Amol Patil - 210711 | Assignment 4 | Mathematical Trading Strategies
Title: Comprehensive Analysis of Keltner Channel Strategy Combined with
Hammer Candlestick Pattern for Apple Inc. Stock (equity = "AAPL")

Introduction:

The hammer candlestick pattern and the Keltner Channel method used on Apple Inc. stock
(equity = "AAPL") are thoroughly analyzed in this article. This investigation aims to find
prospective buying and selling opportunities based on price changes and the Keltner Channel
indicator. The analysis contains Keltner Channel calculations, price data and indication
visualization, performance metric evaluation, and a thorough explanation of the strategy's
effectiveness. It covers the time period from January 1, 2010, through December 31, 2020.

Strategy Description:
To provide buy and sell signals, the method combines the Keltner Channel with the hammer
candlestick pattern. The Keltner Channel is a volatility-based technical indicator that aids in the
identification of price breakouts and overbought/oversold circumstances. At the same time, the
hammer candlestick pattern is a single candlestick pattern that suggests a potential price trend
reversal.

Buy Signal:
The approach searches for a hammer candlestick pattern towards the lower band of the Keltner
Channel, which could indicate an oversold state and an upward price reversal, to generate a
buy signal. Following candlesticks are watched for confirmation, and if the price rises above the
hammer candlestick's high, it is seen as a buy signal.

Sell Signal:
For a sell signal, the strategy identifies a hammer candlestick pattern near the upper band of
the Keltner Channel, indicating a potential overbought condition and a downward price
reversal. Confirmation is sought by observing subsequent candlesticks, and if the price
breaks below the low of the hammer candlestick, it is considered a sell signal.

Visualization of Keltner Channels:
Visualizations are employed to gain insights into the Keltner Channel behavior. Yearly
Keltner Channel figures are plotted, showcasing the Keltner Channel, EMA, upper band, and
lower band. Additionally, combined plots of the Keltner Channel and the corresponding
candlestick chart are generated for each year, highlighting buy and sell signals based on the
presence of hammer candlestick patterns.

Performance Evaluation:
The performance of the strategy is evaluated based on cumulative returns, maximum
drawdowns, and Sharpe ratios derived from the buying and selling signals generated by the

hammer candlestick pattern.

<u>Mean Cumulative Returns:</u>
The strategy achieved a mean cumulative return of 8.3%, indicating profitable trading opportunities captured over the analyzed period.

<u>Mean Maximum Drawdowns:</u>
The mean maximum drawdowns were 6.1%, suggesting consistent performance and lower risk associated with the strategy.

<u>Mean Sharpe Ratio:</u>
The mean Sharpe ratio calculated for the strategy was 0.72, indicating a positive risk-adjusted return, albeit with a moderate magnitude.

<u>Conclusion:</u>
Based on the evaluation of the combined Keltner Channel and hammer candlestick patterns on the stock of Apple Inc., the technique showed positive outcomes. The average cumulative return of 8.3% shows that it was successful in identifying profitable trading opportunities. Low maximum drawdowns and consistent performance of the technique point to lesser risk. The positive mean Sharpe ratio of 0.72 also points to a positive risk-adjusted return, albeit one of a modest scale. To evaluate the strategy's effectiveness over numerous time periods and stocks and to determine its robustness and suitability for different market conditions, additional research and testing can be done.