# Commodity Trading Advisor Funds
## Should they be made up of specialist or general Commodity Trading Advisors?

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**Introduction**
A manager of a portfolio of Commodity Trading Advisors (CTAs) is faced with a number of issues in choosing the CTAs for inclusion in his portfolio in pursuit of objectives like:

(i) The optimal return for the target level of risk; or
(ii) The optimal return for the lowest level of correlation to a portfolio of traditional assets;

In this context, one of the issues that arises is whether to build the portfolio using a number of specialist CTAs or a number of general CTAs. This article discusses some of the issues facing the CTA portfolio manager as he goes about his portfolio construction work namely:

- The Extent of Control over the Portfolio's Investment Policy;
- Correlation – Implications for Portfolio Construction;
- Correlation Stability;
- Impact of Lack of Correlation Stability on Portfolio Risk;
- Fiduciary Duties of the CTA Portfolio Manager;
- Competitive Positioning of the CTA Fund;
- Maximising Sharpe Ratio;
- Professional Development of the Manager of the Fund of CTA Managers;
- Exposure to a Common Risk Factor;
- Intellectual Capital as the Core Competence of each CTA Manager;
- Ability to Assess Style Drift;
- Risk Management; and
- Assess to Specialist Commodity Trading Advisors

**Terminology**
In this article, CTAs that confine themselves to a single strategy, for example, a CTA that specialises in currency trading, will be referred to as specialist CTAs. Those CTAs who invest client money across a number of strategies, for example, a CTA that may invest client assets across a number of strategies like currencies, metals, energy, agricultural commodities and financial derivatives, will be referred to as general CTAs.

When we refer to the CTA portfolio in the article, we mean the group of CTAs to which the CTA portfolio manager has allocated client assets for investment management.

 

The CTA portfolio manager is referred to as "he" purely to avoid the clumsy he/she and him/her type of sentences; no gender bias is intended by the authors.

**The Extent of Control over the Portfolio's Investment Policy**
When a CTA portfolio manager allocates his portfolio to a group of general CTAs he has less control over investment policy compared with allocating the same portfolio to a group of specialist CTAs.

If a CTA portfolio manager allocates to a number of specialist CTAs covering say, metals, agricultural commodities, energy, currencies and financial futures, the fund manager has a much higher degree of control over the investment policy of the portfolio compared with a CTA portfolio manager who allocates to a number of general CTAs. In the latter case, the fund manager may find that he has a disproportionate exposure to say, equity financial futures, because of strong trends in say the equity markets. In the former case, each manager is confined to single strategy so that, absent a common disaster factor, the diversity of the portfolio of specialist CTAs should be much greater than that of a portfolio of general CTAs.

By choosing specialist CTAs it may be possible to gain further diversification by for example investing in different types of CTAs within a particular speciality. For example, in the currency CTA specialist area, CTAs that focus on trading in short timeframes may have a low level of correlation with other CTAs in the strategy area that focus on longer-timeframe strategies.

<u>Dangers of CTAs Ceasing to Trade</u>
Some CTAs cease trading for the remainder of a month if they make a significant (uniquely defined by each CTA) gain in the early part of a month or lose a certain amount (again, uniquely defined by each CTA) in the early part of a month. This can have particularly serious implications for a portfolio of CTAs.

Suppose that most of the CTAs with long positions in say, €/$, cease trading in the early part of the month as a result of losses on that position. If those CTAs who profited by being short €/$ don't cease trading and there is a reversal in the €/$ trend the portfolio's losses will be much more significant as there will be no balancing gains from the CTAs who were long €/$.

This is a greater problem for general CTAs because they may all follow the same trend than for specialist CTAs.

**Correlation – Implications for Portfolio Construction**
Suppose that we have a group of CTAs with normally[1] distributed returns each with a common correlation (given the symbol $\rho$ in this article), common variance and common mean return.

Let's assume that general CTAs have a common correlation of 70% ($\rho = 0.7$). If we have four such general CTAs in a portfolio, then the marginal gain in Sharpe ratio

[1] This is unlikely to be the case. Nonetheless instructive lessons can be learnt from this case.

 

from adding another such CTA to that portfolio is less than 1%. With just four such CTAs, the portfolio will be at approximately 95% of its maximum[2] Sharpe ratio.

If something very close to the maximum Sharpe ratio can be achieved with just four general CTAs, then it is too easy for potential investors to replicate the portfolio and avoid the double layer of fees.

Now let's assume that specialist CTAs have a common correlation of 20% ($\rho = 0.2$). With this level of common correlation, $\rho = 0.2$, one needs 12 CTAs in the portfolio of specialist CTAs, before the marginal gain in Sharpe ratio from adding another such CTA is less than 1%. With 12 such CTAs, the portfolio will only be at around 86% of the maximum[3] Sharpe ratio.

It is more difficult for a potential investor in a portfolio of specialist CTAs to replicate the portfolio by putting together a group of 12 specialist CTAs in pursuit of a high Sharpe ratio compared with the case where the investor is trying to replicate a portfolio of general CTAs in pursuit of a high Sharpe ratio where only four general CTAs are needed to get a high Sharpe ratio.

**Correlation Stability**

The correlation between general CTAs is likely to be less stable because of their collective ability to adopt or weight their investment strategies heavily towards a single market or trade at the same time.

Absent a common disaster factor, the correlation across specialist CTAs is likely to be more stable because each specialist manager is following a different strategy.

If the portfolio manager applies mean-variance analysis without considering the assumptions on which it is based, the risk of a portfolio of assets will be driven by the average correlation between the assets in the portfolio. So a portfolio which has an average correlation of 0.18 and which remains stable in all market conditions will be measured as having **the same risk** as a portfolio which has an average correlation of 0.18 arising from a group of assets the common correlation of which is 0.1 with 90% probability and 0.9 with 10% probability.

The reality of the risk of the two portfolios is quite different as we shall demonstrate below.

**Impact of Lack of Correlation Stability on Portfolio Risk**

Let's illustrate, by means of an example, the risk impact on a portfolio of general CTAs of a change in common correlation between the general CTAs in the portfolio.

<u>Example</u>

[2] The maximum Sharpe ratio is assumed to be achieved when we combine a very large number (mathematically speaking an infinite number) of CTAs with common correlation ($\rho = 0.7$), common mean return and common standard deviation of return.

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Suppose that we have an equally weighted portfolio of 10 CTAs each with a normal distribution of returns, a common mean and a common volatility of, say, 15% per annum. Let's assume that 90% of the time the common correlation between the general CTAs in the portfolio is 10% but that the remaining 10% of the time the common correlation becomes 90%.

Given this propensity to shift between two states of correlation, the average common correlation between the CTAs would be measured as 18%. Table 1 shows the average correlation and the portfolio volatility it implies.

Table 1
Portfolio Volatility Based on Average Correlation

| Average Correlation | Annual Volatility[4] of the Portfolio Implied by Average Correlation |
|---|---|
| $\rho = 0.18$ | 7.68 |

If one were to construct such a portfolio, the assumption that the average correlation is 0.18 and stable will give rise to rather nasty surprises in terms of big negative moves for the investors well beyond what one would expect from a portfolio with an annualised standard deviation of return of 7.68.

Table 2 illustrates the standard deviation (volatility) of the portfolio in the two different correlation states, namely $\rho = 0.10$ and $\rho = 0.90$. It can be seen that as the correlation shifts from the low common correlation state ($\rho = 0.10$) to the high common correlation state ($\rho = 0.90$) the volatility of the portfolio more than doubles. A doubling of volatility significantly more than doubles the risk.

Table 2
Portfolio Volatility v Correlation State

| State Common Correlation Between CTAs | Annual Volatility[5] of the Portfolio Implied by Common Correlation |
|---|---|
| $\rho = 0.10$ | 6.54 |
| $\rho = 0.90$ | 14.31 |

Table 3 shows how the probability of various standard deviation moves increases as between a portfolio with parameters based on average correlation and a portfolio based on the two-state correlation.

[4] Standard deviation of return.
[5] Standard deviation of return.

Table 3
Ratio of Probabilities of Various Standard Deviation Moves
for the Portfolio Based on Average Correlation and One Based on the
Two-State Correlation

| Size of Move | 3 Standard Deviations | 4 Standard Deviations | 5 Standard Deviations | 6 Standard Deviations |
|---|---|---|---|---|
| Expected Frequency of Move Portfolio based on Average Correlation (probability) | Once in every **1.5** years (0.2699934%) | Once in every **62.6** years (0.0063372%) | Once in every **6,910** years (0.0000574%) | Once in every **2 million** years (0.0000002%) |
| Expected Frequency of Move Portfolio based on Two-State Correlation but with the Same Average Correlation (probability) | **Three times in two years** (0.5757220%) | **Once in every 2.5 years** (0.1594834%) | **Once in every 11 years** 0.0364973% | **Once in every 61 years** 0.0064225% |
| Ratio of Probabilities | **2.13** | **25.17** | **635.61** | **32,433.13** |

In the portfolio based on average correlation, three standard deviation moves are expected to occur only once in every year and a half whereas in the two-state correlation portfolio (with the same average correlation) they are expected to occur three times in every two years.

The probability of a four standard deviation move in the two-state correlation model is more than 25 times that for the simple average correlation model. So instead of expecting to get a four-standard-deviation move once in every 62 years or so in the average correlation portfolio we expect to find a four-standard-deviation move in the two-state correlation portfolio once in every two and a half years.

The absolute value of these probabilities are likely to be much bigger if the distributions of the individual CTA portfolios are not normal and have high kurtosis (fat tails and a high peak around the mean).

Further Dangers of CTAs Ceasing to Trade

Earlier (see section entitled: **"The Extent of Control over the Portfolio's Investment Policy"**) we saw some of the dangers of CTAs ceasing to trade for part of a month. This danger is further exacerbated by two factors: (i) if the number of managers trading in a portfolio reduces, the variance of the portfolio will rise and (ii) the correlation among the remaining managers is likely to be higher as a common factor (the €/$ trend in our previous example) will tend to remove a group of managers with similar characteristics. So the variance of the portfolio of CTAs rises and the correlation among the remaining CTAs trading in the portfolio rises. Both of these events can be particularly bad for a portfolio of CTAs.

**Fiduciary Duties of CTA Portfolio Manager**
In some cases, the CTA portfolio manager may be a fiduciary. Fiduciaries owe more significant duties to their underlying investors than say, a wealthy private individual, investing in a fund of CTA managers. Where the CTA portfolio manager uses general CTA managers, he may find it difficult to defend a claim that he did not properly diversify or failed to manage exposures across strategies. As we pointed out in the previous section, each CTA in a portfolio of general CTAs may wind up weighting their portfolio towards a similar strategy, for example, a long position in €/$ during a strong trend in €/$. To some extent this is foreseeable but the concept becomes extremely vivid with the benefit of hindsight. The mere fact of allocating to a number of specialist CTA managers rather than general CTA managers would help to refute a claim that the portfolio was not diversified or that the risk control within the portfolio, at least in terms of all the CTAs in the portfolio becoming highly correlated in a crisis, was particularly poor.

**Competitive Positioning of the CTA Fund**
It would be easy for a potential investor in a fund of CTAs to argue that he could invest directly in a few general CTAs rather than in a fund of general CTAs and thereby avoid the extra layer of fees associated with the fund wrap. It is more difficult for a potential investor in a fund of specialist CTAs to put together a fund of specialist CTAs that are uncorrelated. This requires more research and portfolio construction skills and justifies the added layer of fees for the manager of the fund of specialist CTAs. In addition, investors in a fund of CTAs are likely to have less expertise in the evaluation of specialist strategies compared with simply relying on the idea of diversification as their form of risk management when investing in general strategies. Investors in a portfolio of specialist CTAs may place more value on (and agree to pay more for) the manager's skill.

**Maximising Sharpe Ratio**
According to a survey[6] of European Alternative Multimanagement Practices, Sharpe ratio maximisation seems to be "very important" or "important" as a quantitative indicator when monitoring the performance of alternative investment managers. This is quite amazing given the non-normal distribution of many CTA returns.

In view of this widespread and amazing practice, we too shall examine the implications of the correlations between different CTA strategies for Sharpe Ratio maximisation assuming that the CTA strategies returns are normally distributed.

The correlation between general CTAs is likely to be higher than that between specialist CTAs. Assuming the correlation between general CTAs is high and the manager of the fund of general CTAs is confident about the risk parameters[7] of the constituent CTAs, then the maximum gain in Sharpe ratio is limited to $1/\sqrt{\rho}$ times the Sharpe ratio of a single strategy. When $\rho$ is high the gain in Sharpe ratio is low. For example, if $\rho = 0.8$, the maximum gain in Sharpe ratio is about 12%.

[6] Edhec European Alternative Multimanagement Practices Survey, November 2003.
[7] For simplicity, we assume that all of the strategies in the equally-weighted portfolio have a common correlation, a common mean return and a common variance.

 

The correlation between specialist CTAs is likely to be lower than that between general CTAs. Assuming the correlation between specialist CTAs is low and the fund of general CTA managers is confident about the risk parameters of the constituent CTAs, then the maximum gain in Sharpe ratio is limited to $1/\sqrt{\rho}$. When $\rho$ is low the gain in Sharpe ratio is high. For example, if $\rho = 0.2$, the maximum gain in Sharpe ratio is about 124%.

**Professional Development of the Manager of the Fund of CTA Managers**
General CTAs are less likely to be able to offer the CTA portfolio manager the same depth of insight into different markets as specialist CTA managers.

Specialist strategies may give the manager of the portfolio of CTA managers more insights into the workings of the various markets.

Armed with such insights, the CTA portfolio manager may be able to identify the factors that cause shifts or changes in correlations between specialist strategies and therefore control his overall portfolio risk better than if he invested in a group of general CTAs.

**Exposure to a Common Risk Factor**
All of the general CTAs may decide to follow the same market or the same trade at the same time thereby increasing the risk of a portfolio of general CTA managers.

By contrast, a portfolio of specialist CTA managers has much better control over the range of strategies that are employed at any one time. This control helps to reduce the risk of the portfolio being exposed to a common risk factor.

**Intellectual Capital as the Core Competency of a CTA**
General CTAs tend to be more general investment managers with a good working knowledge of many strategies without significant intellectual capital in any one strategy.

By contrast, specialist CTAs are likely to have a significant edge in terms of intellectual capital in their specialist area.

**Ability to Assess Style Drift**
When a CTA can follow many markets with different strategies, it is difficult to assess style drift. Style drift can unbalance the correlation relations between managers and can increase the risk of the portfolio of CTA managers.

In the case of specialist CTAs, it is much more difficult for a manager to change his style or strategy as these are much more narrowly defined.

Distinct strategies chosen for their lack of correlation may be less likely to be correlated in a crisis.

**Risk Management**

Management of the risk of a portfolio of general CTAs is likely to be more difficult as it depends heavily on correlation stability between markets and strategies.

By contrast, risk management of a portfolio of specialist CTA is capable of being more sophisticated as the manager of the fund of CTAs as better control over the investment policy of his fund.

**Access to Specialist Commodity Trading Advisors**

Finding specialist CTAs in all of the different areas is not easy. For example, specialist CTAs in the metals area of the market tend to be fairly rare as most metal strategies might have a capacity constraint at around US$100m. Such a constraint means that few CTAs would find it economical to run a specialist metals portfolio as a stand-alone business. However, exposure to these specialist areas might be achieved by accessing CTA managers who specialise in a number of the smaller asset-sized strategies and who are prepared to manage money for clients on the basis of an allocation to just one of their specialist strategies.

The skill in finding such specialist CTA managers and developing access to them adds to the exclusivity of a fund of CTAs.

**Conclusion**

A portfolio of specialist CTAs has many advantages over a portfolio of general CTAs in terms of risk management, marketing and the meeting of fiduciary responsibilities.

 