INSIGHTS

Quant hedge fund primer: demystifying quantitative strategies

22/06/2023

26 MIN READ

QEMN | Statistical arbitrage | Managed futures/CTAs | Quant macro/GAA | Alternative risk premia

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In summary

Quantitative hedge funds are investment firms that use advanced mathematical and statistical models, as well as computer algorithms, to make investment decisions. In this piece we explore quantitative investing and provide insights into the most common quantitative strategies. For each of the quantitative strategies we provide a description, we discuss common signal types and look at how each strategy historically performs in different markets and its historic risk and return profile.

> **Despite talk of automation it is people that conduct the research, decide on the strategy, select the universe of securities to trade, what data to utilise, what hardware and connectivity is needed, among many other things.**

Contents:

About Aurum

Aurum is an investment management firm focused on selecting hedge funds and managing fund of hedge fund portfolios for some of the world’s most sophisticated investors. Aurum also offers a range of single manager feeder funds.

Aurum’s portfolios are designed to grow and protect clients’ capital, while providing consistent uncorrelated returns. With 30 years of hedge fund investment experience, Aurum’s objective is to lower the barriers to entry enabling investors to access the world’s best hedge funds.

Aurum conducts extensive research and analysis on hedge funds and hedge fund industry trends. This research paper is designed to provide data and insights with the objective of helping investors to better understand hedge funds and their benefits.

What are quantitative hedge funds?

The term “quantitative investing” isn’t really a description of a uniform strategy, rather it describes how a particular strategy is developed and implemented. The difference between a quantitative (“quant”) strategy and a discretionary strategy can be seen in how the strategy is created and how it is implemented.

Quant strategies use the automated, methodical buy/sell decisions of computer algorithms to trade.

However, people, not machines are still ultimately responsible for quant trading. It is people that conduct the research, decide on the strategy, select the universe of securities to trade, what data to utilise, what hardware and connectivity is needed, among many other things. The individuals and firms involved are commonly called *“quants”*.

Quant trading strategies are most commonly distinguished by:

- asset class
- signal classification

These two conditions tend to be the primary determinant of ‘sub-strategy classification’. For example:

1. If the fund predominantly trades single name equities using short-term, technically based signals with a short average holding period, it would likely be classified as an equity statistical arbitrage fund.
2. By contrast, a fund that traded only ‘macro instruments’, such as futures, FX and bonds, where predicted prices were a function of both short-term technical and longer-term fundamental indicators, would likely be classified as quant macro.

Most common quant strategies

- Equity statistical arbitrage
- Quantitative equity market neutral
- Managed futures/CTAs

The above list is far from exhaustive, but these broad category definitions are used by Aurum's Hedge Fund Data Engine to capture/classify funds in the quant universe. One could also include additional strategy categorisations such as:

- Multi-strategy quant – there are not a large number of peer funds that fall into this category, so funds that trade multiple asset classes and/or combinations of short-term equity statistical arbitrage and longer-term models, are currently classified as 'statistical arbitrage'.
- Quant volatility – if a fund's investment premise is to capture shifts in volatility, known as trading volatility, even if this is executed using a quantitative process, this is currently classified as 'volatility arbitrage'. If the fund is trading volatility in combination with other quant strategies, we typically would group it with 'statistical arbitrage'.

Risk return summary

	Statistical arbitrage	QEMN	CTAs	Quant macro/GAA	Alternative risk premia
Typical assets traded	Equities	Equities	Liquid futures – equity, fixed income, commodities.	Similar to CTAs + cash instruments, bonds, FX, ETFs, Derivatives	Primarily equities, but may also trade some derivatives and instruments similar to quant macro
Typical market directionality /neutrality	Primarily market neutral	Primarily market neutral	Generally directional	Generally relative value. Some have directional positions	Generally market neutral long-term (some exceptions)
Observed beta to traditional assets (equities and bonds)	Typically very low	Typically very low	Typically low	Typically low	Typically low to moderate
Long/short bias	None	None	May be directional but should have no systemic bias to be long or short over the long-term	May be directional but should have no systemic bias to be long or short over the long-term	Typically no bias
Historical volatility	Lower volatility than typical HF universe	Lower volatility than typical HF universe	Higher volatility than wider HF universe	Higher volatility than wider HF universe	Potential exposure to large factor moves – can be large/long drawdowns
Typical factor exposure	Tightly hedged to generic factors	May be hedged to generic factors, but tends to take specific exposure to certain equity risk premia	Typically highly exposed to momentum	Varied, may be tightly hedged; could have a momentum or value bias	High factor exposure by design. Typical ARP fund looks to offer diversified exposrue to many risk-premia factors
Liquidity	Generally highly liquid	Generally highly liquid	Generally highly liquid	Generally highly liquid	Generally highly liquid
Leverage	Can vary significantly: typically 3-8x	Can vary significantly: typically 3-8x	Typical 2-4x (with MTE typically 10-30%)	Typical 2-4x (with MTE typically 15-40%)	Varied (typically 1.5 to 2.0x)

Equity statistical arbitrage

DESCRIPTION

Statistical arbitrage funds generally utilise price data and its derivatives, such as correlation, volatility and other forms of market data, such as volume and order-book information to determine the existence of patterns. Research that identifies repeating patterns and linkages in the data can be used to help the manager forecast the future return of a stock, often over a relatively short timeframe. Relationships are identified through rigorous statistical analysis and back-testing of relation...

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SIGNAL TYPES

The most common signal types are mean reversion, momentum, and event driven. Mean reversion Mean reversion looks to take advantage of the phenomenon of short-term price movements occurring due to supply/demand imbalances with a view that these will then revert back to an equilibri...

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PERFORMANCE IN DIFFERENT MARKETS

Statistical arbitrage portfolios are expected to generate returns regardless of underlying broad market direction. An environment of rapidly spiking correlations between stocks, and for multi-asset managers between asset classes has historically been a challenging period for the strategy, particularly when accompanied by a significant spike in market volatility. Often such an environment of extreme volatility has led to sharp drawdowns. However, the aftermath of such episodes tends to lead to a...

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SAMPLE TRADE

An equity statistical arbitrage fund trades by buying a portfolio of stocks that are perceived to be undervalued and simultaneously selling a portfolio of stocks that are perceived to be overvalued with similar characteristics, such as industry sector, market capitalization, or financial ratios. For example, the fund would identify two stocks that have a historically strong correlation, such as Coca-Cola and PepsiCo. A large investor in PepsiCo then decides to sell a significant block of stock,...

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RISK/RETURN PROFILE

Statistical arbitrage funds are nearly always run with a very low level of beta and are typically market neutral, however, this may not always be the case, with some funds able to take significant directional risk; however, given the higher frequency trading nature of such funds, they are not expected to have significant correlation to markets over time or exhibit a systemic long/short

Quantitative equity market neutral (“QEMN”)

DESCRIPTION

Traditional QEMN strategies take fundamental and/or event-oriented data, such as , balance sheet information and cash flow statement statistics, and systematically rank/score stocks against these metrics in varying proportions. The weights of the scores of the different fundamental data sources may be fixed or dynamic. Managers construct a portfolio that typically comprises hundreds to thousands of positions, long and short. Portfolio construction is done using an optimisation process, or by app...

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SIGNAL TYPES

QEMN fund price prediction models typically use a variety of signals as primary inputs, including: Fundamental data: this includes financial data such as earnings, revenue, profit margins, and cash flow, as well as non-financial data such as industry trends and macroeconomic indicators. Technical data: this includes information about past market trends and patterns, such as moving averages, relative strength, and trading volume. Sentiment data: thi...

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PERFORMANCE IN DIFFERENT MARKETS

QEMN portfolios are usually expected to generate returns regardless of underlying broad market direction. Rapid spikes in market volatility and spiking correlations have been challenging for QEMN strategies. Environments of low realised stock volatility accompanied with low volumes of trading are less favourable for QEMN. Historically, the strategy tends to do much better when there is a reasonable degree of stock price dispersion and oscillation, where stock price movements are driven more by f...

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SAMPLE TRADE

Example of a quantitative equity market neutral strategy that incorporates fundamental signals, such as value, growth, price momentum, and quality, while also using alternative unstructured data: Data collection and processing: The hedge fund collects fundamental data for a universe of stocks, including financial statements, earnings reports, and other relevant company-specific information. The fund also gathers alternative unstructured data, such as news articles, social media sentiment, and sa...

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RISK/RETURN PROFILE

QEMN funds are typically run with a very low level of beta and are market neutral. As indicated above, some QEMN funds may have relatively high degrees of exposure to factors such as, value, growth, market-cap bias, momentum, sector, geography etc. However, funds will have varying levels of correlation to the more ‘generic’ forms of risk premia, e.g., some funds focusing on ‘quality’ signals, will look to use differentiated indicators and/or supplement those signals with other information (e.g., event driven or technical data). Some will also look t...

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Managed futures/CTAs

DESCRIPTION

Commodity trading advisors (“CTAs”) take primarily directional positions in index level or macro instruments, such as futures or FX contracts, in a systematic fashion. Technically, a CTA is a trader of futures contracts as defined by the Commodities and Futures Trading Commission (“CFTC”) and historically, there were many CTAs who were not systematic; such traders are now more likely to be categorised as pursuing a ‘global macro’ strategy. Trend following is the most employed CTA str...

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SIGNAL TYPES

Price and volume data are the primary inputs to trend following price prediction models. Many trend followers focus their research on time-series analysis of returns of single instruments. This contrasts with an approach of looking at cross-sectional analysis of different instruments and contracts and looking for other predictive relationships based on correlations. Other models used in CTAs may incorporate other concepts such as: carry, seasonality, mean reverting or pattern recognition systems...

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PERFORMANCE IN DIFFERENT MARKETS

Managed futures CTA hedge funds have historically performed well in volatile or crisis periods, as well as in markets with low correlations between asset classes. However, they have historically underperformed in long-term trending markets or during extended periods of low volatility. Trend-following CTA hedge funds have tended to perform well during extended market trends but struggled in choppy or range-bound markets. They can also be impacted by sudden market reversals or shifts in macroecono...

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SAMPLE TRADE

Typical trade examples could be: Intentionally directional positions (e.g., long or short particular equity futures index contracts). This aligns with the directional nature of typical CTA trend following strategies, where the fund takes positions based on expected price movements in the underlying asset as guided by technical price-based signals such as moving average crossovers, price breakouts, Relative Strength Index (“RSI”) indicators, etc. Relative value: commodity spread trade playin...

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RISK/RETURN PROFILE

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Quant macro and global asset allocation (“GAA”)

DESCRIPTION

Quant macro aims to generate alpha through large data set analysis and making trading decisions that are based on economic, market and other fundamental indicators as well as statistical models. Quant macro funds have the potential for overlap between CTAs and quant macro, as they often trade the same/similar instruments, i.e., typically ‘macro’ instruments such as futures (across all the main asset classes), but also ETFs, bonds, FX and sometimes swaps and options. It is common for terms li...

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SIGNAL TYPES

Quant macro is a highly data and technology intensive strategy. It typically relies upon complex mathematical models to identify key drivers of price formation/relationships and market trends, calibrate portfolio construction, and generate trading signals. The focus tends to be on macroeconomic factors such as GDP, inflation, interest rates, exchange rates, export/imports, growth, capital flows, market data, etc. Signals are also often classified under a number of familiar factor headings such a...

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PERFORMANCE IN DIFFERENT MARKETS

Quant macro funds tend to perform well in periods of economic uncertainty, such as recessions or geopolitical crises, when macroeconomic factors are driving market movements. However, they may underperform in stable or slowly changing market conditions. Their performance is also influenced by the accuracy and timeliness of their economic data sources and the robustness of their models to changes in market regimes.

SAMPLE TRADE

Broad trade-types may be arranged into various categorisations such as: relative value asset class models, cross asset class models and directional trades. In commodities it could relate to buying/selling over/undervalued commodities, taking into account other factors such as inventory levels, elasticity/substitution dynamics and/or other supply/demand information that can be systematically modelled. Macroeconomic indicators (leading indicators, nowcasting, business cycle, monetary policy etc.) would be used to trade a book of global equity indices both long and short, looking for relative mis-pricing opportunities.

RISK/RETURN PROFILE

There can be some overlap with areas such as CTAs, although typically quant macro funds have a wider scope and are able to trade a broader investment universe including cash instruments, bonds, currencies and other derivatives such as swaps and options. On the other hand, CTAs tend to focus on futures markets. Quant macro funds typically use a broader array of indicators than CTAs, which rely more on technical analysis and price-based models. The strategy is typically used as a diversifier to an...

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Alternative risk premia

DESCRIPTION

The strategy of alternative risk premia in hedge funds involves leveraging the fundamental principles underlying specific hedge fund strategies. By employing a dynamic yet well-defined process, these funds aim to harness a substantial portion of the anticipated returns associated with those strategies. Specific risk factors, such as equity value, momentum, size, etc. are isolated and their risk premia are harvested in a systematic fashion, hence their inclusion in the quant hedge fund strategy g...

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SIGNAL TYPES

Funds tend to have exposure to a well-diversified portfolio of hedge fund premia. Premia can cover everything from equity premia (equity market neutral – trading across value, quality, growth and momentum factors, as well as EM premia), macro premia (e.g., trend following, or EM premia), to arbitrage strategies (e.g., risk arbitrage – holding a portfolio of merger targets diversified by sector and deal type; convertible arbitrage, etc.). There can be some crossover with some risk premia prod...

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PERFORMANCE IN DIFFERENT MARKETS

Alternative risk premia strategies have shown mixed performance during periods of market stress. While these strategies are designed to be more diversified and have lower correlation with traditional asset classes, they can still face challenges during times of heightened market volatility and stress. During periods of market stress, correlations between asset classes tend to increase, which can reduce the effectiveness of alternative risk premia strategies that rely on exploiting relative price...

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SAMPLE TRADE

An alternative risk premia hedge fund may execute a trade by simultaneously buying and selling futures contracts in two closely related asset classes, such as gold and silver or crude oil and natural gas, with the expectation that the price relationship between the two assets will revert to its historical mean. The fund may use a statistical model to identify the deviation from the historical relationship and execute a mean reversion trade, with the expectation of profiting from the convergence...

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RISK/RETURN PROFILE

Alternative risk premia funds typically (but not always) look to be market neutral over the long term, with low correlation to

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Glossary

Computer algorithm – in the context of quant funds, this is a computer program that works through a pre-defined set of instructions (an algorithm) to place a trade. Trading in this way is faster and more frequent than a human could execute.

Signals – Signals in the context of quant hedge funds refer to mathematical models and algorithms that analyse large volumes of financial data to identify patterns and trends. These signals are used to make investment decisions and execute trades.

Nowcasting – the practice of using recently published data to update key economic indicators that are published with a significant lag, such as real GDP. The main purpose of nowcasting is forecasting near-term information flow. Unlike traditional economic forecasting, which relies on historical data and assumes stable relationships between variables, nowcasting seeks to capture the latest information on economic conditions and adjust for potential changes in relationships caused by shocks or structural shifts. Specifically, it is an automated process for predicting what forthcoming data reports may show, based on advanced information and an appropriate dynamic model.

For the latest quant performance and strategy chart packs, click here.

**The Hedge Fund Data Engine is a proprietary database maintained by Aurum Research Limited ("ARL"). For information on index methodology, weighting and composition please refer to https://www.aurum.com/aurum-strategy-engine/. For definitions on how the Strategies and Sub-Strategies are defined please refer to https://www.aurum.com/hedge-fund-strategy-definitions/*

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