Ichimoku Trading Strategy Rulebook

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1 Introduction

This document outlines the **Ichimoku GBP/USD Trading Strategy**, which leverages the Ichimoku Kinko Hyo indicator to identify trading opportunities on the GBP/USD currency pair. The strategy defines entry conditions for both long and short positions, based on price relationships with the Ichimoku components.

2 Ichimoku Overview

Ichimoku Kinko Hyo is a comprehensive trend-following indicator that uses multiple lines to assess price momentum, support/resistance levels, and potential trend reversals. The key components are:

- **Conversion Line (Tenkan-sen):** Short-term trend indicator based on a 9-period high/low average.
- **Base Line (Kijun-sen):** Medium-term trend indicator based on a 26-period high/low average.
- **Leading Span 1 (Senkou Span A):** Average of the Conversion and Base Lines, projected 26 periods ahead.
- **Leading Span 2 (Senkou Span B):** Average of the 52-period high and low, projected 26 periods ahead.
- **Lagging Span (Chikou Span):** The closing price, displaced 26 periods into the past.

3 Indicator Settings

The strategy uses the following Ichimoku settings:

- Conversion Line Periods: 9,
- Base Line Periods: 26,
- Lagging Span 2 Periods: 52,
- Displacement: 26 periods.

4 Calculation of Ichimoku Components

The Ichimoku components are calculated as follows:

- **Conversion Line (Tenkan-sen):**

$$\text{Conversion Line} = \frac{\text{Highest High (9 periods)} + \text{Lowest Low (9 periods)}}{2}$$

- **Base Line (Kijun-sen):**

$$\text{Base Line} = \frac{\text{Highest High (26 periods)} + \text{Lowest Low (26 periods)}}{2}$$

- **Leading Span 1 (Senkou Span A):**

$$\text{Lead Line 1} = \frac{\text{Conversion Line} + \text{Base Line}}{2}$$

- **Leading Span 2 (Senkou Span B):**

$$\text{Lead Line 2} = \frac{\text{Highest High (52 periods)} + \text{Lowest Low (52 periods)}}{2}$$

- **Lagging Span (Chikou Span):**

$$\text{Lagging Span} = \text{Closing Price (26 periods ago)}$$

5 Strategy Rules

5.1 Entry and Exit Rules with Threshold

Entry Rules

To refine entry conditions, a dynamic threshold is added to evaluate the relationship between the Conversion Line (short-term average) and the Base Line (medium-term average). The threshold is determined through historical data analysis and represents the minimum distance required between the two lines to confirm a valid signal.

- **Long Entry Condition**:** Enter a long position when:
  1. The closing price is above both Leading Span 1 and Leading Span 2 (close > Lead Line 1 and close > Lead Line 2).
  2. The Conversion Line exceeds the Base Line by the threshold:

$$\text{Conversion Line} > \text{Base Line} + \text{Threshold}$$

- ****Short Entry Condition**:** Enter a short position when:
  1. The closing price is below both Leading Span 1 and Leading Span 2 (close < Lead Line 1 and close < Lead Line 2).
  2. The Conversion Line is below the Base Line by at least the threshold:

$$\text{Conversion Line} < \text{Base Line} - \text{Threshold}$$

Exit Rules

Exit conditions also leverage the threshold to identify when to close positions:

- **Long Exit Condition:** Exit the long position when:

$$\text{Conversion Line} \leq \text{Base Line} + \text{Threshold}$$

- **Short Exit Condition:** Exit the short position when:

$$\text{Conversion Line} \geq \text{Base Line} - \text{Threshold}$$

5.1.1 Determining the Threshold Historically

To optimize the performance of the strategy, the threshold is determined based on historical data. The process involves iteratively adjusting the threshold and analyzing the performance of the strategy over a specified time period.

1. Initial Setup

- Start with an initial threshold value of 0.
- Apply the strategy to historical data over a defined period.
- Compute the profit and loss (PnL) generated between each entry and exit point.

5.1.2 Adjustment of the Threshold

The threshold is adjusted based on the relationship between the **Tenkan-sen** (Conversion Line) and **Kijun-sen** (Base Line) at the entry and exit levels, and the predefined parameter q (maximum allowable deviation). The adjustment process ensures that only trades with significant deviations are considered, minimizing noise and optimizing profitability.

1. Calculation of the Difference

For both **long and short positions**:

- Calculate the difference between the Tenkan-sen and Kijun-sen at the entry point:

$$\text{Difference}_{\text{entry}} = |\text{Tenkan-sen}_{\text{entry}} - \text{Kijun-sen}_{\text{entry}}|$$

- Calculate the difference at the exit point:

$$\text{Difference}_{\text{exit}} = |\text{Tenkan-sen}_{\text{exit}} - \text{Kijun-sen}_{\text{exit}}|$$

3. Fixing the Parameter q

The parameter q is calculated based on historical data, considering only trades that generate a profit above a predefined threshold S (in percentage). The process is as follows:

1. Identify all trades (both long and short) with PnL exceeding S.
2. Compute the average of the absolute differences between the Tenkan-sen and Kijun-sen for these trades:

$$q = \text{Min}\left(|\text{Tenkan-sen} - \text{Kijun-sen}| \text{ for trades that satisfie PnL} > S\right)$$

4. Dynamic Adjustment Based on Volatility

To make q responsive to market conditions, adjust it based on the normalized volatility:

$$q_{\text{adjusted}} = q \times \frac{\text{Volatility Current}}{\text{Volatility Historical Average}}$$

5. Final Threshold Calculation

The adjusted threshold is then used in the strategy as:

$$\text{Threshold}_{\text{final}} = \text{Max}(0, q_{\text{adjusted}} - \text{Difference}_{\text{entry}})$$

This ensures that the threshold is always non-negative and adapts to the market conditions.

6. Benefits of the Adjustment Process

- **Noise Reduction**: Filters out trades with insufficient deviations, improving signal quality.
- **Risk Adaptation**: The integration of S and volatility adjustments ensures that the strategy remains robust under varying market conditions.
- **Profit Optimization**: By focusing on trades with significant Tenkan-sen and Kijun-sen deviations, the strategy targets higher-probability trades.

5.1.3 Adapting q Based on Market Volatility

To make the threshold q more dynamic and responsive to market conditions, we incorporate market volatility into its calculation. This ensures that the threshold adapts during periods of high or low volatility.

1. Measure Volatility

Volatility (σ) is measured using the standard deviation of returns over a historical window of N periods:

$$\sigma = \sqrt{\frac{1}{N}\sum_{t=1}^{N}(r_t - \bar{r})^2}$$

where:

- r_t is the return at time t,
- $\bar{r}$ is the mean return over N periods.

2. Normalize Volatility

Normalize the measured volatility (σ or ATR) by dividing it by the average historical volatility:

$$\text{Volatility Normalized} = \frac{\text{Volatility Current}}{\text{Volatility Historical Average}}$$

Current volatility is calculated on a 20-days base. Current volatility is calculated on a 252-days base.

3. Adjust Threshold q

The threshold q is adjusted based on the normalized volatility:

$$q_{\text{adapted}} = q_{\text{initial}} \times \text{Volatility Normalized}$$

where:

- q_{initial} is the baseline threshold,
- Volatility Normalized is the ratio of current to historical volatility.

4. Dynamic Behavior of q

- During periods of high volatility (Volatility Normalized > 1), q_{adapted} increases, filtering out weaker signals and reducing noise.
- During periods of low volatility (Volatility Normalized < 1), q_{adapted} decreases, allowing the strategy to capture smaller signals.

5.1.4 Introducing S and Calculating it Optimally with Risk Adjustment

In the threshold determination process, S represents the minimum profit expected (in percentage terms) for a trade to be considered valid in the strategy. S is a key parameter as it helps filter out less profitable trades and ensures that the strategy remains robust and adjusted to market risk.

1. Definition of S

The parameter S is defined as:

$$S = \frac{\text{Profit Expected}}{\text{Initial Capital Allocated}} \times 100$$

where:

- Profit Expected: The profit from a trade in monetary units (e.g., USD).
- Initial Capital Allocated: The capital allocated to the trade.

2. Criteria for S

A trade is considered valid only if the profit generated exceeds S:

$$\text{Trade Valid if: } \frac{\text{Profit}}{\text{Capital Allocated}} \times 100 > S$$

3. Optimal Calculation of S

To determine S optimally, the following steps are taken:

1. **Historical Profit Analysis**: Analyze the historical performance of the strategy and calculate the distribution of profits from trades that meet the entry and exit criteria.

$$\text{Profit Distribution: } P_{\text{trades}} = \{P_1, P_2, \ldots, P_n\}$$

   where P_i represents the profit of the i-th trade.

2. **Average Profit**: Compute the average profit for all trades:

$$\bar{P} = \frac{1}{n} \sum_{i=1}^{n} P_i$$

3. **Adjust for Risk**: Incorporate the risk-adjusted return by considering the standard deviation (σ_P) of profits:

$$S = \bar{P} - \lambda \cdot \sigma_P$$

   where:

   - λ is a risk tolerance parameter (e.g., $\lambda = 1$ for moderate risk, higher for more conservative thresholds).
   - σ_P is the standard deviation of profits from historical trades.

4. Dynamic Adjustment of S Based on Volatility

To make S dynamic and responsive to market conditions, adjust it based on current market volatility:

$$S_{\text{adjusted}} = S \times \frac{\text{Volatility Current}}{\text{Volatility Historical Average}}$$

where:

- Volatility Current: Measured using recent price movements .
- Volatility Historical Average: Average volatility over a longer historical period.

5. Application of S in Threshold Calculation

The adjusted S is used to filter trades and refine the threshold calculation. Only trades generating profits above S_{adjusted} are considered for determining q:

$$q = \text{Min}\left(|\text{Tenkan-sen} - \text{Kijun-sen}| \text{ for trades with PnL} > S_{\text{adjusted}}\right)$$

6. Benefits of Using S

- **Risk Management**: Trades with insufficient returns are excluded, reducing the likelihood of entering trades with poor risk/reward ratios.
- **Market Adaptability**: By adjusting S based on volatility, the strategy dynamically adapts to changing market conditions.
- **Profit Optimization**: Ensures that the strategy focuses on high-probability, high-return trades, enhancing overall profitability.

6 Performance Monitoring

- Evaluate key metrics such as:
  - **Win/Loss Ratio**
  - **Risk/Reward Ratio**
  - **Sharpe Ratio**
- Conduct regular backtesting and optimize parameters as needed.

7 Conclusion

This Ichimoku-based strategy leverages price relationships with key indicator components to identify high-probability trading opportunities on the GBP/USD currency pair. By combining strong entry conditions, robust risk management, and ongoing performance evaluation, the strategy aims to deliver consistent returns in trending markets.