

S&P 500

S&P 500 futures (/ES / /MES) · Daily bars · out-of-sample test Sep 2020 - Sep 2026

A systematic, long-only strategy trading S&P 500 futures, driven by proprietary quantitative signals. It holds at most one contract at a time and is otherwise in cash.

Year expected return

15.0%

Worst drawdown (out of sample)

-9.5%

Calmar ratio (NET)

1.58

annual NET / worst drawdown

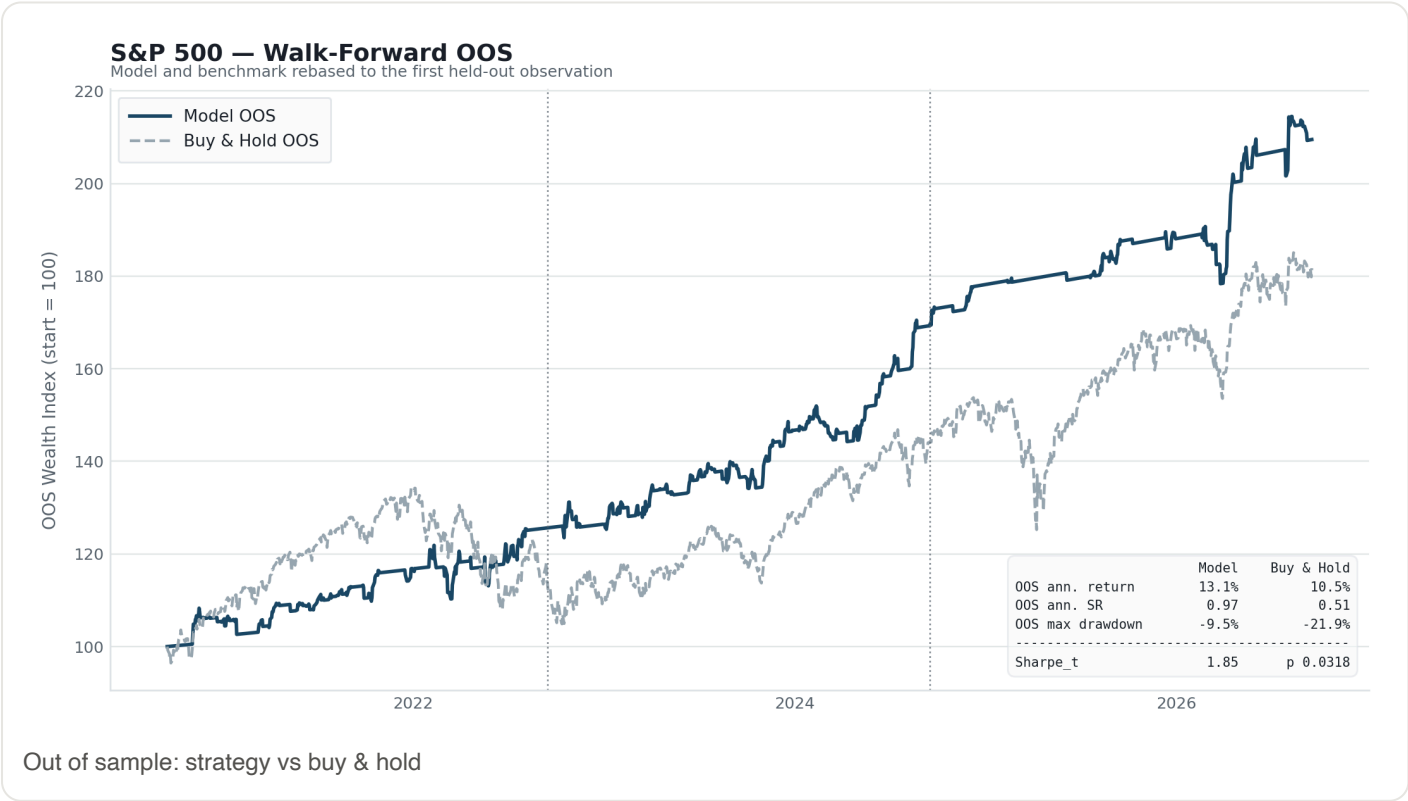
Out-of-sample history

108 rounds

18 py · 1.5 pm

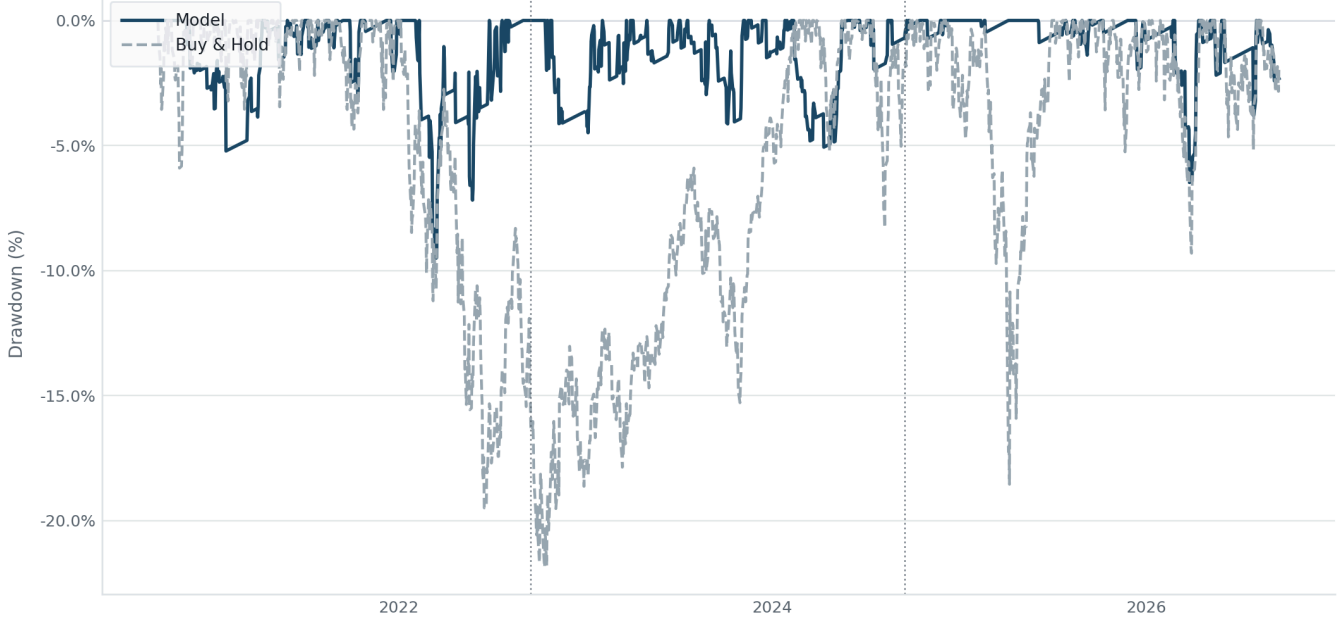
1 · Performance on unseen data

Every figure in this report comes from the out-of-sample period: data the strategy's parameters were never fitted on. It beat buy & hold with a Sharpe advantage of $t = 1.85$ ($p\ 0.0318$), clearing the 95% confidence gate required for deployment. Annualised Sharpe 0.97 against 0.51 for buy & hold.



S&P 500 — OOS Drawdown Comparison

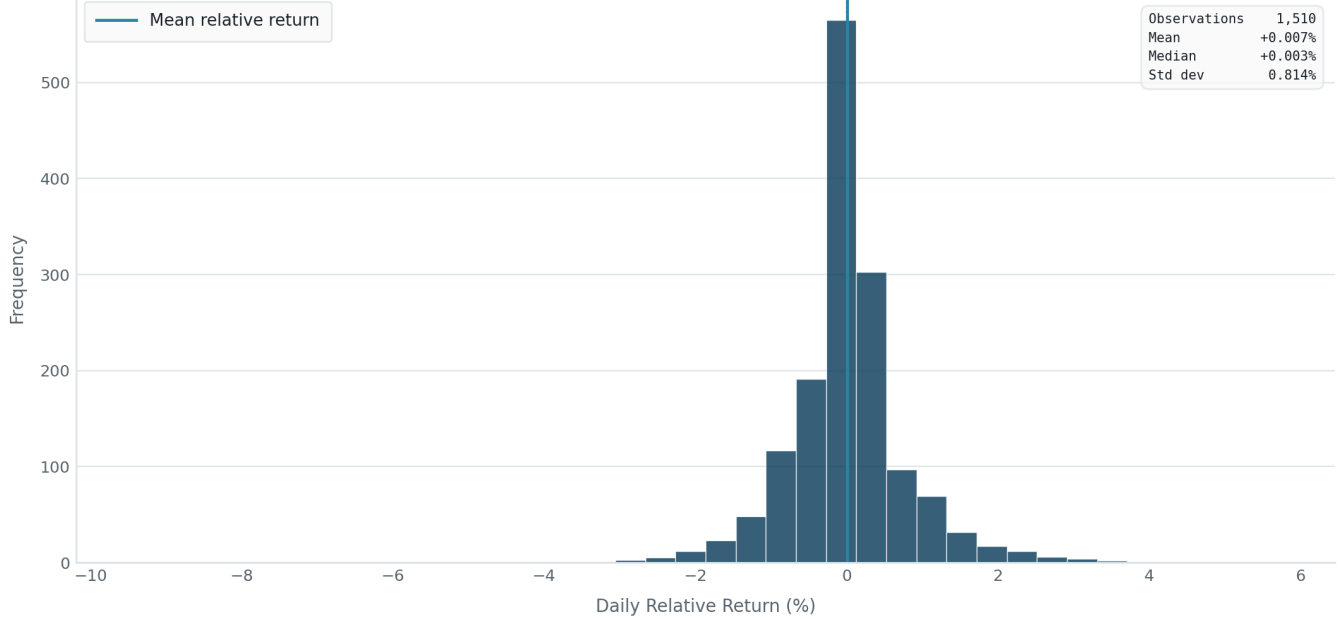
Peak-to-trough loss from each leg's own OOS equity high



Out of sample: drawdowns, strategy vs buy & hold

S&P 500 — OOS Relative Return Distribution

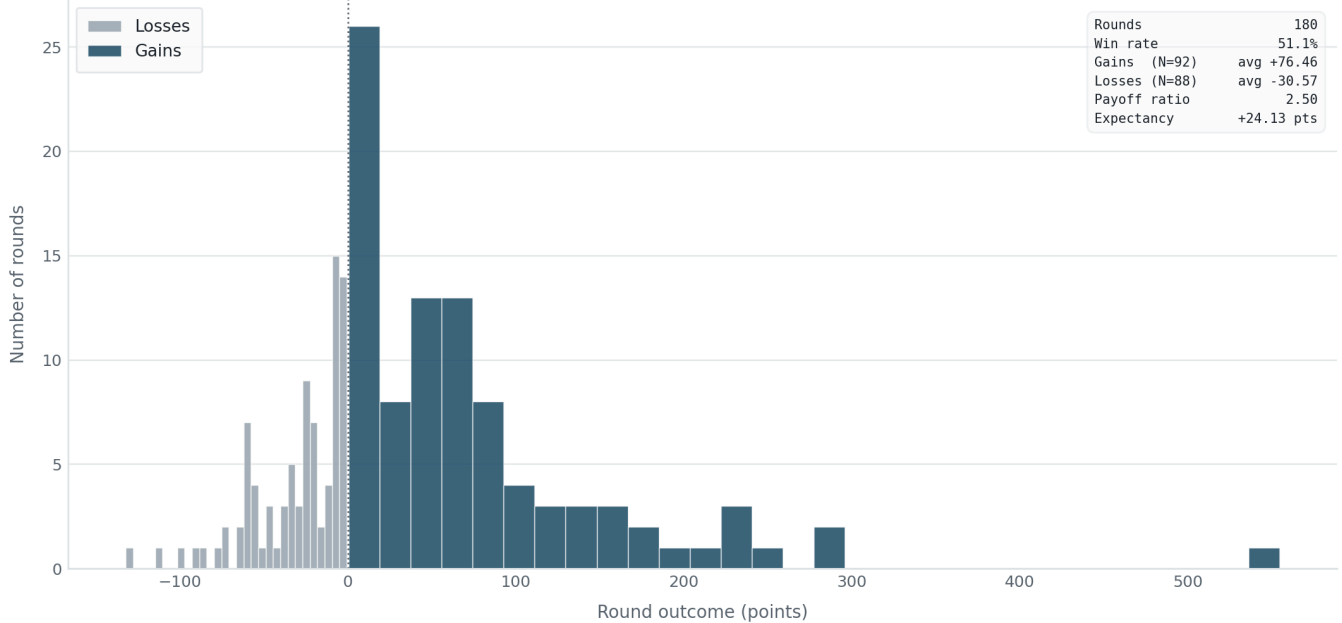
Model daily return minus Buy & Hold daily return



Out of sample: distribution of returns relative to buy & hold

S&P 500 — Round Outcome Distribution

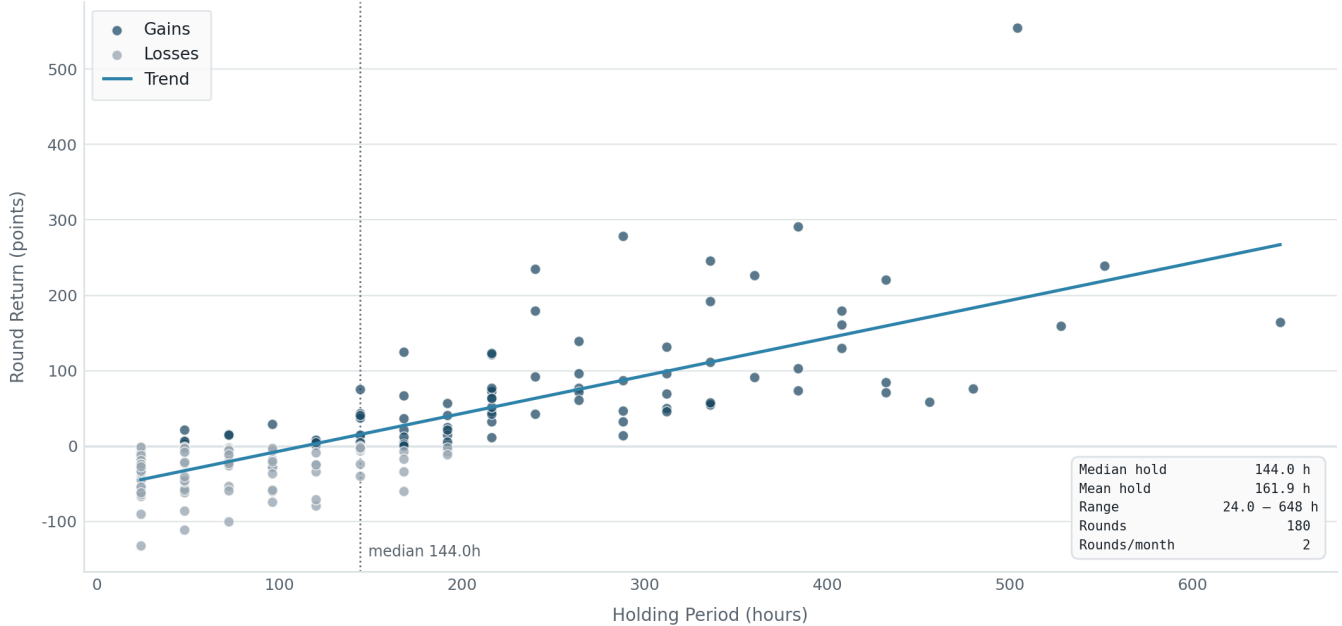
180 rounds · win rate 51%



Winning and losing trades (full sample, final parameters)

S&P 500 — Return vs Holding Period

180 rounds · win rate 51%

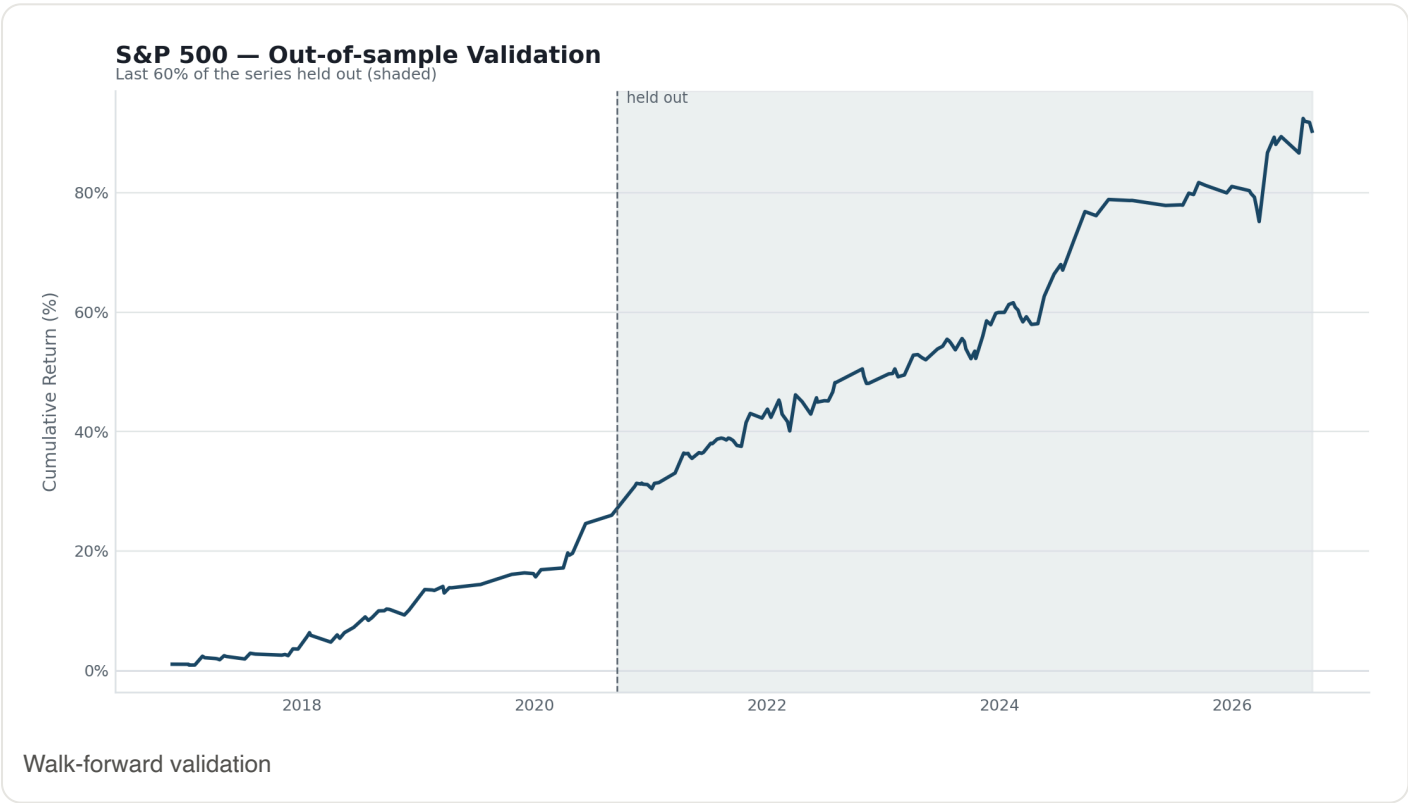


Trade return vs holding period, winners and losers (full sample, final parameters)

2 · How it was validated

The strategy was calibrated by walk-forward testing: each fold is calibrated on a training window, then scored on the period immediately after it, which it never saw. The three test periods are stitched together to give the out-of-sample record above.

Fold	Trained on	Tested on	Sharpe t vs buy & hold
Fold 1	20 Sep 2016 - 16 Sep 2020	17 Sep 2020 - 14 Sep 2022	0.985
Fold 2	20 Sep 2017 - 14 Sep 2022	15 Sep 2022 - 13 Sep 2024	1.452
Fold 3	19 Sep 2018 - 13 Sep 2024	16 Sep 2024 - 18 Sep 2026	0.931
Stitched	All three folds	17 Sep 2020 - 18 Sep 2026	1.855 p 0.0318



3 · Risk-adjusted return

Against its own market (buy & hold S&P 500), the strategy earns an annual alpha of **10.76%** (95% range 6.6% to 15.0%; $t = 5.01$, $p = 0.000001$) with a market beta of only 0.035, so its returns barely follow the market. The market-timing model (Henriksson-Merton) finds a timing effect of -0.038 ($p = 0.0135$) and an alpha of 14.33% ($p = 0.0000$). The alpha holds after allowing for market timing, so the edge is **not** just timing.

Expected annual return $E[R] = r_f + \alpha + \beta \times (R_m - r_f) = 0.0397 + 0.1076 + 0.0350 \times 0.0722 = \mathbf{0.1498}$, where $R_m - r_f$ is the realised excess return of buy & hold over the same period.

4 · What an investor keeps

Contract	Price	\$ per 1.00 move	Notional	CAPM alpha \$ / yr	Investor NET \$ / yr 95% range	NET % of notional	Worst drawdown	Drawdown \$	Calmar (NET)
/ES	7,702.25	\$50	\$385,112	\$41,445	\$57,706 \$41,538 to \$73,874	14.98%	-9.51%	-\$36,612	1.58
/MES	7,702.25	\$5	\$38,511	\$4,145	\$5,690 \$4,073 to \$7,306	14.77%	-9.51%	-\$3,661	1.55

Trading costs - please read. The figures above assume **\$5 per round trip per contract** (buy and sell together), applied equally to the full and the micro contract. What you actually pay depends on your broker, account and exchange fees, and may be higher or lower. Trades are assumed filled at the closing price of the period; slippage beyond that is not modelled. Each extra \$1 per round trip reduces the annual NET by the number of trades per year. The table shows the annual NET at other cost levels:

Contract	\$1 / round trip	\$2.5 / round trip	\$5 / round trip	\$10 / round trip	Each extra \$1
/ES	\$57,778	\$57,751	\$57,706	\$57,616	-\$18
/MES	\$5,762	\$5,735	\$5,690	\$5,600	-\$18

Notional is the full value the contract controls (price × dollar value of a 1.00 move). Returns and drawdowns above are measured against the notional, i.e. a fully funded position. Futures require only a margin deposit, so relative to the cash actually posted both gains and losses are larger. NET includes interest earned on the cash backing the position (3.97% a year).

5 · Robustness

- **Every component earns its place.** Each part of the model was tested by removing it: the complete model reaches a Sharpe ratio of 0.90 against 0.47 for its simplest core. Against buy & hold its Sharpe advantage has $t = 4.96$ ($p = 0.0005$).
- **Sensitivity to settings.** Out-of-sample performance was re-measured across 4,059 neighbouring configurations: 56% beat buy & hold and 3.2% cleared the same 95% confidence gate.

Important information

This report describes the historical, simulated performance of a systematic trading strategy. Past and simulated results do not guarantee future returns. Figures are statistical estimates from a backtest, not forecasts, and the ranges shown reflect estimation uncertainty only. Futures trading is leveraged and can result in losses exceeding the initial margin. Actual results depend on execution, costs, margin and position sizing. This document is for information only and is not investment advice or an offer to buy or sell any financial instrument.