

# SHARED THINKING IN PURSUIT OF POSITIVE SKEW



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There are significant benefits to steering portfolios towards an improved skew in their profile of returns.

Positively skewed returns, when attained, are an appealing feature of systematic strategies. In this note, we examine CTA performance data for evidence of the positively skewed returns to which these funds aspire. We argue that the recent string of exceptions to value-at-risk (VaR) risk measures for such strategies raises questions about crowding in this space – and the risk that deeper-than-anticipated drawdowns may be lurking for investors.

Let us start with the concept of positive skew. When the frequency of extremely positive returns exceeds that of extremely negative returns, the returns have positive skew. The coefficient of skewness is a standardised measure of skew. It is independent of both the mean and volatility of returns – so skew does not in itself tell us about the Sharpe ratio. Conversely, the Sharpe ratio does not tell us about the skew in returns, a commonly recognised weakness of this measure of alpha.

The skew of returns for an investor will depend on the skew of the individual assets traded, the way these positions are combined and the way their resulting risk is managed. Because skew is related to the extremes (or ‘tails’) of a distribution, it is difficult to estimate the true skew of returns accurately, given the limited time series available in financial markets.

In table 1, we show the estimated coefficient of skewness for major futures contracts based on daily

returns in the past five years, alongside a 90% confidence interval for the true skewness (by resampling the data). The table shows how difficult it is to achieve a positively skewed position by using long-only positions in the major asset classes. These confidence intervals are admittedly very wide, reflecting the limited data set of around 1,300 trading days. We could tighten the intervals by adding older data, but such data are of declining relevance to current market conditions, so this step would not necessarily increase our convictions.

“Investors are likely to benefit from better diversification if fund managers can steer their portfolio towards an improved skew in the profile of returns”

## VAR EXCEPTIONS

Modern portfolio management practice relies on other difficult-to-estimate measures of risk, such as volatilities, correlations and VaR. These quantities may also vary over time. While skew may be equally challenging to estimate, we believe seeking to do so is every bit as worthwhile for investors if their asset managers are able to manage skew risk. This is particularly true for absolute return funds that are able to take short positions in assets, turning negatively skewed returns positive.

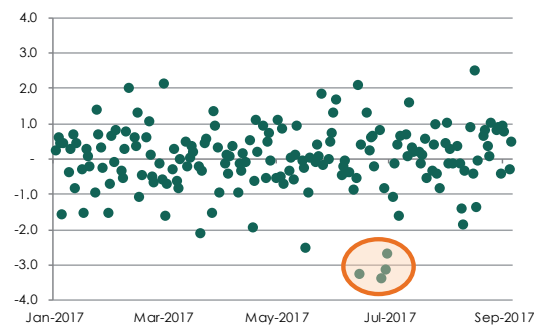
We now turn to CTA sector data to check for evidence of positive skew, analysing daily returns for the SG CTA Index. Figure 1 plots returns for the year to date, standardised by their rolling one-year volatility. This simple z-score for daily returns serves to isolate the days where a conventional VaR model with a one-year window may have failed. These ‘VaR exceptions’ will occur, but if they are more frequent than the VaR model itself expects, then it may be due to unfavourable skew. We have highlighted the four exceptions in the 12 trading days between 15 and 30 June. Investors should be wary of clusters of negative daily returns in the left tail, since these lead to deeper drawdowns than would be the case if such losses were to occur evenly through time. This is particularly true if strategy crowding causes other funds to experience drawdowns at the same time. Under this scenario, investors – who typically have daily liquidity in their CTA investments – may take fright and cause these strategies to deleverage

TABLE 1

Futures contract	Skewness	90% confidence interval
EURUSD	0.1	(-0.2, +0.4)
GBPUSD	-2.4	(-4.6, +0.1)
JPYUSD	0.3	(-0.1, +0.7)
10-year US Treasury note	-0.2	(-0.4, +0.1)
S&P 500 E-mini	-0.5	(-1.0, -0.1)
WTI crude oil	0.1	(-0.2, +0.4)
CME gold	-0.8	(-1.8, +0.2)
CME wheat	0.2	(0.0, +0.4)

Source: Bloomberg/OMGI as at 19/09/2017.

FIGURE 1 SG CTA INDEX DAILY RETURNS STANDARDISED BY THEIR 1-YEAR VOLATILITY



Source: Bloomberg/OMGI as at 19/09/2017.

simultaneously. As a result, a fire sale of positions will likely exacerbate the drawdown.

In figure 2, we zoom out from the year to date to the last 10 years. Here we see the cluster of four large losses in the second half of June 2017 hardly shows up on a plot of the skewness of daily returns. The 90% confidence intervals, therefore, show strong evidence of negative skew for daily returns for the SG CTA Index using a rolling five-year window.

## MONTHLY RETURNS SHOW IMPROVED SKEW

Fortunately fund managers are able to draw on various techniques from the alchemy of risk management to transmute negatively skewed daily returns into positively skewed month returns.

Stop losses on positions should mitigate clusters of negative returns and so limit the depth of drawdowns. The trend-following systematic investment style, still dominant in the CTA sector, has embedded stop losses.

Risk parity is a technique used by fund managers to diversify efficiently risk across asset classes as well as across time. The aim is to maximise the chance of offsetting extreme losses with gains in the

tails of the daily returns distribution, to diversify away negative skew. Successful application of risk parity relies on the effective estimation of future volatilities and correlations for the assets traded.

Figure 3, which details the five-year rolling monthly returns for the SG CTA Index, suggests that skewness of the monthly returns is indeed less negative than daily returns. This supports the case that CTA fund managers are able to improve the skew of daily returns through these portfolio-management techniques.

These charts appear to show a trend of increasingly positive skew in both daily and monthly returns. There is cause for caution here, though, because this trend is partly the result of increased use of techniques such as risk parity, meaning trading may become more synchronised – involving crowding in risk-management techniques that may ultimately decrease their efficiency.

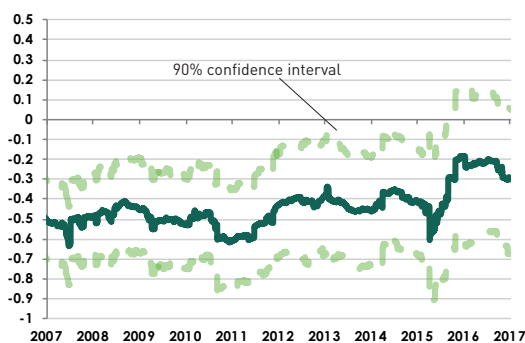
### DEPTH OF DRAWDOWNS

We believe that effective estimation of future skewness in asset returns can allow a fund manager to further enhance returns. Imagine the typical CTA manager had an average Sharpe ratio but good foresight into the skewness of future daily returns. Let us consider what this would achieve for investors, specifically the depth of drawdowns and the correlation of returns with broader hedge fund strategies. Figure 4 explores this ambitious scenario, analysing daily observations of the one-year rolling Sharpe ratio and coefficient of skewness for SG CTA Index daily returns since 2000.

These observations are split in half: an orange set of 2,175 daily observations with skew below the median one-year skew of and a green set of 2,175 days above the median skew. The labels on the chart show that the more favourable skew days have slightly higher alpha (0.62 vs 0.57); shallower one-year maximum drawdowns (-7.3% vs -8.1%); and a lower correlation with broad hedge fund sector returns, using the HFRX Global Hedge Fund Index (+22% vs +36%).

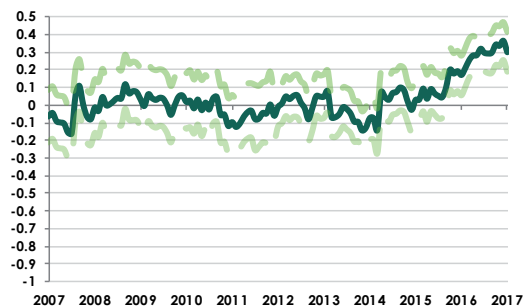
One could argue that we should not in general expect a greater Sharpe ratio for the superior skew subset, since this measure of alpha is independent of the coefficient of skewness. Even if we control for this, equalising the Sharpe ratio of both subsets by nudging the returns and standard deviations of each set to the same level, we still find that half of the data with superior skew has a 0.2% shallower drawdown.

**FIGURE 2 SG CTA INDEX: 5-YEAR ROLLING HISTORICAL SKEW, 1 SEPTEMBER 2007 TO 1 SEPTEMBER 2017**



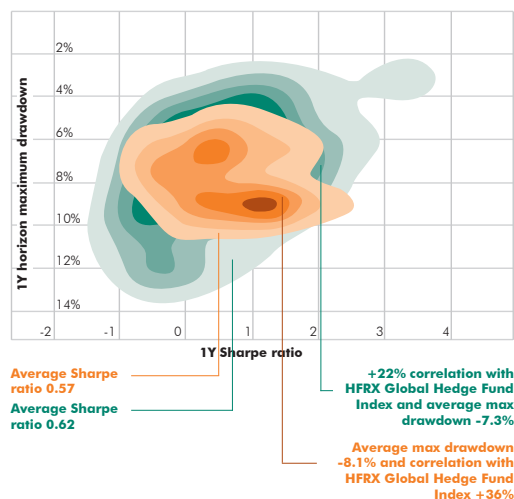
Source: Bloomberg/OMGI as at 19/09/2017.

**FIGURE 3 SG CTA INDEX: 5-YEAR ROLLING HISTORICAL SKEW, 1 SEPTEMBER 2007 TO 1 SEPTEMBER 2017**



Source: Bloomberg/OMGI as at 19/09/2017.

**FIGURE 4 DENSITIES OF <MEDIAN SKEW (ORANGE) AND >MEDIAN SKEW (GREEN) SUBSETS OF SG CTA INDEX DAILY RETURNS**



Source: Bloomberg/OMGI as at 19/09/2017.

To put this in perspective, the annualised daily returns volatility of the SG CTA Index is 8.1%. We can estimate the statistical significance of this difference using a bootstrap simulation study. We re-sample all the daily returns and find that this 0.2% difference corresponds to the 60th percentile of the distribution of the difference. Alternatively put, there is a 40% probability that skew actually plays no role in the maximum drawdown; checking the second largest drawdown, or any rank drawdown in the one-year window up to the 50th largest, gives similar results.

While the case for using skew to reduce maximum drawdowns needs further data to be fully substantiated, the lower correlation with the broad hedge fund returns has much higher statistical significance. A simulation study we have conducted shows there is only a 3% chance that this lower correlation of the superior skew set of returns is purely due to chance and a limited sample size.

### MANAGING SKEW

In this note, we have presented evidence that investors are likely to benefit from better diversification and possibly less extreme drawdowns if fund managers can steer their portfolios towards an improved skew in the profile of returns. We are not suggesting investors should abandon negatively skewed strategies or assets – these may well offer higher returns to compensate for the inferior skew. Rather, we believe investors should ask their hedge fund managers how they manage skew risk in the portfolio. Alternatives to VaR-type risk measures, such as those based on expected shortfall, may help uncover negative skew lurking in the returns.

Skewness is certainly a difficult quantity to estimate, but in our view, managers who seek only to maximise the Sharpe ratio or win rate on their trades are missing an important trick.

For further information, please contact [institutional@omglobalinvestors.com](mailto:institutional@omglobalinvestors.com)



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