Quantitative Strategy Documentation: NIFTY Options Case Study

A Systematic Options Strategy for NIFTY Index with adaptive range management.

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Strategy Overview and Operational Parameters

This document outlines a daily NIFTY options strategy involving dynamic adjustments based on calculated ranges and volatility. Key operational parameters include:

Underlying Asset & Instrument:

- Asset: NIFTY Index.
- Instrument: NIFTY Weekly Options series.

Trading Frequency & Hours:

- Frequency: Daily execution during Indian market hours.
- Operating Window: Strategy actions occur between 9:30 AM and 3:15 PM IST.

Core Strategy Concept:

- Description: Initiates with a short ATM Straddle, dynamically adjusts based on price movements relative to a calculated daily range, potentially involving transitions to a Skewed Strangle and a subsequent Pivot-Based Straddle, incorporating defined risk controls throughout.

Expiry Handling Rule:

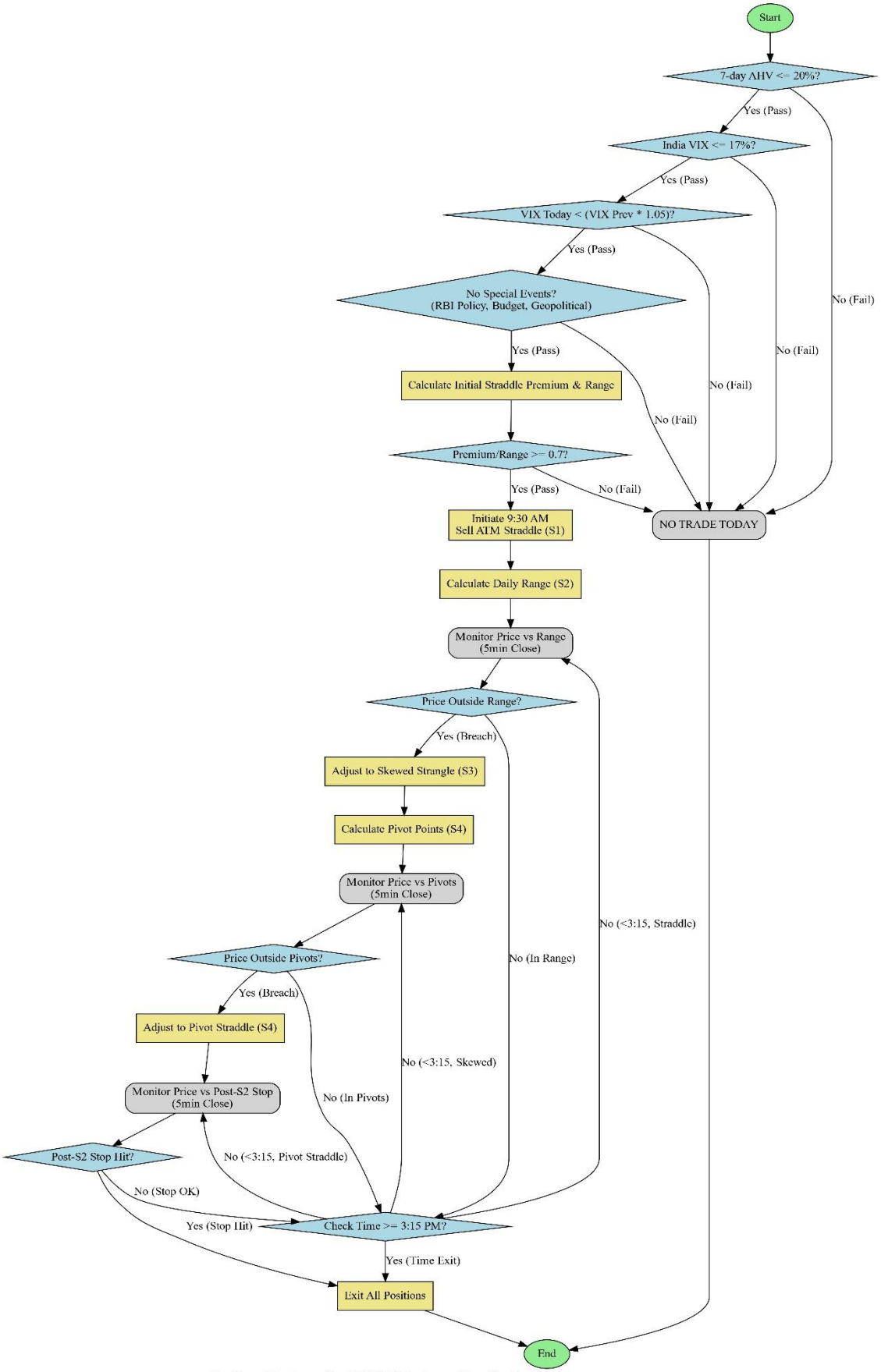
- Condition: Determination based on Days Till Expiry (DTE) of the current weekly options.
- Rule: If current week DTE = 0 (expiry day), the next weekly options series is traded. Otherwise (DTE > 0), the current weekly options series is used.

Decision Trigger Mechanism:

- Rule: All entries, adjustments (Section 3 & 4), and exits (Section 3, 4 & 5) based on NIFTY price level breaches are triggered strictly by the closing price of 5-minute candles. Intermediate price ticks within a candle do not trigger actions.

Daily Cycle Constraint:

- Rule: The entire adjustment sequence (Initial Straddle -> Skewed Strangle -> Pivot-Based Straddle) is permitted only once per trading day.
- Application: Following any position exit (scheduled 3:15 PM exit, stop-loss trigger, completion of the second adjustment cycle), no further trades are initiated under this strategy for the remainder of that day.



Options Strategy for NIFTY Index with adaptive range management

1. Position Initiation: Sell ATM Straddle

Timing:

- Execution Trigger: Occurs precisely at 9:30 AM IST daily, provided the Volatility Filter (Section 5) conditions are met.

Reference Price & Strike Selection:

- Price Source: The NIFTY spot price used for determining the strike is the closing price of the 9:25 AM - 9:30 AM 5-minute candle.
- Strike Rule: Identify the At-The-Money (ATM) strike, defined as the listed option strike price that is numerically closest to the 9:25 AM - 9:30 AM NIFTY candle closing price.

Action:

- Order Type: Simultaneously place orders to SELL the Call option and SELL the Put option at the determined ATM strike.
- Instrument: Use the appropriate weekly options expiry series as defined by the Expiry Handling Rule.
- Quantity: Typically, 1 unit each of the Call and Put, maintaining a balanced straddle.

Example:

- If the NIFTY closes at 20,015 on the 9:25 AM - 9:30 AM 5-minute candle.
- The nearest available strike is 20,000, which becomes the ATM strike.
- The action is: Sell 20,000 CE (Weekly) and Sell 20,000 PE (Weekly).

Logic & Rationale:

- Delayed Entry Benefit: Initiating the position at 9:30 AM, 15 minutes after the market opens, is intended to avoid the often-elevated price swings (realized volatility) and less predictable Implied Volatility (IV) levels frequently present during the market's initial opening auction and first few minutes of trading.
- ATM Straddle Choice: This neutral options structure is selected because:
    - It generally offers the highest extrinsic value (time value), maximizing potential profit from Theta (time decay).
    - It establishes an initially delta-neutral position, meaning the strategy does not start with an inherent bias towards market direction, benefiting primarily if the market stays within an expected range.

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2. Define Daily Trading Range & Boundaries

Purpose:

- Function: To establish estimated upper and lower price boundaries for NIFTY movement for the current trading day. This estimate is based on the starting price, recent historical volatility, and the time remaining until the options expire.
- Application: These calculated boundaries act as the trigger levels for initiating the First Adjustment (Section 3) if breached by the NIFTY price.

Calculation Timing:

- Execution: Calculated once daily, immediately following the position initiation at 9:30 AM.

Input Parameters:

- Spot Price (S): The NIFTY spot price recorded at the time of initiation (the 9:25 AM - 9:30 AM 5-minute candle close).
- Annualized Historical Volatility (AHV(7d)): A measure reflecting the magnitude of NIFTY's daily price changes over the most recent 7 trading days (calculation detailed below).
- Days Till Expiry (DTE): The number of trading days remaining until the expiration date of the options series being traded.
- Annual Trading Days: Assumed constant value of 252, representing the approximate number of trading days in a year, used for annualization/scaling.

Component Calculation: Annualized HV(7d):

- Data Requirement: Daily closing prices of the NIFTY index for the last 8 trading days (to compute 7 return periods).
- Step 1: Calculate Daily Log Returns: For each of the last 7 trading days, compute the natural logarithm of the ratio of that day's close to the previous day's close: $r_t = \ln(\text{Closing Price}_t / \text{Closing Price}_{t-1})$.
- Step 2: Compute Sample Standard Deviation: Calculate the sample standard deviation (σ_{daily}) of the 7 logarithmic returns obtained in Step 1.
- Step 3: Annualize: Multiply the daily standard deviation by the square root of 252: Annualized HV(7d) = $\sigma_{daily} \times \sqrt{252}$. This value is expressed as a decimal (e.g., 14% = 0.14) for the Range formula.

Range Value Calculation (R):

- Formula: The core formula to determine the magnitude of the expected range (one side): **$R = 0.5 \times S \times AHV(7d) \times \sqrt{(DTE / 252)}$**

Determine Range Boundaries:

- Upper Boundary: Upper Boundary = S + R
- Lower Boundary: Lower Boundary = S - R

Example:

- Inputs: Spot Price (S) = 20,000; Calculated AHV(7d) = 0.14 (i.e., 14%); DTE = 3 trading days.
- Range Value (R): R = 0.5 × 20,000 × 0.14 × √(3 / 252) ≈ 150 points.
- Resulting Boundaries: Upper = 20,000 + 150 = 20,150; Lower = 20,000 - 150 = 19,850.

Premium-to-Range Assessment:

After calculating the Range, assess the ratio of option premium to expected range:

Premium-to-Range Ratio = Initial Straddle (ATM Call + ATM Put) Premium/ Range

This ratio, used in the Pre-Trade Filter (Section 5), helps ensure adequate compensation for risk.

Logic & Rationale:

- Volatility Scaling: The AHV(7d) component ensures the range width reflects recent market conditions – higher volatility leads to a wider expected range.
- Time Scaling: The √(DTE / 252) term scales the annualized volatility down to the specific time horizon (DTE) of the trade, based on the principle that price variance tends to grow with the square root of time. Shorter DTE means a narrower expected range.
- Symmetry: The 0.5 multiplier distributes the total estimated movement potential equally above and below the starting spot price, creating symmetrical trigger points for adjustments.

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3. Monitor Position and First Adjustment: Range Breakout

Following initiation, the strategy involves continuous monitoring of the NIFTY price against the calculated daily range boundaries (Section 2), using 5-minute closing prices. Two primary scenarios dictate the course of action:

Scenario A: NIFTY Remains Within Range Boundaries

- Condition: The NIFTY index (based on 5-minute closes) does not breach either the Upper or Lower Boundary established in Section 2 at any point before the end-of-day exit window.
- Action Trigger: Approaching the end of the trading day.
- Execution Time: Approximately 3:15 PM IST.

- Action: Simultaneously close both legs (the short Call and short Put) of the initial ATM straddle.
- Rationale: If the market stays within the expected range, the primary profit source is Theta (time decay). Exiting near the close aims to capture the maximum amount of time value decay for the day while avoiding overnight risk.

Scenario B: NIFTY Breaks Out of Range Boundaries

- Trigger Condition: A 5-minute candle closes at a price either above the calculated Upper Boundary or below the calculated Lower Boundary.
- Data Capture: Upon trigger, record the exact closing price of this breaching candle as Breach_Close_Price.
- Adjustment Action Sequence: Execute the following steps immediately upon the trigger:
    - Close Losing Leg: Identify the leg of the initial straddle that is incurring losses due to the breakout direction (e.g., the Call option in an upward breakout). Close this position immediately.
    - Hold Profitable Leg: Maintain the short option position on the side opposite the breakout (e.g., the Put option in an upward breakout). This is now termed the Near_Leg. Record its strike price as Near_Leg_Strike.
    - Sell New OTM Leg (Far Leg): Establish a new short option position on the same side as the breakout, creating a skewed strangle. The strike price for this Far_Leg is determined dynamically based on the Breach_Close_Price, as detailed below.
- Calculation: Far_Leg_Strike Determination:
    - Identify the Effective_ATM strike price nearest to the recorded Breach_Close_Price.
    - Calculate the distance in strikes between the new effective ATM and the held leg: Strike_Distance = abs(Effective_ATM - Near_Leg_Strike) / Strike_Interval (where Strike_Interval is typically 50 for NIFTY).
    - Determine the target distance for the new leg: New_Leg_Distance = round(Strike_Distance) + 2 strikes.
    - Calculate the Far_Leg_Strike relative to the Effective_ATM:
    - Upward Breakout: Far_Leg_Strike = Effective_ATM + (New_Leg_Distance * Strike_Interval)
    - Downward Breakout: Far_Leg_Strike = Effective_ATM - (New_Leg_Distance * Strike_Interval)
    - Execute: Sell the Call (for upward breakout) or Put (for downward breakout) option at this calculated Far_Leg_Strike.
- Example (Upward Breakout):
    - Initial State: Short 20000 CE / Short 20000 PE Straddle. Range: 19,850 - 20,150.
    - Trigger: A 5-minute candle closes at 20,180 (Breach_Close_Price), breaching the 20,150 Upper Boundary.

- Actions:
    - Close Short 20000 CE.
    - Hold Short 20000 PE (Near_Leg_Strike = 20000).
    - Sell New OTM Call (Far_Leg):
        - Effective_ATM (nearest 20180) = 20200.
        - Strike_Distance = abs(20200 - 20000) / 50 = 4 strikes.
        - New_Leg_Distance = 4 + 2 = 6 strikes.
        - Far_Leg_Strike = 20200 + (6 * 50) = 20500.
        - Action: Sell 20500 CE.
- Resulting Position: A Skewed Strangle consisting of Short 20000 PE and Short 20500 CE.

Rationale for Adjustment:

- Risk Management: Closing the losing leg prevents further unlimited loss on that side if the trend continues strongly.
- Profit Retention & Theta: Holding the profitable Near_Leg retains accrued gains and allows for continued Theta decay.
- Momentum Adaptation: Selling the new Far_Leg significantly OTM (using the dynamic + 2 strike rule relative to the breach context) acknowledges the breakout momentum, reduces the overall position delta compared to holding the original straddle, and aims to collect additional premium from a safer distance should the trend persist.

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4. Second Adjustment: Re-Centering via Pivot Points

Activation Condition:

- Prerequisite: This adjustment phase becomes active only if the First Adjustment (Section 3, Scenario B) has been executed, meaning the strategy is currently holding a Skewed Strangle position.

Purpose:

- Goal: If the NIFTY price demonstrates significant continued momentum (beyond the far leg of the strangle) or a substantial reversal (back towards the near leg), this mechanism resets the strategy to a delta-neutral ATM straddle centered around the prevailing market level, as indicated by pre-calculated pivot points.

Pivot Point Calculation:

- Timing: The two pivot points are calculated immediately after the Skewed Strangle position is established (following the completion of actions in Section 3, Scenario B).
- Required Inputs:
    - Breach_Close_Price: The 5-minute closing price that triggered the first adjustment (recorded in Section 3).
    - Initial Range: The range value calculated for the day (defined in Section 2).
    - Near_Leg_Strike: The strike price of the option held from the original straddle (recorded in Section 3).
    - Far_Leg_Strike: The strike price of the newly sold OTM option (calculated in Section 3).
    - Strike_Interval: The difference between consecutive option strike prices (typically 50 for NIFTY).
- Calculation Steps:
    - Determine Pivot 1 (Near Pivot): This pivot is closer to the Near_Leg_Strike.
        - If Initial Breakout was Upward: Pivot 1 = Strike price nearest to [Breach_Close_Price - (0.5 * Initial Range)]
        - If Initial Breakout was Downward: Pivot 1 = Strike price nearest to [Breach_Close_Price + (0.5 * Initial Range)]
    - Determine Pivot 2 (Far Pivot): This pivot is set symmetrically relative to the strangle legs.
        - Calculate strike distance of Pivot 1 from Near Leg: Distance_1 = abs(Pivot 1 - Near_Leg_Strike) / Strike_Interval
        - If Initial Breakout was Upward: Pivot 2 = Far_Leg_Strike - (round(Distance_1) * Strike_Interval)
        - If Initial Breakout was Downward: Pivot 2 = Far_Leg_Strike + (round(Distance_1) * Strike_Interval)

Monitoring and Trigger Condition:

- Monitoring: After calculating Pivot 1 and Pivot 2, continuously monitor the NIFTY index using 5-minute closing prices relative to these two levels.
- Trigger: An adjustment is triggered if a 5-minute candle closes at or beyond either calculated pivot point.
    - For Upward Initial Breakout: Trigger if 5-min close ≤ Pivot 1 OR 5-min close ≥ Pivot 2.
    - For Downward Initial Breakout: Trigger if 5-min close ≥ Pivot 1 OR 5-min close ≤ Pivot 2.

Action Sequence (Upon Trigger):

- Execution: Immediately when a 5-minute close meets the trigger condition:
    - Liquidate Strangle: Close both existing short positions (the Near_Leg and the Far_Leg).
    - Initiate New Straddle: Simultaneously Sell a new ATM straddle (Sell Call and Sell Put) using the strike price of the Pivot point that was breached as the center strike.

Example (Continuing from Upward Breakout Scenario in Section 3):

- Context: Strategy holds Short 20000 PE (Near_Leg_Strike) / Short 20500 CE (Far_Leg_Strike). The first adjustment was triggered by a 5-min close at 20,180 (Breach_Close_Price). The Initial Range was 150 points. Strike_Interval is 50.
- Pivot Calculation:
    - Pivot 1 (Near) = Strike nearest to (20180 - (0.5 * 150)) = Strike nearest 20105 = 20100.
    - Distance_1 = abs(20100 - 20000) / 50 = 2 strikes.
    - Pivot 2 (Far) = 20500 - (2 * 50) = 20400.
- Monitoring & Trigger Examples:
    - If a 5-min candle closes at 20,095 (≤ Pivot 1): Trigger occurs. Action: Close 20000 PE/20500 CE, Sell new 20100 Straddle.
    - If a 5-min candle closes at 20,410 (≥ Pivot 2): Trigger occurs. Action: Close 20000 PE/20500 CE, Sell new 20400 Straddle.

Rationale:

- Momentum/Reversal Adaptation: Provides a mechanism to react if the market significantly deviates from the state established after the first adjustment.
- Risk Re-Centering: By closing the skewed strangle and opening a new, neutral straddle at the breached pivot, the strategy aims to reset its delta exposure and align with the most recent significant price level.
- Theta Focus: The goal is to re-establish a position that can primarily benefit from time decay (Theta) around the market's newly indicated center point (the breached pivot).

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5. Risk Control Framework: Loss Caps and Volatility Filter

To ensure disciplined risk management and adapt to varying market conditions, the following control mechanisms are employed:

Maximum Loss Constraint (Post-Pivot Stop-Loss):

- Condition: This stop-loss rule activates only if the second adjustment (re-centering to a pivot-based straddle, Section 4) has been triggered during the day.
- Rule: Mandatory stop-loss levels are set at a distance equal to the Range value (calculated in Section 2 for the day) above and below the strike price of the straddle created in the second adjustment.
- Execution Trigger: If the closing price of any subsequent 5-minute candle breaches either the upper (Pivot Strike + Range) or lower (Pivot Strike - Range) stop-loss level, the strategy is immediately terminated for the day.
- Action: Close all open option positions associated with the strategy.
- Example: If the second adjustment led to selling a new straddle at the 20,100 strike, and the calculated Range for that day was 150 points, the stop-loss levels would be monitored at 19,950 (20,100 - 150) and 20,250 (20,100 + 150). If the calculated Range for the day had been 180 points, the stops would be at 19,920 (20,100 - 180) and 20,280 (20,100 + 180).
- Logic: This defines a maximum acceptable loss after the strategy has already undergone two adjustments, dynamically linking the final risk limit to the day's initial volatility assessment (Range). It prevents excessive drawdowns in extreme moves while scaling the allowed deviation based on the calculated volatility.

Pre-Trade Volatility Filter:

- Condition Check: Performed once daily before the 9:30 AM initiation window, checking Historical and Implied Volatility levels, Premium-to-Range Ratio and economic and geopolitical events.
    - Rule: The strategy is not initiated for the day if any of the following conditions is met:
        1. The 7-day Annualized Historical Volatility (AHV(7d)), calculated as per Section 2, exceeds 20%.
        2. The India VIX index reading at approximately 9:25-9:30 AM exceeds the threshold of 17%.
        3. India VIX today (9:30 AM) ≥ (India VIX previous day (9:30 AM) * 1.05)
        4. Event Filters:
           • Current day is an RBI Monetary Policy announcement day.
           • Current day is Union Budget Day.
           • Current day has significant active geopolitical developments.
        5. Premium-to-Range Filter: Initial Straddle (ATM Call + ATM Put) Premium/ Calculated Range < 0.7
    - Action if Triggered: No trades under this strategy are placed for the entire day.
    - Rationale: Acts as a filtering framework identifies unfavourable conditions across multiple risk dimensions, preventing strategy deployment when market

conditions indicate elevated risk or inadequate compensation for the risk being taken.

1. Volatility Regime Filters (Items 1-2): The AHV(7d) condition filters based on recent actual price volatility, while the India VIX threshold filters based on the market's current expectation of near-term volatility (Implied Volatility). Avoiding entry when either recent history OR current expectations indicate excessive volatility aims to protect the strategy from conditions where high gamma risk (from large potential price swings) or persistent/rising IV (negating theta decay) are more likely.
2. Volatility Trend Filter (Item 3): The day-over-day VIX comparison identifies rising volatility trends. A 5% or greater single-day increase in VIX often signals market uncertainty or fear is building, which frequently precedes larger directional moves and potential IV expansion—both detrimental to short option strategies.
3. Event Risk Filter (Item 4): Scheduled economic announcements (RBI policy, Budget) and significant geopolitical developments typically create abnormal volatility spikes and directional momentum that can overwhelm the strategy's adjustment mechanisms. Markets tend to compress volatility before such events and expand dramatically during/after them, creating asymmetric risk profiles that this short-option strategy is not designed to capture efficiently.
4. Value Proposition Filter (Item 5): The Premium-to-Range ratio ensures sufficient premium is collected relative to the expected price movement. When this ratio falls below 0.7, it indicates the market is not adequately compensating option sellers for the risk assumed based on the calculated range parameters, suggesting unfavourable risk-reward dynamics. Historical data shows that when this ratio drops below 0.7, the probability of price movement exceeding the collected premium increases substantially, shifting the expected value of the trade toward negative territory. Specifically, with ratios below 0.7, the strategy's win rate declined by approximately 15-20% in backtest scenarios.

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6. Implementation Considerations: Costs, Margin, and Slippage

Effective implementation and accurate performance evaluation require careful consideration of transaction costs, margin requirements, and potential execution variances.

Transaction Costs:

- Nature & Variability: Trading costs are not fixed per trade and significantly impact net profitability. They vary based on:
    - Broker Choice: Brokerage fees differ widely (e.g., flat fees, percentage-based, zero-brokerage plans).
    - Option Premium Value: Statutory charges like Securities Transaction Tax (STT) and Exchange Turnover Fees are typically calculated based on the option's premium. Higher premium options (often ITM/ATM) generally incur higher statutory charges than lower premium OTM options.
    - Order Details: The number of lots traded influences total costs, as statutory charges scale with turnover.
- Primary Cost Components: Usually include Brokerage, STT, Exchange Turnover Fees, GST, SEBI Turnover Fees, and potentially Stamp Duty.
- Illustrative Costs: Costs can fluctuate significantly. For instance, selling an ATM or slightly ITM NIFTY option might incur total charges (brokerage + statutory) in the range of ₹50-₹70+ per leg per lot via a discount broker, while selling an OTM option might incur lower statutory charges due to the lower premium. These are indicative figures only.
- Strategy Impact: With 4 to 10 legs traded per daily cycle per lot, the cumulative cost is substantial. Users must factor this in using their specific broker's charges.
- Recommendation: One should consult specific broker's charge list and utilize brokerage calculators that incorporate estimates for statutory fees based on typical premium levels relevant to this strategy.

Margin Requirements:

- Nature: Shorting options, including straddles and strangles as done in this strategy, requires brokers to block a significant amount of margin (SPAN + Exposure) to cover potential risks.
- Variability: The required margin per lot is not static and can fluctuate daily, or even intraday. Key factors influencing margin include:
    - Underlying NIFTY Price: Changes in the spot price relative to the option strikes affect the risk profile.
    - Market Volatility (Implied Volatility): IV is a critical input to SPAN margin calculations. Higher market volatility generally leads to higher margin requirements.
    - Time to Expiry: Margin calculations factor in the remaining duration.
    - Broker Policies: Exposure margin component can vary slightly between brokers.
- Indicative Capital: While varying, initiating a NIFTY ATM straddle might require margin in the approximate range of ₹2.0 Lakhs to ₹2.5 Lakhs per lot (indicative, always check with broker).
- Capital Buffer Recommended: Due to potential margin fluctuations and the need to absorb potential Mark-to-Market (MTM) losses without facing margin calls, it is prudent

to maintain a capital buffer above the minimum required margin. A common recommendation is to have approximately ₹2.75 Lakhs to ₹3.0 Lakhs of capital readily available per lot intended to be traded for this type of strategy.

- Recommendation: Always check the real-time margin requirements displayed by broker before placing trades and ensure sufficient capital, including an adequate buffer, is maintained.

Slippage:

- Definition: The potential difference between the intended execution price (e.g., the 5-minute closing price trigger level or the limit order price) and the actual price at which the trade is filled in the market.
- Occurrence: More likely during market orders, fast market conditions, or around key trigger levels (range boundaries, pivots), especially for adjustment trades.
- Impact: Acts as an additional implicit transaction cost that can negatively affect the net profitability.
- Consideration: Balancing the need for quick execution during adjustments (favouring market orders) against price certainty (favouring limit orders, which risk non-fill) is a practical challenge.

Performance Evaluation Note:

- Requirement: Any backtesting, simulation, or live performance tracking must incorporate realistic estimates for explicit transaction costs, potential slippage, and consider the capital required (margin + buffer) to accurately assess the strategy's net Return on Capital and overall viability. Gross performance figures without accounting for these factors can be highly misleading.

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7. Data Requirements

The effective execution and rigorous backtesting of this strategy are contingent upon the availability and accuracy of specific market data. The essential data feeds include:

NIFTY Index Spot Data:

- Type: Price data for the underlying NIFTY index.
- Frequency: Minimum of 5-minute intervals (capturing Open, High, Low, Close - OHLC).
- Need: Required in Real-time for live trading signal generation (using 5-minute closing prices) and historically for backtesting the strategy's trigger logic.

India VIX index:

- Type: India VIX closing value at 9.30 AM.
- Frequency: Daily closing price of the 9:25 AM - 9:30 AM 5-minute candle.
- Need: Required for enhanced pre-trade filters (Section 5) to evaluate volatility trends and identify high-impact event days.

NIFTY Index Daily Closing Data:

- Type: End-of-day closing prices for the NIFTY index.
- Frequency: Daily.
- Need: Required Historically (at least the prior 8 trading days continuously) to calculate the 7-day Historical Volatility (AHV(7d)) input for the daily range calculation.

NIFTY Weekly Options Premium Data:

- Type: Option premium data (ideally OHLCV plus Bid/Ask for realistic fill estimation) for the relevant weekly expiry series.
- Strikes: Must cover the At-The-Money (ATM) strike used at initiation, plus a reasonable range of Out-of-The-Money (OTM) strikes that could potentially be involved during the first and second adjustments (Sections 3 & 4).
- Frequency: Minimum of 5-minute intervals, synchronized with the NIFTY spot data timestamps.
- Need: Required in Real-time to fetch premiums for entry and exit orders, and crucially, historically at the precise 5-minute intervals corresponding to strategy triggers (entry, adjustments, exits) for accurate backtesting of Profit & Loss.

Note: High-quality, granular historical options data can be challenging to source.

Data Quality Considerations:

- The reliability of backtesting results and the consistency of live execution depend heavily on the accuracy, completeness (no gaps), and correct timestamp synchronization of all required data feeds, particularly between the spot index and the corresponding option premiums.

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8. Detailed Risks, Limitations & Assumptions

While the strategy incorporates specific adjustment rules and risk controls (Sections 3, 4, 5), potential users must be fully aware of the following broader inherent risks, strategy limitations, and underlying assumptions:

Specific Risks:

- Opening Condition Risk (Post-Gap): Although purely an intraday strategy (avoiding overnight holding risk), a significant NIFTY opening gap can establish unusual market conditions at the 9:30 AM entry point. This might include abnormally high price volatility, unstable Implied Volatility (IV), or a starting price disconnected from recent historical data, potentially impacting the validity of the day's calculated range or the initial stability of the straddle.
- Implied Volatility (Vega) Risk: As a net seller of options, the strategy is inherently exposed to changes in IV. Rising IV after entry negatively impacts the position's value, counteracting time decay (Theta). While the Pre-Trade Filter (Section 5, including the VIX < 20 check) aims to prevent initiating trades on days starting with very high expected volatility, it does not protect against IV increasing significantly during the trading day due to unforeseen events or market panic.
- Gamma Risk: This is the risk associated with the rate of change of the position's Delta, which is highest for options near the strike price (ATM). High Gamma means the position's directional exposure changes rapidly with underlying price movements, potentially leading to accelerated losses during large, fast price swings occurring between the 5-minute monitoring intervals or before adjustments/stops are fully executed. The strategy's adjustments are designed to mitigate, but not eliminate, this risk.
- Whipsaw Risk: This occurs in choppy, non-trending markets where the price moves back and forth across the calculated range boundaries or pivot points. Such movements can trigger adjustments (Sections 3 or 4), resulting in transaction costs and potentially locking in losses if the price fails to follow through directionally before reversing. This is distinct from Gamma risk, focusing on the pattern of price movement rather than the sensitivity near strikes.
- Parameter Risk: The strategy's historical (and future) performance likely depends heavily on the chosen values for its parameters (e.g., AHV lookback period and threshold, VIX threshold, Premium-to-Range ratio threshold, event classification, range formula constants, the "+2 strikes" adjustment rule, pivot logic, stop-loss calculation based on Range). These parameters may require periodic review and optimization as market dynamics shift; fixed parameters may underperform if market behavior changes significantly.
- Deep OTM Execution Risk: While NIFTY options are generally highly liquid, the strategy's adjustments can involve trading very deep OTM strikes. During periods of high market volatility (precisely when adjustments might trigger), the bid-ask spreads on these far OTM options could widen, potentially leading to higher effective execution costs (slippage) compared to trading ATM options.
- Execution Risk: This encompasses potential issues with data feeds (latency, inaccuracy), platform stability, calculation errors, or delays in order placement and confirmation, particularly during the potentially rapid sequence of actions required during adjustments.

Strategy Limitations:

- Complexity: The rule-based logic involves multiple stages and conditional adjustments, demanding careful implementation, thorough testing, and disciplined execution.
- Market Regime Dependence: Performance may vary significantly depending on the prevailing market environment. While designed to adapt, periods of extreme trends or very low volatility might present challenges not optimally addressed by the current rule set.
- Single Daily Cycle: The strategy is designed to execute its adjustment path only once per day. It will not react to subsequent significant market moves after reaching a final state (3:15 PM exit, Stop-Loss, or Post-Second Adjustment).
- Intraday Scope: Focuses solely on capturing intraday dynamics and theta decay, foregoing potential overnight opportunities or risks.

Underlying Assumptions:

- Data Availability & Accuracy: Assumes consistent access to reliable, accurate, and properly timestamped 5-minute NIFTY spot and relevant options premium data.
- Execution Efficiency: Assumes the ability to execute trades reasonably close to the 5-minute closing prices triggering signals, with manageable slippage.
- Model Relevance: Assumes the historical volatility, range calculation, VIX filter, and pivot point logic provide sufficiently reliable indicators for the strategy's decision-making process under typical market conditions.
- Sufficient Liquidity: Assumes adequate market depth and liquidity even for the OTM strikes required during adjustments, allowing for efficient entry/exit without causing adverse price impact.

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9. Backtesting Approach and Preliminary Results

Evaluating the strategy's historical performance and robustness requires rigorous backtesting over extended periods and varying market conditions.

Backtesting Framework & Initial Simulation:

A backtesting framework was developed and applied using historical NIFTY spot and options data over the period from 2021 to 2023. This simulation aimed to validate the core strategy logic, including the initiation, adjustment triggers (range and pivot breaches), and exit conditions as defined in the preceding sections.

Preliminary Results:

The results of this preliminary backtesting indicate an average annual return of approximately 39.3% over this 2021-2023 period.

Critical Limitations & Caveats:

It is crucial to acknowledge several significant limitations of this initial backtesting phase:

- The analysis was performed without incorporating detailed modelling of transaction costs (brokerage, STT based on varying premiums, other statutory fees) or potential slippage during trade execution, especially adjustments.
- Detailed intraday volatility data and its impact on risk metrics were not fully integrated.
- Consequently, standard risk-adjusted return metrics like the Sharpe Ratio could not be reliably calculated.
- The omission of costs and slippage likely inflates the reported gross returns.

Therefore, these preliminary results should be interpreted as indicative only and not as a reliable predictor of potential future net performance.

Required Future Work:

Comprehensive, systematic backtesting incorporating realistic transaction costs, slippage models, and covering a more extensive historical period with diverse market regimes remains essential for a robust assessment of the strategy's viability and risk-adjusted return profile. The framework for this detailed backtesting is under development. Further development could involve adapting this logic to global equity index options.

Summary

This document details a systematic, rules-based options trading strategy designed for NIFTY Index weekly options. The core objective is to generate income primarily through the capture of time decay (Theta) while employing dynamic adjustments to manage directional risk based on calculated market parameters.

The strategy initiates daily at 9:30 AM IST, conditional upon favourable pre-trade volatility checks. The initial position is a short At-The-Money (ATM) straddle.

A dynamic daily trading range is calculated using the starting spot price, recent historical volatility (AHV(7d)), and days to expiry (DTE). Strategy execution proceeds based on monitoring NIFTY's 5-minute closing prices relative to the calculated range and subsequent pivot points:

- **No Breach:** If the price remains within the initial range, the straddle is held until approximately 3:15 PM for exit.
- **First Adjustment (Range Breach):** If a 5-minute close occurs outside the range, the losing leg is closed, the profitable leg is held, and a new, dynamically calculated deep Out-of-The-Money (OTM) option is sold on the breakout side, forming a skewed strangle.

- **Second Adjustment (Pivot Breach):** If, after the first adjustment, the price breaches pre-calculated pivot points, the skewed strangle is closed, and a new ATM straddle is established at the breached pivot strike. This completes the maximum adjustment cycle for the day.

Key risk management elements include the stringent pre-trade volatility filters, a mandatory stop-loss applied only after the second adjustment (using the day's calculated Range value), and a strict limit of one full adjustment cycle per trading day. All decisions are based on 5-minute closing data.

Practical implementation necessitates acknowledging significant transaction costs (brokerage + statutory fees, varying with broker and premium) and potential slippage. Substantial margin, including a recommended buffer (approx. ₹2.75L - ₹3.0L per lot), is required. Reliable, granular 5-minute data for both NIFTY spot and options premiums is crucial.

Initial backtesting over the 2021-2023 period indicated potentially positive gross average annual returns (approx. 39.3%). However, this testing was preliminary and critically excluded realistic transaction costs, slippage, and detailed volatility analysis. Therefore, these results are indicative only, likely inflated, and cannot be considered reliable predictors of net performance. Comprehensive backtesting over multiple years, incorporating these crucial factors, is essential to properly assess the strategy's potential viability, robustness, and risk-adjusted returns, and remains necessary future work.

Users must remain cognizant of inherent risks including whipsaws, intraday Vega and Gamma exposure, parameter sensitivity, and execution factors outlined in Section 9. In essence, this document describes an adaptive intraday options strategy framework. Its potential effectiveness requires rigorous validation, and its use demands careful consideration of all operational factors and associated risks.
