, C., Freire, G., & Hizmeri, R. (2024). 0DTE Asset Pricing. Available at SSRN.
- Beckmeyer, H., Branger, N., & Gayda, L. (2023). Retail Traders Love 0DTE Options... But Should They?
- Investor.gov, U.S. Securities and Exchange Commission. "Investor Bulletin: An Introduction to Options."
- Option Alpha. "0DTE Options Strategies: Insights from 25k Trades."
- Investor.gov, U.S. Securities and Exchange Commission. "Investor Bulletin: Stop, Stop-Limit, and Trailing Stop Orders."
- https://www.spiderrock.net/an-explosive-combo-zero-day-options-and-retail-traders
- https://www.religareonline.com/knowledge-centre/futures-options-trading/zero-days-to-expiration-options/
- https://medium.com/coinunited-io/unraveling-the-secrets-of-0dte-options-your-comprehensive-guide-to-zero-day-trading-0eb5b7f9bf86
- Boom in 'zero day' options draws regulatory attention. (n.d.). Financial Times. https://www.ft.com/content/a80f8b2c-a68a-4dfb-8054-116c30edfae9