Cross-Asset Momentum (5-Asset Portfolio)

One-Page Summary

Key Questions Addressed

Theme	Question
Momentum Premise	Can medium-horizon time-series momentum deliver stable, diversified returns across heterogeneous assets?
Signal Conditioning	Do low-pass smoothing, robust volatility gating, and cross-asset confirmation improve signal quality?
Portfolio Design	How do entry/exit thresholds and inverse-volatility sizing affect Sharpe, drawdowns, and turnover?
Robustness	Is performance stable across a grid of threshold choices (parameter plateau vs. fine-tuning fragility)?

Conceptual Ideas Proposed

- **Low-pass trend extraction** (EMA/SMA) to suppress high-frequency noise while preserving drift.
- **Volatility gate** via robust z of realised vol (median/MAD baseline) to avoid trading in local turbulence.
- **Cross-asset confirmation** using rolling t-stats with strength-capped voting to boost concordant trends.
- **State/threshold logic**: accumulate amplified returns; trade only when state exceeds entry/exit bands.
- **Risk normalisation**: inverse-volatility scaling with constant gross exposure to balance contributions.

Data & Universe

- Five liquid markets (2007–today): Wheat (ZW), AUD/JPY, DBB (industrial metals proxy for copper), Gold (GC), Brent/WTI (CL).
- Business-day alignment; limited forward-fill for asynchronous holidays; 60% coverage minimum; log-returns.

Key Results (Out-of-Sample)

- **Robust plateau:** Sharpe ≈ 3.23 achieved by multiple entry/exit pairs; broad high-Sharpe region.
- **Profile:** Ann. return $\sim$ 8.6%–8.9%, Ann. vol $\sim$ 2.6%–2.8%, MaxDD $\sim -16\%$ to -17%, low turnover ($\sim$ 8%/day).
- **Note:** Sharpe computed with a 0% risk-free rate.[1]

Illustrative Figures and Tables

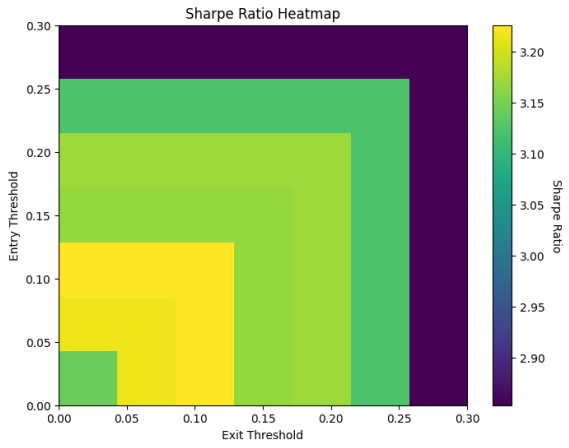

Figure 1: Sharpe ratio heatmap over entry/exit grid (lighter = higher).

Entry	Exit	Sharpe	AnnRet	AnnVol	MaxDD
0.00	0.10	3.226	0.0857	0.0266	-0.1706
0.10	0.10	3.226	0.0857	0.0266	-0.1706
0.10	0.05	3.226	0.0857	0.0266	-0.1706
0.10	0.00	3.226	0.0857	0.0266	-0.1706
0.00	0.05	3.217	0.0861	0.0268	-0.1670
0.20	0.10	3.172	0.0889	0.0280	-0.1559

Table 1: Top parameter pairs by Sharpe; turnover ≈ 0.08/day.

[1] A positive r_f reduces Sharpe numerically but does not change the ranking across thresholds at these excess-return levels.