

Statistical Arbitrage in U.S. Equities

One-Page Summary

Key Questions Addressed

Theme	Question
Signal Construction	How can sector-relative residuals identify short-horizon idiosyncratic dislocations in large-cap U.S. equities?
Portfolio Design	What entry/exit rules, holding limits, and neutrality constraints yield robust mean-reversion performance?
Robustness	How stable are returns across parameter variations and market conditions?

Conceptual Ideas Proposed

- Residual-based z -score signals from short-lookback regressions of each stock on its sector ETF, isolating sector-neutral mispricings.
- Cross-sectional tail selection (top/bottom 10% of residuals) to focus on pronounced deviations.
- Sector momentum filter to avoid trading against prevailing sector trends.
- Equal-weight portfolio construction across active positions, naturally diversifying across sectors.
- Modular architecture enabling substitution of signals, execution logic, and risk-control overlays without altering the pipeline.

Key Results

- **Signal Construction:** Sector-relative residual z -scores consistently identified short-lived idiosyncratic dislocations. These trades averaged ~ 3 days in holding period and achieved win rates above 53%, confirming the signal's ability to capture timely mean-reversion opportunities.
- **Portfolio Design:** Entry/exit thresholds ($Z_{\text{entry}} \approx 2$, $Z_{\text{exit}} \approx 0.5$), a sector-momentum confirmation layer, and equal-weight allocations delivered the best balance between return and drawdown. Sector and beta exposures remained low without imposing hard constraints.
- **Robustness:** Across multiple parameter variants, Sharpe ratios remained near 1.2 and maximum drawdowns stayed below 20%. Performance stability across entry/exit settings and holding limits indicates that the edge is not parameter-fragile.
- *All metrics reported are **net of transaction costs** modeled at 3 bps per side (0.03%) on entry and exit.*

Illustrative Figures and Tables

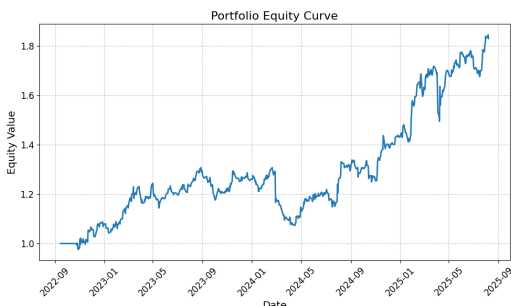


Figure 1: Cumulative equity curve for baseline configuration.

Metric	Value
Annualised Return	23.3%
Volatility	18.8%
Sharpe Ratio	1.21
Sortino Ratio	1.58
Max Drawdown	-17.9%

Table 1: Out-of-sample performance metrics (net of **3 bps per side** transaction costs).