CRA Insights: Finance

CRA Charles River Associates

September 2022

Layered orders and spoofing allegations

Introduction

Spoofing charges made headlines recently when jurors in an Illinois court convicted two former JP Morgan precious metals traders, Gregg Smith and Michael Nowak, of wire fraud, attempted price manipulation and spoofing.[1] JP Morgan itself paid a record potential spoofing penalty of $920 million in 2020 in a separate resolution with the US Department of Justice (DoJ).[2] The manipulation of financial markets via spoofing typically involves allegations of placing non-bona fide orders (alleged 'spoof' orders) which a trader intends to cancel on one side of the market, to facilitate the execution of alleged 'genuine' orders on the opposite side. Alleged spoof orders can be classified into two groups: large orders and layered orders.

The two JP Morgan traders, Smith and Nowak, were alleged by prosecutors to have primarily engaged in a layering strategy.[3] Layered orders refer to multiple orders placed by a trader, on the same side of the market, within a short period of time at multiple price levels.[4] Placement of both individual large orders and a layered group of orders reflects an increase in supply on the buy or sell side of the market. Therefore, authorities can allege that a layered group of orders constitutes spoofing by claiming that the intent of the orders was to create a false impression of market depth.[5]

---

1 "Former J.P. Morgan Traders Convicted of Fraud, Attempted Price Manipulation, and Spoofing in a Multi-Year Market Manipulation Scheme." US Department of Justice. August 10, 2022. https://www.justice.gov/opa/pr/former-jp-morgan-traders-convicted-fraud-attempted-price-manipulation-and-spoofing-multi-year.

2 "JPMorgan Chase & Co. Agrees To Pay $920 Million in Connection with Schemes to Defraud Precious Metals and US Treasuries Markets." US Department of Justice. September 29, 2020. https://www.justice.gov/opa/pr/jpmorgan-chase-co-agrees-pay-920-million-connection-schemes-defraud-precious-metals-and-us.

3 "JPMorgan Spoofing Trial Set To Open With Rare RICO Charges." Lauraann Wood, Law360. July 7, 2022. https://www.law360.com/articles/1508912/jpmorgan-spoofing-trial-set-to-open-with-rare-rico-charges.

4 Some sources use the term layering as a variant of market manipulation via spoofing. See "Potential Manipulation Report." FINRA. https://www.finra.org/compliance-tools/report-center/cross-market-equities-supervision/potential-manipulation-report#2.

5 The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 defines spoofing as bidding or offering with the intent to cancel the bid or offer before execution, *Dodd-Frank Wall Street Reform and Consumer Protection Act, Public Law 111-203, July 21, 2010, Section 747, p. 1739.* The Commodity Futures Trading Commission (CFTC) interprets the statute and provides the following examples of spoofing: (i) submitting or cancelling bids or offers to overload the quotation system of a registered entity, (ii) submitting or cancelling bids or offers to delay another person's execution of trades, (iii) submitting or cancelling multiple bids or offers to create an appearance of false market depth, and (iv) submitting or cancelling bids or

This *Insights* is a follow-up to an earlier article, a primer on futures markets and spoofing allegations.[6] In this piece, we continue the discussion on spoofing with a focus on layered orders in the futures markets.

We first provide an overview of recent spoofing allegations made by the DoJ and the Commodity Futures Trading Commission (CFTC) involving layered orders, and show that orders even as small as two lots can be flagged by the authorities as alleged spoof orders. Then, we analyze the execution probability of layered orders during episodes of sudden market movements (sweeps) in different futures markets. In our sample, we find that 17% of trades happen when at least two prices are executed at the same millisecond in the gold futures market. Furthermore, at least two prices are executed at the same millisecond once in every 12 seconds in the gold futures market. This shows that a layered order at the first two levels of the order book carries the risk of being completely executed. Execution probabilities differ across futures markets depending on thickness (or depth) of the markets, with sudden market movements less likely to occur in thicker markets.

Layered orders flagged by DoJ/CFTC

Layering involves the placement of multiple orders at various price levels. For example, in a criminal charge against JP Morgan trader Christian Trunz, the DoJ cited an incident where Trunz placed a series of eight alleged spoof orders of five-lots each to buy platinum futures at prices of $981.20 to $981.60. Trunz's buy-side layered orders accumulated to a total of 40 lots, and were immediately followed by an execution of four lots on the sell-side via the alleged genuine order.[7]

Similarly, the CFTC in its proceedings against JP Morgan trader John Edmonds identified layering in the silver futures market:[8]

> *On March 5, 2014, at 8:18:39.699 AM Central Time, Edmonds placed an offer to sell two lots of the May 2014 expiry of the COMEX Silver Futures ("SIK4") contract at a price of $21.275, which was the best-offer level ("Genuine Silver Offer"). Less than one second later, at 8:18:40.443, Edmonds began placing a sequence of two-lot bids to buy SIK4 at increasing prices ("Spoofing Silver Bids"). Between 8:18:40.443 and 8:18:41.587, an interval of 1.1 seconds, Edmonds placed ten two-lot Spoofing Silver Bids at the following prices in sequence: $21.255, $21.260, $21.265, $21.265, $21.265, $21.265, $21.270, $21.270, $21.270, and $21.270. Edmonds placed these Spoofing Silver Bids at the fourth best bid through the best bid. Edmonds' s last four Spoofing Silver Bids at $21.270 were at the best bid and were one tick below Edmonds's Genuine Silver Offer. At 8:18:41.595, eight milliseconds after Edmonds placed his tenth bid, Edmonds's Genuine Silver Offer was fully filled by other market participants. Shortly thereafter, Edmonds cancelled all of the Spoofing Silver Bids.*

offers with intent to create artificial price movements upwards or downwards. *CFTC Anti-disruptive Practices Authority, Interpretive Guidance and Policy Statement RIN 3038–AD96, effective May 28, 2013.*

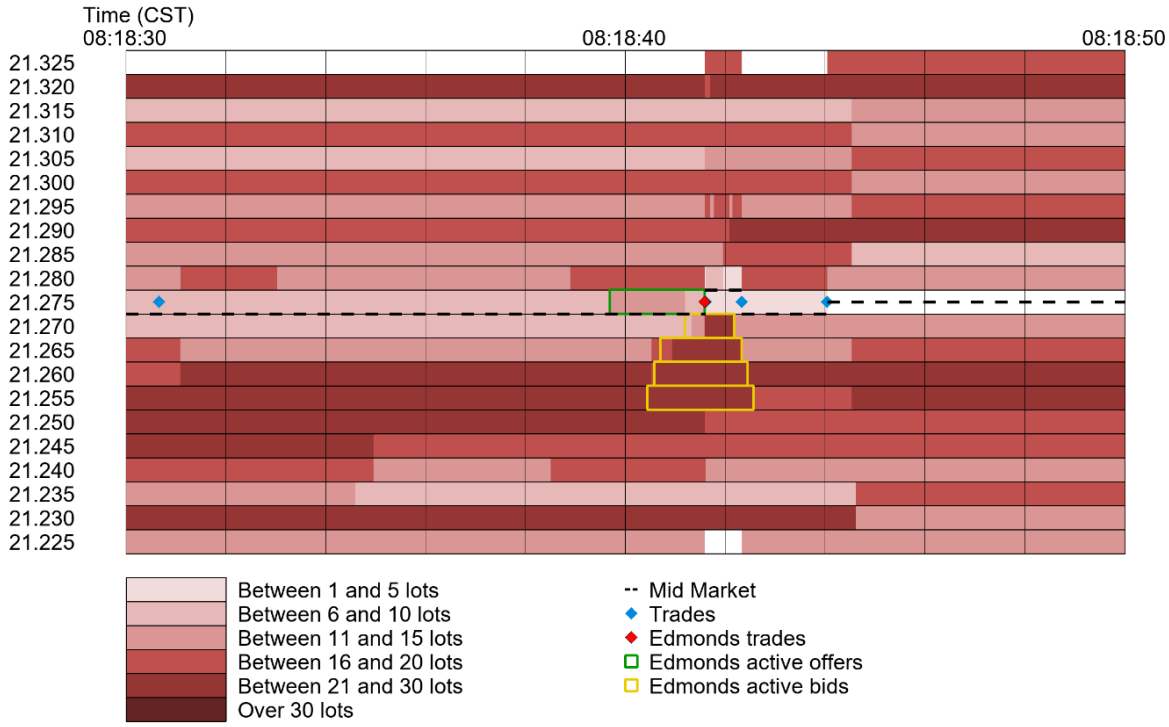
6 See Attari, Mukarram, Lynch, Samuel, Fazilet, Fatih and Chhabra, Rahul. "Primer on futures markets and spoofing allegations." CRA Insights. September 22, 2020. https://www.crai.com/insights-events/publications/primer-on-futures-markets-and-spoofing-allegations/.

7 United States of America v. Christian Trunz, US District Court Eastern District of New York, Case 1:19-cr-00375, pp. 3-4.

8 CFTC Order against John Edmonds, CFTC Docket No. 19-16, p. 3.

Figure 1 below illustrates this incident involving Edmonds on March 5, 2014. The horizonal axis represents time and the vertical axis represents the price level of orders. The dashed line is the midpoint between the best bid and best ask. The darker the shading at any price level and at any point in time, the more lots are available to trade at that price level. The life of Edmonds's two-lot alleged genuine sell order is represented by the green box. The layered buy orders that were shortly cancelled after the execution of the sell order are depicted by the yellow boxes.[9] The red diamond corresponds to the execution of Edmonds's alleged genuine offer.

Figure 1: Example incident in the CFTC Order against John Edmonds[10]



The JP Morgan traders were not the first traders alleged to have engaged in layering. Two former Deutsche Bank traders were convicted of wire fraud in spoofing-related matters in precious metals futures markets.[11] Authorities in other trading markets have also made spoofing allegations involving layered orders. In the *SEC vs. LEK* matter, spoofing using layered orders was alleged in the equity market through shares of publicly listed companies.[12] The *US CFTC vs. Oystacher* matter alleged spoofing with layered orders in copper, crude oil, and natural gas futures, volatility

[9] The CFTC Order against John Edmonds (CFTC Docket No. 19-16, p. 3.) does not give the exact cancellation time of the alleged spoof orders. Using public order book data, we identify timestamps where the outstanding contracts at corresponding price levels decrease exactly by the size of Edmonds's alleged spoof orders. We assume that the timestamp corresponding to the first such decrease is the cancellation time of Edmonds's alleged spoof orders.

[10] Figure 1 uses public trade and order book data from the Chicago Mercantile Exchange (CME), and data from the CFTC Order against John Edmonds, CFTC Docket No. 19-16, p. 3.

[11] "Two Former Deutsche Bank Traders Convicted of Engaging in Deceptive and Manipulative Trading Practices in US Commodities Markets." US Department of Justice. September 25, 2020. https://www.justice.gov/opa/pr/two-former-deutsche-bank-traders-convicted-engaging-deceptive-and-manipulative-trading.

[12] Securities and Exchange Commission v. LEK Securities Corporation, et al., Complaint, March 10, 2017, p.11.

index futures and E-mini S&P 500 futures.[13] On the other hand, in the Eurodollar and Treasury futures market, it has been common to date to see spoofing cases alleging the use of single large orders, as opposed to the use of layered orders.[14]

Spoofing allegations involving layered orders were also made in the seminal spoofing case against Navinder Sarao, the trader who pleaded guilty to illegally manipulating the futures market in connection with the "flash crash" of May 2010.[15] The CFTC alleged that Sarao used an automated layering algorithm to manipulate the E-mini S&P 500 futures market. The algorithm simultaneously placed large orders on the sell side which were eventually cancelled without resulting in a trade. This overload on the sell side created a downward pressure on prices. By turning the algorithm off and on numerous times, Sarao could allegedly profit from the temporary price volatility.[16]

Execution probability of layered orders

Layered orders are placed at multiple levels of the order book as described above. Some portion of layered orders is closer to the inside of the order book and is subject to a higher probability of execution, while another portion is further from the inside and has a lower execution probability. In this section, we analyze events in which orders at multiple price levels are executed simultaneously, and term these events "sweeps." Sweeps are more likely to occur in certain markets, and in these markets execution probability of layered orders is higher.

Our analysis is based on publicly available trade data from the Chicago Mercantile Exchange (CME). The CME provides time, number of contracts, price, and aggressor side data for all trades.[17] In this *Insights* piece, we focus on sweeps in five futures markets – platinum futures, gold futures, Eurodollar futures, Treasury 10-year note futures, and E-mini S&P 500 futures.

We define sweeps as events where orders at multiple price levels on the same side of the order book are executed at the same millisecond and provide results of two analyses for the various number of price levels swept: (i) percentage of contracts executed during sweeps, and (ii) frequency of sweeps during the day.

Table 1 shows contracts executed during sweeps as a percentage of all executed contracts in different futures markets in our sample period.[18] Of all the contracts executed in the platinum futures market, 18% are executed during sweeps of two or more prices which include executions within the same millisecond.

---

[13] US Commodity Futures Trading Commission v. Igor B. Oystacher, et al., Complaint, October 19, 2015, pp 2,14.

[14] CFTC Order in the Matter of Deutsche Bank Securities, Inc., CFTC Docket No. 20-17, p.2; CFTC Order against Mizuho Bank, CFTC Docket No. 18-38, p. 2.

[15] "Futures Trader Pleads Guilty to Illegally Manipulating the Futures Market in Connection With 2010 'Flash Crash.'" US Department of Justice. November 9, 2016. https://www.justice.gov/opa/pr/futures-trader-pleads-guilty-illegally-manipulating-futures-market-connection-2010-flash.

[16] US Commodity Futures Trading Commission v. Navinder Singh Sarao, et al., Complaint, April 17, 2015, pp 1-3.

[17] Aggressor side variable denotes the side of the order crossing the bid-ask spread in a transaction.

[18] We focus on the second week of September every year from 2009 to 2018. See further details on sample selection in the article: Attari, Mukarram, Lynch, Samuel, Fazilet, Fatih and Chhabra, Rahul. "Primer on futures markets and spoofing allegations." CRA Insights. September 22, 2020. https://www.crai.com/insights-events/publications/primer-on-futures-markets-and-spoofing-allegations/.

We find that the percentage of executions during sweeps is highest for the platinum and gold markets, compared to the Eurodollar, Treasury, and E-mini markets. Sweeps are more likely to happen in thin markets, since a large order crossing the bid-ask spread would be executed against orders outstanding at multiple order book levels in thin markets.[19] Results in Table 1 suggest that platinum and gold futures markets are thinner than Eurodollar, Treasuries, and E-mini futures markets. We similarly find that simultaneous executions of orders at three or more prices in Eurodollar, Treasuries, and E-mini futures markets are rare.

Table 1: Contracts executed during sweeps as a percentage of all executed contracts

Number of prices	Platinum	Gold	Eurodollar	Treasury	E-mini
2 or more	18%	17%	3%	1%	4%
3 or more	10%	7%	0.1%	0.1%	0.2%
4 or more	6%	3%	0.0%	0.03%	0.06%
5 or more	4%	2%	0.0%	0.03%	0.02%

Further, we calculate the frequency of sweeps to see whether layered orders are likely to be completely executed in various futures markets. Figure 2.1 shows the average number of two or more price sweeps in each hour during the day and Figure 2.2 shows the same for three or more price sweeps. Since sweeps are much more likely to occur in gold futures market, their frequency is represented in the secondary y-axis in both figures.

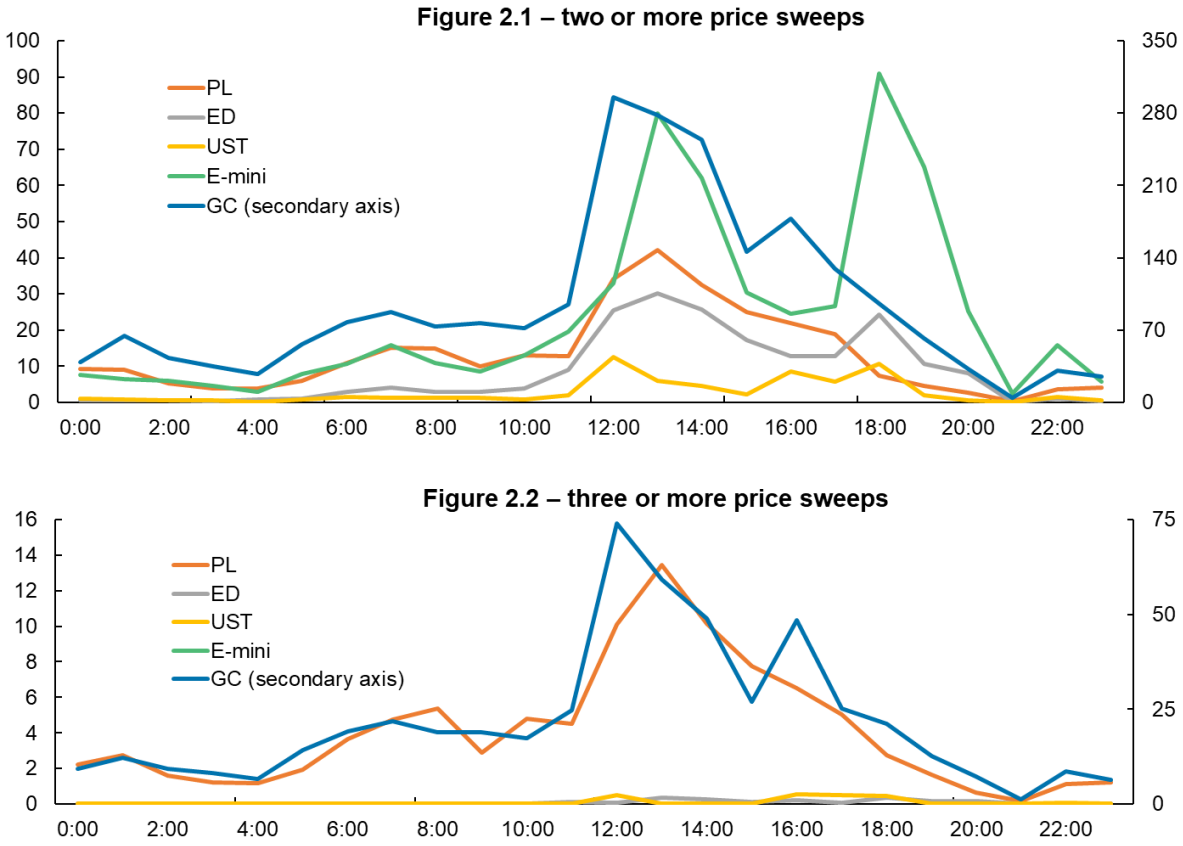
Both figures show that frequency of sweeps increases significantly between 12:00 pm - 4:00 pm UTC, during a time period where New York and London trading hours mostly overlap. The highest number of sweeps per hour during the day in Figure 2.1 are 12.6, 30.2, 42.1, 91.0 and 295.0 in the Treasuries, Eurodollar, platinum, E-mini, and gold futures markets, respectively. This corresponds to one sweep in every 286, 119, 85, 40, and 12 seconds in the Treasuries, Eurodollar, platinum, E-mini, and gold futures markets, respectively.[20] In other words, we find that orders of at least two different prices are executed at the same millisecond once in every 12 seconds in the gold futures market between 12:00 pm and 1:00 pm UTC. The number of sweeps per hour in the E-mini futures market is mostly higher than the platinum futures market; however, the percentage of lots executed during sweeps is higher in the platinum futures market. Similarly, Figure 2.2 shows the number of three or more price sweeps. The pattern is similar to Figure 2.1 for platinum and gold futures markets, although the number of sweeps is lower. The number of three or more price sweeps for the Eurodollar, Treasuries, and E-mini markets are close to zero, which is consistent with Table 1.

[19] A thin market has less orders outstanding at each order book level as compared to thick markets, thus, an order crossing the spread in a thin market has the ability to clear more price levels.

[20] 3600 (number of seconds in an hour)/number of sweeps per hour.

Figure 2: Average number of two or more and three or more price sweeps in each hour during the day

Horizontal axis represents time in UTC, and vertical axis represents number of sweeps per hour



Closing thoughts

While some spoofing cases have focused on single large orders, regulators have also alleged that layered orders can be similarly manipulative, and that a series of consecutive small orders in a layered group can create a market impact comparable to that of a single large order. Based on our analysis, layered orders are not free from the risk of execution due to the existence of sweeps, and we find that the frequency of these sweeps differs across various futures markets.

About the Finance Practice

CRA's Finance Practice provides advanced consulting services to corporate clients and attorneys. We specialize in applying the tools, principles, and findings of finance, economics, and accounting to complex litigation and business problems. Companies, law firms, and government agencies rely on CRA for high-quality research and analysis, expert testimony, and comprehensive support in litigation and regulatory proceedings. Our reputation is built on exceptional client service and our ability to present innovative and pragmatic solutions to complicated challenges. For additional information about how CRA's experts can help you with your litigation and regulatory needs, please visit: **www.crai.com**.

Contacts

Mukarram Attari
Vice President, Co-Practice Leader of Finance
Oakland
+1-510-595-2711
mattari@crai.com

Sam Lynch
Vice President
Boston
+1-617-425-3089
slynch@crai.com

Swati Kanoria
Associate Principal
Boston
+1-617-425-3655
skanoria@crai.com

Fatih Fazilet
Associate Principal
Boston
+1-617-425-3524
ffazilet@crai.com