The Amaranth Case Study

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The Winter 2017 issue of the *Global Commodities Applied Research Digest* (*GCARD*) provided a case study on the MF Global bankruptcy. In this issue of the *GCARD*, we will cover another debacle: the Amaranth hedge fund debacle. While the lessons from the MF Global bankruptcy can best be understood in terms of due diligence principles, the Amaranth blowup can best be understood in terms of market-risk principles, as will be discussed in this article.

Amaranth Advisors, LLC was a multi-strategy hedge fund, founded in 2000 and 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 30, 2006, energy trades accounted for about half of the fund's capital and generated about 75 percent of its profits.

Davis (2006) provides an excellent overview on Amaranth's energy trading. Davis (2006) reports that Amaranth's head energy trader sometimes held "open positions to buy or sell tens of billions of dollars of commodities." Amaranth's energy trading operation was based in Calgary, Alberta. "[Amaranth's head energy trader] saw that a surplus of [natural] gas … [in the] summer [in the United States] 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." Excerpting from key points in Davis (2006)'s article:

- Amaranth's hedge energy trader "also was 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."

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

- "[Natural gas] traders … 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. [Amaranth's head trader would] closely watch how weather affects prices and whether conditions will lead to more, or less, gas in a finite number of underground storage caverns."

Amaranth's structural position-taking may have assisted energy companies in their need to hedge their far-forward production, including through 2010. Davis (2006) writes: "[Amaranth's energy book] was up for the year roughly $2 billion by April [2006], 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 [2006] 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 August 31, 2006, the fund had about $9.2 billion in assets under management. On Monday, September 18, 2006, market participants became aware of Amaranth's distress. The founder had issued a letter to investors informing them that the fund had lost an estimated 50 percent of their assets since its end-August value. Additionally, Hamilton (2006) notes the fund had lost $560 million on Thursday, September 14, 2006 alone.

According to Davis, Zuckerman, and Sender (2007), the fund had scrambled to transfer its positions to third-party financial institutions during the weekend of September 16 and 17, 2006. Merrill Lynch had agreed to take on 25 percent of the fund's natural gas positions for a payment of about $250 million. The fund then lost $800 million more through Tuesday, September 19, 2006, due to the natural gas market moving severely against its positions. On Wednesday, September 20, 2006, the fund succeeded in transferring its remaining energy positions to Citadel Investment Group and to its clearing broker, J.P. Morgan Chase, at a $2.15 billion discount to their September 19, 2006 mark-to-market value. Apparently, the two firms equally shared the risk of Amaranth's positions. On Thursday, September 21, 2006, the natural gas curve stabilized. The hedge fund's losses ultimately totaled $6.6 billion.

On June 25, 2007, the U.S. Senate Permanent Subcommittee on Investigations released a report on the Amaranth debacle, entitled, "Excessive Speculation in the Natural Gas Market." The 135-page report and its further 345 pages of appendices provided details on the Amaranth case. In carrying out its forensic analysis, the Senate subcommittee examined several million individual trades. The subcommittee obtained this information by subpoenaing records from the New York Mercantile Exchange (NYMEX), the Intercontinental Exchange (ICE), Amaranth, and other traders.

Amaranth's spread trading strategy involved taking long positions in winter contract deliveries and short positions in non-winter contract deliveries. These positions would have benefited from potential weather events such as hurricanes and cold-shocks from 2006 through 2010. Although one can justify the economic rationale for Amaranth's strategy, both trade sizing and value matter even more so. The U.S. Senate Permanent Subcommittee on Investigations Staff Report (2007) 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."

Drawing from the U.S. Senate's report, Table 1 summarizes the scale of Amaranth's natural gas trading activity. Figure 1 on the next page draws from the report's appendix to show the positioning of the fund through May 2009, as of the end of August 2006. The U.S. Senate report excludes similar charts for the fund's positions past the May 2009 maturity date and also its miscellaneous commodity investments.

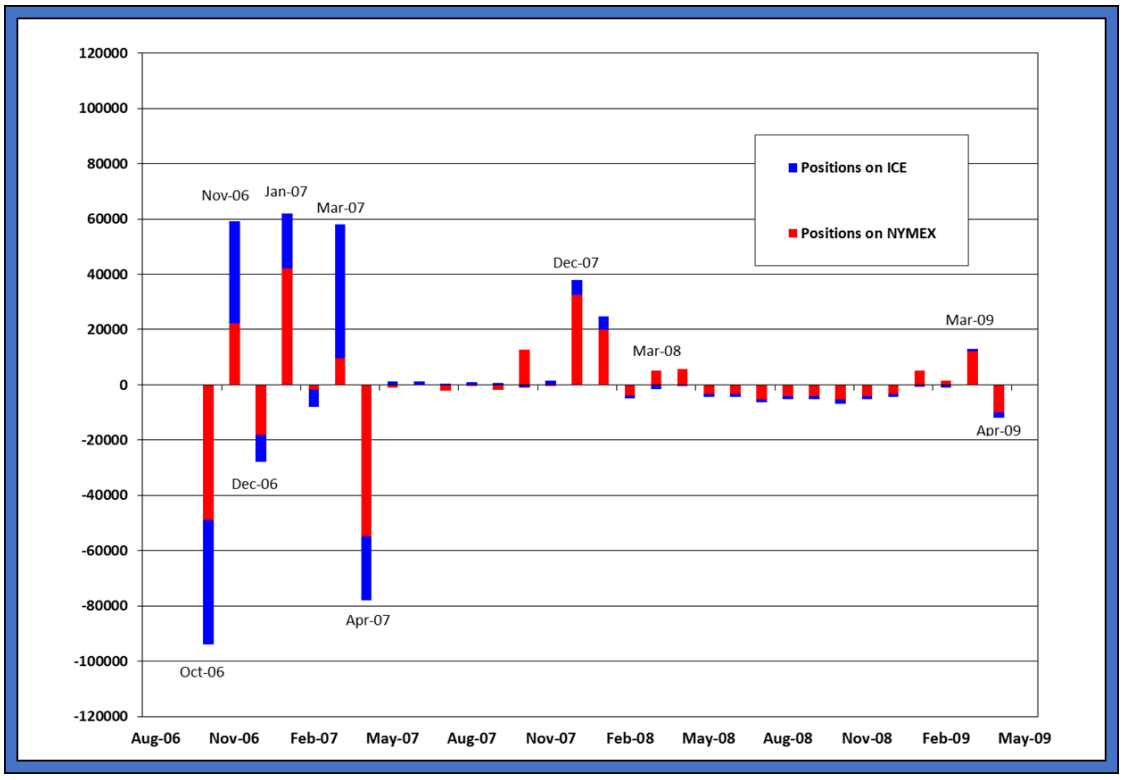
Table 1
Scale of Amaranth's Natural Gas Trading: Excerpted from the U.S. Senate Report of June 25, 2007

At times Amaranth controlled up to 40% of all the open interest on NYMEX for the winter months (October 2006 through March 2007).	pp. 51-52
In late July 2006, Amaranth held a total of more than 80,000 NYMEX and ICE contracts for January 2007, representing a volume of natural gas that equaled the entire amount of natural gas eventually used in that month by U.S. residential consumers nationwide.	p. 52
On 7/31/06, Amaranth's trading in the March and April 2007 contracts represented almost 70% of the total NYMEX trading volume in each of these contracts on that date.	p. 52
Amaranth also held large positions in other winter and summer months spanning the five-year period from 2006-2010.	p. 52
For example, Amaranth held 60% of the outstanding contracts (open interest) in all NYMEX natural gas futures contracts in 2010.	p. 52
On 7/24/06, Amaranth's futures position as a % of NYMEX futures open interest in the December 2007 contract was 81%.	p. 94
On 8/28/06, Amaranth accounted for over 40% of the total volume on the ICE, and over 25% of the entire volume of exchange-traded futures and swaps on NYMEX and on ICE on that date.	p. 101

Source: Excerpted from U.S. Senate Permanent Subcommittee on Investigations Staff Report (2007). The right-hand column shows on what page of the Staff Report that each point is derived from.

NYMEX: New York Mercantile Exchange; ICE: Intercontinental Exchange

Figure 1
Amaranth's Positioning on August 31, 2006 in Natural Gas Contracts on NYMEX and ICE



Source: Adapted from U.S. Senate Permanent Subcommittee on Investigations Staff Report (2007), Appendix V, p. 38.

Amaranth's position sizes were obviously too large for a financial entity that had 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. Also, the fund had entered into these vast positions at exceedingly wide levels for these spreads.

Using the Senate report's documented positions for Amaranth as of August 31, 2006, Till (2008) finds that two spreads were 93 percent correlated to Amaranth's natural gas book: (1) the November 2006 vs. October 2006 (NGX-V6) spread and (2) the March 2007 vs. April 2007 (NGH-J7) spread.

Examining the past spread values for the November-versus-October-2006 spread and the March-versus-April-2007 spread helps to understand the riskiness of Amaranth's documented August 31, 2006 portfolio. If these two spreads had reverted to levels that had prevailed at the end-of-August during the previous six years, up to –36 percent could have been lost under normal conditions, as shown in Table 2 on the next page.

Table 2
Scenario Analysis of Amaranth's Key Risk Positions (August 31, 2006)

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

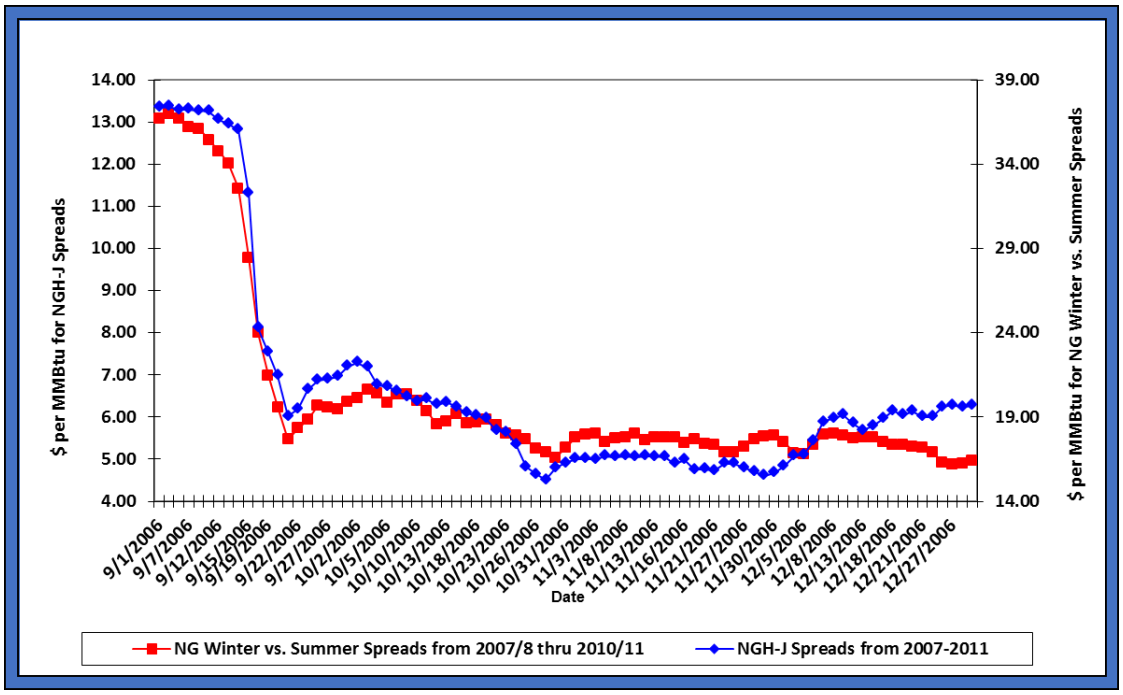
Date	NGV-X	NGH-J	Losses due to V-X	Losses due to H-J	Total Losses	Portfolio Loss
8/31/2000	-0.058	0.26	$ (2,241,256,400)	$ (1,119,408,400)	$ (3,360,664,800)	*-36.5%*
8/31/2001	-0.33	0.09	$ (1,953,970,000)	$ (1,220,631,500)	$ (3,174,601,500)	*-34.5%*
8/31/2002	-0.33	0.113	$ (1,953,970,000)	$ (1,206,936,610)	$ (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%*

Source: Premia Research LLC.

This analysis is based on Amaranth's portfolio as of August 31, 2006, which was two weeks before the fund's implosion. One caveat with this analysis is that it is based solely on the positions documented in the U.S. Senate report's graphical appendix. In mid-September 2006, the fund had lost more than $2 billion month-to-date. At this point the critical-liquidation-cycle was initiated for the fund, a vicious circle in which distressed liquidations cause even greater losses, leading to even greater calls for margin from a fund's credit-providers, which then leads to even more distressed trading. In the case of Amaranth, no natural (financial) counterparty existed who could entirely take on the fund's positions during a very short period when the fund became distressed in mid-September 2006. The natural counterparties to Amaranth's trades were the physical-market participants who had locked in the value of either forward production or storage. The physical-market participants would likely have had physical assets against their derivatives positions so would have had little pressing economic need to unwind their trades at Amaranth's convenience. Michael Cosgrove, then president of Amerex Brokers, confirmed the identity of Amaranth's counterparties in Farrington (2006). "There were storage managers, pipeline companies and retail marketers who had absorbed the other side of the Amaranth position as hedges against their physical businesses," according to Cosgrove.

The time needed to unwind the Amaranth positions can be inferred by seeing if any footprints existed in natural gas price patterns from September 20, 2006 onward. Figure 2 on the next page shows the evolution of natural gas spreads in which the long legs are the winter contracts, and the short legs are summer and spring contracts, which in turn are collectively correlated to Amaranth's actual positions. The graph in this figure is from September 1, 2006 through December 31, 2006. This graph shows the spreads recovered in late September during the immediate aftermath of the portfolio transfer, indicating a (temporary) absence of liquidation pressure. At the end of September 2006, Citadel assumed the entire Amaranth portfolio, taking on J.P. Morgan's half of Amaranth's positions, by paying J.P. Morgan $725 million. Citadel also received all the remaining concessionary payments from Amaranth. As Figure 2 below shows, the natural gas spreads smoothly declined throughout October, and largely bottomed out by the end of October.

Figure 2
Natural Gas Spreads from September 1, 2006 through December 31, 2006



Source: Premia Research LLC.

Data Source: The Bloomberg.

Notes: NG is an abbreviation for natural gas. H and J are symbols for the March and April futures contracts respectively.

At the end of November 2006, widespread public reports existed about the contents of Citadel's bond prospectus, which provided some commentary on the timing of the unwinding of Amaranth's trades. The Citadel document said that the firm had reduced the risk of its Amaranth positions by two-thirds during the first two weeks of October. Given that the natural gas curve bottomed out at the end of October, an inference is that Citadel essentially finished reducing the risk of the remaining positions during the last two weeks of October. Commercial-market hedgers could have been the (ultimate) natural other side to Citadel's orderly unwind of October 2006 because they could realize their substantial hedging windfall at this time.

As Figure 2 shows, further liquidation pressure does not appear on the natural gas curve in November and December 2006. Given how stable the curve was during this time, this period is when normal two-sided flow likely resumed. Given how orderly Citadel's unwind was during October 2006, the firm probably only sustained relatively small losses during this time. Therefore, Citadel was apparently able to realize substantial net profits, given the $1.425 billion net payment that Citadel ultimately received for agreeing to take on Amaranth's distressed portfolio. [$1.425-billion = $2.15 billion (concessionary payment received by Citadel and J.P. Morgan) minus the $725 million that Citadel paid J.P. Morgan so

that Citadel could fully take on the entire Amaranth energy portfolio and all remaining concessionary payments.]

Robert Greer, then of PIMCO, and now a Scholar-in-Residence at the University of Colorado Denver Business School's J.P. Morgan Center for Commodities, notes a key lesson from the Amaranth debacle. Hougan (2008) quotes Greer who said, "[T]he market showed that someone can actually be so big that the market will punish them, rather than reward them for their size."

We will conclude this article with the regulatory response to the Amaranth debacle, drawing from Till *et al.* (2018). Both the CFTC and the Federal Energy Regulatory Commission (FERC) pursued actions against the hedge fund, which were announced on July 25 and 26, 2007, respectively. Although the Senate report focused on whether Amaranth's position-taking pushed up the price of forward winter natural gas prices, the CFTC and FERC's investigations were much more narrowly focused on Amaranth's trading activities on several days of 2006, leading to allegations against Amaranth and its head natural gas trader of attempted and actual manipulation, respectively.

Zajac (2013) reports that "[i]n August 2009, … [Amaranth] agreed to pay $7.5 million to end U.S. cases brought by FERC and the CFTC over price manipulation. [Then] [o]n April 11 [2013], a federal judge in Manhattan gave final approval to a $77.1 million settlement by Amaranth to resolve a class action brought by traders."

The regulatory actions, in turn, against Amaranth's head natural gas trader became complicated by confusion about the FERC's authority over the U.S. energy futures markets. A federal court ruling finally resolved the matter on March 15, 2013. Zajac (2013) states that the U.S. Court of Appeals in Washington, D.C. ruled that the "'FERC lacks jurisdiction to charge … [Amaranth's head trader] with manipulation of natural gas futures contracts.' The Commodity Exchange Act gives the CFTC 'exclusive jurisdiction.'"

Van Voris and Hurtado (2014) report that a year-and-a-half later, on September 15, 2014, the former Amaranth trader "agreed to pay $750,000 to settle a Commodity Futures Trading Commission lawsuit claiming he tried to rig prices of natural gas contracts. … Under the agreement, which 'fully resolves' the commission's claims against him, … [the trader] also agreed to a partial ban on futures trading. … [The trader] neither admitted or denied wrongdoing."

Endnote

The author presented an abbreviated version of this paper on October 4, 2017 at a meeting of the Chicago chapter of the Professional Risk Managers' International Association, which in turn was hosted by William Blair Investment Management.

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Amaranth, natural gas, regulatory.