RISKALGO.AI METHODOLOGY

How the numbers are calculated

Market data, pricing, the Strategy Finder, Roll, and the risk engine: the formulas, the defaults, and the limits.

Educational scenario analysis on model prices. Not financial advice.

OVERVIEW

From market data to a decision aid

1
Market data
Prices, daily history, at-the-money implied vol

2
Pricing
Black-Scholes, volatility smile, Greeks

3
Scenarios
Your view as weighted outcomes for the stock

4
Finder & Roll
Search, price, filter, size and rank ideas

5
Risk engine
Greeks, margin, stress test and VaR

Every figure on screen is a model estimate built from the steps before it. The next slides show each step, in this order.

MARKET DATA

Where the data comes from

Prices and history

Live price and up to 260 daily closes per ticker from Yahoo Finance, about a year, refreshed when you open a ticker. A manual price overrides the quote but never touches the history.

Implied vol readings

One at-the-money IV reading per ticker per day: the average of the near-the-money call and put on the nearest expiry that isn't noisy. IV Rank and Percentile use only the readings the app has collected, so they are sample-based.

Your inputs

Risk-free rate, strikes, expiries, entry prices and fills. Everything else on screen is derived from these three sources.

Option prices in the Pricer, Finder and Roll are model prices, not live quotes.

MARKET DATA

Realized volatility and return skew

Realized volatility

$$\sigma = \text{stdev}(\ln(P_t / P_{t-1})) \times \sqrt{252}$$

Sample standard deviation of daily log returns over the last 250 closes, annualized. It sets the spread of the Finder's scenarios, the VaR figures, and the Pricer's estimated-vol button.

Q-skew of past returns

$$Q = (\alpha^2 - \beta^2) / (\alpha^2 + \beta^2)$$
$$\alpha = a + \sqrt{(ab)}, \ \beta = b + \sqrt{(ab)}$$
$$a = \Sigma \text{ gains} / N, \ b = -\Sigma \text{ losses} / N$$

Q runs from −1 to +1 and is shown ×100. Negative means down-moves outweigh up-moves. This is the skew of the stock's own returns, not the options skew across strikes.

MARKET DATA

Beta to SPY and QQQ

How it is estimated

```
β = Cov(r_stock, r_index) / Var(r_index)
```

- Daily log returns, last 250 trading days
- Closes matched by calendar date; a missing day is skipped
- Dividend-adjusted closes when both series have them
- Needs at least 60 matched returns, else no beta
- Correlation ρ is shown beside it

Where it is used

- Stress test, market modes: each position moves by (index move × its β)
- VaR, market models: each position moves by β × the index's log return
- No beta available: 1.00 is assumed, and the screen says so

A beta is a past estimate. It drifts over time, and calm-period betas understate how closely stocks fall together in a crash.

PRICING

Black-Scholes, a smile, and the Greeks

Volatility by strike

```
σ(K) = σATM + slope × (−ln(K/S) / 0.10)
```

Vol rises as a strike falls below the stock, by one slope per 10%. Slope: Flat 0, Normal 0.03, Steep 0.06. The result never drops below half of the at-the-money vol.

Every option is priced European, with the risk-free rate and any dividend yield.

Units on screen

- Delta: share-equivalent, ×100 per contract
- Vega: dollars per 1 vol point
- Theta: dollars per calendar day
- Notional delta: share delta × price

Vol Solver

Bisection between 0.05% and 500% vol until the model price equals the market price you enter.

PRICING

The Pricer’s probability analysis

The distribution

$$\ln S_T = \ln S_0 + (r - \sigma^2/2)\cdot T + \sigma\sqrt{T}\cdot z$$

z runs from −6 to +6 in 200 steps, each weighted by its normal probability. σ is the vol you set, T is the time to the nearest expiry, and the drift is the risk-free rate, not a forecast.

What it reports

- Probability of profit: total weight where P&L > 0
- Expected profit: Σ weight × P&L
- Average win and average loss: weighted means on each side
- 95% VaR: the loss at the 5th percentile of P&L

STRATEGY FINDER

Six steps from view to ranked ideas

1. **Inputs.** Your view, horizon, confidence, loss limit, vol view and skew.

2. **Scenarios.** The view becomes weighted outcomes, each a distribution of prices.

3. **Grid.** Strikes, widths and expiries are generated for each structure.

4. **Price and test.** Each candidate is valued across the scenarios.

5. **Filter and size.** Weak candidates drop out; survivors get a contract count.

6. **Rank.** Best per structure, then the top three and a few more.

STRATEGY FINDER

Your view becomes weighted scenarios

Bottom (c = confidence, default 60%)
c: price rises. 0.4(1−c): flat. 0.6(1−c): falls further, the adverse case.

Top (default 50%)
The mirror image: c falls, 0.4(1−c) flat, 0.6(1−c) rises further.

Middle (default 70%)
c: price stays in your range. The rest, (1−c)/2 each, breaks out up or down at 1.6× the range.

Event (default 40%)
c/2 big move up, c/2 big move down, 1−c fizzles with a spread 0.6× as wide. The vol view applies to every outcome.

Confidence is your own number. The weights are only as good as that number.

STRATEGY FINDER

Valuing a trade across each scenario

Spread of prices

```
sd = realized vol × √(h / 365)
```

Around each scenario's center price, 41 points from z = −4 to +4 in steps of 0.2, weighted by the normal probability mass in each bin.

At each point the trade is revalued at the horizon, with implied vol multiplied by the vol view (0.85 / 1.00 / 1.15) and a spot-vol effect, clamp(1 − 0.8 × move, 0.75, 1.40).

Costs and totals

```
friction = 0.02 + 0.01 × price
```

Charged per leg, per share, on entry and again on exit if the leg is still open.

```
EV = Σ w · P&L
PoP = Σ w · [P&L > 0]
```

The vol view applies to the main outcome; in Event it applies to all.

STRATEGY FINDER

How strikes and expiries are found

A fixed search grid

- 15 center strikes around the scenario prices
- 5 widths for spreads
- 4 expiries beyond your horizon
- About 300 candidates per spread structure, about 60 per single option

Every candidate is priced; none is picked by rule of thumb.

Strike step by stock price

- Under $10: 0.25
- Under $200: 1
- Under $1,000: 5
- Under $5,000: 25
- Otherwise: 50

The grid is not a live chain, so a suggested strike may not exist. Check it against your broker.

STRATEGY FINDER

Crash test and position size

Worst loss per contract

- 25 prices from min(e^(−2.5σh), 1 − crash) to max(e^(2.5σh), 1 + crash) times spot; crash defaults to 30%
- Vol multiplier is forced to at least 1 (a stress)
- Also checked at the first expiry, and on a wide 55%–160% grid

Contracts

```
n = clamp( floor(limit / loss), 1, 1000 )
```

Limit defaults to the larger of $500 and 20% of 100 shares' value, rounded to $100. A second cap keeps total exposure within 10× the limit.

STRATEGY FINDER

Filters and ranking

Credit trades

- Probability of profit at least 50%
- Credit at least 15% of the risk
- Short strikes at or out of the money

Debit trades

- Probability of profit at least 42%
- Long options need |delta| of 25 or more (single, vertical, straddle, strangle)

Meaningful: expected value at least 1% of the risk. **Rank:** expected profit × contracts. The best of each structure is kept, then the top 3 plus up to 5 more. If nothing passes, the Finder shows the closest candidates with a warning.

STRATEGY FINDER

A worked example (illustrative numbers)

Bottom view, confidence 60%

- Rises: weight 0.60, P&L +$140
- Flat: 0.4 × 0.4 = 0.16, P&L +$90
- Falls further: 0.6 × 0.4 = 0.24, P&L −$310

```
EV = 84 + 14.4 − 74.4 = +$24
```

Then

- PoP = 0.60 + 0.16 = 76%
- Crash-tested worst loss: $400 per contract
- Limit $2,000, so 5 contracts
- EV at size: 5 × $24 = $120

Made-up figures to show the arithmetic, not a recommendation. Real P&L per point comes from the quadrature.

ROLL

How a roll is searched

Candidates

- Buy back the old option at its model price
- New strikes run from the old strike outward, up to 25% of spot
- Expiries are the old date plus 1, 2, 3, 4, 6, 8, 12, 16 or 26 weeks, never before your horizon
- Only single short options can be rolled

Choosing

- |Delta| of the new option within a cap (default 0.30)
- Credit rolls come first; debits are allowed only within a limit (default $0.10 per share)
- Value is EV = Σ w · (P&L of the new short × n – cost to close), using the same scenario weights

ROLL

Booking a roll with your real fills

Model versus fill

```
closeAdj = −(buybackFill − buybackModel) · n · 100
newAdj = −(newFill − modelPrice) · n · 100
```

You enter the prices you actually got. The gap to the model price is kept as an adjustment, so P&L reflects your fills.

What is recorded

- The old position closes, marked as rolled
- Realized P&L = (entry − buyback model) · n · 100, less earlier adjustments, plus closeAdj
- A new position opens with its adjustment and a note
- Paired OPEN-ADJ and CLOSE-ADJ entries appear in the trade log
- Strike and expiry can be edited before booking; prices update

RISK ENGINE

Greeks, margin and assignment

Portfolio Greeks

Each position's delta, vega and theta are summed in share-equivalent units. Notional delta is delta × stock price, in dollars.

Assignment flag

A short leg that is in the money with 7 calendar days or fewer left.

Margin estimates

```
naked: (premium + max(20%·S − OTM, 10%·base))
· 100
spread: width · 100 · n − credit
```

- Debit spreads: none
- Covered by shares, up to 100 per contract
- Futures margin is not modeled

RISK ENGINE

Stress test

Three ways to shock

- Market S&P 500 or Nasdaq: each ticker moves by the index move × its beta
- All tickers in parallel: the same move for everything
- One ticker: only that name moves

A vol shock, in points, is added on top.

How it is valued

Every position is repriced with the shocked spot and vol, and the change is summed. Quick pairs of move and vol: −20/+20, −10/+10, −5/+5, +5/−3, +10/−5, +20/−8.

It is a what-if with the betas and vol you chose, not a forecast. Real crashes move correlations and vol together.

RISK ENGINE

Value at Risk

Horizon and confidence

- 5 trading days (5/252 of a year)
- 99% confidence
- Positions repriced at 7 calendar days out, using each ticker's realized vol

The ticker view shows each name on its own, with its delta and notional delta.

Three portfolio models

- S&P 500: one index move, tickers follow by beta
- Nasdaq: same, with QQQ as the index
- All parallel: every ticker moves together

The market models capture systematic risk only. Stock-specific risk is not included.

LIMITS

What the numbers are not

- Option prices are model prices, not live quotes
- American options are priced as European
- Finder results depend on your view, confidence and vol assumptions
- Betas, volatility and VaR are estimated from past prices
- The search grid can miss strikes, and suggested strikes may not exist
- Margin is an estimate; futures margin is not modeled
- Trade records are yours to enter; nothing is sent to a broker

RiskAlgo is an educational tool, not investment advice.