

Profitability of selected 0DTE index options strategies

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Abstract

In recent years, the volume of trading in 0DTE index options has increased significantly. Despite the growing importance of these instruments in the financial market, there are still relatively few studies that analyze investment strategies in 0DTE index options. The article examines the effectiveness of the Iron Condor option strategy on SPX 0DTE options. Two variants of the Iron Condor strategy were tested using one-minute data of changes in index and option prices over the past 12 months. Both variants of the strategy proved profitable confirming the hypothesis that this type of trading can be profitable. The article confirmed the existence of the phenomenon of overstatement of implied volatility in the 0 DTE options market in relation to the actually realized volatility.

Keywords: 0DTE, index options, options strategies (JEL:G1)

Introduction

In recent years, trading zero days to expiration (0DTE) options has become increasingly popular, especially among retail traders looking to profit from short-term market movements. As a result of the increased interest, the volume of trading in 0 DTE index options has increased significantly, as well as their share of trading in index options with different expiration dates. In 2016, Zero Days-to-Expiration (0DTE) options accounted for only 5% of the total S&P 500 options volume. In 2023, they comprised over 43% (Zaionz, The Rise Of SPX & 0DTE Options, 2023). In 2024 daily volume of SPX 0DTE options in some days exceeds 2 million contracts. Fig. 1 represents the average daily volume of 0 DTE SPX options from 2016 to 2023.

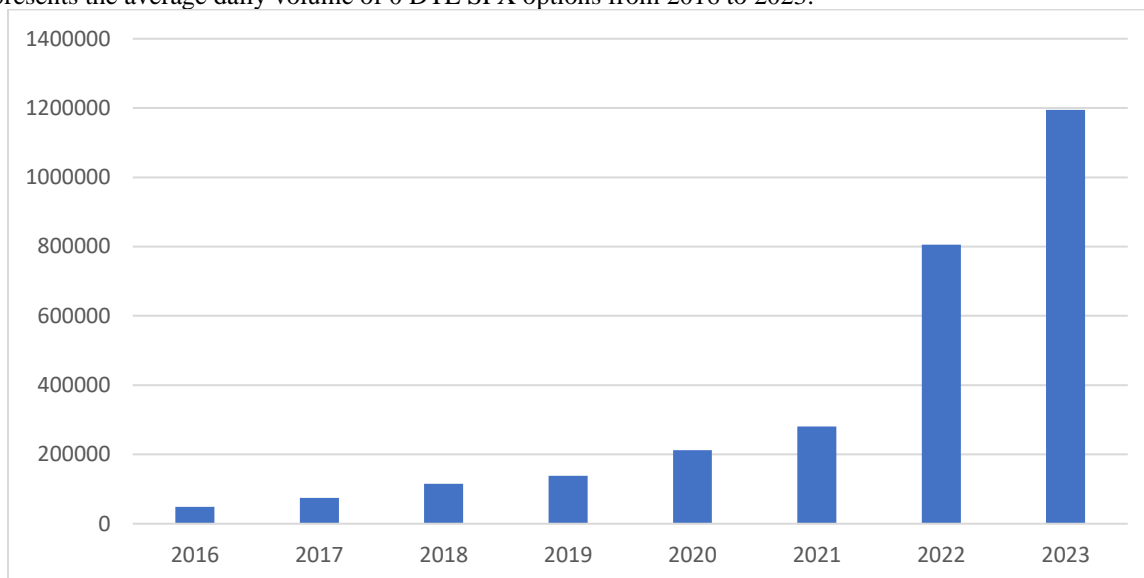


Figure 1: The Figure reports the average daily volume of SPX 0 DTE contracts. The data covers the period from 2016 to 2023 (June of 2023). Source: CBOE

According to J.P. Morgan Chase's estimates released in February 2023, the daily volume of SPX 0 DTE options corresponds to a notional dollar volume of around \$1 trillion (Bandi et al., 2023). One reason for the interest in options with short expiration dates is the opportunity to take advantage of the fact that options' implied volatility (IV) is usually higher than the realized volatility. This provides a potential opportunity to make money on trades in which one takes a neutral position relative to changes in the price of the index (zero delta) in an effort to make money on the difference between implied and realized volatility.

Literature review

Options have traditionally been the domain of Wall Street professionals. However, during SARS-CoV-2, retail investors jumped in. In 2021, during the meme-stock era, retail investors discovered 0DTEs as a gambling method (Fagerlid, 2024). Beckmeyer, Branger, and Gayda (2023) also document that 0DTE options are popular among

retail traders. According to their study, 75% of retail investors' trades in S&P 500 options involve 0DTE contracts, even though retail investors experience substantial losses on these transactions. The realized returns of 0DTE options are highly volatile and skewed, with many strategies yielding negative returns (Vilkov, 2023).

Because 0DTE options are sensitive to changes in the price of underlying assets, one of the main reasons to trade them is the possibility of large returns. These options' features, such as their one-day expiration date, make them especially alluring to traders who want to take advantage of quick changes in the market prices. When implied variance surpasses realized variance, 0DTE options frequently show a sizable variance risk premium that could result in lucrative trades (Vilkov, 2023). Some traders have reported profits of 40% to 300% per trade using strategies that take advantage of market inefficiencies, especially around expiration (Augen, 2009). Traders can take advantage of short-term price movements thanks to the high volume of 0DTE options, especially in times of market volatility (Almeida et al., 2024). Trading of 0DTE options also presents many challenges for traders. The ability to accurately price options, particularly those with very short maturities, is essential for effective trading strategies. 0DTE options are often mispriced, leading to unexpected losses if market movements do not align with traders' expectations (Almeida et al., 2024). Moreover, the study by Kokholm and Stisen on the joint pricing of VIX and SPX options illustrates the complexities involved in pricing options in volatile markets, which is particularly pertinent for 0DTE options that are sensitive to immediate market changes (Kokholm & Stisen, 2015). In addition to pricing, the information content of options, particularly implied volatility, is a significant factor influencing trading strategies. Research indicates that implied volatility derived from options can predict future market movements, which is particularly relevant for 0DTE options trading (Kim & Park, 2020). The predictive power of implied volatility, as explored in various studies, suggests that traders can utilize this information to make informed decisions about entering or exiting positions in 0DTE options (Shaikh & Padhi, 2013). Furthermore, the relationship between implied volatility and market liquidity is critical, as liquidity can significantly impact the execution of trades in the fast-paced environment of 0DTE options (Cui et al., 2021).

Lavanya discusses various hedging strategies that can be employed in volatile markets, including protective puts and covered calls, which are relevant for traders engaging in 0DTE options to mitigate risk while pursuing short-term gains (Lavanya, 2024). The heightened volatility associated with 0DTE options can be influenced by macroeconomic factors and market sentiment, as noted in the study, which emphasizes the need for traders to understand these dynamics to optimize their strategies. The evolution of option valuation theory also plays a crucial role in understanding 0DTE options. As highlighted by the research on option valuation models, the applicability and limitations of these models are critical for traders aiming to assess the risk and potential rewards of 0DTE options (Zhong, 2023). The strategic use of volatility trading strategies, such as straddles and strangles, is also pertinent in the context of 0DTE options. These strategies allow traders to capitalize on expected volatility in the underlying asset, which is particularly pronounced in the short time frame of 0DTE options (Chen et al., 2014). The study by Chen et al. emphasizes the importance of understanding deviations from put-call parity and the implications for volatility prediction, which can enhance the effectiveness of trading strategies employed by 0DTE options traders (Chen et al., 2014). Moreover, the impact of macroeconomic events on market volatility cannot be overlooked. For instance, the Russo-Ukrainian War has intensified volatility in options markets, affecting the risk-return profiles of various options, including 0DTE options (So, 2024).

Research has demonstrated that, especially when it comes to equity index options, implied volatility can be a more reliable indicator of future realized volatility than historical measurements (Kim & Park, 2020; Han & Park, 2013; Birkelund et al., 2015). One well-known indicator of market sentiment and risk is the Chicago Board Options Exchange (CBOE) Volatility Index (VIX), which is based on S&P 500 index options (Driouchi et al., 2015; Osterrieder et al., 2020). Conversely, realized volatility is computed using the underlying asset's historical price data, usually by utilizing techniques like the standard deviation of returns over a given time frame. This measure is a lagging indicator of volatility since it captures what has happened in the market (Hu & Li, 2022; Padhi & Shaikh, 2014). According to research, realized volatility typically follows mean-reverting behavior, meaning high volatility periods are frequently followed by low-volatility periods and vice versa (Shi et al., 2019; McGee & McGroarty, 2017). This characteristic may result in differences between IV and RV, especially when there is market stress or uncertainty and investors' anxiety may increase, causing implied volatility to rise (Bollerslev et al., 2011). The biases present in estimating implied volatility are another reason for the discrepancies between IV and RV. IV frequently overestimates actual market volatility, according to several studies that have shown an upward bias in implied volatility as a predictor of future realized volatility (McGee & McGroarty, 2017; Cheng & Lu, 2015). Several variables, such as investor sentiment, market conditions, and the particulars of the options being traded, can affect this bias (Sudhakar & Srikanth, 2016). For instance, during times of market turbulence, realized volatility may not rise as much as implied volatility, which tends to rise sharply due to increased uncertainty (Majewski et al., 2013). Furthermore, it has been demonstrated that the implied volatility's predictive ability varies based on the options' maturity and the particular market circumstances. Compared to longer-maturity options, which might be more uncertain, shorter-maturity options typically offer more accurate projections of future realized volatility (Kim & Park, 2020; Han & Park, 2013). The significance of context in volatility forecasting is further highlighted by the fact that the relationship between IV and RV can vary among different asset classes and market environments (Padhi & Shaikh, 2014; Wang et al., 2017).

Data and Methodology

If as shown in some studies implied volatility overestimates realized volatility (McGee & McGroarty, 2017; Cheng & Lu, 2015) delta neutral options strategies like: strangles, iron condor or iron butterfly should be used by investors to take advantage of this phenomenon. The article tests the effectiveness of two iron condor strategies in the market for ODTE options on the SPX index. The analysis was made on the basis of the analysis of minute data of options quotes on SPX from last 12 months.

The iron condor strategy is a complex option strategy that combines two option spread strategies (Dziawgo, 2020). It's made up of a short vertical put spread and a short vertical call spread in a single transaction, in the same expiration. We can also understand this strategy as a modification of the strangle strategy by adding purchased put and call options designed to reduce the maximum risk and, above all, reduce the required margin. The Iron Condor strategy involves selling 1 put and 1 call (out of the money) option on a given instrument (usually with a low delta (0.1-0.2) and buying 1 put and 1 call option with a lower delta. The profit and loss profile for such a strategy is presented in Figure 2 (selling put and call options with strike prices P2 and P3) and buying put and call options with strike prices P1 and P4.

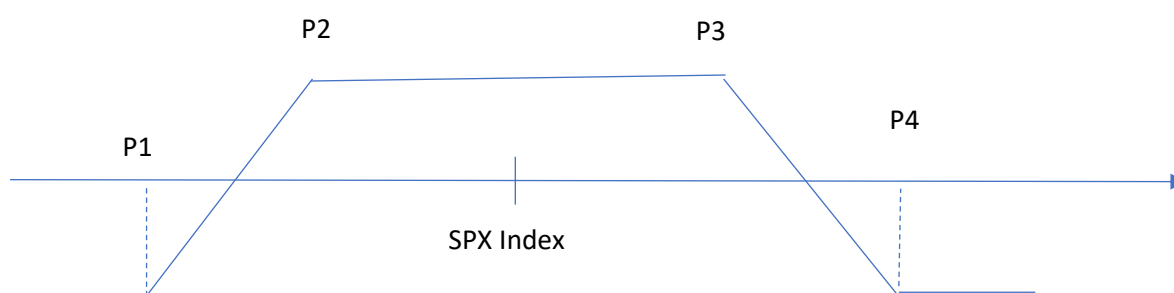


Figure 2: The profit and loss profile of Iron Condor

The article examines the effectiveness of two variants of Iron Condor's strategy over the past 12 months. Both variants of the strategy involved selling one Iron Condor at 10:00 a.m.. To limit losses associated with large movements in the stock index, the strategy was closed (stop loss order) when the loss on the position equaled the value of the premium gained from the sold strategy. In the first variant of the strategy (strategy 1), call and put options with a delta equal to 0.15 were sold. In the second variant of the strategy (strategy 2), call and put options with a delta equal to 0.10 were sold. In both variants of the strategy, put and call options with a delta of at most 0.05 were bought. In order to avoid the risks associated with the FOMC meetings on the days when they were held, no transactions were made.

During the period under review, both variants of the Iron Condor strategy proved profitable. The statistics associated with these transactions are described in Table 1.

Table 1. Basic statistics describing the results of both variants of the Iron Condor strategy on the SPX index

	Strategy 1	Strategy 2
Total P/L	\$5409	\$5166
High P/L	\$6067	\$5166
Maximum Drawdown	-\$4043	-\$1732
Positions	244	244
Win Rate	57,8%	61,5%
Worst Loss	-\$1105	-\$569
Average Win	\$314	\$145
Average Loss	\$377	\$177

Source: elaborated by the author based on OptionAlpha.com

During the period under review, both variants of the Iron Condor strategy proved profitable. In both cases, the annual profits, assuming transacting one contract, exceeded \$5,000. As expected, the first strategy was characterized by a lower share of profitable transactions (it was 57.8% of all transactions). In the case of the second strategy, the share of profitable transactions was 61.5%. Strategy 2 outperformed the first one in terms of maximum drawdown, which amounted to -\$1732, in the case of the first strategy this figure was more than twice

as high and amounted to -\$4043. Figures 3 and 4 show the gains and losses associated with both variants of the Iron Condor strategy.

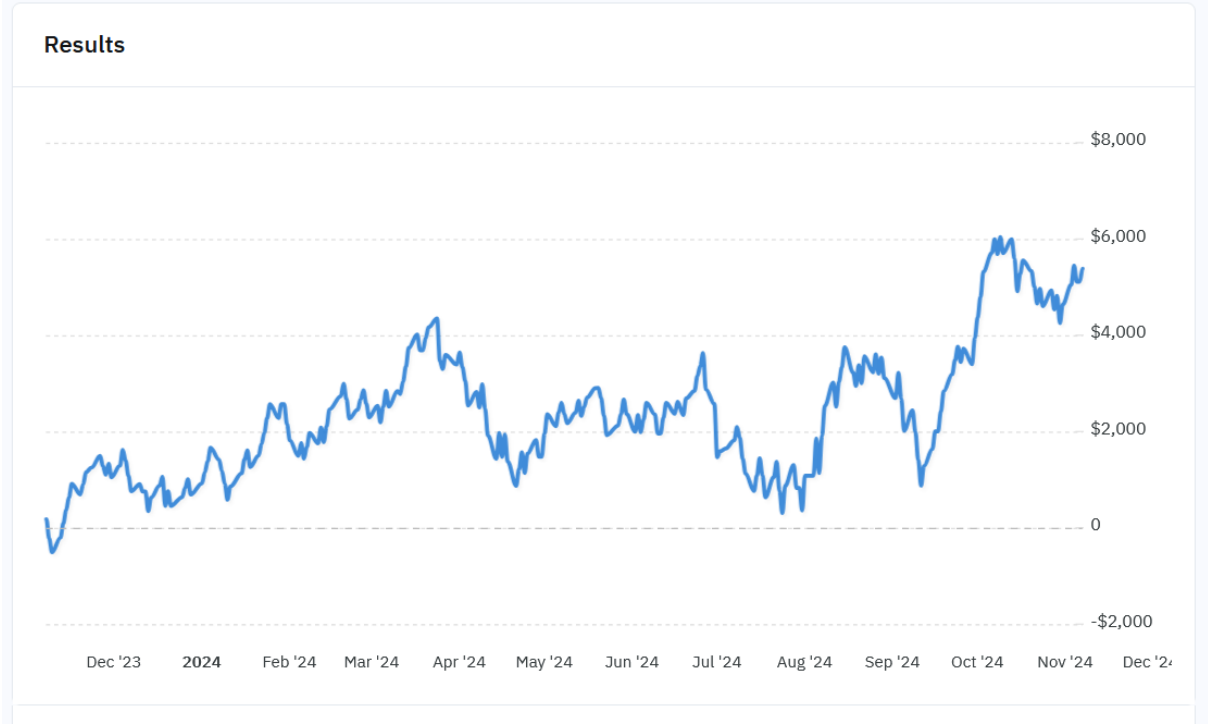


Figure 3: Gains and losses from Iron Condor's strategy in the 0DTE options market on the SPX (Strategy 1) (09.11.2023-09.11.2024) Source: OptionAlpha.com

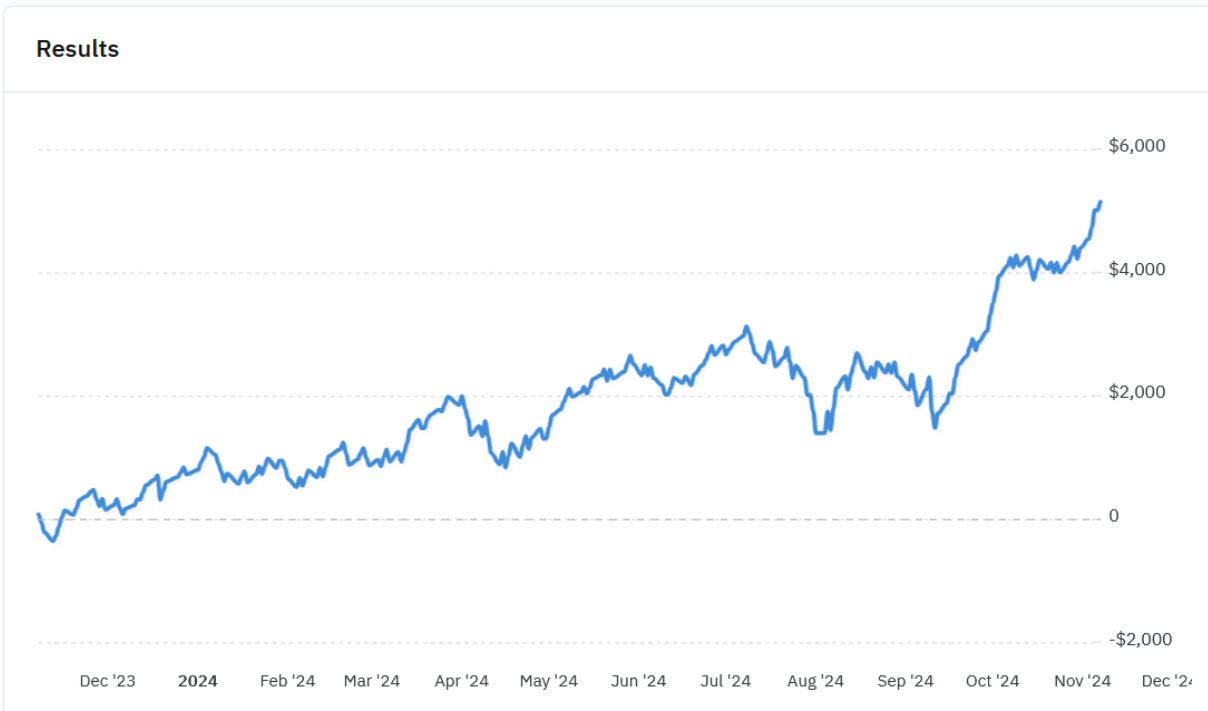


Figure 4: Gains and losses from Iron Condor's strategy in the 0DTE options market on the SPX (Strategy 2) (09.11.2023-09.11.2024) Source: OptionAlpha.com

Table 2 presents the monthly results from the 0DTE Iron Condor strategy. Strategy 2 proved to be far more stable in generating profits, only in two months during the period under review did the share of profitable transactions fall below less than 50% (but not below 45%), in these two months Strategy 2 recorded losses. Table 2. Monthly results of 0DTE Iron Condor strategy on SPX index

	Strategy 1	Strategy 2
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	P/L	Trades	Win Rate	P/L	Trades	Win Rate
2023						
November	\$1356	16	68.8%	\$345	16	62.5%
December	-\$639	19	52.6%	\$398	19	73.7%
2024						
January	\$1880	20	70.0%	\$223	20	60.0%
February	\$11	20	55.0%	\$39	20	55.0%
March	\$1010	19	63.2%	\$995	19	68.4%
April	-\$2115	22	40.9%	-\$677	22	45.5%
May	\$889	21	61.9%	\$1210	21	76.2%
June	\$509	18	61.1%	\$151	18	55.6%
July	-\$2046	21	47.6%	-\$652	21	47.6%
August	\$2281	21	57.1%	\$301	21	52.4%
September	\$287	19	57.9%	\$740	19	68.4%
October	\$857	23	56.5%	\$1167	23	65.2%
November	\$1129	5	80.0%	\$926	5	100%

Source: elaborated by the author based on OptionAlpha.com

Conclusions

The article examines the effectiveness of the Iron Condor option strategy on SPX index 0DTE options. The study uses minute data of options quotes on SPX from the last 12 months to analyze the effectiveness of two Iron Condor strategies. The strategies involve selling one Iron Condor at 10 a.m. and closing the strategy when the loss on the position equals the value of the premium gained from the sold strategy. The results show that both variants of the Iron Condor strategy proved profitable, with annual profits exceeding \$5,000. Such strategies can be profitable due to the phenomenon of overstated implied volatility in the 0DTE options market. Trading of 0DTE options presents unique opportunities and challenges for traders. A comprehensive understanding of pricing models, implied volatility, and market dynamics is essential for developing effective trading strategies. As the market for options continues to evolve, ongoing research will be crucial in better understanding the mechanisms of 0DTE index options.

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