PROJECT 1 – ROC BACKTESTING

7:30 AM SECTION, TEAM 6

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ROC TECHNICAL INDICATOR OVERVIEW

- Rate of Change (ROC): A momentum technical indicator used to measure the percentage change in a security's price over a specified period. It helps traders and investors identify the speed and direction of price movements, often signaling potential buy or sell opportunities based on trends.
- Typically fluctuates above and below centerline of 0 (Positive is bullish and negative is bearish)
- Signals to investors potential trend reversals or continuations by crossing predefined thresholds

ROC CALCULATION

1. Record current price and price from n given periods ago
2. Calculate price change by subtracting prior price from current price
3. Divide price change by prior price to get ROC
4. Multiply result by 100 to put ROC in % form

$$\text{ROC} = \left(\frac{\text{Current Price} - \text{Prior Price}_n}{\text{Prior Price}_n} \right) \times 100$$

Where:

Current Price = Most recent closing price (CCP)
Prior price = Closing price n periods ago (PCP)
n = Lookback period

ROC TRADING LOGIC

- Threshold Crossovers:
  - ROC that cross above a positive threshold → Buy Signal

    Ex: Buy when ROC (10-Day) > 2%
  - ROC that cross below a negative threshold → Sell Signal

    Ex: Sell when ROC (10-Day) < -2%

- Zero-Line Crossovers:
- ROC > 0: Indicates price is higher than it was n periods ago (Bullish and Buy Opportunity)
- ROC < 0: Indicates price is lower than it was n periods ago (Bearish and Sell Opportunity)

- ROC Slope or Trend Analysis:
  - A rising ROC (even if below zero) suggests momentum is improving (Potential Buy)
  - A declining ROC (even if above zero) suggests momentum is weakening (Potential Sell)

- Combination with Moving Averages:
  - If 10-day ROC crosses above its 5-day MA, enter hold position, if it cross below then exit
    - A buy signal occurs when ROC crosses above its moving average
    - A sell signal occurs when it crosses below

Performance of Base Indicator

- 5 Financial Stocks, 3 in the S&P 500 (Tesla, NVDIA, Palantir) and 2 that are not (Coinbase, Moderna)
- Chose these 5 stocks so we do not get skewed results, high volatility, and diversity in sectors.

	Base Indicator
Base	• N = 12 • Buy when ROC > 0 • Sell when ROC < 0
Metrics	- Trades: 175.2 - % Positive: 58.59% - Profit Factor: 1.698 - Anna Sharpe Ratio: 1.328 - Profit to Max Draw: 1.394

- Demonstrates the Signal Crossover method as it shows to buy and sell given the threshold over 0

ADVANTAGES OF ROC (BASED ON BASE INDICATOR)

1. Profitability

Ex. Average net trading profit of $272,959 shows ROC strategy was profitable across all 5 stocks

2. Good Risk-Adjusted Returns

Ex. Average Sharpe ratio was 1.328 which is good with TSLA and NVDA having > 2 which shows excellent adjusted returns

3. Positive Win Rate

Ex. Average of 58.59% of trades were profitable which indicates ability to capture momentum

4. Good Profit Factors

Ex. Average profit factor of 1.698 is decent with TSLA and NVDA showing good profitability per dollar lost

DISADVANTAGES OF ROC (BASED ON BASE INDICATOR)

1. Significant Losses in Some Stocks

Ex. MRNA resulted in -$504,269 with negative Sharpe ratio and high drawdown showing ROC's vulnerability to high volatile stocks

2. High Drawdowns

Ex. Average of the 5 stocks drawdown was -$499,650 which reflects the risk of momentum strategies and volatile stocks

3. Inconsistent Performance

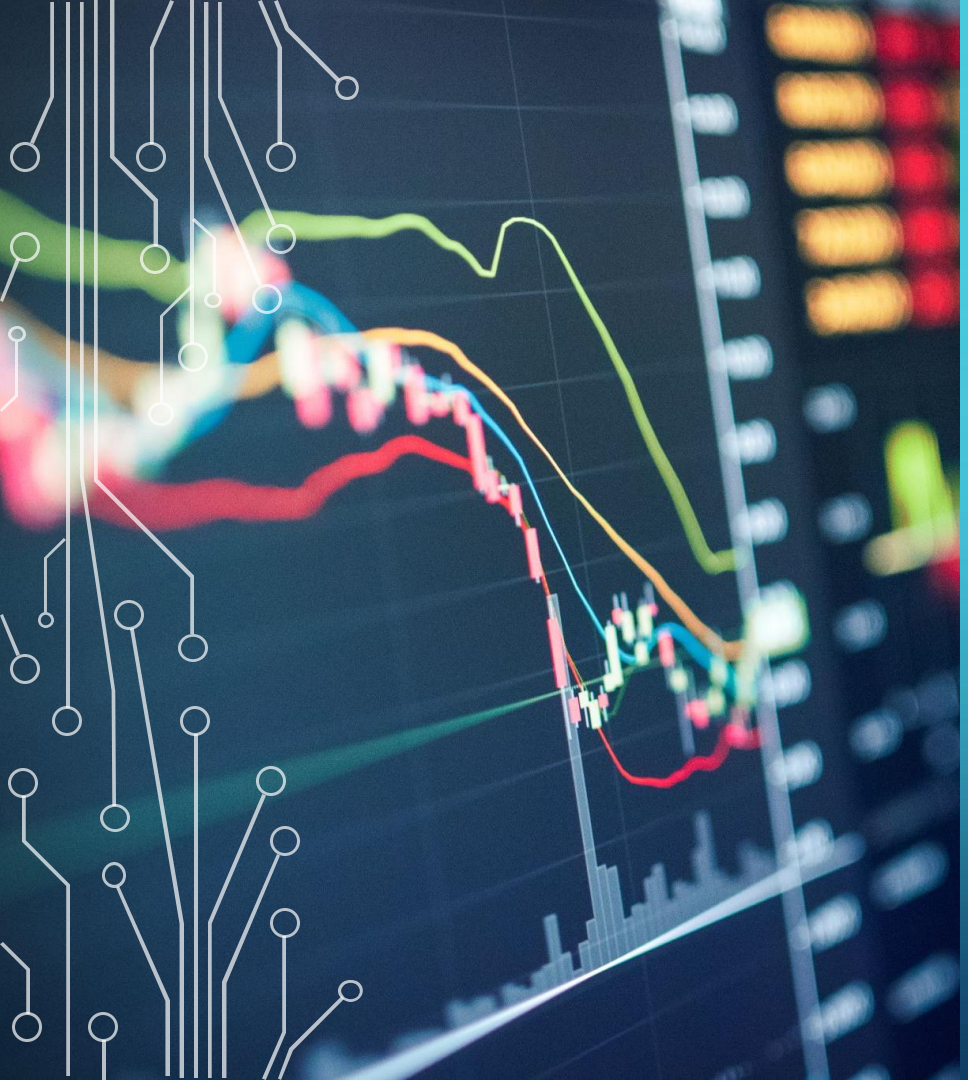
Ex. TSLA, NVDA, PLTR were profitable, but COIN and MRNA had significant losses showing that ROC may be stock dependent

4. Moderate Win / Loss Ratio

Ex. Average ratio was 1.184 which is only slightly above 1 which say that this win rate may not be substantial for long term

Improvement / Adjustments to Indicator

	Improvement #1	Improvement #2	Improvement #3	Improvement #4
Changes to Parameters	• N = 30 • Buy when ROC > 1 • Sell when ROC < -1	• N = 10 • Buy when ROC > 2 • Sell when ROC < -2	• N = 20 • Buy when ROC > 3 • Sell when ROC < -3	• N = 18 • Buy when ROC > 5 • Sell when ROC < -5
Metrics	- Trades: 175.6 - % Positive: 58.96% - Profit Factor: 1.512 - Anna Sharpe Ratio: 0.990 - Profit to Max Draw: 1.126	- Trades: 172.8 - % Positive: 59.55% - Profit Factor: 1.326 - Anna Sharpe Ratio: 0.644 - Profit to Max Draw: 0.792	- Trades: 172.8 - % Positive: 61.42% - Profit Factor: 1.28 - Anna Sharpe Ratio: 0.452 - Profit to Max Draw: 0.682	- Trades: 166 - % Positive: 61.76% - Profit Factor: 1.196 - Anna Sharpe Ratio: 0.296 - Profit to Max Draw: 0.396



OVERALL TAKEAWAYS FROM ROC STRATEGY

Takeaway #1:

- ROC Performs Better in Trending Markets but Struggles with High Volatility Stocks

Takeaway #2:

- ROC Strategy Often Faces a Trade-Off Between Consistency and Risk-Adjusted Returns
    - Ex. Increasing the Win Rate %, deceased the risk adjusted returns and profitability relative to risk

Takeaway #3:

- Signal Comparison provides better results than Signal Crossover
    - Outperforms in % positive, Sharpe ratio, and profit to max draw due to reduced noise, volatility, and excess drawdowns from false signals.

Thank You!

Q & A