

The Time–Target Trade-off in Expiry-Day Call Option Buying: Evidence from a Rule-Based Intraday Strategy in the Indian Index Derivatives Market

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ABSTRACT

This study examines the time–target trade-off associated with rule-based intraday Call-option buying on index expiry days in the Indian derivatives market. The study evaluates whether accepting relatively smaller profit targets with shorter holding periods can improve the effectiveness and consistency of expiry-day option trading compared with waiting for substantially higher returns. An empirical analysis is conducted using 24 recorded expiry-day observations, with Call options purchased at approximately 2:00 PM and subsequently exited during the afternoon trading session. The analysis considers realised percentage returns, holding duration, and India VIX as the principal market-volatility indicator. The results show that 14 of the 24 trades generated positive returns, while 9 produced negative returns and 1 produced approximately zero return. The median realised return was approximately 3.73%, with returns ranging from –95.19% to +77.16%, highlighting substantial dispersion and downside risk. The average holding period was approximately 25 minutes, with a median of about 22 minutes. Importantly, the correlation between realised return and holding period was approximately –0.55, suggesting that longer exposure did not systematically generate higher returns. The correlation between India VIX and realised return was approximately –0.31, indicating that higher volatility alone did not ensure superior Call-option performance. Overall, the findings provide preliminary evidence that shorter holding periods and more moderate profit targets may offer a more practical framework for expiry-day Call-option strategies, although the small sample limits generalisability. The study contributes to the literature by highlighting the importance of the interaction between time to expiry, profit objectives, holding duration, and market conditions in short-horizon option trading.

Keywords: Expiry-day options; Intraday trading; Option trading strategy; Indian derivatives market.

INTRODUCTION

The rapid growth of equity derivatives trading has created increasing opportunities for investors to develop short-horizon trading strategies. These effects become especially pronounced on the expiry day, when the remaining time to maturity is extremely limited and option premiums can experience substantial intraday fluctuations. The final hours of an expiry-day session therefore represent a distinctive trading environment for option buyers. A relatively small movement in the underlying index can generate a disproportionately large percentage change in the option premium, while an unfavourable movement or insufficient price movement can lead to rapid erosion of the premium. Consequently, the profitability of an expiry-day option-buying strategy may depend not only on market direction but also on the timing of entry, profit target and holding period.

This study empirically examines a rule-based intraday Call-option buying strategy implemented around 2:00 PM specifically on index expiry days in the Indian derivatives market. The strategy initially focused on achieving a substantially high return, approximately a doubling of the option premium, which required a relatively long waiting period. Subsequently, the strategy evolved towards smaller profit targets

accompanied by shorter holding periods. This evolution provides an opportunity to investigate an important **time–target trade-off**: whether accepting a smaller profit target with a shorter exposure period can improve the consistency and effectiveness of expiry-day option trading.

The findings indicate that **shorter holding periods may be preferable than prolonged exposure**, although profitability remains highly dependent on market conditions and individual price movements.

LITERATURE REVIEW

The literature on derivatives expiration has established that expiration days can generate distinctive patterns in trading volume, volatility, liquidity and price behaviour. Early evidence by Stoll and Whaley (1987) associated expiration-day price effects with the unwinding of index futures positions, arbitrage activity and the interaction between derivatives and the underlying equity market. Their evidence showed that trading volume and price volatility could become unusually high during the final trading hour on expiration days. Stoll and Whaley (1991) subsequently examined whether these effects persisted following changes in settlement procedures and found that expiration-day effects were sensitive to institutional and settlement arrangements. This suggests that the behaviour of derivatives around expiry cannot be understood solely through option pricing; market structure, settlement mechanisms and the timing of position unwinding are also important.

Subsequent international research has examined how expiration effects vary according to settlement procedures and contract characteristics. Stoll and Whaley (1997), for example, investigated Australian index futures and found unusually high trading activity close to expiration while finding that price movements were not necessarily abnormal relative to non-expiration days. Such evidence indicates that increased activity near expiration does not automatically imply predictable directional returns. Rather, expiration can alter the intensity and distribution of trading without providing a straightforward trading signal.

The Indian derivatives market provides particularly relevant evidence because of its high level of derivatives activity and distinctive expiration and settlement arrangements. Agarwalla and Pandey (2013), using high-frequency Indian market data, found that stock volatility increased significantly during the final half-hour of expiration-day trading, whereas similar effects were not observed across other intraday intervals. Their findings are especially relevant to the present study because they demonstrate that the effect of expiration is not necessarily uniform throughout the trading session. Instead, the final portion of the trading day may represent a particularly important period for examining short-duration option strategies.

Agarwalla and Pandey's broader high-frequency analysis also identified pronounced intraday volatility dynamics in the Indian stock market and examined expiration days alongside other market-wide events. Their findings reinforce the importance of modelling intraday rather than merely daily volatility when studying short-horizon trading strategies. This is consistent with the present study's focus on the exact entry and exit times of Call-option positions rather than relying only on daily opening and closing prices.

Another important strand of literature concerns the relationship between option expiration and the underlying asset through hedging and arbitrage. Expiring derivatives require market participants to rebalance or close positions, while option dealers may adjust their underlying positions as the option's delta and gamma change. Consequently, the effect of expiration may be transmitted from the derivatives market to the underlying index through hedging-related order flow. The traditional expiration-day literature therefore provides a useful theoretical basis for understanding why price and volatility behaviour may become unusual as maturity approaches.

More recent research on **zero-days-to-expiration (0DTE)** options provides an important extension to this literature. Dim, Eraker and Vilkov (2024) examine the rapid growth of same-day-expiry S&P 500 options and investigate the relationship between market-maker gamma exposure and intraday volatility. Their evidence indicates that market-maker gamma positions are related to subsequent intraday volatility and that positive gamma exposure can contribute to intraday price reversals. This finding is particularly relevant for

expiry-day Call-option buyers because the very short remaining maturity makes the option's sensitivity to changes in the underlying exceptionally important.

Adams, Fontaine and Ornathanalai (2024) provide another important perspective by examining liquidity provision in the ODTE market. Their study reports that market makers' intermediation of same-day-expiry S&P 500 options can, on average, attenuate index volatility. They argue that hedging of expiring option positions generates offsetting order flow in index futures, thereby influencing intraday price dynamics. These findings caution against assuming that high ODTE trading necessarily produces greater underlying-market volatility. Instead, the direction and magnitude of the effect may depend on dealer inventory, gamma exposure and the nature of order flow.

Recent research has also emphasised that time remaining to expiration itself contains information about intraday volatility. Todorov and Zhang's work (2022) on short-dated options develops a framework using zero- and one-day-to-expiration options to estimate the deterministic intraday component of volatility. This is directly relevant to the present study because the strategy is implemented during the afternoon of the expiry day, when the remaining time to maturity becomes progressively shorter. The decline in time value and increasing sensitivity to small changes in the underlying may substantially alter the risk-return characteristics of an option position over even a few minutes.

The option-pricing literature also indicates that time to maturity is an important determinant of option value and sensitivity. Whaley (1986), for example, documents systematic valuation errors associated with the degree to which options are in-the-money and their time to expiration. For an expiry-day buyer, this has a practical implication: waiting longer for a large percentage return may expose the position to rapid time-value deterioration if the underlying does not move sufficiently in the desired direction.

Taken together, the literature suggests that expiry-day option trading involves a complex interaction among underlying price movement, time decay, volatility, liquidity, dealer hedging and market structure. Although the existing literature provides substantial evidence concerning expiration-day effects, volatility and market activity, relatively limited attention has been devoted to **the** profitability of a predefined, late-afternoon option-buying strategy. In particular, the literature does not adequately address how alternative profit targets and holding periods affect the success of Call-option buying specifically on index expiry days. The present study attempts to address this gap by examining a rule-based strategy initiated around 2:00 PM and evaluating the relationship between target return, holding duration, trading success and market volatility.

RESEARCH METHODOLOGY

This study adopts an empirical, rule-based intraday research design to examine the time–target trade-off associated with Call-option buying on index expiry days in the Indian derivatives market.

The central objective is therefore to determine whether a short-duration, rule-based Call-option buying strategy can generate consistent returns on index expiry days and whether reducing the profit target and holding period enhances its overall performance.

The analysis is based on the primary dataset containing 24 recorded expiry-day observations. For each observation, the dataset records the trading date, closing India VIX, predetermined buying time, underlying index price at entry, Call-option premium at entry, subsequent selling time, and Call-option premium at exit. The trading rule specifies an entry at approximately 2:00 PM on the selected expiry days, thereby maintaining a consistent entry framework across observations. Variations of a few minutes in the recorded buy time are retained as observed in the underlying data rather than being retrospectively adjusted.

Three principal performance measures are considered. First, the realised percentage return on the option position is calculated from the difference between the exit and entry Call-option premiums relative to the entry premium. Second, the holding period is determined from the recorded buying and selling times and is expressed in minutes. Third, the relationship between realised return and holding duration is examined to

assess the trade-off between the magnitude of the profit objective and the time for which capital remains exposed to expiry-day risk.

India VIX is incorporated as the principal market-volatility variable. The observations are compared across different VIX levels to examine whether the effectiveness of the strategy varies with the prevailing volatility environment. This approach is consistent with the study's motivation that expiry-day option behaviour may differ according to market conditions.

The empirical analysis therefore combines descriptive statistics, trade-level return analysis, holding-period analysis, and comparison across volatility conditions. The results are used to evaluate trading consistency, downside exposure, and the practical relationship between option-return objectives and required holding time.

Empirical Analysis

The empirical analysis is based on 24 expiry-day observations in which a Call option was purchased at approximately 2:00 PM and subsequently exited during the afternoon session. The analysis focuses on realised option returns and holding duration. This structure directly addresses the study's objective of examining whether shorter-duration option buying can provide a more effective alternative than waiting for substantially larger profit targets.

The results reveal considerable variation in the performance of the strategy. Across the 24 observations, **14 trades generated positive returns, while 9 trades generated negative returns and 1 trade produced approximately zero return.** Although the number of profitable observations exceeded the number of losing observations, the magnitude of losses was substantially larger in several cases. Consequently, the median return was approximately **3.73%**. The observed returns ranged from approximately **-95.19% to +77.16%**, demonstrating the substantial dispersion and downside risk associated with expiry-day Call-option buying.

The holding-period analysis indicates that trades were generally short duration. The average holding period was approximately **25 minutes**, with the median close to **22 minutes**. The shortest observed holding period was less than one minute, whereas the longest was approximately **59 minutes**.

An important finding emerges when return is examined against holding duration. The correlation between realised return and holding period is approximately **-0.55**, indicating a moderate negative association in this sample. Thus, longer holding periods were not systematically associated with higher returns; instead, several extended-duration trades experienced substantial premium erosion. This observation provides preliminary empirical support for investigating the time–target trade-off proposed in the study.

India VIX also shows a negative sample correlation with realised return of approximately **-0.31**. This suggests that higher closing volatility levels did not automatically translate into superior Call-option returns. The result indicates that volatility conditions alone may be insufficient to determine strategy success and that the timing and magnitude of underlying price movement remain important.

Overall, the empirical evidence suggests that the strategy can produce frequent positive outcomes, but these gains are accompanied by considerable return variability and significant downside observations. Therefore, reducing the profit target and controlling holding duration warrants further investigation as a potential means of improving the consistency of expiry-day Call-option buying.

CONCLUSION, LIMITATIONS AND FUTURE SCOPE

This study examined the time–target trade-off associated with rule-based Call-option buying on index expiry days, with a predetermined entry around 2:00 PM. The empirical evidence indicates that although profitable trades occurred more frequently than losing trades, the strategy was exposed to substantial downside risk. The wide dispersion of realised returns demonstrates that expiry-day option buying can produce significant gains over short periods, but adverse price movements can result in rapid premium erosion. The negative

relationship observed between holding duration and realised return further suggests that prolonged exposure does not necessarily improve strategy performance. These findings support the relevance of evaluating smaller profit targets together with shorter holding periods rather than focusing exclusively on very high return objectives.

The study has several limitations. First, the analysis is based on a relatively small sample of **24 observations**, which limits the generalisability of the findings. Second, the study focuses specifically on Call-option buying and therefore does not examine Put options or alternative directional strategies.

Future research can extend the sample across a substantially longer period and include both Call and Put options. Alternative profit targets and predefined stop-loss levels can be systematically compared using larger samples. Statistical significance testing and out-of-sample or walk-forward validation could provide stronger evidence regarding the robustness of the strategy. Finally, examining different entry times and comparing expiry-day strategies with non-expiry trading days would help determine whether the observed time–target relationship is specific to the expiry-day environment.

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