

Alternative Viewpoints: “Higher Moment Betas”

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Most investors are familiar with the concept of beta. Beta gives us an idea of how the returns of a security are likely to act in the long run given the returns of the broader market (or the returns of a narrow slice of that market). But that definition assumes that both the security in question and the market in general have bell-shaped normal returns. Hedge funds tend not to fit neatly into this model. Instead, they are positively or negatively skewed and tend to have “fat tails”. So now researchers have come up with new betas that measure how one asset’s variance, skewness and kurtosis (tail-sizes) react to the variance, skewness and kurtosis of other asset classes. In our monthly spot featuring the thoughts of a [CAIA Association](#) member, Mikael Haglund of Altevo Research tells us about how to use these “higher moment betas”.



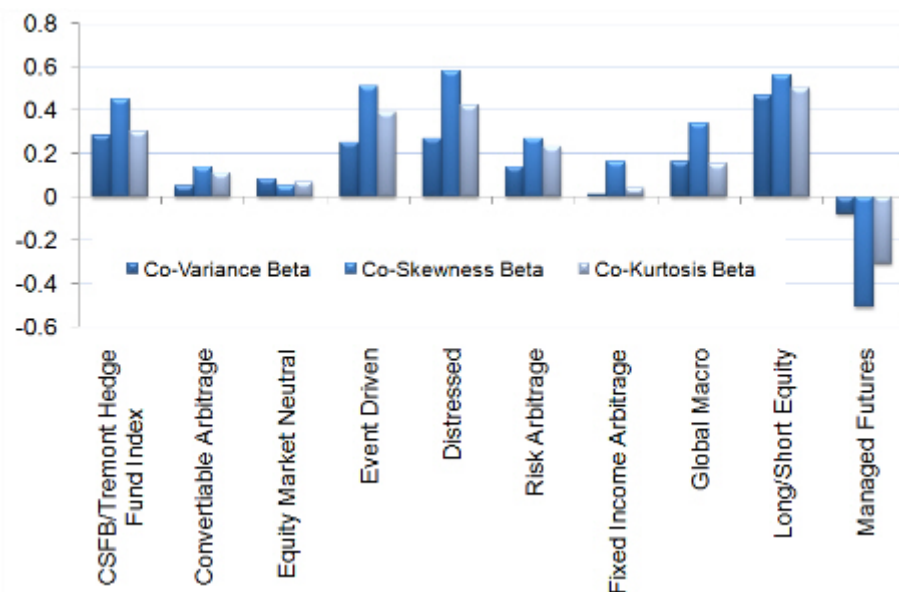
Special to AllAboutAlpha.com by: Mikael Haglund, CAIA, Founder, [Altevo Research](#)

Traditionally, the CAPM and the mean-variance asset allocation approach have been the standard ways of constructing portfolios. But implementing a similar approach is problematic when hedge funds are included. Numerous studies have shown that the returns for different hedge fund indexes display non-normal return distributions when longer time frames are studied. Therefore, working with a framework that assumes asset returns are normally distributed can over- or under-estimate downside risks and lead to suboptimal portfolio allocations.

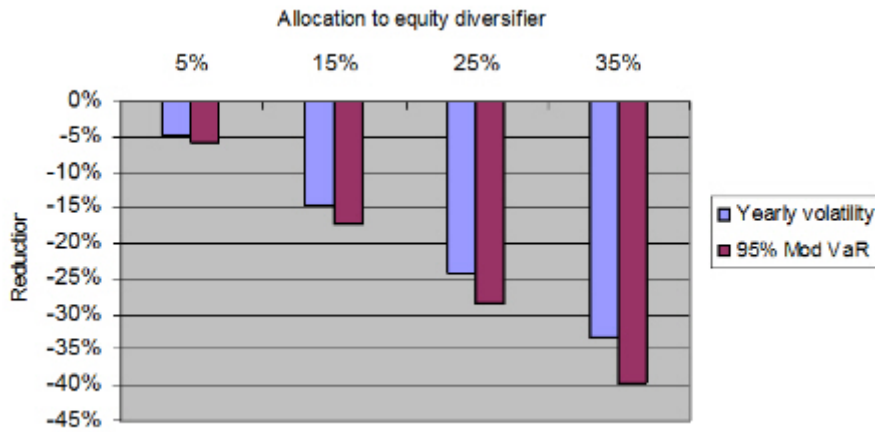
The standard deviation used as a measure of risk in traditional asset allocation techniques only measures deviations from the mean and puts equal weight to positive and negative deviations from that mean. However, usually preferences are asymmetrical. The utility derived from a positive result is often less than that derived from a negative result of equal magnitude. One way of accounting for this preference structure and for the non-normal distributions of hedge funds is to use “higher moment betas” in the portfolio construction process.

Higher co-moment diversification benefits include a marginal reduction in portfolio variance, skewness and kurtosis, and can therefore help determine the appropriate hedge fund strategies to include in a portfolio. The overall aim here is to reduce not just the volatility, but the downside risk of the portfolio.

To determine which of the sub indexes that is suitable to use as equity diversifier for the equity part in a traditional portfolio of stocks and bonds we calculate the higher moment betas (for details on how to calculate these measures, see our [white paper](#) on the topic available at the Altevo Research website).

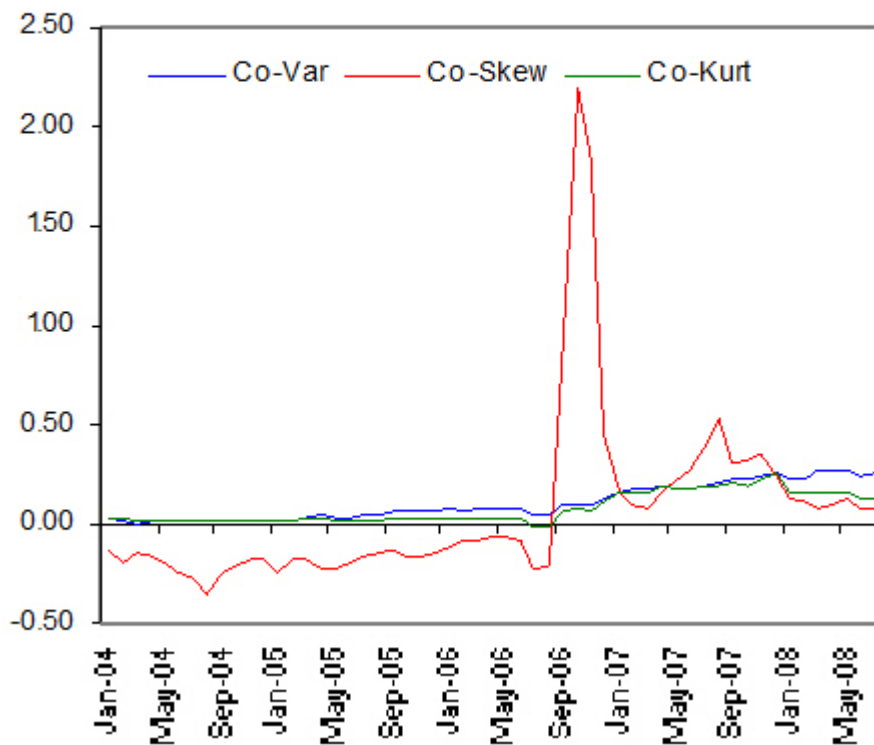


Due to the negative skewness seen in MSCI World, we would want to look for a value below 1 in all the higher moment betas presented in this chart. This would indicate higher moment diversification benefits. As you can see in the chart, Managed Futures, Fixed Income Arbitrage, Equity Market Neutral and Convertible Arbitrage demonstrate the best values of higher moment diversification benefits. So we use these sub-indices to construct the optimal diversifier for our long-only (MSCI World) portfolio. When we add progressively more of the diversifier to the long-only portfolio, the result is marked improvement not only in volatility, but also in “Modified Value at Risk”, a measure that also takes into account skewness and kurtosis.



As we all know, hedge funds have had a tough time during the current credit crisis and Convertible Arbitrage is one of the strategies that suffered the most. So we thought it would be useful to examine how the higher moment diversification benefits of Convertible Arbitrage have developed during the recent crisis. As you can see in the chart below, the diversification benefits on extreme risks of including CSFB/Tremont Convertible Arbitrage hedge fund index in an equity portfolio have indeed decreased somewhat (the higher moment betas have risen) but the strategy still demonstrates significant positive diversification effects (higher moment betas remain well below 1.0).

24-month rolling higher moment betas for Convertible Arbitrage against MSCI World



As you can see, accounting for non-normal return distributions in the portfolio construction process can create more stable portfolios and limit the large drawdowns often seen in traditional equity portfolios during bear market periods. This is especially appealing for investors with defined liabilities, e.g. pension funds, where it can result in a better match between assets and liabilities and thereby limit the risk of the pension plan being under-funded due to decreasing asset values.

- M. Haglund, August 25, 2008

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