Opportunities and Risks in Commodity Markets: Presentation to Chicago PRMIA and Chicago QWAFAFEW

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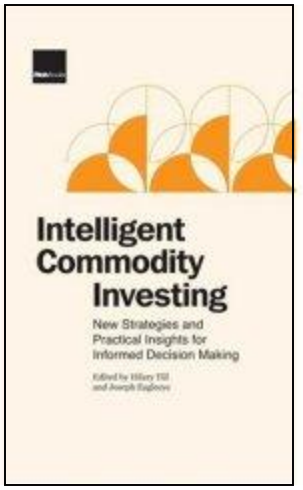
Opportunities and Risks in Commodity Markets

This presentation includes concepts that are covered in:

The 2007 Risk Books publication, Intelligent Commodity Investing, edited by Hilary Till and Joseph Eagleeye:

http://www.riskbooks.com/intelligentcommodity.



Opportunities and Risks in Commodity Markets

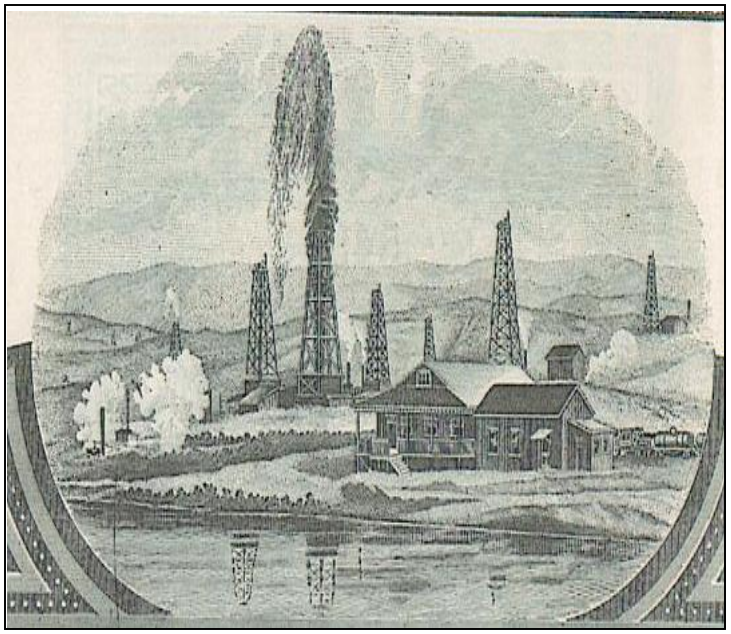
I. **Demand for Energy Investments**

II. **Portfolio Construction and Inadvertent Concentration Risk**

III. **Macro Portfolio Protection**

IV. **Risky Asset Deleveraging**

V. **Postscript on Amaranth**



Cropped from a 1929 share certificate for a speculative oil company in Alberta.

I. Demand for Energy Investments

The Macro Case

- **The macro case for commodity investments has relied on the following two factors:**

  (1) adverse supply shocks resulting from the aging energy infrastructure in the U.S. and Europe, and

  (2) expanding demand, particularly from China.

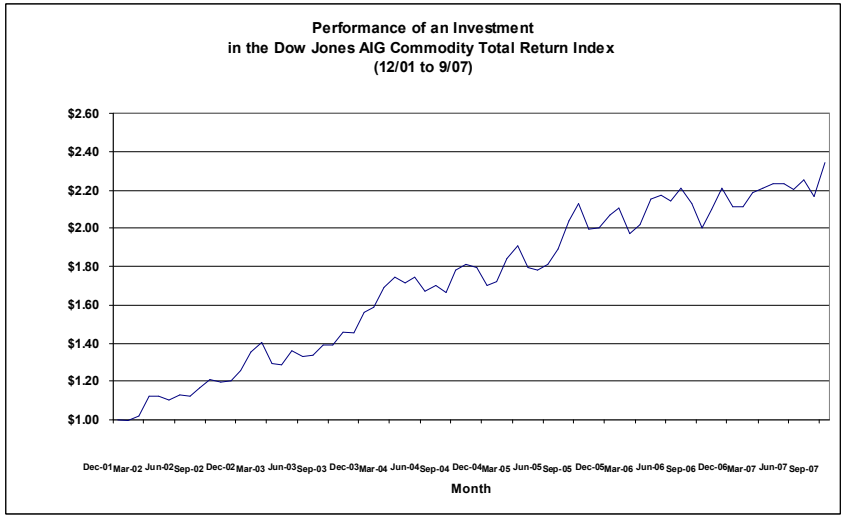
Bas-Relief adornment on an utility building at Dearborn and Washington in Chicago.

I. Demand for Energy Investments

The Macro Case

- **Since the end of 2001, investors have been rewarded for investing in broad-based commodity indices.**

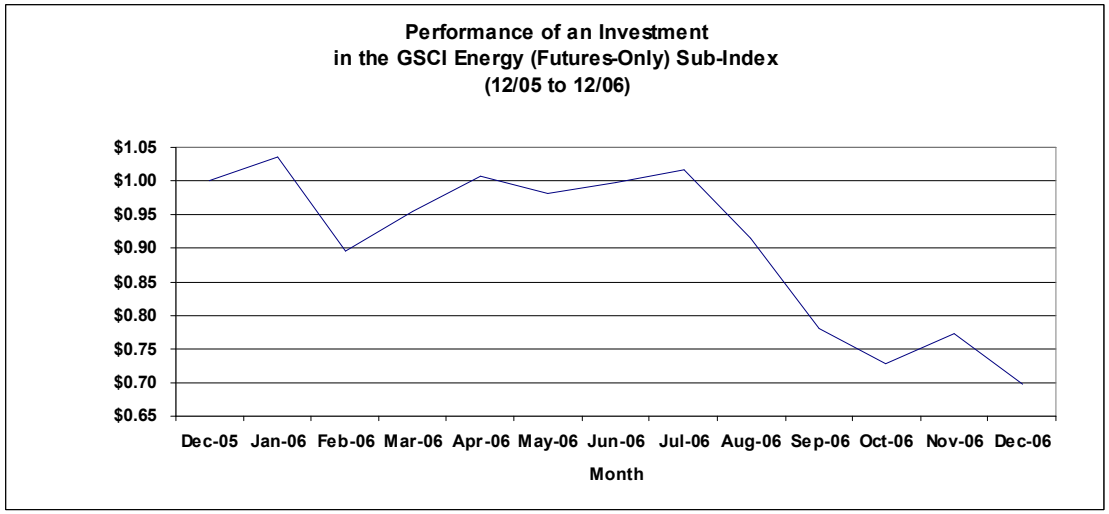
- **The DJAIGCI has had annualized returns of 15.96% (from 12/31/01 to 9/28/07.)**



I. Demand for Energy Investments

Performance of Energy Futures Investments

- **But passively investing in energy futures contracts is not for the faint-hearted.**
  - **The Goldman Sachs energy (futures-only) sub-index lost -30.6% in 2006.**



I. Demand for Energy Investments

Energy Derivatives Relative-Value Trading

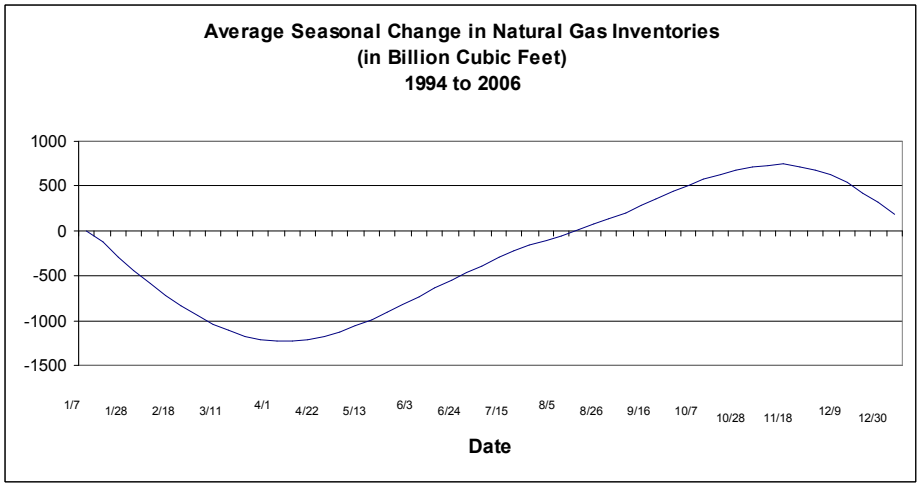
- **Therefore, energy and commodity investors had been drawn to relative-value commodity hedge funds.**

- **As discussed in Till (2007), there are potentially profitable opportunities around build/draw cycles in commodity inventories. These opportunities tend to be monetized through calendar spreads.**

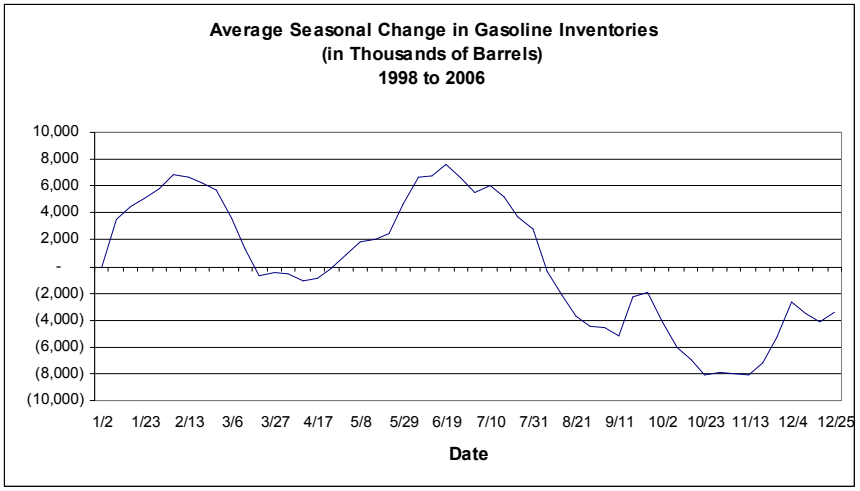
I. Demand for Energy Investments

Energy Derivatives Relative-Value Trading

Average Seasonal Change in Natural Gas Inventories 1994 - 2006



Average Seasonal Change in Gasoline Inventories 1998 - 2006



I. Demand for Energy Investments

Energy Derivatives Relative-Value Trading

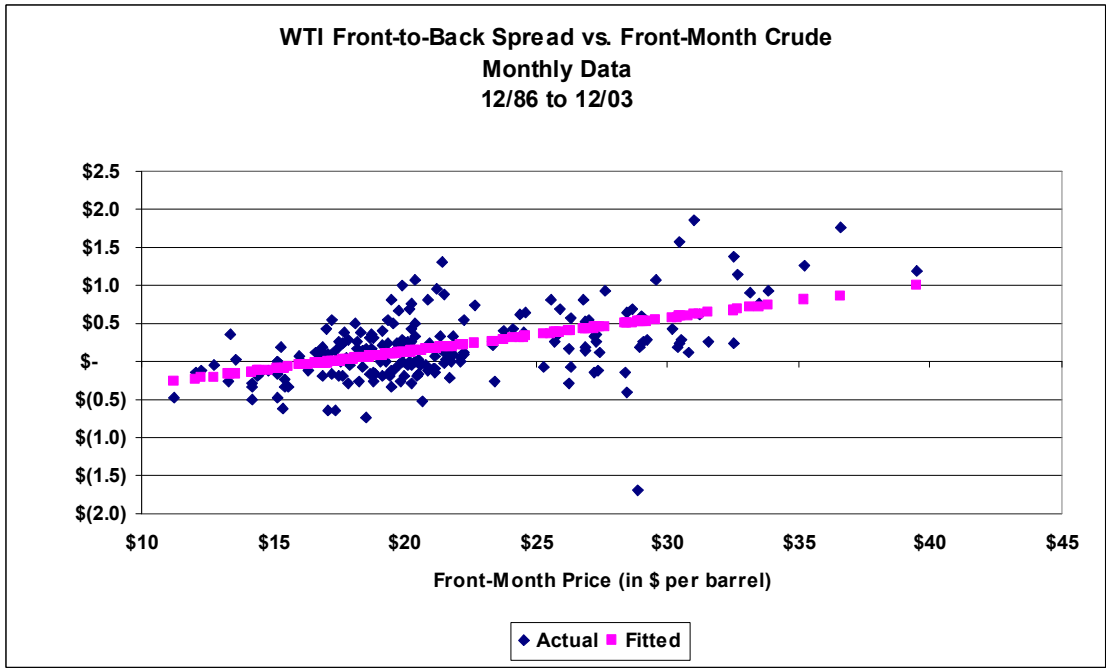
- **For active commodity strategies, expertise in forward curves and storage economics is crucial. Feldman and Till (2006) discuss the structural importance of forward curves in commodity investing.**

- **But even with energy calendar-spread trading, there have been frequent structural breaks over the last 4 years.**

I. Demand for Energy Investments

Structural Breaks

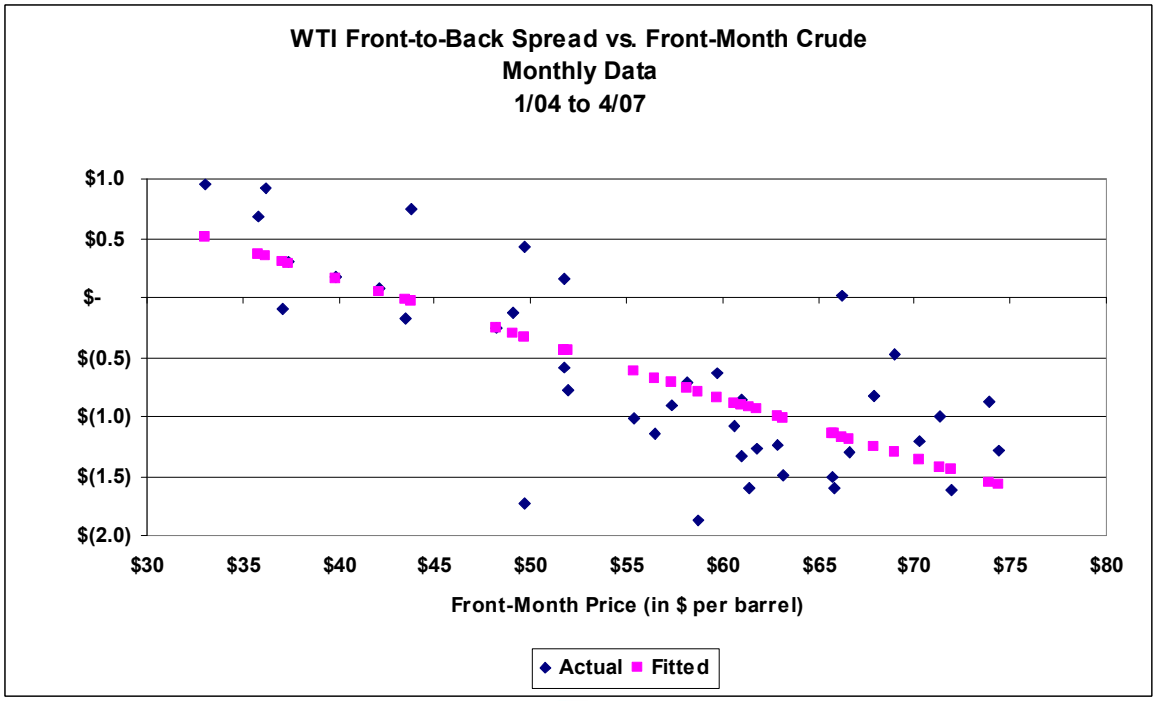
Relationship of Crude Calendar Spreads to Outright Positions



I. Demand for Energy Investments

Structural Breaks

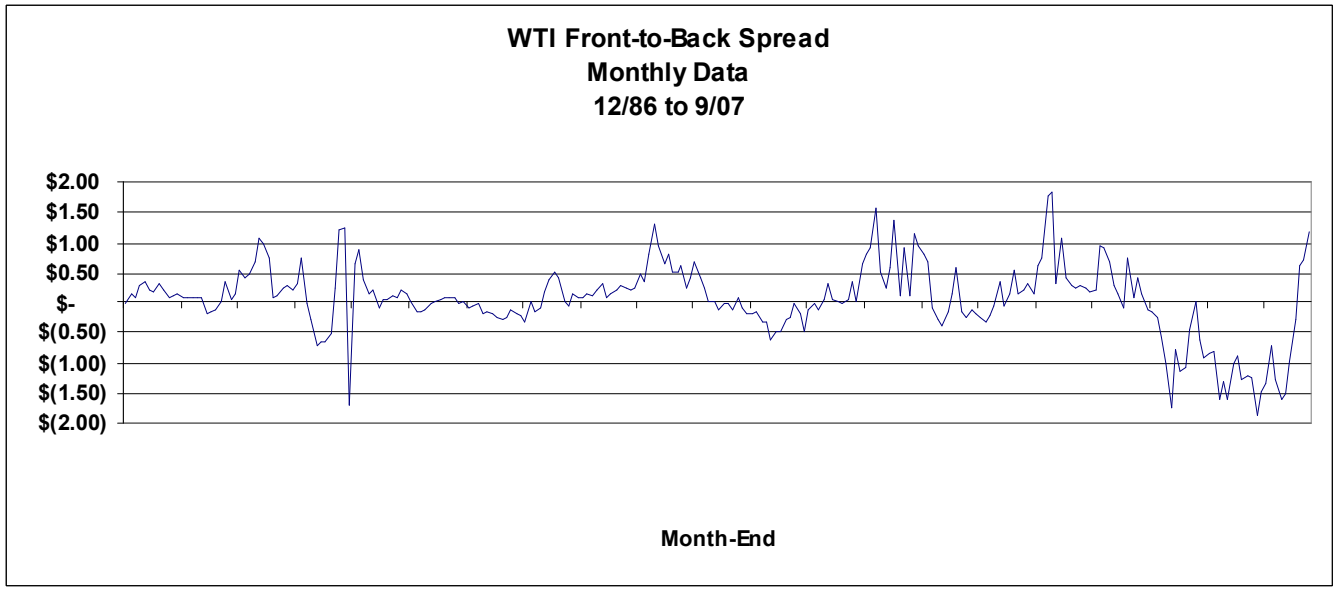
Relationship of Crude Calendar Spreads to Outright Positions: Structural Change



I. Demand for Energy Investments

Structural Breaks

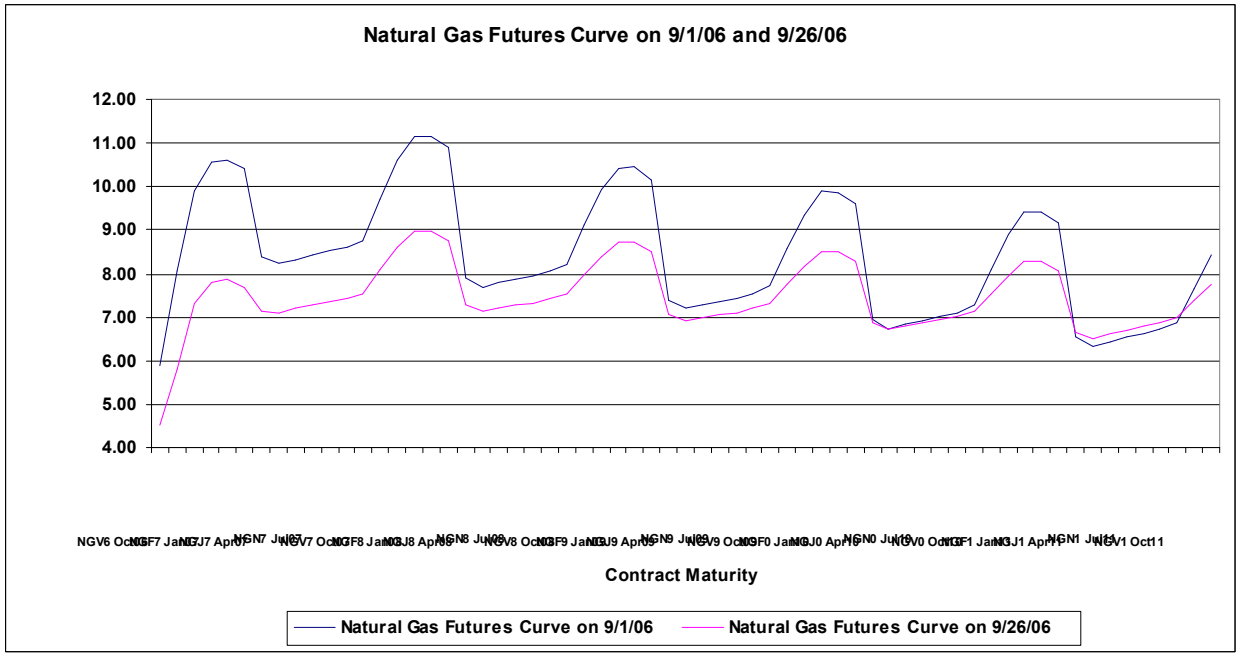
Relationship of Crude Calendar Spreads to Outright Positions: Structural Shift Yet Again in July 2007



I. Demand for Energy Investments

Structural Breaks

Discontinued Reliability of Natural-Gas Calendar Spread Trades

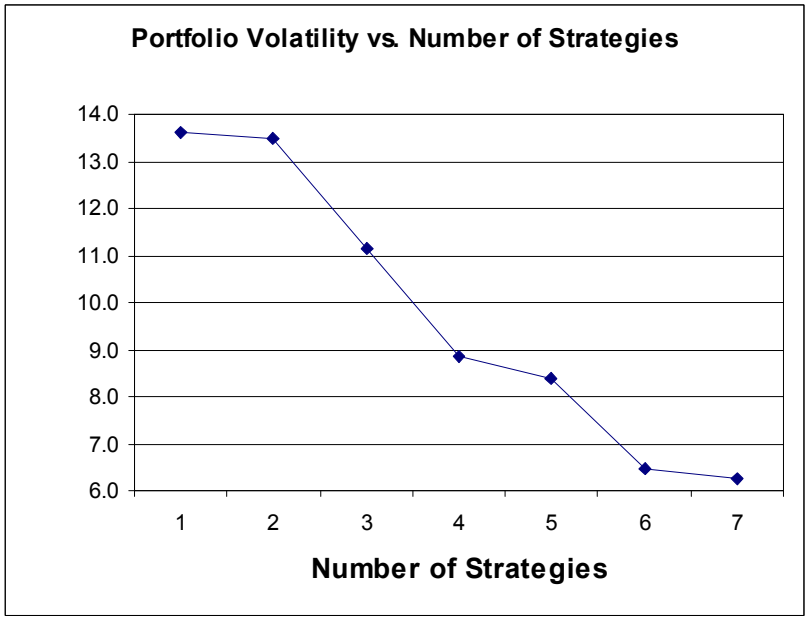


Similar graphic in Petzel (2006).

II. Portfolio Construction and Inadvertent Concentration Risk

Potential Diversification Opportunities, If Can Avoid Inadvertent Concentration Risk

Example of Portfolio Effect When Combining Unrelated Strategies

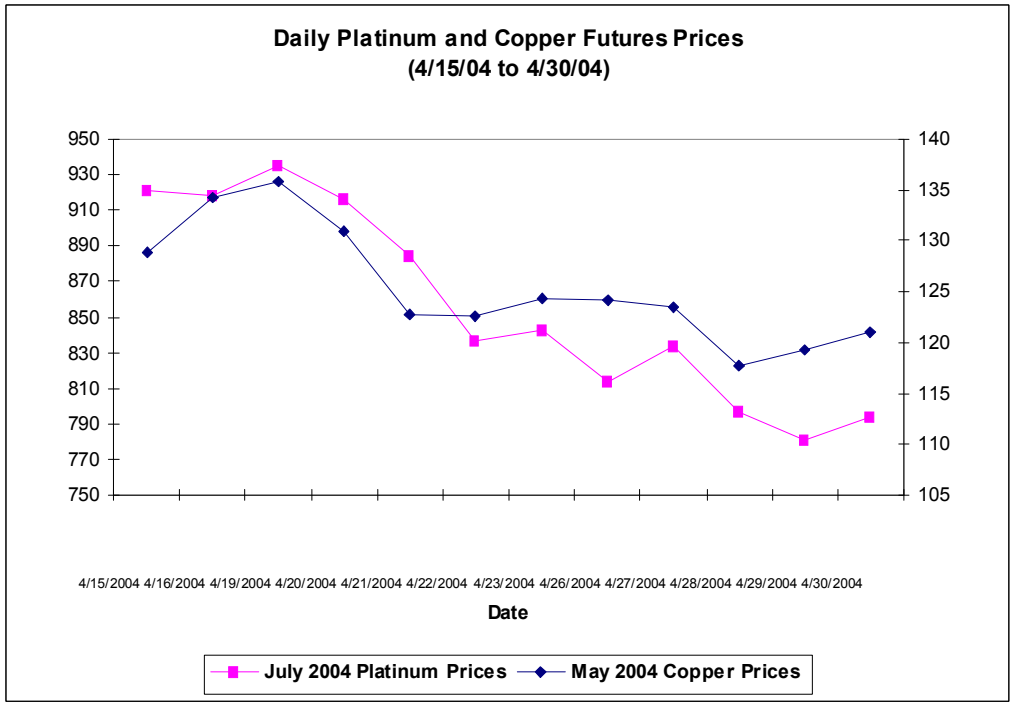


Source: Till and Eagleeye (2003).

II. Portfolio Construction and Inadvertent Concentration Risk

Impact of Chinese Demand: Copper vs. Platinum Example

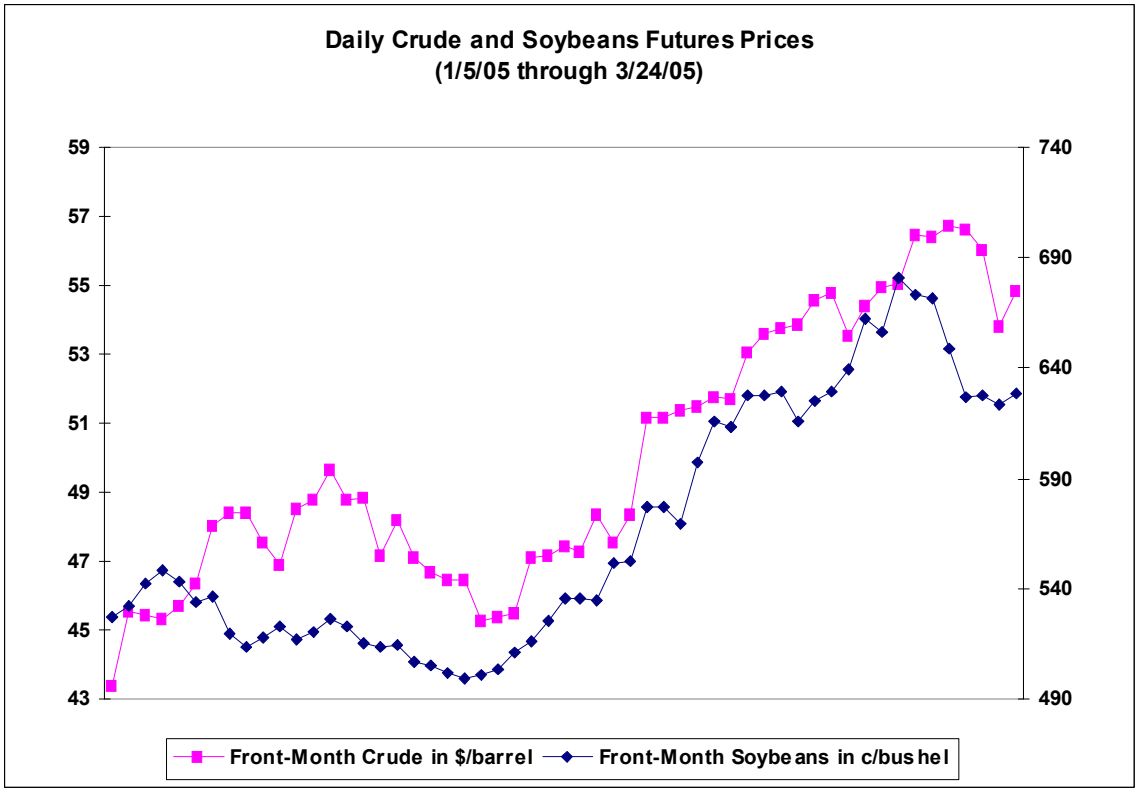
- **Platinum and Copper are at risk to a Chinese demand shock.**
- **In mid-April 2004, there were reports of a more stringent official policy towards industrial loans in China.**



Source: Till and Eagleeye (2005).

II. Portfolio Construction and Inadvertent Concentration Risk

Impact of Chinese Demand: Can Crude Oil, Soybeans, and Copper All Become One Trade?



Source: Till and Eagleeye (2005).

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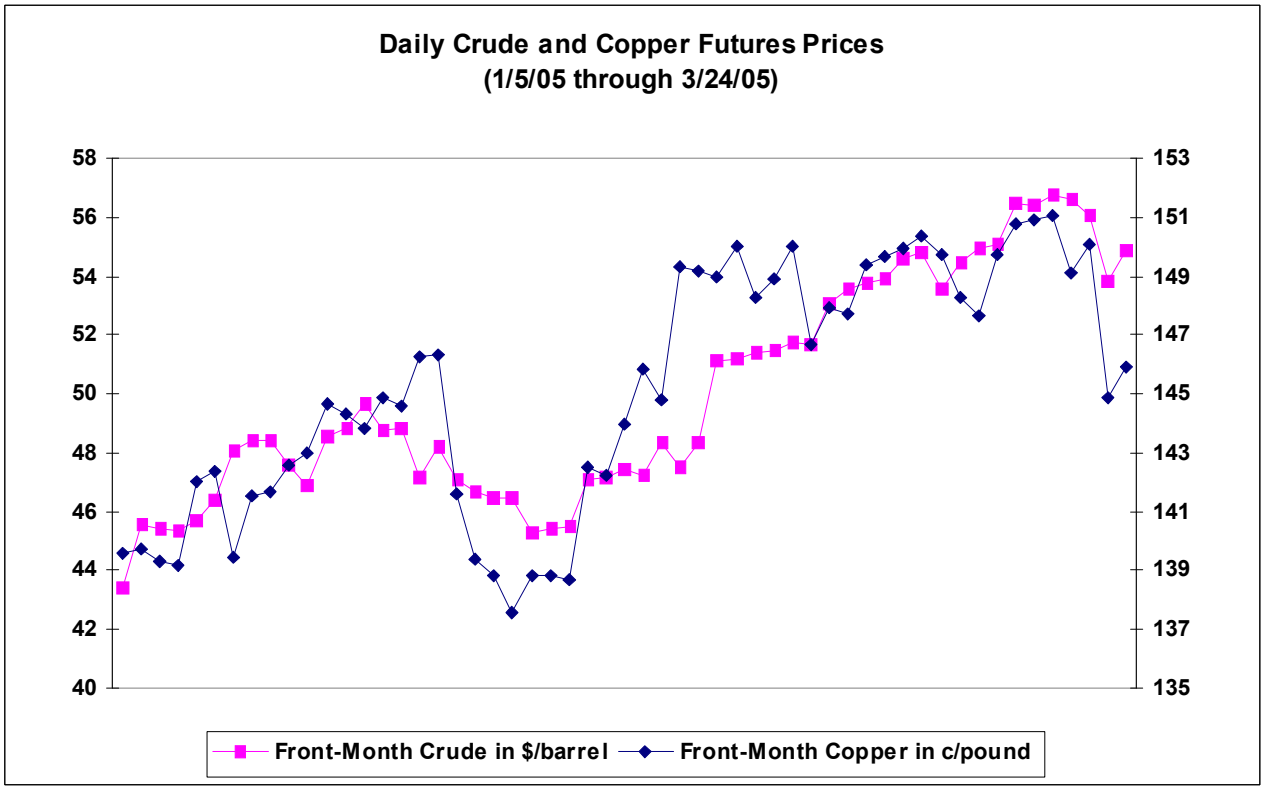
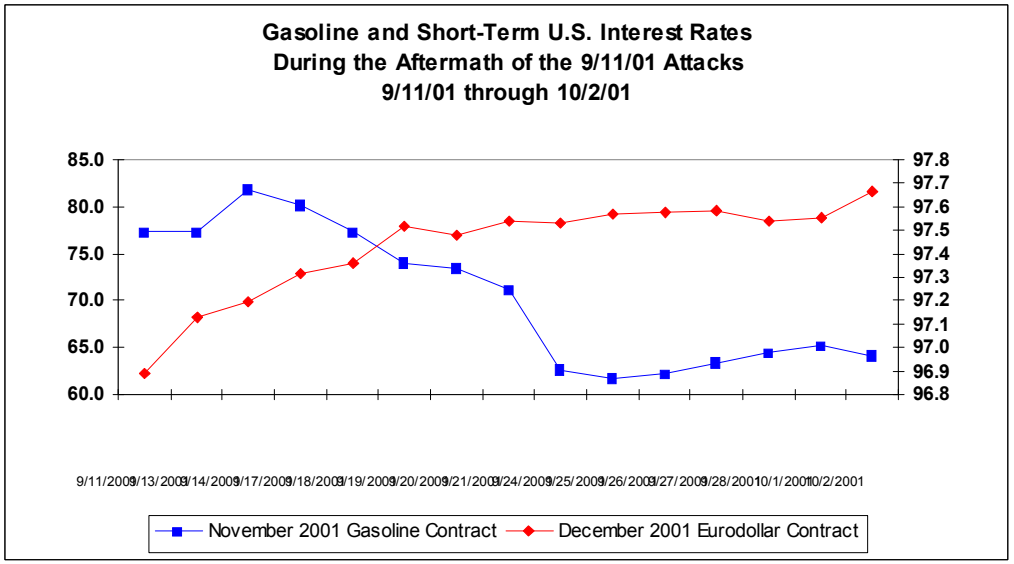


Source: Till and Eagleeye (2005).

III. Macro Portfolio Protection

The Relationship Between Commodities and Interest Rates: The Potential for a Macro Hedge

- **While a short-term U.S. fixed-income position was an effective hedge for long commodity positions during the aftermath of 9/11/01 …**

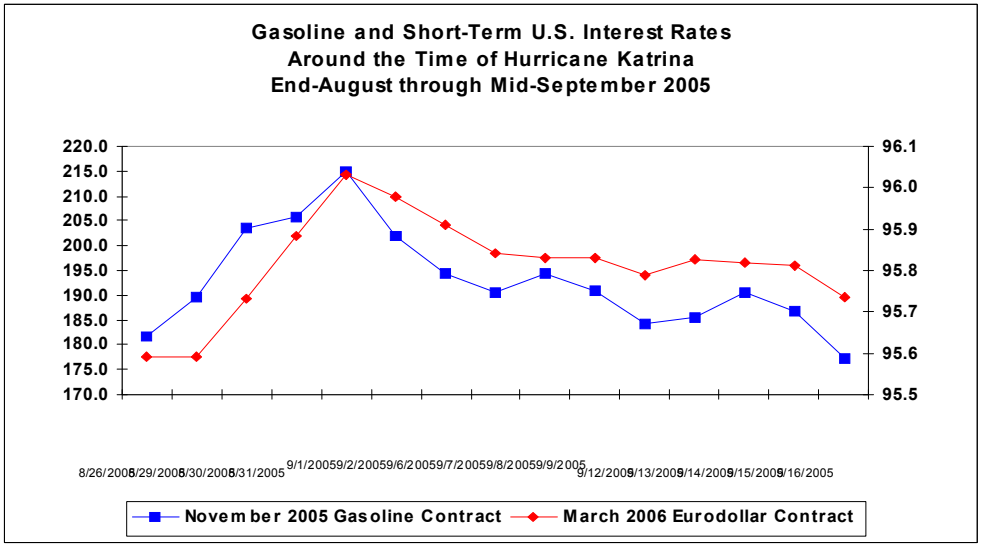


Source: Till (2006a).

III. Macro Portfolio Protection

The Relationship Between Commodities and Interest Rates: Caveat Regarding Dynamic Correlations

- **… this was not the case in the aftermath of Hurricane Katrina; gasoline and deferred short-term interest rates became the same trade, both on the upside and the downside.**



Source: Till (2006a).

IV. Risky Asset Deleveraging

- **Long-biased commodity programs can be at risk to widespread deleveraging of risky investments, …**

- **… as occurred during May and June of 2006; end-of-February 2007; and again in mid-August 2007.**

IV. Risky Asset Deleveraging

May 10, 2006 through June 13, 2006

"Risk Indicator"	
VIX (Equity Implied Vol)*	12.0%

"Risk Assets"	Percent Change
Bovespa (IBX50)	-23.5%
Nasdaq	-10.4%
S&P 500	-7.3%
Nikkei	-10.4%
Silver	-32.4%
Copper	-18.2%
Gasoline (RFG)	-3.6%

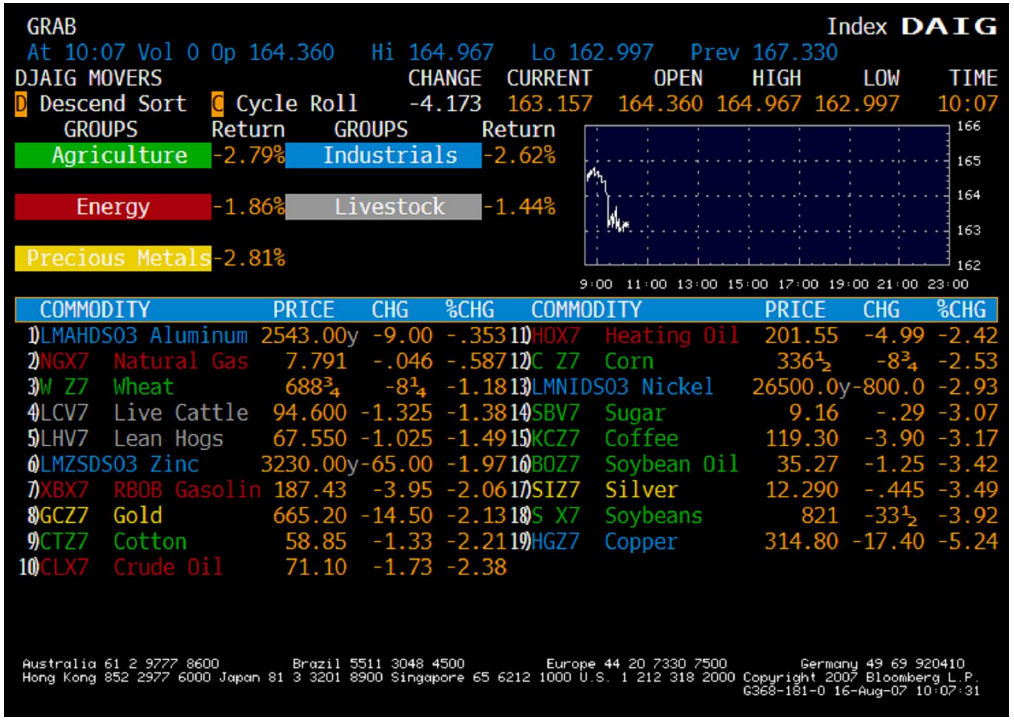
"Safe Havens"	Percent Change
Long Bond	1.8%
Dollar vs. Yen (Long Dollars)	4.5%

* The VIX increased from 11.78% on 5/10/06 to 23.81% on 6/13/06.

IV. Risky Asset Deleveraging

Global Unwind	16-Aug-07
VIX (Equity Implied Vol)*	31%
Risk Assets	**Daily Percent Change**
Bovespa (IBX50)	-2.11%
Nasdaq	-1.01%
Nikkei	-1.99%
Silver	-8.44%
Copper	-7.26%
Gasoline	-1.52%
NZD vs. Yen	-5.32%
"Safe Haven"	**Percent Change**
Long Bond	0.94%
Crack Spreads (Refinery Margins)	**Daily Change**
Gasoline Crack	$1.05
Heat Crack	$0.48

* Absolute level of the VIX (and not change in level as in previous slide.)



V. Postscript on Amaranth

There are reasonably *short-horizon* price-pressure effects on futures calendar spreads …

- **… that are due to the seasonal hedging of commodity inventories, including in natural gas.**

- **But:**
  - **Size matters; and**
  - **Value matters.**

Sources: Till (2006b) and Till (2007).

V. Postscript on Amaranth

Size Matters

- **The U.S. Senate Permanent Subcommittee on Investigations found that in late July 2006, Amaranth's natural gas positions for delivery in January 2007 represented …**

- **… "*a volume of natural gas that equaled the entire amount of natural gas eventually used in that month by U.S. residential consumers nationwide*." [Italics added.]**

V. Postscript on Amaranth

Size Matters

- **This is obviously too large for a financial entity that has no physical energy assets.**

- **If a financial firm cannot make or take physical delivery of a commodity, then that firm's exit strategy is *very* constrained.**

V. Postscript on Amaranth

Value Matters

- **Amaranth had engaged in natural gas calendar-spread trading on a vast scale …**
- **… in which the fund was long winter-delivery contracts and short non-winter-month contracts in the 2006 through at least 2010 maturities. (See Chincarini (2007).)**
- **The fund had entered into these positions at exceedingly wide levels for these spreads.**

V. Postscript on Amaranth

*Scenario Analysis if Winter vs. Non-Winter Spreads Reverted to Past Spread Relationships **

As of the end of August 2006, it was apparent that up to -36% could have been lost under *normal* conditions.

Scenario Analysis if Winter vs. Non-Winter Spreads Reverted to Past Spread Relationships

Number of Contracts	Spread Symbol	Natural Gas Spread	8/31/06 Level
(105,620)	NGV-X	October-November	-2.18
59,543	NGH-J	March-April	2.14

Date	NGV-X	NGH-J	Losses due to V-X	Losses due to H-J	Total Losses	Portfolio Loss
8/31/2000	-0.058	0.26	$ (2,241,256,400)	$ (1,119,408,400)	$ (3,360,664,800)	*-36.5%*
8/31/2001	-0.33	0.09	$ (1,953,970,000)	$ (1,220,631,500)	$ (3,174,601,500)	*-34.5%*
8/31/2002	-0.33	0.113	$ (1,953,970,000)	$ (1,206,936,610)	$ (3,160,906,610)	*-34.4%*
8/31/2003	-0.25	0.44	$ (2,038,466,000)	$ (1,012,231,000)	$ (3,050,697,000)	*-33.2%*
8/30/2004	-0.643	0.57	$ (1,623,379,400)	$ (934,825,100)	$ (2,558,204,500)	*-27.8%*
8/31/2005	-0.185	2.24	$ (2,107,119,000)	$ 59,543,000	$ (2,047,576,000)	*-22.3%*

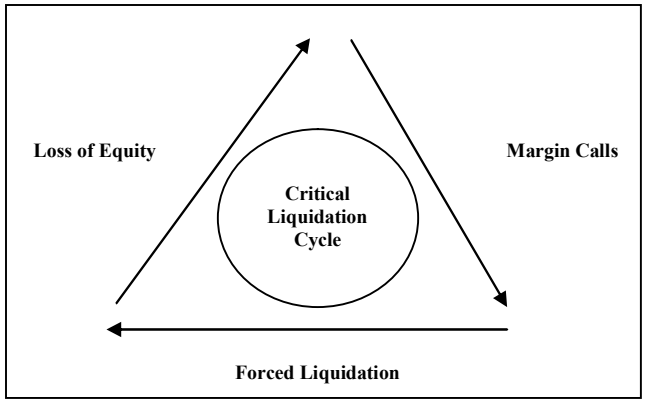
This was two weeks before the fund's implosion.

** Note: This analysis uses positions constructed from the Senate report's graphical representation of Amaranth's positions as of 8/31/06. We simplify our scenario analysis by choosing two spreads that, in combination, were 93% correlated to Amaranth's documented natural-gas book.*

V. Postscript on Amaranth

Critical Liquidation Cycle

- **Severe liquidation scenarios have been formally modeled for highly-leveraged funds. For example, this scenario was modeled as being short a barrier option by de Souza and Smirnov (2004).**



- **This framework appears to be quite appropriate for the Amaranth case.**

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