How Strong Trading Signals can emerge from Market Noise using Quantitative Strategies?

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Navigating the FX and Precious Metal markets can be complex for discretionary traders that rely mostly on their intellectual assessment of available information and scenario projections to take directional or relative value positions. Systematic strategies offer a different compass to cruise in the dynamic world of financial markets. Firstly, because it eliminates emotions, as we like to say "Algos don't have Egos". Secondly, it is also more scalable: a profitable quantitative model can be rolled out to a wide set of underlying while discretionary trading relies mostly on idiosyncratic themes.

The development of successful quantitative trading strategies hinges on the nuanced understanding and application of advanced analytical concepts.

At Electrum, we integrate key quantitative methods—such as the Probabilistic Sharpe Ratio (PSR), Minimum Track Record Length (MIN TRL), dynamic preservation techniques, and denoising of raw price data— to craft robust systematic trading strategies.

FOUNDATION: DENOISING, STATISTICAL ANALYSIS AND POSITION SIZING

The quest for alpha begins with the foundational step of denoising raw price data. Financial markets are rife with noise — stemming from econo-mic data releases to geopolitical events—masking the true underlying market signals. Techniques like moving averages, exponential smoothing, or even more sophisticated methods such as wavelet transforms, are employed to filter out this noise, revealing clearer trends and patterns.

Simultaneously, a deep dive into the statistical properties of financial time series is essential. Achieving stationarity — where the statistical properties of the series do not depend on time —simplifies the modeling process. However, financial data's inherent non-stationarity, characterized by trends and volatility, poses significant challenges. Transformation methods are thus applied to stabilize these properties, all while striving to preserve the series' memory—the autocorrelation that hints at how past values may inform future ones. Techniques ensuring this preservation are crucial, as they maintain the series' predictive power.

The Role of Autocorrelation

Autocorrelation Functions (ACF) and Partial Autocorrelation Functions (PACF) are invaluable tools in this denoising process, offering insights into the "memory" within a series. Identifying significant lags through these functions informs the development of models that are not just reactive but predictive, based on inherent temporal patterns.

Bet Sizing: A Critical Component

Bet sizing is an essential aspect of risk management as it determines the capital allocation to a trade based on expected return and risk. Incorporating stop loss and take profit levels further refines this process, ensuring that potential losses remain within acceptable bounds. This stage benefits greatly from the comprehensive analysis preceding it, allowing for bet sizing that is both statistically informed and optimized.

Preprocessing is quite a journey in the effort to design an effective systematic strategy! Once all the building blocks are assembled, we must test the quality of the strategy and compare it to existing ones to assess whether the proposed strategy is worth deploying.

ADVANCED QUANTITATIVE CONCEPTS

Probabilistic Sharpe Ratio (PSR)

The Probabilistic Sharpe Ratio (PSR), developed by Andrew Lo, offers a probabilistic assessment of a trading strategy's Sharpe ratio, taking into account the uncertainty and variability of this estimation. This metric is crucial for evaluating the quality of a strategy's performance, adjusting for biases especially prevalent in small sample sizes or high-volatility returns.

The PSR answers the question: "What is the probability that an estimated Sharpe ratio is statistically significantly greater than a reference Sharpe ratio?"

This question is crucial for investors and portfolio managers who need to assess the statistical significance of their investment strategy's performance.

The traditional Sharpe ratio provides a point estimate of the risk-adjusted return of an investment strategy, comparing its excess return over the risk-free rate to the standard deviation of the excess returns. However, this estimate doesn't consider the uncertainty or variability in the Sharpe ratio itself, which can be particularly pronounced with shorter return series or more volatile investments.

Minimum Track Record Length (MIN TRL)

The MIN TRL answers the question: "How long should a track record be in order to have statistical confidence that its estimated Sharpe ratio (SR) is above a given threshold."

MIN TRL addresses the need for a sufficient performance data length to reliably estimate a strategy's Sharpe ratio. This concept is vital for ensuring that the evaluation of a strategy's performance is statistically significant, guarding against the pitfalls of drawing conclusions from limited data.

However, an important consideration arises when we test numerous parameters, conducting millions and millions of trials: How do we incorporate the uncertainty introduced by selection bias?

In such extensive testing scenarios, the highest Sharpe ratios observed might not necessarily indicate the best strategies. This is due to the «multiple testing problem» where the more tests we perform, the higher the chance of observing statistically significant results purely from chance. To mitigate this, our quant team integrates adjustments for selection bias into our evaluation process, ensuring that the strategies we identify as superior are not just statistical flukes but truly robust performers. This nuanced approach acknowledges the complexity of financial markets and the intricacies of

quantitative strategy development, where the quest for genuine, sustainable alpha requires careful consideration of both performance metrics and the underlying statistical processes.

The integration of these advanced quantitative concepts—PSR, MIN TRL together with preprocessing methodologies such as memory preservation, denoising and some other methods not discussed here—creates a sophisticated framework for the evaluation and implementation of trading strategies. This holistic approach ensures strategies are not only theoretically sound but also practically viable, enhancing their predictive accuracy and risk management.

Long term sustainability of quantitative strategies:

The competitive nature of financial markets means that all quantitative trading firms are on the quest to identify signals from trading patterns using the same data set. The convergence of ideas and models mean that it is challenging to retain alpha in the long run with the same strategy. It is therefore imperative for traders and institutions to stay ahead of the crowd through constant innovation, adaptation, technology, and talent recruitment.

About electrum

electrum is the trading division of OCIM Group, a wholly owned subsidiary of OCIM Finance SA. Our highly experienced team designs and implements tailor-made hedging solutions on global capital markets, from strategic metals and currencies to interest rates and equities. We provide the group's various entities with dynamic strategies and around the clock execution enabling our partners to focus on their core business while we handle their market exposure. Capitalizing on our in-house expertise, we optimise and de-risk their market transactions so they operate with serenity.