# CTA Common Denominator Index

## An investible benchmark index for the CTA and managed futures industry

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## Abstract

During the summer 2014, we conducted a survey to establish *"The Common Denominators in the CTA and Managed Futures Industry".* The survey was sent to over 3,500 financial industry practitioners globally and we received 51 (1.5%) responses. The survey was conducted from 17th June 2014 until 11th July 2014 by the Nanyang Technological University in Singapore and supported by J8 Capital Management LLP in London.

This article is the final article in a series of three articles. The first article presented the most popular markets traded by the CTA Industry. The second article presented the results on what are the most popular ways to construct a portfolio and fee structures in the CTA industry. This final article presents an investible index based on these survey findings.

The full survey report and the full index development will be published in forthcoming issues of the Journal of Index Investing with the Institutional Investor Journals.

## The CTA Common Denominator Index - a new CTA benchmark

The survey found that the CTA may be generalized in trading a diversified portfolio of popular global markets driven my momentum or trend following in a risk-weighted portfolio, managed to a target volatility and applying a 2/20 fee structure.

We apply these survey findings and create a new index. The CTA Common Denominator Index (CTACDI) is derived from these survey results to establish the common denominators in the CTA and managed futures industry. It may serve investors as an investible and fair representation of the CTA and managed futures industry and allow them to gain exposure to CTA-like returns through a formulaic

investment process. We show that the CTACDI mimics popular CTA and managed futures benchmark indices.

The objective is not to outperform the industry nor to introduce other enhancements or optimizations but to deliver a fair representation of the industry, only.

## THE CTA COMMON DENOMINATOR INDEX

To construct an investible benchmark index, we borrowed from established index methodologies such as the S&P Goldman Sachs Commodity Index [2014] and S&P Index Mathematics [2014]. In our full paper on this index construction we demonstrate in detail how we define underlying rolling long or short future indices based on the SPGSCI methodology and use sensitivity analysis to determine robust parameterization for momentum look-back period, signal observation frequency, portfolio rebalancing frequency, the look-back period of volatility measures used in risk parity and target volatility calculations, and portfolio weighting mechanism. In this article, we present the summary building blocks only.

### Markets

The survey participants were asked to select the most relevant markets for CTAs and managed futures managers to trade in. The top 7 ranking markets each represent one of the core asset classes of equity indices, commodities, currencies, government bonds, and interest rates and within commodities the 3 most relevant commodity sectors of energy, precious, and industrial metals (Exhibit 1). We accept these top 7 markets as representative constituents of the wider global market spectrum and include these seven markets in the CTACDI.

| Number of ticks | Market | Asset class |
|---|---|---|
| 49 | S&P 500 | Equity index future |
| 48 | Euro FX | Currency future |
| 46 | Gold | Commodity future - precious metal |
| 45 | Copper | Commodity future - industrial metal |
| 44 | Eurodollar | Interest rate future |

| | | |
|---|---|---|
| 43 | WTI Crude Oil | Commodity future - energy |
| 41 | 10yr US Treasury Note | Government bond future |

*Exhibit 1 : Top 7 most relevant markets included in the CTA Common Denominator Index.*

For each market, we the calculate rolling excess return indices.

Trade signal calculation and implementation

The survey participants chose "momentum or trend following" as the most popular return engine. In creating the momentum return engine for the CTACDI, we chose a 12 month look-back period for a simple price return calculation to derive the trading signals. The trading signal *S(t)* is calculated daily on the close of the markets. The signal is then implemented on that close and becomes effective for the next day's return.

The signal dictates to enter into a long position if the 12 month momentum is positive and a short position otherwise. The 12 month momentum is calculated by dividing the current underlying index value over the value 12 months ago and subtracting 1 from the quotient. The signal is then applied to the next day's returns. If there is no change in signal, the previous day's position is kept unchanged.

The index is always invested in the markets and zero or neutral positions are not possible.

Portfolio construction

The survey confirmed risk parity as the most common "risk or asset allocation" method among CTAs and managed futures programmes.

The concept of risk parity stems from Bridgewater’s All Weather allocation principles first established in 1996. It allocates more capital to less volatile and less capital to more volatile markets. It is inverse volatility weighted.

In risk parity, we calculate every month the inverse 90 day volatilities of the underlying markets and then weigh each market proportionally. Leverage is applied on the portfolio returns.

Money management

The survey found that using a target volatility mechanism is the most common way to manage money in the CTA and managed futures industry. Leverage in the portfolio is decreased in volatile markets and increased in less volatile markets as measured by realized volatility versus target volatility.

Leverage is increased or decreased proportionally to the ratio of target over realized volatility. The leverage is also managed monthly only at the same point in time the risk parity portfolio weights are applied.

The target volatility for the CTACDI is set at 5% as it produces a good mimic of other CTA benchmark indices.

Embedded interest, costs and fees

The survey set the band for the most common management fee between 1.5 and 2% per annum and for the high water mark performance fee between 15 and 20%. For the CTACDI, we calculate the embedded fees daily accruing with management of fee 2% per annum and a high water mark performance fee of 20%.

The index calculation includes interest earned on cash. It is calculated as the daily returns on 90 day US Treasury Bills and the AUM. We use the same formula and methodology as provided by S&P GSCI$^{R}$ [2014] for the Total Return Index calculation.

The T-Bill returns were added to the excess returns. Then we subtracted trading costs, management fees and performance fees from the total returns.

In Exhibit 2, we assumed following trading costs and slippage per annum and markets before leverage:

| Asset Class | Commodities | Equities | Rates | Currencies | Gov't Bonds |
|---|---|---|---|---|---|
| Cost (basis points) | 25 | 25 | 10 | 10 | 10 |

*Exhibit 2: Cost and trading slippage assumptions per asset class*

## Performance comparison to other benchmark indices

In determining if the resultant index is a "good and fair" representation of the CTA and futures industry, we compare the time series against three popular but not investible benchmark indices: Barclay CTA Index, Newedge CTA Index, and Credit Suisse Managed Futures Index.

We find that, with 95% confidence, the CTACDI correlates with popular CTA and managed futures indices between a lower bound of 0.47 and upper bound 0.69 (Exhibit 3).

| | | 95% confidence interval | |
|---|---|---|---|
| | correlation | lower bound | upper bound |
| Barclay CTA | 0.58 | 0.47 | 0.67 |
| Credit Suisse Managed Futures | 0.61 | 0.51 | 0.69 |
| NewEdge CTA | 0.59 | 0.48 | 0.68 |

*Exhibit 3: Correlation between CTACDI and 3 other popular benchmark indices.*

Exhibit 4 shows the CTACDI time series to mimic popular CTA and managed futures indices.

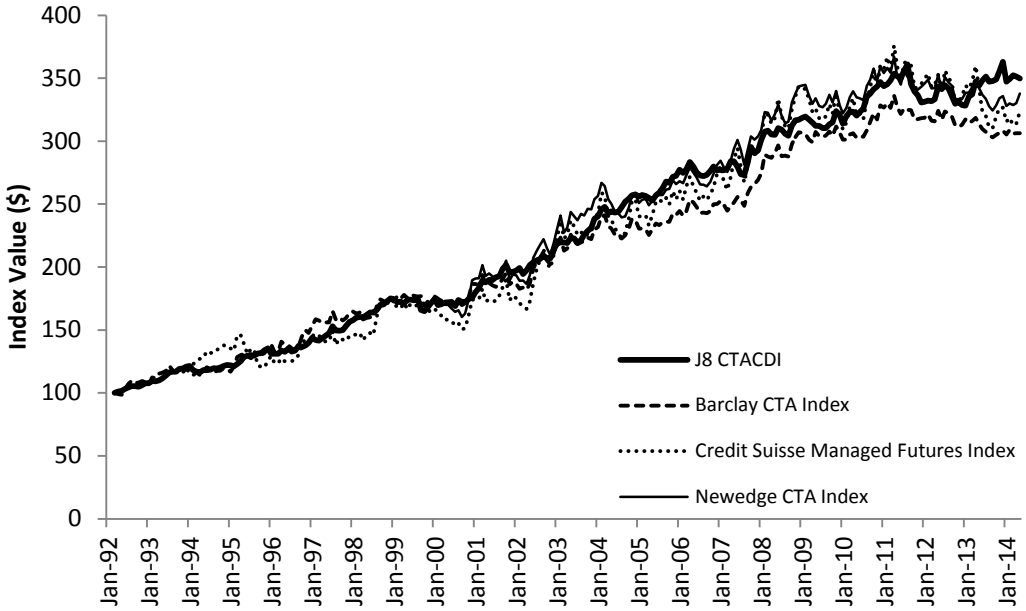


*Exhibit 4*: *Simulated historical performance of the CTACDI with popular CTA benchmark indices, starting March 1992 until June 2014 with Barclay CTA Index starting March 1992, Credit Suisse Managed Futures Index starting end December 1993 and rebased to the CTACDI value on that day, and NewEdge CTA Index starting end December 1999 and rebased to the CTACDI value on that day. Source: Capital Management LLP and Bloomberg LP. Note: Past performance is not indicative for future performance.*

Exhibit 5 compares the historical performance statistics of the CTACDI with popular benchmark indices.

| | CTACDI | NewEdge CTA | Barclay Trader CTA | Credit Suisse Managed Futures Index |
|---|---|---|---|---|
| Annualized Returns | 5.42% | 4.61% | 4.69% | 4.94% |
| Annualized Volatility | 4.78% | 8.63% | 7.74 | 11.52 |
| Negative Month Volatility | 2.94% | 4.58% | 3.88% | 6.58% |
| Sharpe Ratio (0) | 1.13 | 0.53 | 0.60 | 0.42 |
| Sortino Ratio (0) | 1.8429 | 1.0055 | 1.2084 | 0.7509 |
| Max Drawdown | -9.27% | -11.63% | -10.10% | -17.74 |
| Max Drawdown Length [months] | 33 | 37 | 37 | 37 |
| Average length of 5 Largest DD [months] | 16 | 18 | 21 | 25 |
| Skew | -0.17 | 0.20 | 0.54 | 0.02 |
| Kurtosis | 0.54 | 0.64 | 1.08 | -0.01 |
| Profitable Months | 64% | 56% | 53% | 55% |

*Exhibit 5: Historical performance statistics of the CTACDI (starting April 1992), Barclay CTA Index (starting APR 1992), Newedge CTA Index (starting January 2000), and Credit Suisse Manages Futures Index (starting January 1994).*

The CTACDI index exhibits significantly higher risk adjusted returns than its non-investible peers, and shows lower and shorter drawdown periods.

## Conclusions

We set out with a survey to establish the common denominators in the CTA and managed futures industry and we discovered a simple investible method to mimic the industry. The CTA Common Denominator Index is derived from the core principles practitioners use in the industry. This minimalistic but "democratic" index trades seven core futures markets of the S&P 500, Euro, Gold, Copper, WTI Crude Oil, Eurodollar, and 10yr US Treasury Note only. It applies risk parity for portfolio construction and target volatility for money management. Cash is compounded at the risk-free rate of 90 day US T-Bills and it embeds assumed trading costs and slippage and also applies a common 2/20 fee structure.

The findings lead us to conclude that the CTA and managed futures industry by far and large may be described as a low-to-medium frequency momentum or trend following industry, trading global liquid markets only in a risk weighted portfolio, managed to a target volatility.

Coincidentally, we found that the CTACDI also seems to mimic the movements of those popular but non-investible CTA and managed futures benchmark indices. Therefore, the CTACDI may not only serve as a new benchmark index for the industry but also be used in investment products to gain exposure to CTA like returns.

## References and recommended readings

Baltas, A.-N., Kosowski, R. “Momentum Strategies in Futures Markets and Trend-following Funds.” Imperial College Business School, 2012

Bridgewater. “The All Weather Story” http://www.bwater.com/Uploads/FileManager/research/All-Weather/All-Weather-Story.pdf

Chen, Hui Yi. Sachs, Tillmann. Tiong, L.K. Robert. "Common denominators in the CTA and managed futures industry - a survey report." Journal of Index Investing, Institutional Investor Journals, 2014 forthcoming.

Faith, Curtis M. The Way of the Turtle. McGrawn-Hill, 2007.

Gorton, Gary B. Hayashi, Fumio. Rouwenhorst, K. Geert. "The Fundamentals of Commodity Futures Returns." 2012.

Gorton, Gary B. Rouwenhorst, K. Geert. "Facts and Fantasies about Commodity Futures." Yale ICF Working Paper No. 04-20, 2005.

Moskowitz, Tobias. Ooi, Yao Hua., Lasse H. Pedersen. "Time Series Momentum." [2010]

Narang, Rishi K. Inside the black box. John Wiley & Sons, Inc., 2013.

Du Plessis, Johan. Demystifying Momentum: Time-series and cross-sectional momentum, volatility and dispersion. Master's thesis. University of Amsterdam, Amsterdam, 2013

S&P Dow Jones Indices. S&P GSCI$^{R}$ Methodology. McGraw Hill Financial. May 2014.

S&P Dow Jones Indices. Index Mathematics, Methodology. McGraw Hill Financial. March 2014