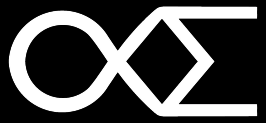
Performance Analysis of SMA and RSI-Based Trading



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Introduction

- This strategy integrates Simple Moving Averages (SMA) and Relative Strength Index (RSI) to generate buy/sell signals for trading
- Aims to show the benefits and risks for using it for different types of stocks (tech vs energy)

ExxonMobil

Implementation

- Data Collection - YFinance
- SMA crossover logic to identify long-term and short-term trends
  - Buy signal: SMA50 > SMA200
  - Sell signal: SMA200 > SMA50
- RSI with a 14 day window to measure momentum
  - Buy signal: RSI < 30
  - Sell signal: RSI > 70
- Combine logic (Ex: A buy signal only when RSI < 30 and SMA50 > SMA200)
- Portfolio management
  - Start with initial balance of $10,000
  - 0.1% for transaction cost and slippage for real-world conditions

```
# Calculate SMAs and RSI
data['SMA50'] = data['Close'].rolling(window=50).mean()
data['SMA200'] = data['Close'].rolling(window=200).mean()
data['RSI'] = calculate_rsi(data)

# Generate Buy/Sell Signals
data['Signal'] = 0
data.loc[(data['SMA50'] > data['SMA200']), 'Signal'] = 1  # Buy signal
data.loc[(data['SMA50'] < data['SMA200']), 'Signal'] = -1  # Sell signal

# Filter signals based on RSI thresholds
data.loc[data['RSI'] > 70, 'Signal'] = -1  # Overbought (Sell)
data.loc[data['RSI'] < 30, 'Signal'] = 1  # Oversold (Buy)

# Initialize portfolio variables
initial_balance = 10000
position = 0
cash_balance = initial_balance

slippage_rate = 0.001  # Slippage rate of 0.1%
transaction_cost_rate = 0.001  # Transaction cost rate of 0.1%
```

Results

- Final portfolio value:
  - Apple: $12,003.28
  - Exxon: $9409.44
- Exxon tends to experience more cyclical and range-bound price movements due to volatility of energy, creating false RSI and SMA signals

Next steps

- Introduce sector-specific parameters for SMA periods or RSI thresholds (longer, shorter)
- Implement Bollinger Bands or ATR to account for volatility