

# A Collection of Articles on the Commodity Futures Markets, Spanning the Agricultural, Metals, and Energy Sectors

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This is a working paper version of a set of articles that was later published in the Fall 2016 Global Commodities Applied Research Digest.

EDHEC is one of the top five business schools in France. Its reputation is built on the high quality of its faculty and the privileged relationship with professionals that the school has cultivated since its establishment in 1906. EDHEC Business School has decided to draw on its extensive knowledge of the professional environment and has therefore focused its research on themes that satisfy the needs of professionals.

EDHEC pursues an active research policy in the field of finance. EDHEC-Risk Institute carries out numerous research programmes in the areas of asset allocation and risk management in both the traditional and alternative investment universes.

This collection of four articles covers issues that are relevant to the agricultural, metals, and energy markets. Each of this collection's four articles is summarised below.

### **The Fundamental Elements of a Commodity Investment Process**

This digest article covers how to further distill returns in the commodity markets beyond that which is available through passive exposures to various commodity sectors. A manager can potentially do so through the use of well-chosen entry and exit rules, trade construction, and downside risk management. In addition, an actively managed commodity portfolio will tend to have dynamic exposures to the various commodity sectors, given the seasonal nature of a number of commodity opportunities.

The article includes examples from the gasoline and copper markets.

### **A Brief Primer on Commodity Risk Management**

In covering the topic of commodity risk management, this practitioner-oriented paper proceeds as follows. A number of trading strategies exist because the trader is paid to bear risk: that is why the strategies can continue to exist, even if well-known. But then in order for a trading program to be viable in the long-term, a trader must implement disciplined risk management procedures. The key parameters for a risk-management program include quantifying a client's risk tolerance and attempting to ensure that one does not exceed that tolerance as well as understanding the price behaviour of commodity futures prices and their potential for explosive behaviour. Both of these parameters are essential for the choice of leverage level and hedging strategy for a trading program. Next the paper covers two types of useful risk metrics for a trading program, which include Value-at-Risk and historical worst-case measures. The article then discusses how to avoid inadvertent concentration risk, namely by understanding the fundamental drivers of a strategy. The paper also advocates the use of (a) out-of-the-money options to hedge against identifiable extreme scenarios and (b) disciplined exit strategies when trading strategies exceed worst-case outcomes. Finally, the paper enumerates what should be included in a trading program's risk-management reports.

The article includes examples from the corn and natural gas futures markets.

### **Why Haven't Uranium Futures Contracts Succeeded?**

In previous work, we have noted that even though the U.S. futures markets have evolved in trial-and-error fashion, one can nonetheless identify the key elements that determined whether particular futures contracts succeeded or failed. In this article, we extend this past analysis by examining why a particular metals futures contract has not succeeded thus far: the uranium futures contract. Such an analysis, may be valuable for new financial centres as they build successful futures markets.

### **Timing Indicators for Structural Positions in Crude Oil Futures Contracts**

Should an investor enter into long-term positions in oil futures contracts? In answering this question, this paper covers the following three considerations: (1) whether crude oil inventories are scarce or not; (2) how to avoid the risk of oil prices crashing; and (3) the use of financial assets for diversification purposes. The paper concludes that positions in crude oil futures contracts should (a) not only be actively timed, but (b) must also be twinned with financial assets in order to hedge against both the possibility of deflationary conditions and/or periodic oil-market-share price wars.

## The Fundamental Elements of a Commodity Investment Process

This digest article briefly covers how to combine structural sources of return in the commodity markets within a comprehensive investment process. This paper is especially relevant for investors in developing markets who are newly embracing the investment opportunities available in commodity futures markets.

### Opportunity Set

The first step in designing a commodity program is to survey the commodity investment universe for opportunities. During times of price stability, the commodity markets that have historically had the highest returns all share one characteristic: they typically trade in backwardation, whereby the nearer month contract trades at a premium to the deferred delivery contracts. This is typically an indication of scarcity.

### The Further Distillation of Returns

An active manager can attempt to further distill the returns in the commodity markets that typically trade in backwardation. The manager can do so through entry and exit rules, trade construction, and downside risk management. A primer on commodity risk management, in turn, is covered next in this collection of digest articles.

### Entry Rules

Once one has chosen the commodity markets to focus on, there are a number of ways to distill a market's returns. This includes through well-chosen entry rules, such as entering positions based on:

- Positive curve dynamics, namely that the commodity's futures curve is in backwardation; or
- Favourable entry levels; or by entering positions during
- Times of seasonal strength.

### Exit Rules

Another way of distilling returns in a market is through well-chosen exit rules.

This includes exiting positions based on:

- Reaching a price target;
- A time stop, which means that one only expects a trade to work over a specific time frame; or if
- A worst-case loss is reached.

### Trade Construction

An additional way to distill a market's returns is via the judicious choice of trade construction. This includes whether to express a view on a market through outright, calendar spreads, intermarket spreads, or options.

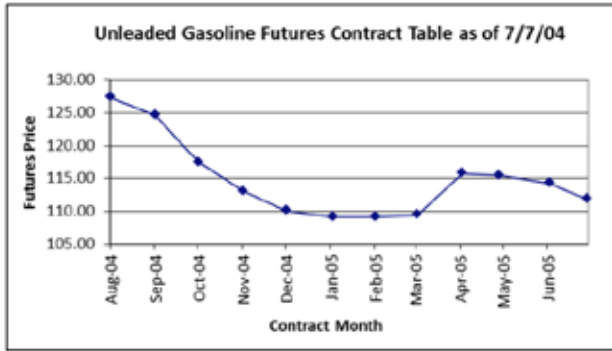
### Specific Examples: Gasoline and Copper

Two examples of strategies, which rely on periodic backwardation, follow. The first example is in the gasoline market. The left-hand-side of Figure 1 illustrates a gasoline futures curve during July 2004. The horizontal axis is the maturity of each futures contract while the vertical axis is the price level for each futures contract.

At that time the gasoline contract, which matured in November, was priced at a steep discount to the front-month contract. If spot prices did not change over the summer, the November contract would appreciate significantly by "rolling up the curve." The right-hand-side of Figure 1 provides a copper market example. The horizontal axis is the amount of copper inventories in weeks of consumption while the vertical axis is the price of copper. This graph shows the historical tendency of copper prices to spike when at scarce inventory levels.

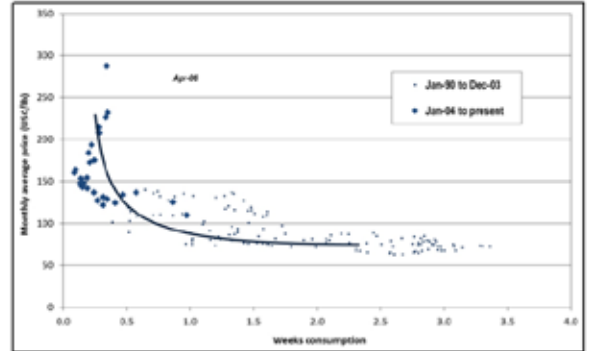
Figure 1

**Rolling up the futures curve  
(Gasoline Example):**



In the summer of 2004, November gasoline was priced at a steep discount to the front month. If spot prices did not change over the summer, this contract would appreciate significantly by "rolling up the curve."

**Long a cheap option  
(Copper Example):**



This graph shows the historical tendency of copper prices to spike when at scarce inventory levels. A reliable indicator of scarcity is when the futures curve is trading "in backwardation."

Source of Graphic: Heap (2006).

**The Monitoring of Fundamental Drivers**

One job of an active manager is to monitor whether the fundamental drivers for his or her strategies are still intact. In the two examples provided above, one needs to monitor whether each commodity sector's inventories are expected to remain structurally low.

**Portfolio Construction**

Now when constructing a commodity portfolio, the goal is have at least 4 to 7 largely uncorrelated strategies at any one time. At times, one can find strategies that normally have correlations amongst each other of -20% to +20%. With such low correlations, portfolio volatility is quite dampened as one adds each of these strategies to a portfolio.

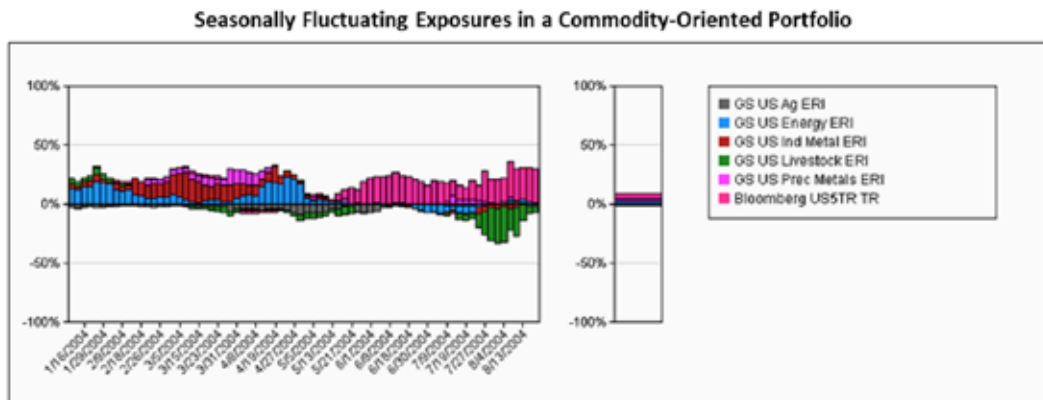
**Systematic Risk Hedging**

A long-biased commodity program will have systematic risk to severe shocks to the business cycle. Therefore, a commodity manager will have a tendency to include long fixed-income positions in the portfolio as a natural hedge to this systematic risk.

**Dynamic Exposures to Commodity Sectors**

An active commodity program will have fluctuating exposures to various commodity sectors. Figure 2 shows a returns-based analysis of a commodity portfolio from the Fall of 2004.

Figure 2



The benchmarks are the S&P Goldman Sachs (GS) Commodity sector excess return (ER) indices and a Bloomberg U.S. fixed-income index. The graph's y-axis is the fraction of R-squared that can be attributed to a benchmark exposure. This is also known as the benchmark's variance component. The middle chart shows each benchmark's contribution to R-squared over the whole history.

Source: Prism Analytics.

Using daily data, this returns-based analysis determined which commodity factors best explained this active program's returns over time. In particular, Figure 2 shows dynamic exposures to energies, metals, U.S. fixed income, livestock, and the agricultural markets in an actively traded commodity-oriented portfolio.

## **Conclusion**

After isolating the commodity markets where there are structural opportunities, a commodity manager can choose to further distill returns in those markets through the use of well-chosen entry and exit rules, trade construction, and downside risk management. The manager must then ensure that the factors which have led to the portfolio's trading opportunities are still intact. A commodity manager will then endeavour to ensure that each additional strategy added to his or her portfolio is not highly correlated to strategies that are already included in the portfolio. If a commodity portfolio has a tendency to have long commodity positions, then it will be exposed to a sharp shock to business confidence, for which a fixed-income hedge would be a natural hedge for this portfolio. Finally, an actively managed commodity portfolio will have dynamic exposures to various commodity sectors, given the seasonal nature of various commodity-market opportunities.

## **Endnotes**

This paper is excerpted from a seminar provided by the author at the Chicago Institute of Investment on August 1, 2016. The research work included in this seminar was jointly developed with Joseph Eagleeye of Premia Research LLC.

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

## **Reference**

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## **A Brief Primer on Commodity Risk Management**

This digest article discusses the practical issues involved in applying a disciplined risk management methodology to commodity futures trading. Accordingly, the paper shows how to apply methodologies derived from both conventional asset management and hedge fund management to futures trading. The article also discusses some of the risk management issues that are unique to leveraged futures trading.

Commodity futures trading is such a niche discipline that discovering how to succeed using disciplined risk-management principles usually only occurs through hard-won experience. This article provides an alternative approach: one can instead review a logical structural framework, as set forth in this digest article.

### **Risk is the Flipside of Return**

A number of derivatives trading strategies are well known and publicised, which does not prevent them from continuing to exist. In discussing consistently profitable grain futures trades, Cootner (1967) stated that the fact that they "persist in the face of such knowledge indicates that the risks involved in taking advantage of them outweigh the gain involved. This is further evidence that ... [commercial participants do] not act on the basis of expected values; that ... [these participants are] willing to pay premiums to avoid risk."

In a number of statistically significant futures trades, an individual who implements these trades assumes some specific event risk that others do not want to assume, which is why there is a return to efficiently bearing this risk in the first place.

### **The Most Important Element of an Investment Process**

The key to a successful trading program is not in discovering proprietary strategies: a diligent literature search will turn up a great number of strategies. Instead, the most important element of an investment process may well be how one implements the program's portfolio construction and risk management methodologies so that one can have both smooth performance and stay in business during dramatic market moves.

### **Product Design Issues**

In derivatives trading, one has a lot of flexibility in designing an investment program. Futures trading requires a relatively small amount of margin. The result is that one can easily adjust one's leverage level to magnify gains (and of course, magnify losses, too.) Trade sizing is mainly a matter of how much risk one wants to assume. A trader is not very constrained by the amount of initial capital committed to trading. With the use of options, one can also be very particular about the risks that the trader wishes to hedge away by paying option premia.

CTA investors frequently expect futures trading programs to be equity diversifiers, so clients thereby expect that a trading program will not do too poorly in the face of a large equity decline.

The parameters of a program's risk management policy should directly flow from the return, risk, and correlation expectations of the program's client base. When attempting to adhere to these top-level parameters, the actual implementation of a program's risk management policy will rely heavily on the particular assumptions about the statistical properties of futures prices.

## Viability of a Futures Program

As noted earlier, a number of statistically significant trading opportunities exist because of the possibility of rare, but nonetheless large, losses. One can build a business or investment program around these positive expected value opportunities, but the particular leverage level and hedging strategy chosen will determine the ongoing viability of the program.

## Standard Risk Management Methodology

The way that risk management is applied at conventional asset managers is typically as follows:

- Translate the client's guidelines into return and risk targets with respect to an index or benchmark;
- Determine the active bets away from a program's benchmark;
- Make assumptions about the expected returns, volatility, and correlation of the active bets;
- Construct the client's portfolio so that the client's return and risk targets will be achieved if one's statistical assumptions are correct; and
- Continually monitor the portfolio's actual return and risk performance for adherence to the established targets.

The conventional asset manager approach to risk management is a useful first step in designing a risk management program for leveraged futures trading. As will be discussed, one still needs to add several layers of risk management to this approach because of the unique statistical properties of commodity futures contracts and because of the different way futures products are marketed.

## Understanding Price Behaviour

Research from the 1970s showed that diversified portfolios of equities have returns that appear to be symmetrically distributed. It is a different matter for commodity prices.

Commodity prices tend to exhibit positive skewness. During times of ample supplies, there are two variables that can adjust to equilibrate supply and demand: more inventories can be held *and* the price can decrease. But, if there are inadequate inventories, *only* the price can respond to equilibrate supply and demand, given that in the short run, new supplies of physical commodities cannot be instantly mined, grown, and/or drilled.

## Value-at-Risk

One should calculate the portfolio's volatility from the recent volatilities and correlations of the portfolio's instruments. This is the standard Value-at-Risk approach. Now, this approach alone is obviously inadequate for a commodity portfolio, which consists of instruments that have a tendency towards extreme positive skewness.

While the Value-at-Risk measure is useful, it has to be used jointly with other measures and actions. The measure is useful since one wants to ensure that under normal conditions, a commodity position has not been sized too large that one cannot sustain the random fluctuations in profits and losses that would be expected to occur, even without a dramatic event occurring.

## Scenario Testing

Using long-term data, a trader should also directly examine the worst performance of a commodity strategy under similar circumstances in the past. In practice, such a measure will sometimes be larger than a Value-at-Risk measure based on recent volatility.

If one is relying on historical data to find pockets of predictability in the futures markets, then examining worst-case outcomes can also serve another purpose. If the loss on a particular commodity futures strategy exceeds the historical worst case, this can be an indication of a new regime that is not reflected in the data. This would trigger an exit from a systematic trade since one no longer has a handle on the worst-case scenario.

### Deep Out-of-the-Money Options

In a systematic program based on historical data, one can make determinations about its expected return. One result is that a trader can decide to give up a small fraction of this expected return in order to hedge against catastrophic risk. A trader can do so with deep out-of-the-money options.

### Exit Strategy

Strictly speaking, although not a risk management issue, one should employ an exit strategy that recognises the mean-reverting properties of commodities. This means examining historical data to determine the typical size of moves during supply/demand imbalances.

### Diversification and Concentration Risk

A commodity manager can potentially set up dampened risk portfolios of commodity futures trades, which are very nearly uncorrelated with each other.

In leveraged commodity futures trading, one must be careful with commodity correlation properties. Seemingly unrelated commodity markets can become temporarily highly correlated. This becomes a problem if commodity managers are designing their portfolios so that only a certain amount of risk is allocated per strategy. The portfolio manager may be inadvertently doubling up on risk if two strategies are unexpectedly correlated.

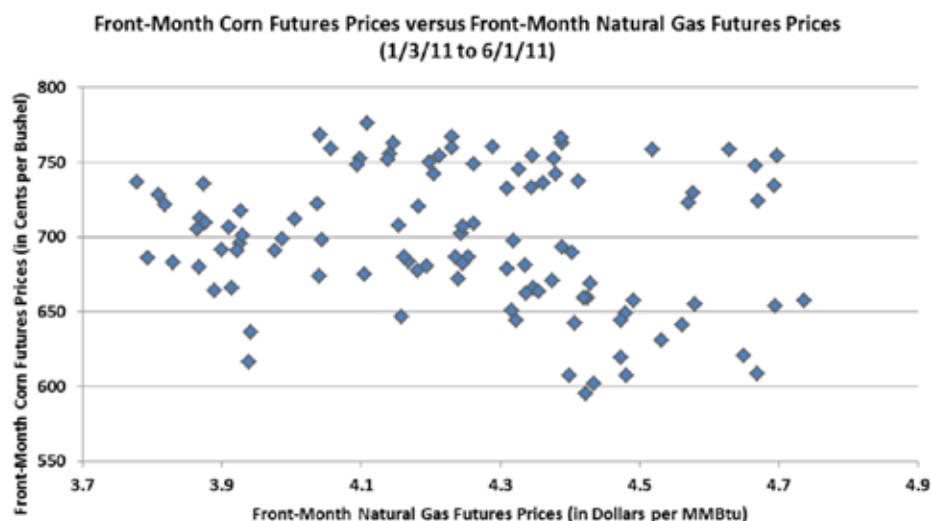
### Understanding the Fundamental Drivers of a Strategy

The antidote for this problem is two-fold. One is to understand what the key factors are which drive a strategy's performance, and the other is to use short-term recent data in calculating correlations. If two trades have common drivers, then it can be assumed that their respective performances will be similar. Recent data can frequently capture the time-varying nature of correlations that long-term data average out.

### Corn and Natural Gas Example

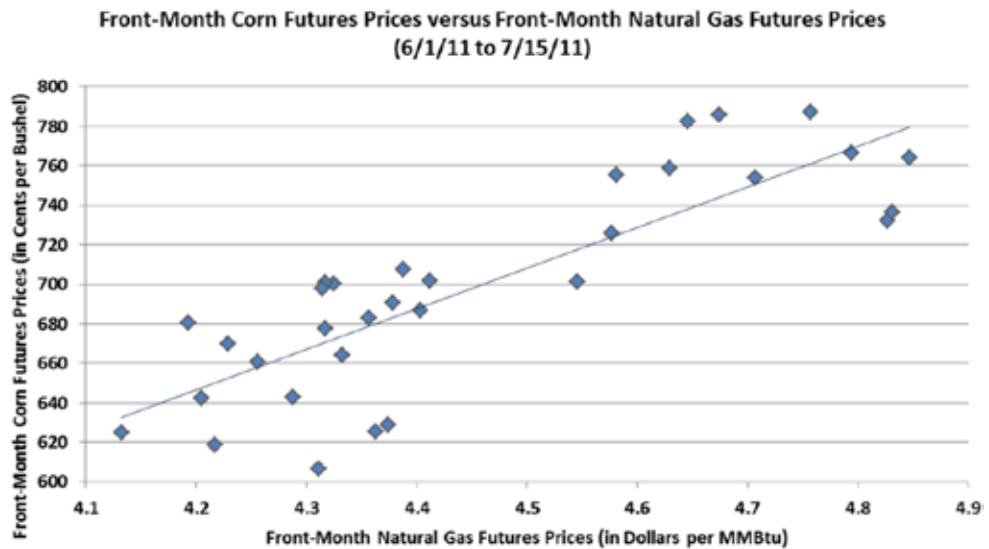
The graphs in Figures 1 and 2 below provide an example from 2011 that shows how seemingly unrelated markets can become temporarily very related.

Figure 1



Source of Data: The Bloomberg.

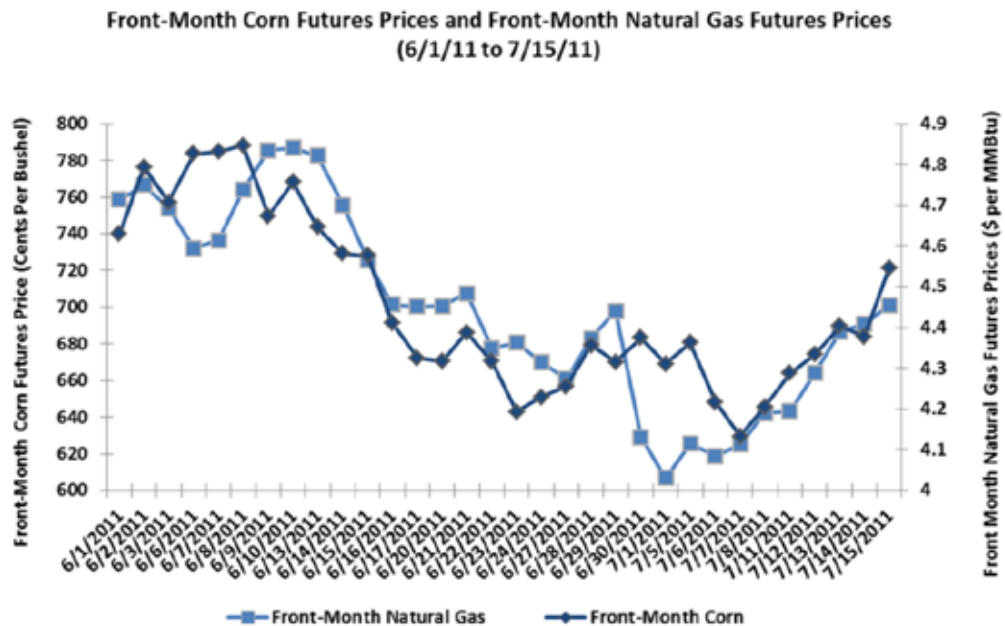
Figure 2



Source of Data: The Bloomberg.

Normally, natural gas and corn prices are unrelated. How could these two seemingly different trades be, in fact, the same trade? Both the July corn and natural gas trades are heavily dependent on the outcome of weather in the U.S. Midwest. Figure 3 further illustrates how both corn and natural gas had common reactions to the possibility of extreme heat in 2011: their prices frequently waxed and waned at similar times during the summer.

Figure 3



Source of Data: The Bloomberg.

Our conclusion is that in order to avoid inadvertent correlations, it is not enough to measure historical correlations. Instead, a trader needs to have an economic understanding for why a trade works in order to best be able to appreciate whether an additional trade will act as a portfolio diversifier.

### Extraordinary Stress Testing

For a commodity futures portfolio, it is also prudent to examine how the portfolio would have performed during various well-defined stock market declines, given that such programs are frequently marketed as equity portfolio diversifiers. If a portfolio shows sensitivity to certain

extreme events when the stock market has declined, this does not necessarily mean that the portfolio should be sized differently or constructed differently. It may mean that a macro portfolio hedge would be in order.

### **Risk Management Reports**

On a per-strategy basis, it is useful to examine each strategy's:

- Value-at-Risk based on recent volatilities and correlations;
- Worst-case loss during normal times;
- Worst-case loss during well-defined eventful periods;
- Incremental contribution to Portfolio Value-at-Risk; and
- Incremental contribution to Worst-Case Portfolio Event Risk.

The latter two measures give an indication of whether the strategy is a risk reducer or risk enhancer.

On a portfolio-wide basis, it is useful to examine the portfolio's:

- Value-at-Risk based on recent volatilities and correlations;
- Worst-case loss during normal times; and
- Worst-case loss during well-defined eventful periods.

Each measure should be compared to some limit, which has been determined based on the design of the futures product. So for example, if clients expect the program to lose no more than say 7% from peak-to-trough, then the three portfolio measures should be constrained to not exceed 7%. If the product should not perform too poorly during financial shocks, then the worst-case loss during well-defined eventful periods should be constrained to a relatively small number. If that worst-case loss exceeds the limit, then one should devise macro portfolio hedges accordingly.

### **Conclusion**

There are a number of derivatives strategies, which earn returns due to assuming risk positions in a risk-averse financial world. The returns are not necessarily due to inefficiencies in the marketplace. How traders design and carry out their risk management policies is key to a program's viability, especially in leveraged commodity futures trading.

### **Endnote and Acknowledgement**

The ideas in this article were jointly developed with Joseph Eagleeye, co-founder of Premia Research LLC.

### **Reference**

- Cootner, P., 1967, "Speculation and Hedging," *Food Research Institute Studies*, Supplement, pp. 65-106.

## Why Haven't Uranium Futures Contracts Succeeded?

Why have some seemingly promising futures contracts not succeeded in the recent past? In this digest article, we examine one such example, the uranium futures market.

The structure of this brief paper is as follows. First we provide some background on the uranium futures contract as well as a description of this contract, and then we note how the uranium market does not sufficiently match up against the criteria for the successful launch of a futures contract.

### Background on the Uranium Futures Contract

Very helpfully, a report by the U.S. Senate in 2014 provides details on the uranium futures contract. According to U.S. Senate (2014):

- The uranium futures contract "was established and began trading for the first time on May 6, 2007."
- "This financially-settled contract is traded on the CME Globex and CME ClearPort trading platforms, and is linked to prices provided by Ux Consulting Company, LLC."
- "In recent years, the uranium futures market has had relatively few participants, the U308 contract has rarely traded, and open interest has generally remained relatively low."
- "There are frequently zero reported trades per day."
- For example, for the week of September 9-September 16, 2014, only one trade was reported, involving 50 contracts."

The specifications for the CME Group's uranium futures contract are provided in Exhibit 1.

Exhibit 1

UxC Uranium U308 Futures Contract Specifications		
Product Symbol	UX	
Venue	CME Globex, CME ClearPort	
Trading Hours	CME Globex (Electronic Platform)	Sunday - Friday 6:00 p.m. - 5:15 p.m. (5:00 p.m. - 4:15 p.m. Chicago Time/CT) with a 45-minute break each day beginning at 5:15 p.m. (4:15 p.m. CT)
	CME ClearPort	Sunday - Friday 6:00 p.m. - 5:15 p.m. (5:00 p.m. - 4:15 p.m. Chicago Time/CT) with a 45-minute break each day beginning at 5:15 p.m. (4:15 p.m. CT)
Contract Size	250 pounds of U308	
Price Quotation	U.S. Dollars and Cents per pound	
Minimum Fluctuation	\$0.05	
Floating Price	The Floating Price for each contract month will be the month-end spot U308 price published in Ux Weekly for the contract month by Ux Consulting Company, LLC (UxC). For settlement of this contract, the month-end spot price provided by UxC will be considered final on the payment date stated in Rule 970.08 and will not be subject to any further adjustment.	

Source: [http://www.cmegroup.com/trading/metals/other/uranium\\_contract\\_specifications.html](http://www.cmegroup.com/trading/metals/other/uranium_contract_specifications.html), which was accessed on November 23, 2014.

## The Uranium Market versus the Criteria for the Successful Launch of a Futures Contract

### Sandor's Criterion Met: There Should be Sufficient Volatility

Sandor (1973) notes that one criterion for a futures contract to be successful is that the price variability of the commodity must be sufficient. That would appear to be the case for uranium prices. Noted U.S. Senate (2014): "In recent years, the uranium market has experienced significant price fluctuations, based on massive swings in market sentiment towards nuclear power and technology changes for alternative sources of energy." This is illustrated in Figure 1.

Figure 1



Source of Graph: U.S. Senate (2014), p. 122, which, in turn, accessed the graph from the Ux Consulting Company, LLC, <http://www.uxc.com>.

### Pirrong's Criterion Not Met: There Should be Fragmented Marketing Chains

Pirrong (2014) notes that "futures contracts are most viable when ..." not only are there "large holdings of inventories to be hedged", but also when "there are relatively fragmented marketing chains ..."

In contrast, there is a "lack of [trading] counterparties in the [uranium] market, [which] add[s] to the risk of holding uranium assets," according to the 2014 U.S. Senate report, which, in turn, cited a December 2008 Goldman Sachs memorandum on uranium trading.

In explaining why pulp futures contracts have never become successful, Pirrong (2014) explained that there has been "a lot of *vertical integration* in pulp, and even freely traded pulp ... [has] not been traded in long chains like grain or oil is. [As a result, there are] few trader intermediaries [in the pulp markets]." (Italics added.)

Does this consideration apply to uranium? The short answer is yes.

According to the World Nuclear Association (2014), "With the main growth in uranium demand being in Russia and China, it is noteworthy that the vertically-integrated sovereign nuclear industries in these countries (and potentially India) have sought equity in uranium mines abroad, bypassing the market to some extent."

## Gray's and Silber's Criterion Not Met: There Should be a Level Playing Field Amongst Participants

Both Gray (1966) and Silber (1985) discuss how, in order to be willing to provide liquidity to a futures market, speculators should not be at a large informational disadvantage.

In contrast, the 2014 U.S. Senate report quoted a December 2008 Goldman Sachs memorandum as stating that the uranium "market was characterised by 'long-term physical participants trading with each other,' which could lead to significant informational disadvantages for new entrants ..."

## Conclusion

While uranium prices have been sufficiently volatile to merit a futures contract, it appears that the industrial organisation of the uranium industry has not been conducive to the success of a futures contract, analogous to other failed futures contracts.

## Endnotes

This article is excerpted from a seminar in Chicago on why some futures contracts have succeeded while others have failed, which was provided by the author to staff from the Shanghai Futures Exchange.

The information in this article has been assembled from sources believed to be reliable, but is not guaranteed by the author.

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- World Nuclear Association, 2014, "Uranium Markets, April. Accessed via website: <http://www.world-nuclear.org/info/nuclear-fuel-cycle/uranium-resources/uranium-markets/> on November 23, 2014.

## Timing Indicators for Structural Positions in Crude Oil Futures Contracts

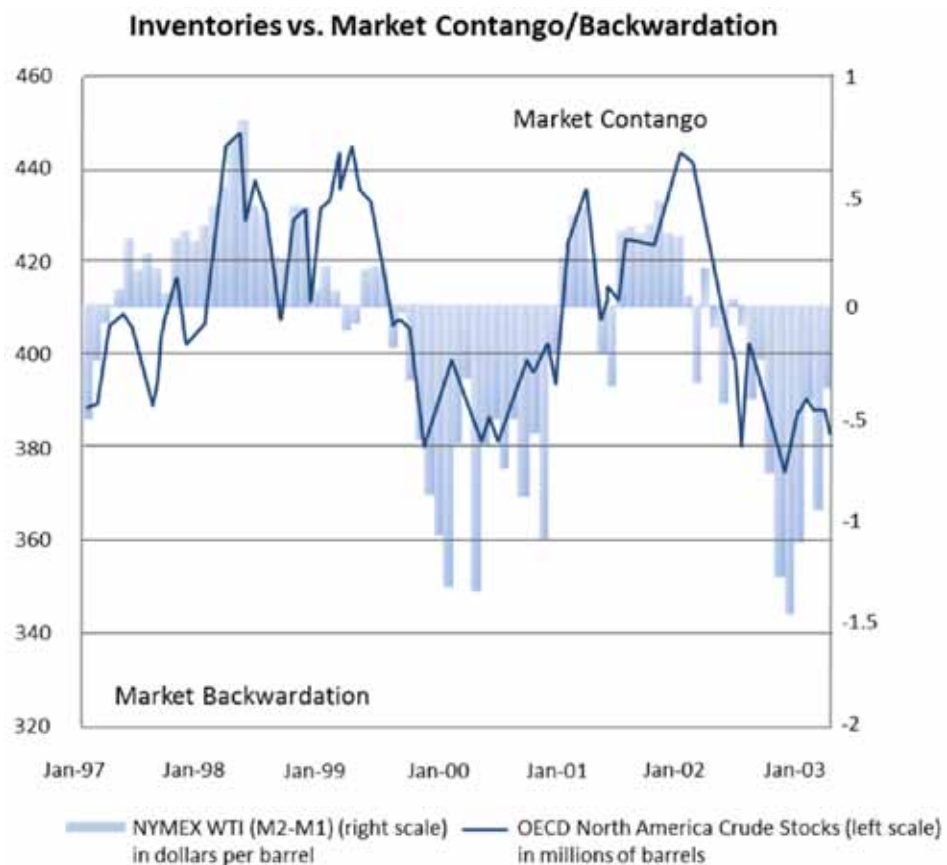
This digest article will argue that it is plausible that there are two fundamental metrics that could be useful for deciding upon crude oil futures positions: (1) whether there are ample inventories or not; and (2) whether spare capacity is at pinch-point levels or not. The article will further argue that a dynamic allocation strategy alone is not sufficient for holding the line against losses in a crude-oil-dominated strategy: financial asset diversification must also be employed.

### Ample Inventories Can Potentially Be Proxied By Roll-Yield-Related Measures

A futures contract's roll yield is positive when the near-month futures contract trades at a premium to deferred-delivery contracts, forming a curve shape referred to as "backwardation." Conversely, the roll yield is negative when the near-month futures contract trades at a discount to deferred-delivery contracts, forming a curve shape referred to as "contango."

When crude inventories have been ample, the front-to-back futures spread has been in contango; and when inventories have been scarce, the front-to-back spread has been in backwardation. This is illustrated in Figure 1. One should consider only taking long-term positions in oil when inventories are scarce, as indicated by the futures curve shape.

Figure 1



Graph based on Tchilinguirian (2003), Left-Hand-Side of Slide 18.

Explanation of Abbreviations: NYMEX = New York Mercantile Exchange; OECD = Organisation for Economic Co-operation and Development; and M2- M1 = Second-Month Futures Contract Price Minus First-Month Futures Contract Price.

### The Avoidance of Crash Risk by Examining the Spare Capacity Situation

One could argue that there is a second fundamental metric that should be taken into consideration with oil positions, and that is the spare capacity situation for oil. To motivate why the spare capacity might be quite important to the behaviour of crude oil prices, one can review the circumstances of 2008. We found out from the events of that year what happens when the oil excess-capacity

cushion becomes quite small. In July 2008, the role of the spot price of oil was arguably to find a level that would bring about sufficient demand destruction so as to increase spare capacity, after which the spot price of oil spectacularly dropped.

As discussed in Till (2016), in addition to OPEC spare capacity, one "may also [need to] include North American drilled, but uncompleted wells, as *de facto* spare capacity" as well.

It may be wise to exit a long-term position in oil futures contracts if there is an indication of low spare capacity (properly defined) in order to avoid the potential of an eventual crash risk. Further, for some market participants, it may also be advantageous to avoid crude oil futures exposure when there is minimal global oil spare capacity so that their trading strategy would not be viewed as "predatory," as advocated by Joseph Eagleeye of Premia Research LLC.

## Return Comparison

How would have returns from holding a structural position in Brent oil futures contracts changed if one only took positions in crude oil when (a) the crude futures curve was backwardated; and (b) there was sufficient spare capacity? The answer is that historically, negatively skewed returns became positively skewed. This return comparison is shown in Figure 2.

Figure 2

<b>Brent Futures (Excess) Returns</b>		
<b>February 1999 through January 2015</b>		
<b><u>Based on Monthly Data</u></b>		
	<b>Unconditional Monthly Returns</b>	<b>Conditional on Previous Month's OPEC Spare Capacity &gt; 1.8 mbd AND Brent Front-to-Back Spread &gt; 0 Monthly Returns</b>
<b>Arithmetic Average:</b>	<b>1.2%</b>	<b>2.0%</b>
<b>Skew:</b>	<b>-0.18</b>	<b>0.12</b>
<b>Minimum:</b>	<b>-34%</b>	<b>-15%</b>

Source: Till (2015b), Figures 9 and 13.

Sources of Data: Bloomberg and the Energy Information Administration.

Explanation of Abbreviation: "mpd" stands for million barrels per day.

The strategy, conditional on both ample spare capacity *and* the Brent futures curve trading in backwardation, is positively skewed with its worst monthly return being -15%. In this case, one only held crude oil futures contracts 45% of the time, and the returns shown in the right-hand column of Figure 2 were only calculated when both conditions held.

A strategy of historically only entering into Brent futures contracts when (1) there had been sufficient spare capacity and (2) when there had been low inventories (as implied by the futures curve) has historically had appealing option-like characteristics. This dynamic allocation strategy has historically behaved as if it owned collars on crude oil. Collars are a combination option strategy of buying out-of-the-money puts financed by selling out-of-the-money calls. Across quartiles of Brent futures returns, the conditional strategy essentially gave up the possibility of very large returns in exchange for avoiding quite negative returns, as discussed in Till (2015a).

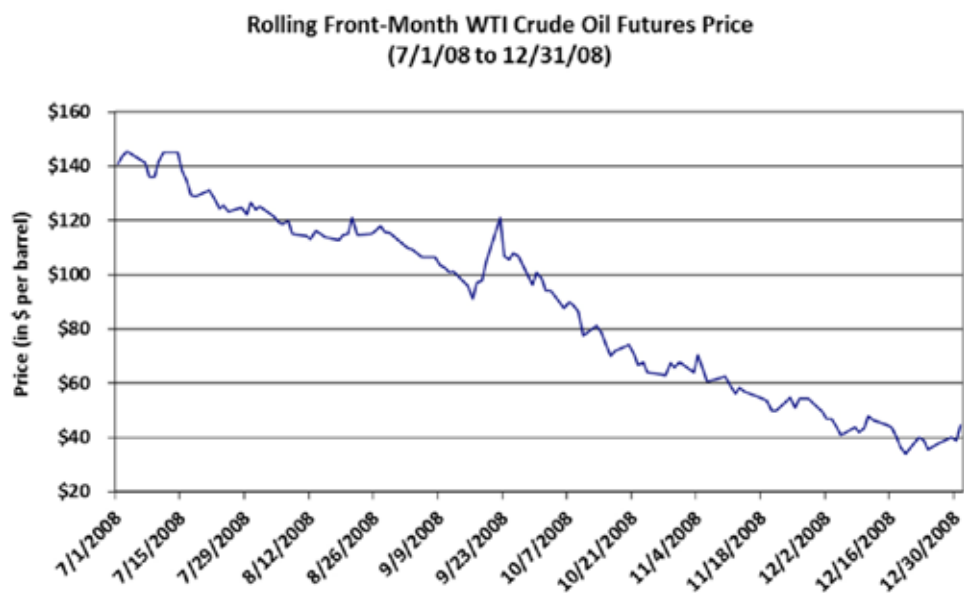
In examining the level of fees that hedge funds have been able to charge for moving the return distribution of an asset class to the right, one might conclude that investors highly prize positive skewness. Therefore, it is useful to examine a strategy's potential option-like characteristics such as was briefly done in this section.

## Financial Asset Diversification for Downside Hedging

The use of timing indicators for deciding upon crude oil futures holdings may be necessary, but is probably not sufficient for this allocation decision. Based on historical data, it appears that one should also consider natural hedging strategies. As explained by Evans-Pritchard (2014), whom in turn cited data from HSBC: "Tumbling oil prices ... have been a bonanza for global stock markets, provided the chief cause has been a surge in crude supply rather than a collapse in economic demand." In this scenario, an equity hedge would serve as an appropriate hedge for petroleum complex holdings. That said, declining oil prices have not always preceded equity-market rallies. If oil prices are undergoing a dramatic decline because of "the forces of global recession," this can overwhelm "the stimulus or 'tax cut' effect for consumers and non-oil companies of lower energy costs," summarised Evans-Pritchard (2014). Under that scenario, a Treasury hedge may be the most effective hedge for petroleum complex holdings.

For example, during the collapse of oil prices during the Great Recession and Global Financial Crisis of the latter half of 2008, Treasuries performed quite well. Please see Figure 3.

Figure 3  
Crude Oil Prices and Treasury Note Futures Returns During 2H08



Source of Data: The Bloomberg.

**10-Year U.S. Treasury Note Futures Excess Returns:  
Under 2H2008 Scenario**

**13.8%**

[Calculated based on rolling the futures contract on  
the first business day of the first-notice-day month.]

Source of Data: Commodity Research Bureau.  
Calculations based on work by Joseph Eagleeye of Premia Research LLC.

If one accepts this article's arguments, then what should be the precise mix of oil-dominated commodity positions, equities, and bonds? In practice, this depends on an investor's (a) return expectations, (b) loss aversion, and (c) tolerance to periodically underperforming one's peer group. For example, in practice, institutional investors are averse to underperforming their peer groups over three-to-five year time frames, and this consideration has historically (apparently) dominated maximising long-term returns. If this is the case for a particular investor, then this fact may need to be taken into consideration in determining an investor's precise asset allocation mix, including oil.

## Conclusion

In addition to examining whether crude oil has ample inventories, which can be inferred from the crude oil's curve shape, a trader or investor might find it advisable to also examine the spare capacity situation for crude oil. But for long-term position-taking in oil futures contracts, even these timing indicators may not be sufficient for holding the line against losses, especially during a deflationary shock. In that case, it may be that prudent portfolio construction is also necessary.

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