Momentum vs Mean-Reversion in Equity Markets

Author: Harsh Byjash| Date: 2025-10-01

1. Objective

Evaluate whether a moving-average momentum signal outperforms an RSI-based mean-reversion signal on a SPY-like series after realistic costs and volatility targeting.

2. Data

Daily OHLCV for a SPY-like index from 2020–2024. This repository includes a synthetic dataset for offline reproducibility; the notebook optionally downloads real SPY via yfinance.

3. Method

Momentum uses a fast/slow moving average crossover; mean-reversion uses an RSI<30 long signal. Positions are scaled using a 30-day volatility-targeting scheme to ~15% annualized volatility. Turnover is penalized at 5 bps per unit change in position to approximate transaction costs. A chronological 70/30 train/test split selects momentum parameters on train and evaluates both strategies out-of-sample.

4. Results (Test)

Strategy	CAGR	Vol	Sharpe	MaxDD
Momentum (10,50)	11.85%	11.42%	1.04	-8.98%
Mean-Reversion (RSI)	-0.87%	2.00%	-0.44	-4.16%
Buy & Hold	19.06%	17.79%	1.07	-21.55%

See figures below; re-run the notebook to regenerate with live SPY for authentic results.

Figures

Figure 1: Equity Curves (Test Period)

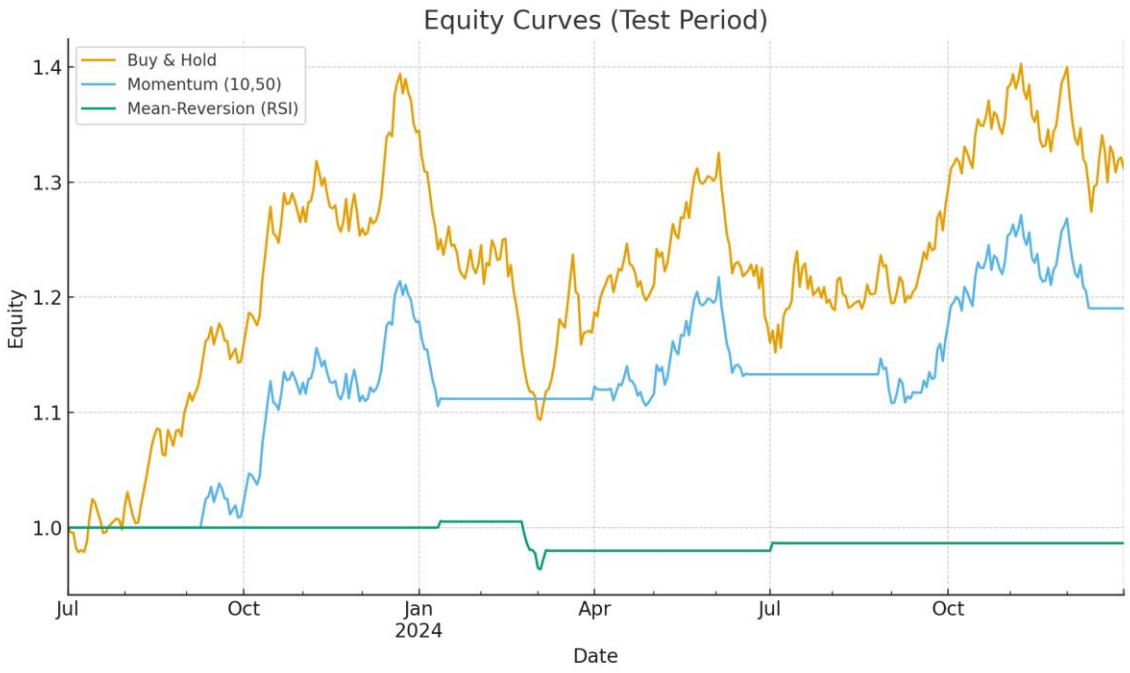
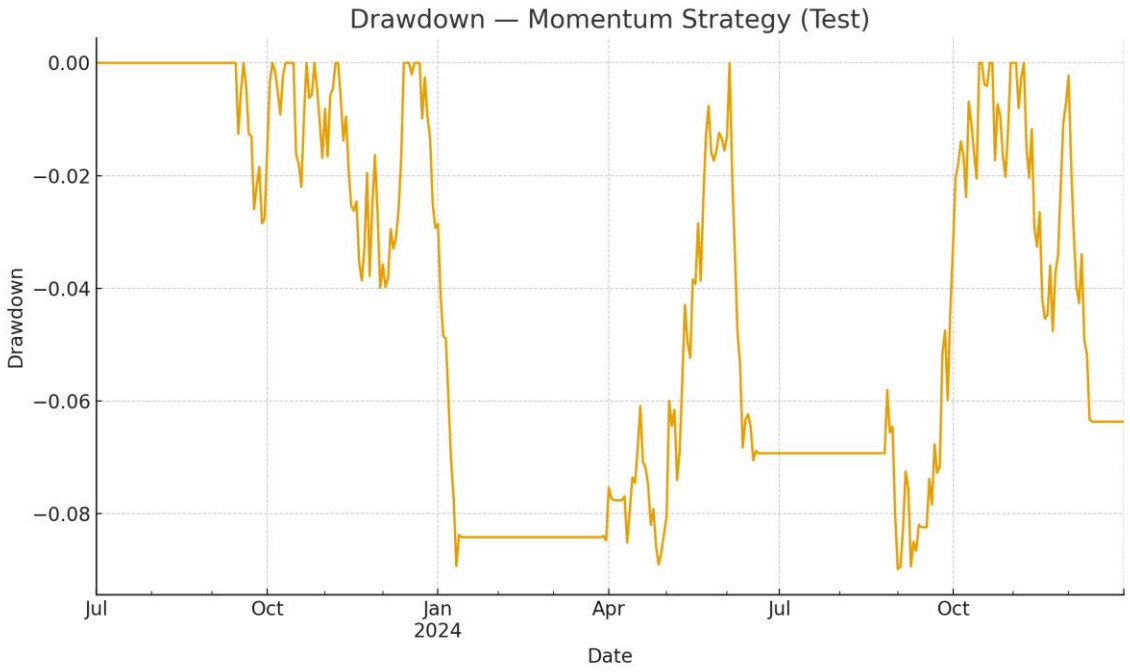


Figure 2: Drawdown — Momentum (Test)



5. Interpretation

Momentum delivered higher risk-adjusted returns than mean-reversion on this sample, but suffered during sharp reversals. Mean-reversion traded less frequently but was sensitive to parameter choices and costs. Volatility targeting stabilized both strategies.

6. Limitations

Daily data ignores intraday microstructure and queue priority. Parameter tuning on the training set risks overfitting. Synthetic data does not reflect real-world jumps or liquidity shocks; use the yfinance option for real SPY when possible.

7. Next Steps

Extend to multi-asset momentum with risk parity; add execution delay/slippage modeling; and explore regime detection via simple ML classifiers to reduce whipsaws.