Selling Crash Insurance: The Volatility Premium Is Real, and So Is the Bill

Gaurav Gupta · Research note · October 2026 · Short one-month S&P 500 variance, 365 monthly trades, 1996–2026

82%
Months profitable after costs

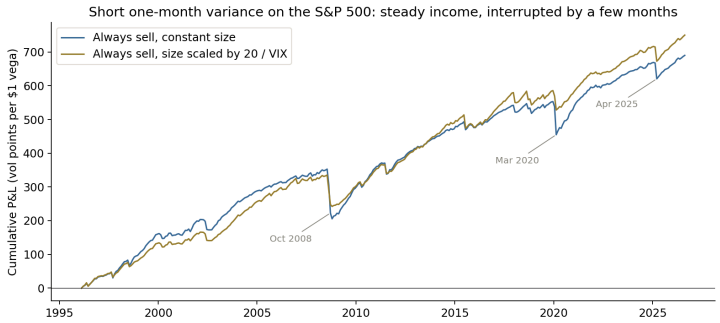
44×
Worst month vs average monthly gain

0.72 → 0.98
Sharpe: constant size vs size × 20 / VIX

-88%
SVXY two-day loss, 5–6 Feb 2018

Rule (P&L per $1 vega, vol pts)	Avg month	Sharpe	Worst month	Skew	Premium on $1bn, worst = 5% NAV
A. Always sell, constant size	+1.89	0.72	-84.1 (Oct 2008)	-5.9	$13.5M a year (1.35%)
B. Carry filter (VIX > trailing realised)	+1.75	0.80	-83.1 (Mar 2020)	-5.9	not sized
C. Size × 20 / VIX	+2.06	0.98	-44.8 (Sep 2008)	-4.0	$27.6M a year (2.76%)

After an illustrative 0.5 vol-point cost per trade (Sharpe 0.34 / 0.45 for A / C at 1.5). Sharpe by half (before / from 2011): A 0.76 / 0.68; B 1.23 / 0.54; C 1.02 / 0.96. A month twice the worst on record costs 10% of NAV under either sizing. Dollar figures illustrative.



Cumulative P&L per $1 of vega notional: steady income, broken by October 2008, March 2020 and April 2025.

SOURCES

- Cboe VIX daily closes, 1990 onward (datahub finance-vix mirror, PDDL)
- SPY and SVXY daily closes, SPY dividends (Yahoo Finance via Hugging Face defeatbeta mirror, ODC-BY)
- Every file pinned by sha256
- Demeterfi et al. (1999), J. Derivatives; Carr and Wu (2009), RFS; Cboe VIX White Paper; ProShares Trust II 8-K (Feb 2018)

METHOD

- Each month-end: sell one-month S&P 500 variance at the VIX close
- Settle against the next 21 trading days of SPY total-return volatility
- Three rules fixed in advance; nothing fitted to outcomes
- Look-ahead unit tests; two halves; cost stress; SVXY reality check

KEY CALCULATIONS

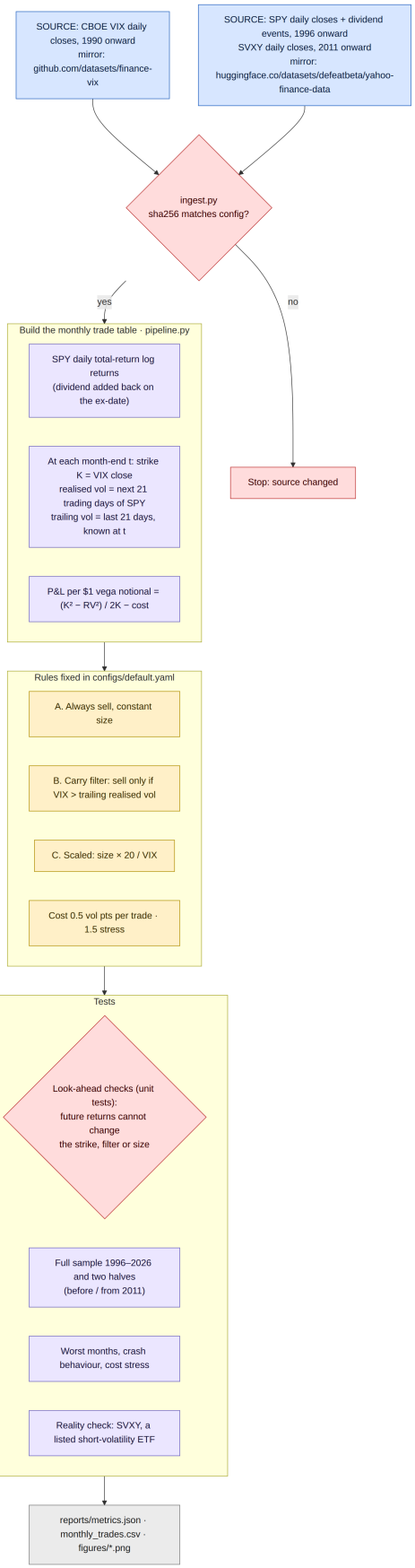
- P&L per $1 vega = $(K^2 - RV^2) / 2K$ − cost
- RV = $\sqrt{(252 \times \text{mean } r^2)} \times 100$, r = daily log total return
- Scaled size = 20 / VIX at the trade date
- Vega notional = 5% × NAV ÷ |worst month|; premium = 12 × avg month × vega

RECOMMENDATIONS

- Size the book from the tail: the worst month on record at a stated share of capital (5% of NAV here), with a month twice as bad accepted in writing.
- Scale exposure down as volatility rises (size × 20 / VIX): about twice the premium for the same tail budget, stable in both halves.
- Hold liquid collateral for the stress month before trading; losses arrive in days.
- Count the position as equity risk: correlation 0.56 with the S&P 500; -26.6 points on average in the index's ten worst months.
- Track execution cost; at 1.5 vol points the Sharpe ratio halves.

Independent research on public data. Not investment advice; not deployed. VIX approximates, but is not, a tradable variance-swap strike. Code: github.com/guptagaurav-info/volatility-risk-premium · Article: guptagaurav.info

Pipeline


SOURCE: CBOE VIX daily closes, 1990 onward
mirror: github.com/datasets/finance-vix
SOURCE: SPY daily closes + dividend events, 1996 onward
SVXY daily closes, 2011 onward
mirror: huggingface.co/datasets/defeatbeta/yahoo-finance-data
ingest.py
sha256 matches config?
yes
no
Stop: source changed
Build the monthly trade table · pipeline.py
SPY daily total-return log returns
(dividend added back on the ex-date)
At each month-end t: strike K = VIX close
realised vol = next 21 trading days of SPY
trailing vol = last 21 days, known at t
P&L per $1 vega notional = (K² − RV²) / 2K − cost
Rules fixed in configs/default.yaml
A. Always sell, constant size
B. Carry filter: sell only if VIX > trailing realised vol
C. Scaled: size × 20 / VIX
Cost 0.5 vol pts per trade · 1.5 stress
Tests
Look-ahead checks (unit tests):
future returns cannot change
the strike, filter or size
Full sample 1996–2026
and two halves
(before / from 2011)
Worst months, crash behaviour, cost stress
Reality check: SVXY, a listed short-volatility ETF
reports/metrics.json · monthly_trades.csv · figures/*.png

The trade and the sizing decision

