

Similar Sharpe ratios hide severe loss tails and distort position sizing

We compare the loss tails of a put-selling index, the US stock market, the momentum factor and fourteen hedge fund strategy indices with what a normal model predicts. Equal volatility hid up to a fourfold difference in drawdown. Expected shortfall describes the tail better, but estimated from one history it did not beat volatility sizing on average out of sample.

SUBJECT

Tail risk and position sizing

EVIDENCE

US market daily 1926-2026,
Cboe, hedge funds 1997-
2026

DOCUMENT TYPE

Private research

Put-sellers and the market earned similar Sharpe ratios, yet the put-seller's bad months fell 1.50 times deeper than normal models predict

The put-selling index comes within 0.09 of the stock market's Sharpe ratio ^[02]. The symmetry fails in the tail: during the worst 5% of months, the strategy's average loss hits 1.50 times the normal model's prediction (against 1.18 for the market). Because most hedge fund indices share this negative skew, volatility and Sharpe ratios are the wrong inputs for sizing leveraged positions ^[04]. Size on the loss tail and a drawdown limit, treating the tail estimate as uncertain.

SHARPE RATIO COMPARISON

0.56 / 0.65

The put-selling index against the US stock market.

TAIL LOSS MULTIPLIER

1.50

Realised CVaR versus normal expected shortfall for put sellers.

NEGATIVE SKEWNESS

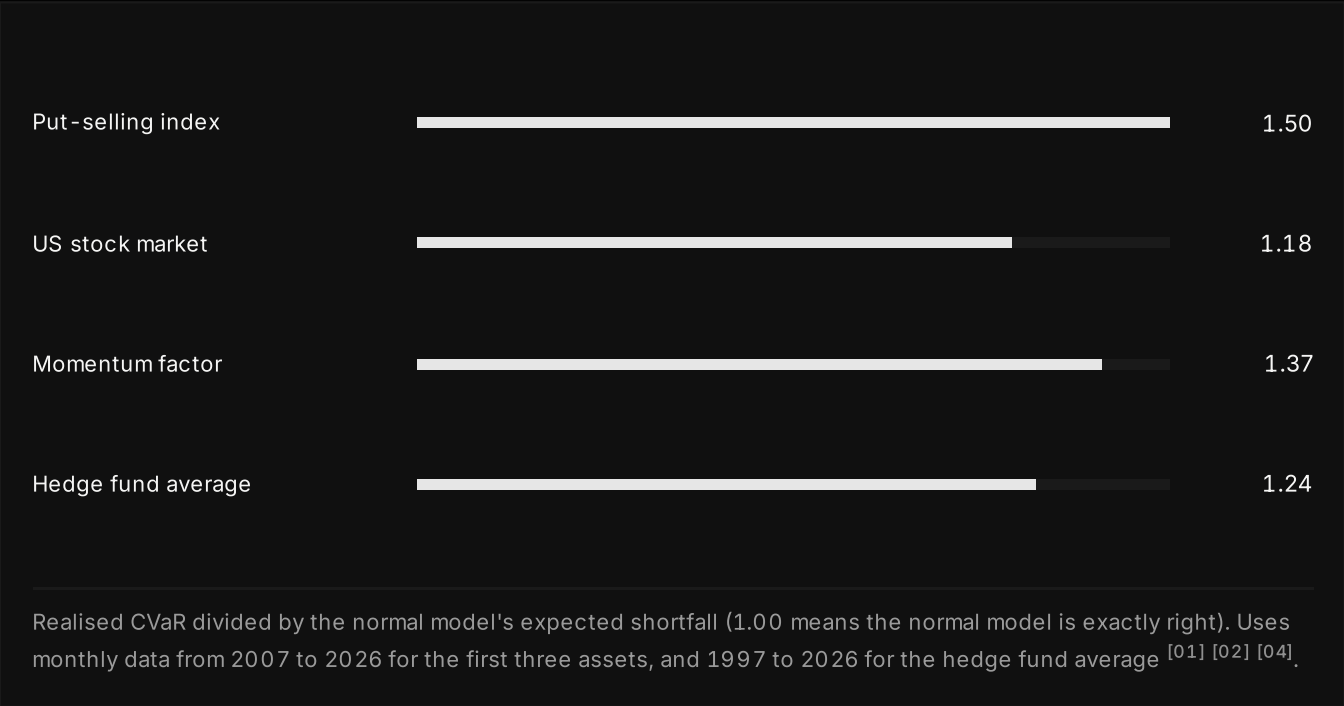
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Hedge fund strategies exhibiting an asymmetric downside.

DRAWDOWN VARIANCE

15–60%

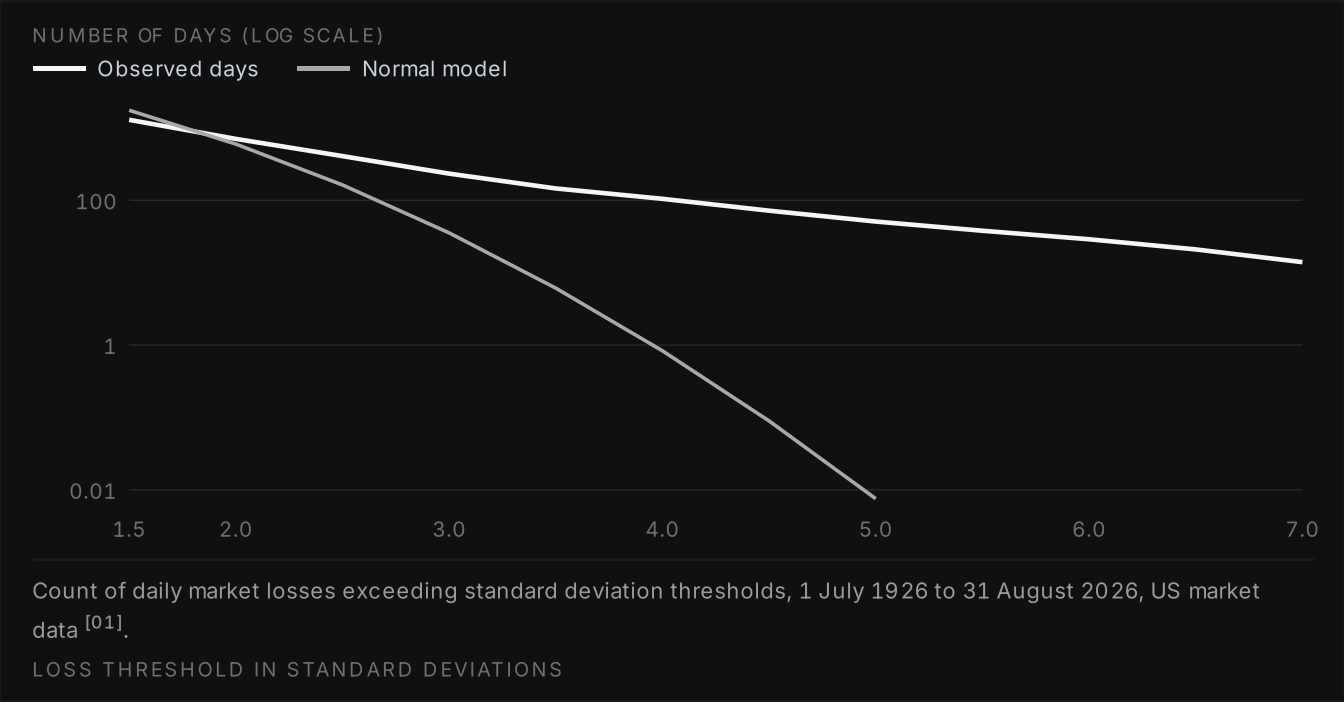
Observed across strategies levered to the same volatility target.



EVIDENCE	Fourteen hedge fund indices scaled to a 10% annual volatility produce largest drawdowns ranging from -15.3% to -59.8% ^[04] . Identical volatility numbers mask entirely different tail risks.
INTERPRETATION	Many hedge fund strategies generate payoffs resembling a short put on the market ^[09] . Mean-variance analysis and volatility metrics ignore this structural left-tail risk entirely.
DECISION IMPLICATION	Volatility-based sizing is incomplete for negatively skewed strategies: add a drawdown limit tested on stressed history and use CVaR as a cross-check.
CAVEAT	The CVaR figure rests on just 11 worst months and is inherently noisy. Out of sample, CVaR sizing did not beat volatility sizing on average.

105 days fell more than four standard deviations. A normal model expects one.

Parametric 95% VaR stops at 1.645 standard deviations. It says absolutely nothing about how far beyond that mark the losses go. In the middle of the distribution the normal model is too pessimistic, yet in the far tail it becomes absurdly optimistic ^[01].



FOUR-SIGMA LOSS EVENTS

105 / 0.8

Against 0.83 expected under a normal model.

OCTOBER 1987 CRASH SEVERITY

16.2σ

Measured in daily standard deviations.

FAILURES OF ROLLING 99% VAR

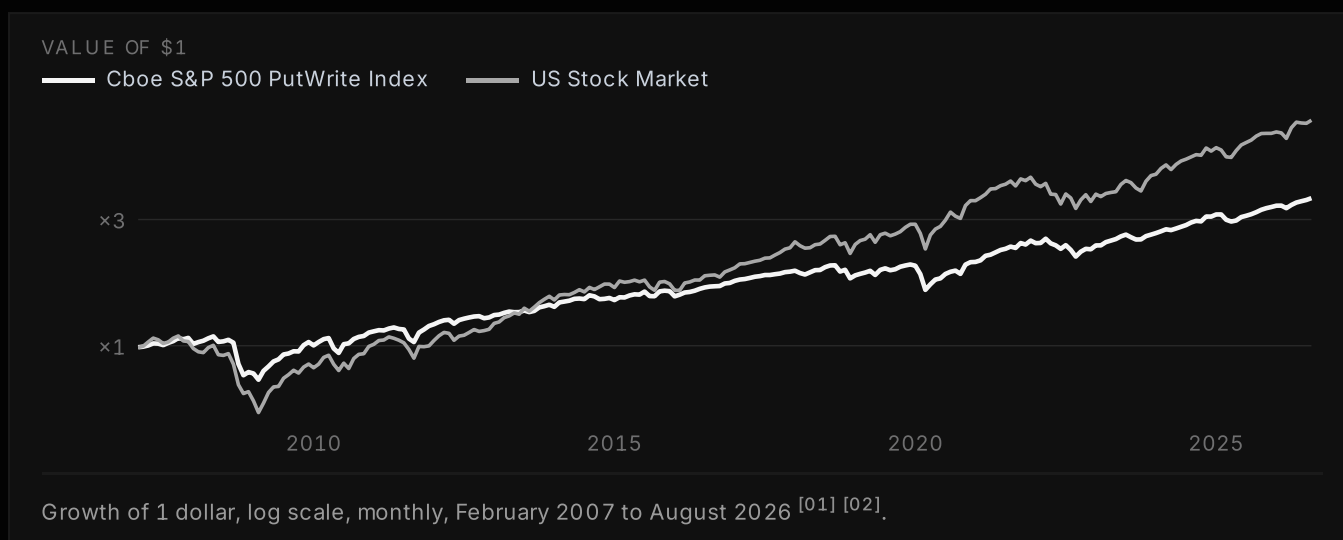
2.36%

Breach rate for a 1% target model.

EVIDENCE	The US market registered a loss beyond five standard deviations on 51 separate days ^[01] . A normal model expects 0.0075 days.
INTERPRETATION	Value-at-Risk is not a coherent risk measure because it can penalise diversification ^[07] . Expected shortfall is a coherent measure.
CAVEAT	These numbers rely on daily index data before transaction costs. The 1926 to 1940 period weighs heavily in the far tail.

The put-seller came within 0.09 of the market's Sharpe ratio and lost 5.9 standard deviations in one month.

The index collects option premium month after month and gives it back in a few short months ^[02]. Its volatility runs at two thirds of the US market's ^[01]. That lower variance flatters the Sharpe ratio.



MEASURE	PUT - SELLING INDEX	US STOCK MARKET
Return a year	7.1%	11.1%
Volatility a year	10.7%	15.9%
Sharpe ratio	0.56	0.65
Skewness	-1.67	-0.51
Excess kurtosis	7.1	1.0
Normal 95% VaR, a month	-4.47%	-6.55%
Realised CVaR, a month	-8.66%	-10.03%
Normal expected shortfall, a month	-5.77%	-8.47%
Worst month	-17.7%	-17.1%
Largest drawdown	-32.7%	-50.3%
Months under water	30 mo	52 mo

INTERPRETATION The normal model reads a calm track record as low risk. It completely misses that the put-seller's worst month was a 5.9 standard deviation move.

CAVEAT This comparison covers one crisis-heavy period, and the stock market had the deeper drawdown in percent ^[01] ^[02]. The focus here is the asymmetric shape of the risk, not the absolute size of the loss.

Ten of fourteen hedge fund strategies have a negative skew, and their tails run up to 1.53 times the normal forecast

Arbitrage strategies take small steady gains and pay in rare large losses. Their Sharpe ratios often look best, but for the arbitrage strategies part of the steady return is payment for carrying the left tail ^[09]. The more negative the skew, the further the realised tail exceeds the normal forecast, driving a correlation of -0.85 across indices ^[04].

INDICES WITH NEGATIVE SKEWNESS

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Out of the fourteen BarclayHedge strategies tracked.

CORRELATION WITH TAIL RATIO

-0.85

How closely negative skew tracks the failure of normal risk forecasts.

FIXED INCOME ARBITRAGE TAIL EVENT

11.3 σ

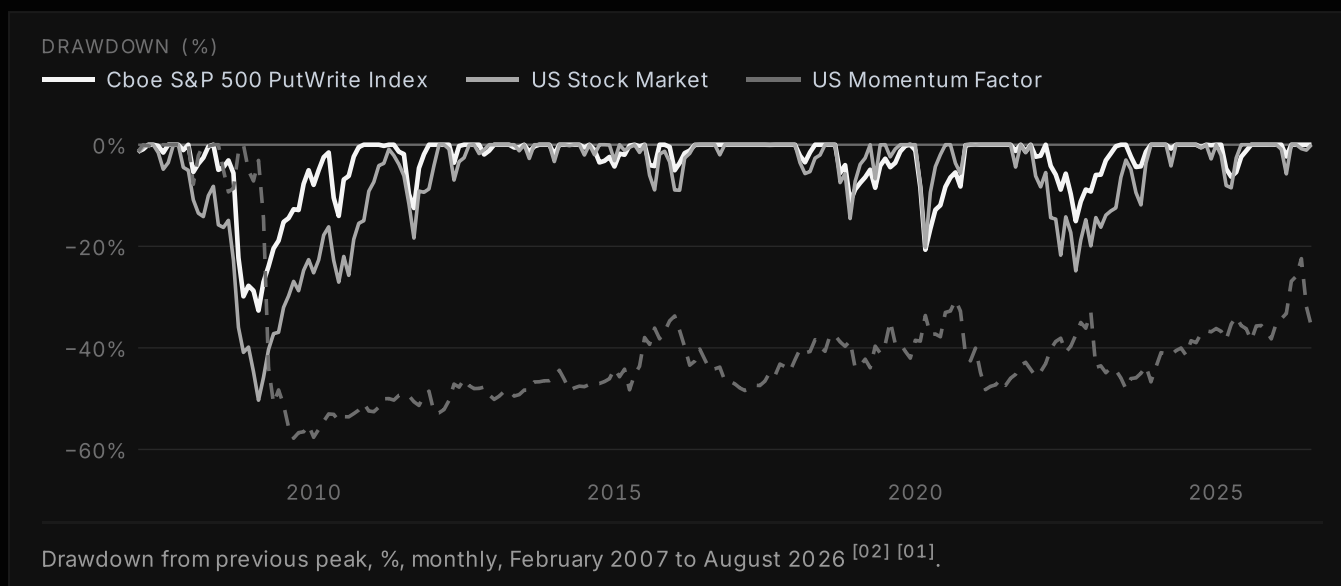
Size of the loss during October 2008 in standard deviations.

STRATEGY	SKEWNESS	EXCESS KURTOSIS	NORMAL EXPECTED SHORTFALL	REALISED CVAR	RATIO
Fixed income arbitrage	-4.85	47.1	-2.10%	-3.22%	1.53
Convertible arbitrage	-2.65	23.5	-2.72%	-3.43%	1.26
Multi-strategy	-1.90	10.1	-2.14%	-3.03%	1.42
Merger arbitrage	-1.42	12.0	-1.69%	-2.19%	1.30
Event driven	-1.38	7.5	-3.51%	-4.46%	1.27
Distressed securities	-1.18	3.7	-3.39%	-4.75%	1.40
Fund of funds	-0.80	4.6	-2.74%	-3.54%	1.29
All strategies (composite)	-0.73	3.6	-3.50%	-4.46%	1.27
Emerging markets	-0.72	3.9	-6.97%	-8.50%	1.22
Equity long bias	-0.61	1.8	-5.87%	-7.07%	1.20
Equity market neutral	0.01	1.8	-1.26%	-1.45%	1.15
Technology sector	0.53	3.1	-6.80%	-7.02%	1.03
Global macro	0.57	1.2	-2.73%	-2.50%	0.92
Equity long/short	0.67	4.6	-3.25%	-3.41%	1.05

EVIDENCE	The realised CVaR divided by the normal expected shortfall averages 1.24 across the fourteen hedge fund indices, hitting 1.53 for fixed income arbitrage ^[04] . Global macro is the only strategy where this ratio sits below one ^[04] .
DECISION IMPLICATION	Discard normal VaR when sizing arbitrage allocations. Allocators must scale positions to survive historical drawdowns and realised CVaR instead of relying on Sharpe ratios.
CAVEAT	Self-reported returns from surviving funds and smoothed illiquid pricing understate both volatility and the loss tail ^[04] . Re-ranking the indices by CVaR changes little at the top, moving just one strategy three places ^[04] .

Momentum has been under its 2008 peak for 213 months. The put-seller needed 30.

Volatility and the Sharpe ratio have no time dimension. Months spent below the high-water mark decide whether investors stay. That duration dictates whether a leveraged book survives margin calls ^[01] ^[02].



PUT-SELLING RECOVERY

30 mo

Months under water from 2008 to 2010.

US MARKET RECOVERY

52 mo

Months spent below the October 2007 peak.

MOMENTUM UNDERWATER

213 mo

Months failing to reach the November 2008 peak.

EVIDENCE

The put-writing index cleared its May 2008 high within 30 months ^[02]. The momentum factor broke down in November 2008 and has spent 213 months failing to recover ^[01].

INTERPRETATION

Short-volatility drops violently but rebuilds capital through constant premium collection. Momentum crashed in the 2009 panic rebound and stayed down.

DECISION IMPLICATION

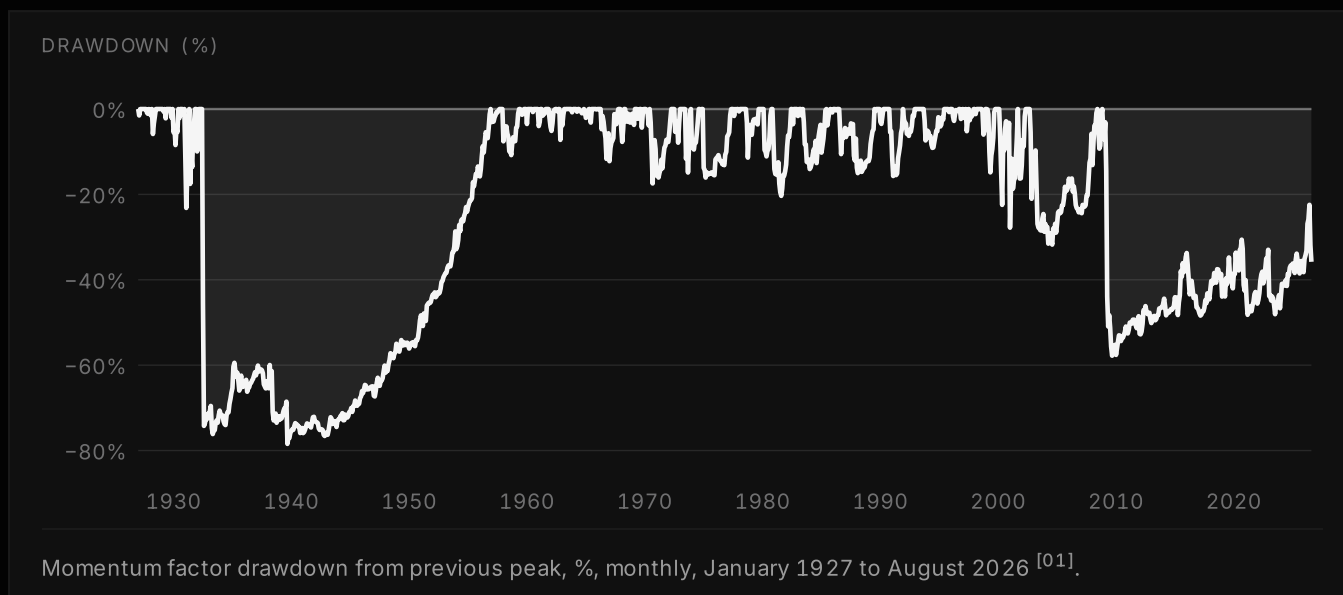
Size positions against your tolerance for time under water. A shallow expected shortfall matters little if recovery takes two decades.

CAVEAT

Drawdown length depends heavily on the start date. A single crisis skews the historical recovery timeline.

Momentum showed a Sharpe ratio of 0.85 just before losing 49% in three months

The trailing record looked perfectly calm, with volatility at an ordinary 14.2% in February 2009 ^[01]. The crash came when the market rebounded after the fall. Daniel and Moskowitz document this pattern ^[10].



TRAILING 36-MONTH
SHARPE RATIO

0.85

Measured up to February 2009.

THREE-MONTH LOSS

-49.4%

Realised from March to May
2009.

MONTHS UNDER WATER

293 mo

From June 1932 to December
1956.

INTERPRETATION

The high trailing Sharpe ratio of February 2009 carried no warning about the crash that followed. A smooth recent history simply cannot forecast the left tail.

DECISION IMPLICATION

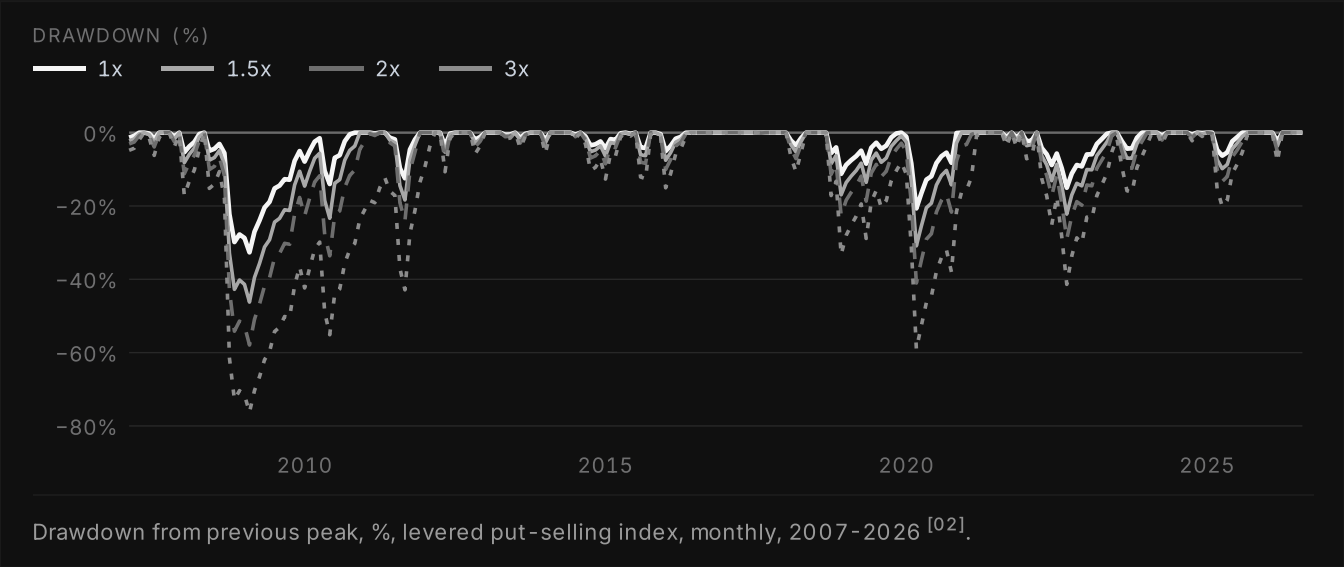
Discard trailing volatility when sizing momentum allocations. Anchor your exposure to the severe drawdown you will face when a fallen market sharply rebounds.

CAVEAT

Momentum is a long-short academic factor before costs, not an investable fund. A trader can partly anticipate the danger since its crashes cluster in market rebounds ^[10].

At three times leverage the put - seller fell 76% and needed a 321% gain to recover

Leverage scales the annual return roughly linearly. The gain needed to get back grows much faster than the initial loss. At 1x leverage the index needed a 48% gain to recover and at 3x it needed 321%, while the months spent under water rose only from 30 to 46 ^[02].

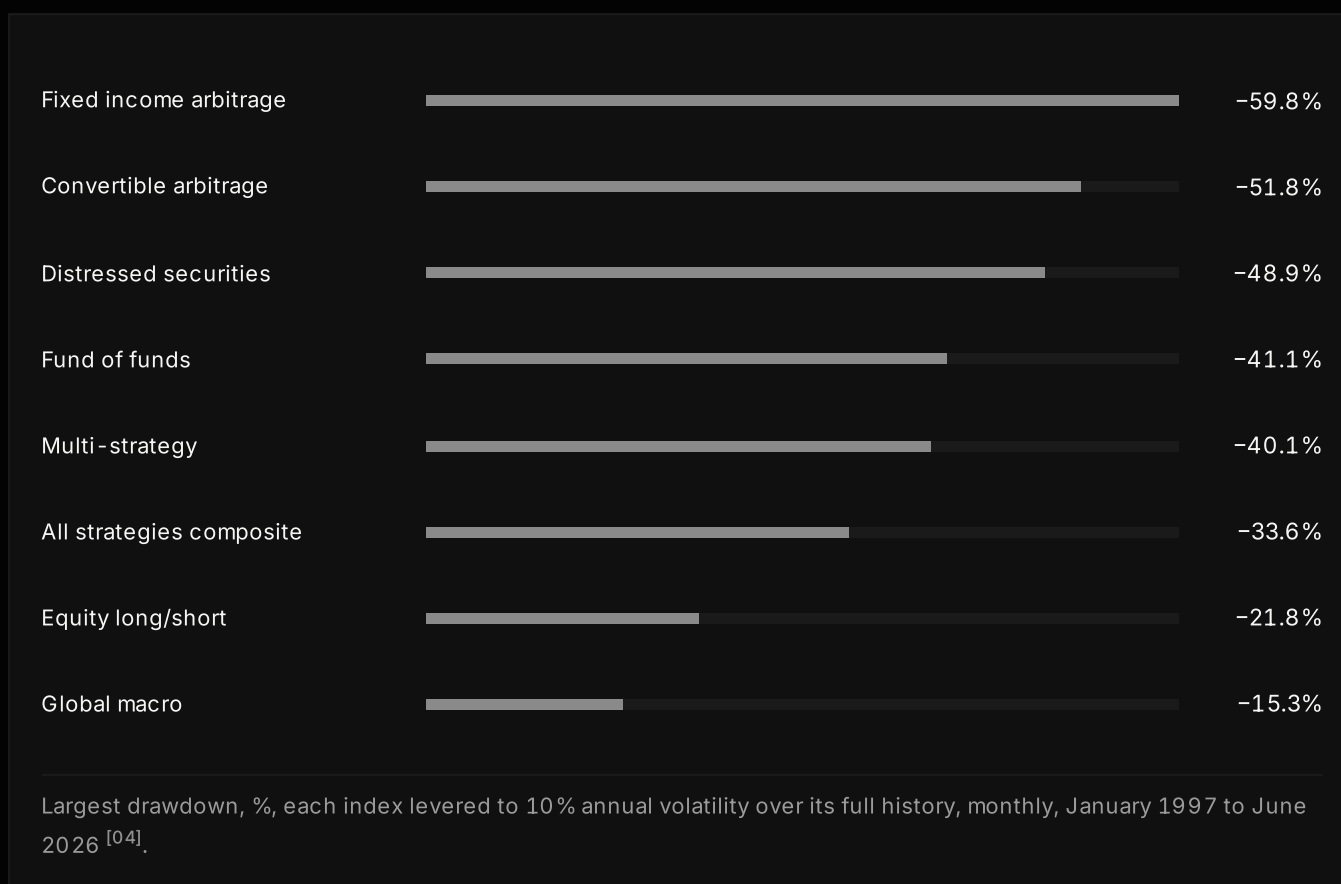


LEVERAGE	RETURN A YEAR	LARGEST DRAWDOWN	GAIN NEEDED TO RECOVER	MONTHS UNDER WATER
1.0×	7.1%	-32.7%	+48%	30 mo
1.5×	9.5%	-46.2%	+86%	31 mo
2.0×	11.6%	-57.9%	+138%	35 mo
3.0×	14.4%	-76.3%	+321%	46 mo

INTERPRETATION	The arithmetic of compounding punishes deep drawdowns severely. Time under water increases modestly, but the performance burden required to repair the capital base explodes.
DECISION IMPLICATION	Size positions based on the gain required to survive a tail event, not just expected volatility. A theoretical recovery path means nothing if the intervening loss breaches the risk tolerance.
CAVEAT	These calculations assume financing at the Treasury bill rate without margin calls. In practice a 58% loss at 2x leverage would trigger a forced sale near the bottom, locking the loss in so the recovery shown in the table would not happen.

At the same 10% volatility, drawdowns ran from 15% to 60%

Equal volatility budgets gave fixed income arbitrage four times the drawdown of global macro. A 20% drawdown limit would have allowed fixed income arbitrage just 0.30 of its volatility-based leverage. Global macro could have taken 1.30. Estimated on 1997-2011 and applied to 2011-2026, CVaR sizing lowered the drawdown for 10 of 14 indices but left the average almost unchanged ^[04].



FIXED INCOME LEVERAGE

0.30

Share of volatility leverage under a 20% drawdown limit.

IMPROVED BY CVAR

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Indices with a smaller out-of-sample drawdown under CVaR sizing.

AVERAGE FUTURE DRAWDOWN

-17.1% / -17.2%

Comparing CVaR against volatility sizing out of sample.

EVIDENCE

Set hedge fund indices to a uniform 10% volatility, and outcomes scatter wildly. Fixed income arbitrage suffered a 59.8% drawdown. Global macro contained losses to 15.3%.

INTERPRETATION

A simple volatility target misses the shape of the loss tail. Variance treats all deviations equally, blinding the model to strategies that hide risk in rare events.

DECISION IMPLICATION

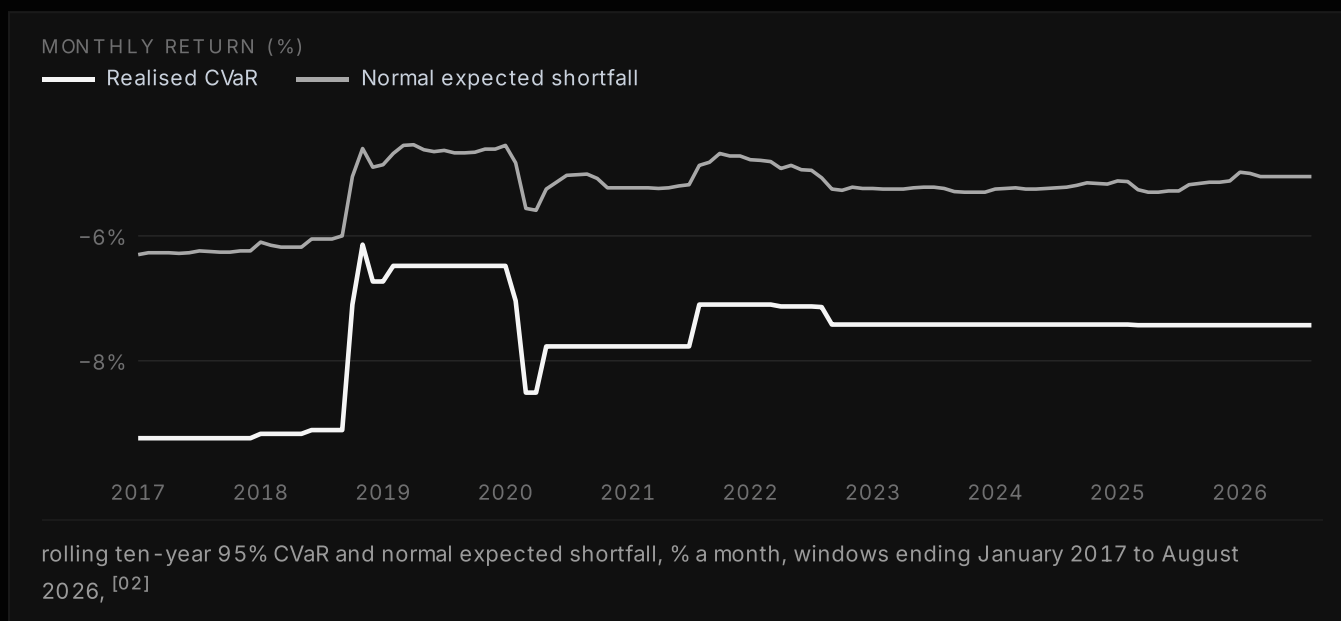
Size on a drawdown limit tested on stressed history, use CVaR as a cross-check, and haircut both ^[07] ^[08]. Relying on a single metric invites failure.

CAVEAT

The full-sample result uses hindsight. The out-of-sample test covers one data split and a largely calm decade.

The put-seller's CVaR estimate swung from -9.2% to -6.1% when October 2008 left the window

CVaR describes the left tail better than VaR, yet it demands a lot of data. A ten-year rolling window leaves you looking at a handful of extreme months ^[11]. The realised tail proved worse than the normal forecast in all 116 windows we checked, and dropping the 2008 crash shifted the severity estimate by a third ^[02].



90% CVAR INTERVAL

**-11.7% ...
-6.0%**

Bootstrap bounds on the estimate

90% SHARPE RATIO INTERVAL

0.16 ... 1.01

Range of possible risk profiles

TAIL OBSERVATIONS

5

Months driving the 97.5% metric

INTERPRETATION

A single history gives a wide interval, so a CVaR-based size carries that uncertainty. Tail events barely appear in this sample.

DECISION IMPLICATION

A 97.5% expected shortfall computed on these 235 monthly returns rests on 5 observations. This is why a single fund record needs stress scenarios and pooled histories ^[05].

CAVEAT

The bootstrap assumes past blocks remain a valid guide. If the market regime breaks, the true tail will land entirely outside these resampled bounds.

The put-seller's three-year Sharpe ratio is higher than in 87.5% of months since 2010 while VIX sits below its median

Calm markets routinely pay insurance sellers, with VIX closing above the subsequent realised volatility on 85.2% of days ^[03]. This volatility premium makes their record look best exactly when the stored-up tail is least visible ^[02]. We saw the same setup when VIX traded at 16.23 at the end of June 2007.



VIX ON 25 SEPTEMBER 2026

14.87

Lower than 69% of trading days since January 1990.

HISTORICAL VOLATILITY PREMIUM

85.2%

Trading days since 1990 VIX exceeded subsequent realised volatility.

EU MARKET RISK RULES START

2027

Transition to capital requirements based on expected shortfall.

INTERPRETATION

High Sharpe ratios on short-volatility strategies mostly reflect a quiet market. Investors mistake the steady premium collection for alpha right up until the loss tail materialises.

DECISION IMPLICATION

Global banking regulators are shifting market risk measures to 97.5% expected shortfall ^[05] ^[06]. Allocators judging leveraged strategies should demand this same tail metric and the full drawdown record instead of stopping at the Sharpe ratio.

Standard risk models severely understate the loss tail in leveraged and short-volatility strategies.

Standard risk metrics routinely disguise the structural downside of short-volatility payoffs. Prudent capital allocation demands assessing historical drawdowns instead of trusting a normal model built around a 1.08% daily standard deviation.

- 01 105 days exceeded four standard deviations.
- 02 Selling puts yielded comparable risk metrics alongside a realised expected shortfall 1.50 times worse than normal estimates.
- 03 Leverage accelerates returns but heavily compounds the downside, leaving a levered put-writing strategy needing a 321% gain just to recover from its trough.
- 04 Momentum strategies look attractive during stable markets. Then they collapse and trap capital for an entire generation. The factor is still under its historical peak after 213 months ^[01].
- 05 Scaling hedge fund indices to identical volatility produced maximum drawdowns ranging from 15% to 60% ^[04]. Relying on historical CVaR for position sizing merely matched simple volatility weighting out of sample.

TAIL RISK SUMMARY

MEASURE	WHAT IT SHOWS	VALUE
Extreme tail days	Count of daily losses far outside normal distribution limits	105
Put-writing shortfall ratio	Ratio of realised extreme losses against normal model predictions	1.50
Negative skewness strategies	Count of hedge fund indices exhibiting asymmetric downside risk	10 / 14
Momentum drawdown duration	Months spent failing to recover the previous market peak	213 mo
Levered recovery requirement	Return required to break even following the maximum trough	+321%
Volatility targeted drawdowns	Range of maximum losses across strategies scaled to identical volatility	15–60%

Never allocate capital to a leveraged strategy without examining its loss tail and the duration of its worst drawdown. Demand to see exactly how the proposed position size would have behaved through that entire historical trough.

Selected sources

-
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https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
 We pull daily and monthly US market and risk-free returns from July 1926 to August 2026, alongside the momentum factor since 1927.
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- [02] **Cboe S&P 500 PutWrite Index**
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 Daily levels and monthly data from February 2007 track a strategy of selling at-the-money S&P 500 puts collateralised by Treasury bills.
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- [03] **Cboe VIX historical data**
<https://www.cboe.com/en/tradable-products/vix/vix-historical-data/>
 Daily closing values since 1990 let us track expected market volatility.
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- [04] **BarclayHedge hedge fund indices**
<https://portal.barclayhedge.com/cgi-bin/indices/displayIndices.cgi?indexID=hf>
 Fourteen strategy indices from 1997 to 2026 provide the monthly return history for hedge funds.
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- [05] **Basel Committee on Banking Supervision, Minimum capital requirements for market risk (January 2019)**
<https://www.bis.org/bcbs/publ/d457.htm>
 This regulatory text forces the shift from a 99% VaR to a 97.5% expected shortfall.
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- [06] **European Commission, temporary adjustments to Basel III market risk rules (4 June 2026)**
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- [10] **Daniel and Moskowitz, Momentum Crashes (2016)**
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 Expected shortfall requires much larger data samples than VaR to achieve the same estimation accuracy.
-

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