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SPOOFING, MARKET MANIPULATION, AND THE LIMIT-ORDER BOOK

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INTRODUCTION

This article provides an overview of legal and enforcement actions relating to “spoofing” and related allegations of disruptive or manipulative trading. It also provides an overview of several economic issues: how spoofing might work; whether it provides any benefits to, or harms, market participants; and how a trader's intent regarding spoofing might be analyzed. The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (“Dodd-Frank Act”) added statutory language explicitly outlawing spoofing, defined as “bidding or offering with the intent to cancel the bid or offer before execution”² in the commodities and futures markets. Recent years have seen both criminal prosecutions and regulatory enforcement actions involving allegations of spoofing and similar behavior. As such legal activity proceeds, courts will likely benefit from analysis of how spoofing might operate, how it might affect markets, and how a trader's trading patterns might provide evidence regarding his or her intent.

What is the right price to pay for a security or a futures contract? It is possible to buy or sell many securities and futures contracts on well-developed exchanges. A simple view would be that transaction prices should reflect all publicly available information. But even in that situation, different investors will have different opinions about the value of the instruments, and prices will be affected by the range of different opinions. Moreover, investors take their cues from one another, so the price at which the instrument is trading, or the price at which other investors are willing to buy or sell the instrument, may influence assessments of the value of the instruments.

An array of laws and rules governs this process. Each financial exchange has its own set of rules governing the submission of orders, trading, and other topics. Government regulatory bodies in turn govern the exchanges. In the United States, the Securities and Exchange Commission oversees trading in stocks, bonds, and options on those securities, while the Commodity Futures Trading Commission (CFTC) takes responsibility over trading in futures and similar products.

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2. Commodity Exchange Act 7 U.S.C. § 6c(a)5 (2014).

Rules govern how trading is done. Laws prohibit manipulative trading practices on both securities and futures exchanges. These laws generally require that the practices be intentional and that they be successful in influencing prices or other trading on exchanges. In addition to these longstanding rules, the Dodd-Frank Act added prohibitions against particular “disruptive” trading practices in futures markets, with somewhat reduced requirements regarding intention and success. These new restrictions include a specific prohibition against spoofing. The CFTC has begun enforcing its anti-spoofing authority, leading to several settlements, and at least one ongoing lawsuit. Federal prosecutors have initiated criminal proceedings in several cases, with the first conviction in November 2015.³

Enforcement proceedings and criminal prosecutions regarding manipulation and disruptive practices such as spoofing raise important issues for economists to analyze. Both manipulation and spoofing require a degree of intent – either to create an artificial price in the case of manipulation or to cancel orders before they are executed in the case of spoofing – and this is likely to require an analysis of economic rationale for the defendant’s trading activities. Such an analysis needs to be embedded in an understanding of the dynamics of the relevant markets.

In the rest of this article, I cover the following subjects. I begin with a review of U.S. statutes, regulations, and regulatory guidance covering manipulation and disruptive trading practices. I discuss recent criminal and civil cases involving market manipulation and spoofing. Finally, I review economic aspects of these issues, starting with an overview of the structure of financial exchanges, the impact that orders have on the markets, possible mechanisms for spoofing behavior to affect the markets, and some issues related to proving intent in spoofing cases.

STATUTES, REGULATIONS, AND REGULATORY GUIDANCE

U.S. financial law has both general rules prohibiting manipulation in financial markets and, for futures markets, a section that specifically prohibits spoofing.

Separate federal laws govern securities and futures markets. The Securities Exchange Act of 1934, among other statutes, covers conduct in securities markets. A key provision of this act is Section 10(b), which makes it unlawful:

To use or employ, in connection with the purchase or sale of any security registered on a national securities exchange or any security not so registered, or any securities-based swap agreement any manipulative or deceptive device or contrivance in contravention of such rules and regulations as the [Securities and Exchange] Commission may prescribe as necessary or appropriate in the public interest or for the protection of investors.⁴

Based on this statutory language, the SEC created Rule 10b-5:

Employment of manipulative and deceptive devices.

It shall be unlawful for any person, directly or indirectly, by the use of any means or instrumentality of interstate commerce, or of the mails or of any facility of any national securities exchange,

- (a) To employ any device, scheme, or artifice to defraud,
- (b) To make any untrue statement of a material fact or to omit to state a material fact necessary in order to make the statements made, in the light of the circumstances under which they were made, not misleading, or
- (c) To engage in any act, practice, or course of business which operates or would operate as a fraud or deceit upon any person, in connection with the purchase or sale of any security.⁵

Similar language for futures market was included in the Dodd-Frank Act:

(1) Prohibition against manipulation

It shall be unlawful for any person, directly or indirectly, to use or employ, or attempt to use or employ, in connection with any swap, or a contract of sale of any commodity in interstate commerce, or for future delivery on or subject to the rules of any registered entity, any manipulative or deceptive device or contrivance, in contravention of such rules and regulations as the [Commodity Futures Trading] Commission shall promulgate by not later than 1 year after July 21, 2010, provided no rule or regulation promulgated by the Commission shall require any person to disclose to another person nonpublic information that may be material to the market price, rate, or level of the commodity transaction, except as necessary to make any statement made to the other person in or in connection with the transaction not misleading in any material respect.⁶

3. Press release, United States Attorney’s Office, *High-Frequency Trader Convicted of Disrupting Commodity Futures Market in First Federal Prosecution of ‘Spoofing’*, (N.D. Ill., Nov. 3, 2015).

4. Securities Exchange Act of 1934, 15 U.S.C. §78j(b) (2014).

5. General Rules and Regulations, Securities Exchange Act of 1934, 17 C.F.R. § 240.10.b-5 (2015).

6. Dodd-Frank Wall Street Reform and Consumer Protection Act § 753 (Anti-Manipulation Authority) 7 U.S.C. § 9.1 (2016).

The CFTC's rule covering this issue reads in part as follows:

Prohibition on the employment, or attempted employment, of manipulative and deceptive devices.

(a) It shall be unlawful for any person, directly or indirectly, in connection with any swap, or contract of sale of any commodity in interstate commerce, or contract for future delivery on or subject to the rules of any registered entity, to intentionally or recklessly:

(1) Use or employ, or attempt to use or employ, any manipulative device, scheme, or artifice to defraud...
§180.2 Prohibition on price manipulation.

It shall be unlawful for any person, directly or indirectly, to manipulate or attempt to manipulate the price of any swap, or of any commodity in interstate commerce, or for future delivery on or subject to the rules of any registered entity.⁷

In addition to these general prohibitions on manipulation, Dodd-Frank also introduced specific language regarding spoofing and other practices on futures and commodities exchanges:

(5) Disruptive practices

It shall be unlawful for any person to engage in any trading, practice, or conduct on or subject to the rules of a registered entity that—

(A) violates bids or offers;

(B) demonstrates intentional or reckless disregard for the orderly execution of transactions during the closing period; or

(C) is, is of the character of, or is commonly known to the trade as, “spoofing” (bidding or offering with the intent to cancel the bid or offer before execution).⁸

Instead of writing a regulation expanding on this Disruptive practices clause, the CFTC issued guidance on the topic in 2013. Regarding part (C), it emphasized that a violation required “intent,” not something looser such as “recklessness.” It also drew a distinction between the intent behind spoofing, and manipulative intent, which is covered by a different part of the statute. Spoofing, it stated, involves a review of “all the facts and circumstances of each particular case, including a person’s trading practices and patterns.” The statute provides no specific definition for spoofing, other than the statutory language that connects to the submission of orders with the intent to cancel those orders before execution. In its guidance, the CFTC also provided some examples of behavior that could qualify as spoofing:

The Commission provides four nonexclusive examples of possible situations for when market participants are engaged in “spoofing” behavior, including: (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 canceling bids or offers with intent to create artificial price movements upwards or downwards.⁹

All four of these examples add to the general language in the statute (“bidding or offering with the intent to cancel the bid or offer before execution”) specific intended effects of the spoofing. Only the last of these examples specifically involves the creation of an artificial price, which is part of a typical manipulation claim.¹⁰

Neither the statute nor the CFTC’s guidance provide any explanation on how intent to cancel orders (bids or offers) should be determined. Because the vast majority of limit orders submitted to exchanges are canceled,¹¹ the CFTC’s wording suggests that an allegation of spoofing would need to come with an explanation of how the allegedly spoofing trader intended to gain from the activity. I will return to this topic later in this article.

7. Prohibition against Manipulation, 17 C.F.R. § 180.1 (2015).

8. Commodity Exchange Act 7 U.S.C. § 6c(a)5 (2014).

9. Antidisruptive Practices Authority, 78 Fed. Reg. 31890 (May 28, 2013).

10. See Gregory Scopino, *The (Questionable) Legality of High-Speed “Pinging” and “Front Running” in the Futures Markets*, 47 CONN. L. REV. 607, 656 (2015).

11. Based on my analysis of data from the SEC’s Market Structure website (http://dc.aws-sec.akadns.net/marketstructure/#Vr39Z_krLsO, accessed Feb. 12, 2016), for stocks, there are at least 20 order cancellations for every trade. For exchange-traded products, the ratio is more than 80 order cancellations for every trade. Similar data for futures markets do not appear to be readily available. (For stocks, the average of daily cancel-trade ratios from Jan. 3, 2012 through Sep. 30, 2015 is 20.52; for exchange-traded products, the average is 84.33.)

RECENT CASES INVOLVING ALLEGATIONS OF SPOOFING AND MANIPULATION

Enforcement and prosecution in the area spoofing and manipulation appears to have expanded in recent years. Some of this legal activity involves alleged manipulation of securities and options, for which the rules have not changed. But most involves activities in the futures markets, for which the CFTC and Federal prosecutors benefit from new statutory language on manipulation and disruptive trading, including spoofing.

Perhaps the most prominent recent case was the criminal prosecution and conviction of Michael Coscia in Federal District Court for the Northern District of Illinois. Mr. Coscia is the first individual to be convicted of spoofing under the new statute.¹² He was charged with both commodity fraud and spoofing, involving six episodes of trading futures on several different commodities. The most detailed allegation in his indictment involved buying Euro FX futures, seven milliseconds after entering three large sell orders, which were then canceled. He then allegedly reversed this process, selling futures at a slightly higher price, nine milliseconds after entering four large buy orders, which he then canceled. This set of roundtrip trades allegedly produced profits of approximately \$175 in less than one second.¹³ Mr. Coscia allegedly repeated this round-trip activity many times.

Another trader, Aleksandr Milrud, had earlier pled guilty of manipulative behavior on the stock market. Mr. Milrud was alleged to have “orchestrated an extensive and sophisticated international layering scheme that targeted U.S. securities markets and involved high-speed trading through numerous brokerage accounts”¹⁴ Layering might be considered a specific form of the more general behavior labeled spoofing. Layering typically implies entering orders at multiple price points to make it appear as if there is substantial interest on one side of the market, with the goal of inducing others to enter more aggressive orders in the same direction, which interact with an order by the

same trader on the other side of the market. Of course, profiting in financial markets requires buying and selling, and Milrud’s was to operate quickly on both sides of the market, making small amounts on each round-trip transaction and repeating the process hundreds of times per day.¹⁵

A highly publicized recent indictment involves similar allegations. In *U.S. v. Sarao*, the government alleges that Navinder Singh Sarao (who is currently fighting extradition from the United Kingdom) layered orders in the market for E-Mini S&P 500 futures contracts and made profits “by repeatedly selling futures contracts only to buy them back at a slightly lower price,” or by doing the opposite. The Sarao indictment provides some information on how he might have managed the risk that his layering orders might get hit. His layering orders were entered several steps away from the best bid or offer in the market, and he allegedly worked with a programmer to develop software that would cancel the orders in the event of a trade or in the event of the market moving close to the levels of his orders. According to the indictment, “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.”¹⁶

In addition to the foregoing activity by prosecutors, enforcement agencies have also been pursuing actions against alleged spoofing. These include actions related to activities in securities markets, under the purview of the SEC, as well as actions related to activities in the futures markets.

On the securities side, the SEC in October 2015 reached a settlement with Briargate Trading, LLC and one of its owners, Eric Oscher, over spoofing on the New York Stock Exchange (NYSE) with pre-open orders. The NYSE sets its opening price based on all existing orders, and it disseminates order imbalance before the opening. Briargate allegedly placed “non bona-fide” orders on the NYSE to influence the order imbalance, which permitted it to execute trades for the same stocks on other exchanges.¹⁷

12. Jessica Corso, *High-Speed Trader Found Guilty In Landmark Spoofing Case*, LAW360, Nov. 3, 2015.

13. Indictment at 6-7, *United States v. Coscia*, No. 1:14-cr-00551 (N.D. Ill., Oct. 1, 2014).

14. Information at 4, *United States v. Milrud*, No. 2:15-cr-00455-JLL (D.N.J., Sept. 10, 2015).

15. *Id.* at 6-7; Ed Beeson, *Canadian High-Speed Trader Pleads Guilty in Spoofing Case*, LAW360, Sept. 14, 2015.

16. Indictment, *United States v. Sarao*, No. 1:15-cr-00075 (N.D. Ill., Sep. 2, 2015).

17. Order, *Briargate Trading, LLC* (SEC, Oct. 8, 2015).

The SEC also recently settled a case involving trading in stock options. It accused Behruz Afshar and others with submitted large “All-or-None” orders for options on the Nasdaq OMX PHLX exchange. The orders were hidden, in that traders with access to order book data would not see the orders, and apparently the orders were inside the existing market bid-offer spread. Then the defendants allegedly placed small (non-hidden) orders on the other side of the market, in order to induce other traders to match or improve on these orders. When the other traders did so, they ended up executing against the hidden orders. Afshar and others apparently profited not by buying at lower prices than they sold, but by receiving rebates on their large hidden order because, as the longer standing order, it was considered by the exchange to have been “making,” or providing, liquidity.¹⁸

Unlike the criminal matters discussed previously, these two settled SEC actions did not involve traders allegedly spoofing on a particular exchange in order to move prices on that exchange. Briargate allegedly spoofed with pre-open orders on the NYSE, in order to moves prices on other exchanges.¹⁹ Afshar allegedly spoofed in order to profit from maker rebates when other traders executed trades against his hidden order, with the profit coming from rebates rather than better prices.

In a more conventional spoofing case, the SEC announced in 2014 a settlement of more than \$1.9 million with Joseph Dondero, the co-owner of Visionary Trading LLC in New Jersey for “spoofing” and “layering” in “publicly traded stocks” Dondero and others, including Lightspeed Trading LLC, were also charged with related securities violations.²⁰ At least some of Dondero’s trading involving posting bids in order to induce more aggressive bids that would then execute against hidden sell orders placed by Dondero.²¹ The CFTC is currently litigating a high profile spoofing case against Igor Oystacher and 3 Red Trading LLC. The case includes allegations of both spoofing and “employment of a manipulative and deceptive device or contrivance.” The defendants’ alleged behavior involves spoofing on one side of the market for various futures, and then entering aggressive orders on the other side

of the market to execute against orders entered in reaction to the spoofing. A different twist in the Oystacher case is that the spoofing orders are alleged to have carried “avoid orders that cross” instructions that automatically canceled them when 3 Red entered orders on the opposite side of the market. The defendants also allegedly entered some of their opposite-side orders as “iceberg” orders, which published only part of the total order, with the rest remaining hidden until the published portion is executed.²² This might have made the reacting orders less cautious than if the entire opposite-side order had been published.²³

In another case, the CFTC filed charges in May 2015 against two traders in the United Arab Emirates for alleged spoofing in gold and silver contracts on the Comex exchange in New York.²⁴ The two defendants settled the charges for combined penalties of \$2.7 million.²⁵

Prior to his indictment, Mr. Coscia settled an investigation by the CFTC and other regulators into his practices. This resulted in a penalty and disgorgement of \$1.4 million each. He also paid a penalty of about \$900,000 to the Financial Conduct Authority in the United Kingdom and a fine of \$800,000 to the CME Group.²⁶

Other regulators have pursued similar claims. The French market regulator, the *Autorité des Marchés Financiers*, recently announced a fine against both a trading firm and an exchange. It found that in 2009 the trading firm, Madison Tyler Europe, engaged in “trading practices, involving huge volumes of extremely rapid messages in the order books of the 27 securities [which] gave, or were likely to have given, false or misleading indications as to the supply and demand for those financial instruments, constituting a market manipulation.” The exchange was fined because it was found to have improperly permitted the trading firm to have engaged in this behavior.²⁷

Finally, the New York State Attorney General has announced an investigation of foreign exchange brokers for possible spoofing in markets for options on foreign currency.²⁸

18. Order, Behruz Afshar (SEC, Dec. 3, 2015).

19. In the United States, stocks often trade on multiple exchanges.

20. Press Release 2014-67 (SEC, Apr. 4, 2014).

21. Order at 7, Visionary Trading LLC (SEC, Apr. 4, 2014).

22. Complaint, CFTC v. Oystacher, No. 15-cv-9196 (N.D. Ill., Oct. 19, 2015).

23. Such “iceberg” orders are also called reserve orders. The disadvantage of hiding part of an order is that displayed volume will typically have priority. In this case, the hidden part of 3Red’s order would not execute until other displayed interest at the same price.

24. *UAE Traders Charged with ‘Spoofing’ NY Market*, FIN. TIMES, May 6, 2015.

25. Press release PR-7353-16 (CFTC, Apr. 5, 2016).

26. Press release PR-6649-13 (CFTC, Jul. 22, 2013); press release (Financial Conduct Authority, July 22, 2013).

27. News release (Autorité des Marchés Financiers, Dec. 8, 2015); Tom Zanki, *France Hits Virtu, Euronext with Market Manipulation Fines*, LAW360, Dec. 8, 2015.

28. *New York’s top prosecutor probes brokers over forex spoofing*, FIN. TIMES, Nov. 23, 2015.

In addition to suits filed by government agencies, a private lawsuit was filed in the Northern District of Illinois by HTG Capital Partners, LLC. The complaint alleged that an unknown group of traders undertook spoofing transactions in the U.S. Treasury futures market on the Chicago Board of Trade. HTG claims that was forced to expend substantial resources to “detect and avoid” the alleged spoofing.²⁹ The trading occurred on the electronic CME Globex platform. The complaint describes the spoofing as follows:

In the first phase, the Doe Defendant(s) would enter Deceptive Orders that they intended to cancel before execution (the “build-up” phase).³⁰ These orders were deceptive because the Doe Defendant(s) intended to cancel the orders before they could be filled; they created the false appearance of market depth, which, in turn, caused unwitting market participants to react by entering buy or sell orders in the same direction as the false momentum. In the second phase, the Doe Defendant(s) canceled the Deceptive Orders they had entered during the build-up phase (i.e., the “cancel” phase). In the third phase, virtually simultaneous to the cancels, the Doe Defendant(s) would enter one or more orders in the opposite direction of the Deceptive Orders and at the same price, trading against the remaining available contracts at that price, thereby “flipping” the market (the “flip” phase).³¹

Spoofing also raises compliance risks for brokers. FINRA charged Lightspeed Trading with the failure to take action when its employees became concerned about spoofing activity by a client. Lightspeed, which was also charged on other issues, settled with FINRA and was fined \$250,000.³²

ECONOMICS OF “SPOOFING”

An economic analysis of the alleged spoofing is likely to form an important piece of the evidence in litigation like the cases discussed above. Spoofing, as well as market manipulation, turns on the intent of the traders. Spoofing requires the intent to cancel orders before their execution, while market manipulation requires the intent to create an artificial price. Absent specific documentary evidence on the intent of traders, an analysis of trading patterns is likely to be important. I will discuss several aspects of such analysis below.

Market structure

As a preliminary matter, it is important to have a basic understanding of the structure of markets for stocks, options, futures, and other such products. All of these instruments trade on organized exchanges, such as the NYSE, NASDAQ, and CME. Members of an exchange submit orders to the exchange, and these orders are typically of two different types. The first type, limit orders, consists of orders to buy or sell a particular quantity of an instrument at a specified price, or better. These orders will typically remain open until they are filled, or until they are canceled. The totality of limit orders for a particular instrument makes up the limit-order book for that instrument.

29. Complaint at 17, HTG Capital Partners, LLC, v. Doe(s), No. 15-cv-2129 (N.D. Ill., Mar. 10, 2015).

30. Footnote in quoted material: “In certain instances, the Doe Defendant(s) would modify the orders (by increasing the quantity for example) to avoid execution instead of canceling them. These modifications produced the same result as a cancel: the orders were not executed.”

31. Complaint at 3-4, HTG Capital Partners, LLC, v. Doe(s), No. 15-cv-2129 (N.D. Ill., Mar. 10, 2015).

32. Ed Beeson, *FINRA Says NY Brokerage Sat on ‘Spoofing’ Suspicions*, LAW360, Feb. 17, 2015.

A sample limit order book is shown in Figure 1. The shares offered column shows the total amounts of limit orders to sell the stock at prices starting at \$10.02 and ascending in steps up the highest offer at \$10.10. The shares bid column shows the total amounts of limit orders to buy the stock, starting at \$9.98 and descending to the lowest bid at \$9.91. The best bid (\$9.98) and the best offer (\$10.02) form the exchange's quote for this stock, and the difference of \$0.04 between the two sides is the bid-offer (or "bid-ask") spread.

Figure 1. Sample Limit-Order Book

ORDER BOOK		
Price	Shares Offered	Shared Bid
\$10.10	100	
\$10.09	100	
\$10.08		
\$10.07	100	
\$10.06	200	
\$10.05	200	
\$10.04	200	
\$10.03	300	
\$10.02	400	best offer
\$10.01		
\$10.00		spread
\$9.99		
\$9.98	best bid	400
\$9.97		500
\$9.96		200
\$9.95		100
\$9.94		
\$9.93		100
\$9.92		100
\$9.91		200
\$9.90		
Totals	1,600	1,600

The second type of order is a market order, which is an order to buy or sell shares (or contracts on options or futures markets) at the prevailing price in the market. A market order submitted to an exchange will typically execute against one side of the exchange's quote. For example, a market order to buy 200 shares submitted to the exchange with the limit order book in Figure 1 will purchase the shares at the offer price of \$10.02. The amount offered at this price then is reduced by this amount, as shown in Figure 2.

Figure 2. After 200 Share Market Buy Order

ORDER BOOK		
Price	Shares Offered	Shared Bid
\$10.10	100	
\$10.09	100	
\$10.08		
\$10.07	100	
\$10.06	200	
\$10.05	200	
\$10.04	200	
\$10.03	300	
\$10.02	200	best offer
\$10.01		
\$10.00		spread
\$9.99		
\$9.98	best bid	400
\$9.97		500
\$9.96		200
\$9.95		100
\$9.94		
\$9.93		100
\$9.92		100
\$9.91		200
\$9.90		
Totals	1,400	1,600

What would happen if a larger market order arrived? In the market shown in Figure 2, suppose a market order to purchase 1,000 shares arrived. This order would execute at multiple price points, buying the remaining 200 shares at \$10.02, and another 800 shares at prices ranging from \$10.03 up to \$10.06. The resulting order book, with the elimination of all these offered shares, is depicted in Figure 3.

The traders who submitted the limit orders that were executed against the two market orders (for 200 and then for 1,000 shares) described above would have sold shares for prices ranging from \$10.02 to \$10.06. If the traders had long positions that they wished to liquidate, they have sold the positions at better prices than they would have received with market orders (which would have executed at \$9.98 or lower). But the traders also faced a risk that their limit orders would not have been executed, and the market could have moved lower, requiring them to accept a price even lower than the existing market bids.

Alternatively, the offers that were executed in Figures 2 and 3 may have been provided by traders who remained active on both sides of the market, submitting both offers to sell shares and bids to purchase shares. These traders would profit to the extent that their sales occur at higher prices than their purchases. The primary risk these traders would face is that the market might move against them. For example, a wave of market buy orders may move the market up, cleaning out much of the offers on the exchange's book. As the limit orders get executed, the traders behind those orders are left with reduced or short positions that they then seek to balance by purchasing the stock. But since the market has moved, they may be required to buy the stock at prices above their sales prices.

Figure 3. After 1,000 Share Market Buy Order

ORDER BOOK		
Price	Shares Offered	Shared Bid
\$10.10	100	
\$10.09	100	
\$10.08		
\$10.07	100	
\$10.06	100	best offer
\$10.05		
\$10.04		
\$10.03		
\$10.02	spread	
\$10.01		
\$10.00		
\$9.99		
\$9.98	best bid	400
\$9.97		500
\$9.96		200
\$9.95		100
\$9.94		
\$9.93		100
\$9.92		100
\$9.91		200
\$9.90		
Totals	400	1,600

How spoofing might work

In this way, the market-making traders bear risk, which they receive in exchange for the profit on the spread between bids and offers. The greater the risk of an adverse market movement, the wider the spread needs to be to compensate market makers for this risk. The risk also gives traders a strong incentive to closely monitor market activity to anticipate any market movements. For example, if they see a build-up of orders on the buy side, they may conclude that the market is likely to rise. They would tend to react by bidding more aggressively (increasing the quantity and price of buy orders) while pulling back offers to sell. See Figure 4.

This in turn sets the stage for attempts to profit from traders' attempts to anticipate market movements, some of which might be characterized as spoofing behavior. Someone might enter more bids for a stock, just as shown in panel 2 of Figure 4. This would induce other traders to bid more aggressively, and may enable others to sell positions at a better price.

Figure 4. Market Reaction to a Build-Up of Orders on Buy Side

Price	1. INITIAL STATE		2. BUILD-UP OF ORDERS ON BUY SIDE		3. MARKET REACTION	
	Shares Offered	Shared Bid	Shares Offered	Shared Bid	Shares Offered	Shares Bid
\$10.10	100		100		300	
\$10.09	100		100		200	
\$10.08					200	
\$10.07	100		100		200	
\$10.06	200		200		200	
\$10.05	200		200		200	best offer
\$10.04	200		200			↑ spread
\$10.03	300		300			↓ spread
\$10.02	400	best offer	400	best offer		
\$10.01		↑ spread		↑ spread	best bid	300
\$10.00		↓ spread		↓ spread		600
\$9.99						700
\$9.98	best bid	400	best bid	700		500
\$9.97		500		1,000		600
\$9.96		200		700		500
\$9.95		100		800		800
\$9.94				400		500
\$9.93		100		500		400
\$9.92		100		200		100
\$9.91		200		200		
\$9.90						
Totals	1,600	1,600	1,600	1,400	1,300	5,000

The effects of spoofing

What is the harm in this behavior? Assuming the spoofing is successful, it induces market makers to buy and sell at more generous prices than they otherwise would. This reduces market makers' profits, and actually might lead them to pull back orders in order to raise the market-making spread. As market orders arrive, the prices at which they execute will be worse (market sells at lower prices and market buys at higher prices). Such a reduction in market liquidity would be a possible economic harm of spoofing.

But another perspective suggests possible economic benefits of spoofing. Economic efficiency benefits when financial markets more accurately reflect available information on the value of instruments traded. Traders will have an incentive to engage in research to acquire such information if they can then trade profitably on the information.

The connection with spoofing is as follows. A trader may have uncovered through research some positive information about a company's stock. In order to buy the stock, it enters limit orders at various prices. The problem is that other traders may guess that these limit orders have come from someone with positive information and bid up the price of the stock. The trader who originally produced the research does not receive the profits from the research, and ultimately the trader's incentives to conduct investment research decreases.³³

But if spoofing is a known part of market behavior, the size of the limit order book will be less meaningful for predicting market movements, and traders will attach less meaning to changes in the size of the order book, and this may help restore the profitability of conducting research. That in turn may help the markets serve more effectively their important role of allocating capital within our economy.

There is an asymmetry in the authorities' concern over spoofing. The focus of the law is to ensure that every order on exchanges' order books represents a genuine intent to trade. Somehow, this is considered to produce a better functioning market. Yet the law does not require that everyone with an intent to trade post limit orders for their entire intended trades. Thus, the size of exchange order books are likely to understate the shares or contracts available for purchase or sale at any price. It is difficult to see how enforcement actions for spoofing improve the quality of the order book.

Demonstrating intent

Turning back to the elements of spoofing in a legal proceeding, a key issue is that the statute on spoofing specifically requires that the defendant have submitted orders with the intention of canceling those orders before execution. Can such intent be inferred from the pattern of a trader's orders? In general, one of three things can happen to an order: (1) it can be executed, (2) it can be canceled, or (3) it can be left open until the market closes. (These three outcomes may be combined, with, for example, an order partially executed and partially left open.) Equity market data suggest that the vast majority of limit orders are canceled.

What does intent mean in this context? It is likely that traders do not expect most of their limit orders to be executed, so in that sense, they probably expect to cancel most of them. If authorities equate expectation with intent, they would likely conclude that most orders are not intended to be executed. But orders that are likely to be canceled may still execute under certain circumstances (such as the arrival of a large market order), and traders presumably consider such possibilities when they post their limit orders.

33. This is a form of the problem described by the SEC as an "order-anticipation strategy." See Concept Release on Equity Market Structure at 54-56 (SEC, Jan. 14, 2010).

Alternatively, authorities could simply target traders with particularly high cancellation rates. But this risks targeting behavior – order cancellation – that is a normal aspect of market functioning. It also risks targeting any trader whose cancellation rate is a statistical outlier. If enforcement authorities review the trading of many traders, some of those will turn out to be statistical outliers. That is not, by itself, a sound process for identifying malfeasance.

It is probably true that limit orders are more likely to be executed if they are closer to the market inside and if they are left open longer (other things equal). Unless the authorities, as a policy matter, wish to discourage orders outside the quote, or short-lived orders, these facts should not be sufficient for demonstrating intent to cancel. It seems unlikely, therefore, that trading patterns will provide sufficient evidence to prove that a trader submitted orders without any intent to have those orders executed under any circumstances.

This suggests that evidence that the orders had some other impact, from which the trader could benefit, is likely to be important in proceedings on spoofing. Specifically, the recent enforcement and criminal cases discussed above generally involve allegations that orders submitted by the defendant induced changes in orders submitted by other traders. Typically, this involved inducing more aggressive limit orders on the same side of the market, against which the defendant then executed opposite side orders. This suggests a three-step pattern: (1) defendant submits limit orders; (2) other limit orders appear at the same price or better; (3) defendant's orders in opposite direction execute against the other limit orders in step 2. It would

then fall to economic experts to analyze whether such a pattern exists, and whether the trading suggests an intention on the part of the defendant to induce the other limit orders to be submitted. The pattern described could be consistent with benign activity as well. For example, the trader could have orders on both sides of the market to benefit from the spread. A more aggressive trader could enter and submit more aggressive orders that then interact with the other side of the defendant's orders. Seeing those more aggressive orders, the defendant concludes the market is moving, cancels his/her open orders, and submits orders on both sides of the new market price.

If a trader is alleged to have pursued spoofing as a strategy, an analysis of the risk and expected return of the strategy can provide evidence on whether this is a plausible claim. The expected return of a spoofing strategy will be the difference between sale prices and buy prices for the strategy, times the number of shares or contracts traded. A viable strategy would need to balance this potential gain against several risks. Markets may move in the time between purchases and sales, possibly causing a loss to traders. In addition, the supposedly non bona-fide orders may be executed, possibly leaving the trader with a large, and risky exposure to the market. Financial economics provides tools to compare the returns to a trading strategy with its risks.

CONCLUDING REMARKS

The Dodd-Frank Act gave U.S. enforcement authorities new tools to control manipulative and disruptive trading practices such as spoofing. In the last year, the authorities have been enforcing the new laws vigorously. Several cases have been settled, and the Department of Justice obtained a conviction of Michael Coscia in a trial about spoofing and market manipulation. We can expect continued action to enforce manipulation and disruptive trading practice. The CFTC has highlighted its need for expanded resources to continue to pursue spoofing and manipulation cases.³⁴

Enforcement of spoofing and manipulation requires difficult economic analysis. Establishing intent may present a significant challenge. The legal definition of spoofing includes the requirement that defendants posted orders that they intended to cancel. The fact that the vast majority of all limit orders are canceled makes such intent a difficult line to draw. In addition to the challenge of proving intent, economic analyses of spoofing and manipulation will often require an analysis of the risks and expected returns of trading strategies alleged to violate the law.

At a broader policy level, a lack of clarity continues to surround the economics of spoofing. It is conceivable that the existence of “non bona fide” orders may actually improve incentives to obtain value relevant information about companies and commodities. The unspoken assumption behind concern about spoofing is that exchanges order books should provide reliable information of buy and sell interest for financial instruments.³⁵ Yet most traders large enough to have any impact on the market will be aware that the limit orders they post will have an impact on other traders’ decisions, and this gives them an incentive to shade the price or quantity of their orders to influence that impact.³⁶ An exchange’s limit order book, therefore, inevitably reflects the strategic behavior of many traders. It is not clear that limiting spoofing, which is only one form of such strategic behavior, will improve the functioning of markets.

34. “The Commission not only has insufficient resources currently, it anticipates more time-intensive and inherently complex investigations due to innovative products and practices within the industry, including the use of automated and high frequency trading. Today, analyzing trading patterns involves sophisticated information technology (IT) capabilities and unique expertise. For example, the advent of new, complicated forms illegal behavior and manipulation, such as spoofing, requires looking at massive quantities of data.” President’s Budget, Fiscal Year 2017 at 4 (CFTC, Feb. 9, 2016).

35. In the words of the London Stock Exchange, “The Exchange reminds member firms that the efficient functioning of the markets and the best interests of participants are undermined if orders placed on the order book do not reflect genuine trading interest. Such behaviour could create a false and misleading impression of the market Stock Exchange Notice N78/07 (London Stock Exchange, Dec. 3, 2007).

36. The economic literature on this topic goes back as far as Albert S. Kyle, *Continuous Auctions and Insider Trading*, 53 *ECONOMETRICA* 1315 (1985).