Cboe®

THE RISE OF SPX® & 0DTE OPTIONS

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Introduction

U.S. options markets have seen significant growth in trading over the last few years, with volume in 2023 on pace to be a record for the fourth year in a row. Multiple catalysts such as retail brokers waiving commission charges, a significant increase in retail investor prowess and a desire for managing portfolio risk after COVID-19 have fueled strong volume growth in the listed options space over the last few years. Since the initial growth seen from COVID-19 and the meme-stock boom, some of the largest growth has been in index options, particularly in options that are expiring on the same day they are traded (0-days to expiry or 0DTE). The S&P 500, ticker: SPX, is the most popular index in terms of options volume. In the first half of 2023[1], average daily volume (ADV) in SPX options reached 2.76MM contracts. 1.19MM of those are SPX 0DTE options. While only accounting for approximately 6% of total options volume traded daily, SPX options represent approximately 33% of total dollars in premium traded[2], and over 50% of notional exposure traded[3].

SPX index options offer investors a wide variety of benefits over ETF options and single name equity options. These benefits include European style settlement – which have no risk of an early exercise, cash settlement – meaning in-the-money options settle in cash, as opposed to the physically settled ETF/stock shares, and the potential for favorable tax treatment.

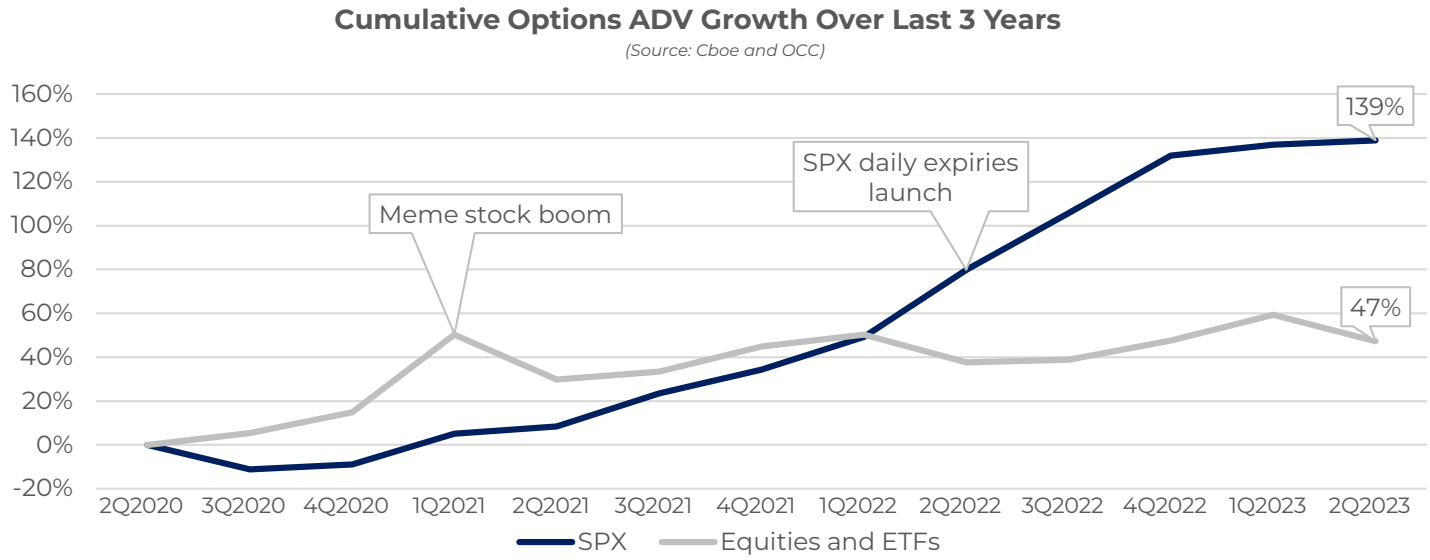
With the massive increase in SPX volume, particularly 0DTE, there have been concerns around market risk associated with this growth. This report will look at trends in both overall and short-dated SPX options trading, including overall volume growth, SPX volume and open interest, the history of SPX 0DTE, typical uses of 0DTE options, quote quality in SPX, costs to trade SPX, the benefits of shorter dated options and addressing some concerns related to the recent 0DTE boom.

Total Options Volume vs SPX Options Volume

From 2000 to 2019, total U.S. listed options OCC[4] volume increased at an annualized rate of 11%. From 2019 to 2023, the industry has been growing at 24% annually. The initial tailwind was retail brokerage platforms eliminating commissions on options trades beginning October 2019. Initially, options volume growth was the largest in options on single name equities as investors took a liking to stocks such as Tesla, GameStop, and AMC. Since late 2021, several types of investors have shifted their preference away from single stock options to broad based index options such as SPX. Growth in SPX options is more than double that of the rest of the options market since 2020, with a substantial portion of that growth coming from 0DTE trading.

1 All data in this report is as of June 30th, 2023
2 Total amount of money paid (or received) for buying (selling) options
3 Index spot value * one hundred
4 Options Clearing Corporation

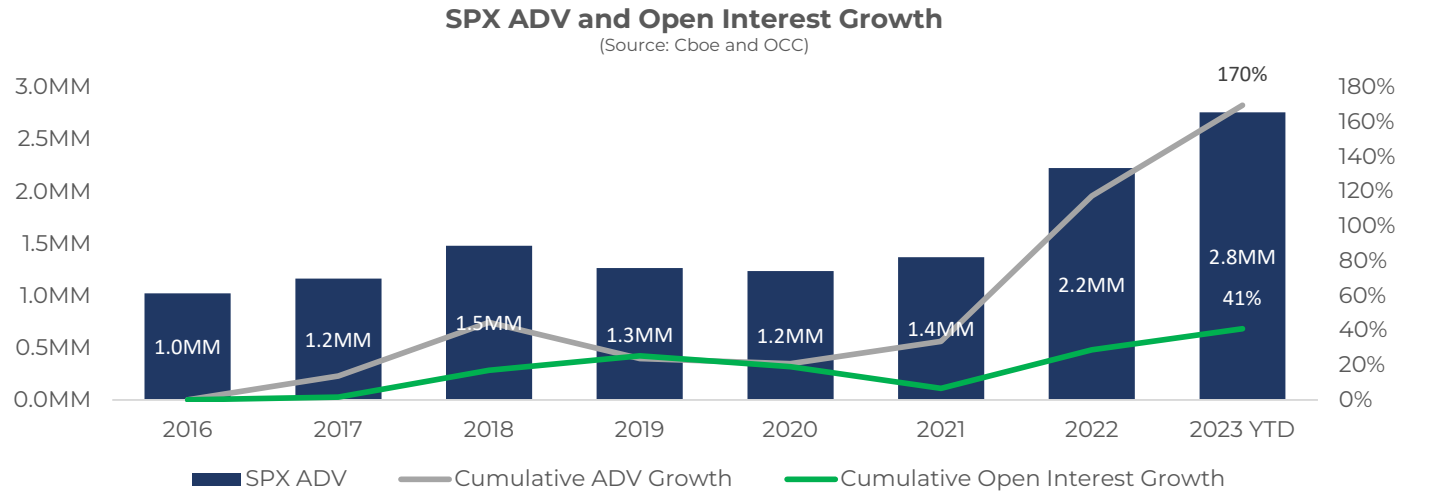
CHART 1: SPX ADV Growth Outpaces Equities & ETF Options
ADV Growth 3x Since 2Q 2020



SPX Volume and Open Interest

As seen below in chart 2, SPX average daily volume is up 170% vs 2016, and SPX open interest is up 41% over that same period. While both are up quite substantially as trading in all expiries across the SPX complex has increased, 0DTE has increased the most. Open interest is calculated at the end of the day by adding all contracts that were opened (and have not expired yet) and subtracting all contracts that were closed (and have not expired yet). Given the nature of open interest being calculated at the end of the day, options that are traded 0DTE never hit the open interest number – which describes the significant difference between ADV and open interest growth.

CHART 2: SPX ADV and Open Interest Are Up 170% and 41% from 2016



History of 0DTE SPX Volume

While options volume across the entire SPX term structure has been increasing, 0DTE has far outpaced the growth seen in all other expiry terms. Looking at total SPX options volume, 0DTE represents 43% of the pie in 2023 year to date. Since the introduction of weekly Friday options in 2005, average options duration had been trending shorter than it did historically. In the second half of 2016, increased customer demand for shorter dated options led to the listing of Monday and Wednesday expiries. In 2017, 0DTE represented 6% of total volume versus 5% in the year prior as more customers took advantage of the new expiries.

From 2017 to 2021, 0DTE grew to 21% as the shorter dated options trend started becoming popular among investors as it offered a better return on capital, the ability to reposition more frequently, and the ability to hedge event risk more accurately (such as an FOMC announcement). 2021 was the last full year that SPX did not have Tuesday or Thursday expiries. Since listing Tuesday and Thursday expiries in 2022, that percentage has grown to 43% in 2023. The hypergrowth seen in 0DTE the last couple of years has been unprecedented.

CHART 3: 0DTE Accounts for 43% of SPX Volume in 2023

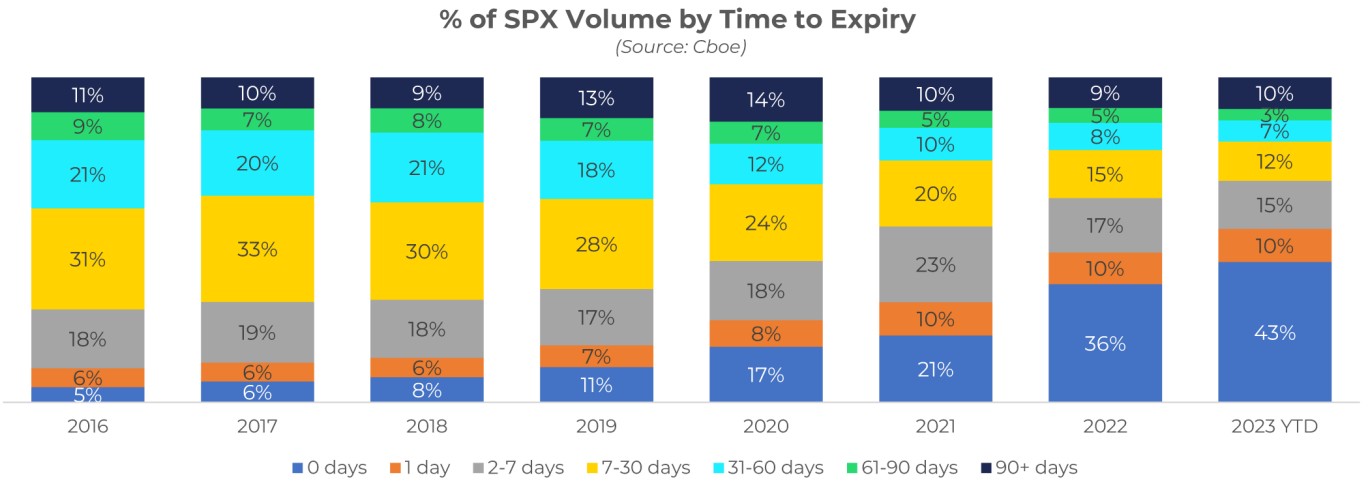
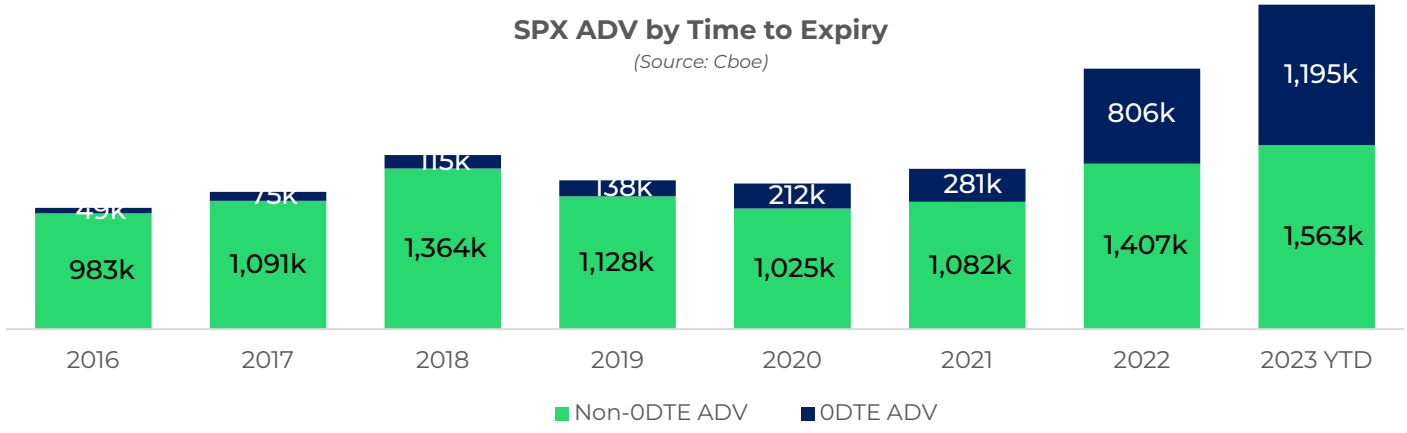


Chart 3 suggests that SPX 0DTE has been growing, and SPX non-0DTE has been shrinking. In fact, as seen in chart 4 all expiries have seen material volume growth, however 0DTE far outweighs the growth seen in other tenors. Non-0DTE and 0DTE ADV are up 7% and 58% annualized, respectively from 2016 to 2023 YTD.

CHART 4: SPX 0DTE ADV Up 58% Annually Since 2016



SPX 0DTE Use Cases

Over the last few years, the options industry as a whole has seen a shift to shorter dated options trading. This is partially due to the listing of more frequent expiries – allowing investors to trade more tactically around events – and partially due to the broadening user base of options traders. SPX, and more specifically 0DTE, volume growth has been coming from diverse types of investors. From large institutions to mid-size hedge funds to small retail traders, volumes have been increasing across the board. Unlike the meme-stock craze during late 2020 and early 2021 which was characterized by retail traders making extremely low delta[5] trades hoping for big stock price swings, the profile of SPX 0DTE volume is materially different.

Most traders are taking a very systematic approach to trading SPX 0DTE. Over 95% of the 0DTE customer opening[6] volume has a capped risk profile (i.e., less than 5% is selling naked calls/puts, straddles, strangles, etc.), as customers typically take a risk averse approach to trading SPX. This is vastly different than the typical trades that were occurring in the meme-stock era and poses much less risk to customers suffering severe losses, and much less risk to dealers on the other side of the customer's trades. The trades in aggregate are typically balanced as well, with the SPX 0DTE put-to-call ratio hovering around one on the typical month. One of the most common strategies among customers is selling either vertical call or put spreads (or both – called an iron condor) to harvest premium. The average strike width (volume weighted) for 0DTE sell to open vertical spreads[7] in 2023 YTD is slightly over twenty-one[8], less than 50 basis points[9] of the index level at the time of writing.

The following charts show SPX customer volume in the most popular strategies[10] throughout the day. The fourth chart shows a clear customer preference in selling to open vertical spreads at the beginning of the day – with a ADV of 63k contracts in the first hour of trading alone. It is important to note that single leg strategies often reflect the repositioning of one leg in an already existing vertical spread. This repositioning contributes to volume growth, but may exaggerate positions, particularly single legs, initiated by customers.

5 The probability of an option finishing in the money at expiration

6 I.e., opening a new position, not closing out an existing position

7 Selling a call (put) and buying a further out-of-the money call (put) to receive a net credit

8 Only trades that had two legs (either calls or puts, not one of each), one being sold, and a further out-of-the money leg being bought were included in the calculation

9 Twenty-one points wide divided by the SPX spot of 4300

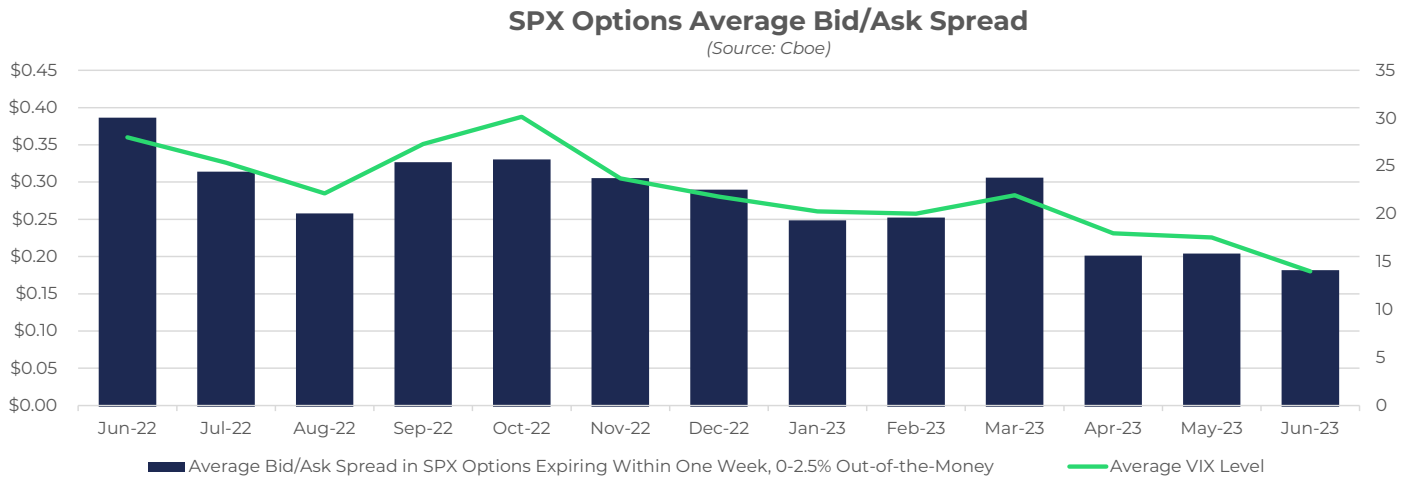
10 Buying/selling single legs, vertical spreads with a net debit or credit. Volume shown in the charts includes over 80% of SPX 0DTE customer volume

CHART 5: Selling SPX 0DTE Vertical Spreads Increases in Popularity

Quote Quality

Outside of the array of benefits investors receive from trading index options, such as European exercise, cash settlement, and potentially favorable tax treatment, one of the main reasons people turn to SPX is due to its robust on-screen liquidity. As the VIX® index has trended downward over the last year or so, the average bid/ask spread in SPX options has trended down as well. In June, the average bid/ask spread width in SPX was only $0.18 in options expiring within one week and strikes 0%-2.5% out of the money. That is a top of book spread width of less than half a basis point of the index level.

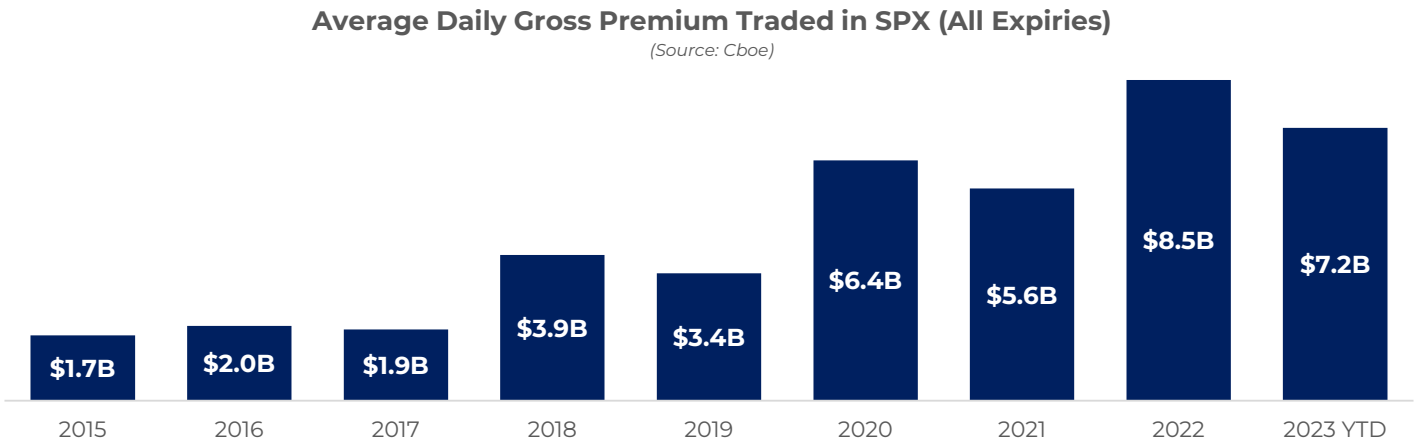
CHART 6: SPX Options Bid/Ask Spread Improves Since 2022



Total Dollar Premium Traded & Costs to Trade SPX

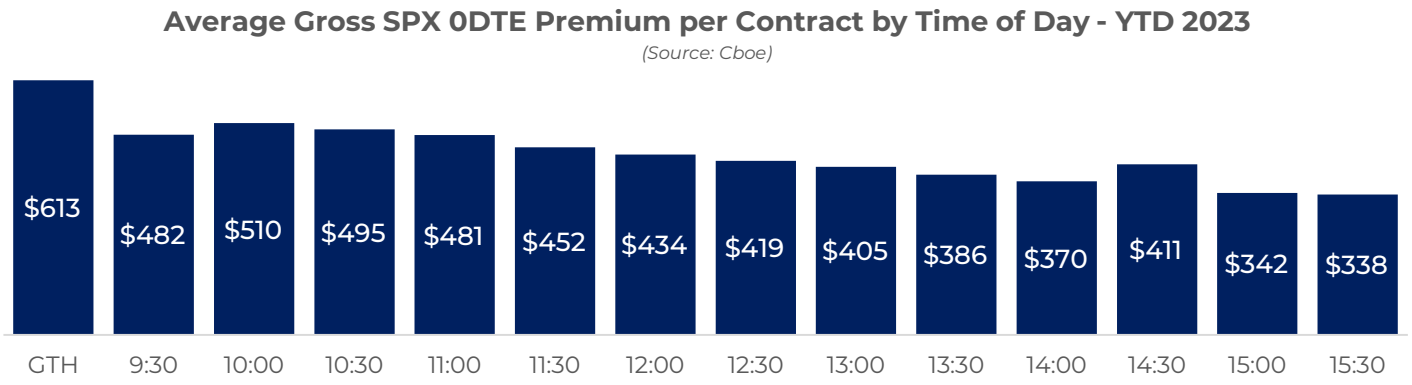
So far in 2023, over $7B per day in premium traded in SPX options. This is down slightly vs 2022 as lower VIX levels in 2023 implies lower options prices relative to last year. Additionally, there is less time premium associated with the shorter dated options that have grown in volume.

CHART 7: Average Daily Gross Premium Traded in SPX Accelerates to $7B Per Day



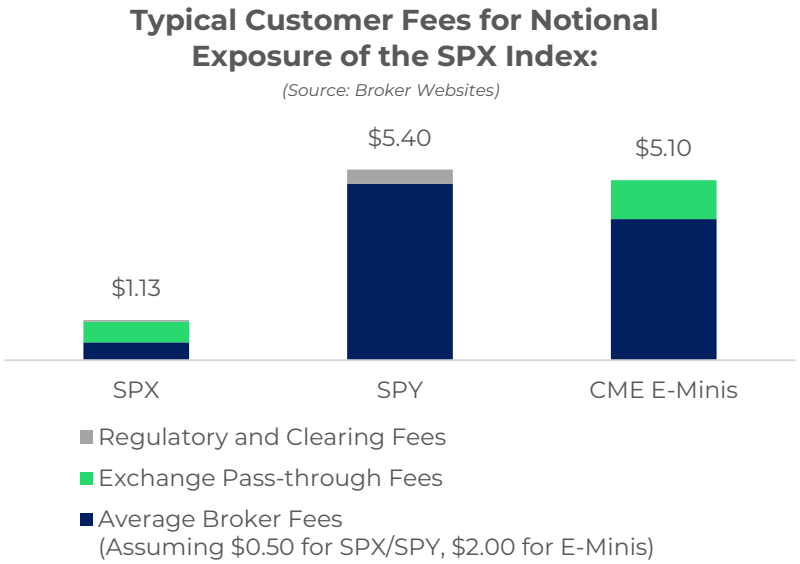
Drilling down into SPX 0DTE, throughout the day as expiry approaches the average gross premium exchanged per contract decreases. Toward the end of the day average gross premium per contract is skewed slightly higher due to traders realizing gains and covering losses on in-the-money options – as opposed to trading out-of-the money options like earlier in the day.

CHART 8: SPX 0DTE Premium Decreases into the End of the Day



Another reason so many investors use SPX as their preferred vehicle for options trading is due to its inexpensive cost to trade. To get the same notional exposure, an investor has the choice between trading 1 SPX contract, 10 SPY contracts or 2 S&P 500 E-Mini options on futures contracts. Given that brokerage fees are typically charged per contract, the total explicit costs to trade SPY options and E-Mini options on futures are significantly higher than trading the same notional exposure in SPX options.

CHART 9: Explicit Fees to Trade SPY and E-Mini Options are 4-5x Higher Than SPX

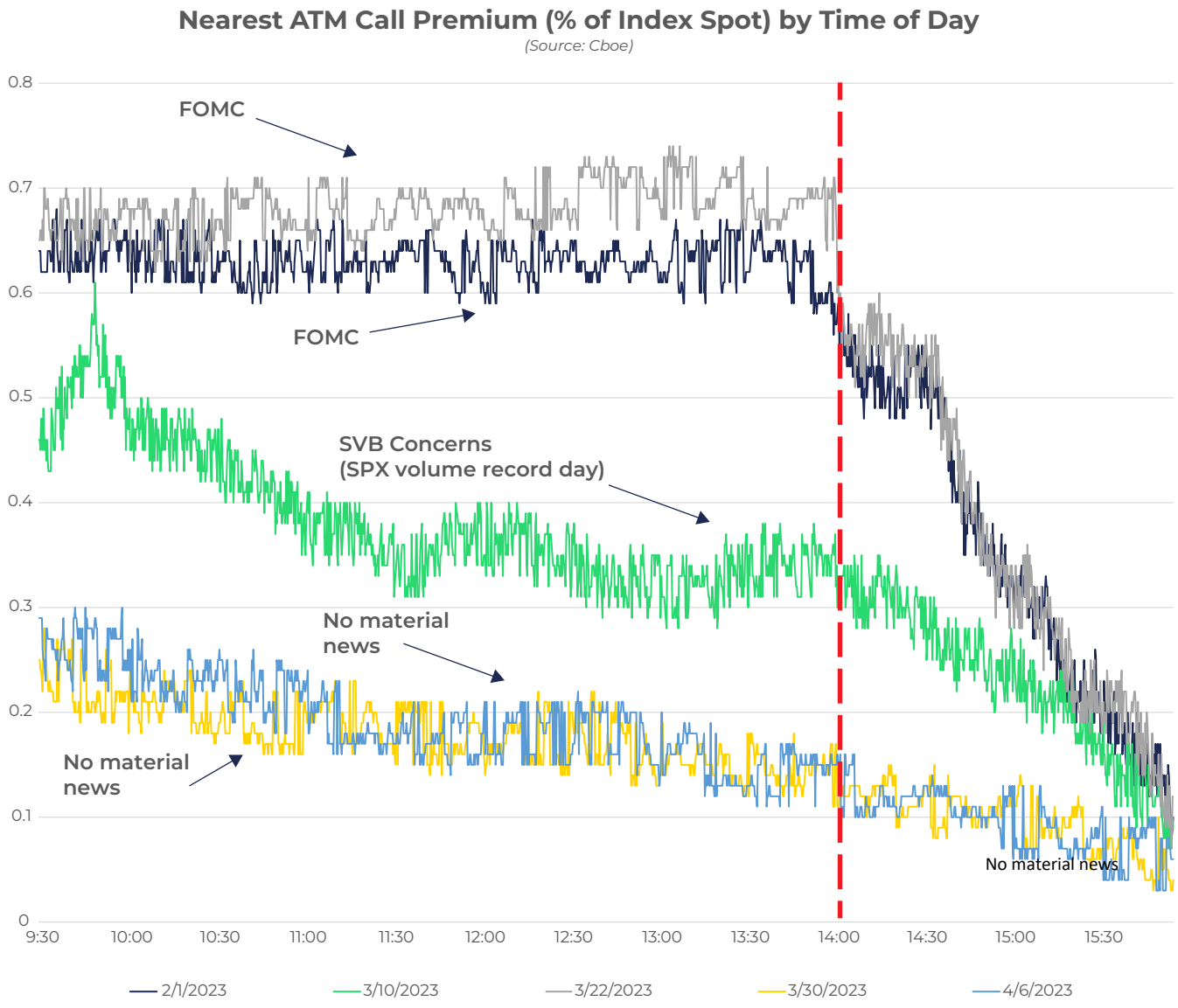


The average cost to trade 1 SPX contract, represents approximately 0.04% of average gross premium exchanged in trading that SPX contract, and only 0.0003% of the notional exposure of one SPX contract. SPY options and CME E-mini S&P 500 options on futures fees are on average 4-5x higher than those in SPX.

Benefits of Short-Dated Options

Short-dated options in general offer investors inexpensive ways to express a short-term view to complement a longer-term strategy, to hedge a portfolio or to trade tactically around events, such as a Federal Reserve meeting. A common strategy, which was mentioned previously, is to sell these short-dated options to harvest the premium (i.e., assuming some level of market risk in exchange for premium) as the day goes on. Typically, the value of the at-the-money option decreases as the day goes on (keeping in mind the option that is at-the-money changes as the index level changes). The chart below depicts the nearest to at-the-money call premium as a percentage of the index level every 15 seconds. An interesting phenomenon is that on Federal Reserve interest rate announcement days, from 9:30am – 1:59pm eastern (right before the interest rate announcement) there has been almost no premium decay in the at-the-money strike, and after 2pm it rapidly declines into the end of the day. In fact, on these days investors are typically cautious in trading before the FOMC announcement, muted 0DTE volumes pre-2pm and explosive volumes post-2pm are quite common on such days.

CHART 10: SPX 0DTE Premium Decay Examples



Addressing Concerns Associated with SPX 0DTE Options

A common concern around the rise of SPX 0DTE is the impact these options could have on the underlying SPX market. Specifically, the fear is if most customer trades are in one direction, dealers on the other side could have large amounts of delta they need to buy/sell to hedge their option positions - and those hedging activities could have disproportionate impact on the SPX Index (particularly if dealers are net short, hedging activity could exacerbate underlying index moves). While that is a valid concern in theory, we find in practice customer flows tend to be fairly balanced in terms of buys and sells.

Digging deeper into 0DTE volume on June 15th, which was the second highest volume day ever (the SPX index moved 170 basis points intraday), it can be shown that net exposure is dwarfed by gross volume. Over 1.33MM customer 0DTE contracts traded that day, with the most popular strikes being the 4420 call (75k contracts traded) and the 4400 put (49k contracts traded).

For reference this is what the market did on that day:

SPX on June 15th	
Open	4365
High	4439
Low	4363
Close	4426

Looking at the most heavily traded strikes, and subtracting sell volume from buy volume, it shows that only 2.2% and 4.8% of gross volume, respectively, was net-bought on the day:

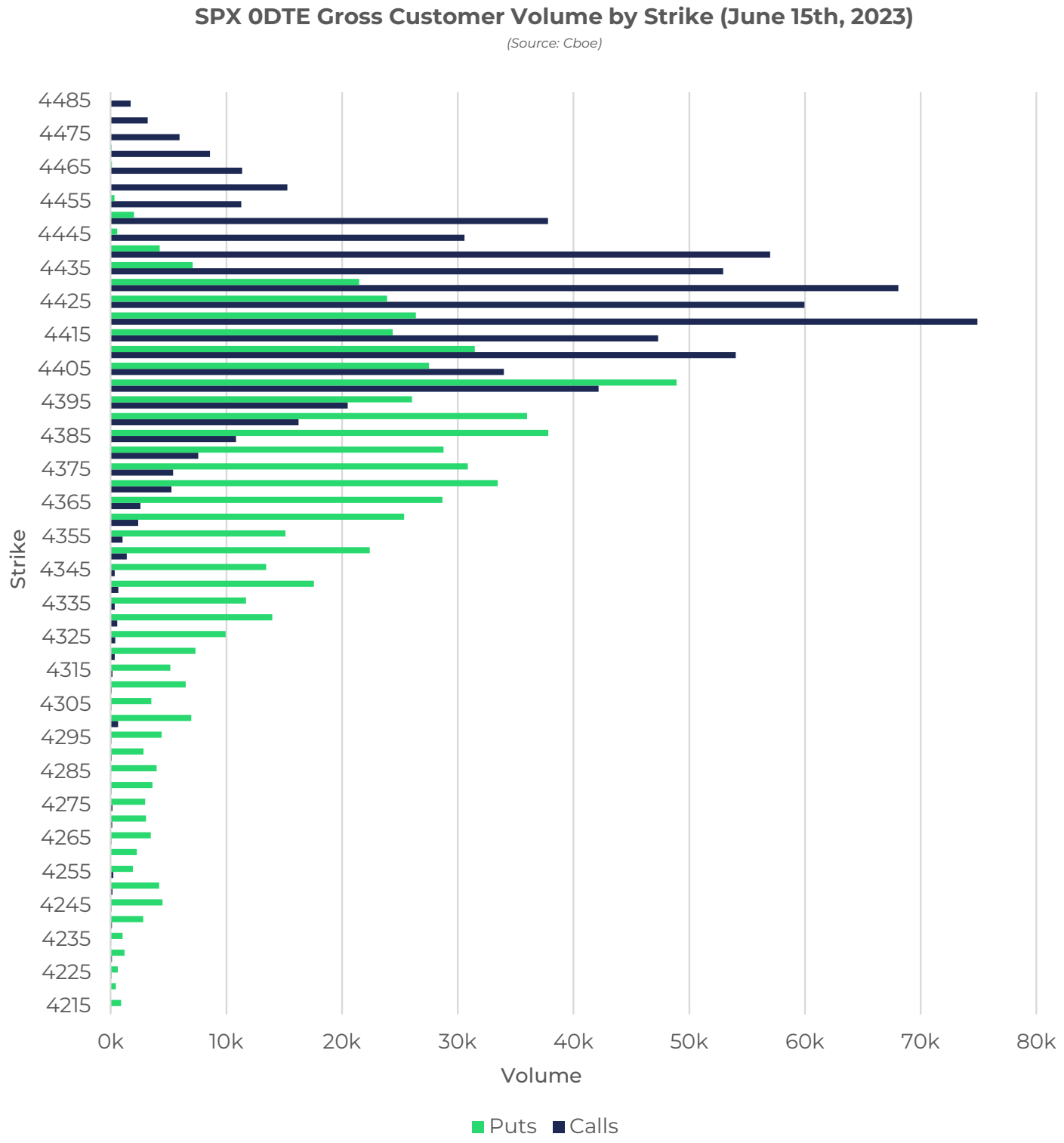
SPX 0DTE on June 15th - Most Active Strikes	Calls	Puts
Most Active Strike	4420	4400
Gross Customer Volume @ Strike	74.9k	48.9k
Contracts Bought @ Strike	38.3k	25.6k
Contracts Sold @ Strike	36.6k	23.3k
Net Bought at 4pm @ Strike	1.7k	2.3k
Net Bought as % of Total Volume @ Strike	**2.2%**	**4.8%**

Looking simply across all strikes, the buys and sells were awfully close in aggregate on the day, with net bought exposure being less than 1% of gross volume:

SPX 0DTE on June 15th - All Strikes	Calls	Puts	Total
Gross Customer Volume	694.3k	643.2k	1,337.4k
Contracts Bought	351.9k	322.1k	674.0k
Contracts Sold	342.4k	321.1k	663.5k
Net Bought at 4pm	9.5k	1.0k	10.5k
Net Bought as % of Total Volume	**1.4%**	**0.2%**	**0.8%**

Breaking it down by strike from gross volume to buys/sells to net buys, shows the drastic difference between net customer positioning versus gross volume.

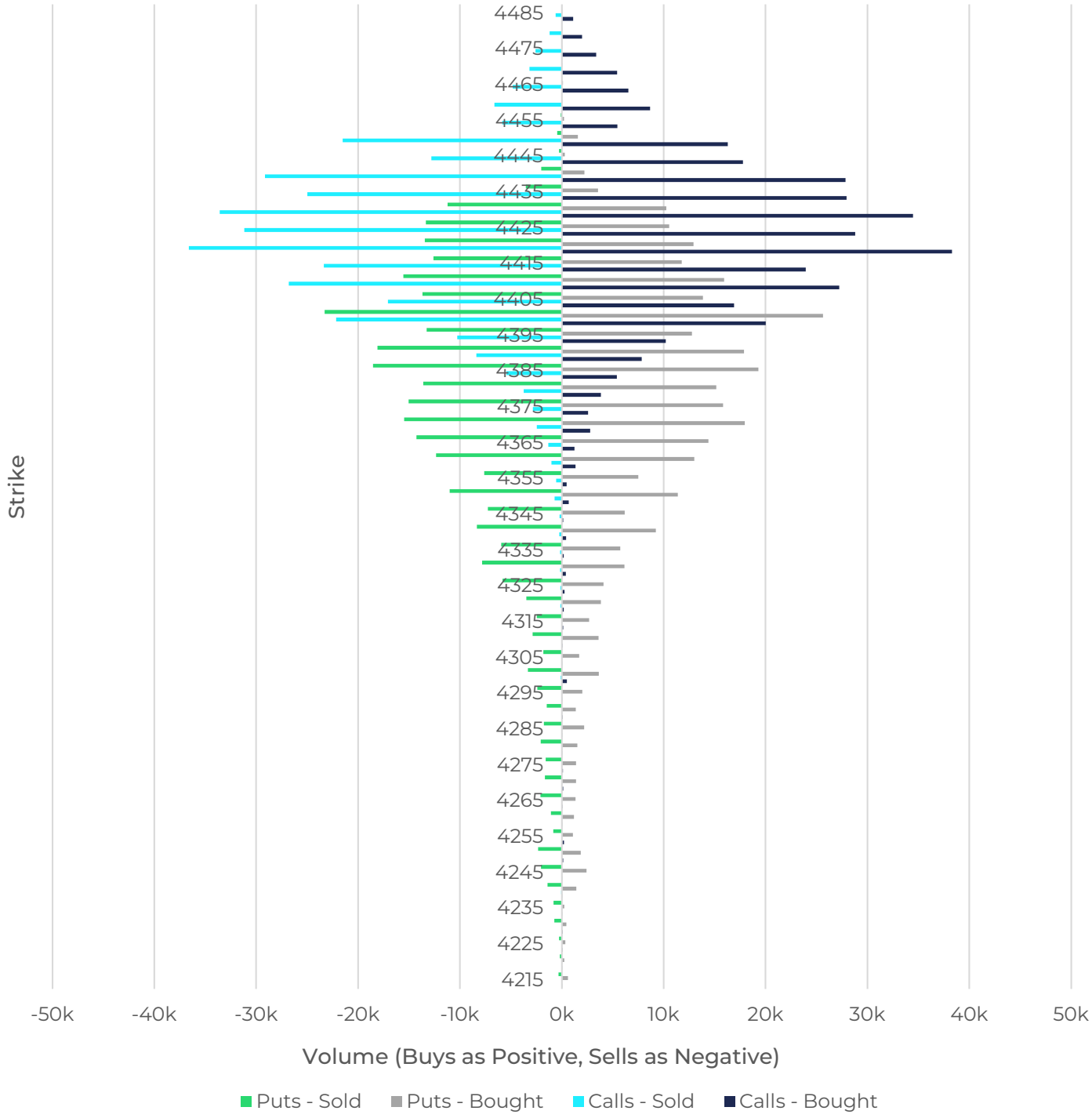
CHARTS 11-13: Net Customer Positions More Balanced Than Gross Volume Suggests



Breaking out customer buys vs customer sells

SPX 0DTE Customer Volume by Strike - Buys vs Sells (June 15th, 2023)

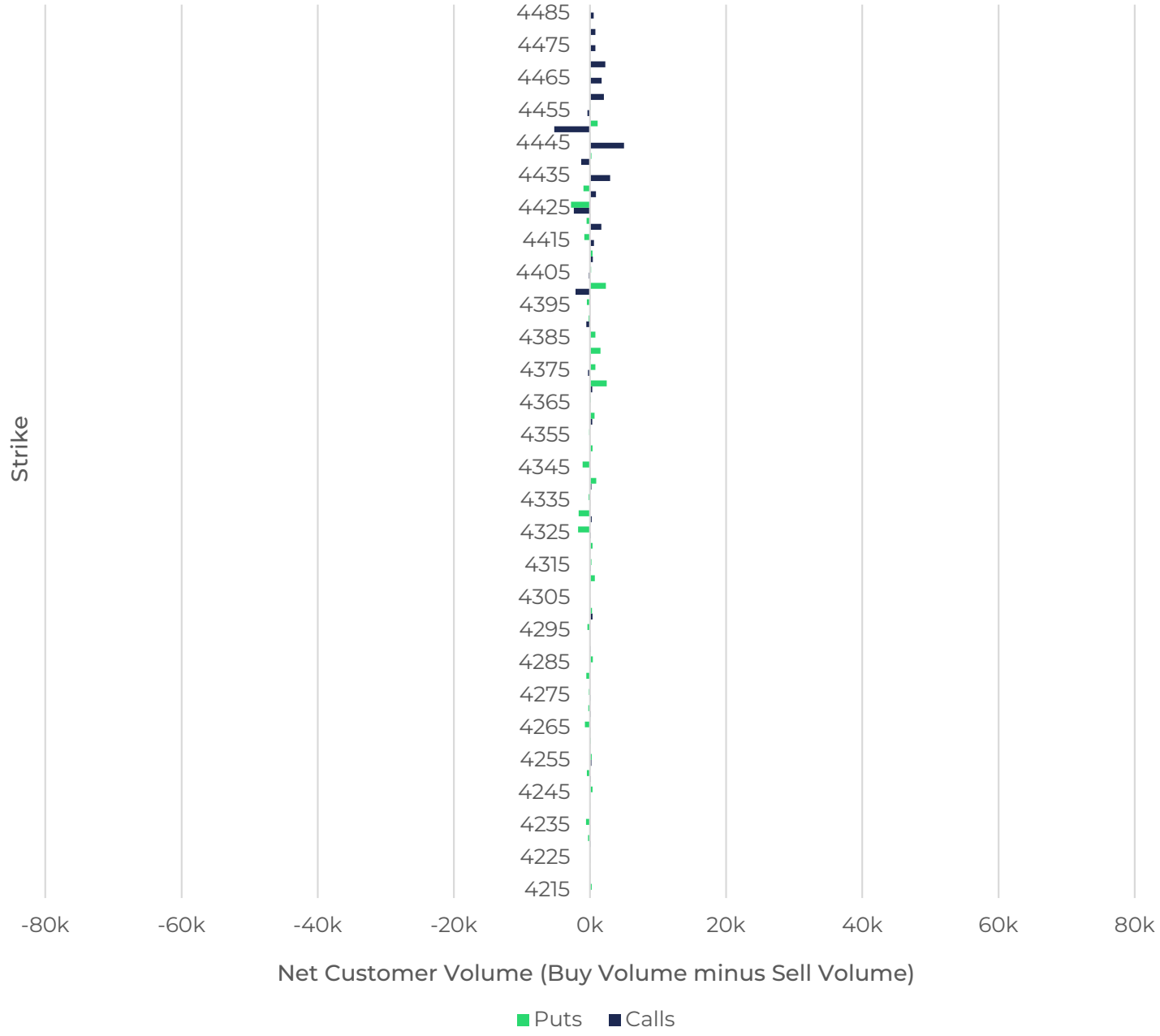
(Source: Cboe)



Netting out customer buys vs customer sells

SPX 0DTE Net Customer Bought Volume by Strike (June 15th, 2023)

(Source: Cboe)



Conclusion

The growth seen in SPX options trading over the last year has received a lot of attention as the democratization of trading continues in full force across the United States and internationally. Cboe will continue to monitor this growth and provide innovative ways to meet investors needs as the market evolves If you have any views or questions on SPX 0DTE we would love to hear from you at sales@cboe.com.

About the Author

Jonathan Zaionz, Senior Derivatives Analyst

Cboe Global Markets

jzaionz@cboe.com

Jonathan Zaionz is a Senior Derivatives Analyst at Cboe Global Markets (Cboe), providing robust business insights and market intelligence. In this role, Jonathan conducts in-depth analysis of the U.S. derivatives market and distills that analysis into actionable insights that help fulfill Cboe's mission of building trusted markets. Additionally, he is responsible for managing various initiatives for Cboe's proprietary index and multi-list options business.

Jonathan holds a Bachelor of Mathematical Finance from the University of Waterloo.

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