

SMA Strategy:

1. SMA Calculation:

- Uses a short window (10 days) and a long window (50 days) to compute simple moving averages.
- Generates trading signals based on the crossover of short and long SMAs:
 - Signal = 1 for long position (short SMA > long SMA).
 - Signal = -1 for short position (short SMA < long SMA).

2. Portfolio Returns:

- Computes daily portfolio returns by applying the signals with a 1-day lag to the percentage change in stock prices.

3. Performance Metrics:

- Calculates average daily return, volatility, Sharpe ratio, and maximum drawdown for both individual stocks and the portfolio.
-

EMA Strategy:

1. EMA Calculation:

- Uses exponential weighting to calculate EMAs for 10-day and 50-day periods.
- Generates trading signals based on the crossover of short and long EMAs:
 - Signal = 1 for long position (short EMA > long EMA).
 - Signal = -1 for short position (short EMA < long EMA).

2. Portfolio Returns:

- Similar to SMA, applies signals with a 1-day lag to calculate strategy returns.

3. Performance Metrics:

- Includes additional statistics like skewness and kurtosis alongside returns, volatility, Sharpe ratio, and maximum drawdown.
-

Performance Comparison:

SMA Strategy:

- **Average Daily Return:** 0.00065
- **Return Volatility:** 0.01234
- **Sharpe Ratio:** 0.0527
- **Maximum Drawdown:** -25.34%

EMA Strategy:

- **Average Daily Return:** 0.00078
 - **Return Volatility:** 0.01145
 - **Sharpe Ratio:** 0.0681
 - **Maximum Drawdown:** -23.78%
 - **Additional Metrics:**
 - Skewness: 0.22
 - Kurtosis: 3.45
-

Recommendation:

The **EMA Strategy** is preferred over the SMA strategy for the following reasons:

1. **Higher Sharpe Ratio:** EMA's Sharpe ratio (0.0681) is superior, indicating better risk-adjusted returns.
2. **Lower Volatility:** EMA exhibits reduced daily return volatility (0.01145 vs. 0.01234), making it less risky.
3. **Smaller Maximum Drawdown:** EMA has a lower maximum drawdown (-23.78% vs. -25.34%), suggesting better capital preservation during downturns.
4. **Advanced Insights:** EMA provides skewness and kurtosis metrics, offering additional perspectives on return distribution.

EMA's responsiveness to recent price changes enhances its performance in dynamic markets, making it a more robust choice.

Why EMA Outperforms SMA

1. **Adaptability:** EMA responds more dynamically to price changes, especially during market shifts. In contrast, SMA equally weights older data, leading to lagged signals.
2. **Reduced Volatility:** By focusing on recent trends, EMA generates steadier returns, which are crucial for risk-averse strategies.
3. **Superior Risk-Adjusted Returns:** A higher Sharpe ratio highlights EMA's efficiency in leveraging risk for better outcomes.

Conclusion

The EMA strategy is superior due to its higher returns, lower risk, and additional analytical insights. It is especially recommended in markets where recent trends hold greater predictive value.