

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

IN RE: AMARANTH NATURAL GAS
COMMODITIES LITIGATION

This document Relates To: All Cases

MASTER FILE
NO. 07-CV-6377 (SAS)

DECLARATION OF DR. CRAIG PIRRONG

I, Craig Pirrong, declare and state pursuant to 28 U.S.C. §1746 as follows:

1. My credentials as an economist are set forth in Exhibit A hereto.
2. I have expertise with the energy and energy markets, am the Energy Market Director of the Global Energy Management Institute at the Bauer College of Business at the University of Houston, and a member of the CFTC's Energy Market Advisory Committee.
3. I also have expertise, and have authored a book and numerous articles on commodity price manipulation.¹

¹ See, e.g., Dr. Craig Pirrong, *Detecting Manipulation in Futures Markets; The Ferruzzi Soybean Episode*, 6 Am. Law. & Econ Rev. 28 (2004); Dr. Craig Pirrong, *Manipulation of Cash-Settled Futures Contracts*, 74 J. of Business 221 (2001); Dr. Craig Pirrong, *The Inefficiency of US Commodity Manipulation Law: Diagnosis and Proposed Cure*, 18 Research in L. & Econ (1997); Dr. Craig Pirrong, *The Self-Regulation of Commodity Exchanges: The case of Market Manipulation*, 39 J. of L. & Econ. 141 (1995); Dr. Craig Pirrong, *Mixed Manipulation Strategies in Commodity Futures Markets*, 15 J. Of Future Markets 13 (1995); Dr. Craig Pirrong, *Commodity Futures Market Regulation; The Inefficiency of the Anti-Manipulation Provision of the Commodity Exchange Act*, Regulations (Fall ed, 1994); Dr. Craig Pirrong, *Commodity Market Manipulation law; A (very) Critical Analysis of Existing Doctrine and a Proposed Alternative*, Wash & Lee Annual Review of Securities & Commodities L. (Sept. 1994).

I am the author of *The Economics, Law, And Public Policy of Market Power Manipulation* (1996). My work on power manipulation in commodity futures markets has been cited the Seventh Circuit Court of Appeals. *Board of Trade of City of Chicago v. S.E.C.* 187 F.3d 713, 724 (7th Cir. 1999) (Easterbrook, J.) (citing to Craig Pirrong, *The Economics, Law, And Policy of Market Power Manipulation* (1996)).

4. Swap dealers routinely hedge the natural gas swap transactions that they enter using offsetting positions in NYMEX natural gas futures contracts.

5. Some natural gas swaps are so-called “NYMEX lookalikes” in which the final settlement prices of NYMEX Henry Hub natural gas futures contracts are used to determine payment amounts. As a result of this direct linkage between NYMEX futures prices and swap cash flows, these swaps are nearly perfect substitutes for NYMEX futures contracts, and changes in their market values are nearly perfectly correlated with changes in NYMEX futures prices. Thus, losses on futures positions used to hedge NYMEX lookalike swaps arising from price changes resulting from manipulation are likely to be almost exactly offset by gains on the hedged swaps.

6. Other natural gas swaps are settled against natural gas prices other than NYMEX Henry Hub natural gas futures prices. For instance, there are swaps with cash flows that are based on the price of gas in the Houston Ship Channel or at the Chicago City Gate. These prices are imperfectly correlated with NYMEX Henry Hub natural gas futures prices. Due to this imperfect correlation, manipulation-caused losses on NYMEX futures positions are not necessarily exactly offset by gains on non-NYMEX lookalike swaps.

7. Manipulation of the NYMEX Henry Hub natural gas futures contract therefore imposes relatively little damage, if any, on swap dealers using these contracts to hedge NYMEX lookalike swaps. It does impose some damage on those holding futures positions as hedges of swaps with payments determined by prices other than the NYMEX Henry Hub futures price.

8. Publicly available data do not permit determination of the exact breakdown of swap dealer positions hedged using manipulated futures contracts. Such a breakdown could be derived from a detailed analysis of positions held by swap dealers making claims, but this analysis would be burdensome, time consuming, and costly to the class as a whole.

9. Determination of the impact of a manipulation of NYMEX Henry Hub natural gas futures prices on a non-lookalike swap requires a detailed statistical analysis of the relation between the NYMEX Henry Hub futures price and the price utilized to determine the payment on this swap. Given the large number of

different prices used to determine payments on non-NYMEX lookalike swaps, this would entail a large number of costly, data intensive statistical analyses.

10. Based on my knowledge of the industry, I conclude that the bulk of natural gas swaps are NYMEX lookalikes. Moreover, many of the prices used to settle non-lookalike swaps are highly correlated with Henry Hub prices.

11. Given these considerations, if it is determined that there should be deductions in payouts to hedgers, then a substantially larger deduction for any swap dealers in the class is justified. In my opinion, a deduction in excess of 90 percent is reasonable.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 21st day of May, 2012

Craig Pirrong
Craig Pirrong

Exhibit A

STEPHEN CRAIG PIRRONG

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EDUCATION

Ph.D., UNIVERSITY OF CHICAGO, December, 1987.

Thesis: An Application of Core Theory to the Study of the Organization of Ocean Shipping Markets.

M.B.A., UNIVERSITY OF CHICAGO, March, 1983.

Concentrations in finance, economics and econometrics.

B.A., THE UNIVERSITY OF CHICAGO, June, 1981.

Major in economics.

THE UNITED STATES NAVAL ACADEMY, July, 1977-August, 1979.

EMPLOYMENT

BAUER COLLEGE OF BUSINESS, UNIVERSITY OF HOUSTON, Houston, TX. Professor of Finance and Director, Global Energy Management Institute, 2003-present.

OKLAHOMA STATE UNIVERSITY, Stillwater, OK. Watson Family Professor of Commodity and Financial Risk Management and Director, Center for Risk Management, 2001-2003.

WASHINGTON UNIVERSITY, OLIN SCHOOL OF BUSINESS, St. Louis, MO.
Assistant Professor of Finance, 1996-2001.

UNIVERSITY OF CHICAGO, GRADUATE SCHOOL OF BUSINESS, Chicago, IL. Visiting Assistant Professor of Finance (October, 1994-August, 1996).

UNIVERSITY OF MICHIGAN, SCHOOL OF BUSINESS ADMINISTRATION, Ann Arbor, Michigan. Assistant Professor of Business Economics and Public Policy (January, 1989-June, 1996).

LEXECON, INC., Chicago, Illinois. Economist (November 1987-December, 1988).

GNP COMMODITIES, Chicago, Illinois. Senior Investment Strategist (1986-1987).

PUBLICATIONS

Articles

- “The Clearinghouse Cure.” (Lead article.) *Regulation*, 2009.
- “Clearing Up Misconceptions on Clearing.” *Regulation*, 2008.
- “The Price of Power: The Valuation of Power and Weather Derivatives.” Forthcoming, *Journal of Banking and Finance*.
- “The Thirty Years War.” *Regulation*, 2005.
- “Detecting Manipulation in Futures Markets: The Ferruzzi Soybean Episode.” *American Law and Economics Review*, 2004.
- “Price Discovery and Data Hubs.” *The Utility Project*, 2004.
- “Got a Match? The Right Way to Report Energy Prices.” *World Energy*, 2003.
- “The Case for an Independent Gas Price Repository.” *World Energy*, 2003.
- “Securities Market Macrostructure: Property Rights and the Efficiency of Securities Trading.” *Journal of Law, Economics, and Organization*, 2002.
- “Securities Market Regulation: A Twenty-five Year Retrospective.” *Regulation*, 2002.
- “The Clinton Regulatory Legacy: Securities Regulation.” *Regulation*, 2001.
- “Manipulation of Cash-Settled Futures Contracts.” *Journal of Business*, 2001.
- “A Positive Theory of Financial Exchange Organization.” *Journal of Law and Economics*, 2000.
- “The Organization of Financial Exchange Markets: Theory and Evidence.” *Journal of Financial Markets*, 1999 (lead article).
- “Electronic Exchanges Are Inevitable and Beneficial.” *Regulation*, 1999.
- “Self-Regulation of Private Organized Markets.” *New Palgrave Dictionary of Economics and the Law*, 1998.
- “The Inefficiency of U.S. Commodity Manipulation Law: Diagnosis and a Proposed Cure.” *Research in Law and Economics*, 1997.
- “Metallgesellschaft: A Prudent Hedger Ruined or a Wildcatter on NYMEX?”

- Journal of Futures Markets*, 1997.
- “Liquidity and Depth on Open Outcry and Automated Exchanges: A Comparison of the LIFFE and DTB Bund Contracts.” *Journal of Futures Markets*, 1996.
- “Price Dynamics in Physical Commodity Spot and Futures Markets: Spreads, Spillovers, Volatility and Convergence in Refined Petroleum Products,” with Victor Ng. *Journal of Empirical Finance*, 1996.
- “The Self-Regulation of Commodity Exchanges: The Case of Market Manipulation.” *The Journal of Law and Economics*, April, 1995.
- “The Welfare Costs of Arkansas Best: the Pareto Inefficiency of Asymmetric Taxation of Hedging Gains and Losses.” *The Journal of Futures Markets*, April, 1995.
- “Mixed Manipulation Strategies in Commodity Futures Markets.” *The Journal of Futures Markets*, February, 1995.
- “The Efficient Scope of Private Transactions Cost Reducing Institutions: The Case of Commodity Exchanges.” *The Journal of Legal Studies*, January, 1995.
- “Commodity Futures Market Regulation: The Inefficiency of the Anti-Manipulation Provisions of the Commodity Exchange Act.” *Regulation*, Fall, 1994.
- “Commodity Market Manipulation Law: A (Very) Critical Analysis of the Existing Doctrine and A Proposed Alternative.” *Washington and Lee University Annual Review of Securities and Commodities Law*, September, 1994.
- “Fundamentals and Volatility: Storage, Spreads, and the Dynamics of Metals Prices,” with Victor Ng. *The Journal of Business*, April, 1994.
- “Regulation: Futures Trading and Institutional Investors.” *The American Enterprise*, January-February, 1994.
- “Multiple Delivery Points, Pricing Dynamics, and Hedging Effectiveness in Futures Markets for Spatial Commodities.” *The Journal of Futures Markets*, August, 1994.
- “Contracting Practices in Bulk Shipping Markets: A Transactions Cost Explanation.” *Journal of Law and Economics*, October, 1993.
- “Manipulation of the Commodity Futures Market Delivery Process.” *Journal of Business*, July 1993 (lead article).
- “Reforming the Contract Designation Process.” *Journal of Financial Engineering*, March 1993.

“Removing Undue Regulatory Impediments to the Use of Futures and Options by Institutional Investors.” *Journal of Financial Engineering*, March 1993. (Reprinted in *Futures International Law Letter*, October, 1992.)

“Application of Core Theory to the Analysis of the Ocean Shipping Industry.” *Journal of Law and Economics*, April 1992.

“The Economic Geography of Grain Markets and Futures Delivery Specification: Manipulation, Price Discovery, and Hedging Effectiveness.” *Review of Futures Markets*, 1992.

“Resolving the Thrift Crisis” with V. Bernard, R. Kormendi and E. Snyder. *Journal of Applied Corporate Finance*, Autumn 1989.

Contributions to Books

“Structural Models of Commodity Price Dynamics.” Forthcoming in H. Geman (ed.), *Encyclopedia of Quantitative Finance*.

“Lattice Approaches to Pricing Derivatives.” Forthcoming in R. Kolb and J. Overdahl (eds.), *Companion to Financial Derivatives*.

“Energy Derivatives.” Forthcoming in R. Kolb and J. Overdahl (eds.), *Companion to Financial Derivatives*.

“Pricing Power Derivatives: Theory and Matlab Implementation.” In J. London, *Modeling Derivatives Applications in Matlab, C++, and Excel*. Financial Times Press, 2006.

“Market Microstructure Issues.” In A. Kleit (ed.), *Electric Choices: Deregulation and the Future of Electric Power*. Rowan and Littlefield, 2006.

“The New Economy: Implications for the Organization and Structure of Securities Markets.” In D. Jones (ed.), *The New Economy Handbook*. The Academic Press, 2003.

“Pricing Forwards and Options Using the Mesh-Based Partial Differential Equation Approach.” R. Jameson (ed.), *Energy Modelling and the Management of Uncertainty*. Risk Publications, 1999. (Republished in 2005).

“Pricing Energy Derivatives,” with Kaushik Amin and Victor Ng. Chapter 4 in R. Jameson (ed.), *Managing Energy Price Risk*. Risk Magazine Publications, 1994. (Republished in 1999 and 2004).

“The Market for Treasury Securities: Microstructure and Market Power.” Chapter 1 in P. Knapp (ed.), *The Treasury Securities Market: The Scholars' Assessment*. Homewood, IL: Business One Irwin, 1994.

“The Economics of Risk Based Capital Requirements.” Chapter 33 in K. Lehn and R. Kamphuis (eds.), *Modernizing U.S. Securities Regulation*. Homewood, IL: Business One Irwin, 1993.

Books

Models of Commodity Prices. Forthcoming, Cambridge University Press.

Corners and Squeezes: The Economics, Law, and Public Policy of Financial and Commodity Market Manipulation. Kluwer Academic Publishers, 1996.

Grain Futures Contracts: An Economic Appraisal. With R. Kormendi and D. Haddock. New York: Kluwer Academic Publishers, 1993.

The Origins and Resolution of the Thrift Crisis. With V. Bernard, R. Kormendi and E. Snyder. New York: Kluwer Academic Publishers, 1989.

PAPERS PRESENTED

“Stochastic Volatility and Commodity Price Dynamics.” Texas A&M University, 31 October, 2008. Institute of Financial Mathematics Conference, Champuloc, Italy, 21 January 2008.

“The Price of Power.” Commodities 2007. University of London, 17 January, 2007.

“Modeling Issues in Commodity Markets.” Commodities 2007. University of London, 18 January, 2007.

“Momentum In Futures Markets.” 2005 European Finance Association Meetings, Moscow, Russia, 25 August, 2005. University of Illinois, September, 2006.

“Upstairs, Downstairs.” 2003 European Finance Association Meetings, Glasgow, 27 August, 2003.

“Upstairs, Downstairs.” 2003 Midwest Finance Association Meetings, St. Louis, March 2003.

“The Price of Power.” 2002 European Finance Association Meetings, Berlin, 28 August, 2002.

“The Price of Power.” 2002 Bachelier Finance Society Second World Congress, Crete, 12 June, 2002.

“Technological Change, For-Profit Exchanges, and the Self-Regulation of Financial Markets.” American Law and Economics Association Meetings, New York, 7 May, 2000.

“Manipulation in Power Markets.” University of California Energy Institute Restructuring Conference, Berkeley, 17 March, 2000.

“A Positive Theory of Financial Exchange Organization.” International Society of the New Institutional Economics Meetings, Paris, 18 September, 1998.

“A Positive Theory of Financial Exchange Organization.” American Law and Economics Association Meetings, Berkeley. 8 May, 1998.

“Efficient Deterrence of Manipulation in Futures Markets.” American Law and Economics Association Meetings, Chicago. 6 May, 1996.

“Raising Revenue in the Worst Way: The Economic Effects of Asymmetric Hedge Taxation.” Virginia Tech Symposium on “Hedge Taxation After *Arkansas Best*: Law, Economics, and Public Policy.” 21 July, 1993.

“Fundamentals and Volatility: Storage, Spreads, and the Dynamics of Metals Prices.” National Bureau of Economic Research Summer Institute Workshop on Asset Pricing. 20 July, 1993. American Finance Association Meetings, 3 January, 1993.

“Price Dynamics in Physical Commodity Spot and Futures Markets.” Econometric Society Meetings, 7 January, 1993. Western Finance Association Meetings, June, 1993. ORSA/TIMS Meetings, November, 1993.

“Still Nature's Metropolis?” Kalo Hineman Symposium on Grain Futures Market Delivery Issues at the Commodity Futures Trading Commission, 15 September, 1991.

“Maintaining the Integrity of the Futures Delivery Process: The Economics of Manipulation and its Deterrence.” American Bar Association/Virginia Tech Conference on Market Manipulation, 9 November, 1990.

“Multiple Delivery Points: Manipulation, Liquidity, and Basis Risk.” American Bar Association/Virginia Tech Conference on Market Manipulation, 10 November, 1990.

Seminar presentations at North Carolina State University, Vanderbilt University, Southern Methodist University, the Federal Reserve Bank of Atlanta, the University of Missouri, the University of Kansas, Arizona State University, Babson University, Yale University Law School, the Michigan Business and Law Schools, the University of Chicago, the Tuck School of Business at Dartmouth University, North Carolina State University, the University of Alberta, Virginia Tech University, Washington University, Columbia University Law School, and the Commodity Futures Trading Commission.

CURRENT RESEARCH ACTIVITY

Papers Under Review

“The Price of Power: The Valuation of Power and Weather Derivatives.” Second round, *Journal of Banking and Finance*.

“Rocket Science, Default Risk, and the Organization of Derivatives Markets.” First round, *Journal of Law and Economics*.

Selected Working Papers

“The Industrial Organization of Trading, Clearing, and Settlement in Financial Markets.”

“The Valuation of Power Options in a Pirrong-Jermakyan Model.”

“Momentum in Futures Markets”

“Bund for Glory, or, It’s a Long Way to Tip a Market.”

“Upstairs, Downstairs: Electronic vs. Open Outcry Markets.”

“The Macrostructure of Electronic Financial Markets.”

“The Organization of Electronic Financial Markets.”

“Third Markets and the Second Best.”

“The Price of Power: Valuation of Power and Weather Derivatives.”

“Manipulation of Power Markets.”

“The Economic Implications of *Arkansas Best*: Asymmetric Tax Treatment of Hedge Income, Hedging Effectiveness, and Price Discovery.”

“The Effects of *Arkansas Best* on Hedge Ratios.”

“Brave New World? The Prospects for Computerized Futures Trading.”

“A Structural Model of Cross Hedging Risk.”

“Two Cheers for Follow-on Research in Pharmaceutical Markets.”

“The Asset Management Incentives Implicit in FSLIC Assisted Acquisition Agreements.”

“Futures Markets as Implicit Loan Markets: The Case of Grains.”

Research in Progress

Momentum in Futures Markets.

Storable Commodity Price Dynamics and Commodity Derivatives Pricing.

Power Price Dynamics.

Pricing Contingent Claims on Power and Weather.

Clearing Mechanisms in Derivatives Markets: Efficiency and Distributive Issues.

Rights Aspects of Commodity Exchanges

Reports

“Woodpulp Futures: Establishing the Essential Facts.” Report to OM Stockholm, 1996.

“Agricultural Futures Exchange in Germany for Europe: Feasibility-Design-Implementation.”
Report to the Warentermibörse, 1995.

“Strengthening the Winnipeg Commodity Exchange Canola Futures Franchise.” Report to the
Winnipeg Commodity Exchange, 1995.

“The Costs and Benefits of Adding Local Traders to the Deutsche Terminbörse.” Report to the
Deutsche Terminbörse, 1994.

“Derivatives Exchanges, Liquidity, and Locals: A Look to the Future.” Catalyst Institute Report,
1994.

“Is There a Future for Stock Branch Indices?” Catalyst Institute Report, 1994.

“The Contribution of Dual Trading to the Liquidity of New York Mercantile Exchange Energy
Contracts” (with NERA). Report for the New York Mercantile Exchange submitted
to the Commodity Futures Trading Commission in support of NYMEX's application
for a waiver from the dual trading ban contained in the 1992 CFTC re-authorization
bill.

“Political Rhetoric and Stock Price Volatility: A Case Study.” Catalyst Institute Report, 1993.

“The Relation Between Oil and Gasoline Futures and Spot Prices” (with Victor Ng). Report
submitted to the New York Mercantile Exchange, 1992.

“An Economic Analysis of the Grain and Oilseed Delivery Mechanism at the Chicago Board of
Trade.” Report submitted to the Chicago Board of Trade, 1991.

“Crisis Resolution in the Thrift Industry: Beyond the December Deals” (with Victor Bernard,
Roger Kormendi, and Ted Snyder). Reported submitted to the Federal Home Loan
Bank Board, 1989.

Refereeing Activities

American Economic Review; Economic Inquiry; International Journal of Law and Economics; Journal of Business; Journal of Economic Dynamics and Control; Journal of Economics and Finance; Journal of Finance; Journal of Financial Markets; Journal of Futures Markets; Journal of Industrial Organization; Journal of Law and Economics; Journal of Quantitative Financial Analysis; Journal of Risk; Review of Financial Studies; Journal of Economic Behavior and Organization; Journal of Business and Economic Statistics; Managerial and Decision Economics; Journal of Economics and Business.

FELLOWSHIPS

Oscar Mayer Fellow, University of Chicago (1983-1986)

RESEARCH GRANTS

Montreal Exchange grant to evaluate feasibility of introducing new commodity futures contracts. OM Stockholm and OMLX, London grant to study the feasibility of a pulp futures market and to design pulp futures and futures options contracts, 1996.

Winnipeg Commodity Exchange grant to study the contracts, rules, and bylaws of the WCE, with the objective of making recommendations to revise them in order to improve the performance of the Exchange's markets, 1994.

Catalyst Institute/DTB Deutsche Terminbörse grant to study the effects of attracting local traders to the DTB, 1994.

Catalyst Institute/DTB Deutsche Terminbörse grant to study the feasibility of new currency derivatives contracts, 1994.

Catalyst Institute/DTB Deutsche Terminbörse grant to study the feasibility of stock branch index derivatives, 1994.

Virginia Tech Center for Study of Futures and Options Markets grant to study the economic implications of the Internal Revenue Service policy on the taxation of hedging gains and losses 1993.

Warner Lambert Corporation grant for the study of competition in pharmaceutical markets 1990-1991.

Chicago Board of Trade grant to study grain futures market delivery issues 1990-1991.

EXECUTIVE TEACHING

Bayerische Vereinsbank, 1995

Anheuser-Busch, 1996.

Energy Power and Risk Management Courses and Conferences, March, June, September, and December, 1999, May 2000.

Peabody Coal Co., 2000.

HSM II Program, Olin School of Business, Washington University, Spring 2000.

PERSONAL

Born 10/20/59. Married to Terry Lehman Pirrong. Two children: Renee Elise (born 11/4/89) and Genevieve Corinne (born 5/7/94). Hobbies: history (especially U.S. Civil War), agonizing over Chicago sports teams, and exercise.