Affidavit of Stewart Mayhew

I. Qualifications

1. I am a Principal at Cornerstone Research, an economic and financial consulting firm, where I have been working since 2010. At Cornerstone Research, I have conducted statistical and economic analysis for a variety of matters, including cases related to securities litigation, financial institutions, regulatory enforcement investigations, market manipulation, insider trading, and economic studies of securities market regulations.

2. Prior to working at Cornerstone Research, I worked at the U.S. Securities and Exchange Commission ("SEC" or "Commission") as Deputy Chief Economist (2008-2010), Assistant Chief Economist (2004-2008), and Visiting Academic Scholar (2002-2004). From 2004 to 2008, I headed a group that was responsible for providing economic analysis and support for the Division of Trading and Markets (formerly known as the Division of Market Regulation), the Division of Investment Management, and the Office of Compliance Inspections and Examinations. Among my responsibilities were to analyze SEC rule proposals relating to market structure for the trading of stocks, bonds, options, and other products, and to perform analysis in connection with compliance examinations to assess whether exchanges, dealers, and brokers were complying with existing rules. I also assisted the Division of Enforcement on numerous investigations and enforcement actions, including matters involving market manipulation.

3. I have taught doctoral level, masters level, and undergraduate level classes in finance as Assistant Professor in the Finance Group at the Krannert School of Management, Purdue University (1996-1999), as Assistant Professor in the Department of Banking and Finance at the Terry College of Business, University of Georgia (2000-2004), and as a Lecturer at the Robert H. Smith School of Business at the University of Maryland (2012). I earned Bachelor of Science and Master of Science degrees in economics from Brigham Young University, and a Ph.D. in Business Administration with an emphasis in finance from the University of California, Berkeley.

4. I have authored numerous articles, including studies published in peer-reviewed academic journals. My academic research has focused on the structure and regulation of option markets, trading in securities markets, and volatility estimation in securities and futures markets.

A list of publications I have authored is contained in my curriculum vitae, attached as Appendix A. Other individuals from Cornerstone Research provided assistance and research under my direct supervision. Neither my compensation nor Cornerstone Research's compensation is dependent on the outcome of this matter.

II. Assignment

5. I have been retained by Powhatan Energy Fund ("Powhatan") in connection with certain virtual electricity trades, known as Up To Congestion ("UTC") trades, made by Dr. Houlian Chen ("Dr. Chen") between February 2010 and August 3, 2010. The Federal Energy Regulatory Commission ("FERC") is alleging that the trades in question violate the FERC's prohibition on market manipulation.[1]

6. I have been asked to evaluate the trading strategy employed by Dr. Chen, to assess whether the strategy involved deception, and whether it was the type of strategy that securities market regulators consider to be manipulative or fraudulent under the definitions and standards used in securities markets.

7. I have also been asked to assess the degree to which Dr. Chen's strategy involving UTC trades was analogous to a strategy followed by Mr. I. M. Amanat ("Mr. Amanat"), the subject of a SEC administrative proceeding ("Amanat Case"),[2] in which the SEC's Division of Enforcement ("Division") alleged that Mr. Amanat violated the antifraud provisions of federal securities laws by executing a series of wash sales in two different accounts designed to reach the trading volume threshold necessary to qualify MarketXT[3] for Nasdaq's market data rebate program.[4]

---

[1] Preliminary Findings of Enforcement Staff's Investigation of Up To Congestion Transactions by Dr. Houlian Chen on Behalf of Himself and the Principals of Huntrise Energy Fund LLC and Powhatan Energy Fund, LLC ("FERC Staff Preliminary Findings"), Docket No. IN10-5-000, August 9, 2013.

[2] In the Matter of Irfan Mohammed Amanat, Admin. Proc. File No. 3-11813, Securities and Exchange Commission, Opinion of the Commission ("Amanat Opinion 2"), November 3, 2007.

[3] Mr. Amanat was the chief technology officer of MarketXT, an electronic communications network ("ECN"), registered broker-dealer, and NASD member. The two accounts used for trading existed at Momentum Securities. Mr. Amanat's family owned fifty-three percent of Tradescape Corporation, which is the parent company of MarketXT and Momentum Securities. (*Id.* at pp. 1, 3, 5.)

[4] The Administrative Law Judge initially found that Mr. Amanat's conduct was not fraudulent, and dismissed all charges against him. (In the Matter of MarketXT, Inc. and Irfan Mohammed Amanat, Securities and Exchange Commission, Initial Decision ("Amanat Initial Decision"), December 22, 2005.) The Division of Enforcement then appealed the decision to the Commission, which reversed the decision (Amanat Opinion 2).

III. Summary of Opinions

8. The strategy implemented by Dr. Chen in the electricity UTC contract is an example of a simple spread strategy, in which a trader takes offsetting positions in two closely related contracts, attempting to obtain a benefit while taking on limited market risk. As such, Dr. Chen's strategy is typical of a broad family of trading strategies in stock, commodity, and derivative security markets. Regulators in securities and commodities markets do not view spread trading as deceptive or manipulative. Dr. Chen's strategy, if implemented in a market regulated by the SEC, would not be considered fraudulent or deceptive.

9. Dr. Chen's strategy is closely analogous to a well-known spread strategy commonly done by market makers and other participants in the exchange-traded stock option market, known as a "dividend spread." The dividend spread strategy involves executing large, simultaneous, offsetting purchases and sales in the same option series. If executed properly, the dividend spread strategy involves virtually no market risk, and has a high probability of capturing a profit, so it can appropriately be characterized as an "arbitrage" strategy. The profit is not derived from any mispricing in the options themselves, but rather, from exploiting a feature of the market structure design.

10. As I stated in a paper I co-authored, "[t]he [dividend spread] strategy exploits the mechanics of the allocation algorithm employed by the clearinghouse to assign option exercises, and involves two parties executing large offsetting buy and sell call option transactions on the last cum-dividend day."[5] The results "have implications for the design and regulation of clearinghouses. An apparently innocuous allocation rule that appears designed to place all option writers on equal footing actually enables certain participants to skew the process in their favor, and creates a huge amount of extraneous trading activity in the process. This lesson may be relevant in other contexts where clearinghouses must allocate assignments."[6] The SEC has chosen not to prohibit the dividend spread strategy, which, similar to Chen's strategy, uses a market design feature to extract profits.

[5] Jia Hao, Avner Kalay, and Stewart Mayhew, "Ex-dividend Arbitrage in Option Markets," *The Review of Financial Studies*, p. 2 (2010) ("Hao et al."). An earlier version of this paper was made available to the public through the Social Science Research Network in 2006. The paper was presented at the 2007 Western Finance Association meetings.

[6] *Id*. at p. 4.

11. The case brought by the FERC against Powhatan[7] is not analogous to the SEC administrative proceeding brought against Mr. Amanat. Mr. Amanat's strategy involved wash trading, and Dr. Chen's strategy did not. The Division offered up a theory explaining why it believed Mr. Amanat's strategy was deceptive, and who was deceived; the FERC has not done so in its case against Powhatan.[8] Mr. Amanat's trading platform would not have qualified for market data rebates had he not engaged in the wash trading strategy the Division alleged to be deceptive, whereas Dr. Chen's trades automatically qualified for the Marginal Loss Surplus Allocations payments. Mr. Amanat's strategy involved little or no risk, and Dr. Chen's strategy did involve risk.

12. I base my opinions on a review and current understanding of the facts in this matter, including information received from counsel for Powhatan Energy Fund, my personal knowledge of market structure and regulation developed over the course of the past twenty years, research I have conducted on specific trading strategies, and my eight years of experience as an economist and regulator at the Securities and Exchange Commission. I have been assisted in my research by staff at Cornerstone Research, including a Ph.D. economist who formerly worked for the Commodity Futures Trading Commission ("CFTC") and has experience and knowledge in energy markets. A list of documents I have relied upon is in Appendix B. I reserve the right to supplement or modify my opinion should further information come to my attention.

IV. Background and Allegations

13. This case involves trading in a type of electricity contract called the UTC contract, traded in the PJM electricity market. This is a virtual contract, meaning that it does not involve the physical movement of electricity between two locations. The difference in electricity prices between two locations is called "congestion." Conceptually, congestion can be thought of as a market price for moving electricity from an origination point ("source") to a destination point

[7] Dr. Chen scheduled UTC transactions in the PJM Interconnection, LLC ("PJM") on behalf of his own funds, HEEP Fund Inc. and CU Fund, and on behalf of the owners and managers of Huntrise Energy Fund, LLC and Powhatan. (See FERC Staff Preliminary Findings at p. 1.)

[8] Rather, PJM continued to make MLSA payments to Powhatan after Dr. Chen received a warning from the PJM market monitor on August 2, 2010 and stopped conducting the UTC trades at issue in this case. (See Written Submission to Commission Investigation Staff on Behalf Of Powhatan Energy Fund LLC ("Powhatan Written Submission"), Docket No. IN10-5-000, October 21, 2011, pp. 31-32.) Based on statements made by PJM, they did view the behavior to be "within the rules" and did not ask that "profits…be refunded back to PJM." (See Milena Yordanova-Kline, "PJM Files Tariff Changes at FERC Aimed at Blocking Marginal Loss Gaming," *Platts Global Power Report*, August 26, 2010.)

("sink").[9] It is calculated by subtracting the price of electricity at the sink from the price at the source.

14. Transactions for electricity deliverable at a particular geographic location on a particular hour of the following day are traded in the Day Ahead Market ("DAM"). Transactions for electricity deliverable on the same day are traded in the Real Time Market ("RTM"). The UTC contracts are settled ("UTC settlement") based on the change in congestion from the DAM on one day to the RTM on the following day.[10]

15. As part of the trading process for UTC contracts, market participants submit bids ("UTC Bids") that specify the maximum they are willing to pay for congestion. If the congestion in the DAM as published at 4:00pm ET is greater than the UTC Bid, the participant's UTC transaction is "canceled." If the congestion in the DAM as published at 4:00 is less than the UTC Bid, the participant's UTC trade is "cleared."[11]

16. In the PJM electricity market, a payment is made to PJM by each entity that schedules transmission to account for the loss of electricity that occurs during the transmission of power from one point to the other.[12] Any UTC transaction that clears requires payment to PJM for transmission service regardless of whether the electricity is actually transmitted.[13] PJM collects more revenue than is needed to pay for the actual electricity loss. The excess revenue collected is then distributed among market participants, and at the time of Dr. Chen's trading this included UTC traders.[14] These excess fees are distributed automatically, and are known as Marginal Loss Surplus Allocations ("MLSA") or Transmission Loss Credits ("TLC").

17. The PJM electricity market also assessed two types of costs ("Costs"), transmission reservation costs and other costs. Transmission reservation costs are for point to point

[9] Powhatan Written Submission at Appendix A, p. 1.

[10] PJM's DAM is a forward market in which hourly pricing is calculated for the next operating day based on generation offers, demand bids and scheduled bilateral transactions. (http://www.pjm.com/markets-and-operations/energy/day-ahead.aspx, accessed on October 23, 2013.) PJM's RTM is a spot market in which current prices are calculated at five-minute intervals based on actual conditions. (http://www.pjm.com/markets-and-operations/energy/real-time.aspx, accessed on October 23, 2013.)

[11] For example, if the source is Point A and the sink is Point B, than the congestion would be B – A. If the UTC Bid is greater than B – A then the UTC is scheduled and would settle the following day using the formula (RTM A – RTM B) – (DAM A – DAM B). (See Written Submission to Commission Investigation Staff on Behalf of Dr. Houlian Chen ("Chen Written Submission"), December 13, 2010, Appendix B, pp. 2-3.)

[12] PJM does not assess the charge for exports from PJM to Midwest Independent Transmission System Operator ("MISO"). (See *Id.* at Appendix B, p. 3.)

[13] Powhatan Written Submission at Exhibit B, pp. 4-5.

[14] The excess revenue is "distributed pro-rata to each Network Service User and Transmission Customer in proportion to its ratio shares of the total MWhs of energy delivered to load … in the PJM Region, or the total exports of MWh of energy from the PJM Region . . ., or the total MWh of cleared Up-to Congestion transactions (that paid for transmission service during such hour)." (Re: PJM Interconnection, L.L.C., Docket No. ER10- -000, August 18, 2010, pp. 4-5.)

transmission and total approximately $0.67 per MWh.[15] Other costs include PJM Scheduling, System Control and Dispatch Service - Market Support, PJM Scheduling, System Control and Dispatch Service - Advanced Second Control Center, Market Monitoring Unit Funding, Reactive Supply and Voltage Control from Generation and Other Sources Service, and Black Start Service, which total approximately $0.20 to $0.25/MWh.[16] Costs were applied to UTC transactions even though no electricity is actually transmitted.[17]

18. Dr. Chen's strategy at times involved bidding simultaneously on two offsetting UTC transactions—for example, bidding on a UTC transaction going from Point A to Point B and simultaneously bidding on a UTC transaction from Point B to Point A.[18] The UTC Bids submitted for the two legs of this trade were sometimes submitted at the same price point and sometimes at a different price point.[19] After Dr. Chen submitted a pair of offsetting bids, there were two possibilities:

a. Both UTC transactions clear, in which case the UTC settlement amounts will be exactly offsetting.
b. Only one of the two UTC transactions clears, in which case the UTC settlement amount is based on the leg that cleared.

19. In the scenario when both UTC transactions cleared, Dr. Chen's trading strategy would be profitable if the MLSA payment (associated with both cleared UTC transactions) exceeds the Costs.[20] In the scenario where one of the UTC transactions did not clear, the trade would be profitable if the single UTC settlement plus MLSA payment exceeds the Costs.

20. In addition, Dr. Chen's trading strategy at times involved bidding simultaneously on two UTC transactions that were not exactly offsetting, but were partially offsetting. For example, Dr. Chen's strategy sometimes involved bidding on a UTC transaction from Point A1 to Point B, and simultaneously bidding on a UTC transaction from Point B to Point A2, where the prices at Point

[15] Chen Written Submission at Appendix B, p. 3.
[16] *Id*.
[17] Transmission reservation costs do not apply to exports from PJM to MISO. (See *Id*.)
[18] For example, Dr. Chen would make a bid on the transmission of 20 MW per hour from MISO to Dayton (in PJM), and then simultaneously make another bid on the transmission of 20 MW per hour from Dayton to MISO. (See *Id*. at p. 15.)
[19] Based on my understanding, when Dr. Chen submitted UTC Bids at more than one price point, both price points were either both positive or both negative.
[20] In this scenario, the settlement amounts were perfectly offsetting and do not figure into the profit calculation.

A1 and A2 were highly correlated.[21] After submitting bids on partially offsetting transactions, there were two possibilities:

a. Both UTC trades clear, in which case the net UTC settlement amount depends on the realized prices in the markets—the settlement amounts from the two contracts may be partially or fully offsetting.
b. One of the two UTC trades clears, in which case the UTC settlement amount is based on the leg that cleared.

21. As for the prior case, the strategy may or may not be profitable. If both trades clear, the strategy will be profitable if the net UTC settlement plus MLSA payment exceeds the Costs. In the scenario when one of the UTC transactions does not clear, the trade will be profitable if the single UTC settlement plus MLSA payment exceeds the Costs.

22. I understand that the FERC is alleging that Dr. Chen's spread trades that involved fully offsetting or partially offsetting positions should be considered a wash trade, or a sham trade, and constitute a violation of the FERC's antifraud provisions.[22]

23. I am aware of one other case concerning the collection of rebates associated with UTC trading that has been pursued by the FERC Staff. Oceanside Power, LLC ("Oceanside") reached a settlement agreement with the FERC Staff on February 1, 2013 relating to these allegations, but neither admitted nor denied the alleged violations.[23] Notably Oceanside's trading did not involve alleged wash trades, rather, Oceanside was alleged to have entered one way UTC transactions from Point A to Point B when the congestion between the two points happened to always be zero in the DAM and nearly always zero in the RTM.[24]

24. The FERC Staff found that Oceanside's "UTC transactions were designed to be trades without intrinsic economic value, which would enable Oceanside to reserve and schedule against large amounts of transmission service without the risk of losses from UTC transactions."[25] It appears to be the FERC's view that Oceanside's trading was designed solely to earn a rebate, and

[21] For example, Dr. Chen made a bid on the transmission of 600 MW from MISO to COOK (in PJM) on February 27, 2010, and then made another bid on the transmission of 600 MW from ROCKPORT (in PJM) to MISO on that same day. (See Chen Written Submission at p. 14, fn. 12.)
[22] FERC Staff Preliminary Findings at p. 2.
[23] In re PJM Up-To Congestion Transactions, Order Approving Stipulation and Consent Agreement ("Oceanside Agreement"), Docket No. IN10-5-00, February 1, 2013.
[24] *Id.* at p. 2.
[25] *Id.* at pp. 4-5.

that it was in violation of the FERC's prohibition against manipulation in the electricity markets "because it was a scheme to defraud the PJM market."[26]

25. I am not familiar with the FERC's use of the phrase "intrinsic economic value" in the context of securities markets, but it appears that the FERC is using the term to refer to the fact that Oceanside's trades were not designed to take a directional position in the electricity market, but rather, were designed to capture MLSA payments. In essence, it appears that the FERC has concluded that a trading strategy allegedly designed to earn rebates in connection with a contract, but not based on the actual price of the contract, constitutes a scheme to defraud.

26. Although the phrase "intrinsic economic value" is unfamiliar to me in this context, prior SEC regulation and enforcement matters have used the phrase "legitimate economic purpose" in the context of manipulation claims. For example, the SEC may allege that a trade had no legitimate economic purpose if it had no purpose other than to deceive other market participants or to circumvent a rule.[27] I am not aware of any instance of the SEC arguing that a trading strategy is illegal or fraudulent merely because it did not have a legitimate economic purpose.

27. In the case of Dr. Chen, the FERC alleges that Dr. Chen's trading strategy involved scheduling of "matched UTC transactions that had the same or nearly the same effect as what the law would label a 'wash trade' or 'sham' transaction."[28] Furthermore, the FERC alleges that "[t]hese trades were carefully configured to eliminate or reduce both profits and losses from price differentials in the market, and they also incurred certain costs related to scheduling the transactions" and that the trades were designed with the "intent to avoid the effects of price changes in the market."[29]

---

[26] *Id.* at p. 5.

[27] In enforcement actions alleging that wash trades and matched orders were used to manipulate upward the price of a stock, the SEC has alleged the wash trades "had no legitimate economic purpose," to bolster the SEC's argument that the sole purpose of the wash trades was to increase the stock price. (See Complaint, SEC vs. Todd M. Ficeto et al., No. CV 11-1637 (C.D. Cal.), February 24, 2011, pp. 3-4.) In other enforcement actions, the SEC alleged that certain trading strategies should be considered "sham transactions" because the trade's sole purpose was to enable the trader to circumvent an SEC rule. (See Complaint, SEC vs. Lion Gate Capital, Inc., and Kenneth Rickel, No. CV 08-06574 (C.D. Cal.), October 7, 2008, pp. 3-11.) In these cases, the SEC has argued that the transactions having "no legitimate economic purpose" is one of the conditions for the transactions to be considered sham transactions.

SEC Rule 204 of Regulation SHO addresses the close-out requirements for failures to deliver resulting from sales of any equity security. In the adopting release for Rule 204, the SEC stated that when "a participant subject to the close-out requirement purchases or borrows securities on the applicable close-out date and on that same date engages in sale transactions that can be used to re-establish or otherwise extend the participant's fail position, and for which the participant is unable to demonstrate a *legitimate economic purpose* [emphasis added], the participant will not be deemed to have satisfied the close-out requirement." Securities and Exchange Commission, Release No. 34-60388, File No. S7-30-08, July 31, 2009, fn. 82.

[28] FERC Staff Preliminary Findings at p. 2.

[29] FERC Staff Preliminary Findings at pp. 2-3.

28. As I explain below, the same factors stated as part of Dr. Chen's allegations are typical in many trading strategies that are legal and pervasively used in securities and commodities markets.

V. Dr. Chen's UTC Trades Are an Example of a Spread Strategy

A. Spread Trading

29. "Spread Trading" is a generic term for a type of trading strategy commonly used by traders in securities, commodities, and derivative securities markets and widely recognized by regulators as a legitimate trading strategy. In a spread trade, a trader takes offsetting positions in two or more instruments, such that the combined position has little or no risk exposure to movements in the market. Using the same language the FERC used to describe Dr. Chen's UTC strategy, spread trades are in fact designed with the "intent to avoid the effects of price changes in the market." However, these strategies are not viewed as deceptive or manipulative by the SEC or the CFTC. In fact, spread trades are pervasive in securities, commodities, and other financial markets.

30. There are many examples of different types of spread trading strategies, some of which are mentioned below. Some spread strategies are designed to allow the trader to speculate on the change between the prices of two related assets, or to derive trading profits by taking advantage of relative mispricing among assets.[30] Other strategies have other purposes unrelated to earning trading profits. In sum, spread strategies are designed to accomplish some economic purpose for the trader, while eliminating some or all of the market risk associated with the price movement of the component assets on which the contract is based. This economic purpose may or may not be related to the profits on the spread trade itself.

31. In most cases, spread strategies are implemented by taking offsetting positions in two instruments that are different from each other but highly correlated.[31] The market risk exposures of the two positions go in the opposite direction from each other, and the market risk exposure of the first position is mostly or entirely offset by the second position. The degree to which the

[30] Greg Kuserk, "Speculation and Hedging," *Financial Derivatives: Pricing and Risk Management*, Editors Robert W. Kolb and James A. Overdahl, John Wiley & Sons, p. 50 (2010).

[31] In some cases, a spread may involve more than two instruments, or it may involve taking offsetting positions in the same instrument.

spread position retains risk depends on the degree to which the two instruments are correlated. In the extreme case when the two instruments are perfectly correlated, offsetting positions in the two contracts should eliminate all market risk.

1. Example of a Spread Strategy: Brent – WTI Spread Trade

32. An example of a common spread trade is the spread between crude oil at two different geographic locations.[32] One such trade involves the price of crude oil traded in the United States for delivery in Oklahoma[33] and the price of crude oil traded in Europe for delivery in the North Sea.[34] An investor who takes a position in the U.S. crude oil contract makes or loses money based on the fluctuations of the U.S. crude oil price. Similarly, an investor who takes a position in the European crude oil contract makes or loses money based on the fluctuations of the European crude oil price. These two prices are highly correlated with each other. Investors in either contract are subject to all the market risks that affect the worldwide price of crude oil.

33. To illustrate the crude oil spread trade, consider an investor who simultaneously takes two offsetting positions by purchasing a U.S. crude oil contract and selling a European crude oil contract. This investor's total position would not be harmed or benefitted by factors that affect the global price for crude oil. Any development in the market that increases the global price of oil would benefit the investor's "long" position in U.S. crude oil but harm the investor's "short" position in European crude oil, and these gains and losses would offset each other. The spread investor would only experience gains or losses to the extent that there are changes in the difference between the U.S. and European crude oil prices. The spread position is designed to eliminate the trader's exposure to market risks, while allowing the investor to achieve an economic objective—in this case to take a targeted position focused on the difference between crude oil prices across geographical locations.

2. Other Examples of Spread Strategies in Financial Markets

34. The example of trading the spread between oil in the US and Europe is just one of many similar spread strategies commonly done in financial markets. This section provides a few

[32] C.L. Dunis, Jason Laws, and Ben Evans, "Trading futures spreads: an application of correlation and threshold filters," Vol. 16, *Applied Financial Economics*, pp. 903-914 (2006).
[33] Commonly referred to as "WTI" or West Texas Intermediate.
[34] Commonly referred to as "Brent".

additional examples of spread strategies commonly used in the markets for futures, stock indexes, stock options, and mortgage-backed securities. It is not a complete list of spread strategies, rather it is intended to illustrate that similar strategies are common in other markets.

35. Another futures market spread strategy is to take offsetting futures positions in the same commodity with contracts maturing in different months, called a "calendar spread." The change in a calendar spread position depends on the difference in prices for the same commodity delivered in two different time periods.[35] Another type of spread trade is the "interexchange spread." This trade involves entering a long and short futures contract position on two different futures exchanges in the same commodity that mature in the same month; the change in the interexchange spread is related to the change of transportation costs for the different delivery points specified by the two different exchanges.[36] Yet another type of futures spread involves a "crack spread" which, for example, includes a long position in a crude oil futures contract and a short position in a refined commodity such as gasoline or heating oil; the change in the crack spread is related to the change in refining margins.[37] Although futures spread trades involve the simultaneous purchase and sale of the same or similar commodities in the same or similar amounts, these types of trades are not considered manipulative.

36. "Index arbitrage" is a general term for a group of spread strategies involving buying and selling instruments linked to or related to a market index, in order to exploit inconsistencies in the relative prices of the instruments.[38] Typically, index arbitrage strategies involve simultaneously taking long and short positions in the same index through different instruments, thus creating a combined position that has no risk exposure to movements of the underlying index. For example, one form of index arbitrage strategy involves buying all the component securities that make up an index and simultaneously selling the index using an index futures contract.[39] Another is to purchase the component securities and short sell shares of an exchange-

[35] Joan C. Junkus, "Agricultural and Metallurgical Derivatives: Speculation and Hedging," *Financial Derivatives: Pricing and Risk Management,* Editors Robert W. Kolb and James A. Overdahl, John Wiley & Sons, pp. 99-100 (2010).
[36] *Id.* at p. 100.
[37] Craig Pirrong, "Energy Derivatives," *Financial Derivatives: Pricing and Risk Management,* Editors Robert W. Kolb and James A. Overdahl, John Wiley & Sons, pp. 127-128 (2010). Another type of "crack spread" or "crush spread" involves the purchase of soybean futures contracts and the sale of soybean meal and/or soybean oil contracts. (See Robert L. Johnson, et al., "The Soybean Complex Spread: An Examination of Market Efficiency from the Viewpoint of a Production Process," Vol. 11, *The Journal of Futures Markets*, pp. 25-37 (1991).)
[38] Praveen Kumar and Duane J. Seppi, "Information and Index Arbitrage," Vol. 67, *The Journal of Business,* pp. 481-509 (1994).
[39] Y. Peter Chung, "A Transactions Data Test of Stock Index Futures Market Efficiency and Index Arbitrage Profitability," Vol. 46, *The Journal of Finance*, pp. 1791-1792 (1991).

traded fund ("ETF") that tracks the same index. Another involves taking offsetting positions in an ETF and a futures contract linked to the same index. These index arbitrage strategies are common and are not considered abusive or inappropriate by regulators in securities or commodities markets. While the typical motivation for implementing index arbitrage is to earn a trading profit, regulators would not view an index arbitrage strategy designed to capture dividends or trading rebates as cause for concern.

37. In option markets, the term "spread" is used to describe any strategy that involves simultaneously buying and selling call options, or simultaneously buying and selling put options. Many of these strategies involve buying and selling the same number of options, in which case the spread position has little or no risk exposure to large increases or decreases in the price of the underlying asset, but gives the trader a targeted exposure to the difference between two option prices. For example, "bull spreads" and "bear spreads" involve simultaneously buying and selling equal numbers of options with different strike prices, "calendar" spreads involve buying and selling equal numbers of options with different expiration dates, and "diagonal spreads" involve buying and selling equal numbers of options with different strike prices and expiration dates. "Butterfly spreads" involve simultaneously buying options at two different strike prices and selling options at an intermediate strike price between the two purchased options.[40]

38. The option spread positions mentioned above have limited risk with respect to movements in the underlying stock price. Other option strategies have essentially no market risk. A "box spread" involves simultaneously taking positions in four different options, two calls and two puts at two different strike prices, such that the combined positions have no exposure to the underlying stock price.[41] A "conversion" involves simultaneously purchasing the stock and "synthetically" selling the stock (by buying a put option and selling a call option). A "reverse conversion" strategy involves "synthetically" buying the stock (by buying a call option and selling a put option) and simultaneously selling the stock. These strategies have no market risk exposure because the risk of the option positions is exactly offset by the risk of the stock position. These and other similar option trading strategies are well-known, legal strategies. I wrote about these strategies in a book chapter when I was working at the SEC.[42]

[40] Stewart Mayhew, "Option Strategies," *Financial Derivatives: Pricing and Risk Management,* Editors Robert W. Kolb and James A. Overdahl, John Wiley & Sons, pp. 512-515, 519-522 (2010).
[41] *Id.* at p. 518.
[42] *Id.* at pp. 503-524.

39. Spread trading is also done in the market for Mortgage-Backed Securities ("MBS") and Collateralized Debt Obligations ("CDOs").[43] MBS are structured finance securities in which a basket of mortgages is bundled together in a portfolio and securities are issued that are linked to the portfolio within a tiered structure (securities in higher tiers have cash flow claims with higher priority than lower tiers). The cash flows resulting from the mortgage principal and interest payments are then channeled to the owners of the securities according to the specified priority structure. Spread trades in this market involve taking offsetting long and short positions in securities with different priority from the same MBS or CDO structure.

40. While some spread strategies are designed to earn trading profits, in other instances, the spread strategy may be designed to hedge a risk,[44] achieve a tax benefit,[45] transfer an existing position in one instrument to an equivalent position in another instrument,[46] acquire shares in order to lend them out, or acquire shares for voting purposes.[47]

41. As I describe in section VI below, the dividend spread strategy in option markets is an example of a legitimate spread strategy involving simultaneously purchasing and selling precisely offsetting positions in exactly the same contract and has almost no market risk.

B. Dr. Chen's Spread Trading

42. Dr. Chen's strategy was typical of spread trading strategies. Like any spread strategy, it involved taking offsetting positions in two contracts, where the two legs of the spread have a high negative correlation, resulting in the elimination of most market risk. As described above, Dr. Chen's strategy sometimes involved submitting a UTC Bid for congestion from Point A to Point B and another UTC Bid for congestion from Point B to Point A. The first contract had positive risk exposure to congestion from A to B, and the second contract had positive exposure to congestion from B to A, which equated to negative exposure from A to B. These two bids, if

[43] Steven Todd, "Credit Default Swaps," *Financial Derivatives: Pricing and Risk Management,* Editors Robert W. Kolb and James A. Overdahl, John Wiley & Sons, pp. 188-189 (2010).
[44] Greg Kuserk, "Speculation and Hedging," *Financial Derivatives: Pricing and Risk Management,* Editors Robert W. Kolb and James A. Overdahl, John Wiley & Sons, pp. 44-47 (2010).
[45] M. Ameziane Lasfer, "Ex-Day Behavior: Tax or Short-Term Trading Effects," Vol. 50, *The Journal of Finance*, pp. 875-897 (1995).
[46] For example, spread trades can be referred to "rolling" one position to another, especially in futures markets where contract maturities expire. A trader who wants to maintain a long position in the underlying commodity will sell the futures contract that is closest to expiring and simultaneously buy a futures contract in a further to maturity futures contract. (See Frank J. Fabozzi, Roland Füss, and Dieter G. Kaiser, "A Primer on Commodity Investing," *The Handbook of Commodity Investing*, Editors Frank J. Fabozzi, Roland Füss, and Dieter G. Kaiser, John Wiley & Sons, pp. 23-24 (2008).)
[47] Tom Nohel, "Hedge Funds and Financial Derivatives," *Financial Derivatives: Pricing and Risk Management,* Editors Robert W. Kolb and James A. Overdahl, John Wiley & Sons, p. 553 (2010).

both cleared, resulted in payments that were exactly offsetting and so eliminated the congestion risk.

43. Also as described above, Dr. Chen sometimes implemented a spread strategy involving congestion contracts from Point A1 to B and from point B to A2. In these cases, if both contracts cleared, the payments would have been partially but not necessarily fully offsetting. One of the main purposes of Dr. Chen's strategy was to enter spread positions and capture the benefit of the MLSA payments.

44. My understanding is that at the time of Dr. Chen's trading, no specific FERC rule prohibited trades designed to capture MLSA payments. Based on my review and analysis of Dr. Chen's trading strategy, I concluded that his UTC trades were not designed to influence the market price, were not intended to create a deceptive appearance of market activity, did not seek to induce other traders to enter the market, did not deceive other market participants, and did not circumvent other rules. The design of the PJM market was such that it allocated MLSA payments automatically among all those with bids that cleared in the market, including virtual traders, regardless of whether those traders had hedged the risk of the trade through the use of spreads.

45. In securities markets, a wash trade is a transaction involving no change in beneficial ownership (a trade where the same entity is on both sides of the same trade).[48] In a wash trade, because the trader is simultaneously acting as buyer and seller in the same transaction, the trader experiences no gain or loss if the transaction is executed at a price that deviates significantly from the market price.[49] Because a trader does not lose any money by executing wash sales at non-market prices, a trader can engage in a series of wash sales at successively higher (or successively lower) prices, thus manipulating the market and deceiving other market participants by creating the false impression regarding the price level. In addition, because the wash trade involves no market risk even when done in large amounts, a manipulator can use wash trades to create the false appearance of an active market (at an arbitrary price point), which also can deceive other market participants and induce them to trade. Because wash trades can be used in

[48] FINRA Rule 5210.01 prohibits transactions unless "such quotation is a bona fide quotation, is not fictitious and is not published or circulated or caused to be published or circulated for any fraudulent, deceptive or manipulative purpose." Although the rule was not in place at the time of Dr. Chen's trading, FINRA Proposed Rule FINRA 5210.02 states that, "Transactions in a security that involve no change in the beneficial ownership of the security, commonly known as 'wash sales,' generally are non-bona fide transactions."

[49] Wash trades may result in a loss because the trader must pay transaction costs to execute the trades.

this manipulative manner, there is a long history of securities regulators recognizing that wash trades are red flags that are potential indicators of market manipulation.[50]

46. Even though wash trades can be used as a manipulative device, they are not inherently manipulative. Based on my experience, the SEC staff would not consider a pattern of wash sales or matched orders to be illegal if the trades had a specific economic purpose, and if the trader's purpose in executing the wash sales was not to deceive other market participants, create a false perception concerning the price or liquidity of a security, or induce other market participants to trade.

47. For example, wash trading conducted by Peter Kellogg for tax purposes was not considered illegal.[51] In another case involving the Rockies Fund, the SEC found that the defendants engaged in wash sales and matched orders but found that "neither of these devices alone constitutes a security violation" and stated that allegations of violations under Section 10(b) require a showing of intent and materiality.[52] In yet another example, Richard Gates of Powhatan, the identical twin brother of Kevin Gates of Powhatan, submitted buy and sell orders a few seconds apart for the same security that were executed milliseconds apart with the economic purpose of assessing the execution quality at different trading platforms. Richard Gates openly talked about these nearly simultaneous buy and sell trades in a Wall Street Journal article.[53] Also, as I explain in the following section, the SEC does not view dividend spread trades as illegal even though the strategy involves the purchase and sale of the same contract.

48. My understanding is that Dr. Chen executed his strategy by submitting different bids on different contracts, each of which was entered into the system in the usual way, and cleared or not cleared according to the normal workings of the PJM market. He did not act as his own counterparty in the trades, and there was no way that he could have arranged for the trades to be executed at non-market prices. His trades were spread trades, not wash trades.

49. Spread trades do not have the same potential to be used as a manipulative device as wash trades, and are not viewed by regulators in the same light as wash trades. I am not aware that

[50] Complaint, SEC vs. Todd M. Ficeto et al., No. CV 11-1637 (C.D. Cal.), February 24, 2011; Complaint, SEC vs. Lion Gate Capital, Inc., and Kenneth Rickel, No. CV 08-06574 (C.D. Cal.), October 7, 2008; Sharon M. Graham and Stephen C. Voss v. SEC, 222 F.3d 994 (U.S. App. D.C.), August 18, 2000.
[51] NASD Office of Hearing Officers, Disciplinary Proceeding No. CMS030257, Hearing Panel Decision (Kellogg), August 6, 2004.
[52] Rockies Fund, Inc., et al. v. SEC, 428 F.3d 1088 (U.S. App. D.C.), November 15, 2005.
[53] Scott Patterson, "Fast Traders' New Edge," *The Wall Street Journal*, June 4, 2010, http://online.wsj.com/news/articles/SB10001424052748703340904575285002267286386, accessed on October 4, 2013.

securities market regulators treat spread trades as red flags for manipulation, nor is there a presumption in securities markets that market participants executing spread trades might be viewed as manipulators if their trades do not have an economic purpose.

50. In summary, Dr. Chen's trading strategy involved executing spread trading strategies, not wash trades. Even if it were to be considered analogous to wash trades, Dr. Chen's trading strategy would not be viewed as a "sham transaction" or manipulative had it been done in securities markets, because the trades had a legitimate economic purpose, the strategy did not involve deception, and it was not intended to circumvent rules.

VI. The Dividend Spread Strategy

51. In the previous section, I discussed how Dr. Chen's trades were an example of a spread strategy, a broad category of strategies that are not only legal but are ubiquitous in financial markets. In this section, I focus on one type of spread strategy that is particularly relevant in the current case due to its close similarity with the strategy at question in this case.

52. The strategy employed by Dr. Chen in the UTC markets is economically similar and closely analogous to a well-documented strategy done in the exchange-traded stock option markets that I will refer to as a "dividend spread" strategy. Elsewhere it has also been referred to as a "dividend play," or "dividend trade."[54]

53. The dividend spread involves trading call options on dividend-paying stocks, on the last trading date before the "ex-dividend" date.[55] In theory, the dividend spread strategy could be done by any trader permitted to buy and write uncovered options, but historically, it has most commonly been implemented by market makers and those who are member firms of option exchanges, who face significantly lower transactions costs than other investors, and therefore have a greater capability of implementing the strategy on a large scale. In essence the dividend spread strategy earns profits by exploiting the mechanics of the allocation algorithm employed

[54] This strategy is described and documented in greater detail by Veronika Krepely Pool, Hans R. Stoll, and Robert E. Whaley, "Failure to exercise call options: An anomaly and a trading game," Vol. 11, *Journal of Financial Markets*, pp. 1-35 (2008) and by Hao et al. at pp. 1-33.
The strategy has also been the subject of media coverage. (See for example, Tennille Tracy, "Playing Options? Get Versed First – Complex Call Trade Pits Sophisticated Investors Against Individuals," *The Wall Street Journal*, October 12, 2009, http://online.wsj.com/news/articles/SB125512865105076953, accessed on October 14, 2013.)

[55] Investors who purchase a stock on or after the ex-dividend date will not receive a dividend payment. The trading date immediately prior to the ex-dividend date is the last day an investor can buy the stock and receive the dividend. (See http://www.sec.gov/answers/dividen.htm, accessed on October 24, 2013.)

by the OCC clearinghouse ("OCC").[56] The trading strategy would not be profitable, but for the fact that the strategy allows the trader to capture the dividend.

A. Background Information

54. To understand how the dividend spread strategy works, it is important to first understand background information including (1) the basic mechanics of call options, (2) what happens to the prices of stocks and of call options when the stock pays a dividend, and (3) how the OCC works, including the mechanics of what happens at the OCC when call options are exercised and assigned. These topics are discussed below.

1. Mechanics of call options

55. A call option on a stock is a contract involving two parties, the "writer" and the "holder" of the call option. The writer is sometimes called the "seller" of the call option. The holder is sometimes called the "buyer" or the "owner" of the call option. One option contract gives the holder the right, but not the obligation, to purchase 100 shares of a particular "underlying stock," for a pre-specified price called the "strike price," any time prior to the option's "expiration date."[57]

56. If the holder chooses to use the option to purchase the underlying stock, it is called "exercising" the option. When a holder of a call option exercises the option, it is then "assigned" to an option writer, at which point the writer has the obligation to sell the underlying stock for the strike price. Individual stock options in the U.S. have "American style" exercise, meaning they can be exercised any time prior to expiration. The dividend spread strategy can only be implemented using American style options.

57. For example, if the underlying stock is Microsoft, the strike price is $32.00, and the expiration date is April 19, 2014, then the buyer of one call option contract has the right to buy 100 shares of Microsoft stock for $32.00 per share, on or before April 19, 2014. The writer of the same option has the obligation to sell 100 shares of Microsoft for $32.00 per share if and when the option is exercised and assigned.

[56] Hao et al. at p. 2.
[57] The Options Clearing Corporation, Prospectus, Put and Call Options, April 12, 2002, https://olui2.fs.ml.com/Publish/Content/application/pdf/GWMOL/Merrill_Lynch_Direct_Options_and_Clearing_Corporation_Prospectus.pdf. Also see http://www.theocc.com/clearing/clearing-services/specifications-equity-options.jsp, accessed on October 30, 2013.

58. The holder of the call option has control of whether and when it is exercised. The holder will only choose to exercise the option when it is in his or her benefit to do so. The call option writer would never consent to write an option unless sufficiently compensated for the risk of loss at assignment. Therefore, the option buyer must always pay money to the option writer at the time a trade is negotiated. The amount of money paid by the buyer to the writer is called the option "price" or the option "premium."

59. It does not make economic sense for an option holder to exercise the call option if the price of the underlying stock is lower than the strike price—if the buyer wishes to buy the stock it would be cheaper to just buy it directly rather than by exercising the option. To continue the example, if the price of Microsoft were $31.00 per share, it would not make sense for the holder of the option to exercise an option with a strike price of $32.00 (it would be cheaper to buy the stock for $31.00 than to exercise and buy it for $32.00). Is this case, the option is said to be "out of the money."

60. On the other hand, it might make sense for the call option holder to exercise the option if the underlying stock price is higher than the strike price. For example, if the price of Microsoft is $33.00 on April 19, 2014, when the option expires, it would make sense to exercise a call option with a strike price of $32.00, as doing so allows the holder to purchase a stock that is worth $33.00 for only $32.00. In this case, the option is said to be "in the money."

61. The question of whether it makes sense to exercise the option early (before the expiration date) is more complicated. Even though an option may be in the money, it may not make sense to exercise if the option still has time left until expiration. Options can derive much of their value from the fact that they still have time left. This is called the "time value" of the option.[58] Exercising an option early might not make sense, because in doing so, the holder loses the option's time value.

62. To illustrate, consider the case where the call option with a strike price of $32.00 expires in April 2014, and the price of Microsoft is $32.01 in February 2014. The call option is "in the money" but only by one penny. Thus, if the option were exercised immediately, the owner would only gain one penny per share (buying stock for $32.00 that is worth $32.01). On the other hand, if the investor does not immediately exercise the option, the investor stands to gain much more than one penny per share if the stock goes up, but if the stock declines, the worst that

[58] Hao et al. at p 10.

can happen is the investor will have lost the opportunity to make one penny per share. In this case, the value of the option if left unexercised is likely to be considerably greater than the one penny it would be worth if exercised. This option is worth more alive than dead, and so it would not make sense to exercise.[59]

63. As a general matter, the value (and the market price) of a call option rises as the underlying stock price rises, and falls as the underlying stock price falls. Consequently, the holder of a call option benefits as the underlying stock rises, and is harmed as the underlying stock price falls. Conversely, the writer of a call option is harmed as the underlying stock price rises, and benefits as the underlying stock price falls.

2. Effect of Dividends on Stock and Call Option Prices and "Early Exercise"

64. When a stock pays a dividend, money leaves the firm and is distributed to shareholders. The money leaving the firm causes the amount of assets owned by the firm to decrease, and therefore causes the stock price to decline. At the moment the stock goes "ex-dividend," the value of the stock instantaneously declines, and this is immediately reflected in a lower stock price. The owner of the stock is not affected by this stock price drop, however, because the amount of the stock price decline should be offset by the amount of the dividend, and receiving the dividend compensates the investor for the stock price drop.[60]

65. When the dividend payment causes the underlying stock price to drop, it also causes the call option prices to drop. Holders of call options, however, do not receive a dividend, and are made worse off as a result of the dividend payment. The only way the call option holder can avoid being harmed by a dividend is by exercising the call option. However, as discussed above, exercising the call option prior to expiration may not be a good idea because this results in losing the option's time value.

66. As it turns out, the best thing the option buyer can do in this situation is to compare the amount of the dividend with the amount of time value left in the option. If the time value is larger than the dividend, it does not make sense to sacrifice the time value in order to get the

[59] If it so happens that the owner is no longer interested in owning the option, it need not be exercised for the investor to get out of the position; it can be resold at the current market price.

[60] The tax status of a dividend may also have implications for the ex-dividend day price drop. (See Avner Kalay, "The Ex-Dividend Day Behavior of Stock Prices: A Re-Examination of the Clientele Effect," Vol. 37, *The Journal of Finance*, pp. 1059-1070 (1982).)

dividend. On the other hand, if the dividend is larger than the option's time value, it is generally better to exercise the option and get the dividend.

67. The time value of a call option tends to be small when the time to expiration is shorter, and when the call option is "deeper" in the money (in other words, when the underlying stock price is much higher than the strike price). Also, the larger the dividend, the more likely it is to be larger than the option's time value. Thus, if the stock pays a relatively large dividend, if the call option is deep in the money, and if the time remaining until expiration is low, it will make sense to exercise the call option on the last day before the ex-dividend date.

68. From the point of view of the call option writer, a dividend that causes the call option price to decline is potentially a benefit, because the call option writer benefits when the value of the call option declines. If the dividend is large, the call option is deep in the money, and the time to expiration is short (the same conditions that make early exercise attractive for the holder), the option writer hopes that the option is not assigned. If the call option is not assigned before the ex-dividend date, the call option writer benefits from the decline in the call option price. If the call option is assigned before the ex-dividend date, the writer is forced out of the option position before the option price declines, and does not benefit from the decline.

3. Mechanics of the Options Clearinghouse, Including Exercise and Assignment

69. All trading in exchange-listed options must be done through registered broker dealers who are members of the OCC,[61] which is the clearinghouse for exchange-traded options in the United States. That is, both the buyer and the seller for each option trade negotiated on the exchange must either be a member of the OCC, trade through an account held by a member of the OCC, or trade through an account with a broker who has a contractual arrangement with a member of the OCC.

70. After the trade is executed on an option exchange, as part of the "clearing" process for the trade, the OCC steps in and becomes the counterparty to both the holder and the writer of the option (see Figure 1). In other words, after a trade between a buyer and seller is executed on the exchange, the buyer does not enter into an option contract with the seller; instead, the buyer

[61] For many years, this clearinghouse was known as the "Options Clearing Corporation," hence the acronym "OCC." In 2011, the name was officially changed to "OCC," reflecting the fact that it had expanded its business beyond just clearing options trades. (See Press Release, OCC, "OCC Revises Brand Identity," March 16, 2011, http://www.optionsclearing.com/about/press/releases/2011/03_16.jsp, accessed on October 18, 2013.)

becomes the holder of an option contract where the writer is the OCC, and the seller becomes the writer of an option contract where the holder is the OCC.[62] This results in the OCC having two positions simultaneously, one as an option holder and one as an option writer in the same contract. These positions are always fully offsetting, so that the net position held by the OCC in each option series is always zero.

Figure 1

71. Because of this process, known as "centralized clearing," there is no longer a connection between individual option holders and individual option writers. This means that if multiple parties have purchased positions and multiple parties have written positions in the same call option series (same underlying stock, same expiration date, and same strike price), in no way are particular option writers matched to particular option holders. Once the trade has cleared and the OCC has stepped in as the central counterparty, the original trade counterparties no longer have any connection or association with each other.

72. This fact has important implications for the exercise and assignment process. If the holder chooses to exercise, the exercise is against the OCC, not against the original counterparty. The rules and design of the OCC ensure that the OCC always maintains a net zero position in each option series (the OCC must always have the same number of contracts held as written). To maintain this zero balance, any time an option holder chooses to exercise, the OCC in turn must assign the same number of contracts among those who have written positions.

73. The OCC uses a randomized process to select which option writers are assigned.[63] Because there is no connection between individual option holders and individual option writers, the option writer who is assigned may not be the original trading counterparty when the

[62] The main purpose of this arrangement is for managing the risk that the writer of the option might default (for example, the risk that the writer of a call option might not have the resources to satisfy their obligation to sell the stock for the strike price if the call option is exercised).
[63] Hao et al. at p. 30, fn. 13.

exercising option holder bought their option. Figure 2 illustrates this through a simplified example, in which there are two buyers and two sellers. When one buyer chooses to exercise an option, the request goes to the clearing house and then the clearing house randomly decides what seller to assign the option to.

Figure 2

74. The assignment process is implemented once each business day, after the close of trading. Instructions from all option holders received since the previous day's assignment are processed as a batch. The process used by the OCC to assign exercises to writers is called the "standard algorithm."

B. Mechanics of the Dividend Spread Strategy

75. The dividend spread is a well-known strategy implemented by option market participants, especially by option market makers.[64] The strategy is implemented on in-the-money call options on dividend paying stocks, in particular using an option series[65] that has open interest prior to the ex-dividend date (meaning that there are existing purchased and written positions at the OCC).

76. As discussed above, when a stock goes ex-dividend, it causes a sudden decrease in the price of call options. If the call options are exercised and assigned prior to the ex-dividend date, the writers to whom the exercises are assigned are forced out of their positions and do not benefit from the price decline. However, it is known that a substantial portion of holders of in-the-money call options fail to exercise prior to the ex-dividend date, even in instances when they

[64] Option market makers are registered with FINRA as dealers and have a special role as liquidity providers on the option exchanges. When they engage in "market making" activity, they are expected to stand willing to take the opposite side of buy and sell orders that are sent to the exchange. In addition, option makers are free to engage in other types of trading not related to their responsibilities as a market maker.

[65] An option "series" refers to a unique combination of contract features for an option—options in the same series have the same underlying stock, expiration date, strike price, and option type (i.e. call option vs. put option).

would be demonstrably better off exercising. If some or all of the call options are not exercised, this decrease in the call price benefits the option writers who are not assigned.

77. The failure of option holders to exercise their deep in-the-money option prior to the ex-dividend date means there is a windfall benefit to option writers as a group. This can be considered as "money left on the table" that goes to those option writers fortunate enough to not be allocated an assignment by the OCC's random allocation process.

78. The purpose of the dividend spread strategy is to exploit the design of the OCC's random assignment process to force assignment on the previously existing option writers, thus leaving the traders implementing the strategy with written option positions that will capture the benefit of the price decline when the stock goes ex-dividend. The following sections explain the mechanics of the strategy in further detail.

1. Two traders establish offsetting purchased and written positions in a deep in-the-money call

79. The first step in the dividend spread strategy is for two traders to take positions in a call option series with the following characteristics: (1) the underlying stock pays a cash dividend; (2) the option series is a call option that is deep in the money, meaning that the strike price is lower than the current underlying stock price, (3) the time value[66] of the option is lower than the dividend; and (4) the option series has open interest when entering the last trading day before the ex-dividend date. I will refer to these traders as "Trader A" and "Trader B" and the option series they identify as the "Series."

80. A particular option series is a better candidate for a profitable dividend spread trade if the dividend payment is larger, the time value is lower, and open interest on the day prior to the ex-dividend date is larger.

81. On the trading day prior to the ex-dividend date, Trader A buys a large number of call contracts in the Series from Trader B, and simultaneously Trader B buys the same number of contracts in the same Series from Trader A. Each of the two traders then has exactly offsetting purchased and written positions in the same option.

82. The trade execution price does not matter, as long as both trades are executed at the same price. No money changes hands when the traders enter these positions because the entry cost of

[66] The time value can be measured as the quoted option premium minus the difference between the current stock price and the option's strike price.

the two positions exactly offset each other (the premium paid by Trader A to Trader B for the first trade is exactly offset by the premium paid by Trader B to Trader A for the second trade).

83. The strategy is more likely to be successful if the size of the two offsetting trades is large relative to the total existing open interest in the Series. As demonstrated by Hao et al., the traders may find it best to implement the strategy using a trade several times larger than the existing open interest.[67]

84. The two traders are not exposed to any risk from movements in the market price of the stock or the options. Any change in the value of the options does not affect the traders because their two positions are exactly offsetting—any losses on one position would be exactly offset by gains on the offsetting position.

2. Both traders exercise their purchased options, and the OCC assigns the exercises

85. The second step in implementing the strategy is for the two traders to exercise the options. On the same day as the initial trade (the last trading day prior to the stock's ex-dividend date), Trader A and Trader B send instructions to exercise their entire purchased position.

86. At the end of the day, the OCC processes all of the day's exercises as a batch, including the exercises by Trader A and Trader B, along with exercises by all other holders of the Series who choose to exercise on that day.

87. It is important to understand that at the time the OCC implements its allocation algorithm, the traders implementing the dividend spread strategy each have simultaneous purchased and written positions in the system. When the OCC assigns the exercises, it randomly assigns the exercises to all written option positions, including the traders' own written positions. Based on the outcome of the random algorithm, some portion of the exercises will be assigned to the traders' own positions, and some portion will almost certainly be assigned to other option writers.

[67] Hao et al. at pp. 31-32.

3. The gains from the dividend spread strategy are greater if the traders execute a larger trade

88. As a result of the dividend spread trades, some of the benefits resulting from the option holders leaving money "on the table" that otherwise would have accrued to the existing option writers are diverted to, or "captured" by, the traders implementing the strategy.

89. The greater the number of contracts purchased and exercised by the dividend spread traders relative to the previously outstanding open interest, the greater (on average) will be the portion of the previous open interest that will be assigned.

90. To illustrate this point, suppose that the existing open interest was 100 contracts going into the final trading day prior to the stock's ex-dividend date, and for simplicity assume that none of the existing holders exercise their options as they should. Then it is the case that:

a. If the dividend spread traders write and buy 100 call option contracts and exercise the purchased calls, the OCC would have to assign 100 exercises across 200 written contracts,[68] so on average, a random allocation would assign 50 contracts to the previously existing writers and 50 contracts to the dividend spread traders. On average, the dividend spread traders would extract one half of the windfall gain resulting from the option holders not exercising.

b. If the dividend spread traders implement the strategy using 900 contracts, the OCC would have to assign 900 exercises across 1,000 written contracts. Because the dividend spread traders have 90% of the written positions, a random allocation would on average assign 810 contracts (90% of 900) to the dividend spread traders and 90 contracts (10% of 900) to the previously existing writers. This would leave the previous writers with 10 written contracts and the dividend spread traders with 90 written contracts, and the dividend spread traders would extract 90% of the gain.

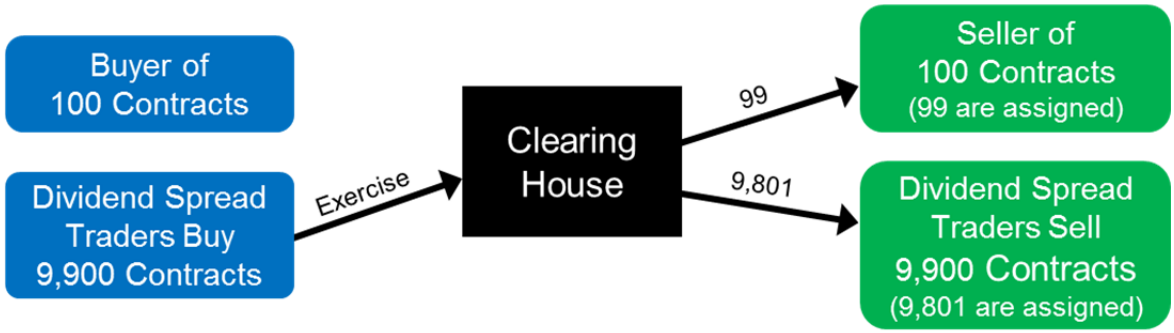
c. If the dividend spread traders implement the strategy using 9,900 contracts, the OCC would assign 9,900 exercises across 10,000 written contracts. On average, 99 contracts (1% of 9,900) would be assigned to the previous writers, who would be left with 1 written contract. On average 9,801 contracts (99% of 9,900) would

[68] The 200 written contracts include the original 100 contracts plus the new 100 contracts written by the traders doing the dividend spread trades.

be assigned to the traders, leaving them with 99 written contracts. The dividend spread traders would extract 99% of the gain.

91. Figure 3 provides a simplified illustration. In the absence of the dividend spread traders, the party who had previously written the call options stood to benefit from the buyer failing to exercise the calls. As a result of the dividend spread traders, however, the clearing house is flooded with 9,900 exercises, which are assigned to the option writers (including the dividend spread traders themselves). On average, the OCC's allocation process would be expected to assign 99 contracts (1% of 9,900) to the previous sellers, leaving them with only one contract.

Figure 3



C. Characteristics of Dividend Spread Strategies

92. The dividend spread strategy has certain characteristics that, if considered in isolation, bear some resemblance to characteristics of market manipulation strategies. However, as discussed in Section D below, the SEC staff does not view the dividend spread strategy as market manipulation because the trades are designed to be profitable without any element of fraud or deception. Because the strategy has a legitimate economic purpose, the SEC staff does not consider the strategy to be illegal or manipulative. In the remainder of this section, I discuss some of the characteristics of the dividend spread strategy that in other circumstances might be viewed as elements of a manipulative trade, but which in the absence of deception or manipulative intent are not a concern to the SEC staff.

93. First, unlike most spread strategies, which involve taking offsetting positions in two correlated but different instruments, the dividend spread strategy involves a trader simultaneously (or nearly simultaneously) taking long and short positions in the same security. In the sense that there was no change in beneficial ownership, the trades are virtually

indistinguishable from wash trades. Moreover, in order to establish these offsetting positions, the party implementing the strategy coordinates with another party to execute two offsetting trades. Thus, the dividend strategy involves executing pre-arranged trades between two parties, and in this respect, resembles matched trading. In other contexts, wash trading and matched trading may be viewed as manipulative.

94. Second, the dividend spread strategy is profitable because it exploits a weakness or vulnerability inherent in the design of the clearing system. In this respect, it has some resemblance to a strategy known as "spoofing" that some regulators might characterize as deceptive or manipulative. Spoofing is a trading strategy that seeks to take advantage of design features of certain trading systems where market makers are obligated to provide liquidity at a price matching the quoted spread.[69] Like the spoofing strategy, the dividend spread strategy diverts and captures benefits that otherwise would have accrued to other market participants. However, the dividend spread strategy captures profits without deceiving or inducing any other participant to trade. Diverting benefits from other market participants is not fraudulent or deceptive if no participants are deceived.

95. Third, the profits earned by the dividend spread trades are not derived by locking in trading profits from the trades themselves, as is often the case in arbitrage strategies. Rather, the benefits are obtained indirectly, by diverting benefits away from other market participants. This occurs by specifically forcing assignments on other market participants and stepping ahead of other participants in line to capture the benefit of the dividend. Some manipulative strategies involving wash sales also derive gains indirectly, for example, by deceiving other market participants as to the true value of the security, inducing them to trade, and then executing other profitable trades with market participants who have been deceived. In such cases, what makes the trades manipulative is not that the profits were earned indirectly, but rather that the profits were achieved through deception.

96. Fourth, the dividend spread strategy may involve trading volume sufficiently large that it has a substantial impact on total trading volume. As illustrated in Exhibit 1 for utility PPL Corporation, dividend spread trading could increase trading volume by a factor of ten or more.

[69] The spoofing strategy exploits this design feature by submitting a smaller limit order on one side of the market to set the quote, then submitting a larger order on the other side of the market, which is then filled by market makers who are obligated to match the quote. To the extent that the spoofing strategy is only profitable because the trader submitted an order that deceived other market participants and induced them to trade at artificial prices, the spoofing strategy could be characterized as manipulative. (See http://www.sec.gov/news/press/2001-129.txt, accessed on October 30, 2013.)

Conceivably, this increase in trading volume could be large enough so that other market participants might be "deceived" in the sense that they could draw incorrect inferences about liquidity, or even make trading decisions based on misperceptions of liquidity. However, the SEC staff still does not view the strategy as illegal. Even though a side effect of the strategy might be that others are deceived, the motivation of the strategy was not to deceive, and the success of the strategy does not depend on deception.

97. Fifth, the dividend spread strategy involves little or no market risk. If implemented and executed properly, the strategy should have no risk exposure to movements in the underlying stock price.[70] Wash sales, when used as part of a market manipulation, also have the characteristic that they have little or no market risk. But this is also a characteristic of many legal spread strategies, such as those described above. Absence of market risk does not make a trading strategy deceptive or manipulative.

D. The SEC Staff Does Not View Dividend Spread Strategies as Illegal or Manipulative

98. The dividend spread strategy has been known to SEC staff since at least 2003, when the Pacific Exchange submitted a rule change proposal that modified their fee structure to place a cap on transaction fees associated with certain types of option strategies, including dividend spreads.[71] Similar rule proposals were submitted to the Commission by the Philadelphia Stock exchange in 2003, the American Stock Exchange in 2004, and the Chicago Board Options Exchange in 2004.[72] These proposals, which facilitated dividend spread trading and other similar strategies by limiting the fees for such trading, became effective shortly after they were filed. The SEC could have taken action to prevent these fee caps from going into effect had it determined that the dividend play and similar strategies were harmful to investors, but it did not do so.

99. In 2004, when I was employed at the Commission, I studied various aspects of the dividend spread strategy, along with Dr. Avner Kalay, who was then working as a consultant for

[70] There is risk in the strategy, however, in the sense that the strategy may or may not be profitable. For example, there is uncertainty as to how much, if any, of the existing open interest will remain unexercised (how much money is left on the table), and how much of the exercised open interest will be assigned back to the traders by the OCC's random allocation algorithm.

[71] Securities and Exchange Commission, Release No. 34-48363, File No. SR-PCX-2003-39, August 19, 2003.

[72] Securities and Exchange Commission, Release No. 34-48459, File No. SR-Phlx-2003-61, September 8, 2003; Release No. 34-49358, File No. SR-Amex-2004-09, March 3, 2004; Release No. 34-50175, File No. SR-CBOE-2004-38, August 10, 2004.

the SEC. Later, while I was still working at the SEC, I co-authored a research article with Dr. Kalay and Jia Hao, which explained the mechanics of dividend spread strategy, and demonstrated that the fee caps adopted by the exchanges led to an increase in the amount of dividend spread trading. This article was subsequently published in The Review of Financial Studies.[73]

100. Another group of researchers, including Veronika Krepely Pool, Hans R. Stoll, and Robert E. Whaley, authored another study of the dividend spread strategy. Their study was published in the Journal of Financial Markets in 2008.[74]

101. Despite the SEC being aware of the strategy for the past ten years, dividend spread trading has continued in option markets through the present time.[75] Exhibit 2 shows a graph of the daily trading volume on Altria call options over a four-week period surrounding the ex-dividend date in March 2013. This is a company that pays a relatively large dividend and is often the target of significant dividend spread activity. As the graph shows, trading volume over this period ranged from less than 3,000 contracts to about 45,000 contracts per day, but jumped to approximately 630,000 contracts on March 12, 2013, the day immediately prior to Altria's ex-dividend date. In all important respects, this graph is essentially identical to Figure 1 of the article I co-authored with Jia Hao and Avner Kalay, which shows the same graph surrounding Altria's ex-dividend date on March 11, 2004.[76]

VII. Dr. Chen's UTC Trades are Not Analogous to the Amanat Case

102. In both the current case and the Oceanside case, the FERC has made the analogy that the UTC trading is similar to trading that occurred in the SEC administrative action in the Amanat Case[77] where, upon appeal to the Commission, the Administrative Law Judge's decision was

[73] Hao et al. at pp. 1-33.
[74] Veronika Krepely Pool, Hans R. Stoll, and Robert E. Whaley, "Failure to exercise call options: An anomaly and a trading game," Vol. 11, Journal of Financial Markets, pp. 1-35 (2008).
[75] Recently, in May of 2013, the OCC moved to adopt a policy to restrict the exercise of options for market makers to the amount of options the market maker is net long. Note that neither the SEC or FINRA has attempted to prosecute traders for undertaking the strategy, but rather, the OCC has proposed adopting a policy to deter the strategy. In contrast, the FERC has opted to penalize traders for undertaking the UTC trading strategy to earn MLSA's prior to the FERC's adoption of the rules which no longer provided MLSA's to UTC traders. (See Press Release, OCC, "OCC to Adopt a Policy to Restrict Exercises to Net Long Positions," May 23, 2013, http://www.optionsclearing.com/about/press/releases/2013/05_23.jsp, accessed on October 18, 2013.)
[76] Hao et al. at p. 3.
[77] Amanat Opinion 2.

reversed and the trader was found to have violated SEC manipulation rules.[78] As I will describe below, the trading that occurred in the Amanat Case was different in fundamental ways from the UTC electricity trading the occurred for both Dr. Chen's trading and Oceanside trading.

103. Mr. Amanat, whose family was majority owner of Tradescape, the parent company of MarketXT and Momentum Securities, allegedly conducted wash trades in two Momentum Securities accounts by crossing internal trades on MarketXT's electronic trading platform without exposing the orders to the market.[79] Mr. Amanat's trading involved de minimis risk. The SEC's Enforcement Division argued that Mr. Amanat was motivated by the prospect of increasing the trading volume on MarketXT to exceed the threshold volume necessary to qualify for market data rebates from Nasdaq. Allegedly, Mr. Amanat, through his wash trading, deceived Nasdaq about whether MarketXT was qualified for the rebates, and deceived the market regarding the amount of data revenue Nasdaq qualified for.

104. In contrast, Dr. Chen's trades were not wash trades. The FERC has not articulated a coherent theory as to how Dr. Chen's strategy deceived anyone. Dr. Chen was qualified to receive the MLSA payments without deceiving anyone, and Dr. Chen's strategy involved risk. These key differences between the Amanat Case and the current case are discussed in greater detail below.

A. Dr. Chen's Trades Were Not Wash Trades

105. Dr. Chen's trades were not wash trades, whereas the SEC's case against Mr. Amanat involved trading that included a large number of wash trades. As discussed above, in securities markets, a wash trade is a trade which involves no change in beneficial ownership, which is achieved by the same entity acting as the buyer and seller on the same trade. I understand that the trading directed by Mr. Amanat involved the synchronized submission of buy and sell orders for the same security, which crossed with one another to execute trades.

106. Conversely, Dr. Chen's trades did not involve wash trades. Rather, as explained previously, Dr. Chen followed a spread strategy that involved entering bids on two different

[78] The case history of SEC enforcement matters is relevant to the FERC because the FERC adopted a similarly worded anti-fraud provision to the SEC's Rule 10b-5. Furthermore, the FERC Staff references the case law pertaining to the SEC's Rule. (See FERC Staff Preliminary Findings at p. 20.)

[79] Mr. Amanat was the chief technology officer of MarketXT, an electronic communications network ("ECN"), registered broker-dealer, and NASD member. The two accounts used for trading existed at Momentum Securities. Mr. Amanat's family owned fifty-three percent of Tradescape Corporation, which is the parent company of MarketXT and Momentum Securities. (Amanat Opinion 2 at pp. 1, 3, 5.)

contracts, one related to the congestion from Point A to Point B, and the other related to the congestion from Point B to Point A.[80] Dr. Chen was not acting as a buyer and seller for both sides of the same contract; rather, he was taking positions in separate contracts with opposite and offsetting risk exposure.

107. My conclusion that Dr. Chen's trades were not wash trades is based on my current understanding of the structure of the UTC market and is not intended to be a legal opinion. Even if it were to be determined that Dr. Chen's strategy should be considered a wash trade, this does not mean the trades would be considered illegal under Federal securities laws. It is my understanding that wash trading may or may not be viewed as a violation of securities laws, depending on whether the trade has an economic purpose,[81] whether the intent was to deceive or manipulate,[82] and potentially other factors.

108. Dr. Chen's trades had a clear economic purpose. Moreover, the strategy did not require deception in order to be successful, and I have seen no evidence presented suggesting that his strategy was intended to deceive.

B. The SEC Enforcement Division's Allegations Specified How Mr. Amanat's Strategy was Deceptive

109. The language of Section 10(b) prohibits the use of manipulative devices in connection with the purchase or sale of securities.[83] Establishing that the trading activities were intended to deceive is a critical element of establishing liability under Section 10(b).[84]

110. In the Amanat Case, the Division articulated a theory that Mr. Amanat's strategy was designed to deceive Nasdaq as to whether MarketXT qualified for their rebate program. The Division also articulated a theory that Mr. Amanat's strategy may have deceived the UTP (the entity that collects and distributes market data revenue) regarding the amount of data revenue to which Nasdaq was entitled.

---

[80] Dr. Chen also conducted trades between three locations, which also have no relation to wash trades.

[81] The decision in the NASD enforcement action against Peter Kellogg confirmed that wash trades are not prohibited if the trades have an economic purpose. (NASD Office of Hearing Officers, Disciplinary Proceeding No. CMS030257, Hearing Panel Decision (Kellogg), August 6, 2004, pp. 2, 14-15.)

[82] The decision in Rockies Fund v. SEC found that the defendants engaged in wash sales and matched orders but found that "neither of these devices alone constitutes a security violation" and stated that allegations of violations under Section 10(b) require a showing of intent and materiality. (Rockies Fund, Inc., et al. v. SEC, 428 F.3d 1088 (U.S. App. D.C.), November 15, 2005.)

[83] Securities Exchange Act of 1934, §10(b), (as amended 2012).

[84] *Id.*

111. Based on my review of the FERC's allegations and preliminary findings in this case, my understanding is that the FERC has not offered any explanation as to how Dr. Chen's strategy was deceptive, or who was deceived. As far as I can ascertain, the FERC's theory appears to be that any trading strategy that is designed to capture MLSA payments without having another economic purpose is inherently fraudulent.[85]

C. Mr. Amanat Would Not Have Qualified to Receive Rebates Absent The Alleged Deception

112. Unlike Mr. Amanat's trades conducted for the purpose of attempting to qualify for a rebate, Dr. Chen already qualified for the MLSA payments, which were paid automatically. Mr. Amanat's trades were not profitable unless and until MarketXT was able to qualify for a rebate, which it appears they were unable to do without executing wash trades.

113. It is my understanding that Nasdaq did not permit market centers to meet the volume threshold for participation in the rebate program by executing wash trades and would not have considered MarketXT to be qualified had they known of the wash trades. Dr. Chen's trades already qualified for the MLSA payments as specifically stated by the FERC. As specified by the Black Oak decision,[86] the FERC unambiguously stated that UTC transactions conducted by virtual traders would be eligible for MLSA rebates and would be "..distributed pro-rata to each Network Service User and Transmission Customer in proportion to … the total MWh of cleared Up-To Congestion transactions (that paid for transmission service during such hour)."[87]

114. In the context of the same Black Oak decision, the FERC also stated that they expected that market participants would have, "an incentive for arbitrageurs to engage in purchase decisions, not because of price divergence, but simply to increase marginal line loss payments."[88] In other words, the FERC staff recognized that the MLSA allocation would impact the decisions of market participants, in addition to market price signals, but did not prohibit this practice.

115. Dr. Chen was a UTC virtual trader paying the necessary transmission costs associated with scheduling his trades. Based on the public nature of the Black Oak decision to allocate

[85] FERC Staff Preliminary Findings at p. 21.
[86] Black Oak Energy, L.L.C., et al. v. PJM Interconnection, L.L.C., Docket No. EL08-14-001, 126 FERC ¶ 61,164, February 24, 2009; Black Oak Energy, L.L.C., et al. v. PJM Interconnection, L.L.C., Docket Nos. EL08-14-003, EL08-14-004, EL08-14-005, 131 FERC ¶ 61,024, April 15, 2010.
[87] Black Oak Energy, L.L.C., et al. v. PJM Interconnection, L.L.C., Docket No. EL08-14-002, 128 FERC ¶ 61,262, September 17, 2009, p. 9.
[88] Black Oak Energy, L.L.C., et al. v. PJM Interconnection, L.L.C., Docket No. EL08-14-001, 125 FERC ¶ 61,042, October 16, 2008, p. 15.

MLSA payments to UTC traders, it would have been clearly understood by other market participants that Dr. Chen qualified for MLSA rebates under the existing rules. In no way was Dr. Chen attempting to qualify for rebates he was not entitled to based on the market rules at the time of his trading.

D. Dr. Chen's Trades Involved Risk

116. Because Mr. Amanat's trades were wash sales, executed by submitting simultaneous paired orders that crossed internally, the trades exposed him to little or no risk. Conversely, Dr. Chen's trades were risky in three main ways.

117. First, one of the two UTC scheduled legs may not clear, in which case the remaining leg would be priced and settled at market prices without the full or partial offset effect of the rejected UTC leg.

118. Second, the use of three locations in the trading strategy (simultaneous UTC transactions from Point A1 to Point B and Point B to Point A2, where the prices at Point A1 and A2 were highly correlated) subjected Dr. Chen to the risk that the realized correlation between Point A1 and A2 may not be as high as expected, in which case the trades would not fully offset one another.

119. Third, the amount of MLSA payments were not known to Dr. Chen at the time he scheduled the UTC transactions, and he bore the risk that the MLSA payments would not exceed the UTC transmission costs paid to PJM and/or the loss on the UTC net settlement amounts.

VIII. Conclusion

120. Dr. Chen implemented a simple spread trading strategy that is typical of a broad range of legitimate trading strategies in stock, commodity, and derivative security markets. A closely analogous strategy to Dr. Chen's trading is the dividend spread strategy in the securities markets. The dividend spread strategy (1) involves taking offsetting positions in the same security, (2) exploits a weakness in the market design, (3) earns profits indirectly by diverting benefits away from other market participants, (4) requires a large volume of trading, and (5) involves little risk. The SEC does not view the dividend spread strategy as market manipulation because there is not an element of fraud or deception.

121. Based on the materials I have reviewed, it is my opinion that the FERC has not articulated a coherent theory as to how Dr. Chen's spread trading deceived anyone. The FERC's theory appears to be that any trading designed to capture MLSA payments without another economic purpose is inherently fraudulent, even if the activity is transparent and not deceptive. Such a theory is not consistent with the regulatory treatment of existing, legitimate, market strategies. If the FERC believes strategies designed solely to capture MLSA payments raise concerns about fairness or market efficiency, the appropriate way to address such concerns would be through regulation of the market structure, not through retroactive enforcement against market participants who at the time had no reason to believe their strategy was abusive.

Executed this 6th of November, 2013

Stewart Mayhew

STEWART MAYHEW
Principal

Cornerstone Research
1919 Pennsylvania Avenue, N.W. Suite 600 • Washington, D.C. 20006
202.912.8960 • fax 202.912.8999
smayhew@cornerstone.com

ACADEMIC BACKGROUND

1996	**University of California, Berkeley** **Walter A. Haas School of Business** *Ph.D., Finance*	Berkeley, California
	Brigham Young University	Provo, Utah
1992	*M.S., Applied Economics*	
1991	*B.S., Economics*	

PROFESSIONAL EXPERIENCE

Cornerstone Research, Inc. — Washington, D.C.

2012-Present *Principal*

2010-2012 *Senior Economist*

Provides economic and financial consulting services and analysis in connection with litigation and regulatory investigations. Specializes in complex litigation involving financial institutions, securities, mutual funds, stock exchanges, investment advisors, broker dealers, derivative securities, and structured products. Experience includes cases involving allegations of securities fraud, market manipulation, violations of fiduciary obligations, and broker-dealer suitability standards. Experience with directing complex cases involving multiple experts.

University of Maryland, Robert H. Smith School of Business — College Park, MD

2012-Present *Adjunct Faculty*

Taught Masters-level course in derivative securities.

U.S. Securities and Exchange Commission — Washington, D.C.

2008-2010 *Deputy Chief Economist (Senior Officer)*

2004-2008 *Assistant Chief Economist*

2002-2004 *Visiting Academic Scholar*

Supervised teams of PhD financial economists. Provided economic analysis and support for SEC Divisions of Trading and Markets, Investment Management, Corporation Finance, and Enforcement, and the Office of Compliance Inspections and Examinations. Worked on examinations and enforcement matters related to market manipulation, insider trading, derivative security valuation, mutual fund market timing/late trading, option backdating, churning, front-running, best execution, and other areas. Worked on rulemaking projects in areas including market structure, short selling, option trading,

regulation of broker dealers, clearing and settlement, securities lending, credit rating agencies, investment advisors, hedge funds, mutual funds, exchange-traded funds, asset-backed securities, municipal bonds, option expensing, and proxy voting.

University of Georgia, Terry College of Business Athens, GA

2000-2004 *Assistant Professor*

Taught courses in Mathematical Finance (PhD), Advanced Speculative Markets (MBA), Financial Engineering (MBA), Derivative Securities (undergraduate), Investments (undergraduate)

Purdue University, Krannert School of Management West Lafayette, IN

1996-1999 *Assistant Professor*

Taught Investments Seminar (PhD), Options and Futures (MBA), Investment Management (undergraduate). Helped organize interdisciplinary program in computational finance.

Berkeley Options Database Berkeley, CA

1993-1996 *Database Manager*

Financial Engineering Associates Berkeley, CA

1995-1996 *Financial Engineer*

Consultant for financial engineering problems and valuation of fixed-income derivatives.

PUBLICATIONS

Ex-dividend Arbitrage in Option Markets, **Review of Financial Studies**, v23 n1 (January 2010): 271-303. (with J. Hao and A. Kalay)

Microstructural Biases in Empirical Tests of Option Pricing Models, **Review of Derivatives Research**, v12 n3 (October 2009): 169-191. (with P.Dennis)

Option Strategies, in "Financial Derivatives: Pricing and Risk Management," Robert Kolb and James Overdahl, eds. Wiley-Blackwell Publishers, 2009.

Stock Returns, Implied Volatility Innovations, and the Asymmetric Volatility Phenomenon **Journal of Financial and Quantitative Analysis**, v41 n2 (June 2006): 381-406. (with P. Dennis and C. Stivers)

Informed Trading in Stock and Option Markets, **Journal of Finance**, v59 n3 (June 2004): 1235-1259. (with S. Chakravarty and H. Gulen)

How Do Exchanges Select Stocks for Option Listing? **Journal of Finance**, v59 n1 (February 2004): 447-471. (with V. Mihov)

Stock Return Dynamics, Option Volume, and the Information Content of Implied Volatility **Journal of Futures Markets**, v23 n7 (July 2003): 615-646. (with C. Stivers)

Risk-Neutral Skewness: Evidence from Stock Options **Journal of Financial and Quantitative Analysis** v37 n3 (September 2002): 471-493. (with P. Dennis)

PUBLICATIONS (continued)

Competition, Market Structure and Bid-Ask Spreads in Stock Option Markets, **Journal of Finance** v57 n2 (April 2002): 931-958. [Reprinted in *Financial Markets*, Jeff Madura, editor, SAGE Library in Business and Mangagement, Sage publications, 2004.]

The Dynamics of International Stock Index Returns, **Research in Banking and Finance** v1 (2000): 219-230. (with H. Gulen)

Stock Index Futures Trading and Volatility in International Equity Markets. **Journal of Futures Markets** v20 n7 (August 2000): 661-685. (with Huseyin Gulen)

The Allocation of Informed Trading Across Related Markets: An Analysis of the Impact of Changes in Equity-Option Margin Requirements **Journal of Finance** v50 n5 (December 1995): 1635-1653. (with A. Sarin and K. Shastri)

Implied Volatility, **Financial Analysts Journal**, v51 n4, (July/Aug 1995): 8-20.

The Political Economy of Early Federal Reclamation in the West, in "The Political Economy of the American West," Anderson and Hill, eds., Rowman and Littlefield, 1994. (with B. D. Gardner)

WORKING PAPERS

The Information Content of NYSE Equity Prices and Closing Imbalances
(with D. T. McCormick and C. Spatt)

Equity Trading and the Allocation of Market Data Revenue (with C. Caglio)

Short Sale Constraints, Overvaluation, and the Introduction of Options (with V. Mihov)

Market Fragmentation Metrics (with L. Harris)

PRESENTATIONS

"Market microstructure: An overview"
U.S. Senate Committee on Banking, Housing, and Urban Affairs Staff, 2010

"Economics of central clearing and exchange trading of security-based swaps"
SEC Division of Trading and Markets training seminar, 2010

"Black Scholes option pricing" and "Valuation of retail structured products"
SEC Enforcement Division, Structured and New Product Unit training seminar, 2010

"Regulation and risk management of new products," "Index linked notes," and 3 other presentations
APEC Financial Regulators Training Initiative, Shanghai, 2010

"Economics of securitization and the 2008 financial crisis"
SEC Graduate program, 2010

PRESENTATIONS (continued)

"Market Microstructure for Emerging Markets" and "Market Manipulation"
SEC International Institute for Securities Market Development, 2008
"Securities market regulation in a world of derivative securities"
SEC International Enforcement Institute, 2006
"Conflicts of interest for market intermediaries"
Council of Securities Regulators of the Americas (COSRA), 2006
SEC International Institute for Securities Market Development, 2006
"Market surveillance: theory, design, and execution," "Market Manipulation," and other presentations
SEC Market Oversight/Enforcement training program, Quito, 2006
SEC Market Oversight/Enforcement training program, Mumbai, 2005

Research papers presented on program at 25 conferences between 1996 and 2010 including:

- American Finance Association (4 papers)
- Western Finance Association (3 papers)
- European Finance Association (3 papers)
- Financial Management Association (3 papers)
- NBER Microstructure Conference
- Vanderbilt Financial Markets Conference
- Cornell/Queens Conference on Derivative Securities
- Q Group Conference
- Chicago Board of Trade Research Symposium

Research presented at 47 seminars at universities and other research organizations

Documents Relied Upon

Title	Date
Prior Filings In the Matter of Dr. Houlian Chen	
Preliminary Findings of Enforcement Staff's Investigation of Up To Congestion Transactions by Dr. Houlian Chen on Behalf of Himself and the Principals of Huntrise Energy Fund LLC and Powhatan Energy Fund, LLC, Docket No. IN10-5-000	8/9/13
Written Submission to Commission Investigation Staff on Behalf of Dr. Houlian Chen, Docket No. IN10-5-000	12/13/10
Written Submission to Commission Investigation Staff on Behalf Of Powhatan Energy Fund LLC, Docket No. IN10-5-000	10/21/11
PJM	
Re: PJM Interconnection, L.L.C., Docket No. ER10- -000	8/18/10
In re PJM Up-To Congestion Transactions, Order Approving Stipulation and Consent Agreement, Docket No. IN10-5-00	2/1/13
Prior Cases	
Black Oak Energy, L.L.C., et al. v. PJM Interconnection, L.L.C., Docket No. EL08-14-001, 125 FERC ¶ 61,042	10/16/08
Black Oak Energy, L.L.C., et al. v. PJM Interconnection, L.L.C., Docket No. EL08-14-002, 128 FERC ¶ 61,262	9/17/09
Black Oak Energy, L.L.C., et al. v. PJM Interconnection, L.L.C., Docket No. EL08-14-001, 126 FERC ¶ 61,164	2/24/09
Black Oak Energy, L.L.C., et al. v. PJM Interconnection, L.L.C., Docket Nos. EL08-14-003, EL08-14-004, EL08-14-005, 131 FERC ¶ 61,024	4/15/10
Complaint, SEC vs. Lion Gate Capital, Inc., and Kenneth Rickel, No. CV 08-06574 (C.D. Cal.)	10/7/08
Complaint, SEC vs. Todd M. Ficeto et al., No. CV 11-1637 (C.D. Cal.)	2/24/11

Documents Relied Upon

Title	Date
Sharon M. Graham and Stephen C. Voss v. SEC, 222 F.3d 994 (U.S. App. D.C.)	8/18/00
In the Matter of MarketXT, Inc., and Irfan Mohammed Amanat, Securities and Exchange Commission, Initial Decision	12/22/05
In the Matter of Irfan Mohammed Amanat, Admin. Proc. File No. 3-11813, Securities and Exchange Commission, Opinion of the Commission	11/3/07
In the Matter of Jeffrey A. Wolfson, Robert A. Wolfson, and Golden Anchor Trading II, LLC (n/k/a Barabino Trading, LLC), SEC Order Instituting Administrative and Cease-and-Desist Proceedings	1/31/12
NASD Office of Hearing Officers, Disciplinary Proceeding No. CMS030257, Hearing Panel Decision (Kellogg)	8/6/04
Rockies Fund, Inc., et al. v. SEC, 428 F.3d 1088 (U.S. App. D.C.)	11/15/05
Academic Literature	
Avner Kalay, "The Ex-Dividend Day Behavior of Stock Prices: A Re-Examination of the Clientele Effect," Vol. 37, *The Journal of Finance* , pp. 1059-1070	1982
Y. Peter Chung, "A Transactions Data Test of Stock Index Futures Market Efficiency and Index Arbitrage Profitability", Vol. 46, *The Journal of Finance* , pp. 1791-1809	1991
Robert L. Johnson, et. al, "The Soybean Complex Spread: An Examination of Market Efficiency from the Viewpoint of a Production Process," Vol. 11, *The Journal of Futures Markets* , pp. 25-37	1991
Praveen Kumar and Duane J. Seppi, "Information and Index Arbitrage," Vol. 67, *The Journal of Business* , pp. 481-509	1994
M. Ameziane Lasfer, "Ex-Day Behavior: Tax or Short-Term Trading Effects," Vol. 50, *The Journal of Finance* , pp. 875-897	1995
C.L. Dunis, Jason Laws, and Ben Evans, "Trading futures spreads: an application of correlation and threshold filters," Vol. 16, *Applied Financial Economics* , pp. 903-914	2006

Documents Relied Upon

Title	Date
Frank J. Fabozzi, Roland Füss, and Dieter G. Kaiser, “A Primer on Commodity Investing,” *The Handbook of Commodity Investing* , Editors Frank J. Fabozzi, Roland Füss, and Dieter G. Kaiser, John Wiley & Sons,	2008
Veronika Krepely Pool, Hans R. Stoll, and Robert E. Whaley, “Failure to exercise call options: An anomaly and a trading game,” Vol. 11, *Journal of Financial Markets* , pp. 1-35	2008
Jia Hao, Avner Kalay, and Stewart Mayhew, “Ex-dividend Arbitrage in Option Markets,” Vol. 23, *The Review of Financial Studies,* pp. 271-303	2010
Financial Derivatives: Pricing and Risk Management , Editors Robert W. Kolb and James A. Overdahl, John Wiley & Sons	2010

Other Documents

The Options Clearing Corporation, Prospectus, Put and Call Options, https://olui2.fs.ml.com/Publish/Content/application/pdf/GWMOL/Merrill_Lynch_Direct_Options_and_Clearing_Corporation_Prospectus.pdf	4/12/02
Tennille Tracy, “Playing Options? Get Versed First – Complex Call Trade Pits Sophisticated Investors Against Individuals,” *The Wall Street Journal* , http://online.wsj.com/news/articles/SB125512865105076953	10/12/09
Scott Patterson, “Fast Traders’ New Edge,” *The Wall Street Journal* , http://online.wsj.com/news/articles/SB10001424052748703340904575285002267286386	6/4/10
Milena Yordanova-Kline, "PJM Files Tariff Changes at FERC Aimed at Blocking Marginal Loss Gaming," *Platts Global Power Report* .	8/26/10

Documents Relied Upon

Title	Date
Press Release, OCC, "OCC Revises Brand Identity," http://www.optionsclearing.com/about/press/releases/2011/03_16.jsp	3/16/11
Press Release, OCC, "OCC to Adopt a Policy to Restrict Exercises to Net Long Positions," http://www.optionsclearing.com/about/press/releases/2013/05_23.jsp	5/23/13
FINRA Rule 5210.01	2/15/10
FINRA Proposed Rule FINRA 5210.02	8/15/13

Websites

http://www.pjm.com/markets-and-operations/energy/day-ahead.aspx

http://www.pjm.com/markets-and-operations/energy/real-time.aspx

http://www.sec.gov/answers/dividen.htm

http://www.sec.gov/news/press/2001-129.txt

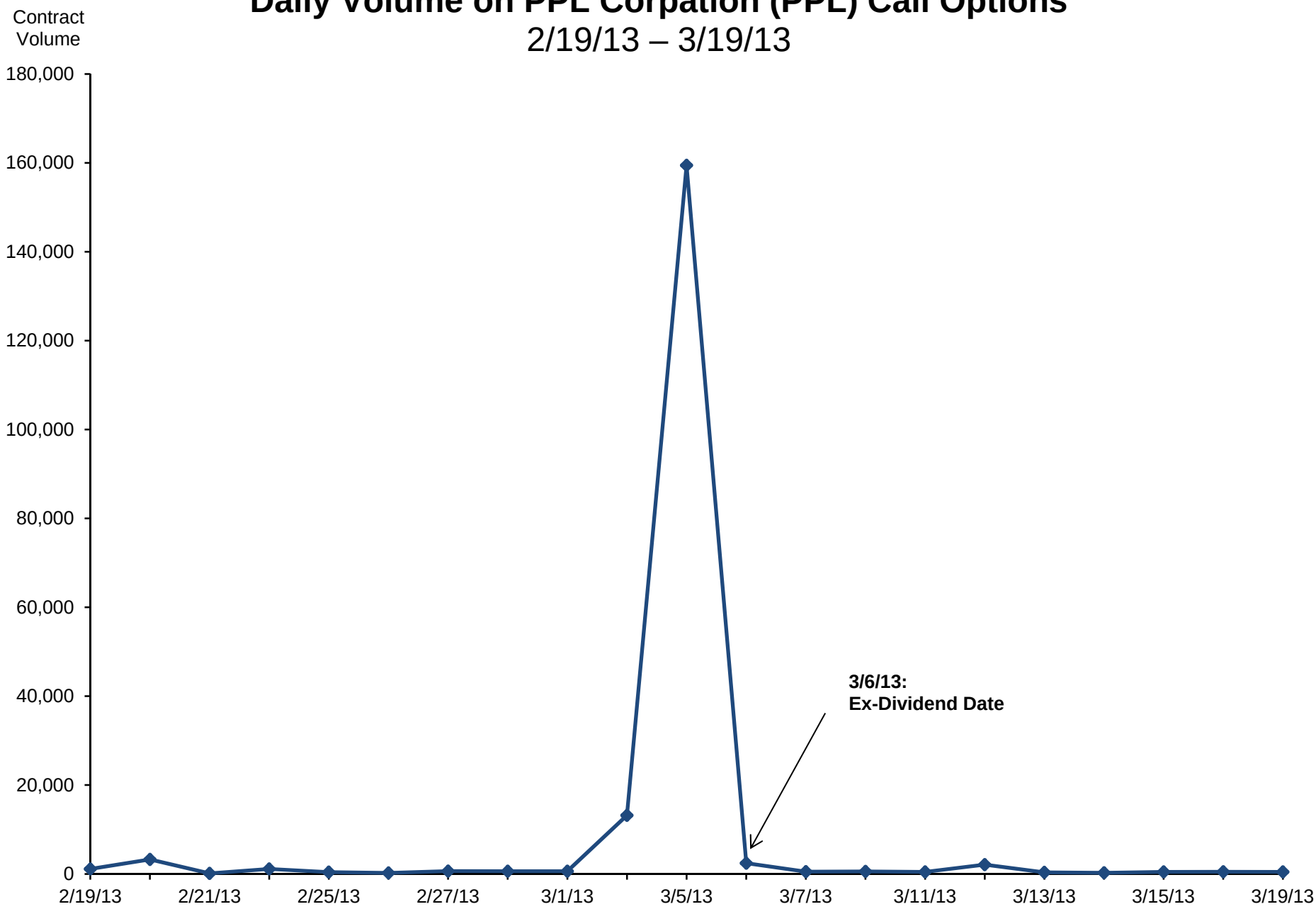
http://www.theocc.com/clearing/clearing-services/specifications-equity-options.jsp

SEC Documents

Securities Exchange Act of 1934, §10(b) (as amended 2012)	
Securities and Exchange Commission, Release No. 34-48363, File No. SR-PCX-2003-39	8/19/03
Securities and Exchange Commission, Release No. 34-48459, File No. SR-Phlx-2003-61	9/8/03
Securities and Exchange Commission, Release No. 34-49358, File No. SR-Amex-2004-09	3/3/04
Securities and Exchange Commission, Release No. 34-50175, File No. SR-CBOE-2004-38	8/10/04
Securities and Exchange Commission, Release No. 34-60388, File No. S7-30-08	7/31/09

Exhibit 1

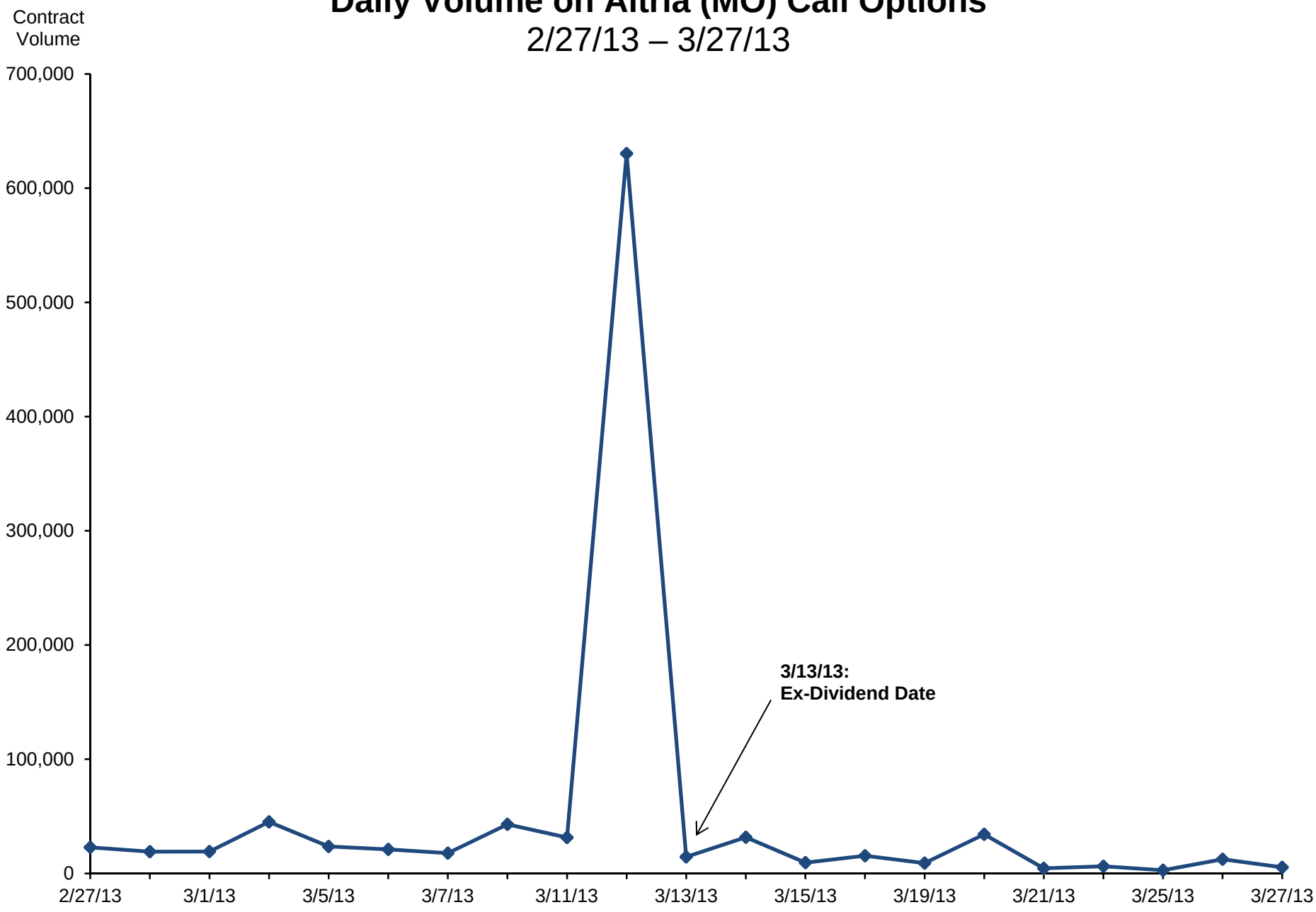
Daily Volume on PPL Corpation (PPL) Call Options
2/19/13 – 3/19/13



Source: The Options Clearing Corporation

Exhibit 2

Daily Volume on Altria (MO) Call Options
2/27/13 – 3/27/13



Source: The Options Clearing Corporation