"Case Studies and Risk Management in Commodity Derivatives Trading"
Presentation to the Chicago Chapter of PRMIA
http://www.prmia.org

June 17, 2008

Ms. Hilary Till
Principal, Premia Capital Management, LLC,
http://www.premiacap.com;

Research Associate, EDHEC Risk and Asset Management Research Centre, http://www.edhec-risk.com; and

Co-Editor, Intelligent Commodity Investing,
http://www.riskbooks.com/intelligentcommodity.

Legal Disclaimers

- **This presentation is provided for educational purposes only and should not be construed as investment advice or an offer or solicitation to buy or sell securities or other financial instruments.**

- **The opinions expressed during this presentation are the personal opinions of Hilary Till and do not necessarily reflect those of EDHEC Business School or those of other organizations with which Ms. Till may be affiliated.**

- **The information contained herein has been assembled from sources believed to be reliable, but is not guaranteed by the presenter. The presenter is not responsible for its accuracy or reliability.**

Case Studies and Risk Management in Commodity Derivatives Trading

I. **Institutional Risk Management**

II. **Proprietary Trading Risk Management**

III. **Hedge Fund Risk Management**

IV. **Fund-of-Hedge-Funds Diversification**

V. **Market Risk Management**

This icon is based on the statue in the Chicago Board of Trade plaza.

Based on Till (2008).

I. Institutional Risk Management

Case Study: International Oil Company (IOC)

Overview

- **In 2007, an IOC ran afoul of market-conduct laws and rules, as enforced by the Commodity Futures Trading Commission (CFTC) and the U.S. Department of Justice (DOJ), for trading activities of the previous five years.**

- **In one particular case, the civil and criminal fines *far* exceeded the market-risk of the activities.**

I. Institutional Risk Management

Case Study: International Oil Company
Lessons

- **Establish clear-cut compliance and ethics programs, not just for the trading staff but also for senior management.**

- **Prospective traders entering into large-scale derivatives trading operations should be as (or more) knowledgeable about regulatory rules and laws, as they are with sophisticated market risk-management techniques.**

I. Institutional Risk Management

Case Study: Bank of Montreal (BMO)
Overview

- **On April 27th, 2007, the Bank of Montreal announced unexpected commodity trading losses of C$350-million to C$450-million.**

- **These losses were later revised upward to C$680-million.**

- **The losses were higher than the bank's revenue from trading for the whole of the previous year, according to *The Desk* (5/18/07).**

I. Institutional Risk Management

Case Study: Bank of Montreal (BMO)
Overview

- **In late April 2007, Deloitte and Touche LLP found that there had been "serious mismarking of the book of [over-the-counter (OTC)] natural-gas options."**

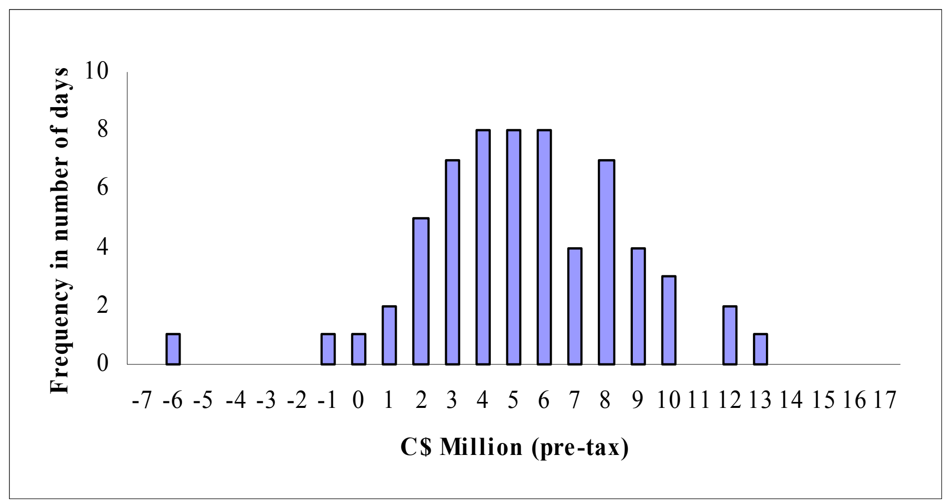
- **"The forensic auditors indicated that they had 'never seen such a wide discrepancy in terms of pricing' between the values marked in BMO's portfolio of natural-gas options and their market value," according to Mavin of the *National Post* (5/10/07).**

I. Institutional Risk Management

Case Study: Bank of Montreal (BMO)
Overview

- **BMO's "C$680 million [reported] loss … [was] over 100 times the average VaR reported for the 2006 fiscal year," noted Blanco and Mark (6/1/07).**

Frequency Distribution of Daily P&L
For Trading and Underwriting at the
Bank of Montreal
<u>(November 1, 2006 to January 31, 2007)</u>



Source: McGlashan of BMO (2007).

I. Institutional Risk Management

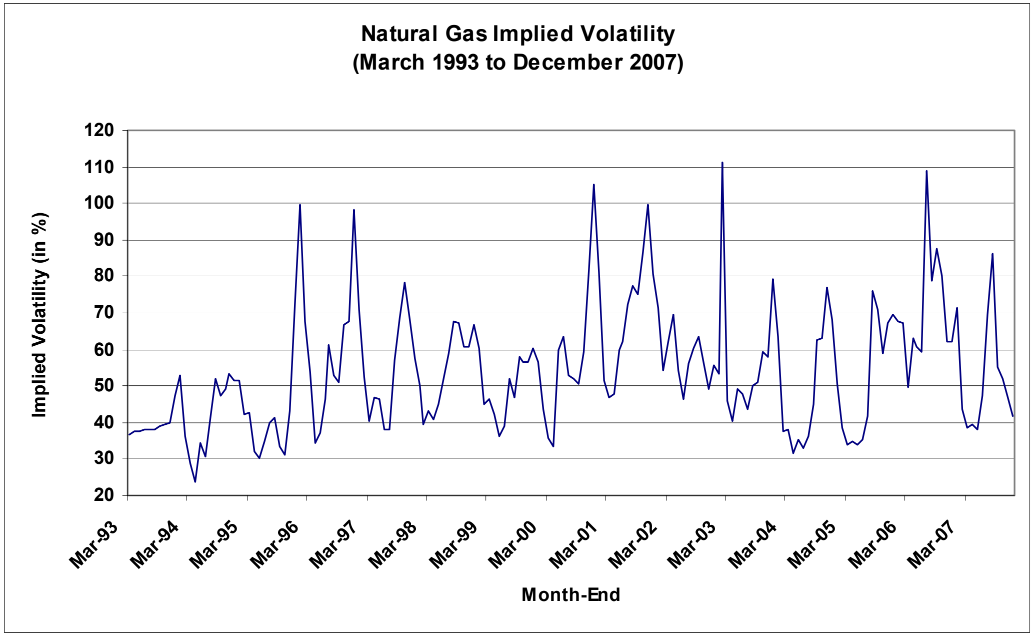
Case Study: Bank of Montreal (BMO)
Overview

- **BMO's "chief risk officer noticed [then] that the risk models had some deficiencies in …**

  … measuring the risk of *long positions in [deep] out-of-the-money … natural gas OTC options*."

  [Italics added.]

Natural Gas Implied Volatility (3/93 to 12/07)



I. Institutional Risk Management

Case Study: Bank of Montreal (BMO)
Lessons

- **According to *The Desk* (5/25/07), the lessons thus far for energy-trading participants are as follows:**

  - **Always get your marks from large, legitimate, established brokers, publishers, or exchanges.**

  - **Make sure that one's code-of-conduct document for traders is sufficient, and that all traders have signed it.**

I. Institutional Risk Management

Case Study: Bank of Montreal (BMO)
Lessons

- **Include in the code-of-conduct document what sort of broker "perks" are unacceptable for traders, and "let nothing be left to common sense."**

- **Ensure that one's trading activity is diversified across more than one broker.**

I. Institutional Risk Management

Case Study: Futures Clearing Merchant (FCM)
Overview

- **On February 28th, 2008, a large FCM revealed an unexpectedly large $141.5-million loss from a wheat-futures trading position taken by one of its registered representatives for the representative's proprietary (own) account.**

- **The clearing firm did not have automatic limits in the sizing of futures trades executed electronically, when the operator was a registered representative of the firm.**

I. Institutional Risk Management

Case Study: Futures Clearing Merchant (FCM)
Overview

- **As a consequence of the wheat loss, the FCM's CEO stated that "the company would introduce limits on positions taken by all customers and traders," reported Cameron and Lucchetti (2008).**

- **The FCM also took other remedial actions to restore customer and shareholder confidence in its risk-management infrastructure.**

I. Institutional Risk Management

Case Study: Futures Clearing Merchant (FCM)
Lessons

- **Impose strict position limits in all electronic trading systems.**

- **When a firm’s financial loss has not been due to an ethical lapse by the company’s management, a company can succeed in retaining the market’s confidence.**

I. Institutional Risk Management

Summary of Risk Management Lessons for Large Institutions

- **In the case of large commodity derivatives trading companies, an emphasis on:**

  1) **complying with regulatory rules and laws;**

  2) **valuing instruments based on pricing sources genuinely independent of the trading team; and**

  3) **imposing strict position limits in all electronic trading systems;**

  … are clearly core principles that all stakeholders in institutionally-sized commodity trading firms should embrace.

II. Proprietary Trading Risk Management

Types of Risks

- **The risk of personal bankruptcy is sufficiently large that a complex system of controls and incentives becomes a moot point.**

- **The main risks are structural breaks in empirical regularities.**

Rembrandt's Storm on the Sea of Galilee, Isabella Stewart Gardner Museum, Boston, and Cover of Against the Gods: The Remarkable Story of Risk by P. Bernstein, 1996, (New York: John Wiley & Sons).

III. Hedge Fund Risk Management

Types of Risks

- **Hedge funds are a hybrid of an institutional asset-management firm and a proprietary trading firm, depending on how much of the principals' wealth is at risk**

- **For large-scale hedge funds, operational risk issues are what is paramount.**

IV. Fund-of-Hedge-Funds Diversification

Diversification of Idiosyncratic Risks

- **A fund-of-funds can potentially dampen the sharp peaks-and-troughs in profitability of individual managers, as demonstrated in Akey (2005, 2007).**

- **Even with this in mind, each individual manager should take steps to keep their market risk within well-understood bounds, which is covered in the next section.**

V. Market Risk Management

Elements of Commodity Risk Management

- **Trade construction**
- **Sizing**
- **Exit strategy**
- **Scenario analyses**
- **Choice of leverage level**

V. Market Risk Management

Trade Construction

- **Futures traders typically aim for a long-option-like payoff profile.**

- **That said, some opportunities in the commodity futures markets have short-option-like payoff profiles.**

V. Market Risk Management

Trade Construction

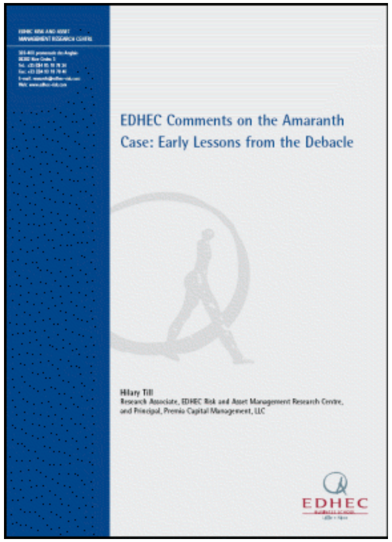
- **If one includes short-option-like strategies in an absolute-return futures program, …**

- **… then the sizing of these trades needs to be reduced compared to the sizing of trades with long-option-like profiles in order to preserve the program's overall long optionality.**

V. Market Risk Management

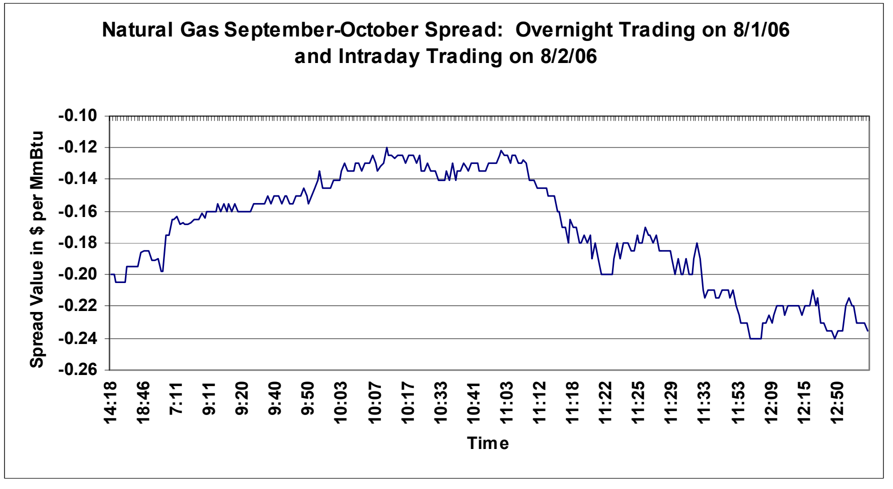
Sizing

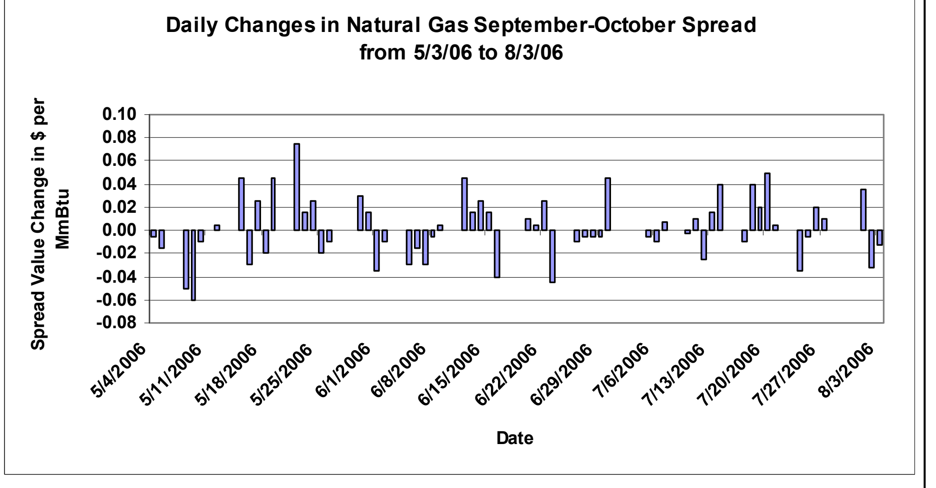
- **Keep sizing within a relatively small fraction of daily trading volume.**
- **The commodity markets do not have natural two-sided flow.**
- **The commodity markets have "nodal liquidity."**



V. Market Risk Management

Sizing
MotherRock Example





The intraday peak-to-trough move in the NG U-V spread was 12c on 8/2/06.

Trading in the NG U-V spread was discontinuous, so there are gaps in the graph when the spread did not trade.

As of 8/1/06, the daily standard deviation of the NG U-V spread had been 2.67c based on the previous three months of data.

Therefore, the spread's intraday move was 4.5 (= 12/2.67) standard deviations (based on the last three months of daily data.)

Source: Till (2006b).

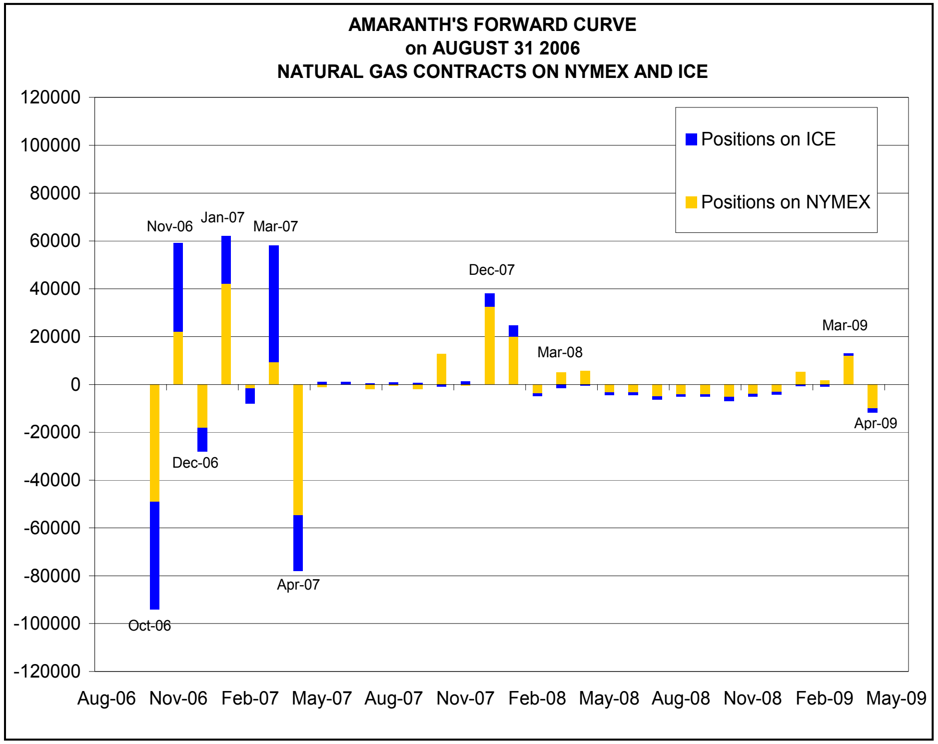
V. Market Risk Management

Sizing

Amaranth Example

- **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.]**



Source: Based on Staff Report (2007), Appendix V, p. 38.

V. Market Risk Management

Exit Strategy

- Using long-term data, one can directly examine the worst performance of a commodity trade under similar circumstances in the past.

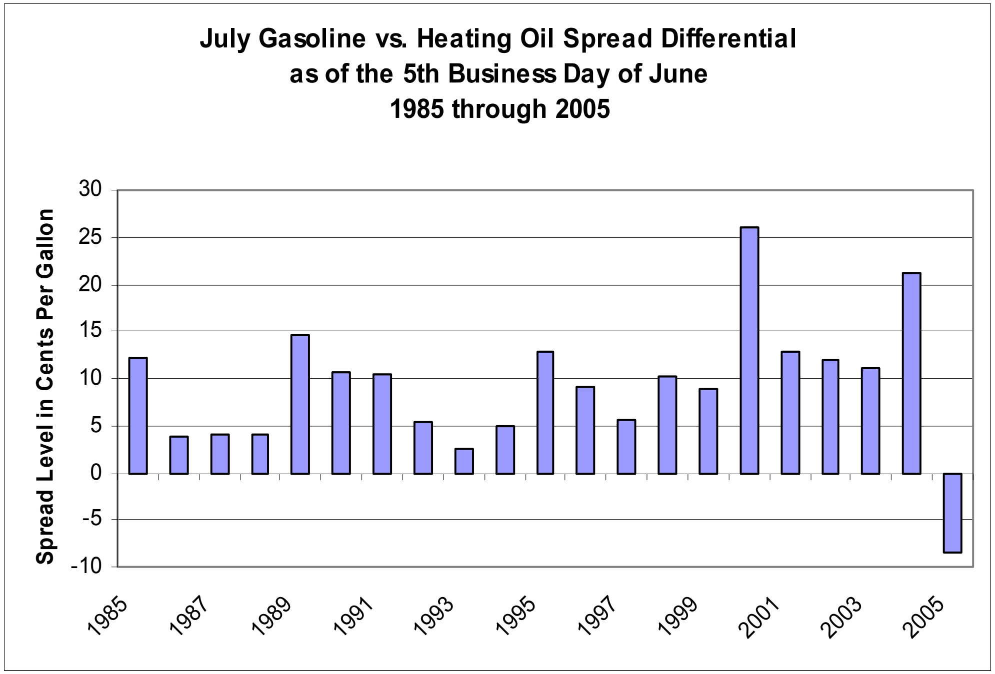
- If the loss on a particular commodity futures trade exceeds the historical worst case, this can be an indication of a new regime that is not reflected in the data.

- This should trigger an exit from a trade since one no longer has a handle on the worst-case scenario.

V. Market Risk Management

Exit Strategy

- **In the summer of 2005, "the big Wall Street houses and some other hedge funds lost many … hundreds of millions [of dollars] on gasoline/heating oil spreads.**



- **They could not imagine that heating oil would go higher than gasoline in June. It just never happened before."**

Source: Fusaro (2005) as cited in Till (2006a).

V. Market Risk Management

Scenario Analyses

- **As described in Till and Gunzberg (2006), when designing a risk management program for a commodity investment, one needs to address both idiosyncratic risks and macro risks.**

- **Idiosyncratic risks include those unique to a specific commodity market.**

- **Macro risks include discovering those risks in the portfolio that can create inadvertent correlations amongst seemingly uncorrelated positions.**

V. Market Risk Management

Choice of Leverage Level

- **Futures trading requires a relatively small amount of margin.**

- **Trade sizing is mainly a matter of how much risk one wants to assume.**

- **Commodities were clearly not immune from sharp episodes of widespread deleveraging of risky investments during the past two years, as occurred during May and June of 2006; end-of-February 2007; and again in mid-August 2007.**

V. Market Risk Management

Choice of Leverage Level

Global Unwind	16-Aug-07
VIX (Equity Implied Vol)*	31%
	Daily
Risk Assets	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

Intraday Performance of Commodities Within the Dow Jones AIG (DJAIG) Commodity Index

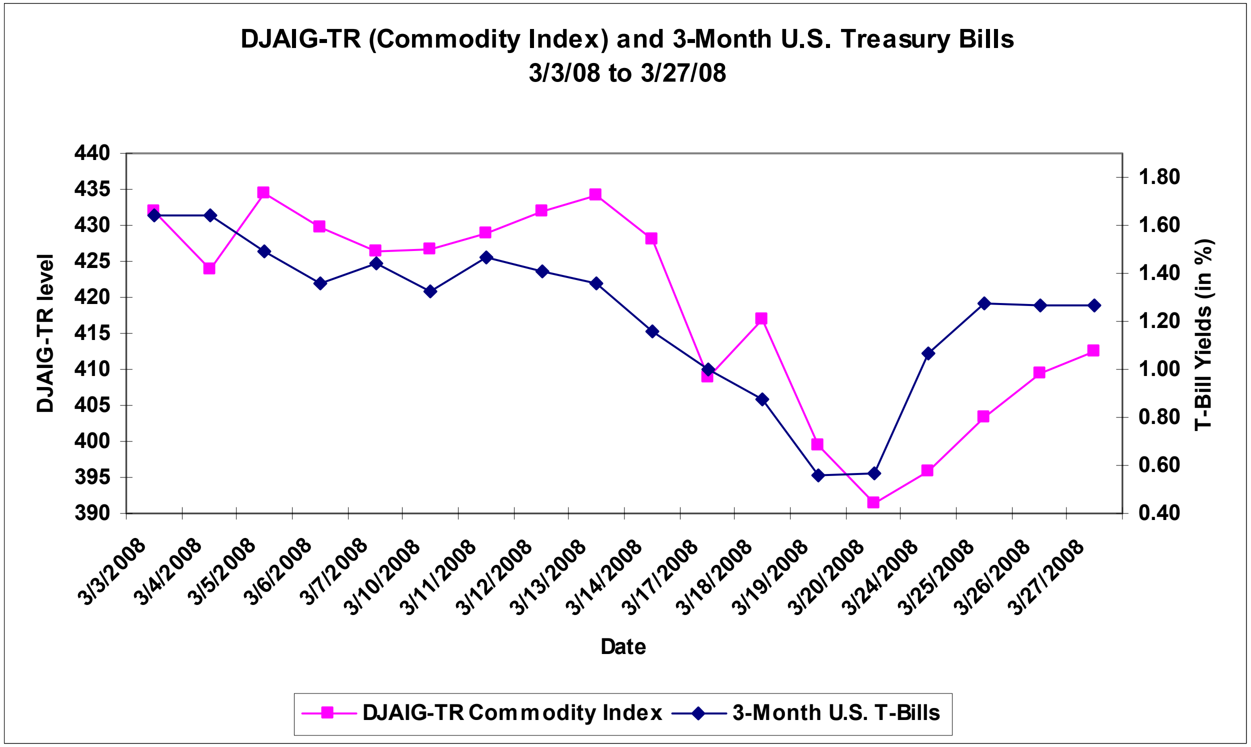
8/16/2007 10:07am CST

Commodity		Price	Change	% Change
LMAHDS03	Aluminum	2543.00y	-9.00	-0.353
NGX7	Natural Gas	7.791	-0.046	-0.587
W Z7	Wheat	688 3/4	-8 1/4	-1.18
LCV7	Live Cattle	94.600	-1.325	-1.38
LHV7	Lean Hogs	67.550	-1.025	-1.49
LMZSDS03	Zinc	3230.00y	-65.00	-1.97
XBX7	RBOB Gasoline	187.43	-3.95	-2.06
GCZ7	Gold	665.20	-14.50	-2.13
CTZ7	Cotton	58.85	-1.33	-2.21
CLX7	Crude Oil	71.10	-1.73	-2.38
HOX7	Heating Oil	201.55	-4.99	-2.42
C Z7	Corn	336 1/2	-8 3/4	-2.53
LMNIDS03	Nickel	26500.0y	-800.0	-2.93
SBV7	Sugar	9.16	-0.29	-3.07
KCZ7	Coffee	119.30	-3.90	-3.17
BOZ7	Soybean Oil	35.27	-1.25	-3.42
SIZ7	Silver	12.290	-0.445	-3.49
S X7	Soybeans	821	-33 1/2	-3.92
HGZ7	Copper	314.80	-17.40	-5.24

Source of Data: The Bloomberg.

V. Market Risk Management

Choice of Leverage Level: The Great Unwind / Great Bail-Out



Source of Data: The Bloomberg.

Conclusion

- **This presentation emphasizes the constant challenges to a trader when attempting to navigate the very dynamic flows of both the commodity markets and the prevailing risk environment.**

- **We also emphasize that operational controls are paramount in an age of increasing legal and regulatory risk, particularly for firms involved in large-scale commodity derivatives trading.**

References

Akey, R., 2005, "Commodities: A Case for Active Management," *Journal of Alternative Investments*, Fall, pp. 8–29.

Akey, R., 2007, "Alpha, Beta, and Commodities: Can a Commodities Investment be Both a High-Risk-Adjusted Return Source and a Portfolio Hedge?", a chapter in Intelligent Commodity Investing (Edited by H. Till and J. Eagleeye), London: Risk Books, pp. 377-417; and in *Journal of Wealth Management*, Fall 2006, pp. 63–82.

Blanco, C. and R. Mark, 2007, "BMO's Derivatives Blow Up", *The Desk*, June 1.

Cameron, D. and A. Lucchetti, 2008, "MF Global Takes a Large Loss On Unauthorized Wheat Trades," *Wall Street Journal Online*, February 28.

Fusaro, P., 2005, "Energy: An Immature Financial Market," *Energy Hedge*, October 5.

Mavin, D., 2007, "BMO Moves On Auditors' Report: Source," *National Post*, May 10.

McGlashan, B., 2007, "Risk Review: Bank of Montreal Group / Investor Community Conference Call / Q1 2007 / Prior to Restatement," March 1.

Degas, Edgar, "The Cotton Exchange at New Orleans," 1873, Musée Municipal, Pau, France.

References (Continued)

Staff Report, 2007, Permanent Subcommittee on Investigations, Committee on Homeland Security and Government Affairs, United States Senate, "Excessive Speculation in the Natural Gas Market," June 25.

The Desk, 2007, "Trader Surprised by Optionable's Dirty Tricks," May 18.

The Desk, 2007, "Optionable Debacle: What Next?" May 25.

Till, H., 2006a, "Portfolio Risk Measurement in Commodity Futures Investments," a chapter in Portfolio Analysis: Advanced Topics in Performance Measurement, Risk and Attribution (Edited by T. Ryan), London: Risk Books, pp. 243-262.

Till, H., 2006b, "EDHEC Comments on the Amaranth Case: Early Lessons from the Debacle," *EDHEC-Risk Publication*, http://www.edhec-risk.com, October 2.

Till, H. (2008), "Case Studies and Risk Management Lessons in Commodity Derivatives Trading," a chapter in Risk Management in Commodity Markets: From Shipping to Agriculturals and Energy (Edited by Helyette Geman), John Wiley & Sons Ltd., Forthcoming.

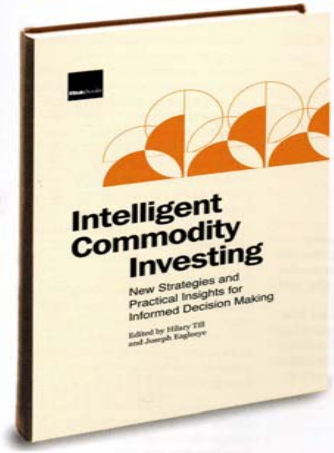
Till, H. and J. Gunzberg, 2006, "Absolute Returns in Commodity (Natural Resource) Futures Investments," a chapter in Hedge Fund Investment Management (Edited by I. Nelken), Oxford: Elsevier Finance, pp. 25-42.

Presentation Prepared By Katherine Farren, CAIA,
Premia Capital Management, LLC.

Special Thanks to Timur Gök, Regional Director of Chicago PRMIA; and to Melanie Angers, Manager, Deloitte & Touche LLP for organizing the Chicago-PRMIA meeting.

Intelligent Commodity Investing

Riskbooks



Bestseller

Intelligent Commodity Investing

Edited by Hilary Till and Joseph Eagleeye

Price
£99/US$194/€149

Format
Hardback/155mm x 235mm/592pp

ISBN
978 1 904339 63 2

"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)

"Covers a full range of concepts that are critical for anyone investing in these markets."
David Kuenzi, Head of Risk Management and Quantitative Research, Glenwood Capital Investments, LLC; A member of the Man Group

"It is the best single resource that anyone involved in the commodity markets could have on their shelf."
David Walsh, Managing Director, Allstate Investments

"This book is a service to our industry."
Robert J. Greer, Senior VP, Real Return Product Manager, PIMCO

With the booming interest in commodity investment there is a growing demand for up-to-date information. This acclaimed book provides timely and intelligent insights from a broad range of institutional investors, consultants, hedge funds, commodity index providers, risk managers as well as research from academia. This is the only multi-contributor book on commodity investment offering a breadth of opinions for sophisticated investors.

It looks at commodity investment from the following perspectives:

- The Investor
- The Active Manager
- The Commodity Index Provider
- The Risk Manager
- The Researcher

The size of the global commodities derivatives market is now estimated to be around US$750 billion. This growth is evident by the increased investment in commodity indexes and the growth of commodity hedge funds. Further evidence of growth is also seen in the increasing size of natural-resources mutual funds. China and other fast-growing countries are snapping up raw materials at a pace that, at times, is faster than mines and oil wells can produce them.

In response to the rapid growth in the market, this timely publication will bring you up to speed on the trends and challenges of commodity investment, providing you with a practical investment framework.

Order online
riskbooks.com

Email order
books@incisivemedia.com

http://www.prmia.org/Chapter_Pages/Chicago/RB07_ICI_LETTER-1.pdf