CRAIG PIRRONG

Professor of Finance
Director, Global Energy Management Institute
Bauer College of Business
University of Houston
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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 Economics of Commodity Market Manipulation: A Survey." *Journal of Commodity Markets*, 2017

"Liquefying a Market: Contracting Dynamics in LNG." *Journal of Applied Corporate Finance*, 2017.

"Bund for Glory, or, It's a Long Way to Tip a Market." *Journal of Applied Corporate Finance*, 2016.

"Risk Management by Commodity Trading Firms: The Case of Trafigura." *Journal of Applied Corporate Finance*, 2015.

"Pick Your Poison-Fragmentation or Market Power? An Analysis of RegNMS, High Frequency Trading, and Securities Market Structure." *Journal of Applied Corporate Finance*, 2014.

"Bill of Goods: Central Counterparties and Systemic Risk." *Journal of Financial Market Infrastructure*, 2014.

"Clearing and Collateral Mandates: A New Liquidity Trap?" *Journal of Applied Corporate Finance*, 2012.

"The Cost of Collateral Management in a New CCP Environment." *DerivSource,* 2012.

"Competition and Vertical Integration in Financial Exchanges." *Competition Policy International*, 2011.

"The Economics of Central Clearing: Theory and Practice." ISDA Discussion Papers Series, 2011.

"Squeeze Play: The Dynamics of the Delivery End Game." *Journal of Alternative Investments*, 2011 (working paper predecessor titled "The Economics of the Manipulation End Game with Private Information About Positions").

"Energy Market Manipulation: Definition, Diagnosis, and Deterrence." *Energy Law Journal*, 2010.

"The Inefficiency of Clearing Mandates." *Cato Policy Studies*, 2010.

"Derivatives Clearing Mandates: Cure or Curse?" *Journal of Applied Corporate Finance,* Vol. 22, Issue 3, pp. 48-55, Summer 2010.

"No Evidence? No Theory? No Problem!: The Inefficiency of Speculative Position Limits." *Regulation*, 2010.

"Comment on Stout, Regulate OTC Derivatives by Deregulating Them." *Regulation*, 2010Fall 2009.

"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." *Journal of Banking and Finance*, 2008.

"Just Say No To Gazprom." *World Energy*, July 2007.

"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.

Newspaper Articles*

"Outside Opinion: High-frequency trading will pay off in time" *Chicago Tribune*. (June 2, 2013).

"Restricting Speculators will not reduce oil prices." *Wall Street Journal*, July 11, 2008.

"Cox in the Crucible." *Orange County Register*, 2005.

Contributions to Books

Craig Pirrong. Regulate in Haste, Repent at Leisure: Private and Public Orderings in OTC Derivatives Markets. In E. Brousseau and J. M. Glachant (eds.), *Oxford Handbook on International Economic Governance*. Oxford, 2017 .

"Exchanges: The Ultimate Manufactured Markets." In E. Brousseau and J. M. Glachant (eds.), *The Manufacturing of Markets*, Cambridge, 2014.

"Structural Models of Commodity Price Dynamics." In H. Geman (ed.), *Encyclopedia of Quantitative Finance*; *Risk Management in Commodity Markets*, Wiley, 2008.

"Lattice Approaches to Pricing Derivatives." In R. Kolb and J. Overdahl (eds.), *Companion to Financial Derivatives*.

"Energy Derivatives." In R. Kolb and J. Overdahl (eds.), *Companion to Financial Derivatives,* (republicshed in 2013).

"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

Commodity Price Dynamics: A Structural Approach, Cambridge University Press, 2011.

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.

Amicus briefs*

NRG Power Mktg. v. Maine PUC, 2008 U.S. Briefs 674 (U.S. July 14, 2009)*

Morgan Stanley capital Grp v. Public Util. Dist. No. 1 of Snohomish County, Washington 2006 U.S. Briefs 1457 (U.S. Nov. 28, 2007)*

PAPERS PRESENTED

"A Bill of Goods: Clearing and Systemic Risk." Oxford University Conference on Derivatives After the Crisis, 2013. Bank of England, Banque de France, and European Central Bank Conference on OTC Derivatives, 2013.

"The Industrial Organization of Execution, Clearing, and Settlement in Financial Markets." Haas/Sloan Conference on the Law & Economics of Organization, University of California, Berkeley, 2012.

"The Mutualization of Default Risk, Fungibility, and Moral Hazard: The Economics of Default Risk Sharing in Cleared and Bilateral Markets." ISNIE Annual Conference, Scotland, 2010. Notre Dame Financial Regulation Conference, 2010.

"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

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

Selected Working Papers

"The Mutualization of Default Risk, Fungibility, and Moral Hazard: The Economics of Default Risk Sharing in Cleared and Bilateral Markets."

"The Economics of Clearing in Derivatives Markets: Netting, Asymmetric Information, and the Sharing of Default Risk Through a Central Counterparty."

"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

"Not Too Big to Fail: Systemic Risk, Regulation, and the Economics of Trading Firms." Trafigura, 2015.

"The Economics of Commodity Trading Firms." Trafigura, 2014.

"Market oversight for cap and trade: efficiently regulating the carbon derivative market." Brookings Institute, 2009.

"An Evaluation of the Performance of Oil Price Benchmarks During the Financial Crisis." WTI Report

U. of Houston, 2009.

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

"Agricultural Futures Exchange in Germany for Europe: Feasibility-Design-Implementation." Report to the Warentermiborse, 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.

Winnepeg 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 19901991.

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

Married to Terry Lehman Pirrong. Two children: Renee Elise and Genevieve Corinne. Hobbies: history (especially U.S. Civil War), agonizing over Chicago sports teams, and exercise.

DR. CRAIG PIRRONG
EXPERT TESTIMONY and RETENTIONS
2005-2013

Puget Sound Energy, Inc. v. All Jurisdictional Sellers of Energy, et al FERC Docket No. EL01-10-085.

San Diego Gas & Electric Company v. Sellers of Energy and Ancillary Services Into Markets Operated by the California Independent System Operator Corporation And the California Power Exchange. FERC Docket No. EL00-95-248.

In re Amaranth Natural Gas Commodity Litigation, S.D.N.Y. 07-C-6377.

Randy Schaefer et. al. vs. Bayer AG et. al., 2010 (Written report). Circuit Court of Lonoke County, AR CV2006-413.

In re Natural Gas Commodity Litigation, S.D. NY 03-CV-6186(VM).

In re BP Propane Indirect Purchaser Antitrust Litigation, N.D. IL Eastern Division 06-C-3541.

Lenny Joe Kyle et. al. vs. Bayer AG et. al. Circuit Court of Woodruff County, AR. CV-2008-107.

Energy Trading Partners L.P. et al v. Federal Energy Regulatory Commission. Docket Number IN06-3-003.

RCG v. Trading Technologies, International, Inc., N.D. IL Eastern Division 95-C-4088.

Asarco LLC v. American Mining Corp. Bankruptcy Court Southern District of Texas, 05-21270.

Energy Trading Partners L.P. et al v. Federal Energy Regulatory Commission. Docket Number IN06-3-003.

Trading Technologies International, Inc. v. eSpeed, Inc., N.D. IL Eastern Division 04-C-5312.

Trading Technologies International, Inc. v. GL Trade, N.D. IL Eastern Division 05-C-4120.

Trading Technologies International, Inc. v. Future Path Trading LLC., N.D. IL Eastern Division 05-C-5164.

Trading Technologies International, Inc. v. CQGT, LLC and CQG, Inc., N.D IL Eastern Division 05-CV-4811.

Power Authority of the State of New York v. Entergy Nuclear Indian Point 3, LLC and Entergy Nuclear Fitzpatrick, LLC, 7:00-cv-06346-CM

Josef A Kohen, Breakwater Trading LLC, and Richard Hershey v. Pacific Investment Management Co. et al. N.D. IL 05-C-4681.

In re Williams Securities Litigation, 2006. N.D. OK 02-CV-72-SPF-FHM.

AEP Energy Services v. Bank of Montreal, 2005. S.D. OH Eastern Division C2-03-335.

In re: Dairy Farmers of America, Inc. Cheese Antitrust Litigation, N.D. IL 09-cv-03690.

In re: Optiver Commodities Litigation, S.D.N.Y. 08-cv-6842.

In re: Platinum and Palladium Commodities Litigation, S.D.N.Y. 10-cv-3617.

Lehman Brothers International (Europe) v. AG Financial Products, Inc. CPLR Sections 501, 503, 509 and GOL-1402 (Supreme Court of the State of New York, County of New York).

PJM Up To Congestion Transactions FERC Docket Number IN10-5-000.

Fifth Market Inc. v. CME Group Inc. et al. D. Del. 08-cv-520.

Chicago Mercantile Exchange, Inc. v. 5th Market Inc., CBM2013-00027 (PTAB 2013) .