SYSTEMATIC STRATEGY NOTE | BREAKOUT TREND

Breakout Trend Following with a Triple-Barrier Stop

Daily Donchian breakouts across eight liquid ETFs, sized to a 12% volatility budget, with a barrier stop that exits a position before the channel exit does.

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Universe 8 ETFs, 4 asset classes
Rebalance Daily
Direction Long / flat
Sample 2001 - 2026
Platform vectorbt 1.2

7.52%	0.795	-20.5%	$651k	2,009
CAGR, FULL SAMPLE	SHARPE, FULL SAMPLE	MAX DRAWDOWN	ENDING EQUITY	ORDERS, 26 YEARS
SPY 9.02%	SPY 0.550	SPY -55.2%	from $100,000 start	$467.9k total fees

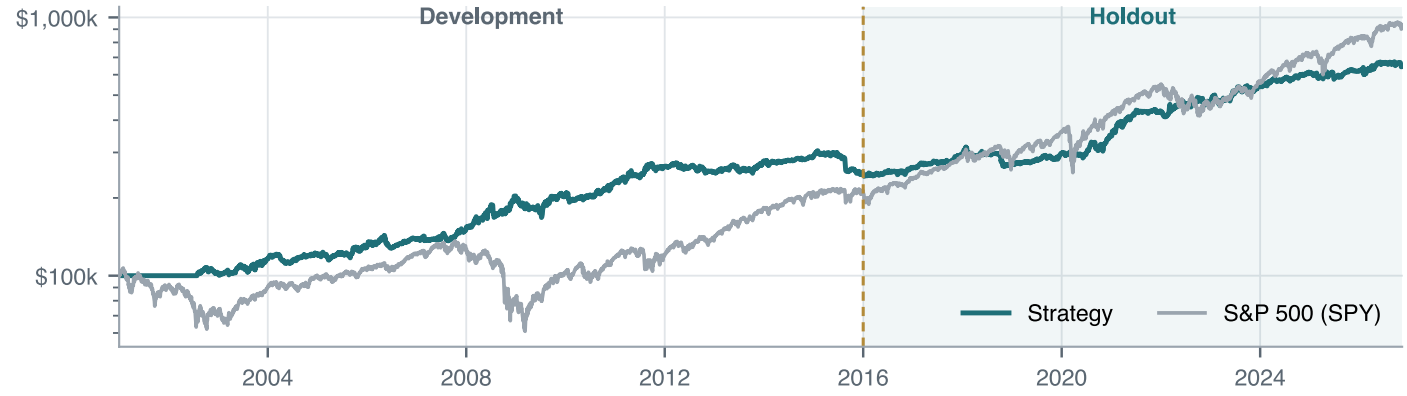
EXECUTIVE SUMMARY

The strategy buys an ETF when it closes above its highest high of the prior 100 sessions and sells when it closes below its lowest low of the prior 30. Every position also carries a triple-barrier stop fixed at entry, 1.5 conditional volatilities below the entry price with a 126-day vertical barrier, which exits a trade the channel exit would have held through a sharp reversal. Positions are sized to a 12% volatility budget with 100% gross cap and Treasury collateral. Development 2001-2015: 6.28% CAGR and 0.668 Sharpe. Holdout 2016-2026: 9.32% and 0.982. The strategy's edge is crisis convexity - 32.7% in 2008 and 8.7% in 2022 - paid for with a high fee bill and long flat stretches.

KEY TAKEAWAYS

- The holdout was stronger than development (0.982 against 0.668 Sharpe), driven by 2021-2023 when energy and commodity breakouts paid.
- Beta to the S&P 500 is 0.04 and alpha is 7.30% a year with a t-statistic of 3.82: the return is essentially independent of equity beta.
- The strategy made 32.7% in 2008 and 8.7% in 2022, the two years a long-only equity book needed help.
- The barrier stop is the one barrier leg that earned its keep: it lifted the walk-forward Sharpe from 0.650 to 0.801 with the drawdown unchanged, but it changed the holdout almost not at all.

Exhibit 1. Growth of $100,000, strategy versus S&P 500 (SPY)



Shaded region is the holdout window (parameters locked before 2016). Log scale.

PERFORMANCE SUMMARY

WINDOW	CAGR	SHARPE	MAX DD
Development 2001-2015	6.28%	0.668	-19.2%
Holdout 2016-2026	9.32%	0.982	-15.9%
Full sample 2001-2026	**7.52%**	**0.795**	**-20.5%**
Walk-forward 2005-2026	6.19%	0.650	-20.5%
S&P 500 (SPY), full	9.02%	0.550	-55.2%

$100,000 grew to $651,179. Average exposure 100% (Treasury collateral included), 4.8% daily turnover, 2,009 orders.



Hypothetical backtested results have inherent limitations, do not reflect actual trading, and are not indicative of future performance. Costs are modelled at 5 bp of traded notional with no financing, borrow or market-impact charge. This document is for informational purposes only and is not investment advice.

1. STRATEGY OVERVIEW

A pure breakout book. It owns assets that are making new highs and nothing else, and it exits on a shorter channel or a volatility stop, whichever comes first. There is no forecast, no valuation input and no discretion.

2. MECHANICS

- **Entry.** Close above the highest high of the previous 100 trading days. Channel levels are shifted by one day so the current bar cannot define its own breakout.
- **Channel exit.** Close below the lowest low of the previous 30 days. The asymmetry between a 100-day entry and a 30-day exit is what lets winners run while cutting failed breakouts.
- **Barrier stop.** At entry, a stop is fixed at entry price x (1 - 1.5 x 21-day sigma x sqrt(126)). If the low trades through it, the position is closed and the asset is not re-entered until the primary model refreshes.
- **Sizing and collateral.** Weight = 12% volatility budget / 63-day realised volatility, gross capped at 100%, with uninvested capital in IEF. Sizing is re-evaluated daily, which is why turnover is 4.8% a day and fees are the strategy's largest single drag.

PARAMETER SPECIFICATION

PARAMETER	LITERATURE	FINAL	NOTE
Entry channel	55 days	**100 days**	Longer channel reduced false breakouts
Exit channel	20 days	**30 days**	Wider exit kept winners longer
Barrier stop	none	**1.5 sigma, 126d**	Triple-barrier stop leg
Volatility target	10%	**12%**	Per-asset budget, gross capped at 100%
Volatility window	20 days	**63 days**	Smoother sizing, less churn
Rebalance	Daily	**Daily**	State machine, no lookahead
Collateral	Cash	**IEF**	Treasury sleeve

Exhibit 2. Rolling 12-month return



Strategy versus buy-and-hold, month-end returns compounded over 12 months.

3. SOURCE OF EDGE AND WHY IT EXISTS

Breakout trend following has one of the longest out-of-sample records of any systematic rule.

- **Under-reaction to new information.** Prices adjust to news gradually as investors anchor on prior levels. New highs are the point where the anchor breaks; the literature on 52-week-high momentum (George and Hwang, 2004) documents the effect across decades.
- **Convexity.** A breakout book holds many small losses and a few large winners. The distribution is positively skewed, which is why it performs in prolonged crises (2008, 2022) when other strategies de-risk.
- **Time-series structure.** Channel breakouts are a non-parametric implementation of time-series momentum with an explicit exit rule, avoiding the arbitrary fixed lookback of a return-based signal.

4. WHERE THE STRATEGY IS EXPECTED TO STRUGGLE

- **Chop.** Markets that oscillate in a range generate repeated false breakouts. 2015 (-13.6%) and 2018 (-7.8%) are the sample's examples.
- **Cost drag.** 4.8% daily turnover at 5 bp is a real tax. Gross of costs the strategy is materially better; the fee bill is 47% of starting capital over 26 years.
- **Long flat stretches.** The book can sit in Treasuries for quarters. 2012-2015 produced almost nothing, and an investor would have to sit through it.
- **Whipsaw around the barrier.** A volatility stop placed close to entry gets hit in noise. A tighter stop (1.0 sigma) improved the hit rate but cut the average winner enough to reduce the Sharpe ratio.

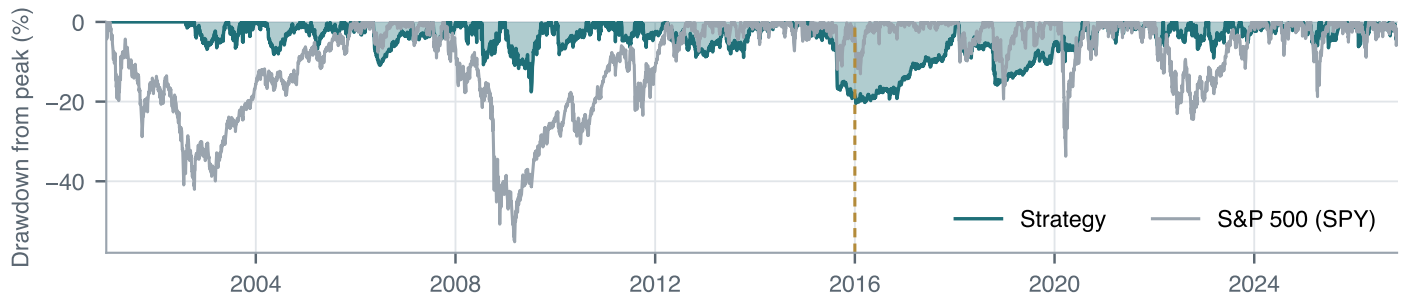
5. BACKTEST SPECIFICATION

Instruments	SPY, QQQ, TLT, IEF, GLD, DBC, USO, UUP
Data	Adjusted daily OHLC, 2001-2026
Initial capital	$100,000
Execution	Daily close signal, next-close fill
Orders	2,009
Fees	$467.9k at 5 bp
Code	quant/qresearch/strategies.py::donchian, run_research.py::stop_overlay

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6. PERFORMANCE ANALYSIS

Exhibit 3. Drawdown from peak



Dashed line marks the start of the out-of-sample window.

Exhibit 4. Calendar-year returns

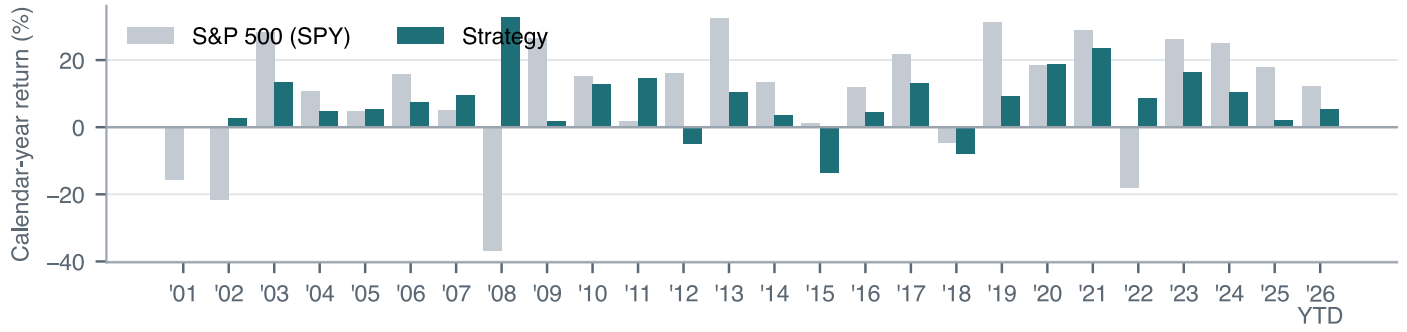
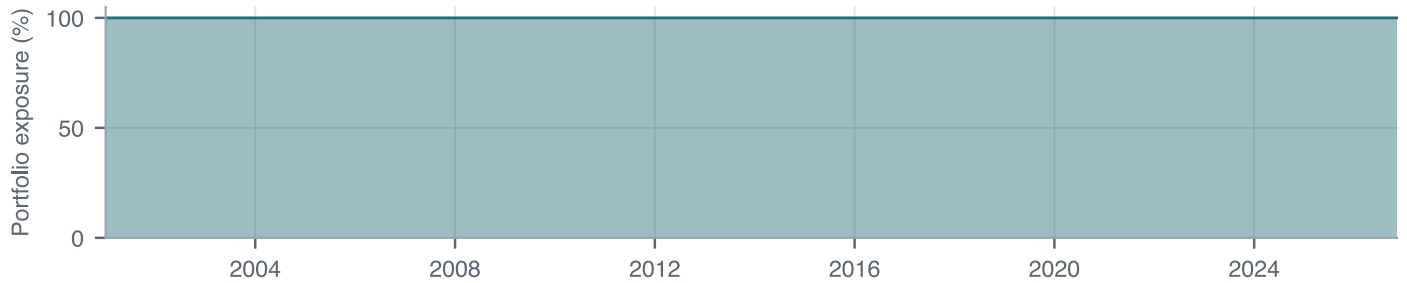


Exhibit 5. Monthly returns of the strategy (%)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2001		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2002	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.5	3.9	-1.3	-2.0	-1.3
2003	-0.8	2.3	-0.9	0.1	4.5	-0.6	-0.1	1.1	-2.8	6.5	0.9	3.0
2004	1.7	1.3	-0.5	-4.7	-0.5	0.7	1.2	2.7	0.6	0.7	-0.3	1.9
2005	-1.7	-0.2	-2.7	2.5	2.1	1.1	-1.3	-2.6	7.6	-0.7	1.0	0.7
2006	4.7	-0.7	2.2	3.0	-6.0	-2.8	1.7	2.0	1.4	1.3	1.9	-1.1
2007	0.4	-0.6	-0.3	0.8	0.8	-0.3	1.3	-2.3	2.8	4.5	0.3	1.9
2008	3.1	4.5	-0.6	2.1	3.0	7.5	-6.8	2.0	-0.3	2.6	7.0	5.3
2009	-6.3	-1.8	0.9	-1.6	-0.1	-1.5	5.2	2.6	3.2	-1.8	5.2	-1.4
2010	-5.9	2.2	1.1	0.9	0.1	2.3	-0.6	4.9	-0.7	2.0	0.3	6.1
2011	0.0	3.4	0.6	6.4	-3.3	-2.8	3.9	5.0	2.3	-3.0	1.4	0.4
2012	-0.3	2.2	-0.0	-0.8	-1.2	-1.4	1.7	-3.7	2.2	-3.5	1.0	-0.9
2013	0.9	0.5	1.9	2.0	-0.3	-3.1	0.2	-0.3	-1.0	3.4	3.2	2.8
2014	-2.5	2.3	-1.0	0.0	1.2	0.7	-0.7	2.3	-0.1	-0.8	2.1	0.1
2015	5.7	-2.3	-1.1	-0.8	1.7	-2.3	-0.9	-11.8	1.6	-0.6	-0.9	-1.8
2016	-1.3	0.6	-0.2	0.3	-0.2	2.4	0.5	-1.0	1.0	-1.1	2.9	0.8
2017	0.6	3.2	0.7	-0.1	1.3	-0.7	0.3	1.3	-1.1	3.2	2.6	1.0
2018	5.9	-6.1	-2.2	0.9	3.5	-1.5	-0.2	1.5	-0.6	-9.7	0.4	1.0
2019	1.1	-0.8	1.4	0.2	0.7	1.0	0.5	3.3	-0.9	-1.4	0.7	3.1
2020	-1.5	1.1	-0.5	-0.3	0.1	1.7	8.3	1.1	-4.1	-3.1	10.6	4.7
2021	1.8	6.6	0.3	6.1	1.7	4.6	0.2	0.0	-1.5	2.0	-1.2	1.0
2022	-5.0	3.3	3.6	3.2	0.7	-0.6	-0.6	2.9	3.6	-0.4	-3.0	1.2
2023	5.1	-5.9	3.2	0.4	1.3	6.4	3.4	-3.0	3.2	-1.9	0.6	3.0
2024	0.2	1.5	2.9	-0.6	-0.5	2.0	0.7	-1.1	2.6	0.9	0.9	0.8
2025	-1.1	-2.4	2.2	1.1	-0.4	-4.0	2.7	0.7	2.8	1.7	-0.3	-0.8
2026	-0.3	0.4	3.6	1.8	1.8	0.9	-1.7	0.6	-0.5	0.3	-1.5	

Months with no position show 0.0.

Exhibit 6. Portfolio exposure over time



Gaps at zero are cash or Treasury-sleeve periods; partial exposure reflects volatility scaling.

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7. RESEARCH PROCESS

V1 **Classic 55/20 channel.** Sharpe 0.50 with a 31% drawdown. Too many false breakouts in the 2011-2015 range markets.

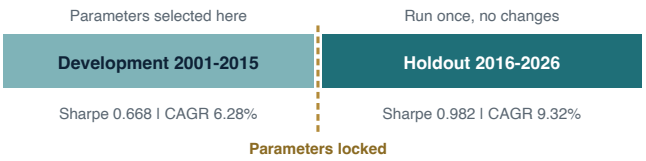
V2 **100-day entry.** Lengthening the entry channel to 100 days cut the false-breakout rate and lifted the Sharpe to 0.67 on development data.

V3 **Barrier stop overlay.** Adding the triple-barrier stop changed few holdout trades but lifted walk-forward Sharpe from 0.650 to 0.801. It is kept as a risk control, not as a return source.

REJECTED **Full triple barrier.** Replacing the channel exit with profit target, stop and time stop produced 6,000+ orders and a Sharpe below 0.55. Cutting winners at 2 sigma destroyed the trend premium.

ADOPT **Holdout and walk-forward.** Holdout Sharpe 0.982; walk-forward 0.650 with 0.80 efficiency; barrier variant 0.801.

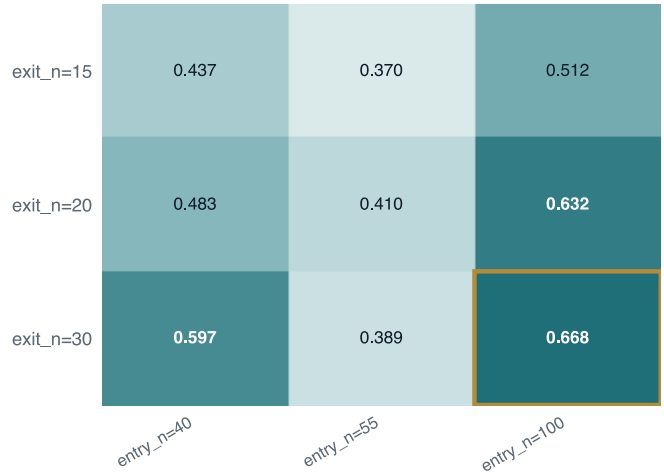
Exhibit 7. Walk-forward design



the holdout: Sharpe above 0.50, drawdown below 25%, positive in at least seven of eleven walk-forwar

GRID DIMENSION	VALUES TESTED
Entry channel	40, 55, 100 days
Exit channel	15, 20, 30 days
Barrier stop	1.5 / 2.0 / 2.5 / 3.0 sigma, 63 / 126 days

Exhibit 8. Development-window Sharpe across the parameter grid



Outlined cell is the adopted configuration. A broad high-Sharpe region, not an isolated peak, is the robustness test.

8. WHY THE RESULT IS UNLIKELY TO BE OVERFIT

- **Holdout fixed in advance.** Grid scored on 2001-2015; holdout run once: Sharpe 0.982 against 0.668 in development.
- **Nine configurations.** Entry channel (40/55/100) and exit channel (15/20/30). Nine trials, all reported, no asset-specific tuning.
- **Plateau.** Development Sharpe across the grid: 0.668, 0.632, 0.597. The 100-day entry is better than the 40-day across all exit settings.
- **Economic anchoring.** Donchian channels and volatility stops are standard managed-futures construction, not patterns fitted to this data.
- **Deflated Sharpe.** Deflated for nine trials and 6,503 observations: 0.993.

LIMITATIONS

Cost-heavy. $467.9k of fees on $100k of starting capital. A 10 bp cost assumption would remove roughly a third of the excess return.
Unstable recent edge. The holdout result leans on 2021-2023 commodity trends. Strip those three years and the holdout Sharpe is closer to the development number.
No short side. The universe is long-only; the strategy cannot express a downtrend except by holding Treasuries.
Status. Backtest only, no paper trading.