

JUSTICE NEWS**Department of Justice**

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FOR IMMEDIATE RELEASE

Tuesday, April 21, 2015

Futures Trader Charged with Illegally Manipulating Stock Market, Contributing to the May 2010 Market 'Flash Crash'

A futures trader was arrested in the United Kingdom today on U.S. wire fraud and commodities fraud and manipulation charges in connection with his alleged role in the May 2010 "Flash Crash," when the Dow Jones Industrial Average plunged 600 points in five minutes, announced Assistant Attorney General Leslie R. Caldwell of the Justice Department's Criminal Division and Special Agent in Charge Robert J. Holley of the FBI's Chicago Division.

Navinder Singh Sarao, 36, of Hounslow, United Kingdom, was arrested today in the United Kingdom, and the United States is requesting his extradition. Sarao was charged in a federal criminal complaint in the Northern District of Illinois on Feb. 11, 2015, with one count of wire fraud, 10 counts of commodities fraud, 10 counts of commodities manipulation, and one count of "spoofing," a practice of bidding or offering with the intent to cancel the bid or offer before execution.

According to allegations in the complaint, which was unsealed today, Sarao allegedly used an automated trading program to manipulate the market for E-Mini S&P 500 futures contracts (E-Minis) on the Chicago Mercantile Exchange (CME). E-Minis are stock market index futures contracts based on the Standard & Poor's 500 Index. Sarao's alleged manipulation earned him significant profits and contributed to a major drop in the U.S. stock market on May 6, 2010, that came to be known as the "Flash Crash." On that date, the Dow Jones Industrial Average fell by approximately 600 points in a five-minute span, following a drop in the price of E-Minis.

According to the complaint, Sarao allegedly employed a "dynamic layering" scheme to affect the price of E-Minis. By allegedly placing multiple, simultaneous, large-volume sell orders at different price points—a technique known as "layering"—Sarao created the appearance of substantial supply in the market. As part of the scheme, Sarao allegedly modified these orders frequently so that they remained close to the market price, and typically canceled the orders without executing them. When prices fell as a result of this activity, Sarao allegedly sold futures contracts only to buy them back at a lower price. Conversely, when the market moved back upward as the market activity ceased, Sarao allegedly bought contracts only to sell them at a higher price.

The charges contained in the complaint are merely accusations, and the defendant is presumed innocent unless and until proven guilty.

This case is being investigated by the FBI's Chicago Division. The case is being prosecuted by Assistant Chief Brent S. Wible and Trial Attorney Michael T. O'Neill of the Criminal Division's Fraud Section, with assistance provided by the U.S. Attorney's Office for the Northern District of Illinois, the Criminal Division's Office of International Affairs and the International Assistance Unit of the Metropolitan Police Service of London, United Kingdom. The Department of Justice appreciates the substantial assistance of the Commodity Futures Trading Commission's Division of Enforcement, which referred this matter to the department.

Sarao Criminal Complaint15-481
Financial Fraud**Criminal Division**
Updated April 21, 2015

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

MAGISTRATE JUDGE MARTIN

UNITED STATES OF AMERICA

v.

NAVINDER SINGH SARAO

CASE NUMBER:
UNDER SEAL

15 CR 75

CRIMINAL COMPLAINT

I, the complainant in this case, state that the following is true to the best of my knowledge and belief.

From in or about June 2009 through in or about April 2014, in Chicago, in the Northern District of Illinois, Eastern Division, and elsewhere, the defendant violated:

Code Section

Offense Description

Title 18, United States Code, Section 1343

Defendant willfully and knowingly, having devised and intending to devise a scheme and artifice to defraud, and for obtaining money and property by means of false and fraudulent pretenses, representations, and promises, did transmit and cause to be transmitted by means of wire communication in interstate and foreign commerce, writings, signs, signals, pictures, and sounds for the purpose of executing such scheme and artifice.

Title 18, United States Code, Section 1348

Defendant knowingly executed, and attempted to execute, a scheme and artifice to defraud a person in connection with a commodity for future delivery, and to obtain, by means of false and fraudulent pretenses, representations, and promises, any money and property in connection with the purchase and sale of any commodity for future delivery.

Title 7, United States Code, Section 13(a)(2)

Defendant knowingly and intentionally manipulated and attempted to manipulate the price of a commodity in interstate commerce.

Title 7, United States Code, Sections 6c(a)(5)(C) and 13(a)(2)

Defendant knowingly engaged in trading, practice, and conduct, on and subject to the rules of the Chicago Mercantile Exchange, that was, was of the character of, and was commonly known to the trade as, "spoofing."

This criminal complaint is based upon these facts:

X Continued on the attached sheet.

RECEIVED

FEB 11 2015

DAVID C. BRUTON
CLERK, U.S. DISTRICT COURT

GREGORY LABERTA
Special Agent, Federal Bureau of Investigation

Sworn to before me and signed in my presence.

Date: February 11, 2015

City and state: Chicago, Illinois

Daniel G. Martin

Judge's signature

DANIEL G. MARTIN, U.S. Magistrate Judge

Printed name and Title

AFFIDAVIT IN SUPPORT OF CRIMINAL COMPLAINT

I, Gregory LaBerta, being duly sworn, state as follows:

1. I am a Special Agent with the Federal Bureau of Investigation. I have been so employed for approximately 9 years.

2. As part of my duties as a Special Agent, I investigate criminal violations relating to complex corporate fraud, including securities and commodities fraud, market manipulation, mail and wire fraud, money laundering, and embezzlement.

3. The information in this affidavit is based upon my personal participation in this investigation, my training and experience, my review of documents and records, and information obtained from representatives of the Commodity Futures Trading Commission ("CFTC"), which is conducting a parallel investigation, representatives of an economic consulting group retained in connection with this investigation who have reviewed relevant trading and order book data (the "Consulting Group"), and other witnesses. Where statements of others are related in this affidavit, they are related in substance and in part. Since this affidavit is being submitted for the limited purpose of establishing probable cause, it does not include each and every fact known to me concerning this investigation.

4. I submit this affidavit in support of a criminal complaint alleging as follows:

a. Between in or about June 2009 and in or about April 2014, in Chicago, and elsewhere, in the Northern District of Illinois, Eastern Division, NAVINDER SINGH SRAO willfully and knowingly, having devised and intending to devise a scheme and artifice to defraud, and for obtaining money and property by means of false and fraudulent pretenses, representations, and promises, did transmit and cause to be transmitted by means of wire communication in interstate and foreign commerce, writings, signs, signals, pictures, and sounds for the purpose of executing such scheme and artifice, in violation of Title 18, United States Code, Section 1343;

b. On or about April 27, 2010; May 4, 2010; May 5, 2010; May 6, 2010; January 28, 2011; February 22, 2011; March 4, 2011; July 29, 2011; August 4, 2011; and March 10, 2014, in Chicago, and elsewhere, in the Northern District of Illinois, Eastern Division, NAVINDER SINGH SRAO did knowingly execute, and attempt to execute, a scheme and artifice to defraud a person in connection with a commodity for future delivery, and to obtain, by means of false and fraudulent pretenses, representations, and promises, money and property in connection with the purchase and sale of a commodity for future delivery, to wit, E-Mini S&P 500 futures contracts, in violation of Title 18, United States Code, Sections 1348(1) and (2);

c. On or about April 27, 2010; May 4, 2010; May 5, 2010; May 6, 2010; January 28, 2011; February 22, 2011; March 4, 2011; July 29, 2011; August 4, 2011; and March 10, 2014, in Chicago, and elsewhere, in the Northern District of

Illinois, Eastern Division, NAVINDER SINGH SARAO did knowingly and intentionally manipulate and attempt to manipulate the price of E-Mini S&P 500 futures contracts, a commodity in interstate commerce, in violation of Title 7, United States Code, Section 13(a)(2); and

d. On or about March 10, 2014, in Chicago, and elsewhere, in the Northern District of Illinois, Eastern Division, NAVINDER SINGH SARAO did knowingly engage in trading, practice, and conduct, on and subject to the rules of the Chicago Mercantile Exchange, that was, was of the character of, and was commonly known to the trade as, “spoofing,” by causing to be transmitted to the Chicago Mercantile Exchange E-Mini S&P 500 futures contract orders that he intended to cancel before execution, in violation of Title 7, United States Code, Sections 6c(a)(5)(C) and 13(a)(2).

Overview of the Investigation

5. As explained below, NAVINDER SINGH SARAO was a futures trader who operated from his residence in the United Kingdom and who traded primarily through his company, Nav Sarao Futures Limited. SARAO traded futures using commercially available trading software, including automated trading software. Such software allowed traders to communicate with markets as quickly as possible and to place, modify, and cancel multiple orders nearly simultaneously.

6. On numerous occasions between at least in or about April 2010 and in or about April 2014, SARAO spoofed the market and manipulated the intra-day price for near month E-Mini S&P 500 futures contracts (“E-Minis”) on the Chicago

Mercantile Exchange (“CME”), including on or about May 6, 2010, when the United States stock markets plunged dramatically in a matter of minutes in an event that came to be known as the “Flash Crash.” The investigation is focused on SARAO’s efforts to manipulate the market for E-Minis by placing multiple large-volume sell orders on the CME (to create the appearance of substantial supply and thus drive prices down) and modifying and ultimately canceling the orders before they were executed. SARAO then exploited his manipulation for his personal profit. The investigation has revealed that SARAO obtained substantial trading profits through this activity. The investigation also has revealed that SARAO misrepresented and lied about his use of computer automation to effectuate the massive split-second modification and cancellation of orders that facilitated his market manipulation.

The CME

7. The CME was a financial and commodity derivatives exchange based in Chicago, Illinois. Several types of financial instruments were traded on the CME, including futures contracts.

8. Futures contracts were standardized, legally binding agreements to buy or sell a specific product or financial instrument in the future. The buyer and seller of a futures contract agreed on a price today for a product or financial instrument to be delivered or settled in cash on a future date. The minimum price increment at which a futures contract could trade was called a “tick,” and the value of a tick for each contract was set by the futures exchange. Futures contracts traded on set, periodic expiration cycles (*i.e.*, monthly or quarterly). A “near-month”

futures contract was one that would expire on the next expiration date for that type of futures contract.

9. Traders placed orders in the form of “bids” to buy or “offers” to sell a futures contract. An order was “filled” or “executed” when a buyer and seller bought and sold a particular contract.

10. The CME operated a global electronic trading platform called Globex, which utilized computer servers located in Chicago, Illinois and surrounding areas within the Northern District of Illinois. Globex allowed market participants to trade either at the exchange itself or from a home or office thousands of miles away.

11. Traders transacted on the CME through a futures commission merchant (“FCM”). An FCM—sometimes referred to as a commodity broker—was an individual or organization which, among other things, accepted orders to buy or sell futures contracts and accepted money from customers to support such orders.

E-Mini S&P 500 Futures Contracts

12. The Standard & Poor’s 500 Index (the “S&P 500 Index”) was an index of 500 stocks designed to be a leading indicator of United States equities. The E-Mini was a stock market index futures contract based on the S&P 500 Index. E-Minis were traded on the CME through Globex. The E-Mini was one of the most popular and liquid equity index futures contracts in the world. As a futures contract, the E-Mini represented an agreement to buy or sell the cash value of the underlying index at a specified date. The notional value of one contract was 50

times the value of the S&P 500 Index. Thus, if the current value of the S&P 500 Index was \$1,320, the value of a single futures contract was \$66,000 ($\$1,320 \times 50$).

Layering Schemes

13. “Layering” (a type of “spoofing”) was a form of manipulative, high-speed activity in the financial markets. In a layering scheme, a trader places multiple, bogus orders that the trader does not intend to have executed—for example, multiple orders to sell a financial product at different price points—and then quickly modifies or cancels those orders before they are executed. The purpose of these bogus orders is to trick other market participants and manipulate the product’s market price (in the foregoing example of bogus sell orders, by creating a false appearance of increased supply in the product and thereby depressing its market price). The trader seeks to mislead and deceive investors by communicating false pricing signals to the market, to create a false impression of how market participants value a financial product, and thus to prevent legitimate forces of supply and demand from operating properly. The trader does so by creating a false appearance of market depth, with intent to create artificial price movements. The trader could then exploit this layering activity by simultaneously executing other, real trades that the trader does intend to have executed, in an attempt to profit from the artificial price movements that the trader had created. Such layering and trading activity occurs over the course of seconds, in multiple cycles that the trader repeats throughout the trading day. Given the speed and near simultaneity of

market activity in a successful layering scheme, such schemes are aided by custom-programmed, automated trading software.

Overview of SARAO's Manipulative Activity

14. Beginning in or about June 2009, SARAO sought to enrich himself through manipulation of the market for E-Minis. By placing multiple large-volume orders on the CME at different price points, SARAO created the false appearance of substantial supply in order to fraudulently induce other market participants to react to his deceptive market information. SARAO thus artificially depressed E-Mini prices. With the aid of an automated trading program, SARAO was able to all but eliminate his risk of unintentionally executing these orders by modifying and ultimately canceling them before execution. Meanwhile, he exploited his manipulation to reap large trading profits by executing other, real orders.

15. On or about June 12, 2009, SARAO sent an email to a representative of his FCM in which he explained that he “need[ed] to get in touch with a [] technician [at the company that provided his trading software (“Trading Software Company #1”)] that will be able to programme for me extra features on [the software],” namely, “a cancel if close function, so that an order is canceled if the market gets close.” Among the products included in Trading Software Company #1’s trading platform was an automated trading program (“Automated Trading Program #1”), which Trading Software Company #1 advertised as a program that allowed non-programmers to engage in automated trading using spreadsheet commands and functions.

16. Later that same month, SARAO sent an email to a representative of Trading Software Company #1 dated June 15, 2009, in which SARAO described the “cancel if close function” that he wanted Trading Software Company #1 to design. Specifically, SARAO wrote that he would “like to be able to alternate the closeness ie one price away or three prices away etc etc.” SARAO further sought “[a] facility to be able to enter multiple orders at different prices using one click” and a function that would cause his “order [to] be pulled if there are not x amount of orders beneath it.” Thereafter, on July 15, 2009, SARAO sent another email to the representative of Trading Software Company #1 in which SARAO wrote that “the [Automated Trading Program #1] formula the guy set up . . . has already been a good help.” Approximately four months later, on November 16, 2009, SARAO sent an email to another representative of Trading Software Company #1 about a “system on [Automated Trading Program #1]” that the representative had “set up” and that SARAO had “found really useful,” that is, the formula mentioned above. As SARAO described the system, when he “turned on” his customized version of Automated Trading Program #1, the program would “put offers a specific value and quantity away from the best offer,” namely, “offers 3, 4 5 and 6 prices away from the best offer.” SARAO requested the code that had been used to design this program, so that he “could play around with creating new versions of the same thing.” Based on my review of these emails and SARAO’s subsequent market activity, I believe that SARAO sought and obtained assistance in designing functions on his automated trading software that would allow him to simultaneously place

numerous orders at different price points and automatically cancel those orders as the market approached them and before they could be executed.

17. Thereafter, SARA O implemented a strategy to manipulate the E-Mini market. Based on my conversations with representatives of the Consulting Group, as well as my review of documents, I know that, among other activity, SARA O used a “dynamic layering” technique, placing, repeatedly modifying, and ultimately canceling multiple 200-, 250-, 300-, 400-, 500-, 550-, 600-, and 900-lot sell orders (whereas the average market size order, based on a sample analyzed by the Consulting Group, was 7 lots).

18. Although the universe of buy and sell orders in the E-Mini market can be much larger, traders in this market are able to see a visible order book comprising the 10 best prices on each side of the market (the “order book”). SARA O typically placed his orders in the middle of the order book on the sell side, such as at levels 4 through 8. SARA O simultaneously placed these large-volume orders at multiple price points on the sell side of the order book, several levels (or “ticks”) above the best offer. He constantly modified these stacked sell orders to stay around 3 to 4 ticks above the best offer.¹ As the market moved down, SARA O modified his orders by lowering his offers to keep them near the best offer, thus ensuring that the downward price pressure remained constant. And when the market moved back up notwithstanding the downward pressure caused by SARA O’s dynamic layering, SARA O modified his orders by raising his offers so that they

¹ In this affidavit, references to SARA O’s conduct include his actions undertaken through his automated trading software.

would remain several levels higher than the best offer. SARAO effectively tethered his orders to the market price, constantly modifying them so that they moved up and down with the market, remaining several ticks above the best offer. By repeatedly modifying his orders in this way, SARAO virtually ensured that they would not be filled. SARAO nearly always canceled these orders without executing them.

19. Exhibit A hereto illustrates SARAO's implementation of the dynamic layering technique during a particular period on May 4, 2010, when the technique was active. As the graph displays, SARAO successfully modified nearly all of his orders to stay between levels 4 and 7 of the sell side of the order book. What is more, Exhibit A shows the overall decline in the market price of E-Minis during this period.

20. Based on documentary evidence I have reviewed, as well as my conversations with Consulting Group analysts, I know that SARAO used Automated Trading Program #1 to implement his dynamic layering technique at least as of in or about March 2010, as well as from 2012 through at least in or about April 2014. As set forth below in paragraph 27, SARAO used Automated Trading Program #1 at least as of in or about March 2010 in order to cancel large volumes of orders. Additionally, the FCM that SARAO began using in or about September 2012 and continues using through the present maintains records that identify and record the use of the particular computer trading program that SARAO employed to place E-Mini orders. Those records show that (a) SARAO used Automated Trading

Program #1 to place over 99 percent of the dynamic layering orders; (b) SARAO rarely used Automated Trading Program #1 to place other orders; and (c) SARAO almost always used a different trading program supplied by Trading Software Company #1 to place his other orders.

21. Based on their analysis of SARAO's market activity, representatives of the Consulting Group have informed me that, while the dynamic layering technique exerted downward pressure on the market, SARAO typically executed a series of trades to exploit his own manipulative activity by repeatedly selling futures contracts only to buy them back at a slightly lower price. Conversely, when the market moved back upward as a result of SARAO's ceasing the dynamic layering technique, SARAO typically did the opposite, that is, he repeatedly bought contracts only to sell them at a slightly higher price.

22. Representatives of the Consulting Group have informed me that they examined almost 400 days on which SARAO traded E-Minis between April 2010 and April 2014 (including 26 days between April 2010 and August 2012 and 366 days between September 2012 and April 2014) and found that SARAO used the dynamic layering technique on approximately 63 percent of those days.

23. While SARAO's dynamic layering technique was the most prominent manipulative technique he used, it was not the only one. Based on my discussions with Consulting Group representatives, I understand that analysts have also identified SARAO's repeated placement of 188- and/or 289-lot orders on the sell side of the market, nearly all of which he canceled before the orders were executed.

Based on analysis of SARA O's trading activity, SARA O appears to have used this 188-and-289-lot spoofing technique in certain instances to intensify the manipulative effects of his dynamic layering technique, by further contributing to the E-Mini order book imbalance (*i.e.*, the difference in the quantity of sell-side and buy-side orders) and corresponding price impact, which SARA O then exploited through his actual trading activity.

24. What is more, Consulting Group analysts have identified a third technique whereby SARA O "flashed" a large 2,000-lot order on one side of the market, executed an order on the other side of the market, and canceled the 2,000-lot order before it was executed. SARA O's large, bogus orders had a tendency to effect artificial movements in the E-Mini market price by creating a false appearance of substantial supply or demand (*i.e.*, flashing a 2,000-lot sell order would depress the market price, whereas flashing a 2,000-lot buy order would inflate it). SARA O could then exploit this price movement by executing a real trade on the other side of the market from his bogus, 2,000-lot order. For example, on March 3, 2014, at approximately 11:38:27.538 a.m.,² SARA O placed a 2,000-lot buy order at a price of \$1,839.25. Within 0.2 seconds, he placed a 169-lot sell order at a price of \$1,839.50. Less than one second later, after filling 20 lots of the sell order, he canceled the 2,000-lot buy order before it had any executions. At 11:38:31.826 a.m., SARA O flashed another 2,000-lot buy order again at the price of \$1,839.25, and filled the remainder of his 169-lot sell order within one millisecond. At

² All times mentioned in this affidavit are in Central Time.

11:38:32.336 a.m., approximately one half-second after placing the second 2,000-lot buy order, SARAO canceled it before it had any executions.

SARAO's Responses to Queries about His Trading Activity

25. Based on my review of emails and other documents obtained from two FCMs used by SARAO, I know that, on several occasions in 2009 and 2010, exchanges in both the United States and Europe noticed that SARAO had engaged in suspicious activity, namely, placing and then quickly canceling large volume orders. In his responses to inquiries from the exchanges, SARAO acknowledged that he in fact frequently canceled large volumes of orders but falsely asserted that he did so manually, without the assistance of an automated trading program.

26. As reflected in correspondence with both SARAO and an FCM he used, the CME observed that, between September 2008 and October 2009, SARAO had engaged in pre-opening activity—specifically, entering orders and then canceling them—that “appeared to have a significant impact on the Indicative Opening Price.” The CME contacted SARAO about this activity in March 2009 and notified him, via correspondence dated May 6, 2010, that “all orders entered on Globex during the pre-opening are expected to be entered in good faith for the purpose of executing bona fide transactions.” The CME provided a copy of the latter correspondence to SARAO's FCM, which suggested to SARAO in an email that he call the FCM's compliance department if he had any questions. In a responsive email dated May 25, 2010, SARAO wrote to his FCM that he had “just called” the CME “and told em to kiss my ass.”

27. Via an email I have reviewed dated March 23, 2010, the CME contacted SARAQ's FCM to alert them that SARAQ "just had 1613 'This order is not in the book' reject messages in the last 5 minutes." (Based on my review of the emails and my participation in this investigation, I believe that these rejection messages were issued when a trader sought to fill one of SARAQ's orders, only to find that the order had already been canceled.) A member of the FCM's compliance department looked into the issue and reported by email to another employee of the FCM that he could "see that [SARAQ]'s using [Automated Trading Program #1]" and that "[i]t looks like he's deleting a huge amount of orders a second which seems to be the root cause of the issue." Another representative of the FCM forwarded this email correspondence to SARAQ, informing him that the CME had contacted the FCM about his cancellation of a "huge amount of orders from the order book," and that such conduct was "not allowed." On March 31, 2010, SARAQ responded by email, writing to the FCM and CME representatives that he would "like to apologise for any inconvenience caused by this." SARAQ claimed that he "was just showing a friend of mine what occurs on the bid side of the market almost 24 hours a day, by the high frequency geeks," and questioned whether the CME's action in responding to his conduct meant that "the mass manipulation of the high frequency nerds is going to end." Referring to another trader, SARAQ further asked, "I see he continues to do this all day every day, yet you have a problem when I showed someone it for 5 mins?"

28. Based on my review of email correspondence between SARAO and one of the FCMs he used as well as SARAO's trading statements, I know that, in addition to trading E-Minis on the CME, SARAO traded futures on Eurex, a German derivatives exchange. I have reviewed an email sent on July 7, 2010, in which a representative of Eurex, based on SARAO's activity on the exchange, requested that SARAO's FCM ask SARAO questions about, among other things, his entry and deletion of orders and whether SARAO entered and deleted those orders automatically or manually. In response, SARAO wrote the following in an email, addressed to Eurex but sent to his FCM representative: "[a]ll my orders are readily available to trade and are placed with the objective of doing so. I DO NOT use ANY computer program that minimizes or reduces the chan[c]e of my trades being filled, unlike every other big trader on the exchange, since that is what they are there for." SARAO insisted that his "orders are 100% at risk, 100% of the time." Having explained that he "trade[s] extremely fast" and would sometimes "go from wanting a large position to going the other way IN AN INSTANT," SARAO claimed that "[a]ll orders are entered/deleted manually by me and only me."

29. On or about May 29, 2014, SARAO provided written responses to a questionnaire that had been submitted to him by the United Kingdom's Financial Conduct Authority, at the request of the CFTC pursuant to the International Organization of Securities Commissions Multilateral Memorandum of Understanding. In those responses, which I have reviewed, SARAO claimed that he was "an old school point and click prop trader" who had "always been good with

reflexes and doing things quick.” He acknowledged that he traded large volumes of E-Minis in large lot orders, but again asserted that his orders “were 100% at risk, 100% of the time.” SARAQ falsely claimed that he had “traded using a basic [trading software provided by Trading Software Company #1] for numerous years,” failing to disclose that Trading Software Company #1 had designed, at his request, several custom, automated trading functions. SARAQ admitted, however, that he had “decided to pay [a second trading software company] to build a program . . . that would help disguise [his] orders more effectively,” claiming that other traders had sought to manipulate the market around his orders. Specifically, SARAQ wrote that he had asked this second trading software company to design three trading functions. In addition to these functions, SARAQ acknowledged that he also “sometimes place[d]” orders “slightly away from the market price [that] move up and down as the market moves with it” (an apparent reference to the dynamic layering technique), but offered a benign explanation for these orders, that is, that he sought to “catch any blips up/down in the market.” SARAQ further claimed that he placed these orders “rarely” and only when he believed the market was “excessively weak or strong.”

The Effect of SARAQ’s Manipulative Activity on the E-Mini Market

30. I have spoken with an expert who reviewed the Consulting Group’s analysis of E-Mini market data for numerous days between April 2010 and April 2014 and who concluded that SARAQ’s use of the dynamic layering technique affected the market price of E-Minis during that time period, creating artificial

prices.³ Specifically, the expert has concluded that the price of E-Minis was artificially depressed (and typically fell) while SARAO's dynamic layering technique was active, and typically rebounded when SARAO ceased using the technique. Examples of this price impact on the dates discussed below are based on the expert's analysis and opinion.

31. The expert has further concluded that, during this same time period, SARAO's dynamic layering technique created a substantial imbalance in the E-Mini order book. For example, based on a sample of dates from April and May of 2010, Consulting Group analysts have determined that when SARAO was not using the dynamic layering technique, the order book reflected an average imbalance of approximately 500 lots. By contrast, when SARAO was using the dynamic layering technique, the number of sell orders exceeded the number of buy orders by an average of 3,000 lots. Such increased imbalance in the order book (in this case, the excess of sell orders relative to the number of buy orders) tended to depress the market price of E-Minis by creating a false impression of increased supply of the futures contracts.

SARAO's Manipulative Activity in 2010

32. Analysts with the Consulting Group have examined SARAO's activity in the E-Mini market on the following four days, among others, in 2010: April 27, May 4, May 5, and May 6. (All of SARAO's orders on the CME were tracked using a Tag 50 ID, which is a unique identifying code assigned by an FCM to a trader that

³ The expert is a professor and academic researcher who studies and has written extensively on financial markets and algorithmic trading.

must be used to enter an order on Globex.) On each of those days, SARAO implemented the dynamic layering technique, placing multiple, simultaneous sell orders that he repeatedly modified so that they would remain several ticks above the best offer. I have been informed by a Consulting Group analyst that, for these days, none of the orders placed as part of SARAO's dynamic layering strategy was executed. According to information provided to me by analysts, SARAO's activity included the following:

a. On April 27, 2010, at approximately 10:22:39.863 a.m., SARAO placed the following five sell orders nearly simultaneously, starting two ticks above the best ask of \$1,200.00, at levels 3 to 7 of the sell-side of the order book: (1) 500 lots at \$1,200.50; (2) 600 lots at \$1,200.75; (3) 600 lots at \$1,201.00; (4) 500 lots at \$1,201.25; and (5) 500 lots at \$1,201.50. SARAO modified these orders many times; two of the orders were canceled and immediately replaced by identical orders which were then modified in their place. In total, SARAO modified the orders 1,967 times (approximately 393 modifications per active order). The modifications occurred when the market price changed, so that SARAO's lowest offer typically remained two or three ticks above the best ask. SARAO canceled all of these orders, without having executed any of them, at approximately 10:29:23.566 a.m. At that point, the prevailing market price of E-Minis was \$1,192.00. SARAO repeated this conduct 60 times on April 27, using the dynamic layering technique for a total of 212.15 minutes. When the dynamic layering technique was active, it placed downward pressure on the market price of E-Minis. SARAO exploited the price movements

during this period by executing 8,651 buy trades (totaling 95,229 lots) and 9,124 sell trades (totaling 95,229 lots) with a total notional value of approximately \$11.3 billion, and obtained approximately \$821,389 in net profits from his E-Mini trades.⁴

b. On May 4, 2010, at approximately 11:00:36.844 a.m., SARA O placed the following four sell orders nearly simultaneously, starting three ticks above the best ask of \$1,172.50, at levels 4 to 7 of the sell-side of the order book: (1) 600 lots at \$1,173.25; (2) 600 lots at \$1,173.50; (3) 600 lots at \$1,173.75; and (4) 600 lots at \$1,174.00. In total, SARA O modified these orders 608 times (approximately 152 modifications per active order). The modifications occurred when the market price changed, so that SARA O's lowest offer typically remained three ticks above the best ask. SARA O canceled all four orders, without having executed any of them, at approximately 11:12:38.762 a.m. SARA O repeated this conduct 31 times on May 4, using the dynamic layering technique for a total of 199.99 minutes. Over the course of the day, SARA O modified a total of approximately 7.4 million lots—approximately 42% of all modification volume in the market that day. The rest of the market combined modified approximately 10.4 million lots. When the dynamic layering technique was active, it placed downward pressure on the market price of E-Minis. SARA O exploited the price movements during this period by executing 8,103 buy trades (totaling 65,015 lots) and 7,883 sell

⁴ SARA O's daily trading profits are derived from account statements of the FCMs he used during the relevant period, and are presented herein as "net" figures after subtracting certain fees and commissions SARA O paid to his FCMs.

trades (totaling 65,015 lots) with a total notional value of \$7.6 billion, and obtained approximately \$876,823 in net profits from his E-Mini trades.

c. On May 5, 2010, at approximately 1:01:41.102 p.m., SARAO placed the following five sell orders nearly simultaneously, starting two ticks above the best ask of \$1,166.00, at levels 3 to 7 of the sell-side of the order book: (1) 250 lots at \$1,166.50; (2) 600 lots at \$1,166.75; (3) 600 lots at \$1,167.00; (4) 500 lots at \$1,167.25; and (5) 500 lots at \$1,167.50. In total, SARAO modified these orders 1,086 times (approximately 217 modifications per active order). The modifications occurred when the market price changed, so that SARAO's lowest offer typically remained two ticks above the best ask. SARAO canceled the orders, without having executed any of them, at approximately 1:23:21.833 p.m. At that point, the prevailing market price of E-Minis was \$1,164.75. SARAO repeated this conduct 18 times on May 5, using the dynamic layering technique for a total of 253.88 minutes. When the dynamic layering technique was active, it placed downward pressure on the market price of E-Minis. SARAO exploited the price movements during this period by executing 10,682 buy trades (totaling 74,380 lots) and 8,959 sell trades (totaling 74,380 lots) with a total notional value of approximately \$8.7 billion, and obtained approximately \$435,185 in net profits from his E-Mini trades.

d. On May 6, 2010, SARAO used the dynamic layering technique extensively and with particular intensity, as discussed in greater detail below.

SARAO's Manipulative Activity Contributed to the Flash Crash

33. Based on my review of documents and conversations with others, including representatives of the CFTC, I know the following information about the Flash Crash. On May 6, 2010, the Dow Jones Industrial Average (the "Dow") plunged by approximately 1,000 points. By early in the afternoon, the Dow was down more than 300 points. In the five-minute span between 1:42 and 1:47 p.m., the Dow fell an additional 600 points. Large sell-side pressure in the E-Mini market (and the resulting price drop for those futures contracts) had spilled into the equities markets and caused the rapid decline. Prices stopped falling when, shortly after 1:45 p.m., the CME paused trading in E-Minis for five seconds, allowing prices to stabilize. By 2:00 p.m., most stocks had recovered, and the Flash Crash was over.

34. Consulting Group analysts have informed me that, early in the morning of May 6, 2010, the CME's order book for E-Minis reflected a divergence in the E-Mini market between buy-side depth and sell-side depth. By early afternoon, sell-side depth was more than twice as large as buy-side depth. As of 1:45 p.m., in reaction to the intense selling pressure, there were few buyers and little liquidity left in the market.

35. According to Consulting Group analysts and the expert, that day, SARAO was active in the E-Mini market on the CME, and contributed to the order-book imbalance that the CFTC and the Securities Exchange Commission have concluded, in a published report, was a cause, among other factors, of the Flash Crash. Among other activity, SARAO used the dynamic layering technique

extensively. SARAQ first used the technique that day at approximately 9:20:00.938 a.m., when he placed the following four sell orders nearly simultaneously, starting three ticks above the best ask of \$1,163.25: (1) 500 lots at \$1,164.00; (2) 600 lots at \$1,164.25; (3) 500 lots at \$1,164.50; and (4) 500 lots at \$1,164.75. SARAQ modified the orders repeatedly and then canceled all four of them, without having executed any of them, by approximately 9:26:53.566 a.m. The modifications occurred when the market price changed, so that SARAQ's lowest offer typically remained three ticks above the best ask. While this dynamic layering cycle was active, the E-Mini price fell 39 basis points, and SARAQ bought 1,606 contracts and sold 1,032 contracts.

36. SARAQ's use of the dynamic layering technique was particularly intense in the hours leading up to the Flash Crash. SARAQ used the technique continuously from 11:17 a.m. until 1:40 p.m. SARAQ began this cycle by placing the following five sell orders nearly simultaneously at approximately 11:17:38.782 a.m.: (1) 600 lots at \$1,156.50; (2) 600 lots at \$1,156.75; (3) 600 lots at \$1,157.00; (4) 600 lots at \$1,157.25; and (5) 600 lots at \$1,157.50. At approximately 1:13 p.m., SARAQ added a sixth sell order for 600 lots, bringing the total to 3,600 lots. The orders were replaced or modified more than 19,000 times before SARAQ canceled them, without having executed any of them, at approximately 1:40:12.553 p.m.⁵ At that point, the aggregate volume of SARAQ's orders was nearly equivalent to the aggregate volume of the entire buy-side of the order book.

⁵ Over the course of the day, SARAQ modified more than 20 million lots, whereas the rest of the market combined modified fewer than 19 million lots.

37. At the same time that SARAO ran this lengthy cycle of the dynamic layering technique, he aggressively used the 188-and-289-lot spoofing technique. Between 12:33 p.m. and 1:45 p.m., SARAO placed 135 sell orders consisting of either 188 or 289 lots, for a total of 32,046 contracts. SARAO canceled 132 of these orders before they could be executed.

38. SARAO's activity created persistent downward pressure on the price of E-Minis. Indeed, during the dynamic layering cycle that ran from 11:17 a.m. to 1:40 p.m., SARAO's offers comprised 20 to 29% of the CME's entire E-Mini sell-side order book, significantly contributing to the order book imbalance. During that period of time alone, the E-Mini price fell by 361 basis points. In total, SARAO obtained approximately \$879,018 in net profits from trading E-Minis that day.

39. Based on my review of SARAO's emails, I know that SARAO preferred to trade during periods of high market volatility, as on the day of the Flash Crash. In an email message dated on or about October 21, 2012, SARAO asserted that he had "made the majority of [his] net worth in . . . no more than 20 days trading," on days when the market was particularly volatile. On the trading days described in this affidavit, SARAO made approximately \$8.9 million trading E-Minis. Overall, between 2010 and 2014, SARAO made approximately \$40 million trading E-Minis.

40. Around the time of the Flash Crash, SARAO took significant steps to protect his assets. In late April 2010, SARAO established a new entity, Nav Sarao Milking Markets Limited, which was incorporated in Nevis. SARAO appears to have created this company as part of a tax avoidance strategy pursuant to which he

also established, in 2012, International Guarantee Corporation, incorporated in Anguilla. Indeed, one of SARAO's so-called "wealth management assistants" described the latter company, in an email to SARAO's FCM dated November 22, 2012, as having been created as part of "tax planning work" undertaken by his firm on SARAO's behalf.

41. In this connection, a representative of SARAO's FCM explained to SARAO in a December 11, 2012 email, summarizing the outcome of the FCM's review and risk assessment relating to trading limits in SARAO's business account, that "the majority of [SARAO's] funds are offshore and what remaining wealth he has in the entity [*i.e.*, Nav Sarao Futures Limited] is tied up in complex structures."

SARAO's Manipulative Activity in 2011

42. Based on my conversations with Consulting Group analysts, I know that SARAO continued using the dynamic layering technique after the Flash Crash. Specifically, on numerous occasions in 2011, SARAO used the technique extensively and reaped millions of dollars in profits. This activity included the following:

a. On January 28, 2011, at approximately 11:54:40.763 a.m., SARAO placed the following six orders nearly simultaneously, starting two ticks above the best ask of \$1,278.25, at levels 3 to 8 of the sell-side of the order book: (1) 500 lots at \$1,278.75; (2) 500 lots at \$1,279.00; (3) 400 lots at \$1,279.25; (4) 400 lots at \$1,279.50; (5) 500 lots at \$1,279.75; and (6) 400 lots at \$1,280.00. In total, SARAO modified these orders 3,341 times (an average of 556.8 modifications per active order). The modifications occurred when the market price changed, so that

SARAO's lowest offer typically remained two ticks above the best ask. SARAO canceled all six orders, without having executed any of them, at approximately 12:50:28.674 p.m. At that point, the prevailing market price of E-Minis was \$1,274.50. SARAO repeated this conduct 24 times on January 28, using the dynamic layering technique for a total of 274.7 minutes. When the dynamic layering technique was active, it placed downward pressure on the market price of E-Minis. SARAO exploited the price movements during this period by executing 10,114 buy trades (totaling 87,736 lots) and 10,301 sell trades (totaling 87,736 lots) with a total notional value of approximately \$11.2 billion, and obtained approximately \$862,048 in net profits from his E-Mini trades.

b. On February 22, 2011, at approximately 11:49:35.588 a.m., SARAO placed the following five orders nearly simultaneously, starting two ticks above the best ask of \$1,318.00, at levels 3 to 7 of the sell-side of the order book: (1) 600 lots at \$1,318.50; (2) 600 lots at \$1,318.75; (3) 600 lots at \$1,319.00; (4) 500 lots at \$1,319.25; and (5) 400 lots at \$1,319.50. Two of these orders were canceled and replaced mid-cycle. In total, SARAO modified these orders 2,787 times (an average of 557 modifications per active order). The modifications occurred when the market price changed, so that SARAO's lowest offer typically remained two ticks above the best ask. SARAO canceled all five orders, without having executed any of them, at approximately 12:40:19.885 p.m. At that point, the prevailing market price of E-Minis was \$1,316.25. SARAO repeated this conduct 18 times on February 22, using the dynamic layering technique for a total of 240.67 minutes.

When the dynamic layering technique was active, it placed downward pressure on the market price of E-Minis. SARA O exploited the price movements during this period by executing 9,736 buy trades (totaling 84,252 lots) and 10,128 sell trades (totaling 84,252 lots) with a total notional value of approximately \$11.1 billion, and obtained approximately \$380,381 in net profits from his E-Mini trades.

c. On March 4, 2011, at approximately 10:10:20.281 a.m., SARA O placed the following five sell orders nearly simultaneously, starting two ticks away from the best ask of \$1,321.25, at levels 3 to 7 of the sell-side of the order book: (1) 400 lots at \$1,321.75; (2) 600 lots at \$1,322.00; (3) 600 lots at \$1,322.25; (4) 400 lots at \$1,322.50; and (5) 400 lots at \$1,322.75. SARA O modified these orders a total of 3,681 times. The modifications occurred when the market price changed, so that SARA O's lowest offer typically remained two ticks away from the best ask. SARA O canceled all five orders by 11:06:10.398 a.m. At that point, the prevailing market price of E-Minis was \$1,317.75. SARA O repeated this conduct six times on March 4, using the dynamic layering technique for a total of 86.95 minutes. When the dynamic layering technique was active, it placed downward pressure on the market price of E-Minis. SARA O exploited the price movements during this period by executing 8,364 buy orders (totaling 74,978 lots) and 8,674 sell orders (totaling 74,978 lots) with a total notional value of approximately \$9.9 billion, and obtained approximately \$296,373 in net profits from his E-Mini trades.

d. On July 29, 2011, at approximately 2:21:17.618 p.m., SARA O placed the following five sell orders nearly simultaneously, starting three ticks

above the best ask of \$1,293.00, at levels 4 to 8 of the sell-side of the order book: (1) 300 lots at \$1,293.75; (2) 500 lots at \$1,294.00; (3) 500 lots at \$1,294.25; (4) 300 lots at \$1,294.50; and (5) 300 lots at \$1,294.75. In total, SARA O modified these orders 1,014 times (an average of 203 modifications per active order). The modifications occurred when the market price changed, so that SARA O's lowest offer typically remained three ticks above the best ask. SARA O canceled all five orders, without having executed any of them, at approximately 14:40:20.181 p.m. At that point, the prevailing market price of E-Minis was \$1,292.25. SARA O repeated this conduct 15 times on July 29, using the dynamic layering technique for a total of 105 minutes. When the dynamic layering technique was active, it placed downward pressure on the market price of E-Minis. SARA O exploited the price movements during this period by executing 8,922 buy trades (totaling 57,945 lots) and 8,977 sell trades (totaling 57,187 lots) with a total notional value of approximately \$7.4 billion, and obtained approximately \$254,128 in net profits from his E-Mini trades.

e. On August 4, 2011, at approximately 8:48:28.359 a.m., SARA O placed the following seven sell orders nearly simultaneously, starting three ticks above the best ask of \$1,234.25, at levels 4 to 10 of the sell-side of the order book: (1) 300 lots at \$1,235.00; (2) 500 lots at \$1,235.25; (3) 500 lots at \$1,235.50; (4) 500 lots at \$1,235.75; (5) 400 lots at \$1,236.00; (6) 400 lots at \$1,236.25; and (7) 300 lots at \$1,236.50. SARA O canceled one of these orders shortly after placing it, and replaced another of the orders with an identical order. In total, SARA O modified

these orders 22,155 times (an average of 3,165 modifications per active order). The modifications occurred when the market price changed, so that SARA O's lowest offer typically remained three ticks above the best ask. SARA O canceled the orders, without having executed any of them, by approximately 10:42:29.477 a.m. At that point, the prevailing market price of E-Minis was \$1,221.00. SARA O repeated this conduct four times on August 4, using the dynamic layering technique for a total of 134.25 minutes. When the dynamic layering technique was active, it placed downward pressure on the market price of E-Minis. SARA O exploited the price movements during this period by executing 2,098 buy trades (totaling 16,695 lots) and 2,226 sell trades (totaling 16,926 lots) with a total notional value of approximately \$2 billion, and obtained approximately \$4,095,771 in net profits from his E-Mini trades.

SARA O's Manipulative Activity in 2014

43. Consulting Group analysts have determined that, as recently as March 2014, SARA O continued to implement the dynamic layering technique. On numerous occasions in early 2014, SARA O placed multiple, simultaneous sell orders (typically consisting of 300 lots each) that he repeatedly modified so that they would remain several ticks above the best offer—virtually ensuring that these orders would not be filled. As set forth above, SARA O used Automated Trading Program #1 to place over 99 percent of the dynamic layering orders.

44. For example, according to information provided to me by a Consulting Group analyst, on March 10, 2014, at approximately 9:34:12.895 a.m., SARA O

placed the following five sell orders nearly simultaneously, starting four ticks above the best ask of \$1,869.25, at levels 5 to 9 of the sell-side of the order book: (1) 300 lots at \$1,870.25; (2) 300 lots at \$1,870.50; (3) 300 lots at \$1,870.75; (4) 300 lots at \$1,871.00; and (5) 300 lots at \$1,871.25. In total, SARAO modified these orders 5,581 times (approximately 1,116 modifications per active order). The modifications occurred when the market price changed, so that SARAO's lowest offer typically remained three ticks above the best ask. SARAO canceled all five orders, without having executed any of them, at approximately 11:00:15.351 a.m. At that point, the prevailing market price of E-Minis was \$1,870.75. SARAO repeated this conduct three times on March 10, using the dynamic layering technique for a total of 90.7 minutes. When the dynamic layering technique was active, it placed downward pressure on the market price of E-Minis. In total, SARAO obtained approximately \$235,833 in net profits from his E-Mini trades that day.

CONCLUSION

45. Based on the information set forth in this affidavit, there is probable cause to believe that:

a. Between in or about June 2009 and in or about April 2014, in Chicago, and elsewhere, in the Northern District of Illinois, Eastern Division, NAVINDER SINGH SARAO willfully and knowingly, having devised and intending to devise a scheme and artifice to defraud, and for obtaining money and property by means of false and fraudulent pretenses, representations, and promises, did transmit and cause to be transmitted by means of wire communication in interstate

and foreign commerce, writings, signs, signals, pictures, and sounds for the purpose of executing such scheme and artifice, in violation of Title 18, United States Code, Section 1343;

b. On or about April 27, 2010; May 4, 2010; May 5, 2010; May 6, 2010; January 28, 2011; February 22, 2011; March 4, 2011; July 29, 2011; August 4, 2011; and March 10, 2014, in Chicago, and elsewhere, in the Northern District of Illinois, Eastern Division, NAVINDER SINGH SARAO did knowingly execute, and attempt to execute, a scheme and artifice to defraud a person in connection with a commodity for future delivery, and to obtain, by means of false and fraudulent pretenses, representations, and promises, money and property in connection with the purchase and sale of a commodity for future delivery, to wit, E-Mini S&P 500 futures contracts, in violation of Title 18, United States Code, Sections 1348(1) and (2);

c. On or about April 27, 2010; May 4, 2010; May 5, 2010; May 6, 2010; January 28, 2011; February 22, 2011; March 4, 2011; July 29, 2011; August 4, 2011; and March 10, 2014, in Chicago, and elsewhere, in the Northern District of Illinois, Eastern Division, NAVINDER SINGH SARAO did knowingly and intentionally manipulate and attempt to manipulate the price of E-Mini S&P 500 futures contracts, a commodity in interstate commerce, in violation of Title 7, United States Code, Section 13(a)(2); and

d. On or about March 10, 2014, in Chicago, and elsewhere, in the Northern District of Illinois, Eastern Division, NAVINDER SINGH SARAO did

knowingly engage in trading, practice, and conduct, on and subject to the rules of the Chicago Mercantile Exchange, that was, was of the character of, and was commonly known to the trade as, "spoofing," by causing to be transmitted to the Chicago Mercantile Exchange E-Mini S&P 500 futures contract orders that he intended to cancel before execution, in violation of Title 7, United States Code, Sections 6c(a)(5)(C) and 13(a)(2).

GREGORY LABERTA
Special Agent
Federal Bureau of Investigation

SUBSCRIBED AND SWORN to before me on _____, 2015

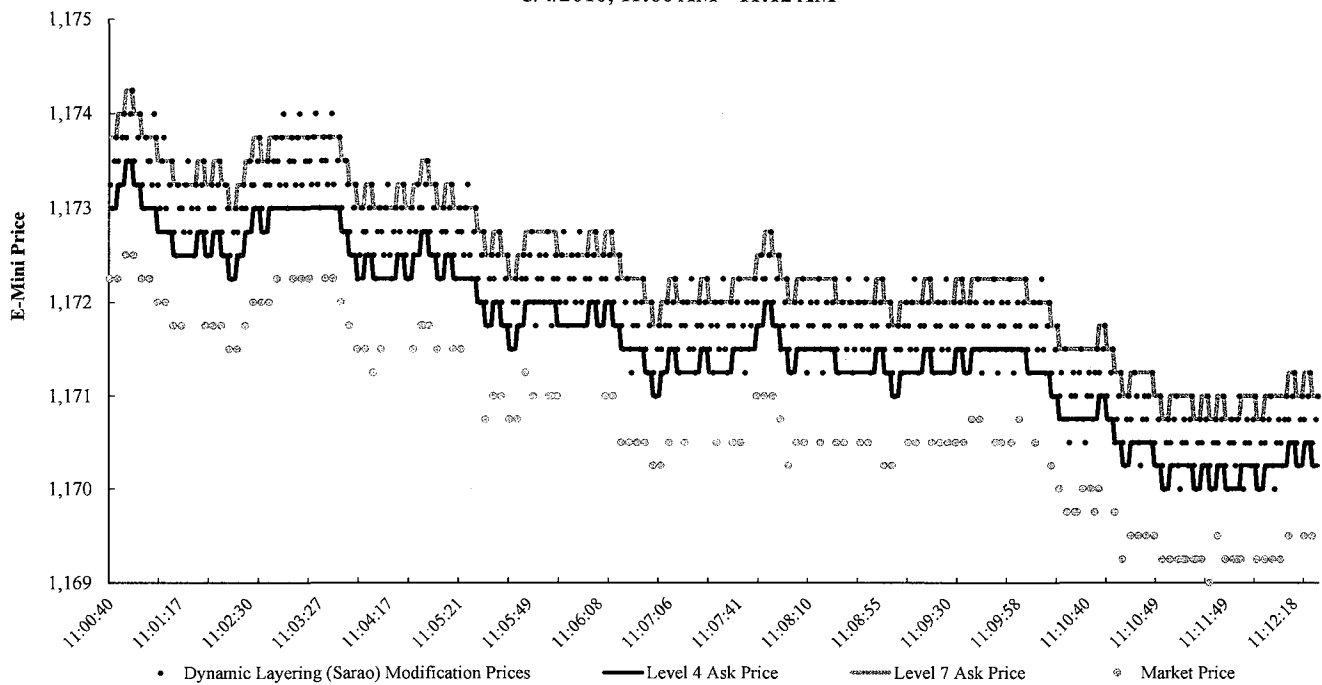
Daniel G. Martin

HON. DANIEL G. MARTIN
United States Magistrate Judge

Exhibit A

As of 2/9/2015

Exhibit A
Example of Dynamic Layering Order Modifications
5/4/2010, 11:00 AM - 11:12 AM



Notes & Sources:

[1] Data are from CME datasets.

[2] This chart displays one active Dynamic Layering period. The blue dots show modification prices on Sarao's four Dynamic Layering orders in this period.

[3] For the purposes of this exhibit, Market Price is the most recent transaction price that occurred less than 0.1 seconds prior to the time of each Dynamic Layering order modification.