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The Amaranth Collapse: What Happened and What Have We Learned Thus Far?

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ABSTRACT

On September 18th, 2006, market participants were made aware of a large hedge fund's distress. On that date, Nick Maounis, the founder of Amaranth Advisors, LLC, had issued a letter to his investors, informing them that the fund had lost an estimated 50% of their assets month-to-date. By the end of September 2006, these losses amounted to $6.6-billion, making Amaranth's collapse the largest hedge-fund debacle to have thus far occurred.

There were (and are) many surprising aspects of this debacle. How could a well-respected hedge fund implode so quickly? Could this multi-strategy hedge fund really have become one big bet on winter natural gas prices? How could Amaranth have amassed such huge derivatives positions in natural gas, comparable in size to nationwide residual natural gas consumption, without any regulators noticing? Given the scale of Amaranth's losses, why didn't this debacle lead to wider systematic distress in the financial markets? That seemed to be a key worry following Long-Term Capital Management's (LTCM's) massive losses in 1998. Why didn't that worry apply with Amaranth's troubles?

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In summary, the answers to these questions are as follows:

• Although Amaranth was technically a multi-strategy hedge fund with positions across asset classes, by 2006 it had devoted a large fraction of its risk capital to natural gas trading.

• Natural gas has offered hedge funds a potentially alluring combination of scalability and volatility, and so has attracted a number of non-traditional financial participants during the past three years, including Amaranth once other arbitrage opportunities had become less lucrative.

• Commodity derivatives markets are relatively small compared to global asset values, so it is possible for even one large hedge fund to overwhelm these markets. This arguably happened with Amaranth's large-scale natural gas trading.

• The U.S. regulatory umbrella, covering energy trading, has had a noteworthy gap in coverage. The exchange-traded futures markets are explicitly regulated by the Commodity Futures Trading Commission (CFTC), and the physical natural gas markets are explicitly regulated by the Federal Energy Regulatory Commission (FERC). But over-the-counter energy derivatives trading, until now, has not been subject to the same regulatory scrutiny. It was on such platforms that Amaranth carried out a substantial fraction of its trading.

• Unlike the LTCM crisis, counterparties did step in quickly to assume Amaranth's positions, which immediately stabilized the natural gas market.

• At the time of Amaranth's implosion, the reason that there were not worries of wider systematic failure is that Amaranth's core risk positions were not similar to those held by the international money-center banks. In the case of LTCM, its positions were highly correlated to those held by money-center banks, meaning that LTCM's distress would become everyone's distress.

This article will briefly cover each of the above topics based on research which I have carried out during the past year for the EDHEC Risk and Asset Management Research Centre. This research, in turn, has been cited by both the European Central Bank and the U.S. Senate Subcommittee on Permanent Investigations. One caveat regarding this article is that its conclusions are necessarily incomplete, given that regulatory actions and litigation against Amaranth are still ongoing.

In review, Amaranth Advisors, LLC was a multi-strategy hedge fund, which was founded in 2000 by Nick Maounis and was headquartered in Greenwich, Connecticut. The founder's original expertise was in convertible bonds. The fund later became involved in merger arbitrage, long-short equity, leveraged loans, blank-check companies, and in energy trading. As of June 30th of 2006, energy trades accounted for about half of the fund's capital and generated about 75 percent of its profits.

A 9/19/06 *Wall Street Journal* (WSJ) article[1] has provided the best overview thus far on Amaranth's energy trading. The following account largely draws from this article.

The *WSJ* reported that Amaranth's head energy trader sometimes held "open positions to buy or sell tens of billions of dollars of commodities." Mr. Hunter was based in Calgary, Alberta.

"Mr. Hunter saw that a surplus of [natural] gas this summer [in the U.S.] could lead to low prices, but he also made bets that would pay off if, say, a hurricane or cold winter sharply reduced supplies by the end of winter. He was also willing to buy gas in even further-away years, as part of complex strategies."

"Buying what is known as 'winter' gas years into the future is a risky proposition because that market has many fewer traders than do contracts for months close at hand."

1 - Davis, Ann, "How Giant Bets on Natural Gas Sank Brash Hedge-Fund Trader," Wall Street Journal, 9/19/06.

"Unlike oil, [natural] gas can't readily be moved about the globe to fill local shortages or relieve local supplies."

"Traders like Mr. Hunter make complex wagers on gas at multiple points in the future, betting, say, that it will be cheap in the summer if there is a lot of supply, but expensive by a certain point in the winter. Mr. Hunter closely watches how weather affects prices and whether conditions will lead to more, or less, gas in a finite number of underground storage caverns."

"Bruno Stanziale, a former Deutsche Bank colleague and now at Societe Generale, works with energy companies that need to hedge their [forward] production. In an interview in July [2006], he contended Mr. Hunter was helping the market function better and gas producers to finance new exploration, such as by agreeing to buy the rights to gas for delivery in 2010. 'He's opened a market up and provided a new level of liquidity to all players,' Mr. Stanziale said."

"[Amaranth's energy book] was up for the year roughly $2 billion by April, scoring a return of 11% to 13% that month alone, say investors in the Amaranth fund. Then … [the energy strategies] … had a loss of nearly $1 billion in May when prices of gas for delivery far in the future suddenly collapsed, investors add. [The energy traders] won back the $1 billion over the summer …"

As of 8/31/06, the fund had about $9.2 billion in assets under management.

On Monday, 9/18/06, Nick Maounis informed his investors that his fund was down about 50% for the month. Additionally, the fund had lost -$560 million on Thursday, 9/14/06 alone.

What happened next was discussed exhaustively in a 1/30/07 *Wall Street Journal* article[2]. The fund had scrambled to transfer its positions to third-party financial institutions during the weekend of 9/16 to 9/17. Merrill Lynch had agreed to take on 25% of the fund's natural gas positions for a payment of about $250 million. The fund then lost a further $800 million through Tuesday, 9/19/06, due to the natural gas market moving severely against its positions. On Wednesday, 9/20/06, the fund succeeded in transferring its remaining energy positions to Citadel Investment Group and to its clearing broker, JP Morgan Chase, at a -$2.15 billion discount to their 9/19/06 mark-to-market value. On Thursday, 9/21/06, the natural gas curve stabilized.

The hedge-fund's losses ultimately totaled $6.6 billion, according to *Bloomberg News*[3].

After the Wall Street Journal article of 1/30/07, there was no new material information available on the Amaranth case. This dramatically changed on 6/25/07 when the U.S. Senate Permanent Subcommittee on Investigations (PSI) released a report on "Excessive Speculation in the Natural Gas Market."[4] This investigative committee exhaustively documented Amaranth's natural gas positions. The PSI examined several million individual trades. They were able to do by subpoenaing records from the New York Mercantile Exchange (NYMEX), the Intercontinental Exchange (ICE), Amaranth, and other traders.

The Senate report confirmed what market participants had already suspected: 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.

The Senate report contained a surprising amount of detail on a previously opaque market. In the past, if one wanted to gain expertise in the arcane commodity derivatives markets, including in natural gas trading, one would have had to have landed an apprenticeship position at one of the handful of energy-merchant companies. This is analogous to the well-known contention that the credible long-short equity hedge fund managers have all learned their craft at a handful shops, including Goldman Sachs' risk arbitrage desk, Tiger, and Harvard Management Company.

2 - Davis, Ann, Gregory Zuckerman, and Henny Sender, "Hedge-Fund Hardball: Amid Amaranth's Crisis, Other Players Profited," Wall Street Journal, 1/30/07.
3 - O'Reilly, Cary, "Ex-Amaranth Trader Sues Agency to Block Enforcement," Bloomberg News, 7/24/07.
4 -"Excessive Speculation in the Natural Gas Market," Staff Report of the Permanent Subcommittee on Investigations, Committee on Homeland Security and Government Affairs, United States Senate, 6/25/07.

With the Senate report, one has access to 135 pages of explanation of natural gas trading along with 345 pages of appendices documenting Amaranth's daily position-taking and choice of energy-trading platform.

Now that Amaranth's natural gas strategy has been conclusively documented, one might wonder why Amaranth chose to concentrate its investments in such a niche market.

In order to answer this question, one needs to provide some background on the U.S. natural gas market.

As noted, natural gas derivatives trading has offered hedge funds a potentially alluring combination of scalability and volatility, and also at times, pockets of predictability. Traders have been able to access these markets through the transparent NYMEX for exchange-traded exposure or through the opaque ICE for over-the-counter exposure.

The key economic function for natural gas is to provide for heating demand during the winter in the northern states of the United States. Natural gas is also a key energy source for air-conditioning demand during the summer.

There is a long "injection season" from the spring-through-the-fall in which natural gas is injected and stored in caverns for later use during the long winter season.

Figure 1 illustrates the normal seasonal pattern of builds and draws in natural gas throughout the year.

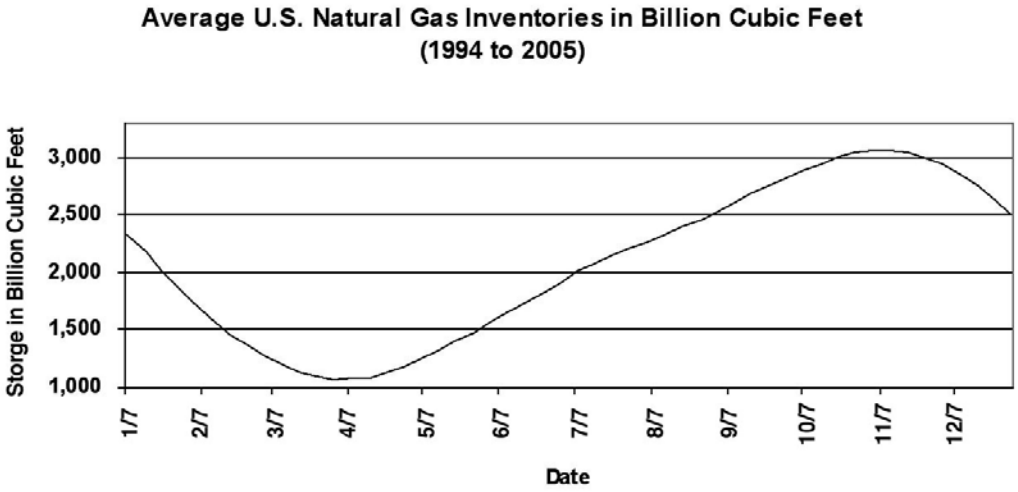

Figure 1
Note: This graph specifically shows the U.S. Department of Energy's total estimated storage data for working natural gas inventories averaged over the period, 1994 to 2005.

Data source: The Bloomberg

Several technical points make natural gas (and its spreads) an especially volatile commodity market:
• Domestic natural gas production has not kept pace with increasing demand for this commodity; this point is illustrated in Figures 2 and 3;

• The U.S. natural gas markets are largely insulated, at least in the short-term, from global energy factors, since only a small amount of U.S. natural gas needs are met through imports of Liquid Natural Gas (LNG);

• There is arguably insufficient storage capacity of natural gas to meet demand if there is a particularly severe winter; and in fact, natural gas prices have spiked during five of the past six winters in order to balance supply and demand; and

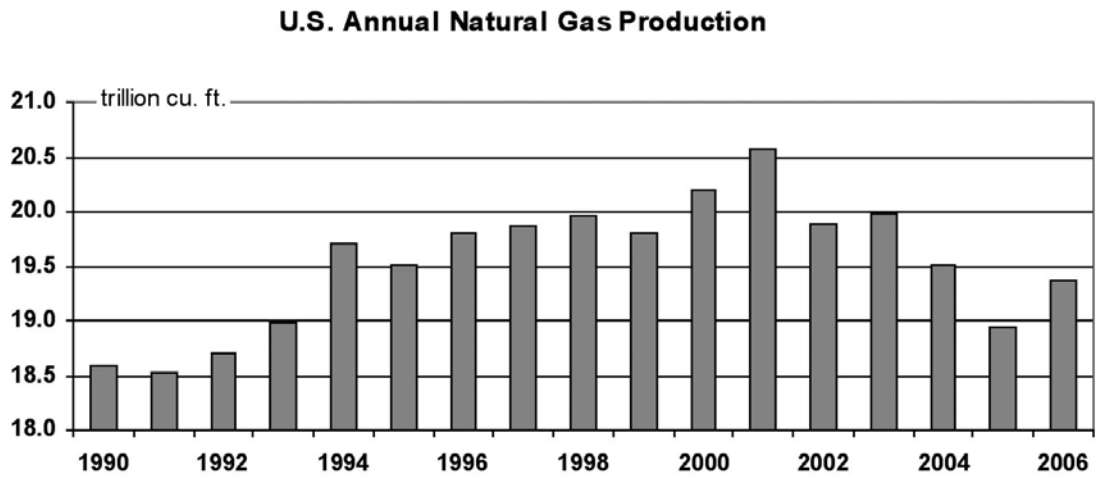

Figure 2
Source: This chart is based on Figure 10 of "Excessive Speculation in the Natural Gas Market," Staff Report of the Permanent Subcommittee on Investigations, Committee on Homeland Security and Government Affairs, United States Senate, 6/25/07, page 19.

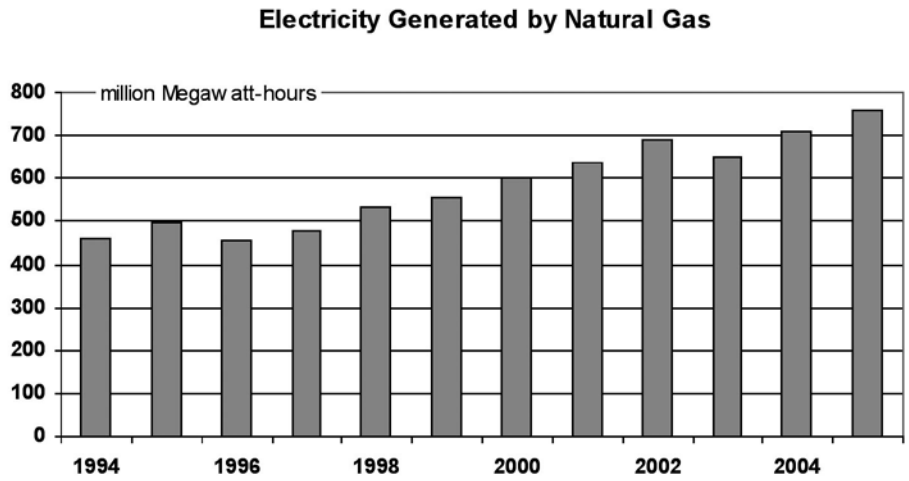

Figure 3
Source: This chart is based on Figure 11 of "Excessive Speculation in the Natural Gas Market," Staff Report of the Permanent Subcommittee on Investigations, Committee on Homeland Security and Government Affairs, United States Senate, 6/25/07, page 20.

• At the end of winter, inventories at some facilities have to be cycled out of storage, regardless of price, in order to maintain the integrity of storage facilities.

In essence, the technical issues with natural gas mean that it is (arguably) a quasi-storable commodity. This has a direct impact on the pricing relationships between different delivery months for natural gas.

In all commodity futures markets, there is a different price for a commodity, depending on when the commodity is to be delivered. For example, with natural gas, a futures contract whose delivery is in October will have a different price than a contract whose delivery is in December. Commodity traders will frequently specialize in understanding the factors that impact the spread between two delivery months; this is known as *calendar-spread* trading. In our example, a futures trader may trade the spread between the October vs. December futures contracts.

Figure 4 shows the futures curve for natural gas of 9/26/06. We refer to the term structure of a commodity futures market as a curve since each delivery-month contract is plotted on the x-axis with their respective prices on the y-axis; thus, a curve is traced out.

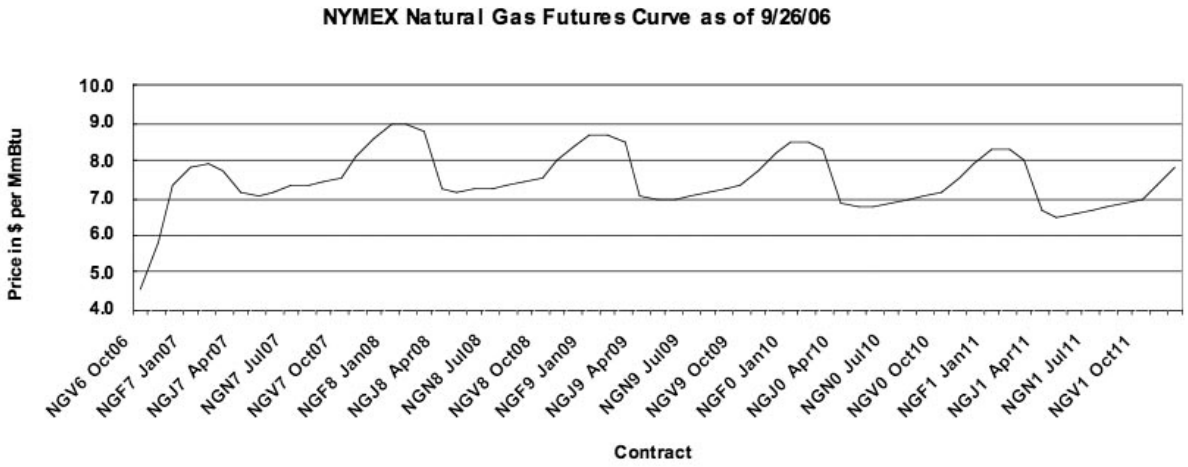

Figure 4
Data source: The Bloomberg.

When the near-month futures contracts trade at a discount to further-delivery contracts, one says that the futures curve is in *contango*. When the near-month futures contracts instead trade at a premium to further-delivery contracts, one says the futures curve is in *backwardation*.

One can note that the yearly futures curves for natural gas in Figure 4 mirror the average inventory build-and-draw pattern of Figure 1. The prices of summer and fall futures contracts typically trade at a discount to the winter contracts. The markets thus provide a return for storing natural gas. An owner of a storage facility can buy summer natural gas and simultaneously sell winter natural gas via the futures markets. This difference will be the storage operator's return for storage. When the summer futures contract matures, the storage operator can take delivery of the physical natural gas, and inject this natural gas into storage. Later when the operator's winter futures contract matures, the operator can make delivery of the physical natural gas by drawing physical natural gas out of storage for this purpose. As long as the operator's financing and physical outlay costs are under the spread locked in through the futures market, then this operation will be profitable.

The example provided above is admittedly a simplified version of how storage operators can choose to monetize the value of their physical assets, but provides enough of an explanation for readers to understand how calendar-spread trading fits into the wider scheme of hedging physical natural gas assets.

It is our expectation that both storage operators and natural gas producers were the ultimate counterparties to Amaranth's sizeable spread trading.

Why are natural gas spreads so volatile? It is only when a commodity is fully storable, that commodity spreads can be predictably stable. In that case, the determining factor between the value of one contract versus a later-month contract is the cost of storing and financing the commodity from one period to the next.

With U.S. natural gas, storage capacity has actually declined since 1989. Further, domestic production has not kept pace with demand. These factors have caused massive volatility in the outright price of natural gas and in the price relationships between different sectors of the natural gas curve. To give one an idea of natural gas' volatility, on 9/26/06, the implied volatility of one-month, at-the-money natural gas options was 92.5%. This was the case even though there were no hurricanes, heat-waves, or cold-shocks confronting the market at the time.

The outright price of natural gas as well as the spread relationships in this market are highly sensitive to the prevailing storage situation for the commodity.

During the summer if there are hurricanes in the U.S., concerns emerge that not enough natural gas will be produced and stored for winter needs. In that scenario, the front-month contract's price has exploded to discourage current demand, and the futures curve has traded in steeper contango to provide a further enhanced return for storage. This eventually occurred in the aftermath of Hurricane Katrina in 2005.
At the start of the winter, if there are predictions of an exceptionally cold winter, the winter contracts trade at a large premium to spring contracts in order to encourage supplies to be brought out of storage immediately, and to discourage any non-essential use of natural gas. This occurred in December of 2005, even though storage at the start of the season was quite high.

At the end of the winter, if there is a cold shock and inventories are at their seasonal low, the end-of-winter contracts can also explode relative to later-month contracts in order to limit current use of natural gas to absolutely essential activities. This scenario occurred in the winter of 2002/3 and is illustrated in Figure 5.

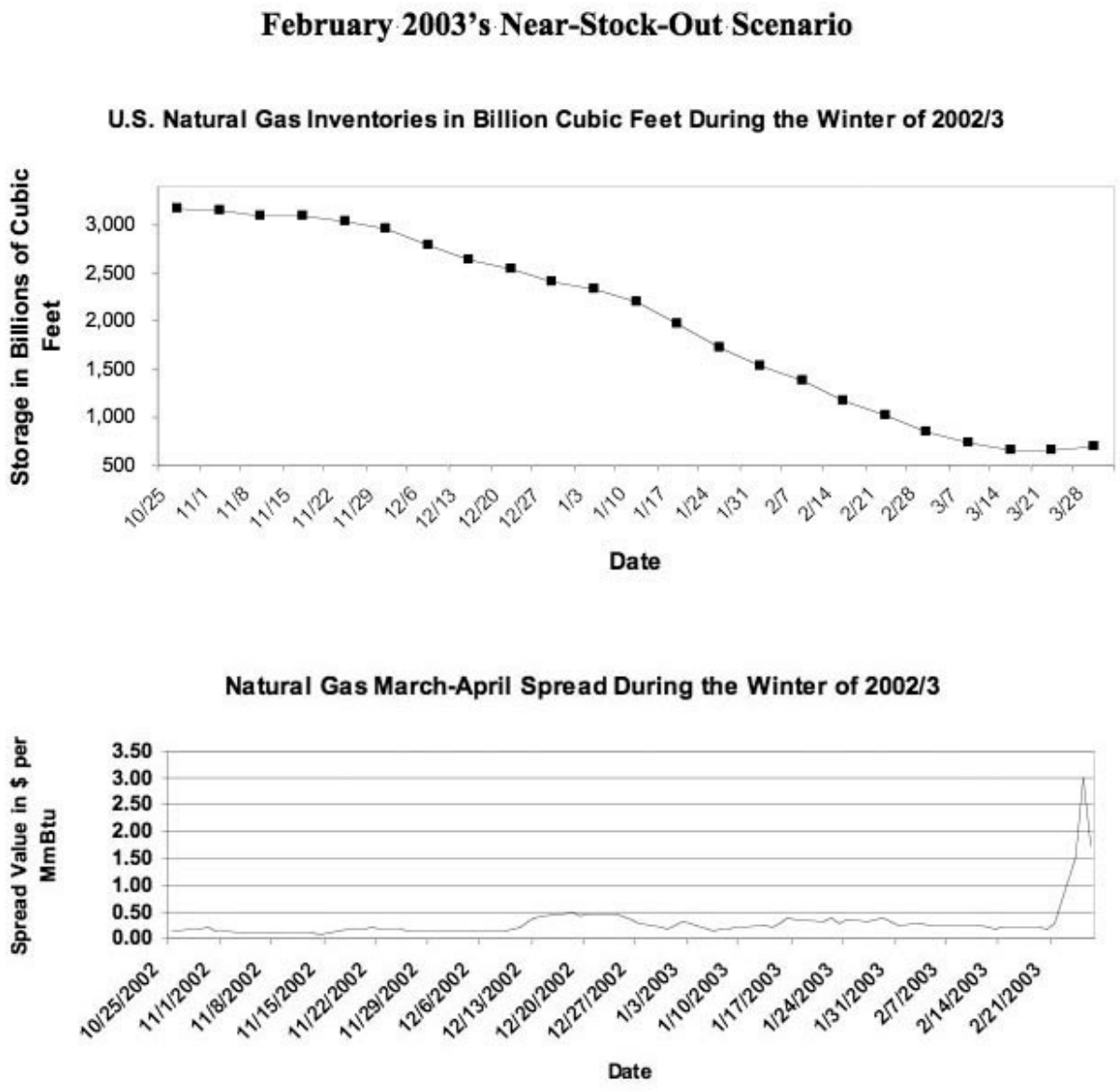

Figure 5
Source: Till, Hilary, "EDHEC Comments on the Amaranth Case: Early Lessons from the Debacle," EDHEC-Risk Publication, 10/2/06.

Data source: The Bloomberg.

Instead, if the winter is unexpectedly mild, and there are still massive amounts of natural gas in storage, then the near-month price of natural gas plummets to encourage its current use and the curve trades in contango in order to provide a return to any storage operator who can still store gas. This occurred during the end of the winter in early 2006.

As one may surmise from the above scenarios, the U.S. natural gas markets provide many spreading opportunities around seasonal inflection points for natural gas use. A bond trader may recognize the natural gas curve as providing rich opportunities for speculation. The summer/fall injection season creates opportunities in the summer/fall versus winter natural gas spread relationship. The end-of-winter period creates opportunities in the March-versus-April natural gas spread. As documented in the U.S. Senate report, Amaranth was precisely involved in these sorts of opportunities on a massive scale.

Now even though one can understand the economic rationale for Amaranth's natural gas trading strategies, the scale in which they implemented their position-taking was clearly inappropriate.

For example, the U.S. Senate report 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. residual consumers nationwide*."

How could just *one* hedge fund amass such a huge position?

One answer is that the commodity derivatives markets, including U.S. natural gas, are relatively small for sophisticated financial-market participants. According to a California Public Employees' Retirement System (2006) presentation[5] , the size of the commodity derivatives markets is less than 2% of global asset values.

A second answer is that the over-the-counter energy markets have largely been free of regulatory scrutiny so a market participant could, until recently, fly under the radar screen in carrying out large-scale trading. That said, there are now bills before both the U.S. Senate and House of Representatives to require that over-the-counter energy derivatives trading, particularly in natural gas, be conducted with the same level of transparency as in the exchange-traded futures markets.

Interestingly, the regulatory action against Amaranth, thus far, has not been focused on the massive (long winter) position-taking of the fund, which was documented in the June 25th Senate report. Instead, two regulatory commissions have recently brought charges against Amaranth and its former energy traders, regarding attempting to manipulate the settlement price of the expiring NYMEX's energy futures contract *downwards* on several occasions.

These charges were brought on June 25th and June 26th, 2007 by the Commodity Futures Trading Commission (CFTC) and the Federal Energy Regulatory Commission (FERC) respectively. To be fair, one should note that Amaranth's current and former principals are vigorously countering the regulatory actions against the firm and its former traders.

The CFTC's regulatory authority mainly covers the exchange-traded futures markets while the FERC is responsible for overseeing the wholesale natural gas and electricity markets in the U.S. The monthly settlement price for the expiring NYMEX natural gas futures contract is frequently used in pricing physical natural gas transactions, so the FERC may have oversight jurisdiction if there is an actual manipulation of the NYMEX settlement price for expiring contracts.

In addition to the attempted-price-manipulation charge, the CFTC also alleged that Amaranth made false statements to the NYMEX when the exchange formally asked the fund about the justification and commercial purpose of its May-contract expiry trading.

The CFTC complaint[6] and FERC order[7] both provide a surprising amount of detailed market-microstructure information. Again, like the U.S. Senate report, the level of detail provided by both regulatory bodies on the functioning of the natural gas derivatives markets is unprecedented.

5 - California Public Employees' Retirement System, "Investments in Commodity Futures: Asset Allocation / Risk Management," Investment Commodity Meeting, Attachment 2, 3/13/06.
6 - Commodity Futures Trading Commission, "Complaint for Injunctive and Other Equitable Relief and Civil Monetary Penalties Under the Commodity Exchange Act," United States District Court, Southern District of New York, U.S. CFTC (Plaintiff) v. Amaranth Advisors, LLC, Amaranth Advisors (Calgary) ULC and Brian Hunter (Defendants), 7/25/07.
7 - Federal Energy Regulatory Commission, Amaranth et al., Docket No. IN07-26-000, "Order to Show Cause and Notice of Proposed Penalties," 7/26/07.

The CFTC complaint requests that the U.S. District Court (Southern District of New York) enter an order prohibiting Amaranth and its former head trader from "engaging in any business activities related to commodity interest trading" amongst other prohibitions.

The FERC was granted anti-manipulation authority in the physical natural gas markets by the Congress in 2005, and the Amaranth case is the first such exercise of this authority.

The FERC is "proposing to order disgorgement of unjust profits and civil penalties totaling nearly $300 million," including a penalty of $30 million for Amaranth's former head trader, Brian Hunter.

The FERC order explains why the commission was calling for very large monetary penalties for Amaranth and two of its natural gas traders:

"There are strong enforcement and deterrence policy bases for setting the civil penalties for individual traders at a high level. The traders in this industry have historically been capable of easily recovering from disastrous performance or misconduct by simply moving to, or starting up, another trading operation. Even after spectacular failures, a trader can attract capital to start new trading activities or a new fund. ... Under the circumstances, the Commission sends here a clear message that manipulation will have severe personal consequences for individual traders in order to deter them and others from violative behavior."

According to an energy industry journal[8] , additional charges may soon be filed against Amaranth and its former energy traders, so any conclusions or lessons to be drawn on the regulatory front are necessarily incomplete at this stage. Instead, we can make observations regarding the robustness of the alternative-investment industry[9].

On 9/15/06 and 9/19/06, during the peak of Amaranth's distress, sections of the natural gas curve underwent 3- to 15-standard-deviation daily moves, a tell-tale sign of a distressed liquidation.

On 9/21/06, one day after Amaranth's positions were moved to Citadel Investments and JP Morgan, the natural gas curve stabilized.

That JP Morgan and Citadel took on Amaranth's energy book en-masse appears to be a preview of how the markets will handle (and are handling) hedge-fund liquidations.

In the middle of October 2006, a hedge-fund trade publication[10] reported that an investment bank was packaging up the assets of various hedge-funds-in-distress to sell on to investors. This is obviously a much preferable route compared to an individually distressed hedge fund trying to quickly sell its assets on the open market. Such a mechanism means that investors in hedge-funds-in-distress will receive much more of their money back, and with less of an adverse impact on whatever the asset class or investment is that the hedge fund is specializing in.

If the capital markets can develop smooth mechanisms for transferring whole portfolios of hedge-funds-in-distress, then one may not see the continuation of large-scale distressed liquidations as with Amaranth (and Long-Term Capital Management.)

In the long-only world, the transferring of portfolios from one active manager to another by pension funds and other institutional investors is already very well-developed to minimize price-pressure effects. The development of similar mechanisms is and will be a very positive development for the hedge fund industry.

In fact, the market-place saw a further example of this type of action on Monday, July 30th, 2007. Citadel Investments notified the market via a press release that it had taken on the credit-focused investments of a distressed hedge fund, Sowood Capital Management. Citadel and Sowood had negotiated this transaction over

8 - The Desk, "The CFTC Lands a Big Fish: More Details on the Taking of Amaranth," Volume 10, 7/27/07, pp. 1, 9-13.
9 - Till, Hilary, Academic Paper on Amaranth, Hedge Funds Review, January 2007, pp. 43-45.
10 - Hedge Fund Alert, "Deutsche Bundling Embattled Funds' Assets," 10/11/06, pp. 1, 4.

the weekend of July 28th-29th when the distressed fund was faced with the uncertainty of whether it could meet imminent margin calls.

Now, in the case of Amaranth, one should still be cautious about concluding that the alternative investment industry has the wherewithal to absorb major hedge fund failures.

In the Long-Term Capital Management crisis, the hedge-fund-in-distress had positions that were highly correlated or identical to the core positions held by leveraged, money-center banks.

In the Amaranth crisis, the fund's key risk positions were calendar spreads in the U.S. natural gas derivatives markets; these are not positions that are central to the risk-taking activities of the main international banks. Therefore, the impact of Amaranth's losses was (arguably) largely confined to its investors.

Also, it is likely that physical natural gas market participants were the ultimate risk takers on the other side of Amaranth's trades, and so benefited from the temporary dislocations that ensued from the fund's distress. In other words, it does not appear that the commercial natural gas industry was damaged by this financial crisis; in fact, commercial-market participants likely benefited.

A true test of the alternative investment industry's robustness would have to be one where a large hedge fund not only became distressed, but also held substantial positions that were highly correlated to those held by the major international banks.

From an investor's perspective, one would hope that the market-place would provide a sufficient disciplining mechanism in preventing future Amaranths. After all, no one would want to see a swift 70% decline in the value of their investments. Perhaps the enduring lesson for global investors in 2006 and 2007 will be that value matters: one should not pay historic levels for forward U.S. winter natural gas prices relative to non-winter months, as Amaranth did in amassing its huge positions; just like one should not have concentrated investments in the U.S. sub-prime mortgage market, particularly without adequate compensation for default risk, as has unfortunately been discovered during the summer of 2007.