Strategy Spotlight
Augmented Short Term CTA Replication

June 2025, Ai For Alpha's Team

Executive Summary

Managed-futures strategies play an essential role in institutional portfolios, providing strong returns and reliable protection during prolonged market downturns. We replicate CTA trend followers through three transparent components—short-term trends, long-term trends, and raw market returns—applied consistently across 24 major futures markets. A Bayesian model dynamically adjusts allocations among these factors to optimise performance.

Our strategy, *Markets + Short-Term Trend*, closely tracks the SG CTA Trend Index with around 80 % correlation but achieves twice its efficiency ratio (return relative to draw-down). The transparent, scalable, cost-effective approach delivers CTA alpha by capturing sustained long-term trends, exploiting cross-market spreads, and reacting quickly to breakout signals.

Strategies Overview

- **STT** – *Short-Term Trend*: average of 10, 20, 40 and 60-day lookback-straddle deltas.
- **LTT** – *Long-Term Trend*: 500-day lookback-straddle delta.
- **MKT** – *Markets*: equally-weighted raw daily futures returns (pure beta).
- **STT+LTT** – *Multi-Horizon Trend*: 50/50 blend of STT and LTT.
- **MKT+STT** – *Markets + STT*: 50/50 blend of MKT and STT.
- **MKT+STT+LTT** – *Markets + Multi-Horizon Trend*: equal thirds of MKT, STT and LTT.
- **SGCTAT** – *SG CTA Trend Index* (ticker NEIXCTAT): benchmark of the 10 largest diversified CTAs, equally weighted, live since Jan-2000.

Blending Short- and Long-Term Trend: A Strategic Case

- **Post-Boom Reality Check.** CTAs gained 25 % in 2022 as rates, USD and commodities all trended one way; that tail-wind faded in 2023. Investors now need a framework that stays productive when slow trends are scarce.
- **Short-Term Edge.** Fast breakout signals monetise policy shocks and sharp reversals that long-term systems miss, adding convexity.
- **Better Risk-Adjusted Replication.** Mixing ST signals with raw market returns tracks 80 % of the SG CTA Index yet improves the return-to-draw-down ratio.
- **Liquid "Insurance".** The *MKT+STT* sleeve offers a transparent, always-on shock absorber without legacy 2 % + 20 % fees.

Look-Back Straddles: Horizon-Controlled Trend Filters

A look-back option pays off on the *path* of the underlying, not just its close. Owning both call and put—the **look-back straddle**—creates a payoff that grows with the largest up *or* down excursion over a window n.

Why this mirrors a trend rule. The daily *delta* of a look-back straddle is positive near recent highs, negative near lows, ≈ 0 in ranges—exactly how a breakout model sizes positions.

Table 1: Look-back straddle mechanics vs. classical CTA features

Concept	Intuition	CTA Analogue
Path-dependent payoff	Rewards the *max/min* move, not just the close.	Trend P&L depends on the journey.
Straddle symmetry	Long both call & put captures large up & down moves.	CTAs go long in up-trends, short in down-trends.
Delta gives a trend score	Sign mirrors price vs. extremes.	Breakout sizing by distance from highs/lows.
Window n	Tune n for fast (10–60 d), medium (120–250 d), slow (500 d).	Diversify horizon risk.
Option convexity	Built-in positive skew, zero premium bleed.	CTAs show positive skew in turbulence.

How the Bayesian Engine (Graphical Model) Works

- **State–Space Setup.** Each SGCTAT daily return is a weighted mix of three latent factors—STT, LTT, raw market return—whose weights follow a Gaussian random walk.
- **Graphical Representation.** A two-layer Bayesian network: hidden states generate observed returns; forward-filter/backward-smooth yields the full posterior path.
- **Sparse Upgrade.** A prior drops unnecessary links, giving filter speed with rich interactions.
- **Practical Pay-off.** Daily probabilities tilt toward STT signals when markets chop and back to LTT beta when trends resume.

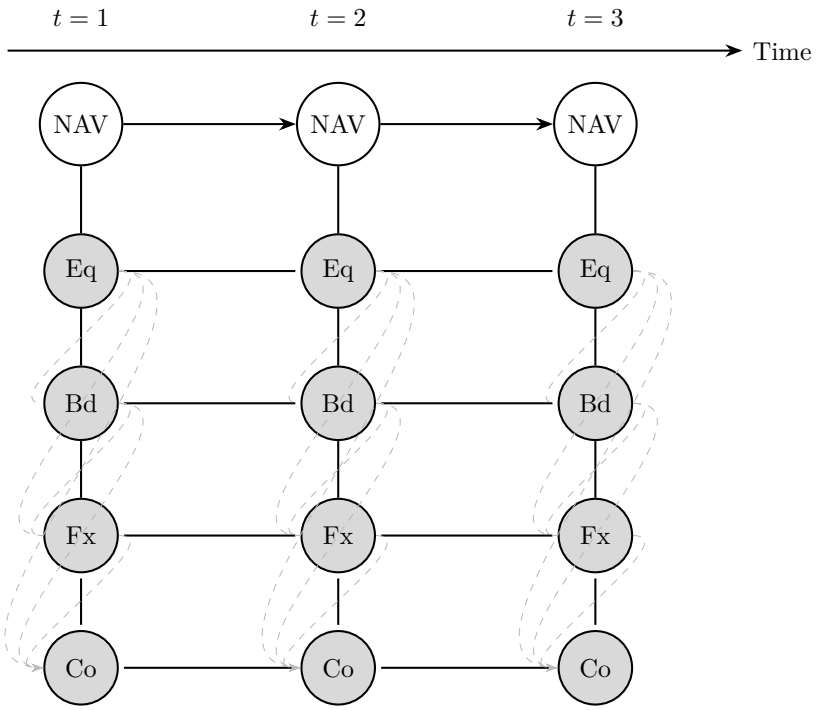

Figure 1: Bayesian network for CTA replication. Hidden weights on four asset clusters (Eq, Bd, Fx, Co) evolve through time and generate observed NAV returns. Dashed links mark cross-asset interactions kept by the Horseshoe prior.

Headline Results (2015–2025)

Table 2: Risk–return snapshot

	MKT+STT	STT	LTT	STT+LTT	SGCTAT
Sharpe	**0.49**	0.20	0.39	0.40	0.03
Max DD (%)	**-14.9**	-15.2	-18.8	-16.7	-22.4
Return/Max DD	**0.48**	0.26	0.32	0.35	0.11
Corr. to SGCTAT	0.80	0.65	0.81	**0.84**	1.00

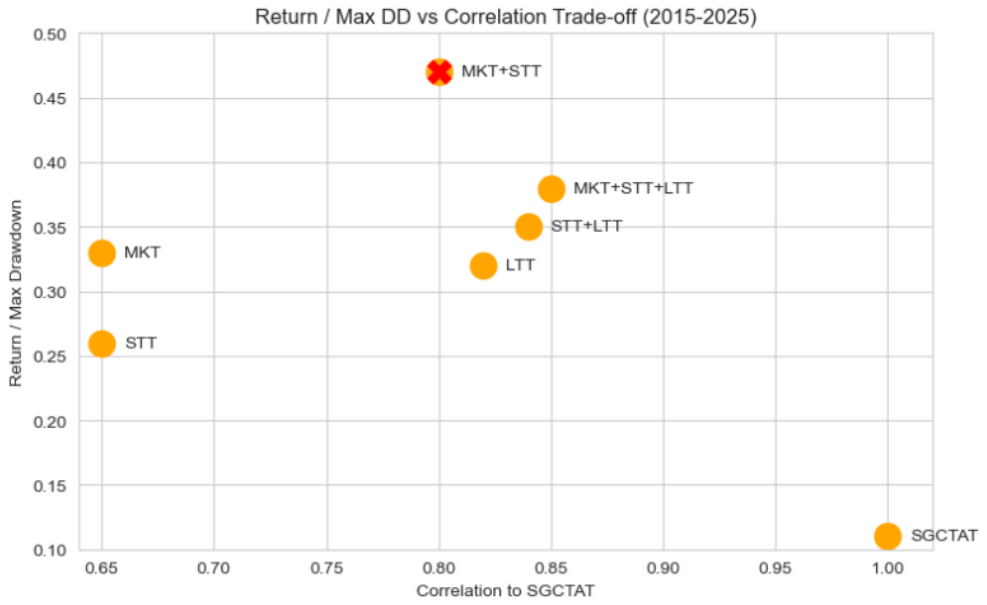

Figure 2: Return/Max DD versus benchmark correlation. **MKT+STT** (highlighted) swaps a few correlation points for a sizeable uplift in risk-adjusted payoff.

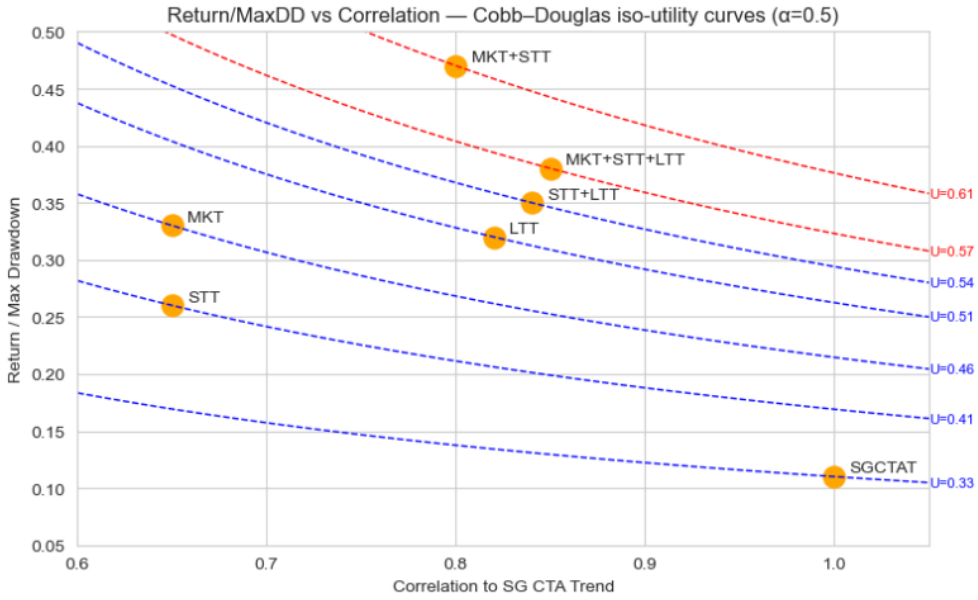

Figure 3: Cobb–Douglas iso-utility curve with $\alpha = 0.5$ (equal weight on correlation and Return/Max DD). The ridge peaks at **MKT+STT**; all competing sleeves lie strictly below the curve.

Interpretation. Table 2 shows the raw numbers, and Figure 2 visualises the trade-off: **MKT+STT** surrenders only 3–4 points of correlation yet delivers the best return for every percent of draw-down. Figure 3 tells the same story with a utility curve.

Robustness Across Regimes

Live COVID–Inflation Window (Jun 2020 – Jun 2025)

Table 3: Five-year live window

	MKT+LTT	MKT	LTT	STT	STT+LTT
Sharpe/Max DD	3.05	3.91	2.44	1.55	2.17
Return/Max DD	0.53	0.66	0.42	0.35	0.40
Max DD (%)	-14.9	-14.8	-18.8	-15.2	-16.7
Sharpe	0.45	0.58	0.46	0.24	0.36

Read-through. Even amid unprecedented policy swings, MKT+STT kept draw-downs below 15 %, validating its role as a liquid overlay during stress.

Full Back-Test (Dec 2004 – Jun 2025)

Table 4: Twenty-year history

	MKT+LTT	MKT	LTT	STT	STT+LTT
Sharpe/Max DD	4.94	3.08	4.01	2.67	4.65
Return/Max DD	0.64	0.45	0.53	0.38	0.58
Max DD (%)	-14.9	-20.3	-18.8	-15.2	-16.7
Sharpe	0.74	0.62	0.75	0.41	0.77

Read-through. Across crises, QE and tightening cycles, MKT+STT consistently reduced draw-downs and improved returns—evidence its edge is structural, not cyclical.

Implementation Blueprint

- **Universe:** 24 highly liquid futures across equities, rates, FX, and commodities.
- **Signal Engine:** Daily look-back straddles; equally weighted short-term (10–60 days) and long-term (500 days) horizons.
- **Allocator:** Proprietary graphical model allocating across market raw returns and/or STT–LTT signals.
- **Transaction Costs:** Fully integrated into the strategy, including execution and roll costs. Estimated total cost: 1.30% to 1.70% annually, including a 50 bp management fee provision.
- **Risk and Performance Monitoring:** Real-time tracking of portfolio risk and performance, with continuous risk analysis and performance attribution reporting.

What Matters for Investors

1. **Sharpen the Sharpe.** Quality of return—not raw correlation—drives portfolio efficiency.

2. **Own Convex Carry.** Short-term signals provide cost-efficient long-gamma exposure without the drag of option premium decay. Combined with market returns, they form an optimal framework that captures both convexity benefits and very long-term trend-driven returns.

3. **Defend the Downside.** Sub-15 % draw-downs preserve risk budget for opportunistic re-risking.

4. **Keep It Transparent.** Implemented entirely with public futures data—no black-box feeds or vendor lock-in.

Conclusion

Markets + Short-Term Trend offers a pragmatic path to resilient returns in CTA trend replication: high Sharpe, shallow draw-downs, and genuine diversification—achieved with transparent signals and optimised fees.