What are the Sources of Return for CTAs and Commodity Indices? A Brief Survey of Relevant Research

October 2015

Hilary Till
Research Associate, EDHEC-Risk Institute
Principal, Premia Research LLC

EDHEC BUSINESS SCHOOL

Abstract

This survey paper will discuss the (potential) structural sources of return for both CTAs and commodity indices based on a review of empirical research articles from both academics and practitioners. The paper specifically covers (a) the long-term return sources for both managed futures programs and for commodity indices; (b) the investor expectations and the portfolio context for futures strategies; and (c) how to benchmark these strategies.

This paper is based on the lecture, "What are the Sources of Return for CTAs and Commodity Indices? A Review of the Historical Literature." This lecture was delivered at a symposium on "How Should We Measure Futures Investment Performance?" This symposium, in turn, was hosted by the University of Illinois at Urbana-Champaign's Department of Agricultural and Consumer Economics, and it took place on October 12, 2015 at the Illini Center in Chicago. (The slides for this lecture are available at: http://www.edhec-risk.com/events/other_events/Event.2015-10-01.2703/risk_event_view.pt?printable=1.)

Research assistance from Katherine Farren, CAIA, of Premia Risk Consultancy, Inc. is gratefully acknowledged.

Structural Sources of Return

In the academic literature, one can find strong evidence – historically at least – for there being persistent returns in futures programs due to momentum, roll yield, and also due to rebalancing. This is actually the case across asset classes, and not just for commodity futures contracts. Each of these return sources will be covered in succession.

Momentum

Although there are two basic types of CTAs, discretionary and trend-following, the investment category is dominated by trend-followers. "[M]ore than 70% of managed futures funds [are estimated to] rely on trend-following strategies," noted Campbell & Company (2013). In a 2012 AQR Capital Management white paper, the firm showed how persistent momentum profits have been across time and across asset classes. This is illustrated in Figure 1.

Figure 1: Hypothetical Performance of Time Series Momentum

Strategy performance after simulated transaction costs both gross and net of hypothetical 2-and-20 fees.

Time Period	Gross of Fee Returns (Annualised)	Net of 2/20 Fee Returns (Annualised)	Realised Volatility (Annualised)	Sharpe Ratio, Net of Fees	Correlation to S&P 500 Returns	Correlation to US 10-year Bond Returns
Full Sample:						
Jan 1903 - June 2012	20.0%	14.3%	9.9%	1.00	-0.05	-0.05
By Decade:						
Jan 1903 - Dec 1912	18.8%	13.4%	10.1%	0.84	-0.30	-0.59
Jan 1913 - Dec 1922	17.1%	11.9%	10.4%	0.70	-0.12	-0.11
Jan 1923 - Dec 1932	17.1%	11.9%	9.7%	0.92	-0.07	0.10
Jan 1933 - Dec 1942	9.7%	6.0%	9.2%	0.66	0.00	0.55
Jan 1943 - Dec 1952	19.4%	13.7%	11.7%	1.08	0.21	0.22
Jan 1953 - Dec 1962	24.8%	18.4%	10.0%	1.51	0.21	-0.18
Jan 1963 - Dec 1972	26.9%	19.6%	9.2%	1.42	-0.14	-0.35
Jan 1973 - Dec 1982	40.3%	30.3%	9.2%	1.89	-0.19	-0.40
Jan 1983 - Dec 1992	17.8%	12.5%	9.4%	0.53	0.15	0.13
Jan 1993 - Dec 2002	19.3%	13.6%	8.4%	1.04	-0.21	0.32
Jan 2003 - June 2012	11.4%	7.5%	9.7%	0.61	-0.22	0.20

Source: Hurst et al. (2012), Exhibit 1.

AQR constructed a simple momentum strategy as follows. They created "an equal-weighted combination of 1-month, 3-month, and 12-month momentum strategies for 59 markets across 4 major classes – 24 commodities, 11 equity indices, 15 bond markets, and 9 currency pairs – from January 1903 to June 2012", explained Hurst el al. (2012).

Excerpting further from the AQR authors' white paper: "Since not all markets have return data going back to 1903, … [they constructed] the strategies using the largest number of assets for which return data exist[ed] at each point in time." They used "futures returns when … available." And then "[p]rior to the availability of futures data," they used "cash index returns financed at local short rates for each country" as proxies for futures returns. Each position was sized to "target the same amount of volatility" and "positions across the three strategies … [were] aggregated each month, and scaled such that the combined portfolio … [had a] volatility target of 10%."

Figure 1 shows that "[t]rends appear to be a pervasive characteristic of speculative financial markets over the long term." The AQR authors theorised that "price trends exist in part due to long-standing behavioural biases exhibited by investors, such as anchoring and herding, as well as the trading activity of non-profit seeking participants, such as central banks and corporate hedging programs." Assuming these factors continue, the long-term profitability from momentum strategies might also continue, and not just be a matter of history.

For further long-term evidence that momentum might be a structural characteristic of markets, one can consider a recent Federal Reserve Bank of Chicago working paper on equities that examined the profitability of momentum strategies in late Victorian-era England and during most of the past eight-and-half decades in the United States. Chabot et al. (2014)'s particular momentum strategies "earned abnormally high risk-adjusted returns ... between 1927 and 2012 [amongst U.S. equities] and [also] ... between 1867 and 1907 ... [amongst English equities]."

"However, the ... strategy also exposed investors to large losses ... during both [historical] periods," noted the Federal Reserve Bank of Chicago paper. Interestingly, "[m]omentum ... [losses] were [apparently] predictable". In both historical periods, losses were "more likely when momentum recently performed well." For the 1867 to 1907 period, losses were more likely when "interest rates were relatively low." And for the 1927 to 2012 period, losses were more likely when "momentum had recently outperformed the stock market". Each of these periods were "times when borrowing or attracting return chasing 'blind capital' would have been easier." The authors argue that the periodic large losses, associated with the strategy plausibly becoming too popular, "play an important role in sustaining" the momentum strategy's historical returns.

The Federal Reserve Bank of Chicago paper raises the question that a sizeable fraction of investors might not capture the documented, historical (but hypothetical) returns of momentum strategies since they may only enter the strategy after it has done well and then exit it once it has performed poorly. This explains why a strategy can potentially continue to exist, even if well known: investors may not be able to tolerate the periodic interim drawdowns, especially if they do not have a firm grasp on why a black-box strategy should be profitable.

Roll Yield

In addition to momentum, the empirical literature also documents that "roll yield" can be considered a structural source of return, at least over long periods of time. A 2014 Campbell & Company white paper attempted to demystify roll yield. Futures returns "and spot returns on the same underlying asset often diverge, and the magnitude of this divergence is known as the futures 'roll yield' ", according to Campbell & Company (2014).

Excerpting further from the Campbell & Company white paper: "The cumulative impact of roll yield can be quite significant, in some cases being similar in magnitude to the entire gain or loss an investor experiences over the lifetime of a trade." In summary, "the roll yield represents the net benefit or cost of owning the underlying asset beyond moves in the spot price itself." "[T]he spot return and roll yield together comprise the total return experienced by an investor (net of financing costs.)" Figure 2 shows the "benefits and costs relevant to selected asset classes." For each asset class, the roll yield can be arrived at by deducting the cost of holding the asset from its benefit.

Figure 2: Benefits and Costs of Holding Selected Asset Classes

Asset Class	Benefits	Costs
Bonds	Current Yield (Bond Coupon) [1]	Financing Rate
Currencies	Foreign Deposit Rate	Local Deposit Rate
Stocks	Dividend Yield	Financing Rate
Volatility	Hedging Against Increases in Volatility*	Insurance Premium*
Commodities	Convenience Yield*	Storage; Transport; Insurance; Financing Rate

** Non-cash flow terms*
1 - In fixed income markets, there is an additional component to returns called the yield curve "rolldown" (unrelated to futures roll yield) which occurs over time as the bond cash flows experience different points along the yield curve.
Source: Campbell & Company, (2014), Exhibit 3.

This net benefit or net cost shows up in an asset class' futures curve. If there is a net benefit to holding the commodity, then a futures contract will be priced at a discount to the asset class' spot price, reflecting this benefit. Correspondingly, if there is a net cost to holding the commodity, then a futures contract will be priced at a premium to the asset class' spot price, reflecting this cost. One can also think of these discounts and premiums as positive carry and negative carry, respectively.

While returns due to highly volatile spot-price changes may dominate performance-attribution calculations in the short-term, returns due to roll yield (or carry) increase in importance over long time frames. For example, Campbell & Company (2013) described a proprietary trend-following benchmark, in which they calculated returns from 1972 through November 2012, and which included a selection of equity, fixed income, foreign exchange, and commodity markets. Over this 40-year period, approximately half of the benchmark's cumulative performance was due to spot return, and the other half was due to roll yield. This particular calculation excluded the impact of interest income. So clearly investors should pay attention to roll yield.

Returning to the table in Figure 2, which shows the benefits and costs of holding selected asset classes, "[f]or financial assets, these represent actual cash flows, while other assets may have non-cash flow costs and benefits [such as] the convenience yield in the case of commodities." The "convenience yield [in turn] reflects the benefits to holding a physical commodity, which tends to be more valuable when inventories are low or shortages are expected."

For commodity traders, grasping the importance of the convenience yield is quite important. We can refer to roll yield as the net convenience yield; i.e. the benefit of holding the commodity netted against its costs. Paying attention to the net convenience yield, or roll yield, is useful over short horizons and separately, over long horizons. Over short horizons, given that the roll yield increases during times of shortage, this factor provides a useful price proxy for fundamental data that can be used as a timing indicator for positions in a particular commodity market. That is, one would only go long a particular commodity futures contract, if one has an indication of scarcity. An example of using roll yield as a short-horizon timing indicator is provided in a later section of this paper.

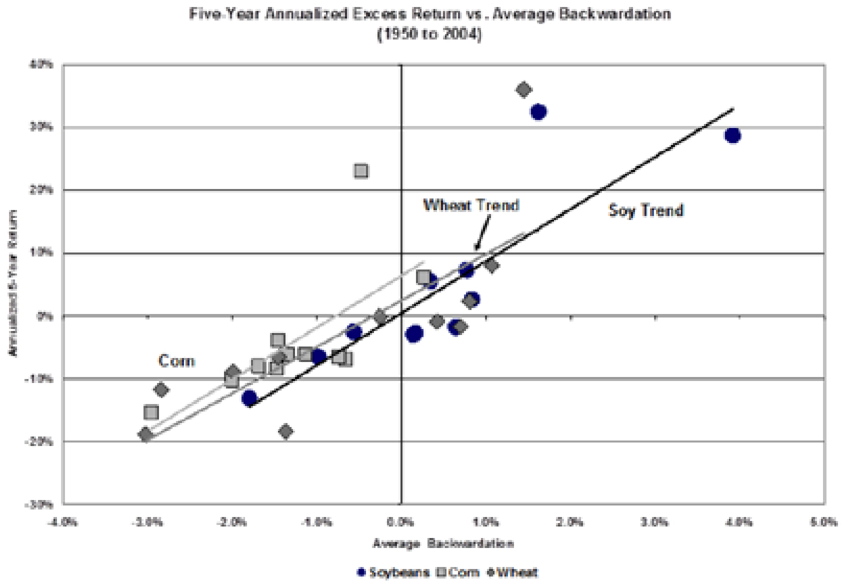
Over long horizons, the roll yield is important for commodity futures contracts. This is because of another structural feature of commodity markets: mean reversion. As noted in Geman (2005), "commodity prices neither grow nor decline on average; they tend to mean-revert to a level which may be viewed as the marginal cost of production. This has been evidenced a number of times in the literature … [for both] agricultural … and … energy commodities. Hence, mean-reversion is one of the main properties that has been systematically incorporated in the literature on commodity price modeling."

If a commodity has a tendency over long enough timeframes to mean-revert, then by construction, returns cannot be due to a long-term appreciation (or depreciation) in spot prices. In that case, over a sufficient time frame, the futures-only return for a futures contract would have to basically collapse to its roll yield. Can we observe this historically in commodity futures markets? The answer is essentially yes (although with one exception, which will be covered in the next section of the paper.)

Feldman and Till (2006) examined three agricultural futures markets from which one could obtain price data since 1949. The authors had originally wanted to obtain continuous price data that was longer than this, but this was not possible because during WWII there had been price controls that stopped trading on the Chicago Board of Trade. So the dataset had to begin at the point that futures markets had fully recovered, post WWII. In the 2006 paper, the authors found that over a

50-year-plus time frame, the returns of three agricultural futures contracts were linearly related to roll yield across time, but this result only became apparent at five-year intervals.

Figure 3:



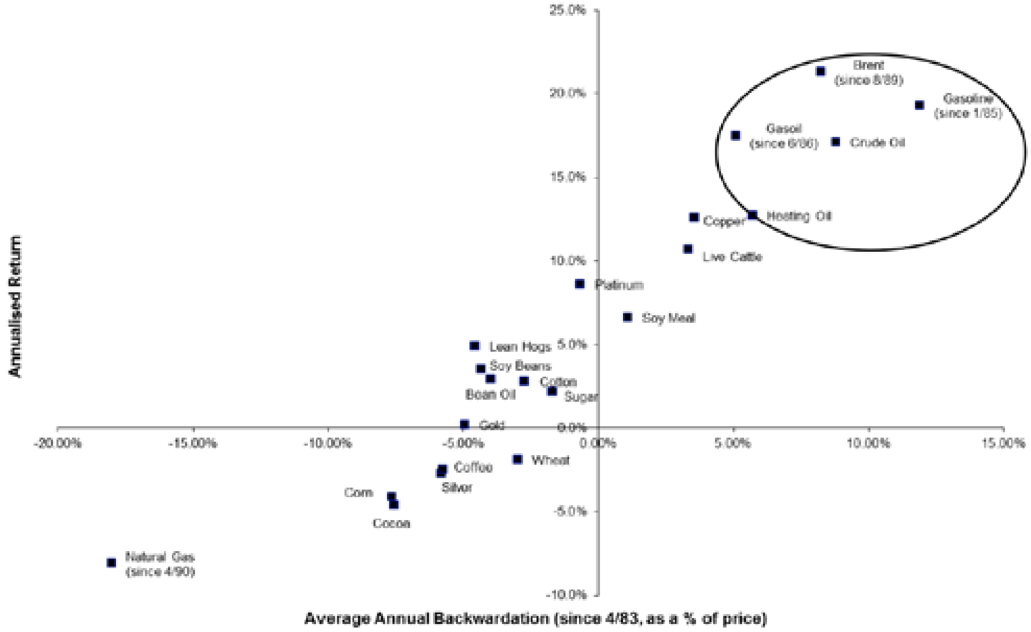
Graph based on research undertaken during the work that led to the article by Feldman and Till (2006).

At this point in the paper, it is necessary to define some commodity futures contract terminology. When a deferred futures contract trades at a discount to the spot price, we call this futures curve shape: backwardation. And when the deferred futures contract trades at a premium to the spot price, we call this futures curve shape: contango. A futures contract that is structurally backwardated will on average have positive roll yield; while a futures contract that is structurally in contango will on average have negative roll yield.

Figure 3 shows the futures-only returns of corn, soybeans, and wheat over 5-year time frames against each contract's average curve shape. The average curve shape in turn is linearly related to the average roll yield for the contract. Instructively, the data-points that do not fit the expected linear relationship were from the early 1970s during the devaluation of the dollar. So at least from the evidence of Figure 3, we would say there have been two drivers of long-term futures-only returns in the agricultural markets: (1) the roll yield; and (2) the revaluation of real assets during a substantial currency devaluation.

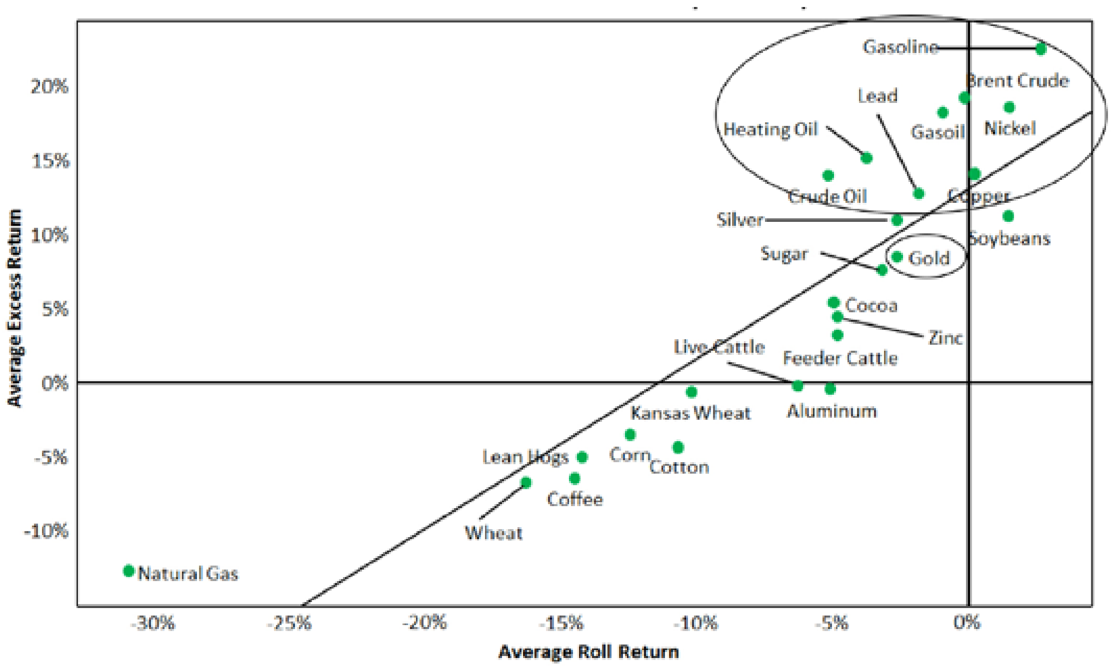
Figure 3 focused on understanding the returns of particular commodity futures contracts *across time*. In contrast, Figures 4 and 5 focus on examining the return drivers, *across commodities*, over 15-to-21 year time frames. Figure 4 shows annualized returns of commodity futures contracts versus the curve shape from 1983 to 2004 whereas Figure 5 provides an updated view from January 1999 through June 2014.

Figure 4: Annualised Return VS. Average Annual Backwardation (1983-2004)



Graph based on Nash and Shrayer (2005), Slide 2

Figure 5: Roll Returns and Excess Returns 1/1999-6/2014



Graph based on Arnott (2014), Slide 16
Market and Zimmermann (2008), p.138: "The roll return captures the slope of the term structure of the futures prices and can be positive (...backwardation) or negative (...contango).

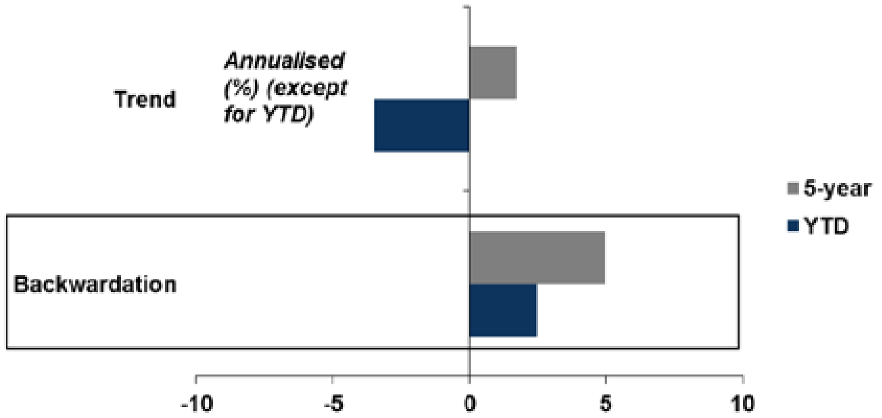
One might conclude that at least over very long time frames, the roll yield has been a meaningful driver of returns in commodity futures contracts.

How has a strategy linked to roll yield performed recently? Figure 6 is excerpted from a recent Barclays presentation on the performance of their Backwardation Alpha Index. This index takes a long position in the ten most backwardated commodities and shorts the Bloomberg Commodity Index.

Through July 2015, this index had annualised year-to-date returns of 1.9%, and 5-year annualised returns of 5.4%.

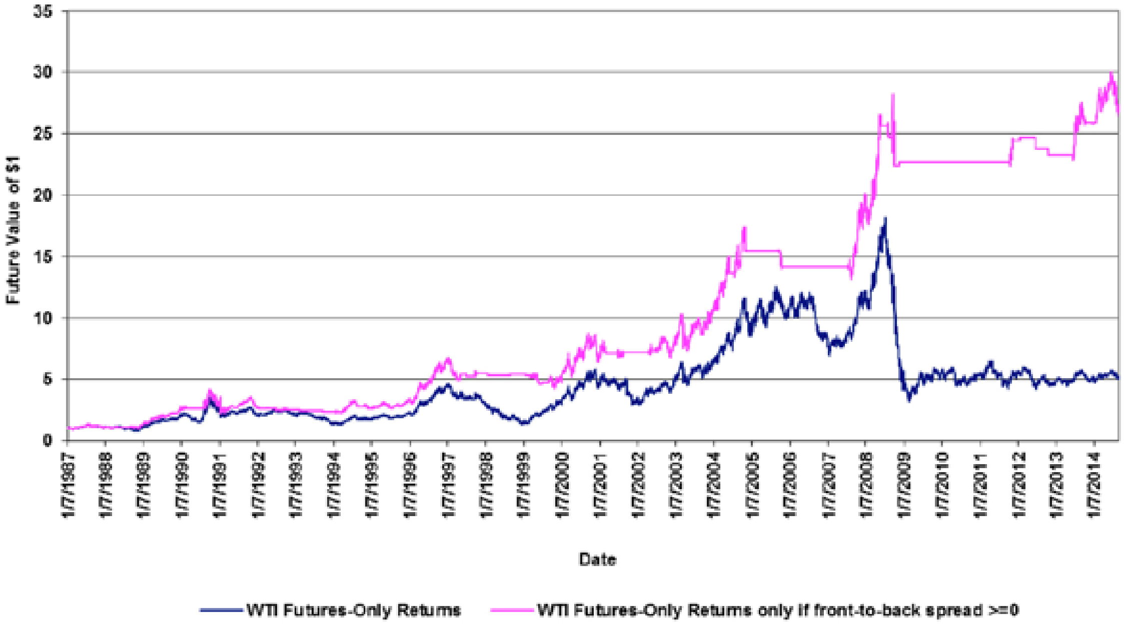
This paper had noted earlier that one could use roll yield as a proxy for fundamental data, and that one might only consider entering into a long position in a particular futures contract if one had an indication of scarcity. Figure 7 shows how *substantial* the return difference is, depending on whether one holds WTI oil futures contracts unconditionally versus only if the first-month futures price minus the second-month futures price is positive: i.e. if the front-to-back spread is in backwardation (and therefore has a positive roll yield).

Figure 6: Performance of selected Commodity Index Strategies



Source of Graph: Excerpted from Norrish (2015), Slide 17.

Figure 7: Future Value of a $1 Unconditionally Investing in WTI Oil Futures vs. Only Investing if WTI is Backwardated (1/7/87 through 8/29/14)

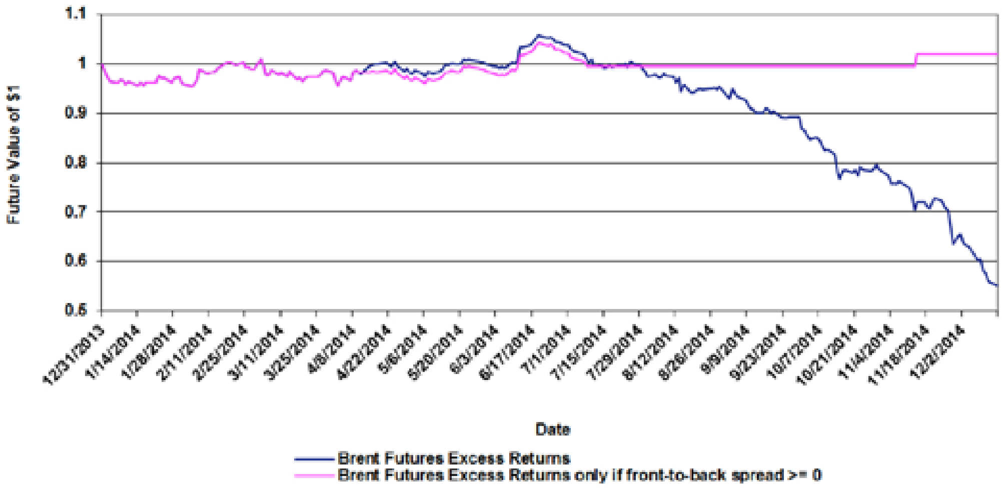


Source of Data: The Bloomberg. The Bloomberg ticker used for calculating WTI Futures-Only Returns is "SPGSCLP <index>".

The annualised returns from 1987 through the end-of-August 2014 for holding and rolling WTI futures contracts were 6.2% per year over T-bills. Correspondingly, the returns over the same period for only holding a WTI futures contract when the contract's front-to-back spread was in backwardation were 12.8% per year over T-bills.

Examining a more recent time frame, starting in July 2014 the Brent futures market went into contango pretty much continuously. If a trader or investor had elected to only buy and roll Brent futures contracts when the contract was backwardated, then that trader's returns would have been quite different from the returns of a passive investor in Brent contracts, as illustrated in Figure 8.

Figure 8: Future Value $1 Unconditionally Investing in Brent Oil Futures vs. Only Investing if Brent is Backwardated (12/31/13 to 12/15/14)



Source of Data: The Bloomberg. The Bloomberg ticker used for calculating Brent Futures-Only Returns is "SPGSBRP <index>".

Perhaps a structural holding in crude oil can only be justified if the contract is in backwardation. Obviously, though, one must be very careful with any back-tested results in making future predictions about the utility of any one factor.

"Rebalancing Return"

So far this paper has only discussed return drivers at the individual futures contract level. The mean-reversion of commodity prices can also have meaningful consequences for returns at the *portfolio*- or *index-level*. Specifically, this feature is at the root of an additional source of return, quite separate from trends in spot prices or the potential persistence of curve-structure effects. That potential additional source of return is the return from rebalancing. Erb and Harvey (2006) discussed how there can be meaningful *returns from rebalancing* a portfolio of lowly-correlated, high-variance instruments. "Commodity futures contracts happen to display … [these] characteristics …", noted Sanders and Irwin (2011).

Figure 9 demonstrates that two assets which have complete round turns in their price levels can, when combined and rebalanced each period, actually have a positive portfolio-level return.

Figure 9:

Time	Price Asset 1	Price Asset 2	Return Asset 1	Return Asset 2	Equal Weighted Return
1	10	10			
2	20	30	100%	200%	150%
3	30	40	50%	33%	42%
4	40	50	33%	25%	29%
5	50	60	25%	20%	23%
6	50	40	0%	-33%	-17%
7	40	10	-20%	-75%	-48%
8	30	20	-25%	100%	38%
9	20	20	-33%	0%	-17%
10	10	10	-50%	-50%	-50%
	Arithmetic Average		9%	24%	17%
	Geometric Average		0%	0%	4%

Table based on Sanders and Irwin (2012), Table 2.

The rebalancing effect was explained Greer et al. (2014), as follows: "[A] 'rebalancing return' … can naturally accrue from periodically resetting a portfolio of assets back to its strategic weights, causing the investor to sell assets that have gone up in value and buy assets that have declined." Erb and Harvey (2006) concluded, in turn, that the returns from rebalancing are the one “reasonably reliable source of return” from owning (and rolling) a basket of commodity futures contracts. The issue, yet again, like roll yield, is that the rebalancing effect will not be apparent over short horizons.

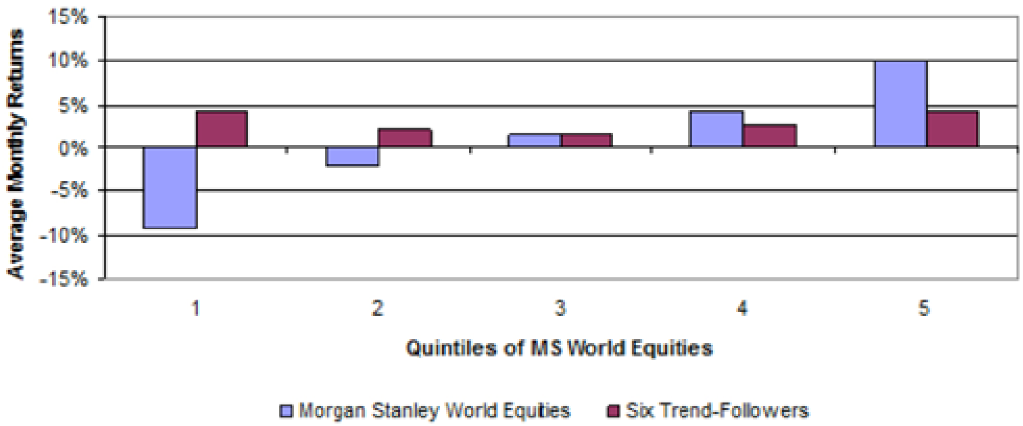
Interestingly, the rebalancing effect is not solely relevant for commodity futures contracts. In Erb and Harvey’s 2006 *Financial Analysts Journal* paper, the authors discussed how important rebalancing can be to equity returns. “From December 1970 through May 2004, the market cap[italisation]-weighted Wilshire 5000 had a compound annualised return of 11.4 perc ent ... [while] the equally-weighted Wilshire 5000 had a return of 20.3 per cent. In this case, the return of the equally-weighted equity portfolio was almost twice as high as the return of the aggregate stock market.”

Thus far this paper has reviewed the potential structural return sources for CTAs and for commodity indices. For CTAs, it has been momentum. And for commodity indices, at the individual contract level, it is roll yield; while at the portfolio or index level, there is the potential of additional returns due to rebalancing. This paper will now briefly cover investor expectations for CTAs and commodity indices, followed by a brief discussion of benchmarking.

Investor Expectations and Portfolio Context

Since the 1990s, there have been a number of papers, which have examined the pay-off profiles of dynamic trading strategies. These return profiles were found to be non-linear with respect to the major asset classes. This caused some authors to compare certain dynamic trading strategies to being option-like. For example, Fung and Hsieh (1997a) have highlighted an option-like aspect of trend-following returns. Figure 10 shows the returns of six large trend-following funds across five different world equity market environments.

Figure 10: Average Monthly Returns of Six Large Trend-Following Funds in Five Different MS World Equity Market States (April 1983 to March 1997)

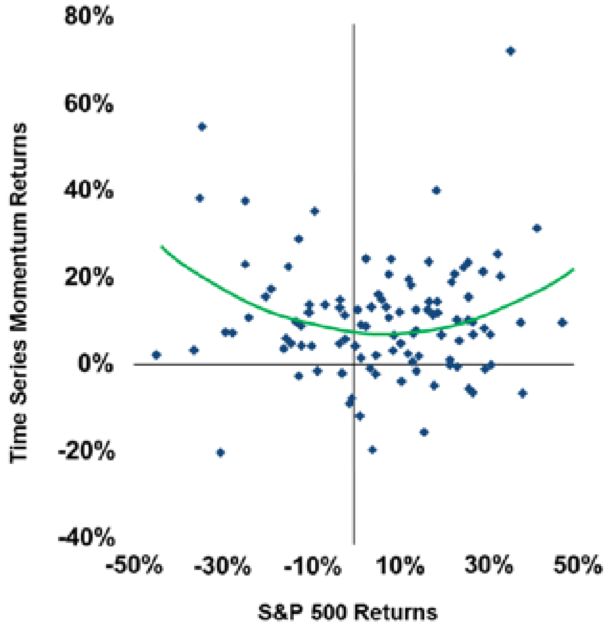


MS: Morgan Stanley
Source: Fung and Hsieh. (1997a), Exhibit 2.

In Figure 10, State 1 maps into the average returns of world equities and CTAs during the worst equity months while State 5 consists of the average returns of world equities and CTAs during the best equity months. The trend-following CTA returns are similar to the pay-off profile of “a ‘straddle’ conditional on the different states of the global equity markets.”

Later in Fung and Hsieh (2001), the authors formalised the notion of trend-followers as being “long options” by likening the strategy to a portfolio of lookback straddles. In recent work, AQR researchers showed how well a simple momentum strategy performed during extreme moves in U.S. equities, analogous to Fung and Hsieh’s 1997 work. This is illustrated in Figure 11.

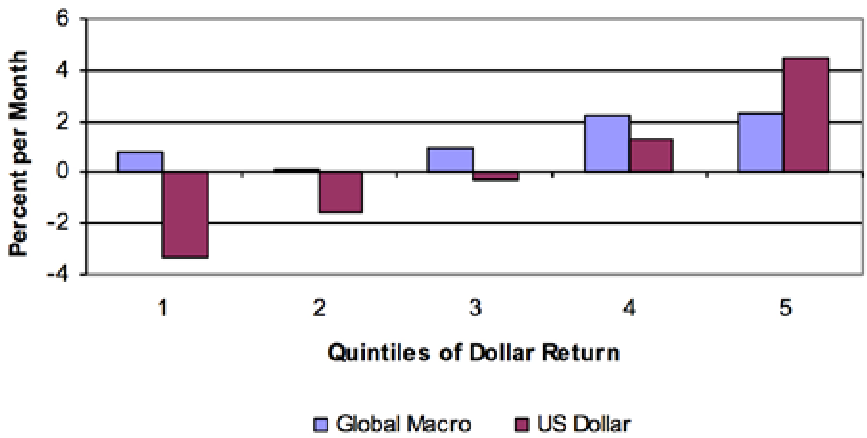
Figure 11: The Annual Net of Fee Returns of a Time Series Momentum Strategy Versus the S&P 500, 1903-2011



Graph based on Hurst et al. (2012), Exhibit 2.

For completeness, Fung and Hsieh also showed how the global macro style had behaved like a straddle on the U.S. dollar. This is illustrated in Figure 12.

Figure 12: Global Macro Style versus the Dollar



Source: Fung and Hsieh (1997b).

Fung and Hsieh (1999) also graphed the global macro style versus five equity-market environments. They find that the global macro style had been positively correlated with stocks: "However, it underperforms equities in up markets and outperforms equities in down markets, behaving as if it owned collars ([i.e.,] short calls and long puts) on U.S. equities." Arguably, both CTA and global macro investors expect long-options-like pay-off profiles from their managers.

Regarding commodity indices, institutional investors expect this investment to provide diversification for their balanced equity-and-bond portfolios. According to Fenton (2015), an updated efficient-frontier analysis for adding commodities to a standard US 60/40 portfolio shows that the optimal long-run allocation over the period, March 1988 through June 2015, would have been 10%. See Figure 13.

Figure 13: Efficient Frontier, S&P GSCI TR Index March 1988 through June 2015

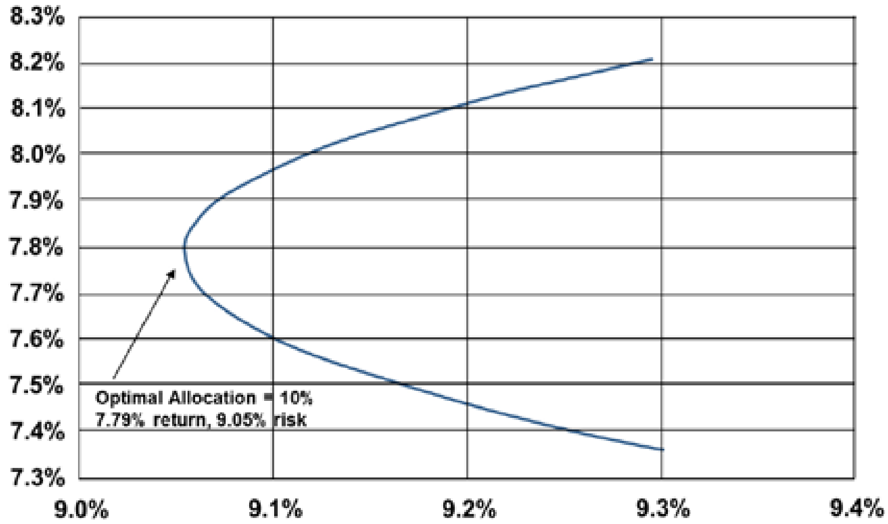


Diagram based on Fenton (2015).

That said, this optimal allocation has been time frame specific. "Starting the analysis at December 1998 (just ahead of the long run bottom in crude) shows only 3% as the optimal allocation to commodities for that period." See Figure 14.

Figure 14: Efficient Frontier, S&P GSCI TR Index December 1998 through June 2015

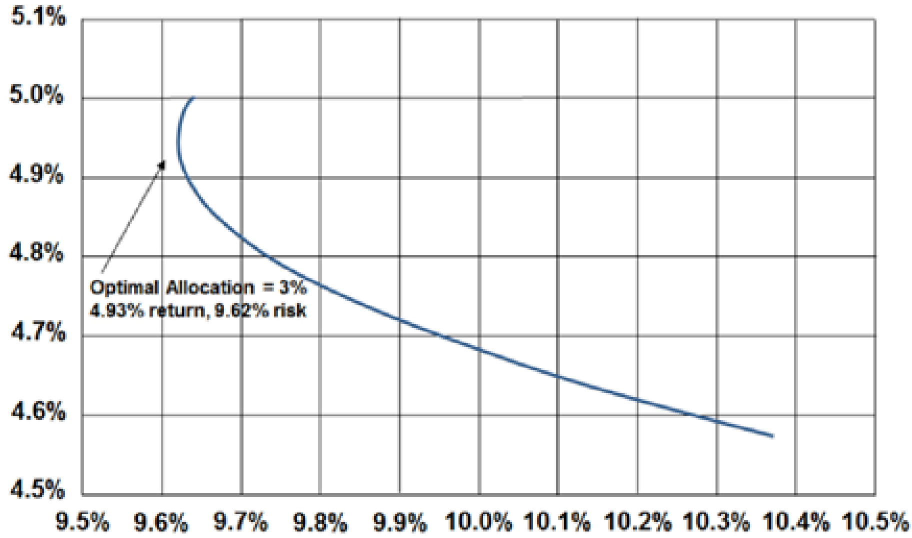


Diagram based on Fenton (2015).

For the three-year period ending June 2008, commodities delivered meaningful diversification benefits. The analysis points to 8%, as the optimal allocation for commodities. See Figure 15.

What is the recommended allocation to a commodity index such as the S&P Goldman Sachs Commodity Index? "Given the evident policy and geopolitical risks [of] today", Fenton (2015) recommended a 3% allocation.

Figure 15: Efficient Frontier, S&P GSCI TR Index June 2005 through June 2008

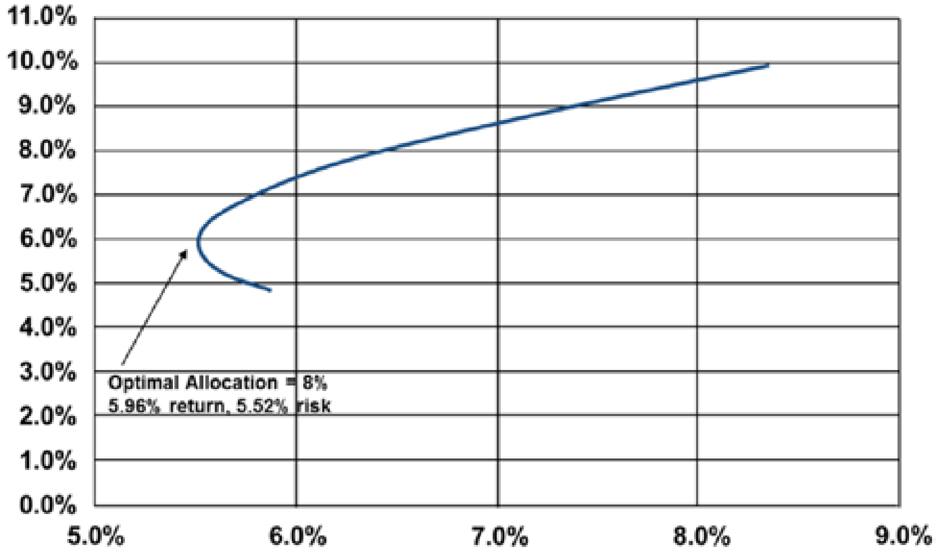


Diagram based on Fenton (2015).

Benchmarking

The last section of this paper will argue that if portfolio diversification is the goal for an investor, then an index is an appropriate benchmark for a futures investment. Instead, if capturing an alternative beta is the goal, then a mechanical replication strategy is an appropriate benchmark. And finally if absolute returns are the goal, then the investor's benchmark depends on whether the strategy is pure alpha or well-timed beta.

Portfolio Diversification and Indices

In institutional management, asset allocation is regarded as the dominant source of returns. The investment industry has been organised around the idea that asset allocation is the most important investment decision and that individual managers should be allowed limited discretion around investment benchmarks.

Typically, pension fund consultants advise institutional investors on the most appropriate long-term asset allocation mix. These intermediaries assign benchmarks for each asset class within the overall recommended portfolio. These consultants also recommend particular funds or managers to carry out a particular mandate with a specific benchmark. The chosen funds are then responsible for providing investment results that are relative to their benchmark.

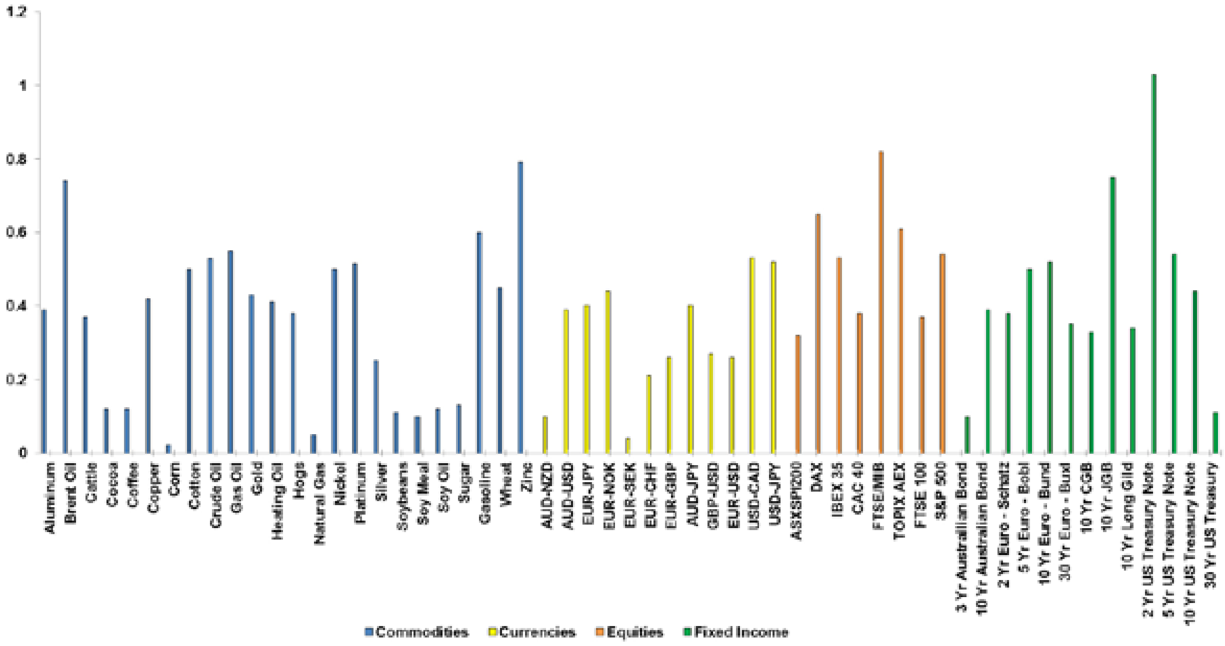
The asset allocation choice and its benchmark are the investor's responsibility. Importantly, the investor owns the risk of the benchmark's results. And the choice of which index as the benchmark is crucial, including for commodity allocations.

Alternative Beta and Mechanical Replication Strategies

Alternatively, if capturing an alternative beta is the goal, then a mechanical replication strategy is appropriate as the benchmark for an investment.

Hurst et al. (2010) simulated a trend-following strategy across 60 highly liquid futures and currency forwards during the period from January 1985 to December 2009. Figure 16 shows the performance of this strategy for each of the 60 contracts.

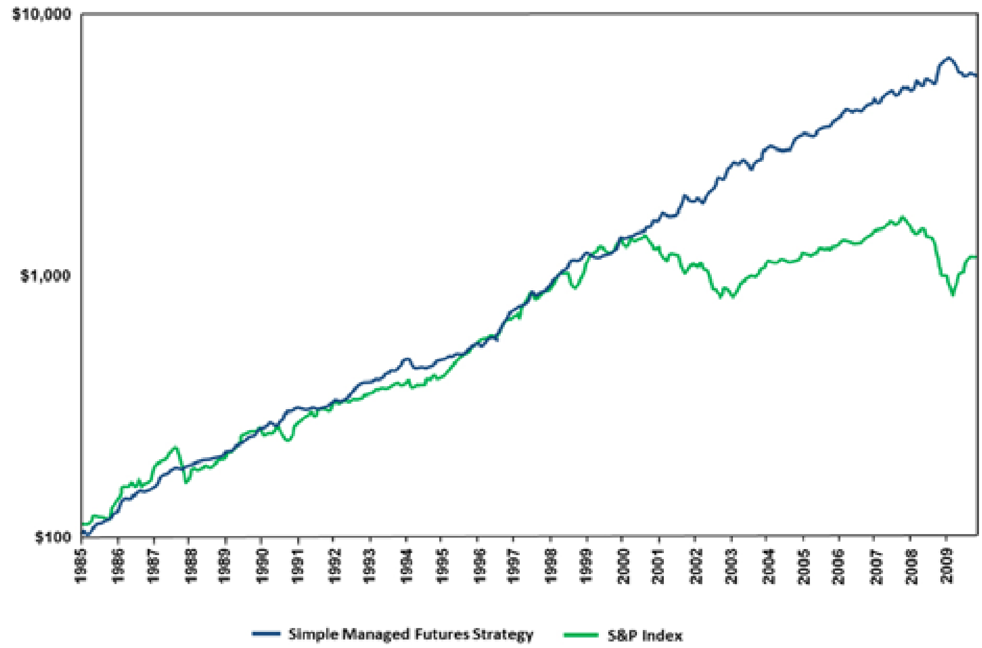
Figure 16: Performance of the Hypothetical Simple Managed Futures Strategy for Each Individual Asset



Bar chart based on Hurst et al. (2010), Exhibit 3.

Due to the lack of correlation amongst markets, Figure 17 shows how relatively smooth the simulated program's performance had been relative to the S&P 500 from 1985 through 2009. A CTA, which charges actively managed fees, should be benchmarked against such a simulated strategy.

Figure 17: Hypothetical Growth of $100 Invested in the Simple Managed Futures Strategy and S&P 500 Index



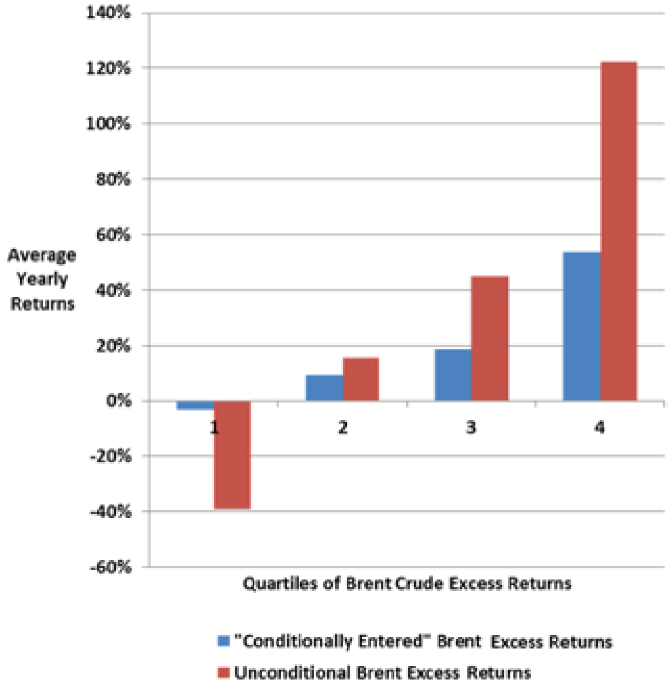
Graph based on Hurst et al. (2010), Exhibit 4.

Absolute Returns: Pure Alpha or Well-Timed Beta

Lastly, an investor might enter into a futures-related strategy for pure alpha returns or for well-timed beta exposures. If a strategy is providing pure alpha, then one is left with comparing the strategy with competing pure-alpha strategies on a return-to-risk basis. Otherwise, if a strategy is providing well-timed beta exposures, one should ensure that the strategy is pushing the asset class' return distribution to the right; that is, that the strategy is providing exposure to the asset class while limiting its losses.

For example, Figure 18 provides an example of a market-timing model for crude oil futures contracts that produced a collar-like profile across states of the oil market.

Figure 18: "Conditionally Entered" vs. "Unconditionally Entered" Brent Crude Oil Futures (Excess) Returns End-January 1999 through End-December 2014



Source: Till (2015), which was based on joint work with Joseph Eagleeye of Premia Research LLC.

Conclusion

Based on a brief review of academic and practitioner articles, this paper noted that there may be structural returns in futures strategies as a result of momentum, roll yield, and rebalancing. One caveat is that one's holding period may have to be quite long term in order for these return effects to be apparent. However, even structurally positive returns may be insufficient to motivate investors to consider futures products. A CTA (or global macro) investor may require that the program's return profile is also long-options-like; and an institutional investor will expect that a commodity index will provide diversification for a stock-and-bond portfolio. The paper also noted that how these programs are benchmarked will depend on whether a futures program is considered a beta, an alternative beta, pure alpha, or well-timed beta. This paper correspondingly provided recommendations for benchmarks for each of these types of investment exposures.

References

• Arnott, R., 2014, Research Affiliates, Commodity Presentation, S&P Dow Jones Indices' 8th Annual Commodities Seminar, London, September 11.

• Campbell & Company, 2013, "Prospects for CTAs in a Rising Interesting Rate Environment," *Campbell White Paper Series*, January.

• Campbell & Company, 2014, "Deconstructing Futures Returns: The Role of Roll Yield," *Campbell White Paper Series*, February.

• Chabot, B., Ghysels, E. and R. Jagannathan, 2014, "Momentum Trading, Return Chasing, and Predictable Crashes," *Federal Reserve Bank of Chicago Working Paper*, November.

• Erb, C. and C. Harvey. 2006, "The Tactical and Strategic Value of Commodity Futures," *Financial Analysts Journal*, Vol. 62, No. 2, March/April, pp. 69-97.

• Feldman, B. and H. Till, 2006, "Backwardation and Commodity Futures Performance: Evidence from Evolving Agricultural Futures Markets," *Journal of Alternative Investments*, Vol. 9, No. 3, Winter, pp. 24-39.

• Fenton, C., 2015, "Commodity Hedger and Investor Projector: The Ascent of Risk," Blacklight Research, July 28.

• Fung, W. and D. Hsieh, 1997a, "Survivorship Bias and Investment Style in the Returns of CTA's: The Information Content of Performance Track Records," *Journal of Portfolio Management*, Vol. 24, No. 1, Fall, pp. 30-41.

• Fung, W. and D. Hsieh, 1997b, "Empirical Characteristics of Dynamic Trading Strategies: The Case of Hedge Funds," *The Review of Financial Studies*, Vol. 10, No. 2, Summer, pp. 275-302.

• Fung, W. and D. Hsieh, 1999, "A Primer on Hedge Funds," *The Journal of Empirical Finance*, Vol. 6, No. 3, September, pp. 309-331.

• Fung, W. and D. Hsieh, 2001, "The Risk in Hedge Fund Strategies: Theory and Evidence from Trend Followers," *Review of Financial Studies*, Vol. 14, No. 2, Summer, pp. 313-341.

• Geman, H., 2005, Commodities and Commodity Derivatives (Chichester: John Wiley & Sons).

• Greer, R., R. Walny and K. Thuerbach, 2014, "We See Opportunities in Commodities," *PIMCO Viewpoint*, March.

• Hurst, B., Ooi, Y. H. and L. Pedersen, 2010, "Understanding Managed Futures," AQR Capital Management, Winter.

• Hurst, B., Ooi, Y. H. and L. Pedersen, 2012, "A Century of Evidence of Trend-Following Investing," AQR Capital Management, Fall.

• Markert, V. and H. Zimmermann, 2008, "The Relationship Between Risk Premium and Convenience Yield Models," in F. Fabozzi, R. Füss and D. Kaiser (eds) The Handbook of Commodity Investing (Hoboken: John Wiley), pp. 113-144.

• Nash, D. and B. Shrayer, 2005, "Investing in Commodities," Morgan Stanley, Presentation, IQPC Conference on Portfolio Diversification with Commodities, London, May 24.

• Norrish, K., 2015, "Commodity Investing After the Supercycle," Barclays Commodities Research, September.

• Sanders, D. and S. Irwin, 2012, "A Reappraisal of Investing in Commodity Futures Markets," *Applied Economic Perspectives and Policy*, Vol. 34, No. 3, September, pp. 515–530.

• Till, H., 2015, "Structural Positions in Oil Futures Contracts: What are the Useful Indicators?", *Argo: New Frontiers in Practical Risk Management, Spring, pp. 67-81.* Available at: http://www.iasonltd.com/wp-content/uploads/2015/07/Argo_06_Spring_2015_eng.pdf

Founded in 1906, EDHEC Business School offers management education at undergraduate, graduate, post-graduate and executive levels. Holding the AACSB, AMBA and EQUIS accreditations and regularly ranked among Europe's leading institutions, EDHEC Business School delivers degree courses to over 6,000 students from the world over and trains 5,500 professionals yearly through executive courses and research events. The School's 'Research for Business' policy focuses on issues that correspond to genuine industry and community expectations.

Established in 2001, EDHEC-Risk Institute has become the premier academic centre for industry-relevant financial research. In partnership with large financial institutions, its team of ninety permanent professors, engineers, and support staff, and forty-eight research associates and affiliate professors, implements six research programmes and sixteen research chairs and strategic research projects focusing on asset allocation and risk management. EDHEC-Risk Institute also has highly significant executive education activities for professionals.

In 2012, EDHEC-Risk Institute signed two strategic partnership agreements with the Operations Research and Financial Engineering department of Princeton University to set up a joint research programme in the area of risk and investment management, and with Yale School of Management to set up joint certified executive training courses in North America and Europe in the area of investment management.

For more information, please contact:
Carolyn Essid on +33 493 187 824
or by e-mail to: carolyn.essid@edhec-risk.com

EDHEC-Risk Institute
393 promenade des Anglais
BP 3116 - 06202 Nice Cedex 3
France
Tel: +33 (0)4 93 18 78 24

EDHEC Risk Institute—Asia
1 George Street
#07-02
Singapore 049145
Tel: +65 6438 0030

EDHEC Risk Institute—Europe
10 Fleet Place, Ludgate
London EC4M 7RB
United Kingdom
Tel: +44 207 871 6740

EDHEC Risk Institute—France
16-18 rue du 4 septembre
75002 Paris
France
Tel: +33 (0)1 53 32 76 30

www.edhec-risk.com