SAMPLE RESEARCH REPORT · QUANTIDE

Trend following across seven asset classes, *with volatility targeting.*

Does a simple, pre-specified trend rule improve on a 60/40 portfolio once costs, cash and an honest out-of-sample period are accounted for?

PREPARED	DATA	OUT OF SAMPLE	VERDICT
6 November 2026	3 Jan 2006 – 5 Nov 2026	From 1 Jan 2017	Not tradeable as specified

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A good drawdown control. *Not a return engine.*

The rule holds each of seven liquid ETFs only while its trailing twelve-month return (skipping the latest month) is positive, sizes each holding to a share of a volatility budget, and keeps the remainder in T-bills. It was specified in full before the first run, and the most recent ten years, from January 2017, were held out of the testing.

0.74 → 0.37	0.65	-11.6%	4.8%
Sharpe, in sample → out of sample	60/40 Sharpe, out of sample	Worst drawdown, against -32.2% for 60/40	Realised volatility, against a 10% target

VERDICT

Not tradeable as specified.

Out of sample the Sharpe ratio halved, from 0.74 to 0.37, and fell below a plain 60/40 portfolio (0.65). The strategy did what trend rules are supposed to do in a crisis, in six of the seven stress periods tested. It did not earn enough the rest of the time to justify replacing a balanced portfolio. It stays on the list as a candidate defensive sleeve, with one pre-registered follow-up (section 6).

Findings

1. **The edge decayed.** In sample the rule beat 60/40 on a risk-adjusted basis (0.74 against 0.60). Out of sample it did not (0.37 against 0.65). The in-sample period contains 2008, which flatters any trend rule.
2. **Crisis protection held up, including out of sample.** In the 2022 rate shock the strategy lost 3.1% while 60/40 lost 20.7%. Through the financial crisis it gained 7.0% while 60/40 lost 32.2%. It lost less than 60/40 in six of the seven stress periods tested.
3. **The sizing is mis-specified, and that is the main finding.** The rule targeted 10% volatility and delivered 4.8%. Sizing each asset alone ignores the diversification between them, so the portfolio was on average only 56% invested, and below half invested on 40% of days. Much of the low return is under-exposure, not a weak signal.
4. **The parameters are not the problem, and tuning them would be a mistake.** The best out-of-sample setting (9-month lookback, Sharpe 0.62) was not the best in sample (12-month, 0.77). Choosing it now would be fitting to the hold-out.
5. **Costs matter, but they do not decide it.** At 172% annual turnover, raising costs from 10 to 50 basis points takes the Sharpe from 0.54 to 0.39. Even at zero cost it is 0.57, still short of 60/40 over the full period (0.63).

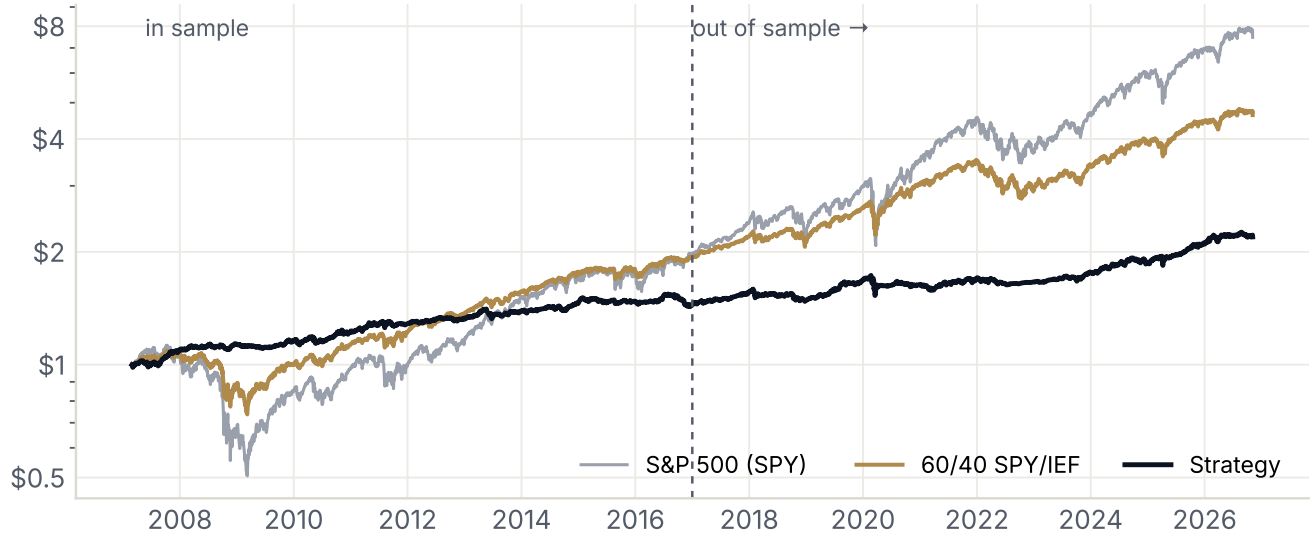
The rules, *written down first.*

Everything below was fixed before the first backtest ran. The twelve-month lookback and 10% volatility target are conventional choices in trend-following research, chosen for that reason and not tuned. Section 5 shows what other choices would have done.

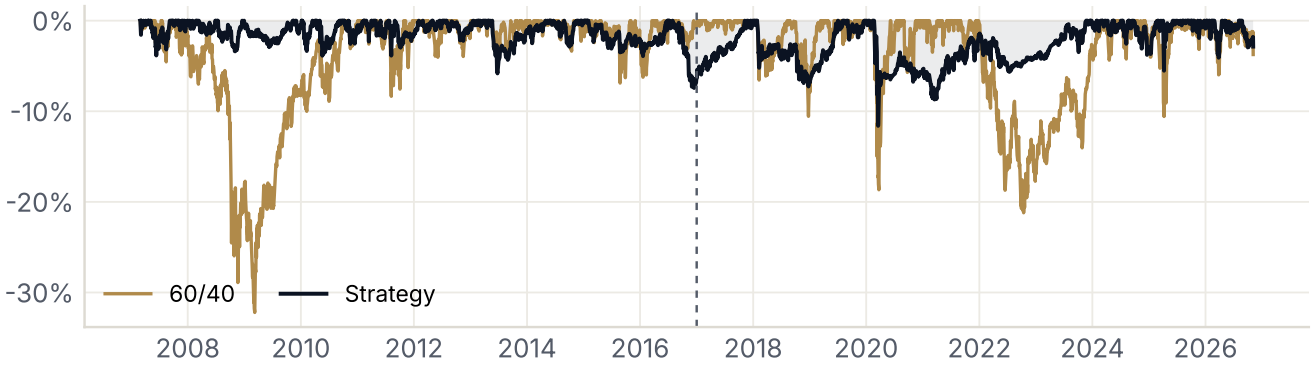
Universe	SPY (US equities), EFA (developed ex-US equities), VNQ (US real estate), IEF (7–10 year Treasuries), TLT (20+ year Treasuries), GLD (gold), DBC (broad commodities). Seven liquid ETFs, one per asset class.
Signal	Hold an asset when its return from 252 to 21 trading days ago is positive (twelve-month momentum, skipping the most recent month to avoid short-term reversal). Otherwise hold none of it.
Sizing	Each held asset gets (10% ÷ its 63-day realised volatility) ÷ 7 of the portfolio. Total exposure is capped at 100%: no leverage, no shorts.
Cash	Whatever is not invested earns the 13-week T-bill yield, accrued daily.
Rebalance	Weights are decided on the close of the last trading day of each month, using only data up to that close.
Execution	Trades fill at the **next** day's close, one full day after the decision. Between rebalances holdings drift with prices.
Costs	10 basis points per unit of turnover (5 commission and spread, 5 slippage), charged on every rebalance. Section 5 tests up to 50.
Benchmarks	60% SPY / 40% IEF, rebalanced monthly under the same costs and execution. Also shown: SPY alone, and the seven assets in equal weight.
Periods	First decision 28 Feb 2007, once every asset has a full year of history. In sample to 31 Dec 2016. Out of sample from 1 Jan 2017 to 5 Nov 2026, never looked at while specifying the rules.
Sample size	238 monthly rebalances and 175 entries and exits across the seven assets. Comfortably above the thirty-trade floor below which a result is not evidence.

> The one-day execution lag is deliberate. Filling on the same close that produced the signal is the most common source of look-ahead bias in monthly strategies, and it flatters results quietly.

Growth of one dollar, *and what it cost on the way.*



Growth of $1, log scale, after costs. 28 Feb 2007 to 5 Nov 2026. The dashed line marks the start of the out-of-sample period.



Drawdown from the previous peak. The longest time underwater was 944 trading days, from 2020-02-24 to 2023-11-20.

Out of sample, 1 January 2017 to 5 November 2026

	STRATEGY	60/40	S&P 500	EQUAL WEIGHT, 7 ASSETS
Annual return (CAGR)	**4.3%**	9.3%	14.5%	8.0%
Annual volatility	**5.2%**	10.7%	18.1%	9.5%
Sharpe ratio (excess of T-bills)	**0.37**	0.65	0.70	0.60
Sortino ratio	**0.43**	0.81	0.85	0.74
Maximum drawdown	**-11.6%**	-21.2%	-33.7%	-19.4%
Calmar ratio	**0.37**	0.44	0.43	0.41
Worst month	**-3.3%**	-7.4%	-12.5%	-7.7%
Months positive	**64%**	69%	69%	68%

In sample, 28 February 2007 to 31 December 2016

	STRATEGY	60/40	S&P 500	EQUAL WT.
Annual return (CAGR)	**3.8%**	6.9%	7.1%	4.9%
Annual volatility	**4.4%**	11.3%	20.9%	12.1%
Sharpe ratio (excess of T-bills)	**0.74**	0.60	0.40	0.41
Sortino ratio	**0.98**	0.76	0.50	0.54
Maximum drawdown	**-7.4%**	-32.2%	-55.2%	-33.4%
Calmar ratio	**0.51**	0.21	0.13	0.15
Worst month	**-3.3%**	-10.3%	-16.5%	-16.2%
Months positive	**61%**	63%	63%	57%

Full period

	STRATEGY	60/40	S&P 500	EQUAL WT.
Annual return (CAGR)	**4.1%**	8.1%	10.8%	6.5%
Annual volatility	**4.8%**	11.0%	19.6%	10.9%
Sharpe ratio (excess of T-bills)	**0.54**	0.63	0.54	0.49
Sortino ratio	**0.67**	0.79	0.66	0.63
Maximum drawdown	**-11.6%**	-32.2%	-55.2%	-33.4%
Calmar ratio	**0.35**	0.25	0.20	0.19
Worst month	**-3.3%**	-10.3%	-16.5%	-16.2%
Months positive	**62%**	66%	66%	62%

Calendar-year returns

YEAR	STRATEGY	60/40	DIFFERENCE
2007 from 28 Feb	**+9.2%**	+7.1%	+2.2%
2008	**+3.9%**	−17.7%	+21.6%
2009	**+1.8%**	+13.2%	−11.4%
2010	**+6.4%**	+13.5%	−7.1%
2011	**+4.6%**	+7.9%	−3.3%
2012	**+3.3%**	+11.3%	−8.0%
2013	**+5.0%**	+15.6%	−10.6%
2014	**+4.6%**	+11.9%	−7.3%
2015	**+1.1%**	+1.7%	−0.6%
2016	**−2.0%**	+7.7%	−9.6%
2017	**+8.1%**	+13.7%	−5.6%
2018	**−5.0%**	−2.0%	−3.1%
2019	**+13.0%**	+21.8%	−8.8%
2020	**−2.4%**	+16.6%	−19.0%
2021	**+4.0%**	+15.1%	−11.1%
2022	**−2.3%**	−16.6%	+14.3%
2023	**+6.2%**	+16.8%	−10.6%
2024	**+5.5%**	+14.2%	−8.6%
2025	**+12.4%**	+13.9%	−1.5%
2026 to 5 Nov	**+4.7%**	+4.4%	+0.3%

The strategy trailed 60/40 in 16 of 20 calendar years and led it in the years 60/40 fell hardest. That is the shape of an insurance policy, and it has to be judged as one.

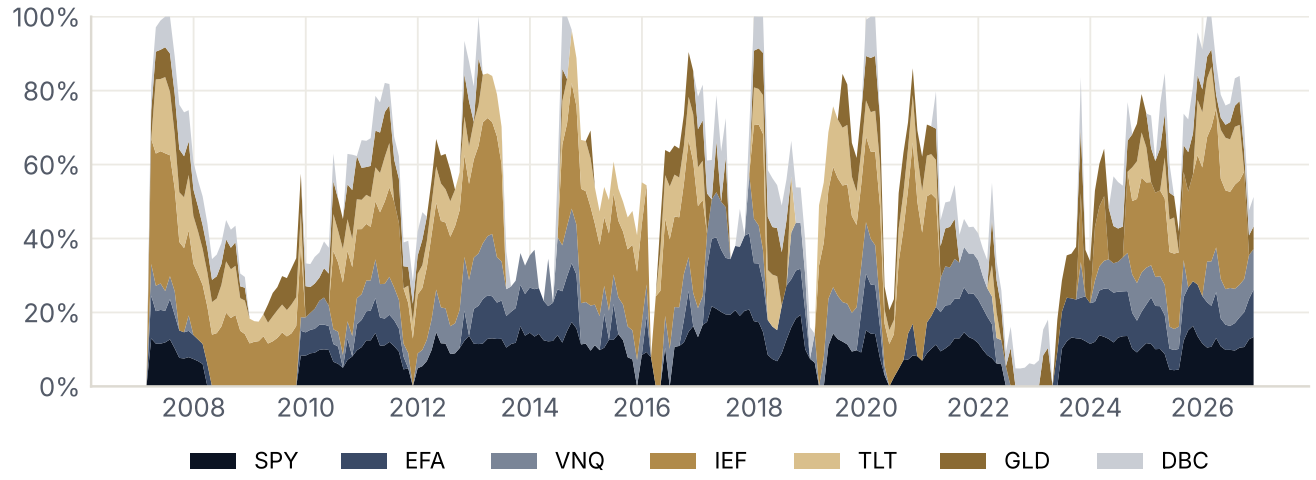
Where it earned its keep.

Peak-to-trough windows of the S&P 500, plus the 2013 taper tantrum in bonds, dated by the market and not by the strategy.

EPISODE	STRATEGY	60/40	S&P 500
Global financial crisis 2007-10-09 to 2009-03-09	**+7.0%**	−32.2%	−55.2%
Euro debt crisis 2011-04-29 to 2011-10-03	**−2.1%**	−6.6%	−18.6%
Taper tantrum 2013-05-21 to 2013-06-24	**−5.8%**	−5.3%	−5.6%
Q4 2018 sell-off 2018-09-20 to 2018-12-24	**−4.7%**	−10.5%	−19.3%
Covid crash 2020-02-19 to 2020-03-23	**−9.5%**	−18.7%	−33.7%
2022 rate shock 2022-01-03 to 2022-10-12	**−3.1%**	−20.7%	−24.5%
2025 tariff shock 2025-02-19 to 2025-04-08	**−4.4%**	−10.6%	−18.8%

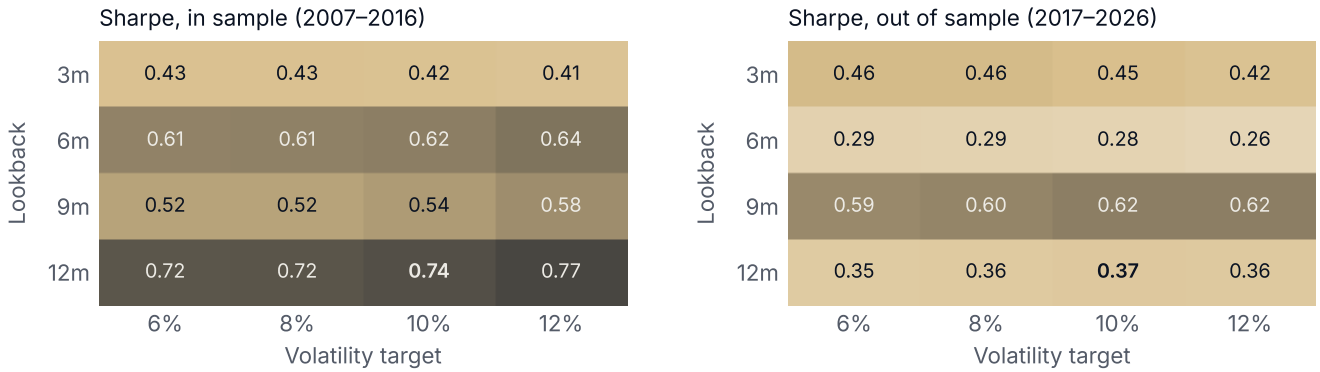
The one episode it did worse in, the 2013 taper tantrum, is instructive: a fast reversal in bonds and equities together, too quick for a monthly signal to react. Trend rules protect against slow-moving damage, not sudden shocks.

What it held



Month-end holdings after drift. The unshaded area above each stack was in T-bills. Exposure averaged 56% and fell to 0% at its lowest.

Would another choice *have changed the answer?*



Sharpe ratio for sixteen variants: four lookbacks and four volatility targets. The specified rule (12 months, 10%) is in bold. Every variant was run under the same costs, lag and periods.

No variant rescues the conclusion. Out of sample the best was 0.62, still below 60/40's 0.65. The ranking also changed between periods: the in-sample leader (12-month) fell to 0.36 out of sample. The volatility target barely moves the Sharpe, which is consistent with finding 3: at a 10% target the cap on total exposure bound in only 5% of months, so the target mostly scales an already under-invested book up or down, which leaves the Sharpe ratio almost unchanged.

Cost sensitivity

COST PER UNIT TURNOVER	CAGR	SHARPE
0 bps	**4.3%**	0.57
10 bps as tested	**4.1%**	0.54
25 bps	**3.8%**	0.48
50 bps	**3.4%**	0.39

Attribution by asset

ASSET	AVG. WEIGHT	ENTRIES / EXITS	SHARE OF RETURN
US equities SPY	**9.4%**	16	29%
Gold GLD	**6.1%**	28	23%
US Treasuries, 7–10 year IEF	**16.1%**	17	15%
US real estate VNQ	**6.3%**	28	12%
Developed ex-US equities EFA	**6.6%**	28	8%
Broad commodities DBC	**4.6%**	32	7%
US Treasuries, 20+ year TLT	**6.6%**	26	6%

What this rests on, *and what would change it.*

Assumptions

- **Data.** Yahoo Finance adjusted daily closes, with dividends reinvested and ETF expense ratios already in the price. Free data, not reconciled against a second vendor. A desk would reconcile it.
- **Instruments.** ETFs stand in for the asset classes. Their histories are short: DBC begins in February 2006, which sets the start date. Futures would give a longer, cheaper and more precise test.
- **Execution.** Next-day close fills, fractional shares, no market impact beyond the slippage charge. Reasonable at retail and small-fund size in these ETFs; not at institutional size.
- **Cash.** Earns the 13-week T-bill yield. Without it, roughly half the portfolio would earn nothing, and the results would look worse than reality between 2022 and 2026.
- **Taxes.** Ignored. A 238-rebalance strategy realises gains that 60/40 defers, which matters in a taxable account.
- **Regime.** Twenty years containing one great financial crisis, a decade of falling rates and one inflation shock. A different twenty years could rank these strategies differently.

What would change the conclusion

- Scaling the whole portfolio to its volatility target, rather than each asset alone, so that it is fully used. This is the single most likely improvement, and it is the follow-up below.
- Judging it as a sleeve rather than a replacement: for example 20–30% of a portfolio alongside 60/40, measured on the combined drawdown.
- A longer test on futures back to the 1970s, which includes the last inflationary decade.

PRE-REGISTERED FOLLOW-UP

Same universe, signal, costs, lag and periods. One change: scale the held positions together so that the portfolio's 63-day realised volatility meets 10%, still capped at 100% gross. Success is an out-of-sample Sharpe above 60/40's 0.65 with a maximum drawdown under half of 60/40's. Anything less and the idea is closed.

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