ETF Trading System Forensic Analysis & Optimal Allocation Strategy

Quantitative Trading Portfolio

Prepared: 04 April 2026
Strategies analysed: S1, S2, S3, S4, S5, S6, S7, S8, S9, S10
Trade universe: 11,687 trades | 2015–2026

11,687 Total trades analysed	**2015 – 2026** Test period	**10 sub-systems** Strategies	**57.8%** Overall win rate
1.25 System profit factor	**1.01x** Avg win / avg loss	**0.82x** MFE / MAE ratio	**0.625** Best 3-combo Sharpe

This report presents a complete forensic analysis of a 10-strategy systematic momentum trading system deployed across ASX and US equity markets, including ETFs, single-stock shorts, sector rotations, and cryptocurrency. Analysis covers trade-level metrics, market regime performance, correlation structure, and optimal capital allocation across the three highest-quality sub-strategies.

SECTION 1 — SYSTEM OVERVIEW

System Architecture

This is a multi-strategy ensemble running 10 distinct sub-systems (S1–S10) across 11,687 trades from February 2015 through April 2026. The portfolio operates both long (S2–S7, S9, S10) and short (S1, S8) books across ETFs, individual equities, cryptocurrency (BTCUSD), and sector rotations. Trade durations range from intraday (S1, S8 at 0 bars) to multi-week swing (S3 at avg 13.5 days). All performance judgements are anchored on trade-level % gain metrics rather than nominal dollar figures, which are distorted by compounded position sizing.

Compounding Context

The account size proxy (mean trade size) grew from approximately $15,600 in 2015 to $1.85 million in 2025 — roughly 120x. This means a single bad S8 trade in 2025 at -12% on a $2.5M position loses approximately $300,000, while the same -12% trade in 2016 lost approximately $3,000. The 2025 S8 drawdown of -$3.2M in raw dollar terms was only -0.34% average gain per trade across 348 trades — a moderate underperformance, not a catastrophic failure — but it consumed most of the compounded account gains from prior years in dollar terms.

Overall System Metrics

Metric	Value	Assessment
Total trades	11,687	Full 2015–2026 period
Win rate	57.8%	6,755 winners / 4,932 losers
Average win	+1.83%	Per trade % gain
Average loss	-1.81%	Per trade % loss
Win/loss ratio	1.01x	Near-symmetric — edge is in win rate
Profit factor	1.25	Gross wins / gross losses
Average MFE	+1.51%	Peak open profit
Average MAE	-1.84%	Maximum adverse excursion
MFE / MAE ratio	0.82x	Exit slightly before peak — room to improve
Long trades	6,155 (53%)	S2–S7, S9, S10
Short trades	5,532 (47%)	S1, S8

SECTION 2 — PER-STRATEGY FORENSIC ANALYSIS

Strategy Performance Summary

Strategy	N	Side	Win rate	Avg win	Avg loss	W/L	Profit factor	Avg bars	Position %	$ contrib
S1	1,263	Short only	51.5%	+1.28%	-1.03%	1.24x	1.23	0 (intraday)	30%	13.4%
S2	436	Long only	71.3%	+1.83%	-1.81%	1.01x	2.65	6.3	20%	21.3%
S3	123	Long only	69.1%	+2.87%	-2.11%	1.36x	2.87	13.5	30%	11.3%
S4	559	Long only	75.0%	+4.01%	-7.06%	0.57x	1.79	3.6	~10%	5.9%
S5	1,183	Long only	63.7%	+0.96%	-1.13%	0.85x	1.41	1.8	10%	6.3%
S6	770	Long only	65.2%	+1.57%	-1.60%	0.98x	2.17	1.7	5%	6.9%
S7	1,875	Long only	61.0%	+1.32%	-1.50%	0.88x	1.35	1.8	5%	5.6%
S8	4,269	Short only	53.3%	+2.01%	-1.89%	1.06x	1.06	0 (intraday)	20%	15.3%
S9	896	Long only	47.3%	+2.22%	-1.84%	1.21x	1.14	4.8	~1.5%	~0%
S10	313	Long only	61.3%	+2.74%	-2.74%	1.00x	1.77	2.2	20%	14.1%

S1 — Short, Intraday, 30% Position

Win rate of 51.5% is marginal for a system that relies on direction, yet this strategy carries the largest single position size at 30% of account. It holds zero bars — pure intraday mean reversion on the short side, avoiding overnight gap risk entirely. The upside is structural diversification against all long strategies (correlation near zero or negative). Max consecutive losses of 11 is the worst in the system. The 30% sizing is aggressive relative to its 1.24x win/loss ratio.

S2 — Long, Multi-Day (avg 6 days), 20% Position

The standout strategy. 71.3% win rate, profit factor 2.65, contributing 21.3% of all system profits. MAE of -2.34% is slightly wide relative to avg wins of +1.83%, suggesting the system sometimes takes pain before recovering, but MFE/Win at 0.96x shows exits are close to optimal. The 2022 bear year showed only 8 trades — likely a filter correctly reduced exposure. Weakest year 2022 (-$23K) is minor. S2 is systematically under-allocated at 20% given its quality metrics.

S3 — Long, Swing (avg 13.5 days), 30% Position

Fewest trades (123) but highest win/loss ratio at 1.36x and profit factor 2.87 — the best quality strategy on these metrics. MFE actually exceeds final win (MFE/Win = 1.08x), meaning it gives back some open profit on exits, suggesting exits could be tightened. The 30% position is large for a multi-week hold.

S4 — Long, BTCUSD-Dominant (2 symbols only)

Win rate of 75% looks excellent until you see avg loss of -7.06% against avg win of +4.01% — a 0.57x win/loss ratio. The distribution is fat-tailed on both sides: max win +21.6%, max loss -43.6% (Bitcoin crash). The hard 12-bar time stop creates predictable blow-ups in volatile conditions. Works in trending crypto conditions (2017: +2.79%, 2023: +2.13%) and bleeds in choppy or crashing markets (2018: -1.68%).

S8 — Short, Intraday, 20% Position, 1,015 Unique Symbols

The most complex and highest-risk element of the system. A profit factor of 1.06 is dangerously thin — one bad patch tips it negative, as 2025 proved. The short book faces structural headwinds in strong bull markets. The MFE/Win ratio of only 0.62x is the worst in the system. The worst single trades (-14% CAR, -13.9% QS, -13.1% RKLB) are all recent 2025, suggesting more short-squeeze environments. No hard stop appears to be in place — a -14% trade on a $2.5M position is a $350K single-trade loss.

S9 — Long, Multi-Day (avg 4.8 days), Minimal Sizing (~1.5%)

$1,760 total profit across 896 trades over 11 years — effectively flat. Win rate of 47.3% and all 696 "Change in Sig" exits belong to S9 with a 38.6% win rate and -0.57% avg gain. Forced signal reversals are destroying what little edge exists. The tiny position size suggests the developer already has limited conviction. This strategy should be retired, substantially redesigned, or the "Change in Sig" exit logic overhauled.

SECTION 3 — YEAR-BY-YEAR & MARKET REGIME PERFORMANCE

Year-by-Year System Performance

Year-by-year results are measured on the sum of trade-level percentage gains to eliminate compounding distortion. A higher sum in a given year reflects stronger trade-level performance, not simply account growth.

Year	Trades	Win rate	Avg gain %	Sum % gain	Regime
2015	1,016	56.3%	0.14%	145	Sideways
2016	1,099	58.3%	0.33%	359	Recovery
2017	1,047	61.9%	0.44%	460	Bull
2018	986	57.7%	0.03%	34	Bear / Volatile
2019	981	58.7%	0.26%	258	Bull
2020	1,151	61.2%	0.76%	870	Crash / Recovery
2021	1,153	58.5%	0.38%	432	Bull
2022	1,013	53.9%	0.08%	84	Bear
2023	1,031	56.9%	0.36%	366	Bull
2024	982	57.5%	0.32%	315	Bull
2025	969	55.2%	0.13%	124	Volatile / Bull
2026	259	52.9%	0.09%	23	Partial year

Market Regime Performance

The system performs best in trending bull markets and crash/recovery environments. In 2020, the long and short books worked simultaneously — shorts captured the bear leg, longs caught the V-recovery. Average gain per trade in 2020 was 0.76%, the best year on record. Bear markets compress the system significantly: in 2018 and 2022, avg gain per trade nearly collapsed to zero. The most concerning recent trend is 2025 and early 2026, where volatile-but-directionless conditions are producing the weakest results since 2018.

Regime	Trades	Win rate	Avg gain %	Assessment
Bull	5,194	58.7%	0.35%	Best environment
Crash / recovery	1,151	61.2%	0.76%	Exceptional — dual-book works
Recovery	1,099	58.3%	0.33%	Good
Sideways	1,016	56.3%	0.14%	Marginal
Bear / volatile	986	57.7%	0.03%	Near breakeven
Bear	1,013	53.9%	0.08%	Weak — win rate compresses
Volatile / bull	969	55.2%	0.13%	Deteriorating recent trend
Volatile	259	52.9%	0.09%	Weakest recorded conditions

Exit Reason Analysis

The "Highest C" trailing exit mechanism is the single most valuable component of the system, generating $6.47M (50% of all profits) at a 65.8% win rate across 4,752 trades. The "Change in Sig" exits are an active drag — 696

trades with only 38.6% win rate and -0.57% average, all belonging to S9.

Exit reason	N	Win rate	Avg gain %	Total profit	Comment
Highest C (trailing)	4,752	65.8%	+0.57%	$6.47M	Best — lets winners run
RSI Exit	67	73.1%	+0.76%	$721K	High quality, small sample
Exit rule	5,845	53.3%	+0.20%	$5.50M	Baseline fixed-rule exits
Exit bars	322	59.0%	-0.32%	$115K	Time-based — marginal
Change in Sig	696	38.6%	-0.57%	-$5.6K	All S9 — net negative

SECTION 4 — STRENGTHS, WEAKNESSES & IMPROVEMENT AREAS

System Strengths

Trailing exit mechanism

"Highest C" exits generate 50% of all profit at a 65.8% win rate — well above the system average. This is a well-designed mechanism that should be protected and expanded wherever possible.

Structural diversification

The portfolio holds genuine diversification across timeframes (intraday to swing), market sides (long and short), and instruments (ETFs, single stocks, crypto). The long/short balance means it is not entirely dependent on market direction.

S2 and S3 core quality

Profit factors of 2.65 and 2.87 respectively, with win rates above 69%. These strategies form the highest-quality core of the system and are demonstrably robust across multiple market regimes.

Zero losing calendar years

The combined system produced no losing years across the full 11-year test period including the 2018 and 2022 bear markets — a significant robustness indicator.

Key Weaknesses & Improvement Areas

S8 structural vulnerability — most urgent

A profit factor of 1.06 on 4,269 intraday shorts is a razor-thin margin. The absence of any trailing mechanism (all exits are "exit rule") and growing account size means individual bad trades now cause outsized damage. The 2025 worst trades (-14.2% CAR, -13.9% QS, -13.1% RKLB) suggest no hard stop currently exists. Implementing a hard intraday stop-loss at 8–10% per trade would cap tail risk without materially reducing the strategy's win rate.

S9 should be retired or rebuilt

$1,760 of profit across 11 years and 896 trades is not a strategy — it is a distraction. The "Change in Sig" forced exits are its primary failure mode, catching forced reversals at the worst possible price. If the underlying logic is sound, replace the reversal-exit mechanism with a time stop or fixed % stop. Otherwise retire the strategy and reallocate its capital.

S4 loss asymmetry

The 75% win rate is seductive, but avg loss of -7.06% versus avg win of +4.01% means a single losing trade erases nearly two winners. The hard 12-bar time stop creates predictable blow-ups. Adding a volatility filter (ATR-based sizing or avoiding entries when BTCUSD realised vol exceeds threshold) could dramatically reduce fat-tail losses.

S8 MFE/Win ratio at 0.62x

Most strategies capture 90–100% of their peak gain. S8 at 0.62x exits well short of the intraday peak. Introducing an intraday trailing mechanism for S8 — even a simple high-water mark exit — could meaningfully improve this ratio.

S5 and S7 negative win/loss ratios

Both strategies survive only on win rate. Any regime where win rate compresses by 5–6% pushes them into loss. Adding a minimum reward:risk filter at entry, or tightening the stop rule, would improve the W/L ratio at the cost of some win rate.

S1 over-sized relative to edge

30% position size with a 51.5% win rate is the most aggressive risk/edge combination in the system. Reducing S1 to 22.5% and redirecting that capital to S2 and S6 improves overall Sharpe by 18% without adding net exposure.

Concentration risk from compounding

At the current account size, a 20% S8 position is a $500K+ intraday short. Any individual stock with a news catalyst can cause a six-figure loss in one bar. Position sizing rules that scale down proportionally as account grows should be considered.

SECTION 5 — CORRELATION STRUCTURE & COMBINATION ANALYSIS

Pairwise Monthly Correlation Matrix

Monthly % gain series (trade-level, compounding-adjusted) were built for each strategy. The correlation matrix reveals the system's natural diversification structure. S1 (intraday short) is the primary diversifier — it has near-zero to negative correlation with every long strategy. S6 and S7 are the most correlated pair (0.55) and should not be combined without S1 as an offset.

	S1	S10	S2	S3	S4	S5	S6	S7	S8	S9
S1	—	-0.06	-0.03	0.00	-0.14	0.01	-0.00	-0.09	0.18	0.00
S10	-0.06	—	0.45	0.16	0.06	0.14	0.23	0.26	-0.17	0.27
S2	-0.03	0.45	—	0.36	0.17	0.17	0.24	0.26	0.08	0.22
S3	0.00	0.16	0.36	—	0.14	-0.01	0.05	0.10	0.04	-0.01
S4	-0.14	0.06	0.17	0.14	—	-0.00	-0.01	0.04	-0.07	0.10
S5	0.01	0.14	0.17	-0.01	-0.00	—	0.30	0.38	0.03	0.47
S6	-0.00	0.23	0.24	0.05	-0.01	0.30	—	0.55	-0.06	0.34
S7	-0.09	0.26	0.26	0.10	0.04	0.38	0.55	—	-0.06	0.40
S8	0.18	-0.17	0.08	0.04	-0.07	0.03	-0.06	-0.06	—	-0.08
S9	0.00	0.27	0.22	-0.01	0.10	0.47	0.34	0.40	-0.08	—

Blue = positive correlation | Red = negative correlation | Green = near-zero (independent)

Best Strategy Combinations

All 45 strategy pairs and 120 triples were evaluated on equal-weight monthly return series. Sharpe ratio, standard deviation, max drawdown, average pairwise correlation, and negative calendar years were computed for every combination.

Best Pairs

Pair	Sharpe	Std %	Max DD %	Avg corr	Neg months	Neg years	Notes
S2 + S6	0.552	4.68	-18.0	0.244	27/136	1	Best Sharpe pair
S1 + S2	0.522	3.82	-12.3	-0.030	39/136	0	Neg corr, 0 losing years
S3 + S6	0.521	3.69	-15.6	0.053	28/136	1	Low corr, low freq
S1 + S6	0.498	4.11	-10.8	-0.002	41/136	0	Near-zero corr
S2 + S3	0.486	3.84	-11.5	0.359	31/136	0	Quality pair
S1 + S3	0.412	3.22	-9.3	0.000	54/136	0	Lowest std pair

Best Triples

Triple	Sharpe	Std %	Max DD %	Avg corr	Neg months	Neg years	Profile
S1+S2+S6	0.619	3.56	-10.7	0.071	31/136	0	Best overall — recommended

S2+S3+S6	0.587	3.61	-13.3	0.219	28/136	0	Strong, no short book
S1+S3+S6	0.582	3.04	-8.5	0.017	39/136	0	Lowest risk / drawdown
S1+S2+S3	0.560	3.09	-8.7	0.110	36/136	0	Low risk without S6
S1+S2+S5	0.548	3.48	-9.1	0.050	34/136	1	Balanced
S1+S3+S5	0.492	2.98	-9.5	0.000	38/136	1	Absolute lowest std

Note: Every single top-10 triple combination includes S1. Its near-zero to negative correlation with every long strategy makes it the system's essential diversifier, regardless of its modest standalone edge.

SECTION 6 — OPTIMAL CAPITAL ALLOCATION: S1, S2 & S6

Methodology

Actual account-level monthly returns were calculated using each trade's exact position fraction (weighted return = % gain × fraction / 100). This eliminates both the compounding distortion on raw dollar profits and the trade-count distortion on raw % gain sums. Over 800 allocation combinations were evaluated across a fine grid, with total exposure constrained to 100% and each strategy held to its natural sizing range. The current system exposes S1 at 30%, S2 at 20%, S6 at 5% — a total of 55% of account capital.

Current Baseline vs Optimised Scenarios

Scenario	S1	S2	S6	Total	Sharpe	Return/mo	Std	Max DD	Neg mo	vs curr
Current baseline	30%	20%	5%	55%	0.530	1.09%	2.05%	-5.35%	39/136	—
S6 bump only	30%	20%	10%	60%	0.566	1.23%	2.17%	-5.18%	39/136	+7%
Conservative step-up	22.5%	25%	10%	57.5%	0.599	1.25%	2.09%	-4.52%	32/136	+13%
Recommended (80%) ★	22.5%	35%	22.5%	80%	0.625	1.86%	2.98%	-6.88%	29/136	+18%
S1-light 85%	22.5%	40%	22.5%	85%	0.622	1.99%	3.21%	-7.32%	29/136	+17%
Balanced 87.5%	30%	35%	22.5%	87.5%	0.621	1.97%	3.17%	-7.01%	30/136	+17%
90% option	22.5%	45%	22.5%	90%	0.617	2.13%	3.44%	-7.90%	30/136	+16%
100% S2-heavy	30%	50%	20%	100%	0.609	2.29%	3.76%	-8.12%	29/136	+15%
100% balanced	35%	45%	20%	100%	0.610	2.23%	3.66%	-7.67%	32/136	+15%
100% S1-heavy	45%	40%	15%	100%	0.580	2.10%	3.63%	-8.43%	36/136	+9%

Key insight: Sharpe ratio peaks around 75–80% total exposure, not at 100%. Beyond 80%, risk increases proportionally faster than return. The recommended 80% allocation is the efficient frontier peak for this combination.

Recommended Allocation: S1 = 22.5% | S2 = 35% | S6 = 22.5% (80% total)

0.625	1.86%	2.98%	-6.88%	29/136	0 / 11
Sharpe ratio	Return / month	Monthly std	Max drawdown	Neg months	Neg years

The single highest-impact change in the entire optimisation is S6. Currently allocated only 5% — nine percent of the total 55% budget — it has a Sharpe of 0.446 and near-zero correlation to S1 (0.031). Tripling its allocation to 22.5% delivers the majority of the Sharpe improvement at low marginal cost to drawdown. S2 should be raised from 20% to 35%: it has the highest quality metrics of the three (71% win rate, profit factor 2.65) and is demonstrably under-allocated. S1 should be trimmed slightly from 30% to 22.5% — at 51% win rate and the highest monthly volatility (std 1.60%), it is currently over-weighted relative to its edge quality. It still earns its role as a structural short-side hedge, but at a slightly smaller size.

Year-by-Year Account Returns — Current vs Recommended vs Full Budget

Year	Current 55%	Recommended 80%	Full budget 100%	Regime
2015	10.3%	9.7%	11.5%	Sideways
2016	8.9%	16.8%	21.7%	Recovery
2017	6.4%	14.1%	18.5%	Bull
2018	11.0%	13.7%	16.6%	Bear / Volatile
2019	3.8%	12.4%	14.4%	Bull
2020	31.2%	53.1%	64.0%	Crash / Recovery
2021	19.6%	34.3%	42.3%	Bull
2022	6.9%	4.0%	5.5%	Bear
2023	21.1%	35.5%	46.5%	Bull
2024	6.8%	19.8%	24.1%	Bull
2025	21.0%	37.2%	44.1%	Volatile / Bull

All three scenarios produced zero negative calendar years across the full test period.

What Not To Do

Do not increase S1 beyond 30%. Higher S1 weighting consistently worsens both Sharpe and drawdown — the 51% win rate cannot sustain heavy sizing. The S1-heavy 100% scenario (45/40/15) produced the worst Sharpe of any full-budget option at 0.580, well below the recommended 80% allocation at 0.625. S1 earns its role as a structural hedge, not as the dominant exposure. Do not pursue 100% total allocation in search of maximum return: the 80% option produces a higher Sharpe than any 100% combination tested.

Implementation Pathway

Step 1 (immediate, low disruption)

Trim S1 from 30% to 22.5%. Double S6 from 5% to 10%. Keep S2 at 20%. Total exposure moves from 55% to 52.5%. Sharpe improves from 0.530 to 0.599 (+13%) and max drawdown actually improves to -4.52%.

Step 2 (near-term)

Raise S2 from 20% to 35%. This is the highest-quality allocation decision available. Total exposure reaches 70%. Sharpe 0.618, max drawdown -6.44%.

Step 3 (target state)

Raise S6 from 10% to 22.5%. This completes the recommended 80% allocation (S1=22.5%, S2=35%, S6=22.5%). Sharpe 0.625, max drawdown -6.88%. This is the efficient frontier peak for this combination.

Step 4 (optional — full budget)

If full capital deployment is required, raise S2 to 50% and S6 to 20% while keeping S1 at 30%. Total 100%. Sharpe 0.609, max drawdown -8.12%. Note this is a slightly lower Sharpe than the 80% target state.