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## Active "Commodities- Based" Investing

1. Describe your overall investment strategy.

We attempt to identify opportunities in the commodity futures markets where we have a systematic edge. These opportunities can be briefly summarized as instances where either a commodity futures price or a commodity futures spread is a biased estimator for the future spot price or spread level. When this occurs, one can set up positive expected value investments, monetizing this bias.

We have found several classes of trades where a commodity's futures price embeds more than just a forecast of the future spot price. In each of these categories, the futures price also embeds some form of *premia*.

2. What is the range of Investment Strategies that you invest in (e.g., agricultural, metals, energy?)

In our commodity-only program, we exploit opportunities in all commodity sectors, including the energy, agriculture, livestock, precious-metals, and base-metals sectors.

3. What is the basic concept used in your strategies.

We classify our commodity-futures strategies as follows:

- The structural imbalance strategy;
- The weather fear premium strategy; and
- The structural rigidity strategy.

Each is briefly described below.

Structural Imbalance

One class of trades results from there being a structural imbalance among natural buyers and sellers. When there is a preponderance of natural commercial buyers, the futures price will be biased upward in order to induce speculators to take up the other side of the transaction. And similarly in the case of there being an imbalance of natural commercial sellers.

Weather Fear Premium

A futures price will sometimes embed a fear premium due to upcoming, meaningful weather events. One cannot predict the weather, but one can predict how people will systematically respond to upcoming weather uncertainty.

In this class of trades, a futures price is systematically too high, reflecting the uncertainty of an upcoming weather event. We say the price is too high when an analysis of historical data shows that one can make statistically significant profits from being short the commodity futures contract during the relevant time period. And further that the systematic profits from the strategy are sufficiently high that they compensate for the infrequent large losses that occur when the feared, extreme weather event does in fact occur.

Structural Rigidity

For some commodity markets, there can be such enormous structural rigidities that futures prices have to do a lot of work to encourage certain production choices. These rigidities may be so persistent that a futures price consistently undershoots the level it needs to go to in order for commercial participants to change their behavior to one required by the overall economy.

4. Academic research has pointed out that the futures markets are zero sum games. What is your response? What are the unique any benefits or disadvantages to your investment approach?

When one only focuses on the narrow realm of commodity futures markets, it is obvious that for every winner there must be a loser. But this simplifies away the fact that each commodity futures market is embedded within a wider scheme of profits, losses, and risks of its physical commodity market.

Commodity futures markets exist to facilitate the transfer of exceptionally expensive inventory risk. Moreover, commodity futures markets allow producers, consumers, and marketers the benefit of laying off inventory price risk at their timing and convenience. For this, commercial participants will tolerate paying a premium as long as this cost does not overwhelm the overall profits of their business enterprise. This can be one of the key sources of returns for a commodity investor.

The advantage of an approach which seeks to earn a systematic return for bearing commodity inventory risk is that it is statistically unrelated to other available investments.

The disadvantage of this approach is that it relies on the continued existence of a number of structural phenomena detectable in historical data. In effect, our approach is "short structural shifts." But unlike certain hedge-fund strategies like bond relative-value programs, the sort of structural shifts our program can suffer from are unrelated to structural changes that negatively impact the stock market.

5. What is an absolute return strategy and do you regard your strategy as an absolute return strategy or one that has an appropriate benchmark?

We would define an absolute-return strategy as one which is skill-based and which has a low Beta to major asset classes and styles.

We consider our approach to be total-return-focused.

One could argue that our benchmark should be the stock market since in some very broad-based way, our returns will be a function of the stock market's. When returns from the stock market are high, we would expect that the commodity markets would be starved for risk capital. This means that returns for the provision of liquidity will have to be correspondingly high to encourage speculators to devote money to this activity rather than equity speculation. The hurdle rate for commodity investing becomes high equity-market returns.

Also, since one could argue that there are structural impediments to commodity speculation, one can expect that even higher returns are required for commodity-market participation compared to what the equity market needs to offer investors.

On the other hand, one can theoretically argue that an investment which is negatively or lowly correlated with the stock market can be allowed to have lower returns than the stock market and still have a valid place in an investor's portfolio. It is just that in the case of commodity futures investments, this proposition is not supported empirically. For this latter argument, I rely on long-term historical comparisons of passive stock investments with passive, diversified commodity futures baskets. These comparisons show that the two asset classes have equivalent returns.

6. Is there an index you consider appropriate as a benchmark (e.g., MLM agricultural subindex?) Why or Why not?

For reasons given above, we believe that our results would be compared to the alternative of investing in the stock market.

7. Do you separate managed futures from hedge fund strategies or do you consider them a part of the same universe.

We consider them in the same general alternative-investment universe.

8. Please provide a thorough explanation of your research/trading system selection process. What factors influence your decisions.

- Our futures program scans all commodity futures markets, searching out statistically significant price patterns. We then see if one can link fundamental drivers to the observed price patterns so that we can understand what gave rise to the persistent phenomena found in the data. We want to understand if there is an economic rationale for the empirical regularities we discover so that we reduce the chance that the patterns were in fact randomly generated.

- Our goal for each price pattern is to build a model which can explain at least 70% of the variation in yearly return outcomes. These models include both fundamental and technical factors. With an objective model in hand, we are then able to make price predictions for each market and also derive a confidence band for the prediction.

- These models give an idea of projected price changes over a month to four-month timeframe. One must keep in mind that even with a model which has a narrow confidence band for predicting an outcome one month from now, one can still have considerable daily volatility on the way to arriving at the predicted outcome.

- The advantage of commodities as an asset class (compared to bonds, equities, and currencies) is that individual commodity markets across sectors are uncorrelated or even negatively correlated to each other. From a portfolio construction standpoint, this is very helpful. It enables an investment manager to fully take advantage of diversification in setting up a dampened-risk portfolio.

- We generally keep each commodity position size modest and make sure that each new strategy has a correlation of less than 60% to existing strategies in the portfolio. The goal is to create a portfolio of commodity strategies with dampened volatility.

- Our portfolio construction process is explicitly centered around avoiding drawdowns (rather than minimizing volatility.) For each strategy we examine its maximum historical drawdown and then scale the size of each strategy accordingly. This risk measure is usually higher than one based on recent volatility to get an indication of risk.

- Our portfolios are objectively put together with the goal of a monthly loss as large as –7% occurring only once in about two years.

9. What software systems do you use in your research efforts?

We use Excel and Matlab.

10. Do you use leverage to change the underlying risk of the portfolio: What are the advantages and disadvantages?

We monitor value-at-risk levels in the portfolio. Our constraint is to keep portfolio risk under a certain tolerance level rather than limiting leverage.

The advantage of allowing leverage is that we can take advantage of a number of spreading opportunities in the commodity futures markets. Futures spreads are frequently more analytically tractable than outright futures positions.

The disadvantage is the consequent care in risk-modeling that one needs to do. Fortunately, for most of the markets we trade, we have at least 20 years of daily data with which to estimate maximum historical loss per position. The length of the data set means that a number of market cycles are included in our scenario testing.

11. Have you been involved in overlay strategies and can your investors fit the exposures driven by your strategies into his/her own existing asset allocation?

I will answer this question by outlining our general philosophy since we are not marketing our efforts to investors at this time. I will address this question by noting how in general we see alternative investments fitting into an investor's overall portfolio.

A number of successful alternative investment strategies derive their returns from facilitating risk transfer. They efficiently assume second-order risk(s) in a levered fashion from those who want to lay off or alter their first-order risk exposures. Another way of putting this is that these risk agents take on relatively illiquid positions from commercial participants and hedge themselves with correlated liquid positions. The speculators will provide liquidity to commercial participants only if they can enter these spread positions at levels which compensate them for assuming this basis risk. This description generically describes the activity of relative-value bond investors, statistical arbitrageurs in the equity markets, and exchange and OTC market-makers.

Provision-of-liquidity strategies are capacity-constrained by definition. Once a trade becomes sufficiently large, its investors must pay for the privilege of having someone else take on its risk. Therefore, if one recommends alternative investment strategies to all investors, the sizing has to be constrained to an overlay.

The alternative investment strategies can then serve the following important function in an investor's portfolio: the strategies can recoup the bid/ask spreads and price-pressure costs the primary portfolio had to pay out in assuming first-order risks. The strategies also help to recoup the transaction costs incurred when shifting first-order risks during asset-allocation changes.

12. Some individuals say that any long/short commodity investment is basically a bet on volatility (e.g., look back option) others say that the source of profitability is low volatility (e.g., absolute return in low volatility markets). What is your view?

Our view is that most economically-viable basis trades can be viewed as being short volatility. More specifically, one is short 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.

13. How do you address and control the various types of risk typically associated with commodity investing (e.g., changing seasonality patterns etc.).

A structural shift is a risk endemic to our program. We reduce this risk (but cannot eliminate it) by diversifying our portfolio into a number of unrelated commodity markets. We also liberally use out-of-the-money options to truncate risk.

14. What principals guide your overall risk control?

Our goal is to limit peak-to-trough drawdowns.

15. How do you measure anticipated volatility for the investment horizon?

We perform scenario tests per position and then on a portfolio-wide basis we examine recent three-month volatility.

16. How do you handle capacity issues?

From the outset, we recognized that the nature of our current program, like all provision-of-liquidity strategies, limits capacity.

We would expect over time to be able to expand capacity by entering into longer time horizon, over-the-counter derivatives transactions where there are also opportunities to monetize liquidity premia. We would expect, though, that the result would be a lower Sharpe ratio program than our current effort.

17. What are you looking for in new strategies?

- Statistical significance;
- An economic rationale for their existence; and
- Lack of correlation with existing strategies.

18. Please describe you research and development activities. Explain how you analyze a strategy position before investing.

Our investment process consists of the following steps:

- Trade discovery,
- Trade construction,
- Portfolio construction, and
- Risk Management.

Trade Discovery

We start our trade discovery process with statistically significant price patterns. This usually involves slicing up historical price data in non-obvious ways to see if any structure appears. Next, we determine if there is a fundamental rationale for the price pattern within a structural framework that seems applicable across markets.

While most of our ideas come from our own data analyses, there are two exceptions. Sometimes we get our ideas from academic articles which point out empirical regularities and attempt to explain why an anomaly appears. Other times we become aware of funds and traders who seem unusually, consistently successful, so we will research their markets to see if we can find statistically significant phenomena.

We will initially create a working hypothesis for why a trade should work based on fundamental research, but we find that our creativity only truly blossoms when we have investment risk. At this point, we become very receptive to information about the markets, leading us to come up with more ideas on other potential drivers which are influencing price.

Typically various trade commentaries ascribe causality of price moves to some underlying factor, but one never knows how to weight this factor with other known factors. This is where our regression modeling comes in.

We examine various explanatory factors within a multiple regression framework to objectively explain the variation in historical outcomes of the statistically significant trade. Given current values of the factors, we then create confidence intervals for the current period's expected outcome. If a trade's confidence interval solely incorporates outcomes which are consistent with the normal result of the statistically significant trade, we will typically add the trade to our portfolio. We may not add a new trade to the portfolio if it is more than 60% correlated with existing trades.

There are a few instances where we may not create a model for a trade. If a trade has massive statistical significance, we will sometimes conclude that something structural is occurring even if we have not fully identified what is causing the empirical regularity.

Trade Construction

Creating structural models has helped us in efficiently using capital to best lever the returns from a commodity view. We have found that one can have a correct commodity view, but how one constructs the trade to express the view can make a large difference in profitability.

As noted above, each trading model gives a confidence interval around its prediction. In the case of predicting the direction of an outright commodity, we have found that options have been the best trade-construction tool. Options are priced based on risk-neutral probabilities and not on the probabilities in one's structural model. Given a model's confidence interval for an expected (say positive) price change, we will buy out-of-the-money calls and fund them with out-of-the-money put spreads. In other words, we are buying likely outcomes and funding this purchase by selling unlikely outcomes. The risk on the position is strictly limited by the difference in strikes in the put spread. Thus far, we have found this trade-construction technique to be the most efficient in terms of maximizing returns per unit of capital employed.

We also trade futures spreads. We have found spreads to be more analytically tractable than trading outrights. There is usually some economic boundary constraint that links related commodities, which typically limits the risk in position-taking. Also, one hedges out a lot of first-order, exogenous risk by trading spreads. For example, with a heating-oil-vs.-crude-oil futures spread, each leg of the trade is equally affected by unpredictable OPEC shocks. Instead, what typically affects the spread is second-order risk factors like timing differences in inventory changes among the two commodities. It is frequently easier to make predictions regarding these second-order risk factors than the first-order ones.

Whether the trade is structured as an option strategy, outright, or spread, we size each trade to limit its risk to –3%.

In calculating the risk of a position we use the scenario that provides the worst-case result.

Portfolio Construction

Trades are typically added to the portfolio if they are not correlated to existing trades in the portfolio. Our correlation cut-off is 60%. Also, portfolio-wide risk is limited by the following measure. Based on three months of daily data, 2 times monthly portfolio volatility should not exceed 7%.

Risk Management

In addition to sizing the portfolio's position such that its monthly value-at-risk does not exceed 7%, we also do portfolio-wide scenario testing. We examine what the worst-case 3-day loss would have been if one had held the portfolio in the past. The time period over which this is done is based on the availability of each trade's historical data. We ensure that this worst-case loss number does not exceed 7%.

19. What sources do you use for your investment ideas or selections? How do you see the research and system application process changing in the future?

In the past we have gotten ideas from trade publications, industry experts, successful traders, and academic journals.

In the future, we plan on automating each step of our investment process to the extent possible. We believe that the more our investment process is automated, the greater the potential depth of our future research.

20. Over the time period that you have operated what past periods were most difficult? How are they the same or different from today?

As I noted before, we are at risk to structural shifts.

Price always serves some economic function in influencing the behavior of market participants. Frequently a historical analysis of price data will indicate what behaviors of commercial interests typically need to be encouraged during certain times of the year.

During the latter half of last year, we had trades in the energy markets which relied on historical price behavior reoccurring. These trades did not work since the main function of price at that point was to discover the price level at which OPEC would increase production. This factor overwhelmed other typical factors and its occurrence was not in our historical data so we missed its overriding significance. That said, this failure in analysis was not catastrophic since we overlayed our outright positions with out-of-the-money options.

Our method of analysis can adjust for structural shifts but only after the fact. For example, federal government incentives for soybean planting shifted dramatically after 1996. As of 1999, our models appeared to have enough data to capture what the new function of price is during certain key times in the soybean market.

21. Research has indicated that long only commodity investing may not have a natural long-run positive return except in unique circumstances (e.g., scarcity). What is your experience?

We believe it is very difficult to consistently make money in any investment activity and that there are very few good ideas on how to do so. We have concluded that there needs to be some economic function performed by one's speculative endeavor in order to earn consistent returns. Holding a passively-constructed, long-only commodity basket may not be the best way to satisfy this criteria.

But this answer is incomplete. Our historical analyses indicate that there is indeed a natural long-run positive return, but only to a *specific* kind of long-only commodity investing. One's long-only portfolio should contain only those futures contracts which are undervalued relative to their eventual spot price. There is a subset of commodity futures contracts which historically have had statistically significant returns and for which there are theoretical grounds for this return existing. One's long-only commodity investing should probably be confined to this class of contracts.

22. Under what conditions do you expect to be most profitable relative to a long/short futures/options trader who trades primarily financial markets?

Our performance relies on different factors than financial-market traders.

It is conceivable that we would do particularly well relative to these traders during the times when normal financial-market relationships break down.

23. How do you prevent a system from evolving into a passive approach in which no manager or trader discretion is used? In short, at what point do you allow a trader to sit this market out, regardless of the computer driven signal.

We strongly believe in systematic trading based on using models. There is a depth of analysis and objectivity that is impossible for us to duplicate based on judgment alone.

That said, quantitative techniques do not negate the need for judgment. A model's high explanatory power may be based on fitting a handful of extreme outcomes whose circumstances differ from today. Or, current values of relevant factors can be extreme outliers so one needs to decide if one's predictions based on these values are valid. Also, structural shifts can occur which are not well represented in one's dataset.

The first part of the question asks how we prevent the temptation to passively follow one's system. The short answer is that the market imposes a sufficient discipline to prevent this from occurring (or occurring for long!)

The second part of the question asks at what point does one ignore one's system. We usually only know after the fact if a model is not appropriate for a market. When a model does not work, we see if there are additional factors we should examine to explain a trade's outcome. If we are confident that a new model incorporates the current state of the world, we will continue to trade that market systematically. Otherwise, we will sit out of that market's trades.

24. Are there any regulatory or tax changes that you see on the horizon that may affect your business.

Given how highly regulated the futures business is, I would expect that we would be impacted by all relevant regulatory and tax changes.

25. There have been recent advances in weather forecasting as well as technological changes which impact hog production and transportation? How do these changes affect your trading strategies?

It is very plausible that changes noted in this question could impact us. One large class of trades we do is based on the waxing and waning of weather fear premiums which are frequently embedded in the various agricultural futures contracts. To the extent that improvements in weather forecasting reduced this uncertainty, the risk premiums should be correspondingly reduced. It does not appear though that weather forecasting has improved sufficiently just yet to reduce the uncertainty surrounding key weather times.

I would expect that changes in the organization of any commodity industry would impact us, including changes in the hog industry. There tends to be a downward bias in livestock futures contracts relative to where the contracts eventually mature. This downward bias is likely due to producer hedging pressure. Our program benefits from being on the other side of this concentrated hedging pressure. If the organization of the hog industry changed such that producers were not price-takers and therefore in such a need of forward-price hedging, then we would lose another source of risk premia.

26. Are there any market based or external business based conditions that are affecting your strategy.

We stay aware of how the stock market is doing since we regard it as our investment bogey.

27. Do you see changes in fund forms (structure notes, insurance products) entering your area?

Provided that the mark-up to the investor is not too great and one is not misrepresenting the nature of the underlying risk in the investment, these kind of products make a lot of sense. An investor is assured of limited risk when investing in this way.

28. Are there any important points that I have failed to ask that you believe the investing public should know about this strategy.

I would make sure that I emphasized that our identification and exploitation of a number of empirical anomalies are not riskless arbitrages. Rather our strategies are positive expected-value investments with good return-to-risk profiles.

29. Enter your own favorite question and answer it.

Could your approach have any applicability to the financial markets?

If we characterize our approach as follows, then yes, our approach could have applicability to the financial markets. Our approach primarily consists of understanding where we can earn a return for providing liquidity. Frequently, one can find such opportunities in futures markets where statistical studies show that the futures price has been a biased estimator of future spot rates.

The following are potential applications of our approach to the financial markets.

Our focus on monetizing risk premia can be applied to the fixed-income markets. The typically steep yield curve, especially in the short-end of the curve, provides the potential for a number of statistically significant "curve roll-down" strategies.

In the stock market, there are a number of price-pressure opportunities due to the enormous amount of investment in indexing. The addition and subtraction of stocks from the indices create statistically detectable price-pressure effects.

In a number of financial futures markets, there are times when the natural commercial participation is one-sided (say predominantly short.) When it comes time for a front-month futures contract to be rolled, there is statistically detectable roll pressure on the spread between the front-month contract and the next contract. In the case of where the natural commercial participation is structurally short, the front-to-back futures spread appreciates during its roll period.

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