VaR, CVaR & the Kelly Criterion

A plain-English guide for traders and investors

These three ideas help answer different risk questions: How much might I lose? How bad could the losses be when things go wrong? And how much of my money should I risk?

1. VaR — Value at Risk

VaR is an estimate of a loss limit over a chosen time period and confidence level. It answers: "Under the model, how much could I lose before losses become unusually large?"

A simple example

Suppose a trading account has a one-day 95% VaR of $1,000. In plain English, the model estimates that on about 95 out of 100 days, the loss should be no more than $1,000. On about 5 out of 100 days, the loss could be greater than $1,000.

Important: VaR does NOT say the worst possible loss is $1,000. It does not tell you how large the loss might be on those unusually bad days.

Think of VaR as a warning line: losses are expected to stay on one side of the line most of the time, but they can cross it.

2. CVaR — Conditional Value at Risk

CVaR looks beyond the VaR warning line. It estimates the average loss in the worst tail of outcomes. It answers: "When losses are among the worst cases, how bad are they on average?" CVaR is also commonly called Expected Shortfall (ES).

A simple example

Imagine the same one-day 95% VaR is $1,000. Now suppose the 5% of worst days have losses averaging $1,800. The 95% CVaR is approximately $1,800. That means that, among those worst 5% of days, the average loss is $1,800.

So VaR marks the threshold; CVaR describes the average damage beyond that threshold. CVaR is useful because two strategies can have the same VaR but very different extreme-loss behavior.

3. Kelly Criterion — How much should I risk?

The Kelly Criterion is a mathematical method for estimating what fraction of your capital to risk when you have a repeatable edge. Its goal is to maximize long-run growth over many bets or trades.

A simple example

Imagine a simplified trade with a 60% chance of winning and a 40% chance of losing, where the win and loss are the same size. The full-Kelly fraction for this simplified setup is 20% of capital. That is the mathematical growth-maximizing fraction under the assumptions—not a recommendation to risk 20% on a real trade.

In real markets, the true win probability and payoff size are uncertain. A small error in those estimates can make full Kelly far too aggressive. Traders therefore often use fractional Kelly, such as half-Kelly or quarter-Kelly, to reduce volatility and the chance of a devastating drawdown.

Kelly is not a stop-loss system and does not guarantee profits. It only gives a sizing result if the inputs and model are reasonable. If there is no reliable positive edge, Kelly may tell you to risk nothing.

Quick comparison

Tool	Plain-English question	What it tells you
VaR	How much might I lose at a chosen confidence level?	A loss threshold for a time period and confidence level.
CVaR / Expected Shortfall	How bad are losses in the worst cases?	The average loss in the selected worst tail of outcomes.
Kelly Criterion	How much capital should I allocate to a trade with an edge?	A theoretical position-size fraction for long-run growth.

How traders can use them together

- VaR: Set a statistical view of the loss that a strategy might experience over a day, week, or other period.
- CVaR: Check the severity of the strategy's worst outcomes, not just the threshold where the tail begins.
- Kelly: Consider position sizing only after you have credible estimates of the strategy's win rate, average win, and average loss.

Important limitations

- All three depend on assumptions and estimates. Historical data may not represent the next market environment.
- VaR and CVaR can underestimate risk when markets gap, liquidity disappears, correlations change, or extreme events are missing from the data.
- A 95% VaR is not a promise that losses will stay below the number 95% of the time in the future.
- Kelly can produce very large position sizes when an estimated edge looks strong. Overestimating that edge can cause severe losses.
- For practical trading, combine risk metrics with sensible leverage, position limits, stop planning, diversification, and stress testing.

The easiest way to remember

VaR = Where is the loss warning line?

CVaR = How painful are the losses beyond that line, on average?

Kelly = How much should I risk when I believe I have an edge?

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