



Mean Reversion Cointegration Strategy

Aiden Drepaniotis



Strategy

Concept: Exploit the statistical relationship between 3 related stocks by taking advantage of when they differ from their historical means and placing trades to anticipate their return to the mean

$$z = \frac{x - \mu}{\sigma}$$

μ = Mean

σ = Standard Deviation

Rolling Standard Deviation: Calculated a rolling standard deviation over 180 days to be used for volatility calculation.

Volatility Based Approach: I used a low threshold of 33rd percentile and high of 75th of the standard deviation and compare to to the rolling standard deviation to find the volatility at that moment

Z-Score: Used to determine how far the current spread deviates from its historical helping, identifying when to go short or long

Bollinger-Bands: Trading Indicators based on exponential moving average that widen or shorted based on volatility creating dynamic entry and exit positions

Implementation

Stocks: XOM (Exxon), CVX (Chevron), SHEL (Shell)

Short: Z-score > 1.2 and Spread $>$ Upper Bollinger Band (Low Volatility)

Z-score > 1.5 and Spread $>$ Upper Bollinger Band (High Volatility)

Z-score > 2.5 and Spread $>$ Upper Bollinger Band (Extreme Volatility)

Long: Z-score < -1.2 and Spread $<$ Lower Bollinger Band (Low Volatility)

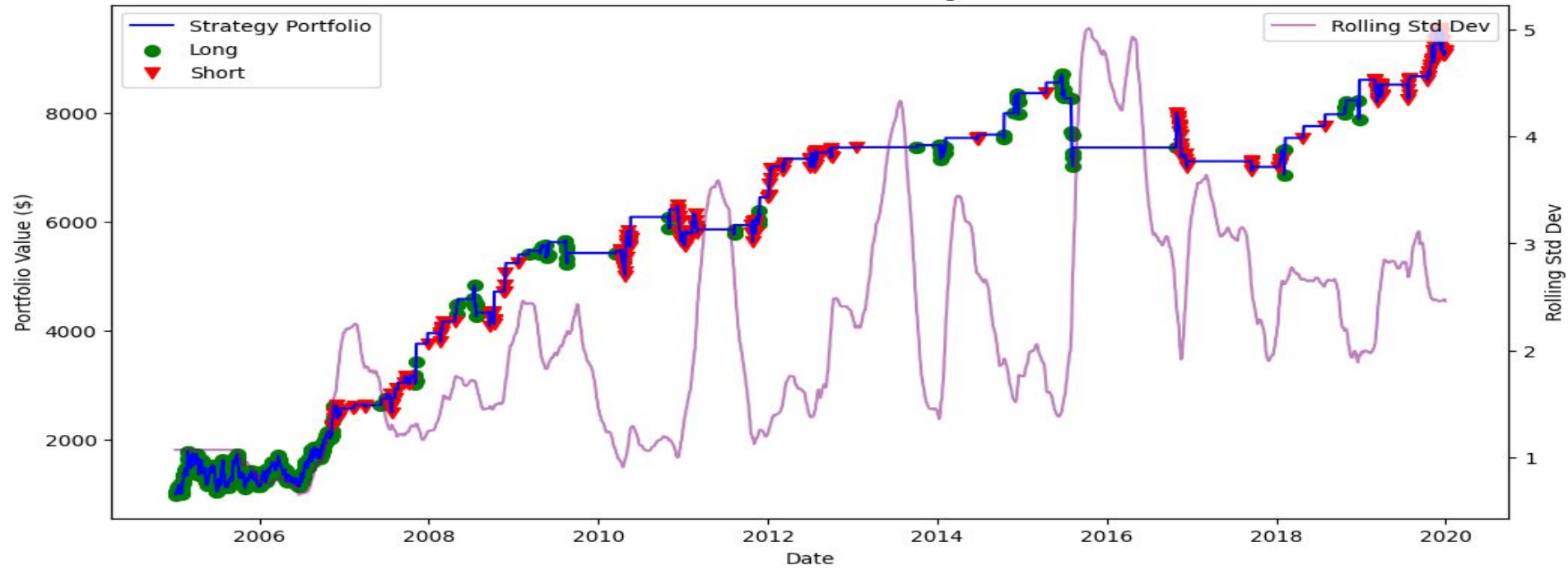
Z-score < -1.5 and Spread $<$ Lower Bollinger Band (High Volatility)

Z-score < -2.5 and Spread $<$ Lower Bollinger Band (Extreme Volatility)

Exit: If Z-score reverts back above -0.5 or below 0.5

Both Z-score and Bollinger bands are dynamically shifted based on the current volatility. This allows for a more accurate representation of the stocks current condition and trades made on that fact.

Portfolio Performance vs. Rolling Std Dev



Pros: This shows strong long-term growth and dynamically changing approach being most profitable in low to moderate volatility periods

Cons: There are large periods of little to no movement and struggles in extreme volatility situations

Future: Optimize the strategy to be more profitable in high-extreme volatility markets