

Options Trading Strategies and Call Calendar Analysis

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Introduction

This report details the development and backtesting of various options trading strategies, including Long Straddle, Covered Call, and Protective Put, across different market scenarios. It also analyzes the risk-reward profile, time decay effects, and volatility impacts of two distinct Call Calendar scenarios, focusing on the implications of differing time horizons. This report serves as a comprehensive exploration of options trading strategies and their practical applications.

Task 1: Strategy Development and Backtesting

Data Generation

The analysis utilizes historical closing prices of a financial instrument (e.g., Bank Nifty) over a period of five years. Data is collected from reputable sources and cleaned to remove any anomalies. The simulated market conditions are categorized as high volatility, bullish with low volatility, and bearish with high implied volatility.

Long Straddle Strategy

High Volatility Market: The Long Straddle strategy is employed when expecting high market volatility. It involves buying both a call and a put option with the same strike price and expiration date.

- **Implementation:** An initial investment is made to buy at-the-money (ATM) options. The profit potential is theoretically unlimited for the call option, while the put option protects against significant downside movement.
- **Backtesting Results:** Historical data is used to identify periods of increased volatility (e.g., earnings announcements, economic reports). The results demonstrate a strong profit when the underlying asset moves significantly in either direction.

Covered Call Strategy

Bullish Market with Low Volatility: This strategy is implemented in a bullish market with low expected volatility. It involves owning the underlying asset and selling a call option on the same asset.

- **Implementation:** The strategy generates income through premiums received from the sold call option. This provides a cushion against minor declines in the underlying asset.
- **Backtesting Results:** In stable or slowly rising markets, the returns from premiums enhance total returns. However, in a strong upward movement, profits are capped at the strike price of the call sold.

Protective Put Strategy

Bearish Market with High Implied Volatility: In a bearish market with high implied volatility, a Protective Put strategy can be used. It involves owning the underlying asset and buying a put option to protect against potential losses.

- **Implementation:** This strategy allows the investor to maintain upside potential while having the right to sell at the put option's strike price.
- **Backtesting Results:** The backtesting shows that this strategy minimizes losses during market downturns, especially when implied volatility is high, as the cost of puts increases.

Main Execution Function

This function executes the backtests for all strategies using a Monte Carlo simulation approach. Each simulation run considers random movements based on historical volatility, and results showcase the profitability or loss incurred with each strategy over time.

Analysis of Results

The backtesting results illustrate the performance under various market conditions:

- **Long Straddle:** Maximizes profits during substantial volatility, particularly useful during events like earnings releases.
- **Covered Call:** Positive performance in a bullish market; however, profit potential is capped when the stock rises significantly.
- **Protective Put:** Provides a safety net in downward market movements, particularly effective during high volatility periods.

Task 2: Call Calendar Analysis

Scenario 1: Short Call (60 days) vs. Long Call (70 days)

This scenario examines a call calendar spread, focusing on performance concerning different underlying price movements and potential time decay.

- **Implementation:** The short call is sold with a shorter expiration (60 days), while a long call is purchased with a longer expiration (70 days) at the same strike price.
- **Performance Analysis:** The profit potential depends on the underlying asset trading close to the strike price at the time of the short call's expiration.
- **Results:** Backtesting shows that the strategy profits from time decay on the short position while maintaining upside potential with the long position.

Scenario 2: Short Call (0 days) vs. Long Call (1 day)

This scenario investigates a short time horizon, comparing a short call with zero days to a long call with one day.

- **Implementation:** This scenario tests extreme time decay effects where the short call expires immediately while the long call is held for one more day.
- **Performance Analysis:** The short call will expire worthless if the asset price is below the strike, leading to immediate profit.
- **Results:** The analysis reveals that very short-term options can provide quick returns but involve higher risks due to rapid time decay.

Analysis of Task 2 Results

- **Risk-Reward Profile:** Limited profit potential and defined maximum loss. Calendar spreads provide flexibility but require careful management.
- **Time Decay Effects:** Greater time difference increases the impact of time decay, making it essential to assess market conditions and timing strategies.
- **Volatility Impacts:** High volatility significantly affects profitability and spread value, creating opportunities for adjustments in strategy.

Discussion

Key insights from both scenarios include:

- Time horizons influence risk-reward profiles and sensitivity to decay, highlighting the need for strategic timing in options trading.
- Larger expiry differences increase the significance of time decay, especially in uncertain markets where rapid adjustments may be needed.
- Short-term spreads are sensitive to volatility, allowing for rapid gains or losses, necessitating constant monitoring of market conditions.

Conclusion

This report has analyzed multiple options trading strategies and the concept of call calendars. The backtesting of various strategies demonstrates their efficacy under diverse market conditions.