What are the Sources of Return for CTAs and Commodity Indices?

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CTAs and Commodity Indices

I. **Return Sources: Momentum, Roll Yield, and the Rebalancing Premium**

II. **Portfolio Context**

III. **Benchmarking**

Icon above is based on the statue in the Chicago Board of Trade plaza.

I. Return Sources

A. Momentum

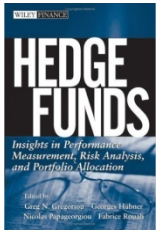
B. Roll Yield

C. Rebalancing Premium

Source of Graphic:
Chicago Board of Trade / CME Group.

I. A. Momentum

Trend-Following is the Predominant Style Amongst CTAs



"Although there are two basic types of CTA's, discretionary and trend-following, the investment category is dominated by trend-followers.

Trend-followers are also known as systematic traders. The operative word here is systematic.

Automated programs screen the markets using various technical factors to determine the beginning or end of a trend across different timeframes."

Source: Till and Eagleeye (2005).

I. A. Momentum

Hypothetical Performance from January 1903 to June 2012 Across Asset Classes and Timeframes

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 (Annualized)	Net of 2/20 Fee Returns (Annualized)	Realized Volatility (Annualized)	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.

I. A. Momentum

Stock Price Momentum in London between 1867 and 1907, and in the United States Between 1927 and 2012

"[M]omentum has earned abnormally high risk-adjusted returns … between 1927 and 2012 and … between 1867 and 1907 ...

However, the momentum strategy also exposed investors to large losses (crashes) during both periods.

Momentum crashes were predictable - more likely when momentum recently performed well (both eras), interest rates were relatively low (1867–1907), or momentum had recently outperformed the stock market (… [1927-2012]) — times when borrowing or attracting return chasing 'blind capital' would have been easier."

Source: Chabot et al. (2014).

I. B. Roll Yield

1. **Across Asset Classes**

2. **Amongst Agricultural Futures Contracts**

3. **Across Commodities**

4. **As a Timing Indicator for Crude Oil Futures Positions**

I. B. 1. Roll Yield Across Asset Classes

"[T]he roll yield is simply the excess benefit or cost of owning the underlying asset."

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

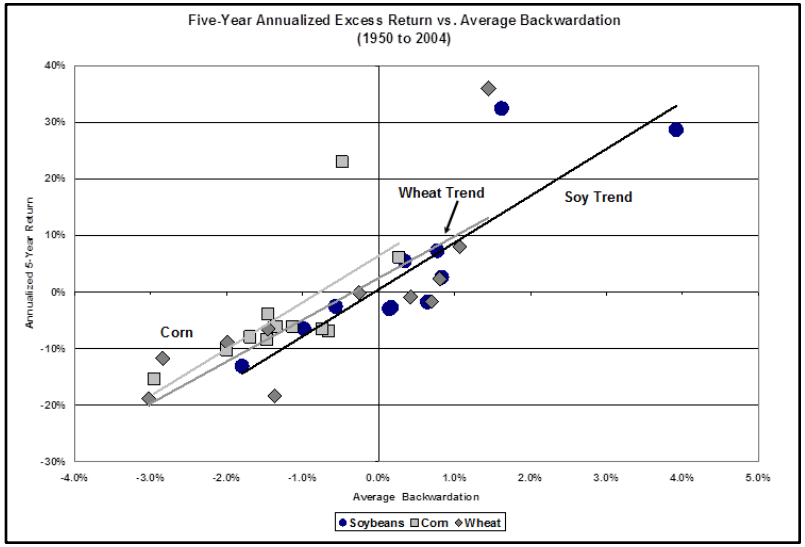
[1] In fixed income markets, there is an additional component to returns called the yield curve "rolldown" (unrelated to futures roll yield) which occurs over time as the bond cash flows experience different points along the yield curve.

Source: Campbell & Company, (2014), Exhibit 3.

I. B. 2. Roll Yield and Agricultural Futures Contracts

Long-Term Return Driver Across Timeframes

We can also examine the impact of a futures contract's structural curve shape *across time*, for those contracts that have long histories.



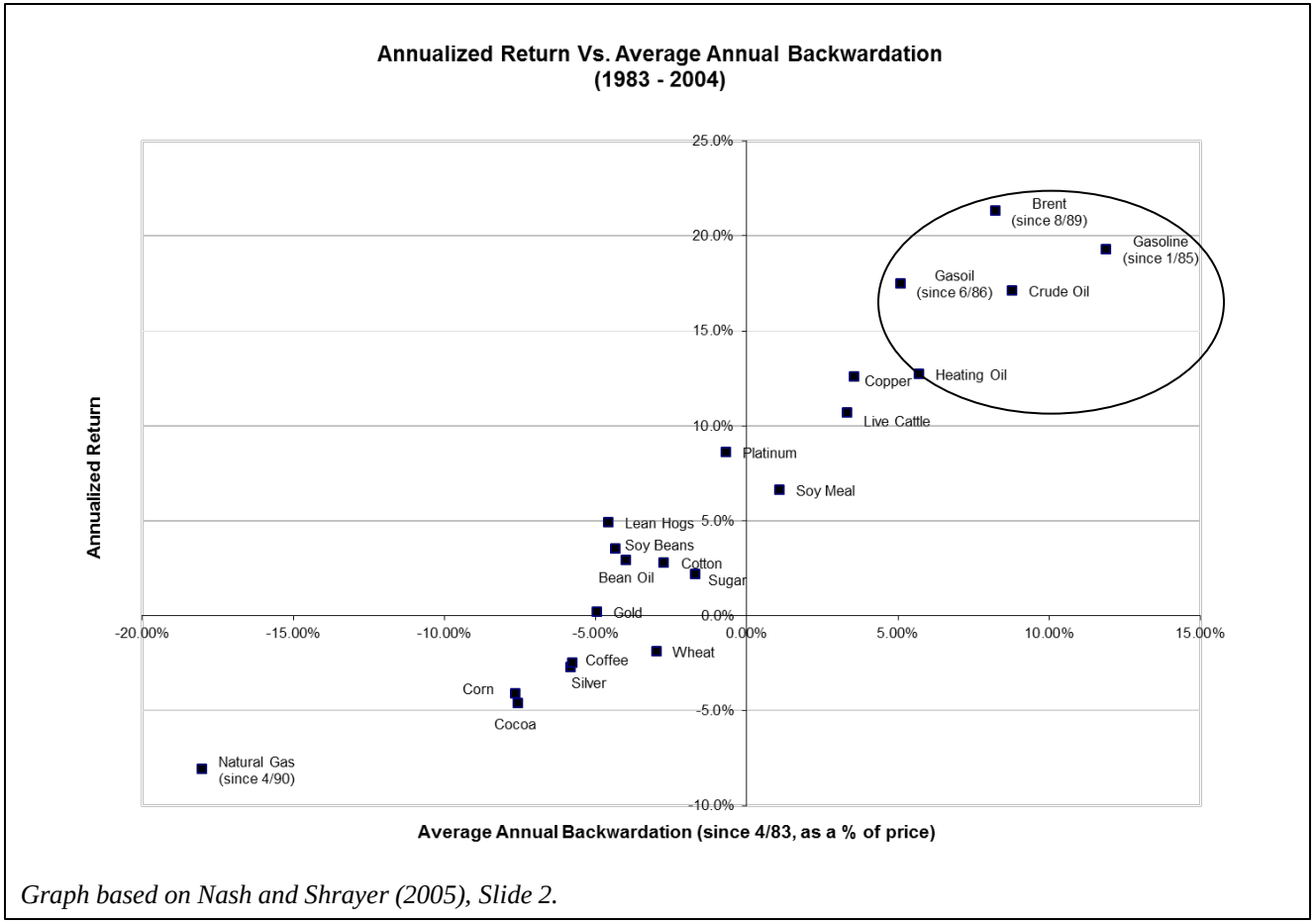
Graph based on research undertaken during the work that led to the article by Feldman and Till (2006).

Over a 50-year-plus timeframe, the returns of three agricultural futures contracts were linearly related to their curve shapes *across time*: this result only became apparent at five-year intervals.

Source: Feldman and Till (2006).

I. B. 3. Roll Yield and Commodities

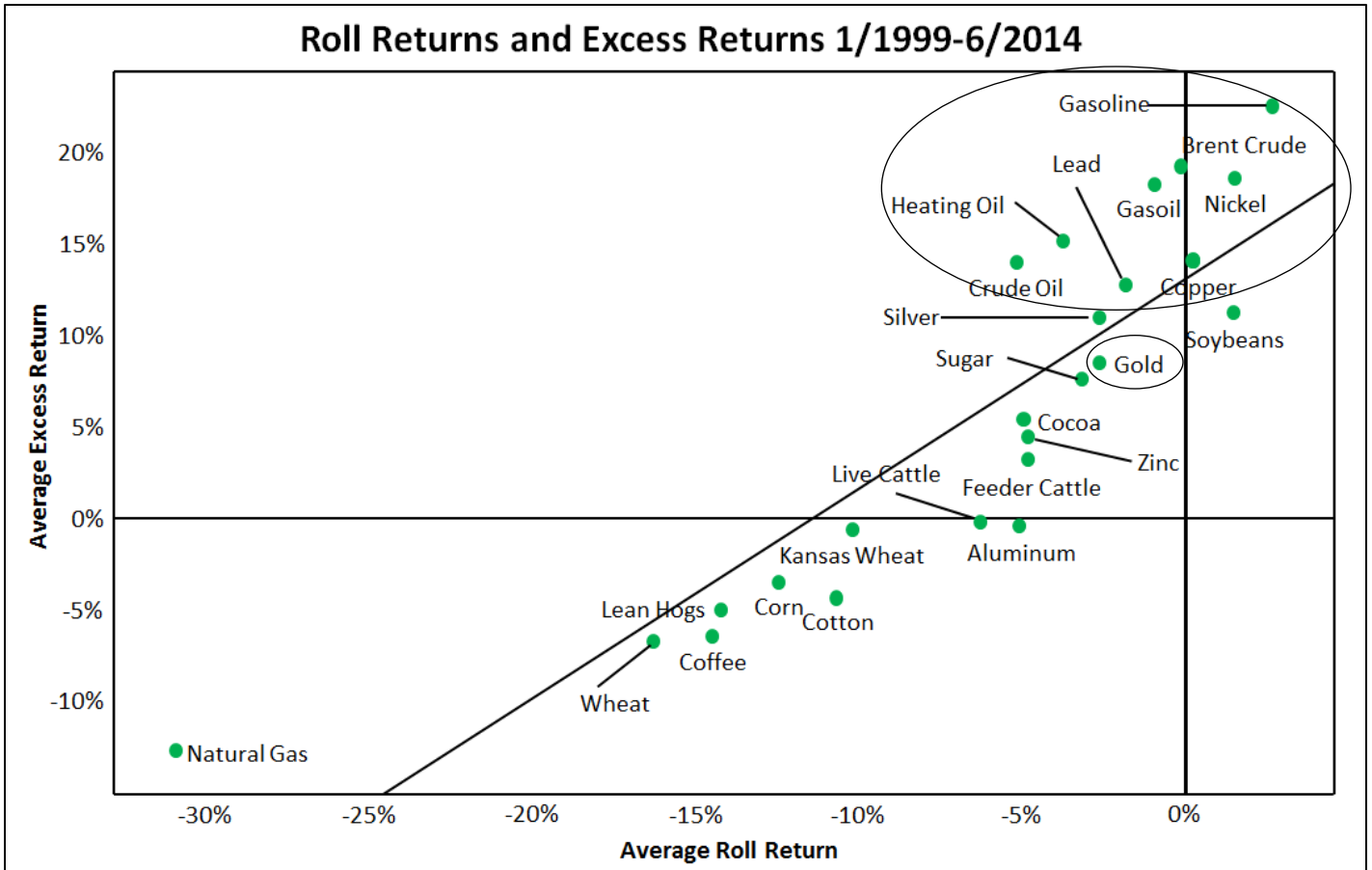
Long-Term Return Driver Across Commodities



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

I. B. 3. Roll Yield and Commodities

Long-Term Return Driver Across Commodities



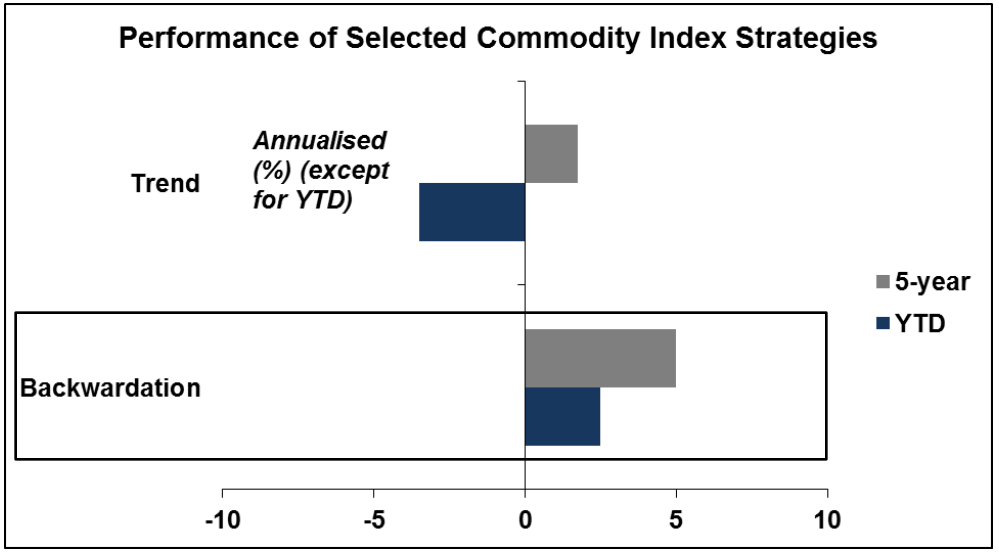
Graph based on Arnott (2014), Slide 16.

Markert 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)."

I. B. 3. Roll Yield and Commodities

Recent Returns, according to Barclays

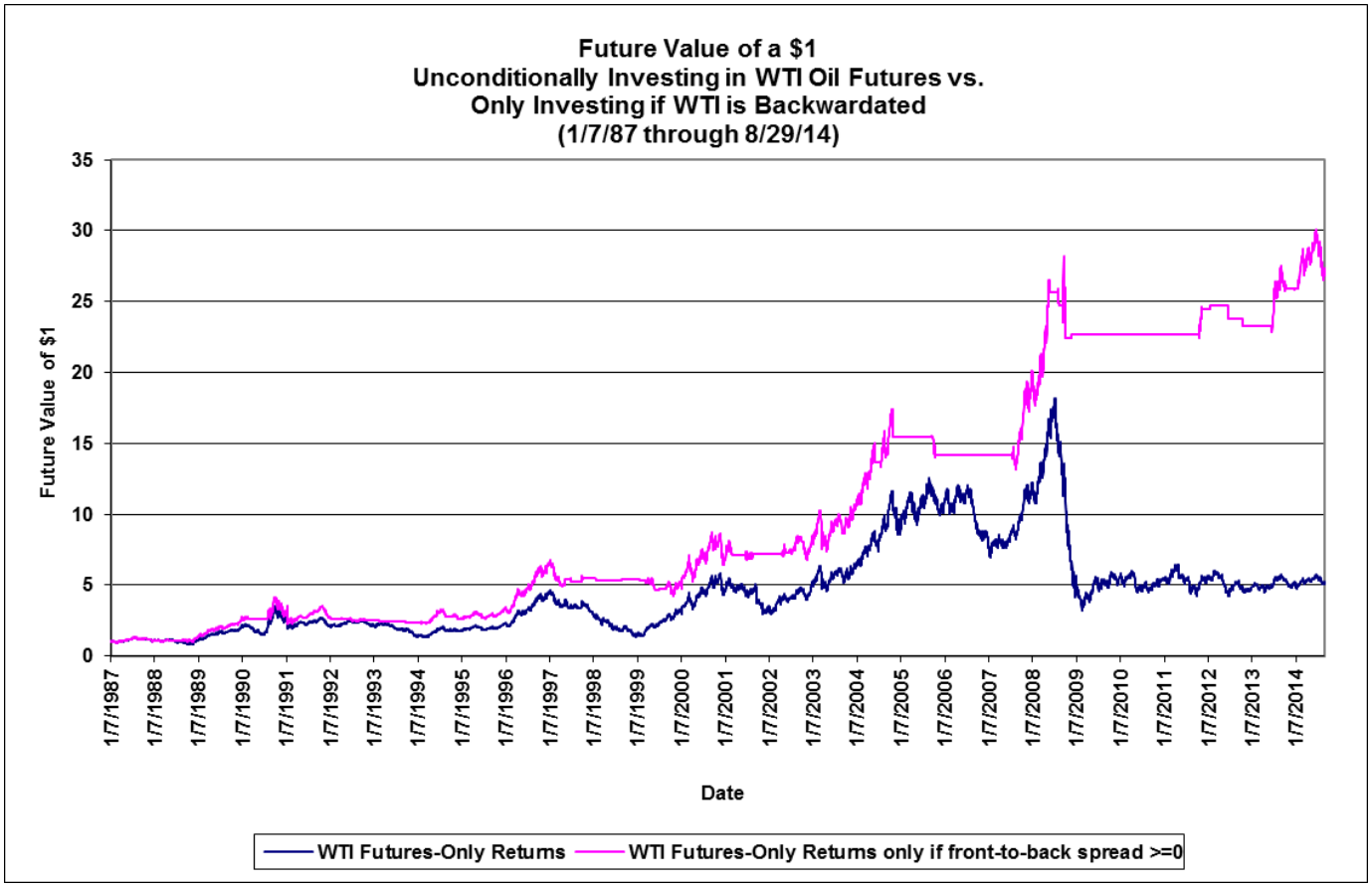
"A market is in *backwardation* if the spot price is above the futures price or if the nearby futures price is above prices on more distant futures contracts. In this case, if an index is long the nearby contract and will roll into more distant contracts when the nearby is about to expire, the roll return will be positive.



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

Source: Jensen and Mercer (2011).

I. B. 4. Roll Yield and Crude Oil

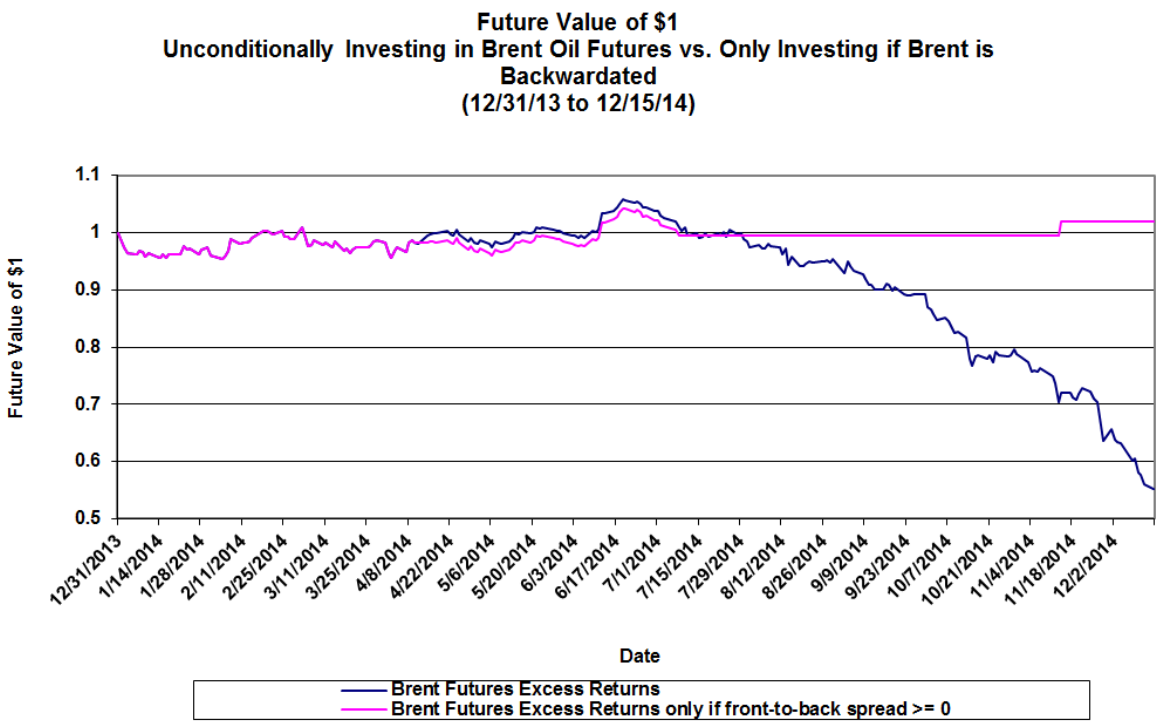


Source of Graph: Till (2015a).

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

I. B. 4. Roll Yield and Crude Oil

What about more recently?



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

I. C. Rebalancing Premium

There is an additional return opportunity at the portfolio level, which can potentially be earned even if the geometric average returns of individual futures contracts are zero, as demonstrated by Sanders and Irwin (2012).

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.

I. C. Rebalancing Premium

The rebalancing effect was explained by Greer (2000), and more recently in Greer *et al.* (2014):

"[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."

II. Portfolio Context

A. CTAs (and the Global Macro Style) as (in effect) Long Options on Financial Assets

B. Commodity Indices as Financial Asset Diversifiers

- **The Special Case of Crude Oil**

Source of Graphic:
Chicago Board of Trade / CME Group.

II. A. 1. CTAs as (in effect) Long Options

Fung and Hsieh (1997a)

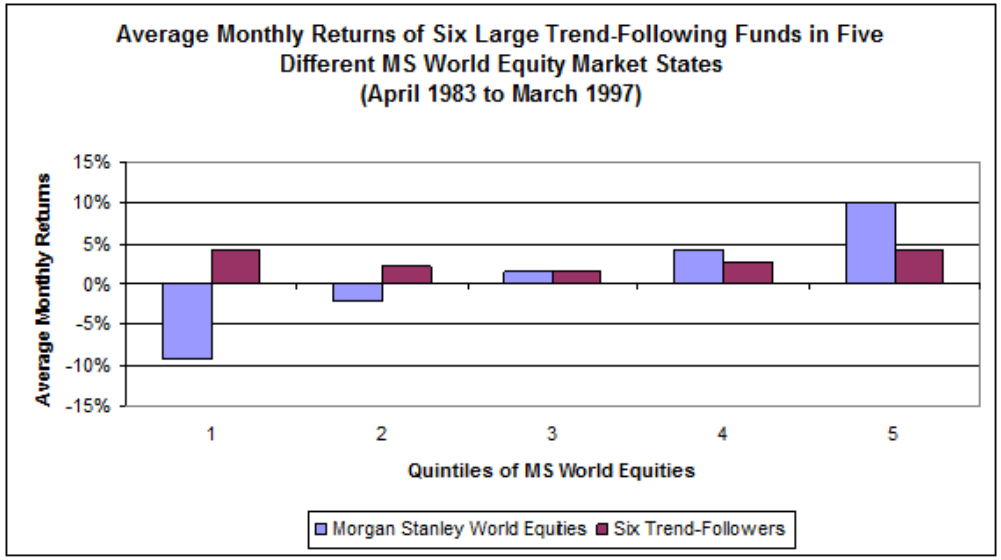
Fung and Hsieh highlighted an option-like aspect of trend-following returns.

The figure on the next slide shows the returns of six large trend-following funds across five different world equity market environments.

II. A. 1. CTAs as (in effect) Long Options

Fung and Hsieh (1997a)

State 1 maps into the average returns of world equities and CTA's during the worst equity months while State 5 consists of the average returns of world equities and CTA's during the best equity months.



MS: Morgan Stanley

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

The trend-following CTA returns are similar to the payoff profile of "a 'straddle' conditional on the different states of the global equity markets."

II. A. 1. CTAs as (in effect) Long Options

Fung and Hsieh (2001)

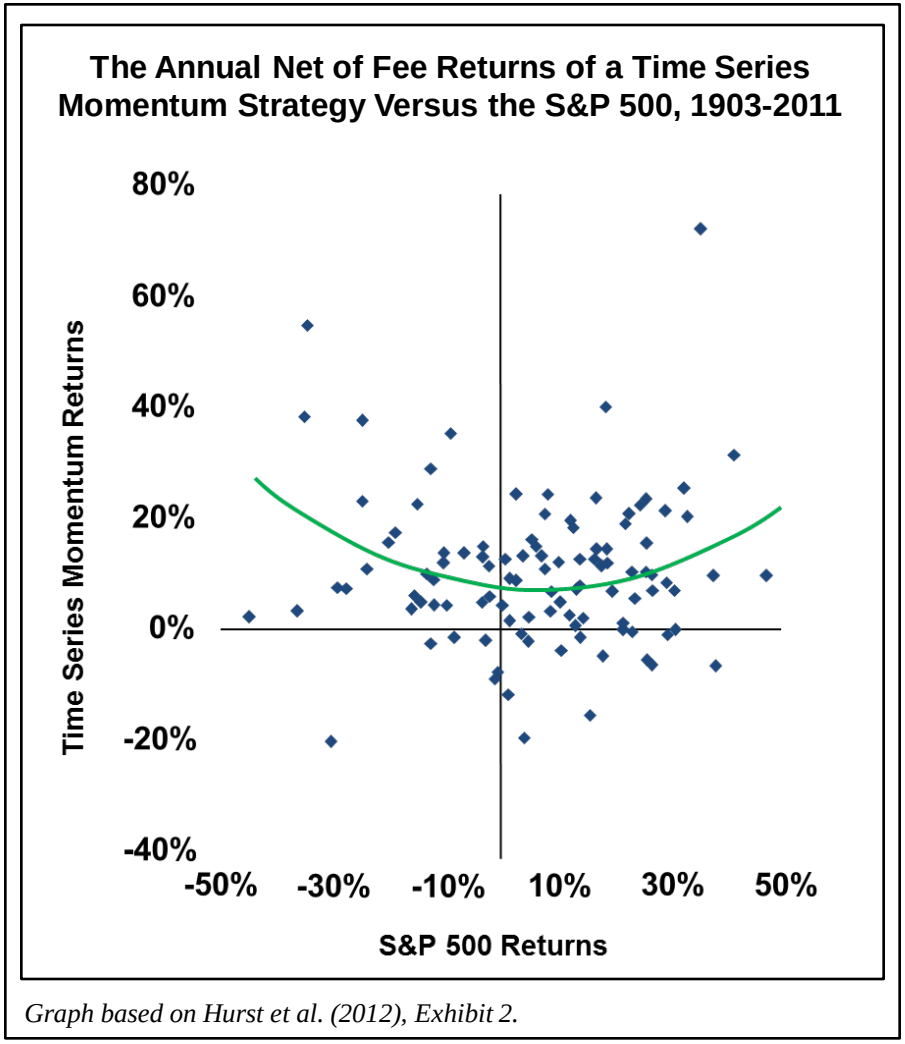
Later the authors formalize the notion of trend-followers as being in effect, "long options" by likening the strategy to a portfolio of lookback straddles.

When only examining times of extreme equity moves, Fung and Hsieh were able to explain about 61% of the variation in trend-following returns. The time period of this study was from January 1989 through December 1997.

The key variables in explaining trend-following returns were lookback straddles on U.S. bonds, Dollar/Mark, wheat and silver. Lookback straddles on short rates (Eurodollar and Short Sterling) and Dollar/Yen were also noted as contributing factors.

II. A. 1. CTAs as (in effect) Long Options

AQR (2012)

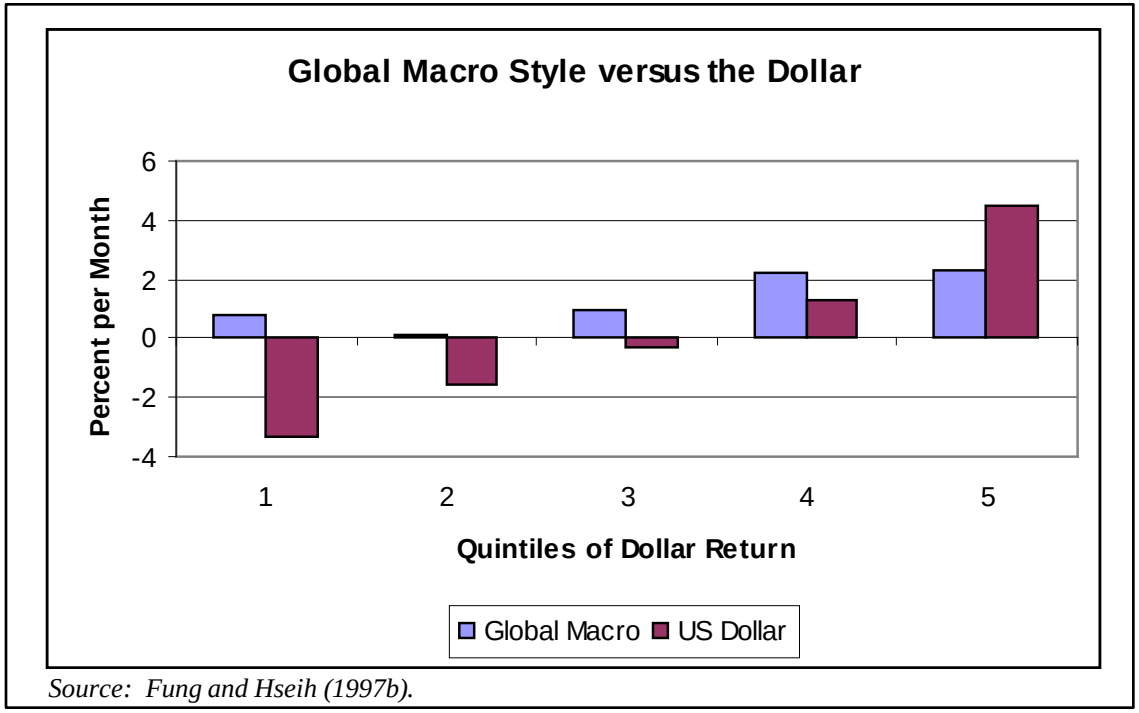


Graph based on Hurst et al. (2012), Exhibit 2.

II. A. 2. Global Macro Style as (in effect) Long Options

Fung and Hsieh (1997b)

The global macro style has behaved like a straddle on the U.S. dollar.



Source: Fung and Hseih (1997b).

II. A. 2. Global Macro Style as (in effect) Long Options

Fung and Hsieh (1999)

Fung and Hsieh also graphed the global macro style versus five equity-market environments. They found 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 (short calls and long puts) on U.S. equities."

II. B. Commodity Indices as Financial Asset Diversifiers

Efficient Frontiers (1 of 3)

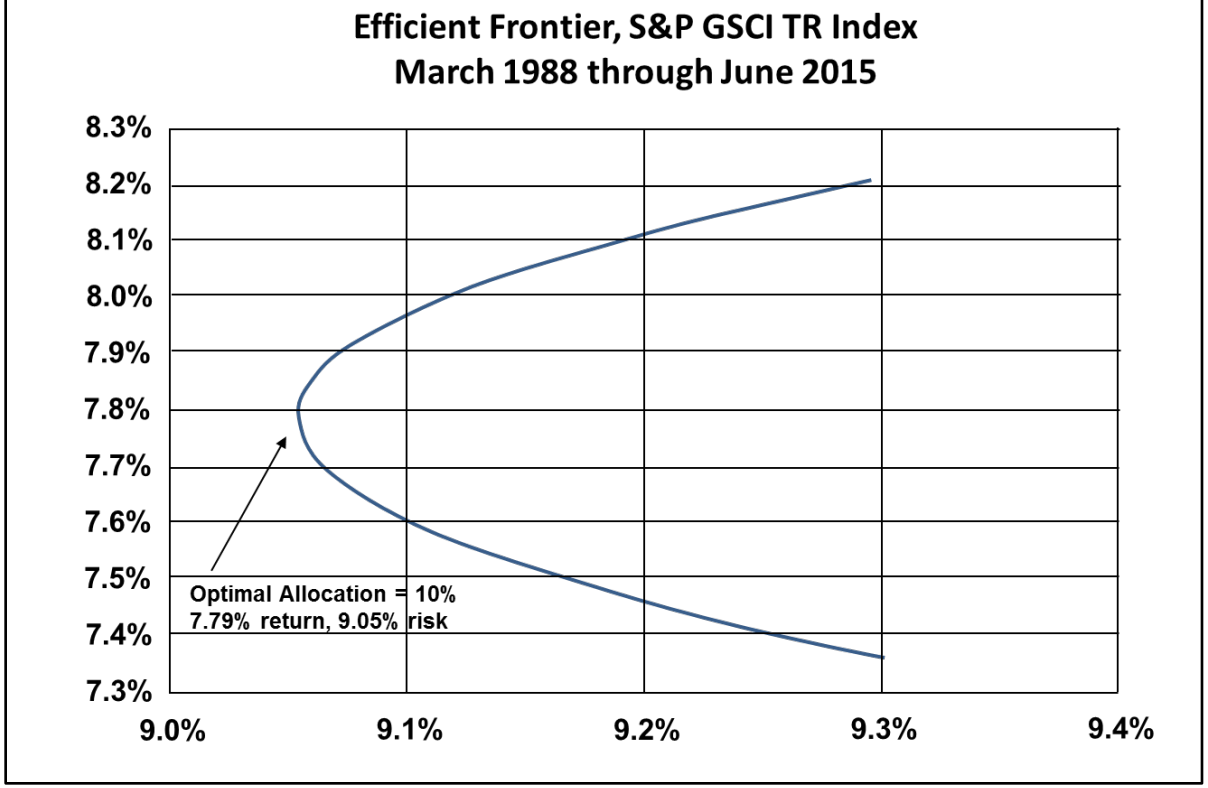


Diagram based on Fenton (2015).

S&P GSCI TR stands for Standard & Poor's Goldman Sachs Commodity Index Total Return.

II. B. Commodity Indices as Financial Asset Diversifiers

Efficient Frontiers (2 of 3)

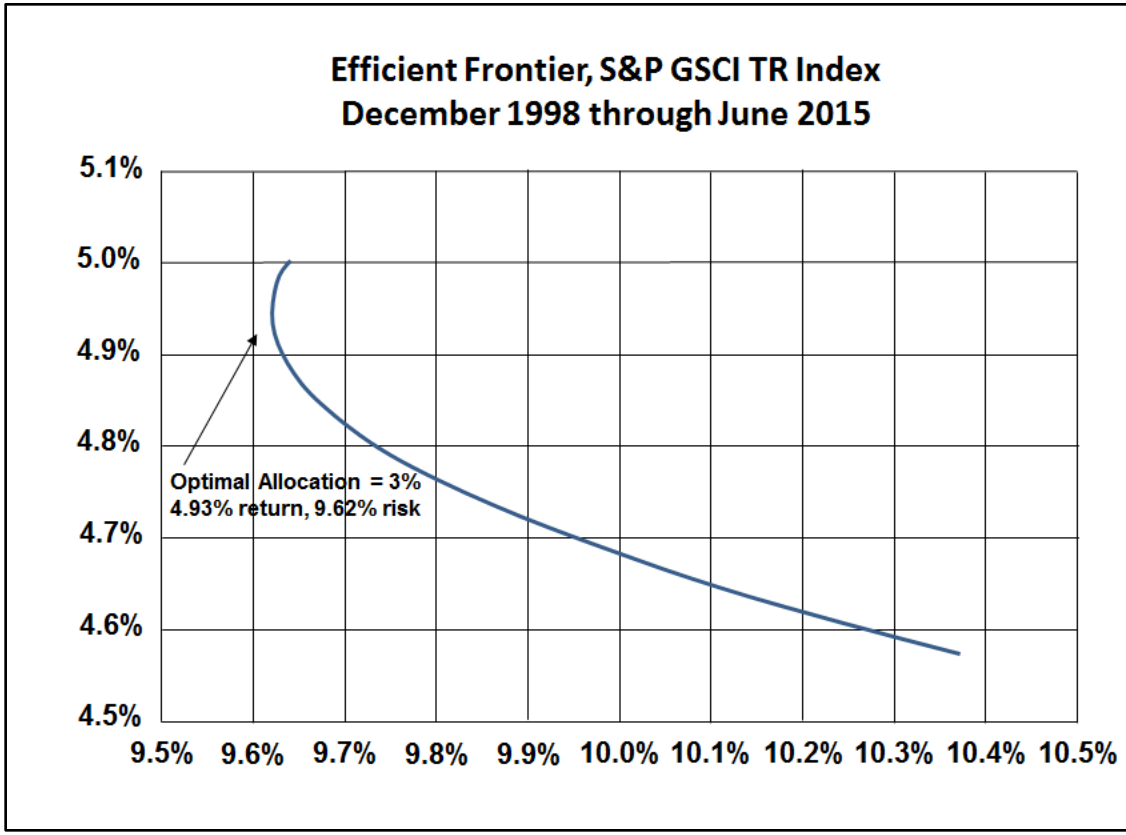


Diagram based on Fenton (2015).

II. B. Commodity Indices as Financial Asset Diversifiers

Efficient Frontiers (3 of 3)

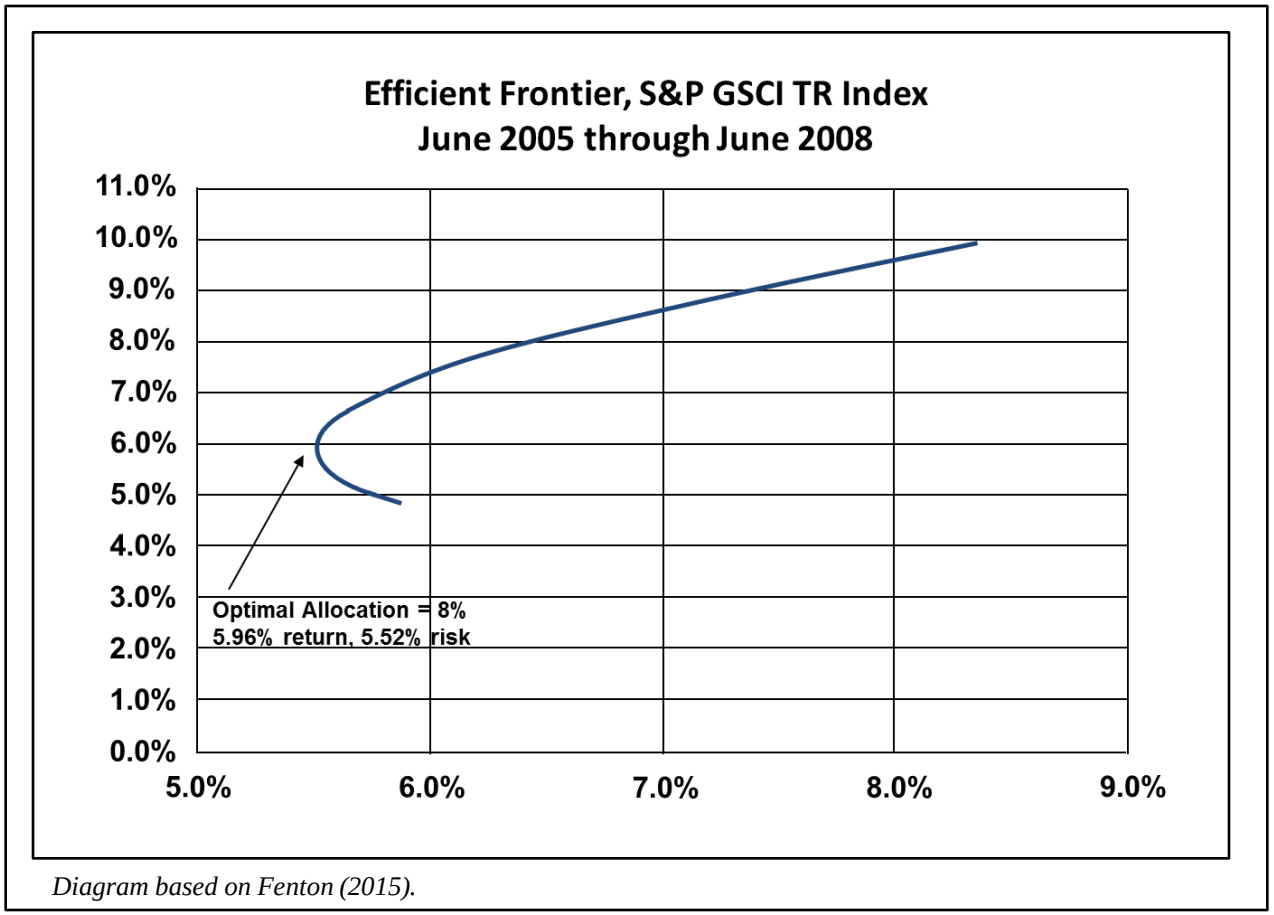


Diagram based on Fenton (2015).

II. B. Commodity Indices as Financial Asset Diversifiers

The Special Case of Oil

In order for a basket of commodity futures contracts to not only hedge bond investments against inflation, but also do so effectively for equity investments, then the commodity index needs to have a concentration in the petroleum complex, according to Froot (1995).

Accordingly, the main commodity indices tend to be heavily weighted in the petroleum complex.

Source: Till (2014).

III. Benchmarking

A. If Portfolio Diversification is the Goal, Then an Index as the Benchmark is Appropriate

B. If Capturing an Alternative Beta is the Goal, Then a Mechanical Replication Strategy is Appropriate as the Benchmark

C. If Absolute Returns are the Goal, Then the Benchmark Depends on Whether the Strategy is Considered to be Pure Alpha or Well-Timed Beta

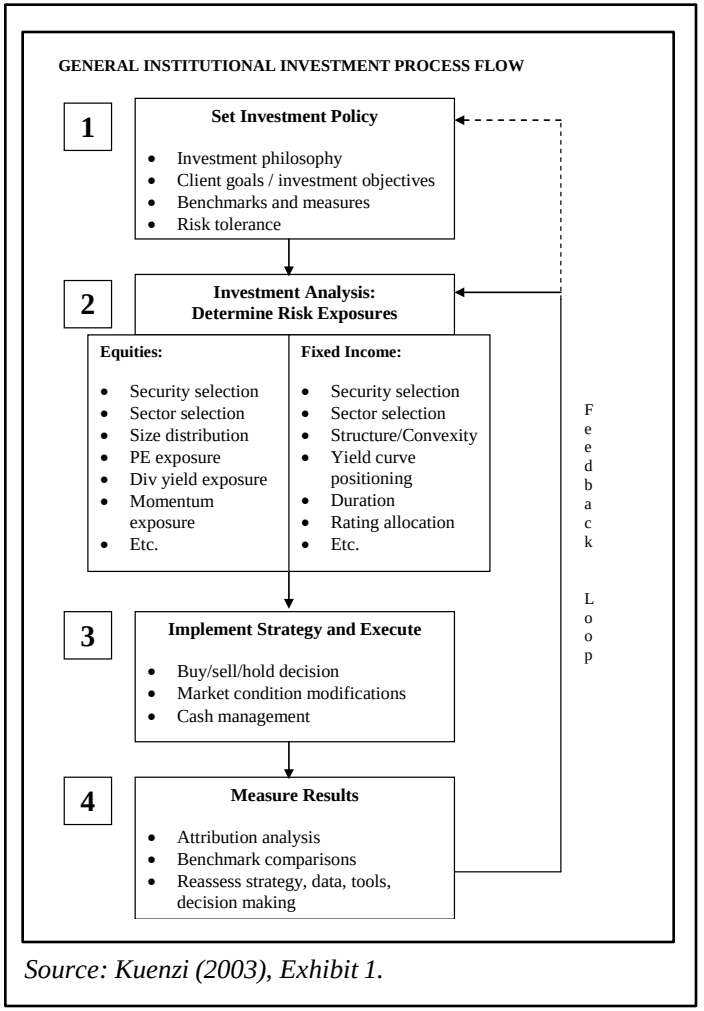
Source of Graphic:
Chicago Board of Trade / CME Group.

III. A. Portfolio Diversification and Indices

Asset Allocation as the Dominant Source of Returns

The investment industry has been organized around the idea that asset allocation is the most important investment decision and that individual managers should be allowed limited discretion around investment benchmarks.

The institutional decision-making diagram on the right has applicability beyond just equities and fixed income, specifically including *commodities*.



Source: Kuenzi (2003), Exhibit 1.

Source: Till and Eagleeye (2003).

III. A. Portfolio Diversification and Indexes

Asset Allocation as the Dominant Source of Returns

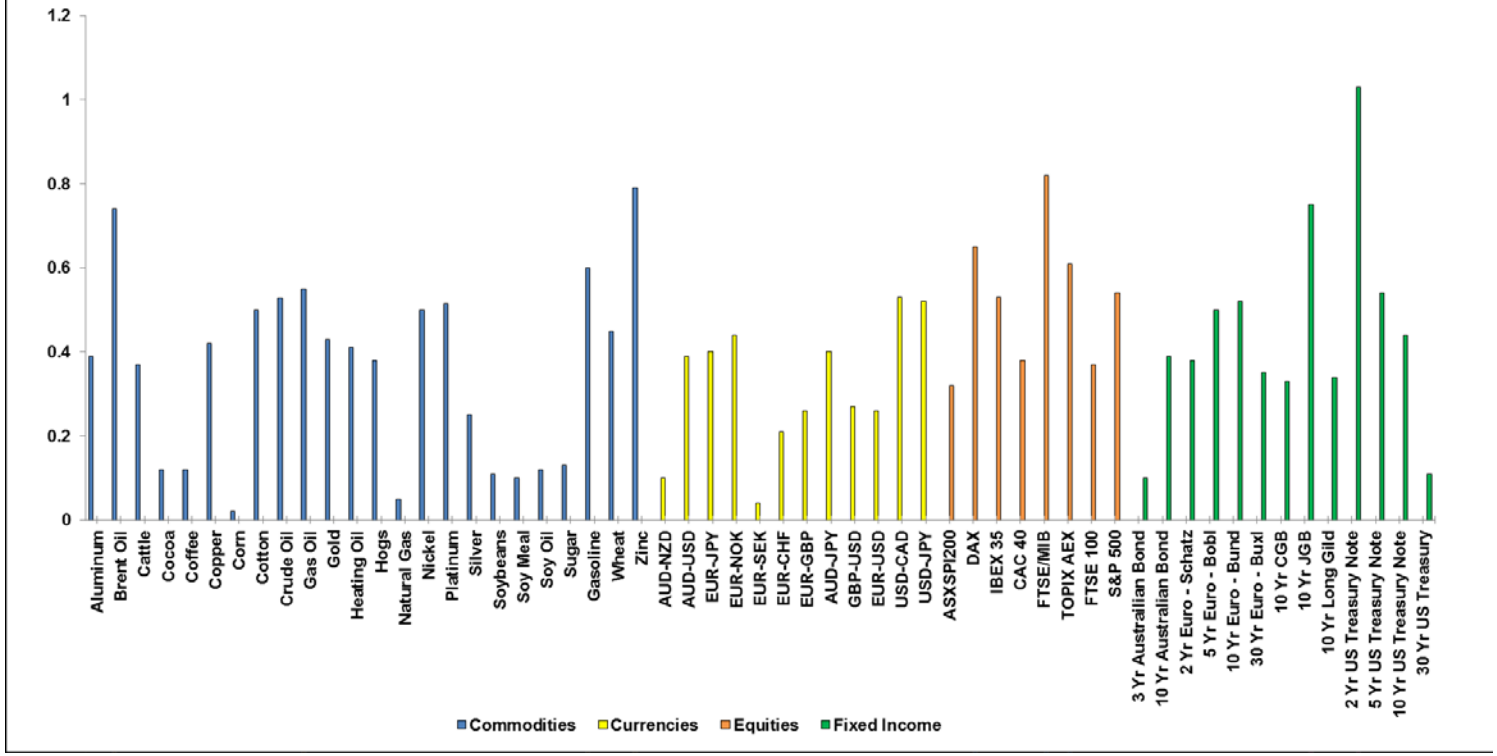
Pension fund consultants and financial planners advise institutional and retail clients respectively on the most appropriate long-term asset allocation mix. These intermediaries assign benchmarks for each asset class within the overall recommended portfolio.

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.*

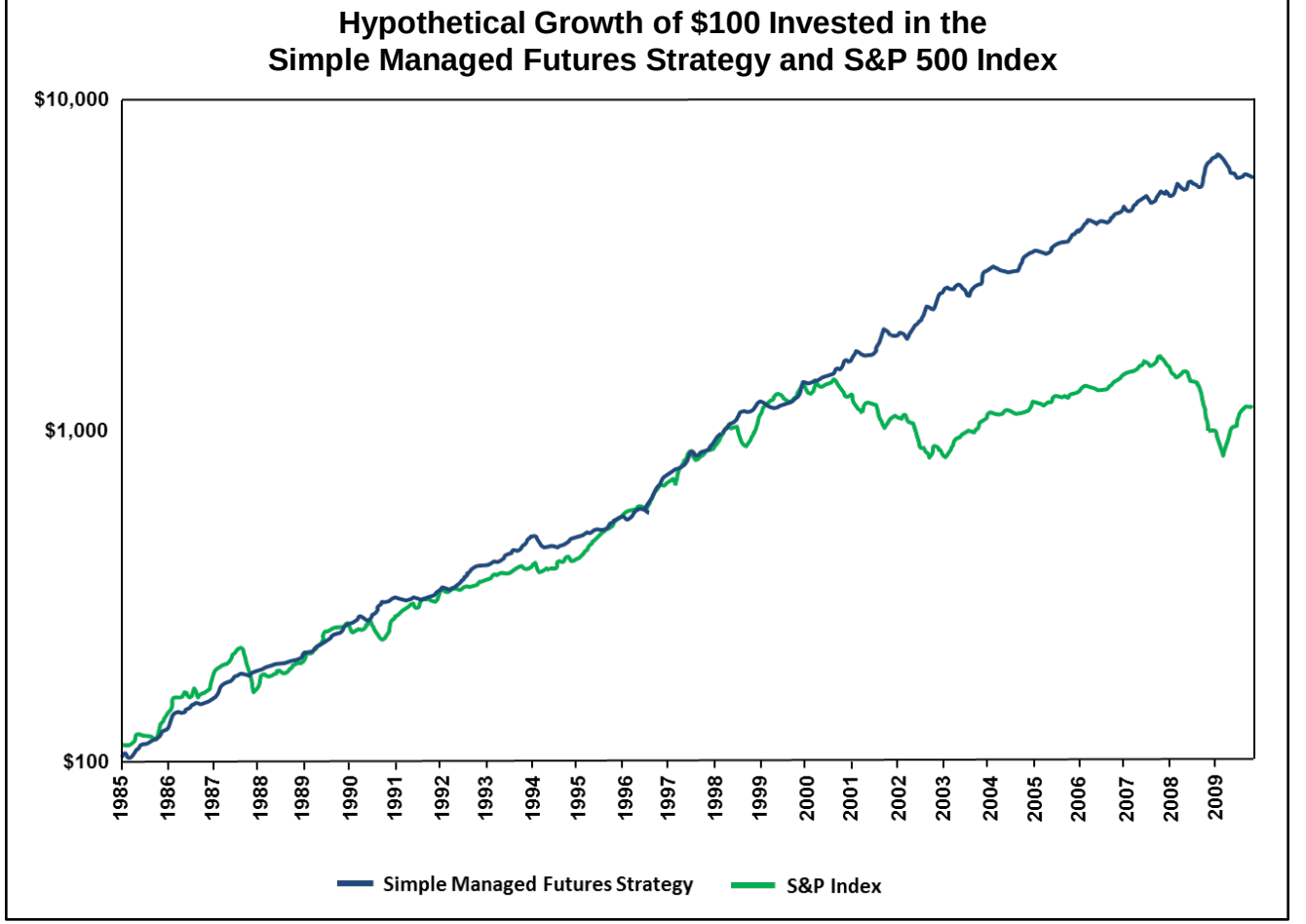
Source: Till and Eagleeye (2003).

III. B. Alternative Beta and Mechanical Replication Strategies



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

III. B. Alternative Beta and Mechanical Replication Strategies



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

III. C. Absolute Returns: Pure Alpha or Well-Timed Beta Exposure

Till and Eagleeye (2006) noted that an idealized total-return strategy is not supposed to deliver a consistent beta: it is supposed to either deliver pure alpha or well-timed beta exposures.

A passive index would be inappropriate as a benchmark for such a strategy, other than to assure that a strategy is indeed a total-return strategy since one should not pay alpha fees for a beta strategy.

III. C. Absolute Returns: Pure Alpha or Well-Timed Beta Exposure

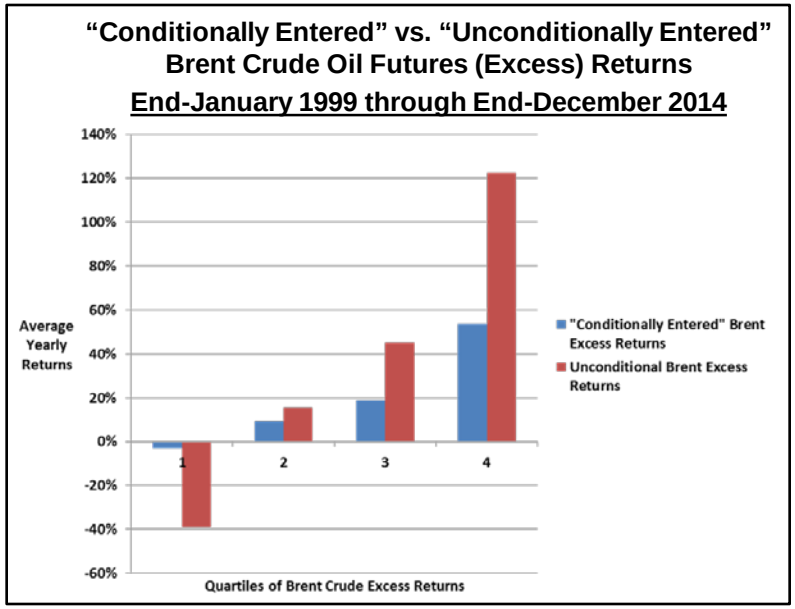
Pure Alpha: Peer Group as a Benchmark

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.

III. C. Absolute Returns: Pure Alpha or Well-Timed Beta Exposure

Well-Timed Beta Exposure: Long-Options-Like Profile as Benchmark

Otherwise, if a strategy is providing well-timed beta exposures, one should ensure that the strategy is indeed pushing the asset class' return distribution to the right; i.e., that the strategy is providing exposure to the asset class while limiting its inevitable losses, as discussed in Ineichen (2003).



Source: Till (2015b).

Conclusion

Thank you to the Department of Agricultural & Consumer Economics at the University of Illinois in Urbana-Champaign for sponsoring this symposium.

Photograph of the Ceres statue on top of the Chicago Board of Trade (CBOT) building.

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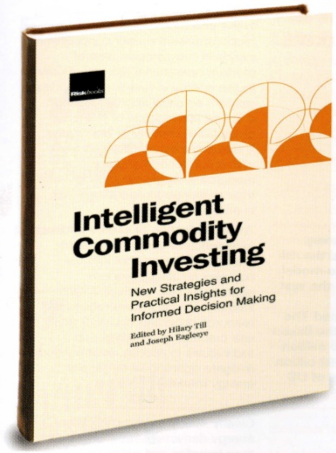
Intelligent Commodity Investing

Risk*books*



"Essential reading for commodity investors, or would-be investors, everywhere."
Sir Howard Davies, Director, London School of Economics and Political Science; and Former Chairman of the Financial Services Authority (UK)

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Hilary Till

Hilary Till is a co-founder of the proprietary trading firm, Premia Capital, http://www.premiacap.com.

Premia Capital employs statistical techniques, primarily in the natural-resources futures markets, in trading *principal-only* capital. The firm is *not* seeking outside capital for its trading program.

Ms. Till is also a principal of Premia Risk Consultancy, Inc., which advises investment firms on risk-management policy; in addition, she is a principal of Premia Research LLC, which designs investment indices.

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Ms. Till has presented her analysis of the commodity futures markets to the following institutions: the U.S. Commodity Futures Trading Commission, the International Energy Agency, and to the (then) U.K. Financial Services Authority. Most recently, she was a panel member at the U.S. Energy Information Administration's workshop on the "evolution of the petroleum market and [its] price dynamics."

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