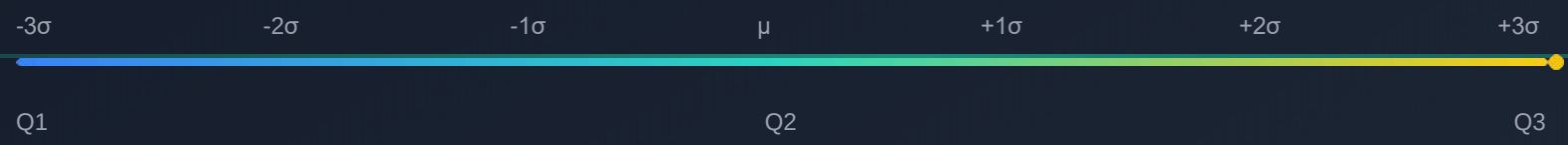
Forex Trading Strategy

A quantitative approach to identifying mean-reversion opportunities using statistical analysis



October 23, 2025

Quantitative Trading

Prepared and compiled by Chongrux

Thank You

Heartfelt Gratitude

Ajarn BANK

Opened the world of systematic statistical trading

Statistical Thinking = Trading Edge

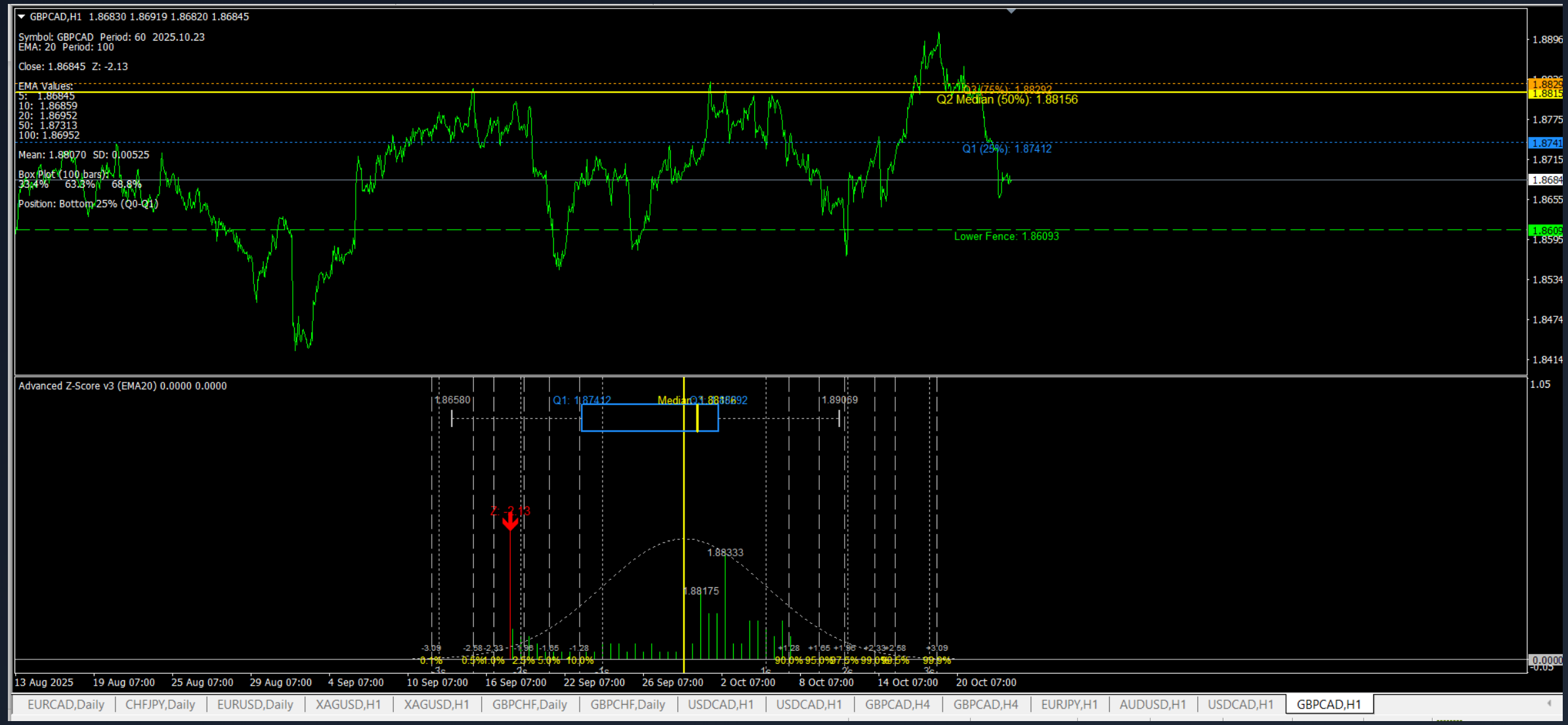
Thank you for transforming data into direction, and logic into confidence.

Khun : Napath Posayabut

known for his expertise in *systematic trading*, *statistical analysis*, and *money management*. He frequently collaborates with Ajarn BANK and appears in seminars and media focused on professional trading strategies.

Date: 2025-10-22

Introduction to the Strategy



Introduction to the Strategy

What is the Z-Score & Quartile Strategy?

A systematic, data-driven approach that integrates statistical analysis with market structure to identify high-probability trading opportunities in the Forex market.

Z-Score Component

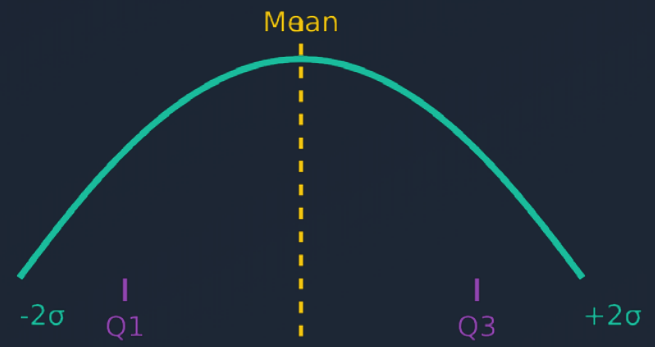
Statistical measure quantifying how far a price is from its mean, expressed in standard deviations.

Quartile Component

Divides price action into four equal parts, providing context for current price position within the market structure.

Strategy Integration

The strategy combines these two tools to identify situations where price has moved to a statistical extreme within a defined range.



"Leveraging statistical principles for systematic trading in the Forex market"

Core Principles

Mean Reversion Foundation

The strategy is built on the statistical principle that asset prices, after experiencing extreme movements away from their historical average, tend to gravitate back towards that average over time.

Non-Directional Approach

Does not attempt to predict the future direction of a trend but rather capitalizes on temporary deviations from the mean.

Volatility-Based Strategy

Thrives on price fluctuations that create the "extreme" conditions necessary for Z-Score signals, while quartiles help define the boundaries of these fluctuations.

Visualizing Mean Reversion

Key Insight: *The strategy identifies high-probability entry points when price action deviates significantly from its statistical average.*

Z-Score Fundamentals

What is Z-Score?

A statistical measure that quantifies how far a data point is from the mean, expressed in terms of standard deviations.

It serves as the initial key pillar of our trading strategy, providing a robust method to identify statistical outliers in price action.

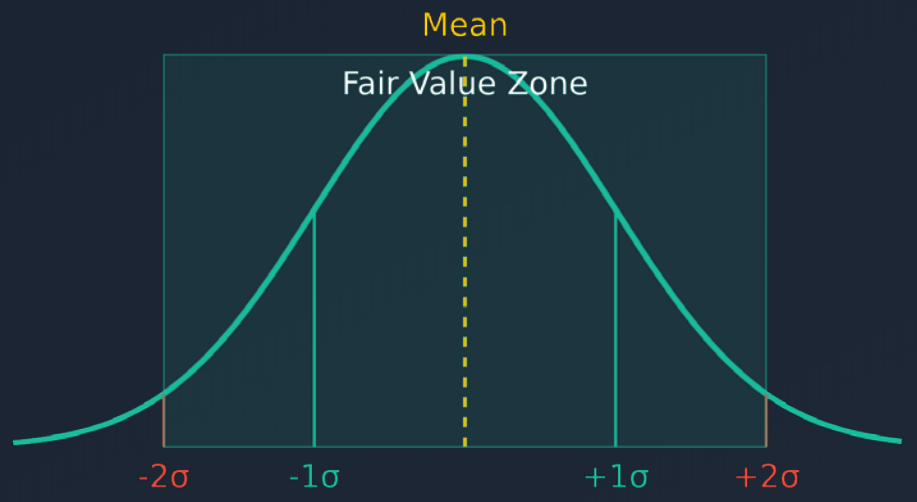
Key Role

Identifies when price has moved to a statistical extreme within a defined range, increasing the probability of reversion to the mean.

Trading Application

Helps pinpoint potential overbought or oversold conditions in the Forex market, providing actionable trading signals.

Standard Normal Distribution



68%	95%	99.7%
of data within ±1σ	of data within ±2σ	of data within ±3σ

Statistical Foundation of Z-Score

Normal Distribution

The Z-Score relies on the Normal Distribution (bell curve), which illustrates how data points are distributed around an average.

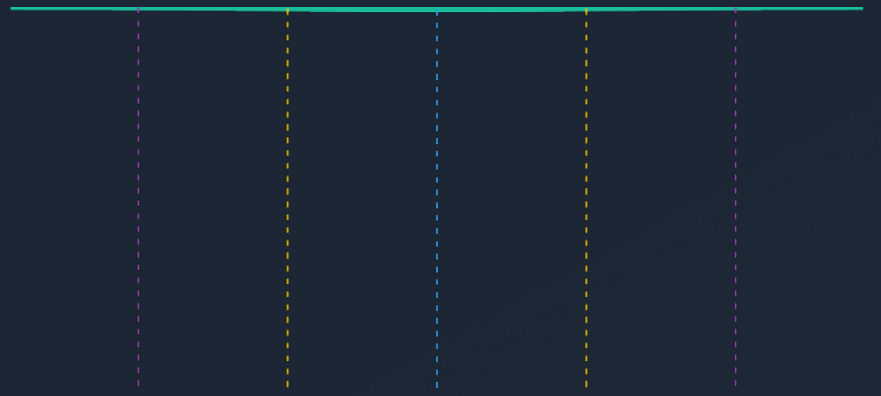
Most observations cluster near the mean, with fewer observations as you move away from the center.

Standard Deviation

The Standard Deviation (σ) measures the typical distance between a data point and the mean.

In a normal distribution, it helps identify how spread out the data is from the mean.

Standard Deviation in Normal Distribution



68%

of data within ±1σ

68% of data falls within ±1 standard deviation

95%

of data within ±2σ

95% of data falls within ±2 standard deviations

99.7%

of data within ±3σ

99.7% of data falls within ±3 standard deviations

Z-Score Calculation

Z-Score Formula

$$Z = (X - \mu) / \sigma$$

Where:

Z

The Z-Score, representing the number of standard deviations a data point is from the mean.

X

The current price or value of a specific indicator (e.g., closing price of a currency pair).

μ (Mu)

The mean (average) of the price or indicator over a defined lookback period, typically represented by a Moving Average.

σ (Sigma)

The standard deviation of the price or indicator over the same defined lookback period.

Lookback Period

The time frame over which the Z-Score is calculated, typically using historical price data.

Application

In Forex trading, the Z-Score helps identify overbought or oversold conditions in currency pairs.

Interpreting Z-Score in Forex Trading

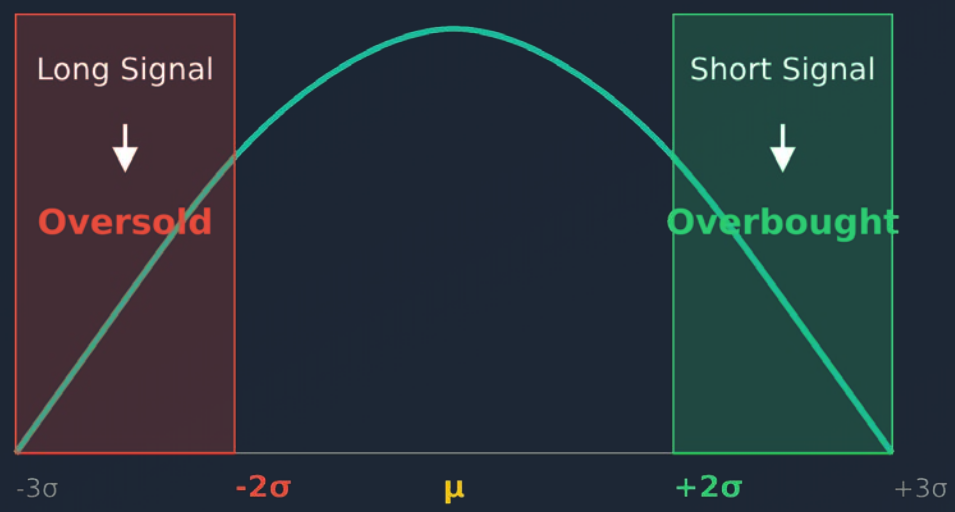
Overbought Signal (Z-Score > +2.0)

- Price is more than two standard deviations above its mean
- Often interpreted as a potential reversal signal
- Suggests a short opportunity as price may revert to average

Oversold Signal (Z-Score < -2.0)

- Price is more than two standard deviations below its mean
- Often interpreted as a potential reversal signal
- Suggests a long opportunity as price may revert to average

Z-Score Visualization



Note: Thresholds can be adjusted based on currency pair, timeframe, and desired sensitivity

Traders often use Z-Score in combination with other indicators to confirm signals

Quartile Analysis Overview

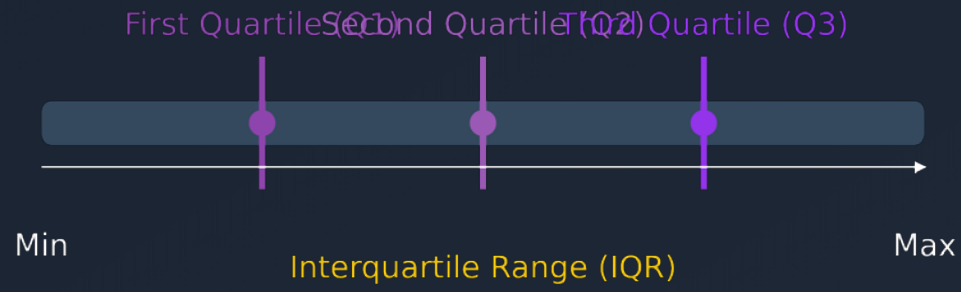
What are Quartiles?

Statistical measures that divide a dataset into four equal parts, each containing 25% of the data points.

Role in the Strategy

- Provide context to the market's current price structure
- Define the prevailing trading range
- Identify areas of potential value

Visualizing Quartiles



Q1	Q2	Q3	Q4
25%	50%	75%	100%

Defining Quartiles

What are Quartiles?

Statistical measures that divide a dataset into four equal parts, each containing 25% of the data points.

First Quartile (Q1)

The value below which 25% of the data falls. Also known as the "lower quartile."

Second Quartile (Q2)

The middle value of the dataset, below which 50% of the data falls. Also known as the median.

Third Quartile (Q3)

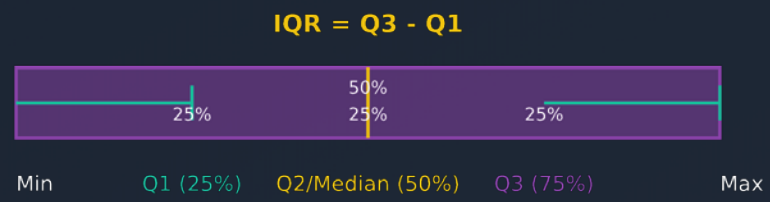
The value below which 75% of the data falls. Also known as the "upper quartile."

Interquartile Range (IQR)

The difference between the third and first quartiles: IQR = Q3 - Q1

Represents the middle 50% of the data and is a robust measure of statistical dispersion, less sensitive to outliers than the standard deviation.

Visual Representation



Market Structure Context

Quartile Segmentation

Quartiles segment the price range into three distinct zones, helping identify potential undervaluation or overvaluation.

Lower Zone (Below Q1)

Prices considered relatively low, indicating potential oversold conditions.

Middle Zone (Q1 to Q3)

The "fair value" range where prices tend to revert to and spend most time.

Upper Zone (Above Q3)

Prices considered relatively high, indicating potential overbought conditions.

Price Range Segmentation

↓ Support Zone ↔ Reversion Zone ↑ Resistance Zone

The strategy trades from extreme zones back towards the middle zone.

Calculating Quartiles for Trading

1 Select a Lookback Period

Determine the number of past price bars (e.g., 20, 50, 100) for the rolling window.

2 Collect Price Data

Gather closing prices from the selected lookback period.

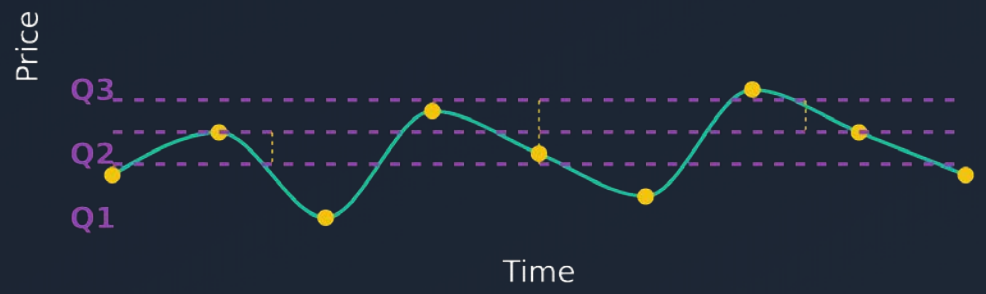
3 Sort the Data

Arrange prices in ascending order.

4 Calculate Quartiles

Find the values at the 25th, 50th, and 75th percentiles.

Quartile Calculation Visualization



Trading Platform Implementation

Trading platforms like TradingView and MetaTrader allow for custom indicators that plot quartile levels on charts.

The Integrated Strategy

Combining statistical timing with structural context

Strategy Integration

The true power of this strategy emerges when **Z-Score's timing signal** is combined with **Quartile's structural context**, enhancing the reliability of entry and exit points.

Z-Score

Identifies **when** price has reached a statistical extreme

Timing component

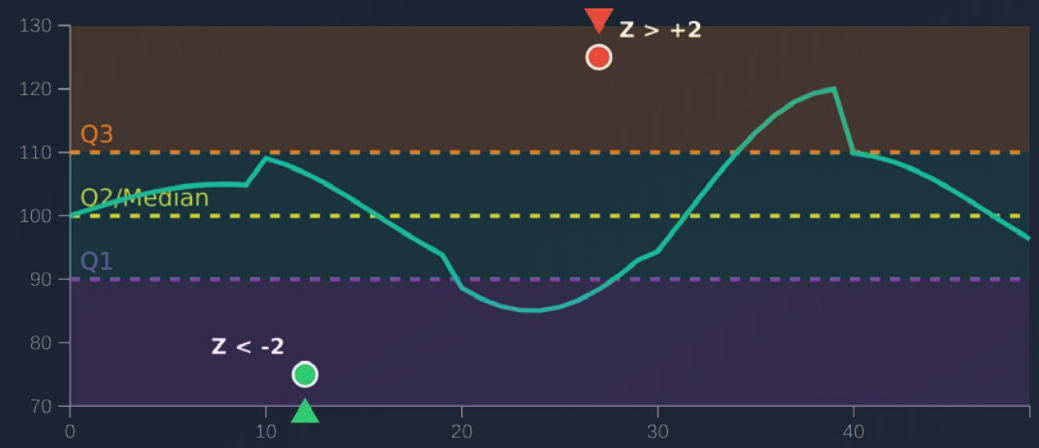
Quartiles

Defines **where** price is positioned within the market structure

Structural component

The strategy filters for high-probability mean-reversion setups where price has moved to a **statistical extreme** within a **defined structural zone**.

Visual Representation



Key Benefits of Integration:

- Improved signal accuracy by confirming extremes with structural context
- Clearer entry and exit points with defined boundaries
- Higher probability of successful mean-reversion trades

Entry Rules

Confluence of Conditions

Entries require both Z-Score and Quartile conditions to align, ensuring high-probability setups.

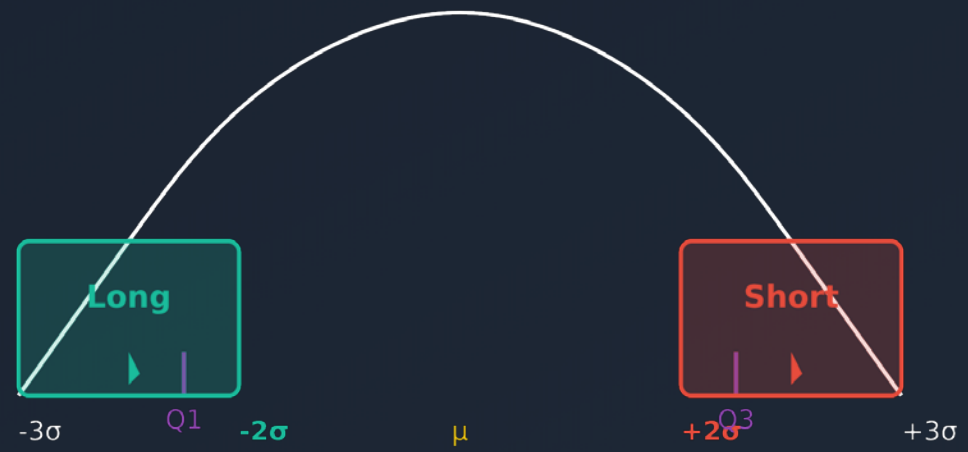
Long Entry

- Z-Score < -2.0
- Price in 1st Quartile (Below Q1)

Short Entry

- Z-Score > +2.0
- Price in 4th Quartile (Above Q3)

Visual Representation



Long Entry Zone

Short Entry Zone

Exit Rules

Mean Reversion Target

Exit when Z-Score crosses back towards 0, indicating price reversion to its average.

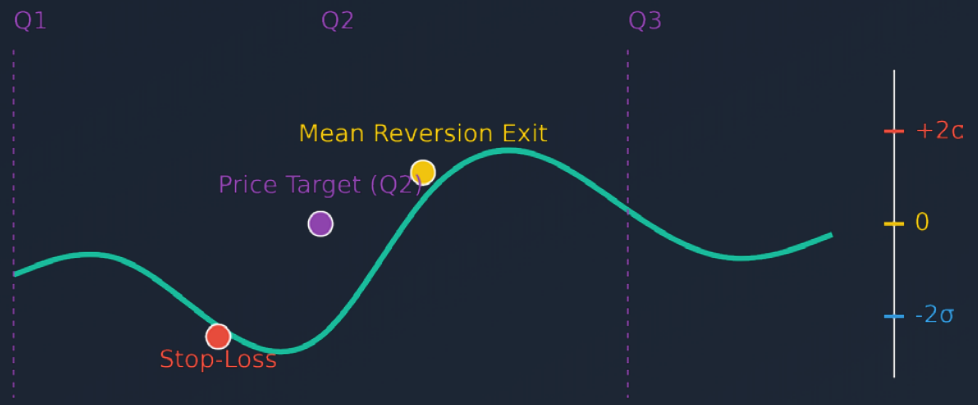
Price Target

Exit when price reaches the median (Q2) of the defined quartile range, representing fair value.

Fixed Stop-Loss

Implement a predetermined stop-loss based on ATR or structural price levels to limit losses.

Exit Strategy Visualization

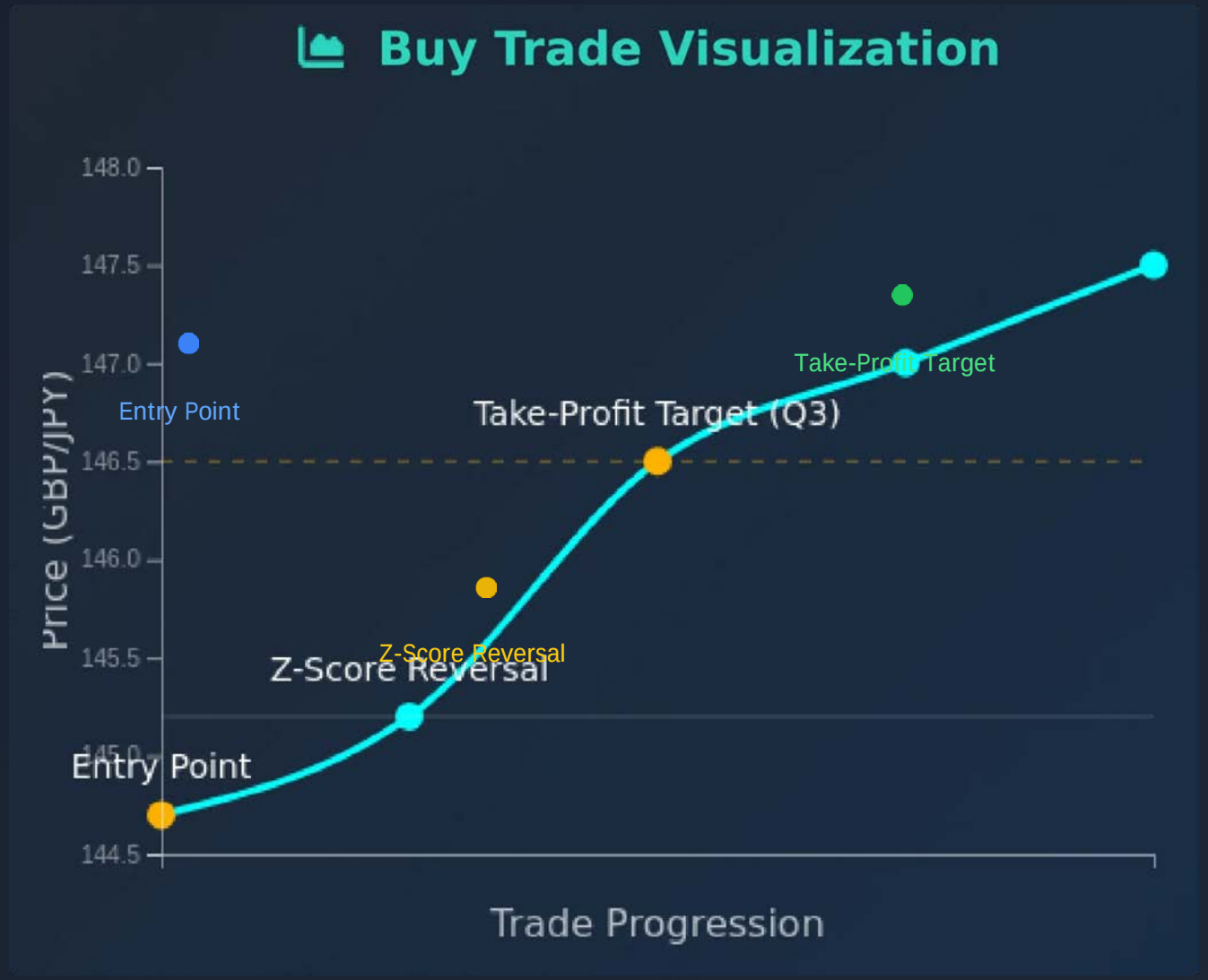


Price Action & Exit Points

Mean Reversion	✓
Price Target	✓
Stop-Loss	✓

Strategy Visualization Example

AUD/USD Trading Setup



Setup Analysis

Entry: Z-Score < -2.0 and price in 1st Quartile (below Q1)

Exit: Z-Score crossing back towards 0 or price reaching Q2

Key Insights

- Confluence of Z-Score & Quartile creates high-probability setup
- Price action shows mean reversion from extreme oversold condition

Parameter Selection

Lookback Period Impact

The lookback period significantly influences the strategy's performance:

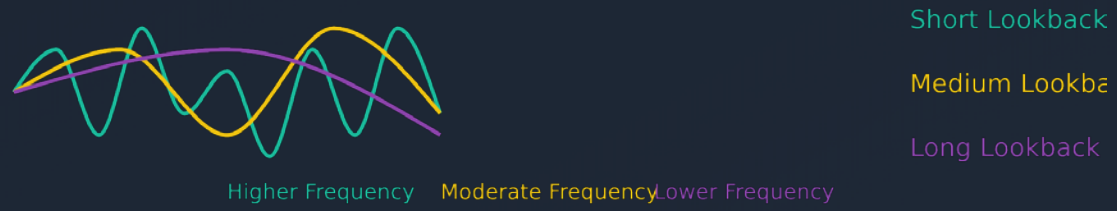
Key Considerations

- **Signal Frequency:** More frequent signals with shorter lookback periods
- **Sensitivity:** Higher sensitivity to price changes with shorter periods
- **Lag:** Shorter periods produce less lag in signal generation

Lookback Period Comparison

Lookback Period	Signal Frequency	Sensitivity	Lag
Short (e.g., 20)	High	High	Low
Medium (e.g., 50)	Moderate	Moderate	Moderate
Long (e.g., 100)	Low	Low	High

Visualizing Lookback Impact



Step-by-Step Case Study

1 Setup Identification

- Monitor Z-Score and Quartile indicators
- Identify when Z-Score is significantly above +2.0 and price is in 4th Quartile

2 Entry Execution

- Execute short trade when conditions are met
- Confirm with price action and indicator signals

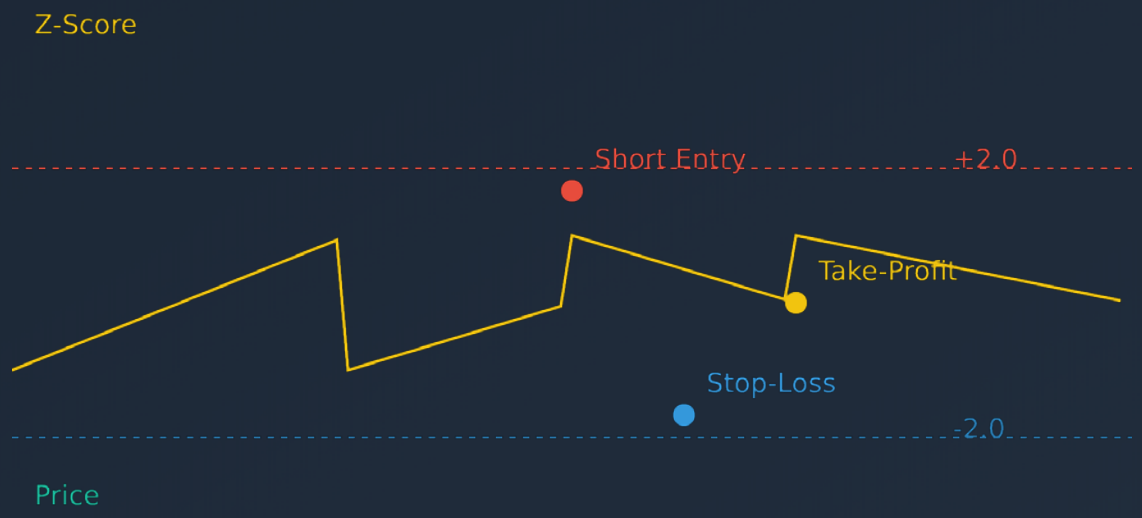
3 Stop-Loss & Take-Profit

- Place stop-loss above recent swing high
- Set take-profit at median (Q2) or when Z-Score crosses below 0

4 Trade Management & Exit

- Continuously monitor trade
- Exit when price reverts to mean (Q2) or Z-Score indicates equilibrium

EUR/USD Trade Example



Entry

Z-Score > +2.0
Price in Q4

Target

Price to Q2
Z-Score → 0

Risk

Stop-Loss above swing high
Position size based on risk%

Platforms and Tools

Implementing the Z-Score & Quartile strategy requires trading platforms that support custom indicators for precise statistical calculations.

TradingView

- Supports custom indicators via Pine Script
- Offers built-in statistical functions
- Wide availability of user-contributed indicators

Pine Script | Web-based

MetaTrader

- Supports MT4/MT5 for custom indicator development
- Requires programming knowledge (MQL4/MQL5)
- Extensive library of technical indicators

MQL4 | MQL5 | Experts

Custom Indicators Needed

Z-Score Indicator

For calculating statistical extremity

Quartile Indicator

For defining market structure zones

Risk Management

Per-Trade Risk

Limit capital risked on any single trade to 1% to 2% of your total trading account to preserve capital during adverse market movements.

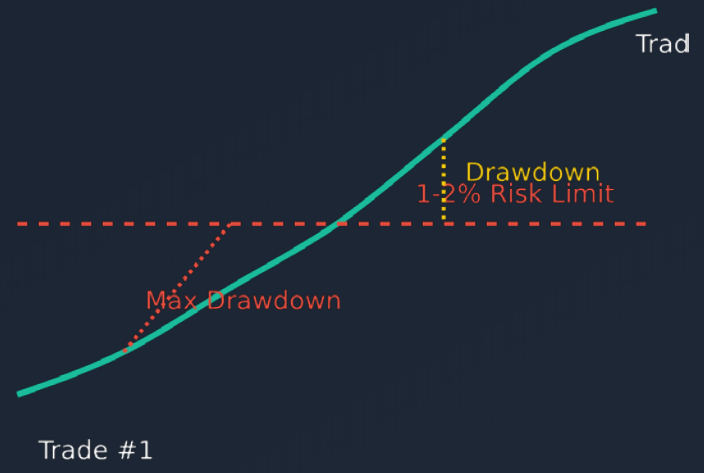
Position Sizing

Calculate appropriate lot size based on your defined stop-loss distance and predetermined per-trade risk to ensure consistent monetary loss exposure.

Correlation Risk

Avoid simultaneously entering multiple trades on highly correlated currency pairs (e.g., EUR/USD and GBP/USD) to prevent increased overall risk exposure beyond your intended limits.

Risk Management Visualization



Effective risk management is paramount to preserving capital and ensuring the sustainability of any trading strategy.

Backtesting and Validation

Backtesting Process

Backtesting is an indispensable process for evaluating the historical performance and robustness of the Z-Score & Quartile strategy across various currency pairs and timeframes.

Apply Strategy Rules

Implement the strategy's entry and exit rules to historical price data

Simulate Trading

Execute trades based on signals while accounting for slippage and transaction costs

Calculate Performance

Generate performance metrics to evaluate the strategy's effectiveness

Analyze Results

Identify strengths, weaknesses, and potential optimizations

Key Performance Metrics

Profit Factor

Ratio of gross profits to gross losses, indicating the strategy's profitability. A profit factor greater than 1 suggests a potentially profitable system.

Sharpe Ratio

Measures risk-adjusted return, indicating how much return is generated per unit of risk taken. Higher Sharpe ratios are generally preferred.

Maximum Drawdown

The largest peak-to-trough decline in the trading account, representing the worst historical loss experienced. Critical for understanding potential capital at risk.

Strategy Limitations

Key Limitations

As a mean-reversion strategy, the Z-Score & Quartile approach has inherent limitations in certain market conditions.

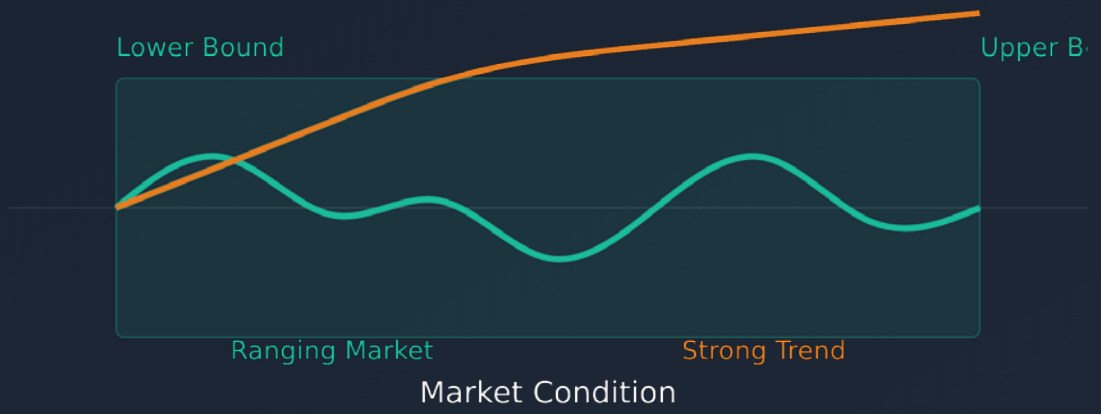
Poor Performance in Strong Trends

Underperforms in markets with strong, sustained trends where prices become extreme and continue moving rather than reverting.

Directional Bias

Inefficient in markets with clear directional bias, generating potential losing trades during strong trend phases.

Market Condition Comparison



Ranging Markets

Optimal for mean-reversion strategies. Price oscillates within defined bounds, creating frequent reversion opportunities.

Strong Trends

Prices become extreme and continue moving, causing mean-reversion strategies to generate losing trades.

Pros and Cons

Balanced assessment of the Z-Score & Quartile strategy

Advantages

- **Objective Signals**
  Eliminates emotional bias from trading decisions
- **Statistically Based**
  Relies on mathematical principles for trading signals
- **Clear Entry & Exit Rules**
  Well-defined criteria for trade execution
- **Adaptable Timeframes**
  Suitable for various trading horizons

Disadvantages

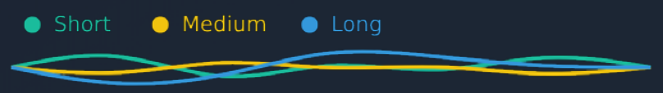
- **Trending Market Performance**
  Underperforms in strong trending markets
- **Custom Tools Required**
  Needs specialized indicators for implementation
- **Potential Whipsaws**
  False signals in choppy markets
- **Parameter Optimization**
  Requires backtesting for optimal settings

Success depends on proper implementation and risk management

Further Development

Parameter Optimization

- Optimize lookback periods for Z-Score and Quartile calculations
- Find optimal settings for specific currency pairs
- Adapt parameters to different timeframes



Technical Filters

- Integrate long-term moving averages to identify trend direction
- Filter trades against strong trends to improve performance
- Add volatility filters to enhance signal reliability

New Asset Classes

- Apply core concepts to commodities markets
- Extend to stock market indices
- Explore application to individual equities

"The true value of the Z-Score & Quartile strategy lies in its adaptability and potential for continuous enhancement through quantitative refinement."

Conclusion

The Z-Score & Quartile Forex Trading Strategy is a disciplined, quantitative approach that leverages statistical principles to identify high-probability mean-reversion opportunities in the dynamic Forex market.

Statistical Foundation

Combines Z-Score's timing signals with Quartile's structural context to identify statistically extreme price conditions.

Objective Decision Making

Provides clear entry and exit rules, removing emotional bias from trading decisions.

Adaptable Framework

Can be optimized for various currency pairs, timeframes, and market conditions.

Final Thoughts

While no strategy can guarantee profitability, the Z-Score & Quartile approach provides a robust framework for risk management and trade execution. Like all trading methodologies, it requires diligent backtesting, optimization, and disciplined implementation for long-term success in Forex trading.

Thank You