

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

PJM Up-To Congestion Transactions

Docket No. IN10-5-000

Affidavit of Dr. Craig Pirrong

Introduction

1. I have been retained by Skadden, Arps, Slate, Meagher and Flom, to evaluate the trading activity of Houlian (Alan) Chen in PJM during the April-August, 2010 period. Based on my review of Mr. Chen's trading records, I conclude that his trades were legitimate, and not manipulative in either intent or effect. In particular, his trades were not wash trades.

Background and Qualifications

2. I am Professor of Finance, and Director of the Global Energy Management Institute at the Bauer College of Business of the University of Houston. Prior to joining the faculty of the University of Houston in January, 2003, I was the Watson Family Professor of Commodity and Financial Risk Management at Oklahoma State University. I assumed this endowed professorship in 2001 after holding research and teaching positions at the University of Michigan, the University of Chicago, and Washington University. My *curriculum vitae* is attached. It lists all of the publications that I have authored in the last ten years. It also lists cases in which I have testified as an expert at trial or by deposition within the preceding four years.

3. I have researched the economics of financial, futures, and securities markets for most of my academic career. I have published scholarly articles concerning financial, securities and futures markets. I have written articles on the behavior of futures prices, the organization and governance of futures exchanges, and various aspects of futures market regulation, including the regulation of market manipulation.

4. As an academic and consultant, I have been deeply involved for about 20 years in issues relating to commodity futures markets, commodity prices, and the economics of commodity market manipulation. My research has been published in a wide variety of scholarly journals. I have been a peer reviewer for many journals, including the American Economic Review, the Journal of Finance, the Journal of Law and Economics, the Journal of Futures Markets, Economic Inquiry, the Journal of Economic Behavior and Organization, the Journal of Business, and the Journal of Business and Economics Statistics.

5. Much of my research has focused specifically on issues of market manipulation. I have published a book (titled *The Economics, Law, and Public Policy of Market Power Manipulation*), as well as nine economics, finance, and law review articles on this subject.

6. I was the primary author of a study commissioned by the Chicago Board of Trade ("CBOT"), later published as a book titled *Grain Futures Markets: An Economic Appraisal*. That study analyzed the economics of the delivery system for CBOT corn, wheat, and soybean futures contracts, specifically focusing on how to revise that system to make it less vulnerable to manipulation. I recommended the

adoption of a multiple delivery point system, and specifically analyzed the pricing and hedging implications of such a system. A part of this research on multiple deliverable contracts was published in a peer-reviewed journal.

7. In 1992 I was a member of the MidAmerica Institute for Public Policy Research Treasury Securities Market Task Force. This Task Force was formed in the aftermath of the Salomon Brothers squeeze of the two year Treasury note. As a member of the Task Force, I investigated issues relating to microstructure and market power in the market for Treasury Notes and Bonds.

8. I have consulted with commodity exchanges in Sweden and Germany regarding the design of futures contracts, including the design of the delivery mechanisms for wood pulp, European wheat and European pigs. A main objective was to design contracts that were not vulnerable to manipulation.

9. In 1997 and 1998 I served as a member of the CBOT's Grain Delivery Task Force ("GDTF"). This body was charged by the exchange with the responsibility of designing new delivery terms for CBOT corn and soybean futures contracts. Such a redesign was mandated by the United States Commodity Trading Futures Commission ("CFTC") because the old delivery mechanism had become unduly susceptible to manipulation. Among the Task Force's objectives was to design a contract that would tend to prevent and diminish the likelihood of price manipulation. The terms recommended by the GDTF were adopted by a large majority of the CBOT membership, and approved by the CFTC (with some modifications for soybeans) in May, 1998.

10. I provided expert testimony in a case related to market manipulation, *In re Soybean Futures Litigation*, Nos. 89 C 7009, 90 C 11th 8 (N.D. Ill. 1995). I have also been retained by the CFTC as an economic expert in a commodity manipulation case and also as an expert in manipulation matters by the Winnipeg Commodity Exchange, pursuant to enforcement actions undertaken by the WCE. In addition, I have provided expert testimony in other manipulation cases, *American Agric. Movement v. Board of Trade*, 848 F. Supp. 814 (N.D. Ill. 1994), *aff'd in part, rev'd in part sub nom. Sanner v. Board of Trade*, 62 F.3d 918 (7th Cir. 1995), and *Kohen v. Pac. Inv. Mgmt. Co.*, 2007 U.S. Dist. LEXIS 56389 (N.D. Ill. 2007). I provided expert testimony in *Energy Transfer Partners, L.P.*, a FERC case. My research has also been cited in a 7th Circuit Court of Appeals decision on manipulation. *Board of Trade v. SEC*, 187 F.3d 713, 724 (7th Cir. 1999) (Easterbrook, J.).

11. In June 2005, I was retained by FERC to make a one-day presentation on the economics, law, and regulation of market manipulation to economists, analysts, and attorneys in the agency's Office of Market Oversight and Investigation. I made this presentation in June 2005.

12. I have testified before the House Agriculture Committee (which has jurisdiction over futures markets and exchanges) on matters relating to an energy market manipulation.

13. I was an invited participant in the Federal Trade Commission's workshop on its proposed oil market manipulation rule.

14. I have taught courses on derivatives (including natural gas futures, forwards, and swaps) at the graduate and undergraduate levels for eighteen years. These

courses have covered the pricing of derivatives instruments, including natural gas derivatives, the use of derivatives for hedging and speculative purposes, and manipulation. I currently teach the PhD course in futures and options in the Bauer College of Business at the University of Houston, and an MBA course in energy derivatives.

15. I have a book on commodity pricing—including the pricing of electricity and electricity derivatives—forthcoming from the Cambridge University Press.

16. I am currently director of the Global Energy Management Institute (“GEMI”) at the Bauer College of Business of the University of Houston. GEMI is a world leader in energy finance education. Moreover, GEMI routinely hosts educational events for energy professionals, including a well-attended energy trading conference held every year.

Analysis of Mr. Chen’s Trading

17. Prior to 31 May, 2010, Mr. Chen would typically purchase day ahead power in MISO, and sell it day ahead at a point in PJM, such as Mt. Storm. He would simultaneously buy power day ahead at another, geographically proximate point in PJM, such as Greenland Gap, and sell day ahead power into MISO.

18. Mr. Chen traded “up to congestion” (“UTC”) contracts. These contracts have the feature that if based on clearing prices in the day ahead market, the spread between the PJM price and the MISO price on one of the legs exceeds \$50, that leg is rejected.

19. Since the MISO day ahead purchase and sale in the transactions described at ¶17 *supra* canceled if neither leg was rejected due to a breaching of the \$50

transmission price limit, in this case Mr. Chen would have been left with a long position at one PJM point (Greenland Gap in the foregoing example) and a short position at the other (Mt. Storm in the example). If one leg was rejected (e.g., the MISO into Mt. Storm leg), Mr. Chen was left with a long position in one control area and a short position in another. This would most likely result in a long position in day ahead PJM power, and a short position in day ahead MISO power.

20. Real time spreads between points in PJM are not constant, and in particular, they fluctuate randomly. At times, these random fluctuations can be extremely large. If neither leg was rejected, Mr. Chen was at risk to changes in this real time intra-PJM spread.

21. The differences between real time PJM and MISO prices—PJM-MISO real time spreads—are not constant, and fluctuate randomly. If one leg was rejected due to a breach of the \$50 UTC limit, Mr. Chen was at risk to this real time PJM-MISO spread.

22. Spread trading is ubiquitous in virtually every commodity market. Indeed, a very large fraction of trading of everything from aluminum to corn to oil to natural gas to power to zinc is spread trading. Spread trading performs an important price discovery function, facilitates hedging, and provides liquidity to the market. Spread trading should be encouraged as a way of facilitating the efficiency of the market.

23. Mr. Chen chose the busses that he utilized in his spread trading based on fundamental analysis. That is, he attempted to identify bus prices that were

overpriced relative to others. By carrying out such fundamental research, and trading based on it, Mr. Chen was contributing to price discovery in the market.

24. To reiterate, Mr. Chen was at risk when engaging in this trading activity. Indeed, these risks were quite large. In particular, Mr. Chen lost over \$300,000 in this strategy on 30 May, 2010 when day ahead time spreads widened dramatically to exactly \$50/MWh. This reflects the fact that the distribution of electricity prices exhibit “heavy tails.” That is, the probability of extreme changes is large, as compared to the standard “normal” (bell-shaped) distribution often used to characterize risk.

25. The facts that (a) Mr. Chen was at risk to spread changes, and (b) was buying and selling power at different PJM points, means that in no way can his trading be considered “wash trading.” A wash trade involves a (near) simultaneous purchase and sale of the same asset or commodity. Wash trades create no exposure to risk of price changes. In contrast, Mr. Chen’s positions were at risk to changes in prices. This is demonstrated by the fact that Mr. Chen’s profit margins on these transactions fluctuated, and indeed, he suffered large losses on at least one day.

26. After suffering a loss on 30 May, 2010, Mr. Chen reconsidered his trading strategy. Mr. Chen decided that, in addition to executing trades as he had in the past (i.e., either with imports from MISO to PJM node A and exports from PJM node B to MISO, or simply stand alone day ahead trades to or from an interface) he would buy day ahead power in MISO and sell it at a point in PJM under a UTC

contract, and simultaneously buy day ahead power at the same point in PJM, and sell it into MISO.

27. Under this new strategy, Mr. Chen was not at risk to intra-PJM real time spread changes, as he had bought and sold power at the same bus in PJM.

However, Mr. Chen was still at risk.

28. Specifically, Mr. Chen faced the risk that one leg of the pair he submitted would be rejected. In the event, Mr. Chen was at risk to the PJM-MISO real time spread risk on the non-rejected leg.

29. Given that it was impossible for both legs to be rejected (since MISO minus PJM cannot exceed \$50 if PJM minus MISO does, and *vice versa*), and since the probability of rejection of a leg was non-zero, Mr. Chen was at risk to PJM-MISO real time spread changes with positive probability.

30. Again, this means that these were not wash trades. There were states of the world in which Mr. Chen would have faced exposure to price risk. In contrast, in a wash trade, no such states of the world exist.

31. There is another way of seeing this. UTC contracts are a combination of (a) standard “vanilla” spreads in forward contracts and (b) an embedded option. Crucially, the option embedded in the MISO to PJM UTC trade is different than the option embedded in the PJM to MISO trade. Mr. Chen’s trading strategy was therefore an option spread transaction. Although the forward contract portions of the two UTC legs of his trades cancelled out, the option portions did not. This left Mr. Chen with a contingent price exposure. In contrast, in a wash trade there is no contingent price exposure.

32. In essence, Mr. Chen was speculating that, contingent on the MISO into PJM day ahead spread exceeding \$50, the day ahead PJM into MISO spread was downward biased. That is, on average, given this contingency, the real time difference between the PJM and MISO prices was larger than the difference between the day ahead PJM and MISO prices. This difference between the average (or “expected”) real time PJM-MISO difference and the day ahead PJM-MISO difference is referred to as a price “bias.”

33. Commodity speculation is, in essence, betting on price bias.¹ Thus, Mr. Chen was engaging in a speculative transaction that involved taking on risk in exchange for an expected profit.

34. Mr. Chen neither made nor took deliveries of physical power, as would be necessary as part of one type market manipulation: a manipulation based on the exercise of market power, e.g., a classic corner or squeeze. In such a manipulation, a trader with a large financial position buys or sells excessively large physical quantities in order to distort prices in a way that enhances the value of his financial position.² Since he did not make or take delivery of physical power, Mr. Chen could not have manipulated the market through the exercise of market power.

35. Mr. Chen did not act in a deceptive manner. He made his purchases and sales openly, and entered the information necessary to execute his trading strategy

¹ J. M. Keynes. *A Treatise on Money* (1930).

² S. C. Pirrong, *The Economics, Law, and Public Policy of Market Power Manipulation* (1996).

in an open and transparent way. Moreover, the information he entered was correct and hence could not have been fraudulent.

36. As a result of the transactions Mr. Chen executed, he was eligible for, and received, transmission loss credits (“TLC”). TLC therefore affected the profitability of the strategies that Mr. Chen employed.

37. Mr. Chen responded rationally to the economic signal that was inherent in the design of the TLC. It would be unduly burdensome and unrealistic to expect traders to decide whether or not to respond to economic signals if they can do so without engaging in deception or exercising market power. If PJM deems that the TLC is incentivizing undesirable transactions, the problem is in the incentives inherent in the TLC, rather than with traders responding rationally to these incentives.

38. Traders respond to price and value signals, regardless of whether those price and value signals are reflect only economic fundamentals, or are also affected by regulations and market design. Several examples illustrate this point.

39. For instance, the price that traders are willing to pay for corn, and the amount of corn they are willing to buy, depends on the subsidy for the production of ethanol. This subsidy is a purely legislative artifact, but affects the economics of purchasing corn. The higher the subsidy, the more corn traders purchase, and the higher the price they are willing to pay for it.

40. As another example, prior to the passage of the Staggers Rail Act in 1980, the Interstate Commerce Commission set rail rates on grain shipments. The regulated rate structure (a) equalized the rail rates on grain shipments to different

ports, even though the costs of serving these ports differed, and (b) protected the (lower) through rate from interior points to export points on shipments of grain that were shipped from a given interior point to an interior terminal, and then sent from the interior terminal to an export point. As a result of this rate structure, shipments were roughly equalized across export ports, and it was conventional for shippers to ship grain from a producing location (such as central Iowa) to an interior terminal market (such as Chicago) where it was stored for some period before being shipped to an export point. The Staggers Act eliminated these features of the regulated rate structure, and as a consequence (a) more grain was shipped to lower cost ports, and less grain to higher cost ports, and (b) grain was shipped directly from producing points to export ports without being stored at interior points like Chicago. This change in behavior makes it plain that the original patterns of shipment and storage were driven by the incentives inherent in the regulated rate structure. Again, traders responded to the economic incentives inherent in the regulated price structure, even though this regulated rate structure was not economically efficient.

41. As a final example, futures contracts often include premiums for delivery at certain locations (or of certain grades) and discounts for other locations (or grades), and these premiums and discounts do not equal market price differentials between the locations (or grades). When deciding where (or what) to deliver, market participants take into account the exchange-specified premiums and discounts. Specifically, they choose to deliver the “cheapest to deliver” location

(or grade), where the calculation of the cheapest to deliver explicitly includes the specified premium or discount.

42. In each example, traders respond to the economic signals inherent in the subsidy, or regulated rate structure, or contract design. When their responses to these signals were deemed inefficient, as in the case of rail rates, neither Congress nor regulators attempted to punish the traders. Instead, Congress changed the regulations to eliminate equalization and through rate protection. Traders responded quickly to the new price signals. Similarly, there have been cases where exchanges decided that delivery premiums and discounts were leading to inefficient delivery and trading behavior. In these cases, exchanges revised the price differential structure in these contracts in order to give traders efficient price signals.

43. Mr. Chen was acting no differently than the buyer of corn in a market where ethanol is subsidized; or the trader of wheat under regulated rail rates; or the trader of a futures contract with a particular premium or discount structure. He was responding rationally to economic signals—price signals—inherent in the market regulation and design. To the extent that his actions were inefficient, the fault is with the market design, not with his response thereto.

44. And again, it is unduly burdensome and unrealistic to charge traders with the task of determining which price signals they should respond to, and which they should not. This puts traders like Mr. Chen in the position of mind readers trying to divine the intent of regulators. Mind reading being a very imprecise art, in attempting to do so they will inevitably do some things that regulators consider

inefficient, and will inevitably fail to do some things that regulators think they should do. This places traders at the acute risk of suffering penalties for their inability to distinguish which price signals regulators intend for them to follow, and which ones they do not. Moreover, out of fear of suffering such penalties, some traders may shy away from taking actions in response to price signals that would have the effect of enhancing market efficiency.

45. In the present instance, PJM essentially demands that Mr. Chen, and other traders, decide which kinds of trades “should” receive TLC payments, and which should not. This is a truly difficult task, and one fraught with potential for error. Rather than demanding that traders like Mr. Chen read their minds, system regulators should design a TLC mechanism that provides the incentives to undertake the kinds of trades they prefer, and which does not incentivize the kinds of trades that they do not prefer.

46. It should also be noted that the TLC payments that Mr. Chen received were risky. That is, he could not know at the time at which he initiated the transactions, what the TLC payment associated with those transactions would be. Those payments were determined by conditions prevailing in the PJM system at the time that the power flowed.

47. For instance, in June, 2010, the TLC payments averaged \$.56, but had a standard deviation of \$.09; in July, 2010, they averaged \$.66 with a standard deviation of \$.16, and in August, 2010 they averaged \$.60 with a standard deviation of \$.20. The positive standard deviations indicate that the transactions that Mr. Chen undertook were risky. Since these payments were risky,

transactions that generated such payments cannot be considered as wash trades *per se* because wash trades involve simultaneous purchase and sale with no risk of loss.

48. Furthermore, scarce enforcement resources are best employed detecting and investigating conduct that distorts, or has the potential to distort the allocation of real resources, i.e., distorts or has the potential to distort the production, consumption, or transmission of power. Mr. Chen's transactions entailed no such distortions, or the potential for such distortions.

Summary and Conclusions

49. Mr. Chen engaged in transactions that put him at risk, and hence which were not wash trades. Moreover, Mr. Chen did not exercise market power or engage in misleading or deceitful acts. Furthermore, he responded rationally to economic incentives—price signals—inherent in the PJM market design. As a result, his trades were legitimate, and not manipulative. Moreover, his trades did not distort the production, consumption, or transmission of power. Thus, there is no economic basis for pursuing legal action against Mr. Chen.

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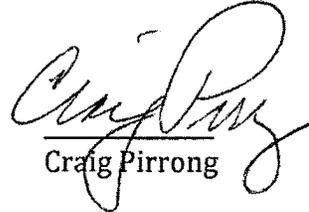
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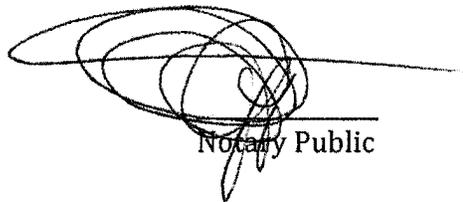
State of Missouri)
)
County of St. Louis) ss

AFFIDAVIT

Craig Pirrong, first being duly sworn on oath, deposes and says that the foregoing is his sworn affidavit in this proceeding and that the foregoing affidavit is true, correct, and complete to the best of his information, knowledge, and belief.


Craig Pirrong

Subscribed and sworn to before me this 8th day of December, 2010


Notary Public

My Commission Expires:

CAROL GOOLSBY
Notary Public - Notary Seal
State of Missouri
Commissioned for St. Louis County
My Commission Expires: Nov. 14, 2014
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