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High Speed Trading on Stock and Commodity Markets— From Courier Pigeons to Computers

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By

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> The success of a speculator depends on the accuracy of his estimates, and it follows that where we find organized speculation we find the best perfected facilities for securing early and accurate information. This is one of the striking merits of the speculative system. In any business, knowledge and foresight are the chief requisites of success. Nowhere do we find such strenuous efforts in this direction as among large speculators. It may be said with scarcely an exception that every successful operator in the stock or grain market has been distinguished by his unusual success in securing accurate information in advance of his competitors.
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> With this body of keen experts, striving by the use of private wires, special agents and every other means, to discover and foresee every event bearing on values, speculation has been well defined as the struggle of well-equipped intelligence against the rough power of chance.
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> --Henry Crosby, 1896 [2]

ABSTRACT

A growing concern in the stock and commodity markets over the last several years has been the rise of high-frequency traders (HFTs). Those traders employ high-speed computer technology for the algorithmic origination, transmission and execution of their orders through fiber optic cables and micro wave towers. That technology allows HFT orders to be executed in times measured in fractions of a second. As a result of this technological advance, HFTs are now dominating trading volumes. This phenomenon has, on the one hand, led to claims by proponents of high-speed trading that HFTs are an important source of market liquidity and should not be subject to burdensome regulation. Critics of HFTs, on the other hand, are claiming that high speed trading is abusive and disruptive for other traders. Those critics also claim that HFTs use their high-speed advantage to trade in advance of other customers and that HFTs should be regulated in a manner that will remove their advantages. This article will show that concern over informational advantages of traders through "high speed" communications is not a new

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[2] Henry Crosby, *Speculation on the Stock and Produce Exchanges of the United States*, Vol. VII, Studies in History, Economics and Public Law, 117 (1896) (footnotes omitted).

phenomenon. Such advantages have historically been employed through communication methods that have included fast sailing ships, courier pigeons, stagecoaches, smoke signals, semaphore flags, flashing mirrors, the telegraph and the telephone. This article will also show how computerized high-speed trading transformed the stock and commodity markets from inefficient open outcry auctions to more efficient electronic trading platforms in which HFTs play an important role. The article concludes that HFTs are simply a continuation of market advances and that efforts to slow down HFTs are misguided.

I

INTRODUCTION

HIGH SPEED TRADING CONCERNS

A growing concern in the stock and commodity markets over the last several years has been the rise of high-frequency traders (HFTs).[3] HFTs seek advantage over other traders through the use of algorithmic trading programs that execute orders through high-speed fiber optic cables, microwaves and even lasers.[4] The speed of HFT order

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[3] The Securities and Exchange Commission has noted that:

> One of the most significant market structure developments in recent years is high frequency trading ('HFT'). The term is relatively new and is not yet clearly defined. It typically is used to refer to professional traders acting in a proprietary capacity that engage in strategies that generate a large number of trades on a daily basis. These traders could be organized in a variety of ways, including as a proprietary trading firm (which may or may not be a registered broker-dealer and member of FINRA), as the proprietary trading desk of a multi-service broker-dealer, or as a hedge fund. . . .

SEC, *Concept Release on Equity Market Structure*, 75 Fed. Reg. 3594, 3606 (Jan. 21, 2010). *See generally e.g.*, *Scott Patterson*, *The Quants* (2010) (describing the development of HFTs).

[4] An advisory committee created by the Commodity Futures Trading Commission identified the following as attributes of a HFT:

> (a) Algorithms for decision making, order initiation, generation, routing, or execution, for each individual transaction without human direction;
> (b) low-latency technology that is designed to minimize response times, including proximity and co-location services;
> (c) high speed connections to markets for order entry; and
> (d) recurring high message rates (orders, quotes or cancellations) determined using one or more objective forms of measurement, including (i) cancel-to-fill ratios; (ii) participant-to-market message ratios; or (iii) participant-to-market trade volume ratios

Concept Release on Risk Controls and System Safeguards for Automated Trading Environments, 78 Fed. Reg. 56542, 56545 (Sept. 12, 2013) (footnote omitted).

entry and execution is further enhanced by the "co-location" of their computer servers at specially built exchange facilities.[5] These communication advantages allow HFTs to shave microseconds off trade origination and execution times, providing advantage over traders that do not have such high-speed capabilities.[6]

As will be described below, the quest for "high-speed" trading advantages is not a new phenomenon. High-speed traders in earlier centuries employed communication mediums that were faster than the norm at the time. Such devices have included fast sailing ships, courier pigeons, express coaches, smoke and hand signals, semaphore flags, mirrors, the telegraph and private telephone lines. Those advances in communication initially benefitted individual speculators who were the first to employ them, but concerns were voiced that those "high-speed" traders were taking advantage of slower speed market participants. There was, however, another side of the coin that those critics largely ignored. The introduction of ever-faster communication methods transformed stock and commodity markets from local exchanges with little liquidity into international

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[5] Senator John McCain (R. Ariz) described co-location as follows:

> Another key tactic used by high-frequency trading firms is co-location. This practice involves trading firms literally renting space for their computers in the same room as the computers that run the stock exchanges so that they can receive market information directly from the exchanges' computers as fast as possible. The investors that don't buy this direct connection to the exchanges receive market data via a government-established system using out-of-date technology called the Securities Information Processor that compiles market data much more slowly.

Remarks of Senator John McCain, in Hearings on *Conflicts of Interest, Investor Loss of Confidence, and High Speed Trading in U.S. Stock Markets* before the Senate Permanent Subcommittee on Investigations (June 17, 2014, available at http://www.hsgac.senate.gov/subcommittees/investigations/hearings/conflicts-of-interest-investor-loss-of-confidence-and-high-speed-trading-in-us-stock-markets, (accessed on June 19, 2014).

[6] The Securities and Exchange Commission has noted that:

> Unlike years ago, trades today are transacted in milliseconds or faster and dispersed among many trading centers. These changes have allowed large market participants to employ sophisticated trading methods to trade electronically on multiple venues in huge volumes at very fast speeds.

SEC, *SEC Adopts Large Trader Reporting Regime*, Release No. 2011-154 (July 26, 2011), available at http://www.sec.gov/news/press/2011/2011-154.htm (accessed on March 17, 2011). Microwave transmissions were becoming increasingly popular in 2014 for HFTs. Matthew Leising, High-Frequency Traders Find Microwaves Suit Their Need for Speed, Bloomberg BusinessWeek, July 24, 2014, http://www.businessweek.com/articles/2014-07-24/high-frequency-traders-find-microwaves-suit-their-need-for-speed (accessed on July 27, 2014).

markets that dominated international finance.

Twentieth century markets thus benefitted from ever-higher speed trading advances, but were still hampered by the slow paced "open outcry" auction markets that emerged from the nineteenth century. The computer was only solely integrated into those markets and did not fully arrive until this century. The modern HFT is the by-product of a much-needed shift from the inefficient and sometimes abusive open out cry trading floors of exchanges to the modern electronic trading platform. Before the advent of electronic trading platforms, traders on the New York Stock Exchange (NYSE) would typically formulate orders in their heads based on some market signal they viewed to be favorable. The trader would phone the order into a broker's trading desk, usually located on or near a market center. The broker would transmit the order to a floor broker on the trading floor by messenger, hand signals or pneumatic tubes. The floor broker would then take the order to the NYSE specialist's post where a listed stock was traded for execution. The process would be reversed to report the execution of the order.

This process was slow, cumbersome and costly because commissions had to be paid to brokers. The specialist was also paid a costly fee in the form of the spread he quoted between his bid and ask quotes. The order execution process was similarly cumbersome in the over-the-counter (OTC) market where competing market makers had to be consulted in order to assure the best execution price for orders. There too commissions (or markups or markdowns) and spreads had to be paid to brokers and market makers.

The slowness of this process raised further costs concerns from "latency" and "slippage. Latency is the period of delay that occurs between the time an order is

formulated and the time that it is executed. The slower the execution process, the greater is the latency associated with the order.[7] "Slippage is a reference to the potential change in the price of an investment between the time a trade is contemplated or entered and its execution. Delays in the order entry process, *i.e.*, latency, exposes a trader to greater risks of slippage and lost trading opportunities.[8]

HFTs seek to minimize latency and slippage through the formulation and transmission of their orders by computer algorithms and high-speed data transmission devices. One HFT group spent $300 million to build a high-speed data line between New Jersey and Chicago in order to reduce order latency by three milliseconds. Another fiber optic project sought to cut five milliseconds off order entry between London and New York at a cost of a projected $500 million.[9] Microwave transmissions are even faster.[10] The most recent development in the effort to reduce latency is the use of laser communications.[11]

The efficiencies achieved by the high-speed transmission and execution of their orders made HFTs successful.[12] The specialists on the NYSE and market makers on

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[7] *Michael J. Mcgowan, The Rise Of Computerized High Frequency Trading: Use And Controversy*, 2010 Duke L. & Tech. Rev. 16.

[8] *See*, Goldstein v. Mortenson, 113 S.W.3d 769, 773 (Tex. App. 2003) ("The time expended in placing phone calls allowed market positions . . . to change, often resulting in serious losses . . . . The negative effect resulting from such a delay is known in the industry as 'slippage.'").

[9] SCOTT PATTERSON, DARK POOLS, 287-288 (2012).

[10] *Michael Lewis, Flash Boys* -- (2014).

[11] *See*, Scott Patterson, *Traders With Need for Speed Turn to Laser Beams*, Wall St. J., Feb. 12, 2014, at A1.

[12] The prospectus of a HFT firm, which was proposing to go public before HFT trading activities were engulfed in controversy, advertised that it was:

> a leading technology-enabled market maker and liquidity provider to the global financial markets. We stand ready, at any time, to buy or sell a broad range of securities, and we generate revenue by buying and selling large volumes of securities and other financial instruments and earning small amounts of money based on the difference between what buyers are willing to pay and what sellers are willing to accept, which we refer to as "bid/ask spreads." We make markets by providing quotations to buyers and sellers in more than 10,000 securities and other financial instruments on more than 210 unique exchanges, markets and liquidity pools in 30 countries

Nasdaq, who traditionally filled liquidity gaps in that market, are now pretty much a thing of the past. Instead, HFTs are dominating markets and driving trading volumes on both the stock and commodity markets.[13] By 2009, some two-thirds of stock-market volume was attributable to "high-frequency traders, who can buy or sell in less than 400 microseconds, or nearly a thousand times faster than you can blink your eye."[14] HFTs trading volume appears to have dropped in more recent years, but were still estimated to be accounting for more than half of all stock market trading volume in June 2014.[15] Trading volumes in the futures markets are also dominated by HFTs.[16] However, critics of HFTs claim that their high speed trading is, at least in some instances, abusive and

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> around the world. We believe that our broad diversification, in combination with our proprietary technology platform and low-cost structure, enables us to facilitate risk transfer between global capital markets participants by supplying liquidity and competitive pricing while at the same time earning attractive margins and returns.
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> We believe that market makers like us serve an important role in maintaining and improving the overall health and efficiency of the global capital markets by continuously posting bids and offers for securities and other financial instruments and thereby providing to market participants an efficient means to transfer risk. All market participants benefit from the increased liquidity, lower overall trading costs and enhanced execution certainty that we provide. While in most cases we do not have customers in a traditional sense, we make markets for global banks, brokers and other intermediaries, in addition to retail and institutional investors, including corporations, individuals, hedge funds, mutual funds, pension funds and other investors, all of whom desire to transfer risk in multiple securities and asset classes for their own accounts and/or on behalf of their customers.

Virtu Financial, Inc. SEC Form S-, filed March 10, 2014, available at https://www.sec.gov/Archives/edgar/data/1592386/000104746914002070/a2218589zs-1.htm#dm16701_business (visited on May 27, 2014).

[13] Dennis K. Berman, *The Game: Saving the Stock Market Only to Destroy It*, WALL ST. J., Aug. 24, 2010, at C1.

[14] Jason Zweig, *The Intelligent Investor: Staying Calm in a World of Dark Pools, Dark Doings*, WALL ST. J., Oct. 24, 2009, at B1.

[15] Scott Patterson, *High Speed Traders Face Tighter Rein*s, Wall St. J., June 6, 2014, at C1.

[16] The Commodity Futures Trading Commission has noted that:

> An established body of data indicates the importance of electronic and algorithmic trading in U.S. futures markets. In 2012, approximately 91.50% of exchange trading volume in U.S. futures markets was executed electronically. Estimates indicate that algorithmic trading first accounted for at least 50% of orders in 2009, and accounted for over 40% of total trading volume in 2010. . . . . Increased automation in both order generation and matching, combined with the exponentially faster communication networks . . . has in many cases reduced the trade lifecycle to as little as a few milliseconds. As a result, high-frequency trading ("HFT") strategies have also become an increasingly important component of automated trading environments.

Concept Release on Risk Controls and System Safeguards for Automated Trading Environments, 78 Fed. Reg. 56542, 5654- (Sept. 12, 2013) (footnotes omitted).

disruptive of orderly markets.[17] Those critics seek regulation of HFTs in order to handicap their trading advantages.[18]

The related development of unregulated "dark pools," *i.e.*, non-public markets where orders are executed without the public scrutiny available for regulated exchange trading, has aroused further concerns.[19] Dark pools are anonymous trading platforms for trading stock listed on public markets.[20] Orders placed through an exchange are visible to the public and all other market participants but an order or an indication of interest entered on a dark pool is revealed only to other dark pool participants. This gives dark pool participants access to information unavailable to the public.

A popular book has condemned HFTs and essentially charged those traders with improperly front running orders of other traders through their advanced trading techniques.[21] Especially criticized were trading programs that took advantage of SEC regulations that had tried to equalize trading opportunities. HFTs were using the

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[17] *See, e.g.*, *Michael Lewis, Flash Boys* (2014).

[18] Hearings were held in Congress in 2014 that considered the need for such regulation. Hearings on *Conflicts of Interest, Investor Loss of Confidence, and High Speed Trading in U.S. Stock Markets* before the Senate Permanent Subcommittee on Investigations (June 17, 2014, available at http://www.hsgac.senate.gov/subcommittees/investigations/hearings/conflicts-of-interest-investor-loss-of-confidence-and-high-speed-trading-in-us-stock-markets, (accessed on June 19, 2014).

[19] SCOTT PATTERSON, DARK POOLS (2012) (describing those pools and related concerns). It was estimated in June 2014 that 40 percent of U.S. stock trades were occurring on dark pools. Cameron Smith, *Stock Investors Can Handle the Truth*, Wall St. J., June 3, 2014, at A11. The SEC has noted that unreported trades are not unique only to dark pools:

> In general, dark liquidity (that is, trading interest that is not included in the consolidated quotation data) is not a new phenomenon. Market participants that need to trade in large size, such as institutional investors, always have sought ways to minimize their transaction costs by completing their trades without prematurely revealing the full extent of their trading interest to the broader market . . . . In addition, broker-dealers acting as over-the-counter ('OTC') market makers and block positioners long have provided liquidity directly to their customers that is not reflected in the consolidated quotation data.

Regulation of Non-Public Trading Interest, 74 Fed. Reg. 61208-09 (Nov. 23, 2009).

[20] Austin J. Sandler, T*he Invisible Power Of Machines: Revisiting The Proposed Flash Order Ban In The Wake Of The Flash Crash*, 2011 DUKE L. & TECH REV. 3, n. 18.

[21] *Michael Lewis, Flash Boys* (2014).

requirement that investors receive the best price available anywhere on public markets to anticipate trades on multiple markets and profit from that opportunity.[22]

Exposure of this practice set off a public outcry in the press.[23] Regulators and politicians saw an opportunity to grab headlines by targeting those traders for prosecutions and new rules. The New York Attorney General launched a broad scale investigation into the trading practices of HFTs in April 20114.[24] That probe was later expanded into the dark pools operated by Goldman Sachs Group, Inc., and other large banks.[25] The New York Attorney General shortly afterwards charged Barclays PLC for misrepresenting the access it provided to its dark pool by HFTs.[26]

The SEC responded with its own investigation of dark pools in order to determine whether they were undermining the integrity of U.S. markets.[27] The SEC also proposed rules that would attempt to move trading from dark pools to the public exchanges and subject HFTs to regulation by requiring them to register with the agency as broker-dealers.[28] FINRA began an investigation of customer order routing practices by broker-

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[22] *See, Conflicts of Interest, Investor Loss of Confidence, and High Speed Trading in U.S. Stock Markets* before the Senate Permanent Subcommittee on Investigations (June 17, 2014, available at http://www.hsgac.senate.gov/subcommittees/investigations/hearings/conflicts-of-interest-investor-loss-of-confidence-and-high-speed-trading-in-us-stock-markets, (accessed on June 19, 2014) (describing that concwern.

[23] *See e.g.*, Jacob Goldstein, *Trading Places*, N.Y. Times (Magazine), Dec. 13, 2013 at 14 (high frequency traders "used the new technology to foil long term investors by trading ahead of the slower players"); http://blogs.barrons.com/stockstowatchtoday/2013/05/03/charlie-munger-hft-is-legalized-front-running/; http://www.thewire.com/business/2014/04/is-high-frequency-trading-as-bad-as-michael-lewis-wants-you-to-think/359903/ (accessed on July 1, 2014).

[24] Scott Patterson, *Subpoenas Are Sent to Fast-Trading Firms*, Wall St. J., April 17, 2014 at C2.

[25] Justin Baer & Scott Patterson, *Banks Draw Trading Scrutiny*, Wall St. J., May 10-11, 2104 at B2.

[26] Scott Patterson & Andrew R. Johnson, *Barclays Sued Over 'Dark Pool*,' Wall St. J., June 26, 2014 at C1.

[27] Scott Patterson, Jean Eaglesham & Bradley Hope, '*Dark Pools' Face New SEC Probe, Wall St. J.*, June 10, 2014, at C1.

[28] Andrew Ackerman & Bradley Hope, *SEC Set to Spur Exchange Trading*, Wall St. J., May 27, 2014, at C1; Scott Patterson, *High Speed Traders Face Tighter Rein*s, Wall St. J., June 6, 2014, at C1; William Alden, *S.E.C. Chief Offers Rules to Govern Fast Trading*, N.Y. Times, June 6, 2014 at B1. The SEC appeared to be following Germany's lead, which enacted legislation in 2013 that requires high frequency traders ("HFTs") to register with the government and subjects those traders to special organizational

dealers to determine if orders were being sent to execution centers on the basis of payments for that order flow rather than the best execution price.[29] The Commodity Futures Trading Commission (CFTC) launched a separate investigation of incentive arrangements that sought to attract HFTs to particular trading platforms.[30]

Congress also could not resist the publicity over HFTs. The Senate Permanent Subcommittee on Investigations scheduled hearings in June 2014 on HFTs to determine whether their trading is injurious to the markets and whether trading incentives used to attract orders to particular trading platforms are appropriate.[31] Those trading incentives involve "payment for order flow" from market makers to brokers as an incentive to route customer orders to the payer for execution. Another practice of concern are "maker-taker" payments in which an electronic trading platform charges fees or pays incentives for order depending on whether the parties to an executed order initiated the trade or whether they accepted the initiating order.[32]

Regulators and industry participants have raised further concerns over the fragmentation of trading among electronic trading platforms and traditional trading venues. As 2014 began there were thirteen public exchanges and some fifty "Alternative Trading Systems," i.e., non-exchange electronic trading platforms, that were open to

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requirements.Tim Cave, *German Firm Quits Over Tough High-Frequency Trading Rules* (June 5, 2013), http://blogs.wsj.com/moneybeat/2013/06/05/german-firm-quits-over-tough-high-frequency-trading-rules/.

[29] Scott Patterson, *FINRA Opens Broker-Routing Inquiry*, Wall St. J., July 9, 2014, at C3.

[30] Scott Patterson and Jenny Strasburg, *High-Speed Trading Firms Face New U.S. Scrutiny* (March 18, 2014), http://online.wsj.com/news/articles/SB10001424052702303287804579447610625554506.

[31] Sarah N. Lynch, *Senate Panel to Probe High-Speed Trading, Broker Conflicts*, http://www.reuters.com/article/2014/06/09/us-senate-markets-idUSKBN0EK20K20140609 (accessed on June 10, 2010).

[32] William Alden, *Senate Hearing on Fairness of High-Speed Stock Trading Could Get Heated*, N.Y. Times. June 17, 2014, at B5; Scott Patterson, *Senate Turns Gaze to Superfast Trading*, Wall St. J., June 17, 2014, at C3.

HFTs.[33] Compounding that complex array of markets, SEC "Regulation NMS (National Market System) requires brokers to route their customer orders to the exchange displaying the best available public price at any given time."[34] This requirement has been used by HFTs to anticipate orders complying with that requirement and to trade in front of those orders.[35] Another concern is that the high message traffic generated by HFTs is overwhelming the ability of markets and traders to deal with that volume, and a number of computer glitches on exchanges have resulted in trading halts and alarming market crashes.[36]

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[33] Gary Cohen, *The Responsible Way to Rein in Super-Fast Trading*, Wall St. J., March 20, 2014.

[34] *Id*.

[35] *Michael Lewis*, *Flash Boys* -- (2014). As was noted in Senate hearings on this issue:

> One of the most predatory high-frequency trading practices depends on the on unintended consequences of the SEC's Regulation National Market System, or Reg NMS. That regulation essentially mandated that investment firms must buy or sell stocks at the best price available. While that might sound like a reasonable requirement, hi-frequency trading firms can take advantage of the rule by putting out offers to buy or sell small amounts of stock at attractive prices. When a large investor, seeking to make a big order, accepts the high-frequency trading firm's offer because it is the best price available, the high-frequency trader can predict that the large investor will have to go to another exchange to purchase the rest of his order. The high-frequency trader can then race ahead of that investor to the other exchange, buy up all available shares, and sell them to the large investor at a higher price.

Remarks of Senator John McCain, in Hearings on *Conflicts of Interest, Investor Loss of Confidence, and High Speed Trading in U.S. Stock Markets* before the Senate Permanent Subcommittee on Investigations (June 17, 2014, available at http://www.hsgac.senate.gov/subcommittees/investigations/hearings/conflicts-of-interest-investor-loss-of-confidence-and-high-speed-trading-in-us-stock-markets, (accessed on June 19, 2014).

[36] http://www.theguardian.com/business/2014/jun/07/inside-murky-world-high-frequency-trading (accessed on July 1, 2013). The Commodity Futures Trading Commission has noted that errors in order transmissions have sometimes disrupted markets:

> Increased interconnectedness encourages price efficiencies when economically identical or related contracts are traded on multiple exchanges. However, it also increases the speed with which a disruption on one trading platform, or within one ATS or algorithm, can impact related markets. For example, a trading platform may experience changes in the prices, spreads or volatility of one or more of its products due to errors in an ATS or algorithm active in its markets. Even if this algorithm does not trade elsewhere, such changes are likely to quickly impact the prices, spreads, and volatility of related products on other platforms, as automated systems attempt to arbitrage price differences. The potential result is a cascading series of market disruptions, brought about by the malfunction of a single ATS or algorithm trading on a single platform.
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> Transmission effects such as this are illustrated by events like the May 6, 2010 "Flash Crash." On that day, major equity indices in both the futures and securities markets fell over 5% in minutes before recovering almost as quickly. After investigation by both the Commission and the SEC, it was found that a fundamental seller utilized an automated execution algorithm to sell 75,000 E-

Part II of this article will describe early high-speed trading techniques and the concerns they raised. Part III will describe twentieth century stock and commodity markets and the inefficiencies they engendered from their lack of automation. Part IV will show how those markets were automated and fostered HFTs. Part V describes the concerns raised by HFTs and current efforts to regulate their activities.

II

EARLY HIGH-SPEED TRADERS

1. From Telescopes to Carrier Pigeons

A Japanese document written in 1706 recounts the tale of a merchant who obtained considerable market advantage by having messengers use hand signals to forewarn him of rice price changes at the Osaka rice market. The merchant was able to observe those signals from several miles away in Koriyama through a telescope. This

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> mini contracts (valued at approximately $4.1 billion) over an abbreviated time interval. The algorithm placed orders based on recent trading volume but was not programmed to take price or time into account; because of this lapse, a feedback loop triggered continued orders from the algorithm even as prices moved far beyond traditional daily ranges. Like the hypothetical example provided above, these declines in the derivatives market quickly filtered over to different, but closely related, products on many other exchanges. Soon after the initial moves in the E-mini contract, similar extreme volatility was experienced by the S&P 500 SPDR exchange traded fund and by many of the 500 underlying securities which make up the index itself.

Concept Release on Risk Controls and System Safeguards for Automated Trading Environments, 78 Fed. Reg. 56542, 56547 (Sept. 12, 2013) (footnotes omitted). The SEC, by consent sanctioned Knight Capital for failing to maintain adequate safeguards to prevent the entry of millions of erroneous orders that disrupted the stock markets on August 1, 2012. The errors occurred as a result of a programing error in allowing customer access to a NYSE Retail Liquidity Program. This conduct was found to have violated SEC Rule 15c3-5,[36] [17 C.F.R. §15c3-5], which requires broker-dealers to implement controls to guard against risks posed by the direct market access of broker-dealers and their customers. This rule requires broker-dealers to prevent automated system errors, outages and other failures and to mitigate the effects of such problems when they do occur. In the Matter of Knight Capital Americas LLC, Fed. Sec. L. Rep. (CCH) ¶80,403 (2013).

information gave the merchant an advantage over other merchants, and he was able to profit greatly from that information. That merchant's scheme, however, received a setback after a drunken messenger was late and became confused over the proper hand signals. The merchant suffered large losses when he acted on an erroneous signal sent by the drunken messenger.[37]

Rice futures trading in Japan during that era were also using other high-speed communications to foster trading and obtain market advantage. By 1716, rice traders were employing "elaborate communications systems based on smoke signals, flag signals, and carrier pigeons" that enabled traders and brokers to transmit information between Japanese cities at a distance of 350 miles with "great speed."[38]

Fast sailing ships were long used in Europe for obtaining information that could be used to profit from price changes in securities. In the eighteenth century, Sir Henry Furnese, "'throughout Holland, Flanders, France and Germany, . . . maintained a complete and perfect train of intelligence . . . the fall of Namur added to his profits, owing to his early intelligence.'"[39]

The House of Rothschild regularly employed human couriers to provide advance news of market moving events in the nineteenth century. Nathan Rothschild famously acted on advance news of Wellington's victory at Waterloo in 1815 that was supplied by an agent who had sped to England aboard a fast ship after the battle. Rothschild used that information to purchase British government bonds that rose in value when knowledge of

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[37] David Moss and Eugene Kintgen, *The Dojima Rice Market and the Origins of Futures Trading*, Harv. Bus. Sch. Case Study No. 9-709-044 (Nov. 10, 2010) (Appendix).

[38] *Id. See also*, Mark D. West, *Private Ordering at the World's First Futures Exchange*, 98 Mich. L. Rev. 2574 2586-2587 (1999-2000) (noting the use of this communication method to transmit messages on rice prices between Tokyo and Dojima)

[39] Henry Crosby, *Speculation on the Stock and Produce Exchanges of the United States*, Vol. VII Studies in History, Economics and Public Law, 116, n.3 (1896) (citation omitted).

the victory became generally known.[40] "Unfortunately—as with every innovation in communications—it was not long before the Rothschilds' rivals were sending just as many couriers of their own."[41] To regain advantage, Rothschild turned to carrier pigeons to send market information from European cities to London. Using a crude code, messages sent by this method would advice whether to buy or sell securities.[42]

In America, fast coaches drawn by horses and sailing ships were used to speed market information. Within a year of the founding of the Philadelphia Stock Exchange in 1790, express coaches were speeding to Philadelphia from New York. Those coaches carried news from ships docking in New York that could affect security prices on the Philadelphia exchange.[43] Express coaches played a similar role after the approval by Congress in 1790 of Alexander Hamilton's plan to refund the Revolutionary War debt.[44] That debt was virtually worthless before that funding scheme was approved, but became quite valuable when Congress agreed to refund it at par. Those receiving advance news of that plan quickly hired express coaches and fast sailing ships and directed them to various cities and locals to purchase the old debt at steep discounts for redemption at par. There was much criticism of members of Congress who participated in these purchases or

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[40] Frank Prial, *The English Rothschilds*, N.Y. Times (Magazine), Dec. 5, 1982 at SM115.

[41] *Niall Ferguson*, *The House of Rothschild: Money Prophets (1798-1848)* 234 (1998).

[42] *Id*. Ironically, notice of Nathan Rothschild's death in Europe in 1836 was sent to London by courier pigeon. ". . . [A] sportsman, looking for birds in the neighborhood of Brighton, on the English coast, shot a pigeon which, when picked up, proved to be one of the well-known carrier-pigeons of the Rothschilds. Under its wings was a small piece of paper, bearing the words: 'Il est mort.'" V. *Illustrated American*, 421 (1890).

[43] As the Philadelphia Stock Exchange later noted:

> The speeding coaches that clattered from New York to Philadelphia carried speculators and stockjobbers, agents of foreign investors, and inside traders with privileged information that could move the market, and make their fortune at the expense of the Philadelphia merchants.

Philadelphia Stock Exchange, The History of the Philadelphia Stock Exchange 1, available at http.//www.phlx.com/exchange/phlxhistory.pdf (accesed on Oct. 18, 2007).

[44] *See*, *Ron Chernow*, *Alexander Hamilton* 297-306 (2004) (describing the political fights over this refunding measure).

tipped others.[45] Thomas Jefferson called that effort a "base scramble."[46] However, it was not until some 220 years later that Congress passed the STOCK Act of 2012, which now prohibits such insider trading by members of Congress.[47]

Advance information received from a British sailing ship of the signing of the Treaty of Ghent after the War of 1812 led to large profits by a speculator in New Orleans that resulted in a famous Supreme Court case on the issue. It appeared that, on the night of February 18, 1815, certain merchants received word from the British fleet that the treaty of Ghent had been signed by the American and British commissioners, an event that had already been published in the British press. This news was made public in New Orleans through a handbill distributed at 8:00 a.m. on Sunday morning, February 19, 1815. A merchant in the house Peter Laidlaw & Co. who had earlier received that information arranged to purchase 111 hogsheads of tobacco soon after sunrise on that same Sunday morning from another merchant who was unaware of the treaty. The value of the tobacco sold in that transaction increased from 30 to 50 per cent once information about the treaty became widely known. That increase in value was due the effect that the treaty would have on the reopening European markets to American tobacco. The selling merchant reclaimed the tobacco after learning of the treaty and the issue made its way to the Supreme Court where Justice John Marshall ruled that the purchaser had no duty to

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[45] *See*, *Jerry W. Markham*, I *A Financial History of the United States: From Christopher Columbus to the Robber Barons (1492-1900)* 80 (2002) (describing that scandal).

[46] *Robert Irving Warshow*, *Alexander Hamilton* 123 (1931). Jefferson was appalled at this activity and charged that:

> [c]ouriers and relay-horses by land and swift sailing boats by sea were flying in all directions. Active partners and agents were associated and employed in every state, town and country neighborhood; and this paper was bought for five shillings, and even as well as two shillings, in the pound, before the holder knew that Congress had already provided for its redemption at par. Immense sums were thus filched from the poor and ignorant, and fortunes accumulated by those who had themselves been poor enough before.

Robert Irving Warshow, *Alexander Hamilton* 123-124 (1931).

[47] Stop Trading on Congressional Knowledge Act of 2012 ("STOCK Act"), 112 P.L. 105; 126 Stat. 291.

disclose that information to the seller.[48]

An increase in cotton prices in Liverpool, England in 1824 provided a profit opportunity for U.S. speculators. When that news arrived in New York special packets were sent south directing cotton purchases and other methods were used to obtain advantage through special expresses that were much faster than those available through the U.S. mail system, which was then the normal method for transmitting and making public news reports of market moving events. As one author noted:

> speculators sent packets to Southern cotton markets, The messenger who arrived first made substantial profits for his employer by purchasing cotton at normal prices. This was hardly an isolated occurrence. Speculators in Eastern ports, especially New York, sought advance information about fluctuations in distant markets. Ships from Europe would sometimes dawdle along the coast while a courier carried market intelligence ashore. Messengers then hurried the information south. It was even charged that public mail carriers were bribed or delayed while private messengers dashed ahead to convert their exclusive market. information into profits. [49]

In response to concerns over cotton speculations, the Post Master General proposed an express service between Boston, Massachusetts and Augusta, Georgia in 1825 that would travel at the rate of eleven miles per hour. That service "would convey information about 'any sudden and important change in the price of the principal staples of our Country.'"[50] It was believed, that this service would "'put a stop to the system of speculation which has lately been so extensively practiced by individuals of one commercial town on those of another who were not possessed of the same means of information.'"[51] Needless to say, cotton speculations continued through other means.

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[48] Laidlaw v. Organ, 15 U.S. (2 Wheat) 178 (1817).
[49] Richard B. Kielbowicz, *Speeding the News: Postal Express, 1825-1861: The Public Policy of Privileges for the Press*, 22 Social Science J. 50 (Jan. 1985) (citation omitted).
[50] *Id*. (footnote omitted).
[51] *Id*. at 50-51 (footnote omitted).

A signal system between the New York and Philadelphia stock exchanges using telescopes, semaphore flags, mirrors during the day and lanterns at night was created in the 1830s.[52] The operator of that then high-speed communications system, William C. Briggs, a Philadelphia stock broker, could flash information between those two exchanges within minutes, allowing him to arbitrage stocks that were traded in both Philadelphia and New York.[53] D.H. Craig was also using courier pigeons to send information to Boston from Halifax, Nova Scotia where ships first landed with news from Europe.[54]

A way to speed orders on Wall Street was through the use of "pad-shovers," who acted as messengers between brokers. They were "walking tickers" and would shove their messages right under the broker's noses to make sure they were read immediately. "Rushing the Pad, they used to call the process."[55] The fleetest of these pad-shovers was William Heath, who was so fast that he was called the American Deer."[56] The pad-shovers were eventually replaced by faster communication systems, but messenger boys

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[52] Philadelphia Stock Exchange, Seeing With the Eye of Imagination 3 (1993). As one financial historian has noted:

> Timely information is so important to securities markets that, in the 1830s, a semaphore line sprang up between Wall Street and Philadelphia. Men were stationed on tall buildings and hills every six or eight miles, armed with flags and telescopes. The man on the top of the Merchants' Exchange on Wall Street, where the Stock Exchange was then located, would signal opening prices to a man in Jersey City across the Hudson, and the information could get to Philadelphia in about thirty minutes.

John Steele Gordon, The Great Game: The Emergence of Wall Street as a World Power (1653-2000) 79 (1999).

[53] *David Hochfelder, The Telegraph in America, 1832-1920*, 101 (2012).

[54] *Jerry W. Markham*, I *A Financial History of the United States, From Christopher Columbus to the Robber Barons (1492-1900),* 163 (2002); James D. Reid, *The Telegraph in America: Its Founders, Promoters, and Noted Men*, 609 (1879).

[55] *Edwin Lefevvre, The Making of a Stockbroker* 160 (1924).

[56] *Jerry W. Markham*, I *A Financial History of the United States, From Christopher Columbus to the Robber Barons (1492-1900),* 245 (2002*); A Shock to Wall-Street: Henry N. Smith and William Heath & Co. Fail. The Culmination of Dealings That Beagan Before Black Friday – A Blow From Vanderbilt's Axe.* New York Times, Oct. 3, 1885.

continued to be "an important link in Wall Street's flow of information."[57]

The introduction of the telegraph in 1844 changed the speed of communications by magnitudes and soon led to its use by speculators. "The telegraph would have a profound impact upon the financial services business and helped put an entire generation of carrier pigeons out of work."[58] In 1846, a telegraph line between Philadelphia and New York also replaced Briggs's, once high-speed mirrors and flags.[59] It was soon reported that "certain parties in New York and Philadelphia were employing the telegraph for speculating in stocks."[60]

The telegraph was also used to trade on advance information about Civil War battles, allowing speculators to profit in the gold markets in New York that were sensitive to such news.[61] "Anson Stager, serving as both U.S. Military Telegraph Corps (USMT) superintendent and Western Union superintendent, and George Ladd, Western Union's California superintendent, both made fortunes leveraging their advance knowledge of war news to speculate in gold."[62]

This high-speed information advantage also induced "some crafty manipulators" to profit from such information in advance of other traders. "A favorite ploy was to bribe a telegraph operator or war office clerk" in order to obtain advance knowledge of military developments.[63] "The Lees, Grants, and Shermans had their counterparts in the great stock operators who bribed soldiers, sutlers, politicians, and telegraph operators, in order

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[57] *James E. Buck, The New York Stock Exchange* 82 (1999).
[58] *Charles R. Geisst, Wall Street* 46 (2004).
[59] *David Hochfelder, The Telegraph in America, 1832-1920*, 101 (2012).
[60] Office of Technology Assessment, *Electronic Bulls and Bears: U.S. Securities Markets and Information Technology* 129 (1990).
[61] "Gold prices would "gyrate with each new victory or defeat for the Union army." *Ron Chernow, The House of Morgan: An American Banking Dynasty and the Rise of Modern Finance* 22 (1990)
[62] *David Hochfelder, The Telegraph in America, 1832-1920*, 104 (2012).
[63] *Maury Klein, The Life and Legend of Jay Gould* 69 (1986).

to get the latest information from the front."[64]

"The so-called Bogus Proclamation incident in May 1864 demonstrated the power of telegraphic information (even false information) to influence the gold market."[65] That incident involved the planting of a false claim supposedly issued in Washington by President Lincoln and telegraphed late at night by the Associated Press to newspaper editors in New York. This bogus message stated that, because of war reverses, the President was announcing the draft of 400,000 additional men into the Union army. This caused stock prices to plunge on Wall Street and gold prices to soar. This scheme was carried out by Joseph Howard, the city editor of the Brooklyn Eagle, who made a large profit from this hoax. Howard was sent to jail for this fraud but served less than three months. President Lincoln granted that early release after announcing, only a few months after the hoax, that the government would actually be drafting 500,000 additional men.[66]

The stock ticker, which was invented in 1867, was another advance in high-speed trading technology, which "broadcast real-time financial information from exchange floors to anyone subscribing to the service . . . ."[67] "Taking the information supplied by the trading-floor reporters, telegraph operators entered transaction data onto a circular push-button keyboard, activating the print wheels of tickers in subscriber's offices."[68]

The Atlantic cable was also used to send quotes after it became fully operational in 1866. "From the stock broker's standpoint its prime value was in transmitting

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[64] *Edward Chancellor*, *Devil Take the Hindmost* 160 (1998).
[65] *David Hochfelder*, *The Telegraph in America, 1832-1920*, 101 (2012).
[66] *The Civil War Gold Hoax, 1864*, available at http://www.museumofhoaxes.com/hoax/archive/permalink/the_civil_war_gold_hoax (accessed on June 3, 2012).
[67] *Inventions Change*, Life, Spring 1992, at 23.
[68] *James E. Buck*, *The New York Stock Exchange* 116 (1999).

instantaneous quotations, and orders to buy and sell securities, between the continents."[69] This led to an "arbitrage business, in which stock houses with foreign connections learned to profit by the price differences between the New York and London markets for American shares."[70]

For many years, the telegraph remained the key to high-speed trading on Wall Street. "Then, as now, traders believed they could make money if they knew about trades before their competitors did."[71] A *Harpers Weekly* illustration from 1873 shows a maze of wires "running from buildings around the stock exchange, with Western Union promoting 'direct wires.'"[72] One broker described the layers of telegraph wires used by brokers on Wall Street and its environs as being so dense that, "'[n]o bird could fly through their network, a man could almost walk upon them; in fact, they darkened the street and the windows below their level.'"[73] This network of wires became such a nuisance that the City of New York required them to be buried beneath the streets.[74]

"Thomas Edison's quadruplex, a device that allowed four messages to be sent simultaneously over one telegraph wire" was invented in 1874 and further speeded Wall Street communications.[75] The invention of the telephone was another communications advance. In 1878, two years after its invention, the NYSE installed the first telephones on its floor.[76] By 1880, most brokers had telephone lines connected directly to the

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[69] *Edmund C. Stedman, The New York Stock Exchange* 195 (1905).
[70] *Id.*
[71] Floyd Norris, *Sacrificing Sense for Speed in Markets*, N.Y. Times, April 10, 2014.
[72] *Id.* The first edition of the *Wall Street Journal* that was printed on July 8, 1896 contained front-page advertisements from brokers and bankers promoting their "Direct Wire" connections. For example, Spencer Trask & Co., advertised its direc wire connections among its offices in New York, Albany and Providence R.I. and to markets in Philadelphia, Boston and Chicago.
[73] *David Hochfelder, The Telegraph in America, 1832-1920*, 101 (2012) (citation omitted).
[74] *Russell O. Wright, Chronology of the Stock Market* 18 (2002).
[75] *Inventions Change*, Life, Spring 1992, at 23.
[76] *Russell O. Wright, Chronology of the Stock Market* 19 (2002).

exchanges.[77]

It was thought by some that the telegraph and telephone limited speculation by making important market moving information generally available. In 1890, however, the president of Western Union testified before Congress that 46 percent of that company's "message traffic was 'purely speculative,' including 'stock-jobbing, wheat deals in futures, cotton deals in futures' and horse racing odds, while only 34 percent pertained to what he considered 'legitimate trade.'"[78]

Large brokerage firms earned the sobriquet of "wire houses" by reason of their high-speed telegraph and telephone connections with branch offices and the exchanges.[79] By 1905, a San Francisco broker was executing orders within five minutes of their receipt on stock and commodity exchanges in New York and Chicago. Another San Francisco broker had a private wire to the Boston Copper Market.[80] Jones & Baker was the country's largest stockbroker in 1917 and ran private wires to the homes of favored clients.[81] As trading surged in the markets during the 1920s, commission brokers had in place some 500,000 miles of private wires to transmit customer orders and information, including over 100 private wires stretched between New York and Chicago.[82]

In 1924, the NYSE added ticker tape enlarging machines that allowed ticker tape information to be displayed on large overhead screens on the floor.[83] By 1925, the NYSE

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[77] Office of Technology Assessment, *Electronic Bulls and Bears: U.S. Securities Markets and Information Technology* 129 (1990).
[78] *David Hochfelder*, *The Telegraph in America, 1832-1920*, 103 (2012) (citation omitted).
[79] *Jerry W. Markham*, II *A Financial History of the United States: From J.P. Morgan to the Institutional Investor (1900-1970)* 8 (2002); J. Peter Ferderer, *Advances in Communication Technology and Growth of the American Over-the-Counter Markets*, 1876-1929 13 (2008).
[80] *Jerry W. Markham*, II *A Financial History of the United States: From J.P. Morgan to the Institutional Investor (1900-1970)* 9 (2002).
[81] *Id*. at 86
[82] *Id*. at 129.
[83] *James E. Buck*, *The New York Stock Exchange* 143 (1999).

had also installed some thirty miles of copper pneumatic tubes to connect its specialists trading booths with broker telephone booths on the NYSE floor. Order execution instructions from broker desks on the NYSE floor were placed in those pneumatic tubes by "tube men." In an effort that would presage efforts to slow HFT's "[t]he pneumatic tube system was constructed so that a message traveling a long distance would arrive at the same time as one sent by a shorter route, in this way not giving anyone an unfair advantage."[84]

In 1930, the NYSE introduced a new high-speed ticker that could report trading activity at 500 characters per minute, nearly double the speed of prior tickers.[85] Stock market quotes were then sent from the exchanges to a Western Union office in New York and were punched onto a perforated tape by clerks. "The tape was then fed through the telex machine, which sent out electrical impulses that became the prices on the ticker seen in brokerage offices around the country."[86]

Many brokers had a "board room" for customers to observe a ticker tape of trading activity on the NYSE.[87] In the mid-1930s, there were over 9,000 tickers in the U. S. and Canada.[88] "Additional information shown on the ''board'' might include current information on commodity prices, foreign currencies, the number of shares sold each hour on the New York Stock Exchange, and the Dow-Jones average might also be posted periodically."[89] In addition, earlier in the 1930s, the industry developed a mechanism for projecting the ticker tape onto a screen by a trans-lux machine, which made for easy

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[84] *Id.* at 142.
[85] *Jerry W. Markham*, II *A Financial History of the United States: From J.P. Morgan to the Institutional Investor (*1900-1970) 226 (2002); Richard J. Teweles and Edward S. Bradley, *The Stock Market* 149 (1998).
[86] *Charles R. Ge*isst, *100 Years of Wall Street* 65 (2000).
[87] *Twentieth Century Fund, Inc., The Security Marets* 231 (1935).
[88] *Id.* at 230-231.
[89] *Id.*

viewing and was popular with customers.

2. Early Co-location Issues

An issue of considerable concern with high speed trading by HFTs has been their efforts to locate, actually "co-locate," their computer servers in or near an exchange facility so that they can receive market data more quickly and respond accordingly.[90] Co-location or other efforts to obtain close proximity to an exchange reduces latency.[91] Co-location seeks the same time and place advantage that exchange floor members have sought and enjoyed over the centuries and which was a principal attraction for membership that was zealously guarded then and now and usually came with a steep price for a seat on the exchange.

The informational advantages of a central exchange and co-location have long been known. In Rome, over 1,600 years ago, one "way for merchants to more efficiently spread information was to work physically near each other. Knowing each other, seeing each other each day, and gossiping together would undoubtedly increase the information flow between the merchants.[92]

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[90] Remarks of Senator John McCain, in Hearings on *Conflicts of Interest, Investor Loss of Confidence, and High Speed Trading in U.S. Stock Markets* before the Senate Permanent Subcommittee on Investigations (June 17, 2014, available at http://www.hsgac.senate.gov/subcommittees/investigations/hearings/conflicts-of-interest-investor-loss-of-confidence-and-high-speed-trading-in-us-stock-markets, (accessed on June 19, 2014).

[91] As the CFTC has noted:

> Two common methods for reducing latency are co-location and proximity hosting, defined as the placement of a firm's trading technology in close proximity to the trading platform. They may be offered directly by an exchange or by a third-party service provider. Co-location denotes those connectivity solutions hosted by the exchange itself, while proximity hosting indicates services offered by third parties.

Concept Release on Risk Controls and System Safeguards for Automated Trading Environments, 78 Fed. Reg. 56542, 56546 (Sept. 12, 2013) (footnotes omitted).

[92] David Kessler & Peter Temin, *The Organization of the Grain Trade in the Early Roman Empire*, 60

The so-called Buttonwood Agreement, which laid the groundwork for the NYSE in 1792, stated that the signers would sell "Public Stock" at a fixed rate of commission and that members "will give preference to each other in our Negotiations."[93] The Buttonwood Agreement effectively limited membership of its members to the wealthier financiers in New York, providing an exclusive society for stock trading at collusive rates of commission. "Before long, the Buttonwood Agreement lapsed, but its exclusionary principle served as the foundation of the New York Stock & Exchange Board," the predecessor to the NYSE.[94] By 1819, the members of that exchange reached a "mutual understanding 'not to inform outsiders of the bids, offers or transactions of any particular members.'"[95] The exchange floor then became a central source of valuable information on the most current value of stocks traded through its facilities.

Traders on exchange floors could generate orders and respond to events much faster than those removed from the floor. Even with the development of the telegraph and telephone, floor traders retained a decided time and place advantage over traders without such access. Exchange membership "exclusivity allowed members to use the information obtained at the Board for their own advantage in trades with nonmembers."[96] This informational advantage did not pass unnoticed by politicians. The New York Senate passed a bill in 1836 that would have prohibited the NYSE from closing its trading sessions to non-member traders, but that bill was defeated.[97] Stymied speculators on the curb market drilled a hole through a wall on the NYSE trading floor in 1837 in order to

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ECON. HIST. REV. 313, 329 (2007).

[93] *Edmund C. Stedman, The New York Stock Exchange* 36 (1905).

[94] *Stuart Bruchey, Modernization of the American Stock Exchange (1971-1989)* 8 (1991).

[95] *Edmund C. Stedman, The New York Stock Exchange* 70 (1905).

[96] *Walter Werner & Steven Smith, Wall Street* 29 (1991).

[97] *Jerry W. Markham,* I *A Financial History of the United States, From Christopher Columbus to the Robber Barons (1492-1900),* 159 (2002).

hear quotations.[98] That practice was stopped but during the Civil War brokers paid $100 to listen through a keyhole so that they could follow stock quotations on the floor of the NYSE.[99]

The NYSE also sought to preserve its time and place location advantage for floor members by restricting access to the floor by telephone and telegraph devices. As Henry Crosby noted in 1896, private wires between Boston and New York were in popular use. "A change in price in either place was known by the broker on the floor of the other within less than thirty seconds. This was trade reduced to its finest point. It is not necessary to point out how completely such dealings bring about a uniformity in price."[100] In 1894, however, the NYSE required communications from the floor to the telephone to be sent by a messenger. "This action was taken solely for the practical purpose of bringing the business of other centers to the New York market, and to more strictly maintain commission rates."[101] This "was a backward step from the economic point of view, and, on the practical side as well, the opinion is not uncommon that it diminished rather than increased business." [102]

Information from the trading floor proved its value in other ways. The NYSE and the commodity exchanges sought to gain control over their quotations by restricting and selling the right to receive that data through telegraph lines. That information was deemed valuable and could be sold to traders seeking high-speed access to exchange

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[98] Robert Steiner, *The Big Board's Bicentennial, 200 Years Later, Small Investors Find Clout at America's Premier Exchange*, Wall St. J., May 13, 1992, at C1, col. 4.
[99] Edmu*nd C. Stedman*, *The New York Stock Exchange* 146 (1905); *Jerry W. Markham*, I *A Financial History of the United States, From Christopher Columbus to the Robber Barons (1492-1900)*, 242 (2002).
[100] Henry Crosby, *Speculation on the Stock and Produce Exchanges of the United States*, Vol. VII Studies in History, Economics and Public Law, 138-139 (1896).
[101] *Id*.
[102] *Id*.

trading data. The exchanges also recognized that they could shut down competitors by denying access to their quotes. Some of those competitors were the unsavory bucket shops that were essentially betting operations on grain and stock prices:

> As financial markets increasingly became markets in information, control of and access to the flows of quotations became a major source of conflict between exchanges, telegraph companies, brokers, and bucket shops. By broadcasting quotations to a wider and wider audience, the ticker and telegraph network enabled the dramatic growth in stock trading and ownership in the twentieth century.[103]

The battle with the bucket shops over exchange quotations was all about the trading advantages of such information. The exchanges' power to sell and distribute that data selectively was strongly protected by the Supreme Court in *Board of Trade v. Christie*, in 1905.[104] There, the Court recognized the property right of an exchange in its trading data and the corresponding right to control its use. The Court further rejected a claim that the information should be made freely available because it was being used byh exchanges to encourage speculation.[105]

Exchanges have thus long employed the practice of selling market information at the highest price the market will bear.[106] The Supreme Court did later place some limits

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[103] *David Hochfelder, The Telegraph in America, 1832-1920*, 102-103 (2012).

[104] Board of Trade v. Christie, 19 U.S. 236 (1905).

[105] Justice Holmes thus stated that the Chicago Board of Trade was:

> a great market, where, through its eighteen hundred members, is transacted a large part of the grain and provision business of the world. Of course, in a modern market contracts are not confined to sales for immediate delivery. People will endeavor to forecast the future and to make agreements according to their prophecy. Speculation of this kind by competent men is the self-adjustment of society to the probable. Its value is well known as a means of avoiding or mitigating catastrophes, equalizing prices and providing for periods of want. It is true that the success of the strong induces imitation by the weak, and that incompetent persons bring themselves to ruin by undertaking to speculate in their turn. But legislatures and courts generally have recognized that the natural evolutions of a complex society are to be touched only with a very cautious hand, and that such coarse attempts at a remedy for the waste incident to every social function as a simple prohibition and laws to stop its being are harmful and vain.

19 U.S. at.247-248.

[106] After the author joined the CBOE as an executive in 1974, he was given the unenviable task of informing the quote vendors that the exchange would no longer pay them to publish the exchange's price

under the antitrust laws on the exchanges' ability to use their market power to punish others by arbitrarily denying access to their trading data. In *Silver v. New York Stock Exchange*,[107] the Supreme Court held that the NYSE could not order its members to remove private direct telephone wire connections with a nonmember without giving the nonmember due process in the form of notice of the intention to sever those connections, a statement of the reasons for the action, and an opportunity to be heard on the matter.

In 1918, the NYSE prohibited specialists on its floor from disclosing customer stop orders to others, *i.e.*, customer orders directing the buying or selling of a stock when it reached a particular price. Traders had been using that information to profit from those orders as market prices changed.[108] However, information in the specialists' book of limit and stop orders remained available to the specialists, providing them with "special knowledge." This allowed the specialists to have "a tremendous advantage over the general public" when trading for the specialists' own account.[109] The specialists claimed that this advantage was justified because their trading provided stability and liquidity to the market and more efficient pricing because they were making continuous two-sided markets for customer orders. The floor traders on the NYSE could make no such claims because their training was purely opportunistic. Those floor traders did not make continuous markets and tended to accentuate price trends and volatility.[110]

III

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information. Instead, the vendors would have to pay the exchange for that data. One vendor smashed his quote machine in front of me upon being informed of this change, but the firm still paid.

[107] Silver v. New York Stock Exchange, 374 U.S. 341 (1963).

[108] *Jerry W. Markham*, II *A Financial History of the United States: From J.P. Morgan to the Institutional Investor (1900-1970)* 86 (2002)

[109] U.S. Sen. Rep. No. 1455 73d Cong., 2d Sess. 25 (1934).

[110] *Jerry W. Markham*, II *A Financial History of the United States: From J.P. Morgan to the Institutional Investor (1900-1970)* 125 (2002)

TWENTIETH CENTURY EXCHANGES—THE PRE-COMPUTER ERA

1. THE NYSE

The time and place advantage of floor traders on the NYSE over other traders was well in place when the federal securities laws were enacted to regulate their activities in the 1930s. As the SEC has noted, during that period, the exchanges operated as auction markets through a labyrinth of brokers and specialists who provided liquidity for the stocks traded through their facilities. The SEC has thus noted that:

> In the mid-1930s, the predominant markets for the trading of securities in the United States were the organized stock exchanges. Predominant among these were exchanges such as the NYSE and New York Curb Exchange (. . .[renamed] the American Stock Exchange ('Amex')), which operated as centralized, continuous auction markets for the trading of listed securities. Those auction markets offered liquidity, continuity, and depth to investors through the services of several categories of member brokers and dealers: (1) commission brokers (who traded primarily for the accounts of public customers); (2) floor brokers (who traded primarily for the accounts of other exchange members); (3) floor traders (who traded primarily for their own accounts); and, most importantly, (4) 'specialists.' Exchange specialists, trading issues assigned to them at particular floor locations called 'posts,' performed the dual functions of effecting transactions in securities allocated to them both for their own accounts (as dealers) and for the accounts of others (as brokers). As dealers, the specialists assumed "affirmative'' obligations to trade for their own accounts in order to maintain market continuity and depth, and were subject to statutorily imposed ''negative'' obligations to abstain from trading for their own accounts unless such trading was necessary for the maintenance of a fair and orderly market. As brokers, the specialists were required to execute not only market orders (to buy or sell at the best current market price), but also limit orders (orders to buy or sell at a specific price or better) and ''stop'' orders (orders requiring the specialist to execute the order when a transaction in the security occurs at or above the 'stop' price in the order). [111]

The process for executing a customer order was a laborious one that involved

[111] SEC, *Self-Regulatory Organizations; Delta Government Options Corp.; Order Granting Temporary Registration as a Clearing Agency*, 55 Fed. Reg. 1890 (1990) (footnotes omitted).

transmitting the order by wire or telephone and then to a floor broker for manual execution at a specialist's post.[112] Floor traders on these exchanges still had a decided time and place advantage that gave them an edge over "outside operators," *i.e.*, traders entering orders from outside the exchange, who also had to pay higher commission rates than exchange members.[113] Criticism of NYSE floor traders led that exchange to prohibit them from trading for their own account unless their bid or offer was at least one eighth of a dollar better than customer orders.[114]

The Securities Exchange Act of 1934 (34 Act) imposed statutory duties of self-regulation on the exchanges. This required the exchanges to enforce their rules against members through disciplinary actions.[115] The 34 Act directed the SEC to consider the

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[112] The SEC observed that:

> The exchanges of the 1930s were designed, through the interaction of specialists and floor brokers, to accommodate trading by retail investors as well as institutions. Typically, a customer's market order, placed initially with a branch office of a member firm, would be routed by telephone or wire to the trading floor of the broker's firm, usually in New York City; there, it would be taken by a floor broker. The floor broker would then carry the order to the specialist's post, where the floor broker would either: (1) match the order against a reciprocal order represented in the crowd or left with the specialists, to be recorded in the specialist's ''book.'' When buy and sell orders could not matched, the specialists would function as dealer, buying or selling a sufficient amount of stocks to ensure a continuous, orderly market.

SEC, *Self-Regulatory Organizations; Delta Government Options Corp.; Order Granting Temporary Registration as a Clearing Agency*, 55 Fed. Reg. 1890 (1990) (footnotes omitted).

[113] *Jerry W. Markham*, II *A Financial History of the United States: From J.P. Morgan to the Institutional Investor (1900-1970)* 4 (2002).

[114] *Id.* at 60.

[115] As one court noted:

> As national securities exchanges, the intervenors are self-regulatory organizations (SROs). *See* 15 U.S.C. § 78c(a)(26) (2006) (defining SROs). They therefore "have 'a duty to promulgate and enforce rules governing the conduct of [their] members,' under the oversight of the SEC." *Standard Inv. Chartered, Inc. v. Nat'l Ass'n of Sec. Dealers, Inc*., 560 F.3d 118, 119 (2d Cir. 2009) (quoting *Barbara v. N.Y. Stock Exch., Inc*., 99 F.3d 49, 51 (2d Cir. 1999)); *see also Silver v. N.Y. Stock Exch*., 373 U.S. 341, 352-53, 83 S. Ct. 1246, 10 L. Ed. 2d 389 (1963) (discussing SRO's duty of self-regulation). Exchanges must file their rules with the SEC and ensure compliance therewith. *See* 15 U.S.C. § 78f(b)(1) (2006). Section 6 of the Exchange Act requires that the rules of national securities exchanges, *inter alia*, "provide for the equitable allocation of reasonable dues, fees, and other charges among its members and issuers and other persons using its facilities"; "promote just and equitable principles of trade"; and do not "permit unfair discrimination between customers, issuers, brokers, or dealers" or "impose any burden on competition that is not necessary or appropriate in furtherance of the purposes of" the Exchange Act. 15 U.S.C. § 78f(b)(4), (5), (8) (2006).

complete separation of the roles of "brokers" who execute orders for customers and "dealers that trade for their own account as principal with their customers.[116]

The SEC's report on that issue focused on the roles of the specialists and floor traders on the stock exchanges. The SEC noted the time and place advantage of floor traders and specialists, which was especially valuable when the NYSE ticker tape was running late because of heavy trading in volatile markets.[117] A late tape was not uncommon on heavy trading volume days. The NYSE even had a "Ticker Tape Delay" indicator that showed how long the tape was running behind the reporting of trades.[118]

The SEC's report was critical of the role of floor traders because they had no obligation to maintain a fair and orderly market. However, it was not until the 1960s that the SEC effectively excluded such traders from exchange floors.[119] Even then, the specialists continued to enjoy their time and place advantage. To be sure, that advantage was tempered by a requirement that they maintain a continuous two-sided "fair and

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NetCoalition v. SEC, 715 F.3d 342, 344-345 (D.C. Cir. 2013).

[116] SEC, *Report on the Feasibility and Advisability of the Complete Segregation of the Functions of Dealer and Broker Pursuant to Section 11(e) of the Securities Exchange Act of 1934* (June 20, 1936). The SEC defined the role of a broker as someone who is acting as an agent of his customer in the purchase or sale of securities:

> He does not undertake to sell to or buy from his customer but rather to negotiate a contract of purchase or sale between the customer and a third party. The transaction is solely for the account of the customer who becomes the owner of securities purchased by the broker on his behalf, is entitled to the profits realized and is liable for the losses incurred. he broker has no beneficial interest in the transaction except the commission or other remuneration which he receives for his services.

Id. at xiv. The SEC defined the role of a dealer as being:

> [S]imilar to those of a dealer or jobber in merchandise. The dealer sells securities to his customer which he has purchased or intends to purchase elsewhere or buys securities from his customer with a view to disposing of them elsewhere. In any such transaction he acts for his own account and not as agent for the customer. He receives no brokerage commission but relies for his compensation upon a favorable difference or spread between the price at which he buys and the amount for which he sells. The risk of loss is entirely his own.

Id.

[117] *Jerry W. Markham*, II *A Financial History of the United States: From J.P. Morgan to the Institutional Investor (1900-1970)* 209 (2002).

[118] *James E. Buck, The New York Stock Exchange* 161 (1999).

[119] 17 C.F.R. §240.11a-1.

orderly" market. This required specialists to quote a "spread" between the price at which what it was willing to sell shares and the price at which it stood ready to buy share. This was no penalty, however, because the specialist captured the "spread" as a profit. All things being equal, the specialist would profit on the difference in prices between his buy and sell orders. This advantage of the specialist was thought justifiable because the presence of the specialist gave assurance of liquidity for investors seeking to buy and sell NYSE listed securities.[120]

NYSE rules continued to seek to protect the specialists' monopoly over NYSE listed stocks. The NYSE had prohibited its members from dealing in NYSE listed stocks outside the exchange's floor since 1863. The SEC, however, acted to stop the NYSE from enforcing that restriction where its stocks traded on regional exchanges. In 1940, there were seventeen such exchanges, but their volume was comparatively small, and the NYSE's restriction, (found in NYSE Rule 390) on off-exchange trading continued to apply to the larger OTC market.[121]

Rule 390 posed a serious problems for the execution of large institutional orders because the specialists did not have sufficient capital to execute large block trades at a competitive price.[122] This was an important because trading in the stock markets was being driven beginning in the 1950s by institutional traders, than retail traders who had

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[120] That advantage was also subject to criticism. As one commentator has noted:

> Being a New York Stock Exchange specialist—each stock had one—was a lucrative business because there is information in every trade. Like Nasdaq market makers, they didn't charge commissions but instead would keep the spread, or the difference between the bid and the ask price, measured in quarters (25 cents) and eighths (12.5 cents). And specialists were notorious for front running customers. Simply put, if they didn't like the spread on a buy order, they would buy shares themselves and then raise the price of the shares they had to offer, knowing there was a buyer in the market. At a cocktail party many years ago, I asked a specialist about this and he told me, 'You big investment banking guys shouldn't worry about it, we need to get paid too.'

Andy Kessler, *High-Frequency Trading Needs one Quick Fix*, Wall St. J., June 16, 2004, at A15.

[121] *Jerry W. Markham*, II *A Financial History of the United States: From J.P. Morgan to the Institutional Investor (1900-1970)* 244 (2002).

[122] *See*, LISA ENDLICH, GOLDMAN SACHS 66 (1999) (describing this inability).

historically driven trading volumes.[123]

The growth of institutional size orders caused substantial conflict between the exchanges and those institutions. The NYSE wanted to milk those orders by requiring the institutions to pay the specialists spreads, and the NYSE required those institutions to pay a large commission to the NYSE member firm executing their trades. The institutions wanted neither to pay the spread nor the commission. The institutions were particularly galled that their large block trades, which required the same paperwork as a small order, were forced to pay a commission magnitudes greater than small trades.[124]

The lack of capital on the part of specialists to execute large block orders led in the 1950s to block trading arrangements in which broker-dealers like Goldman Sachs assembled large institutional trades "upstairs" and then reported them to the NYSE floor for execution. Broker-dealers arranged block trades upstairs by contacting known active and wealthy traders and institutional traders, such as pension funds, endowments and other trusts, and insurance companies. The arranging broker-dealer exposed the order in whole or in part to other institutional clients and solicited those traders to take all or a portion of the block. Through this process, the broker-dealer was able to obtain a better

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[123] As one source notes:

> . . . in the 1950s, the stockbrokers' world began to change. The profile of the 'typical' investor was changing, from the moderately affluent individual investor occasionally buying or selling a few shares through his retail stockbroker to the continuously active, professional institutional investor who was active in the market all the time, buying and selling positions in dozens of different stocks everyday.

CHARLES D. ELLIS, THE PARTNERSHIP 137 (2008). This growth of institutional trading led to an extensive five-volume study by the Commission in 1973 on the identity of institutional traders and their role in the marketplace. I-V *Institutional Investor Study Report of The Securities and Exchange Commission*, 92nd Congress, 1st Sess., House Doc. # 92–64 (1971). The *Institutional Investor Study* was conducted pursuant to a joint resolution of Congress, which directed the SEC to determine the effect of institutional trading "upon the maintenance of fair and orderly securities markets . . . the stability of such markets . . . the interest of the issuers . . . and upon the interests of the public . . . ." Pub. L. No. 90-438 (July 29,1968).

[124] This was an enormous expense for active institutional traders. For example, the commission on a 100,000-share transaction was 1,000 times higher than the commission on a 100-share transaction even though the costs of executing larger trades were not nearly as disproportionate. *Utilization of Membership on National Securities Exchanges for Public Purposes*, 38 Fed. Reg. 3902, 3015 (Feb. 8, 1973).

price on the block than would be available if the block were simply dumped on the NYSE floor. [125] This provided some relief to those institutional traders, but they were still suffering from the requirement that they pay retail commission rates on their trades until the SEC began the process of eliminating that restriction in the 1970s.

Before lifting that restriction, the SEC sought to block institutional traders from becoming registered as broker-dealers. Before fixed commissions were eliminated in the 1970s, many actively trading institutions had sought to register with the SEC as broker-dealers in order to become members of the stock exchanges. Such membership would have allowed those institutions to avoid the exchanges' fixed minimum commissions that exchange members firms were required to charge to their non-member customers, no matter what the size of their trades.[126] The NYSE sought to block that effort,[127] with the aid of the SEC, which was concerned that large institutional traders might come to dominate the markets if they were allowed to register as broker-dealers and become exchange members.[128]

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[125] CHARLES D. ELLIS, THE PARTNERSHIP 137 (2008). By 1986, institutional block sales constituted almost 50 percent of volume on the New York Stock Exchange, up from 15 percent in 1970. Report of the Presidential Task Force on Market Mechanisms II-16 (1988). Although NYSE Rule 390 has since been repealed, block trading continues. In 2012, monthly block trading volume on the NYSE was usually over $120 billion and was exceeding $140 billion per month in 2013.See, http://www.nyxdata.com/nysedata/asp/factbook/viewer_edition.asp?mode=table&key=3140&__category=3 (accessed on March 27, 2013).

[126] The Commission banned exchange fixed commission schedules on May 1, 1975. *See*, III JERRY W. MARKHAM, A FINANCIAL HISTORY OF THE UNITED STATES, FROM THE AGE OF DERIVATIVES TO THE NEW MILLENNIUM 29-30 (2002) (describing these developments).

[127] *See*, S. Rep. No. 94-75, 94th Cong., 1st Sess. 39 (1975) (describing that resistance).

[128] The SEC, therefore, allowed institutional traders to become broker-dealers only if 80 percent of their trading was with the public, which effectively blocked most institutional traders from becoming broker-dealer members. *See*, Cliff Fridkis & Willam J. Hunter, *Securities and Exchange Commission: Coping With Institutional Membership and Anticompetitive Practices*, 41 Geo. Wash. L. Rev. 841 (1972-1973 (discussing this controversy). Legislation enacted in 1975 also prohibited money managers from creating affiliated broker-dealers in order to qualify as an exchange member unless they did most of their business with the public. *See*, II JERRY W. MARKHAM, A FINANCIAL HISTORY OF THE UNITED STATES, FROM J.P. MORGAN TO THE INSTITUTIONAL INVESTOR (1900-1970) 359 (2002) (describing that controversy). Congress was concerned with conflicts of interests between institutions that combine the role of an unregistered customer and that of a broker. As stated in a 1975 Senate report:

In the meantime, NYSE Rule 390 gave rise to the so-called "third" and "fourth" markets in NYSE listed stocks.[129] The third market involved transactions in NYSE stock executed for institutional customers by broker-dealers that were not NYSE members and, therefore, not subject to the requirements of Rule 390 or exchange minimum commissions.[130] The fourth market involved transactions between two institutional investors directly, without exchange or broker-dealer intermediation, and it was these systems that led to the development of electronic communications networks that match customer orders.[131] In 1969, the Institutional Network Corporation sought to develop an electronic network that would allow institutions to trade large blocks of stock.[132] This was significant since the institutions were doing almost 50 percent of the stock business

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> Until very recently . . . fixed commission rates have provided artificial incentives for the combination of money management and brokerage. This combination could distort the natural evolution of the markets. Where functions are separated, institutions are customers for securities market services. As such, they will seek the most efficient and flexible market relationships, and thus help to sharpen price and service competition in the securities business. If the institutional money managers are also the brokers, however, they will lose a good deal of their incentive to bargain with the brokers on behalf of their beneficiaries, thus sacrificing an important instrument of protection for the millions of Americans whose securities investments are made through the medium of institutions.

S. Rep. No. 94-75, 94th Cong., 1st Sess. 41 (1975). Institutions already holding regional exchange memberships were allowed to keep them for a period of three years. "But it would be inappropriate and inconsistent with the Congressional purposes, for an institution to acquire an exchange membership during this period solely for the purpose of using that membership to effect transactions for its own account." H.R. Conf. Rep. No. 94-229, 94th Cong. 1st Sess. 14 (1975).

[129] The first market is a reference to the distribution of shares to the public under the Securities Act of 1933 and the second (secondary) market is the exchanges, Nasdaq, and now other trading centers where already issued shares are traded.

[130] As one standard text book has noted:

> The *third market* is a market for large blocks of listed shares that operates outside the confines of the organized exchanges. In the third market, blocks of stock (units of 10,000 shares) are traded OTC. The participants in the third market are large institutions (such as mutual funds, insurance companies, and pension funds) that often need to trade large blocks of shares. Brokers assist the institutions in the third market by bringing buyers and sellers together and, in return, receive a fee.

RONALD W. MELICHER & EDGAR A. NORTON, INTRODUCTION TO FINANCE 298 (2011).

[131] In the fourth market, "[c]ertain large institutional investors arrange purchases and sales of securities among themselves without the benefit of a broker or dealer." RONALD W. MELICHER & EDGAR A. NORTON, INTRODUCTION TO FINANCE 298 (2011).

[132] *Sid Mittra, Inside Wall Street* 224 (1971).

at that time and were excluded from membership on the NYSE.[133]

The NYSE and other stock exchanges otherwise traded pretty much in the same manner as they did in the nineteenth century, but with some marginal increases in communications technology. For example, the speed of the ticker was increased in the 1960s to 900 characters per minute.[134] The NYSE was also experimenting with "optical reader cards" that were filled out by reporters at the trading posts on the floor that could be read by a computer and transmitted over the ticker.[135]

By the 1960s, the NYSE Quotation Department was also supplying quotes to telephone callers by voice recordings. "Quote boys" phoned in the bid and asked quotes for some 300 stocks. The voice recording was then played back to subscribers to the service, which they could access by dialing a three-digit code. At any one time, up to thirty-seven subscribers could access the recorded quote for any one stock.[136] By 1966, the American Stock Exchange was using computers to input trading information from the floor into its ticker system.[137]

Technology had not added much to order execution times on the exchanges and trading remained a cumbersome process in the 1960s. Orders had to phoned or sent by teletype to the floor operations of a broker-dealer, which sent them to a floor broker (by hand signal, pneumatic tube or mechanical conveyor belt) who then conveyed the order to the specialist for execution or placement in the specialist's book of limit orders. The

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[133] It was noted in 1992 that:

> Traders are shifting waves of business in NYSE listed securities to the Fourth Market, in which large institutional investors trade directly among themselves in informal groups, and to foreign exchanges, most of which are completely automated.

Dale Oesterle, Donald Winslow & Seth Anderson, *The New York Stock Exchange and Its Outmoded Specialist System: Can the Exchange Innovate to Survive?* 17 J. Corp. L. 223, 227-228 (1992).

[134] *Sid Mittra*, *Inside Wall Street* 22 (1971).

[135] *James E. Buck*, *The New York Stock Exchange* 192 (1999).

[136] *Id*. at 185.

[137] *Stuart Bruchey*, *Modernization of the American Stock Exchange (1971-1989)* 41 (1991).

process was repeated to confirm the order on execution. As a SEC study of the securities markets noted in 1963:

> In spite of its importance, the floor of the NYSE has been untouched by most of the technological developments of the 20th century. A critic of the N¥SE's progress in technological innovation has said that the basic organization of the Exchange's floor has not changed since the 'period in which the institution solidified--slightly before the telephone.' While the Special Study should not be understood as espousing the proposals made by this commentator, there is undoubtedly some merit in his analysis. Aside from recent developments in methods of transmitting orders to the floor . . . and various innovations and proposed innovations with respect to the reporting of transactions . . . there has been no. basic change in the methods of executing orders since the NYSE floor took its present form. Except for firms utilizing teletype devices, orders reach the Exchange by telephone and are written down on slips by clerks. From that point, orders are transmitted manually by brokers, or through tubes, to-the trading post. Orders given to specialists are again transcribed by hand onto the specialists' books. At present there is no internal means of assuring that quotations announced on the floor of the Exchange are the same as those disseminated to the public. Even after the Exchange automates its off-floor quotation service such assurance will not be provided.[138]

The NYSE faced a near total collapse at the end of the 1960s, when increased trading volumes resulted in a "paper work crisis."[139] NYSE members were unable to deal

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[138] *Study of Unsafe and Unsound Practices of Brokers and Dealers, Report and Recommendations of the Securities and Exchange Commission*, H.R. Doc. No. 231, 92d Cong., 2d Sess. 353 (1971) (footnotes omitted). The order execution process on the American Stock Exchange in the early 1960s was described as follows:

> The member firm's booth clerk receives a sell order either from the firm's order room or branch office via telephone or teletype. The clerk relays the customer's limit order . . . from the booth to the floor broker. To do so he uses a hand signal or writes the order . . . on an order slip and places it on a conveyor belt that carries it to the edge of the trading floor. The floor broker acknowledges the order and walks to the post where . . . [the stock] is traded and hands it to the specialist. The specialist stamps the order with date and time and files it in the trading post rack until ready for execution. He executes the order when the market price .. [reaches the limit order price] and records the volume, price, and clearing name . . . of the contra broker on the order slip. (if the specialist executes the order for his own account he enters the sale and is trading book). The specialist's clerk then reports the execution of the order to the member firm booth clerk via I pneumatic tube system. And in the meantime the data clerk at the trading post has checked the accuracy of the stock symbol and sales price on the sales slip. The sale is then entered into a key set, the data clerk verifies entry, and the sale . . . appears on the ticker.

Stuart Bruchey, Modernization of the American Stock Exchange (1971-1989) 40 (1991).

[139] *See, Study of Unsafe and Unsound Practices of Brokers and Dealers, Report and Recommendations of the Securities and Exchange Commission*, H.R. Doc. No. 231, 92d Cong., 2d Sess. 24 (1971) (describing that crisis and its causes).

with the avalanche of documents required to document and clear this increased trading volume.[140] Between 1968 and 1970, over 100 NYSE firms failed, including several large ones, as a result of their inability to document customer trades properly and in a timely manner. This crisis resulted in an industry wide effort to computerize and streamline clearing and settlement practices and paperwork. The result was that by the turn of this century the stock markets could execute and clear trading volumes in the billions of shares, whereas before it had choked on average trading volumes of 16 million shares per day.[141]

The floor trading operations of the exchanges were also subject to abuse. Two specialists on the floor of the Amex were found to have been engaged in the sale of unregistered securities and a massive stock price manipulation scheme.[142] A series of scandals erupted on the NYSE in this century as trading there was migrating to electronic trading platforms. The Justice Department brought criminal charges against various specialists for "interpositioning" their trades between customer order. However, those prosecutions failed. The SEC did obtain settlements from specialist firms totaling over $240 million over charges that those firms were trading ahead of customer orders and for taking orders into their own accounts that could have been matched against other

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[140] As the SEC later found:

> The operations crisis in the securities industry first reached major dimensions in August of 1967. Newspaper reports of that period recall the feverish efforts of the Wall Street community to keep up with each day's business: Stock certificates and related documents were piled 'halfway to the ceiling' in some offices; clerical personnel were working overtime, six and seven days a week, with some firms using a second or even a third shift to process each day's transactions. Hours of trading on the exchanges and over the counter were curtailed to give back offices additional time after the closing bell. Deliveries to customers and similar activities dropped seriously behind, and the number of errors in brokers' records, as well as the time required to trace and correct these errors, exacerbated the crisis.

Study of Unsafe and Unsound Practices of Brokers and Dealers, Report and Recommendations of the Securities and Exchange Commission, H.R. Doc. No. 231, 92d Cong., 2d Sess. 219–220 (1971).

[141] *See*, *Jerry W. Markham*, 23A *Broker-Dealer Operations Under Securities and Commodities Law*, §13:3 (2013) (describing those improvements).

[142] *Robert Sobel*, *AMEX: A History of the American Stock Exchange (1921-1971)* 260-266 (1972).

customer orders. Another SEC settlement involved fourteen specialists on other exchanges that were alleged to trading ahead of customer orders.[143]

2. The OTC and Nasdaq Market

The over-the-counter (OTC) market traces its origins to the curb market that began in the nineteenth century. In the OTC, or "curb" market as it was initially called, trading took place in the streets of New York. Brokers used messengers to send hand signals from their offices to the curb traders in order to expedite orders. "Fingers were used to spell out the identity of the security and the number of shares to be purchased or sold. To make it easier for a clerk to pick out his broker in the milling crowd below each broker wore some distinctive article of clothing—a colorful jacket or an unusual hat."[144] However, the curb traders moved their operations indoors in 1921 to the Curb Exchange that later became the American Stock Exchange.[145]

Nevertheless, a network of brokers continued to operate an informal, but significant, OTC market. This market became more formalized with the founding of the National Association of Securities Dealers, Inc., (now FINRA), which became formally recognized as an industry self-regulatory body by the after passage of legislation in 1938 authorizing that role under the federal securities laws.[146]

Rather than a specialist's post, OTC trading was conducted by telephone and

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[143] *See, Jerry W. Markham, A Financial History of the United States, From Enron Era Scandals to the Subprime Crisis (2004-2006)* 143-144 (2011) (describing those scandals).
[144] *Stuart Bruchey, Modernization of the American Stock Exchange (1971-1989)* 17 (1991).
[145] *See*, Robert *Sobel, AMEX: A History of the American Stock Exchange (1921-1971)* 260-266 (1972) (describing this history).
[146] *See, Mark Ingebretsen, Nasdaq* 41-43 (2002) (describing this history).

telegraph during much of the twentieth century.[147] By the 1930s, some OTC broker-dealers specialized in particular OTC securities and, like a specialist, provided "broad and continuous" markets in those securities.[148] Quotations for OTC securities were published in the "pink sheets" starting in 1911, so named because the quotations were printed on pink paper.[149] The quotes in the pink sheets were not firm. They were merely a "guide" as to what the securities could have been bought or sold for at the time the quotes were compiled.[150] This meant that a broker posting quotations in the pink sheets had to be contacted by telephone. A firm order price could then be negotiated that might vary from the quote in the pink sheets based on order size or changes in market conditions.

In 1963, the SEC completed a massive study of the securities markets.[151] Among other things, it found abuses by brokers using the pink sheets to engage in manipulative activity. The SEC's Special Study suggested using computers to report broker-dealer OTC stock quotations.[152] The suggestion in the Special Study gave rise to the creation of

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[147] *Twentieth Century Fund, Inc., The Security Markets* 265 (1935).
[148] *Id.* at 265 (1935).
[149] *Jerry W. Markham*, II *A Financial History of the United States: From J.P. Morgan to the Institutional Investor (1900-1970)* 60 (2002).
[150] *Report of Special Study of Securities Markets of the Securities and Exchange Commission*, H. Doc. No. 95, 88th Cong. 1st Sess. 635 (1963).
[151] The SEC Special Study described the OTC market as follows:

> Transactions in securities outside the organized securities exchanges are described as taking place in the over-the-counter market. The over-the-counter market is actually a group of markets, in which broker-dealers transact business with the public as principals or agents, dealing for the most part in securities not listed on any exchanges. Some dealers may maintain inventories in one or more over-the-counter securities and be willing to both buy and sell them to other broker-dealers, in which case they are known as "market makers" in those securities.

Report of Special Study of Securities Markets of the Securities and Exchange Commission, H. Doc. No. 95, 88th Cong. 1st Sess. 13 (1963).
[152] The Special Study stated that:

> Apart from the possible utilization of a computer for the crossing of orders, the information supplied by a computer system could be expected to confer important benefits on broker-dealers and on the public. It would permit the immediate identification of the highest bid and lowest offer, and thus facilitate the task of a broker-dealer in obtaining the best market for his customer. Another advantage would be the compilation of complete data relating to quotations and transactions, so that actual price and volume data could be made public as in the case of listed securities, thus improving the ability of investors, lending institutions, and other interested persons

the Nasdaq market in 1968.[153] That market allowed broker-dealer quotes to be posted on a computer network that could be accessed by other broker-dealers, and it allowed more rapid updating of quotes. Still, orders had to negotiated orally over the telephone.[154]

Unlike the specialists on the NYSE, Nasdaq market makers competed with each other for stocks traded on Nasdaq. Multiple market makers might compete with each other for a single Nasdaq stock. The Nasdaq market makers, nevertheless, had market making obligations that required them to quote a continuous two-sided market that was fair and orderly. This meant, however, that customers had to pay the spread between the bid and ask prices of those market makers, plus a brokerage commission or a mark up or mark down when the broker-dealer was selling for its own account.[155]

3. The Futures Markets

The futures markets are regulated separately from the securities markets and by an independent regulator, the Commodity Futures Trading Commission (CFTC).[156] The futures markets historically operated as a public open out cry market carried out on

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> to evaluate over-the-counter securities and markets. The data could also be speedily and comprehensively retrieved for surveillance or study purposes by the Commission and other regulatory bodies to which access would be granted.

Report of Special Study of Securities Markets of the Securities and Exchange Commission, H. Doc. No. 95, 88th Cong. 1st Sess. 658 (1963).

[153] Nasdaq is an acronym for National Association of Securities Dealers Automated Quotation system. *Mark Ingebretsen*, *Nasdaq* 18 (2002)

[154] *Jerry W. Markham*, II *A Financial History of the United States: From J.P. Morgan to the Institutional Investor (1900-1970)* 347 (2002). The pink sheets continued to publish quotes for stocks not actively traded or quoted on Nasdaq. III JERRY W. MARKHAM, A FINANCIAL HISTORY OF THE UNITED STATES, FROM THE AGE OF DERIVATIVES TO THE NEW MILLENNIUM 185-186, 250-251 (2002).

[155] *See*, In the Matter of Certain Market Making Activities on Nasdaq, 1998 WL 919673 (S.E.C. 1998) (describing role of Nasdaq market makers).

[156] That regulation is carried out under the Commodity Exchange Act of 1936. 7 U.S. C. §1 *et seq*.

commodity exchange floors. However, those floor operations varied materially from those on the securities markets and no OTC trading was allowed for futures.

Starting in the nineteenth century and still in practice today for non-electronic executions, orders to the floor of a commodity futures exchange were transmitted to an order desk operated by a futures commission merchant (FCM) on the floor. The order was then taken manually to the pit by a ":runner," or the order might be flashed by the runner through hand signals to a floor broker located in the trading pit. The floor broker would then execute the order by public outcry in the pit against other customer orders represented by floor brokers or with floor traders trading for their own accounts. The floor traders had the time and place advantages of the specialists on the stock exchanges but had no obligation to maintain fair and orderly or continuous market.[157]

The execution of customer orders in commodity futures trading pits were often chaotic in actively traded contracts during volatile markets. "Trade throughs" of customer limit orders was common in "fast" markets because floor brokers could not react in time to sharp market movements. The popular movie *Trading Places* that was released in 1983 paints a realistic picture of some of the more active pits.

The commodity futures exchanges were regulated by the Commodity Exchange Act of 1936.[158]

4. The CBOE

Another model of the open outcry exchange was the Chicago Board Options

[157] *See, Jerry W. Markham, The History of Commodity Futures Trading and its Regulation* (1986) (describing the development and trading on the futures exchanges).
[158] 7 U.S.C. §1 *et seq*.

Exchange, Inc. (CBOE), which had elements of both a stock and a commodity futures exchange. The CBOE, which was created in 1973, used a futures style trading pit for trading in its standardized option contracts. Floor brokers held and executed customer market orders, but customer limit orders were held and executed through a separate book managed by a "board broker." The board broker was initially an exchange member but later was replaced by exchange employees. The effect of this arrangement was to separate the role of a specialist from the book of limit orders.[159]

Market making functions on the CBOE were carried out by floor traders trading for their own accounts. However, unlike the floor traders on commodity futures exchanges but like market makers and specialists in the stock markets, CBOE floor traders had affirmative obligations to trade for their own accounts in order to maintain a continuous and orderly two-sided market. The stock exchanges attempted to compete with the CBOE using those exchanges' traditional specialists as market makers. However, the CBOE dominated options trading until the advent of electronic trading.

IV

AUTOMATION ARRIVES

1. Introduction

Automation began arriving on the stock exchanges in the 1970s in the form of

[159] *See*, Jerry W. Markham & David J. Gilberg, *Stock and Commodity Options -- Two Regulatory Approaches and Their Conflicts*, 47 Albany L. Rev. 741, 744-745 (1983) (describing this process).

automated executions for small traders. The NYSE implemented a Designated Order Turnaround system in 1976 (and in 1984, the Super DOT system) that provided for the automated execution of small customer orders, *i.e.*, orders of 2,000 shares or less, at the bid and ask prices posted by the specialist.[160] That advanced the speed execution of those customer orders, but the specialist was still compensated by the spread between those bid and ask prices.[161]

In 1978, thee SEC authorized the Cincinnati Stock Exchange to operate an electronic trading system in which agency and principal limit orders would be matched by computer. However, it was a very low volume exchange with only limited participation by a few large broker-dealers.[162] However, other traders were discovering that the computer could be used as a tool for trading. The advent of algorithmic trading brought numerous active traders into the markets. For example, so called "program trading" appeared in the 1970s, which employed computer software programs to generate automated orders through algorithms cued to react to market events.[163] "Index arbitrage" traders also appeared. These were traders who tried to take advantage of small differences in the prices between a basket of stocks traded on NYSE and a parallel commodity futures index covering that basket.[164]

In response to program trading and arbitrage trading of index products, NYSE

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[160] Jerry W. Markham and Daniel J. Harty, *For Whom the Bell Tolls: The Demise of Exchange Trading Floors and the Growth of ECNs*, 33 IOWA J. CORP. L. 865, 897 (2008).
[161] *Jerry W. Markham, A Financial History of the United States, From the Age of Derivatives to the New Millennium (1970-2001)* 102-103 (2002).
[162] *Stuart Bruchey, Modernization of the American Stock Exchange (1971-1989)* 64 (1991). One of the leaders in that experiment was Bernie Madoff, who later became the world's largest crook through a massive Ponzi scheme that was exposed in the market downturn in during the Financial Crisis in 2008. *See, Diana B. Henriques, The Wizard of Lies, Bernie Madoff and the Death of Trust* 68 (2011) (describing that involvement).
[163] *See*, Jerry W. Markham & Rita McCloy Stephanz, *The Stock Market Crash of 1987 -- The United States Looks at New Recommendations*, 76 GEO. L. J. 1993, 2000 (1988) (describing program trading).
[164] *Id*. at 2001.

specialists began to offer "baskets" of securities that allowed institutional investors to trade all 500 stocks in the Standard & Poor's Index in a single trade of a minimum of $5 million. Customized baskets of fewer stocks were also permitted.[165]This allowed program traders and Index arbitrage traders to hedge and trade positions in both the derivative and equity markets.

Concern arose that these computer driven traders were adding volatility to the market. Critics also warned that a "cascade" scenario could result from algorithmic trades that would automatically generate sell orders in a declining market that would push prices lower and thereby generate more sell orders and so on until the market crashed.[166] Those concerns seemed to have been justified by the Stock Market Crash of 1987, which witnessed a stock market decline in excess of the crash in 1929. NYSE stocks lost $1 trillion in value during the 1987 crash and the Dow Jones Industrial Average dropped 508 points on a single day.[167] Studies by the SEC, the CFTC and others of the Stock Market Crash of 1987 concluded that computerized trading had played a large role in adding volatility to the market.[168] A Presidential Commission also studied the trading of those institutional traders and suggested reforms, hardly any of which were implemented.[169] Instead, the markets quickly recovered and computer trading became an accepted part of trading in both the futures and stock markets.

The causes of the Stock Market Crash of 1987 were much debated, but the inability of the NYSE and Nasdaq markets to handle the execution of large volumes of orders in a

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[165] William Power, *Big Board to Launch 'Basket' Trades Today*, Wall St. J., Oct. 26, 1989, at C1.
[166] *See*, Jerry W. Markham & Reita McCloy Stephanz, *The Stock Market Crash of 1987 -- The United States Looks at New Recommendations*, 76 Georgetown L. J. 1993, 2001 (1988) (describing those studies).
[167] *Report of the Presidential Task Force on Market Mechanisms* 1 (Jan. 1988).
[168] *See*, *Id.* at 1993-2043(describing those studies).
[169] *Report of the Presidential Task Force on Market Mechanisms* (Jan. 1988).

volatile market was disturbingly clear. A report by the Government Accounting Office found that thousands of customers had complained about the October crash and that most of those complaints related to difficulties in trade executions. An investor hotline received some 6,700 calls from investors who lost $450 million in the market, an average of $172,000 per caller.[170] It was also determined that specialists on the NYSE had been unable to cope with the trading volumes during the October 1987 crisis and that many Nasdaq market makers had fled from the market, abandoning their market making obligations in the process.

Like the NYSE, Nasdaq developed an automated "Small Order Execution System" (SOES) that executed smaller orders automatically at bid and ask prices set by Nasdaq market makers. That SOES system became a target the so-called "SOES Bandits" who traded for their own account and used computerized access to the SOES to take advantage of the failure by Nasdaq market makers to keep their electronic quotes updated to reflect current events. The SOES bandits traded often and were even given training programs and office space by broker-dealers on how to trade frequently and at high speed.[171] The NASDAQ market makers responded to those attacks by widening their spreads and engaging in prohibited collusive activities.[172] After those practices were

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[170] General Accounting Office, *Financial Markets: Preliminary Observations on the October 1987 Crash* 50 (1987).

[171] II JERRY W. MARKHAM, A FINANCIAL HISTORY OF THE UNITED STATES, FROM J.P. MORGAN TO THE INSTITUTIONAL INVESTOR (1900-1970) 219-220 (2002)(describing the trading of SOES Bandits).

[172] *Report Pursuant to Section 21 (a) of the Securities Exchange Act of 1934 Regarding the NASD and the NASDAQ Market*, Securities Exchange Act Release No. 37542 (Aug. 8, 1996). The SEC had approved a rule proposed by the National Association of Securities Dealers, Inc. (NASD) that had sought to exclude "professional traders" from using SOES. That rule was remanded by the District Columbia Court of Appeals to the SEC for further action because its definition of what is a professional trader was vague and unjustified. Timpinaro v. SEC, 2 F.3d 453 (D.C. Cir. 1993). The SOES bandits and other day traders did raise concerns because they were not required to post margin on their trades unless the position was carried overnight. *See*, 23A JERRY W. MARKHAM & THOMAS L. HAZEN, BROKER-DEALER OPERATIONS UNDER SECURITIES AND COMMODITIES LAW §8:11 (2012) (describing this concern). FINRA required "pattern day

exposed, the NASD was assessed with a large penalty by the SEC for failing to supervise the market makers and the Nasdaq market was required to reorganize its self-regulatory operations.[173]

2. The ECNS Arrive

Order matching services outside the confines of exchange floors were appearing before the beginning of the twenty-first century. These services were called "electronic communications networks" (ECNs) and later "alternative trading systems' (ATS). The ECNs initially were mostly order matching services that paired offsetting buy and sell orders from different traders. Trading on the ECNS, at least initially, was, therefore, order driven. There was, initially, no market maker or specialist that maintained a continuous two-sided market on the newly arrived ECNs, which caused liquidity concerns.[174] This process also meant that the traders did not have to pay the specialist or market makers the spreads demanded where the orders were executed on the NYSE or Nasdaq.

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traders" to maintain minimum equity of $25,000 on any day that the customer day trades, and it imposed other leverage restrictions, none of which involved registration as a broker-dealer. *See*, JERRY W. MARKHAM & THOMAS L. HAZEN, BROKER-DEALER OPERATIONS UNDER SECURITIES AND COMMODITIES LAW §8:11 (2012) (describing these restrictions).

[173] In the Matter of Certain Market Making Activities on Nasdaq, 1998 WL 919673 (S.E.C. 1998) (describing the misconduct of Nasdaq market makers and imposing sanctions on the NASD and Nasdaq).

[174] The critical role of exchanges has historically been to provide liquidity so that owners of stock can sell or liquidate their ownership interest in exchange for cash. "A market with liquidity is one in which the investor can really convert his securities into cash at a price close to the last sale." *The Securities Markets, A Report, With Recommendations by William McChesney Martin, Jr., submitted to the Board of Governors of the New York Stock Exchange* 10 (Aug. 5, 1971). One measure of liquidity is how rapid a stock can be bought or sold and another is the width of the spread between bids and offers in the market. The debate over the "black box" exchange of fully automated trading by the matching of orders to computers with met by the concern that order matching alone would not make a effective market:

> 'In the overwhelming majority of stocks, public buying and selling is often insufficient to ensure that the order of a willing buyer can always be matched with that of a willing seller. For that reason, markets are created or their quality is improved my professional traders (specialists or market makers) who put their own capital at risk and thereby supply liquidity to the markets.'[174]

Stuart Bruchey, Modernization of the American Stock Exchange (1971-1989) 65 (1991) (quoting Norman Poser).

Consequently, liquidity on these ECNs, at least initially, depended on the presence of a buyer and seller entering opposing matching orders or by acceptance of a quoted bid or offer posted by another trader who might be quoting only one side of the market. Nevertheless, ECNs were soon changing the markets.[175]

By the end of the twentieth century ECNs and other non-traditional trading venues were executing more than twenty percent of volume in Nasdaq listed shares.[176] However, only 4 percent of exchange listed shares were traded on ECNs at that time because NYSE Rule 390 still applied to most of the more actively traded shares listed on that exchange.[177] The growth of the ECNS exploded as the twenty-first century began, aided by the repeal of NYSE Rule 390 in 2000.[178]

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[175] The SEC observed in 1991that

> in today's securities market many small individual investors have relinquished direct management of their investments to professional investment managers. Accordingly, large institutional investors such as public and private pension or retirement funds, mutual funds, insurance companies, foundations, hedge funds and investment managers have grown extraordinarily in number and size, and have become a predominant type of market participant. Investor demands for returns greater than market averages have caused institutional investors and investment managers to develop complex and innovative relationships, products, and trading strategies. These new investment relationships, products and strategies have led to increased specialization in investment management and linked capital markets around the world. These developments enable institutional investors to trade large amounts of securities and commodities with stunning swiftness to minimize risk or to profit from small differences in valuation.

Securities Exchange Act Release No. 29593, 56 Fed. Reg. 42550 (Aug. 22, 1991) (emphasis added).

[176] Thousands of traders were using electronic trading systems as the twentieth century closed to engage in HFTs. One discount electronic trading firm discounted commissions and its clientele trading some 95 million shares per day, which was then about 10 percent of Nasdaq trading volumes.23 JERRY W. MARKHAM & THOMAS L. HAZEN, BROKER-DEALER OPERATIONS UNDER SECURITIES AND COMMODITIES LAW §2:39 (2012).

[177] III JERRY W. MARKHAM, A FINANCIAL HISTORY OF THE UNITED STATES, FROM THE AGE OF DERIVATIVES TO THE NEW MILLENNIUM 15 (2002).

[178] The growth of HFTs has been described by one author as flowing from the development of ECNs regulated as ATS by the SEC:

> Individual investors subscribing to ECNs can enter orders electronically into the network via a custom computer terminal, and the ECN will then automatically match and execute contra-side orders. If no match is identified, then an ECN order can be posted externally on NASDAQ as soon as it becomes the best price. This arrangement allows ECNs to 'function as a hybrid between a broker for counterparties, a broker-dealer or market-maker, and an exchange, and their gain has been at the expense of NASDAQ.' The early ECNs provided many benefits over past trading venues—including

Both Nasdaq and the NYSE gradually introduced electronic trading into their operations until the old school NYSE specialists and Nasdaq market makers were pretty much sidelined.[179] Indeed, the NYSE specialists changed their identity and began calling themselves "liquidity providers."[180] HFTs are now dominating trading volumes and providing market liquidity as a substitute for the traditional specialist and Nasdaq market maker. Today, floor trading operations are only a ghost of what had been once a colorful spectacle often portrayed in news reports as the essence of the stock and commodity exchanges.[181]

This shift did not escape the SEC's notice. In 2010, the SEC noted that HFTs and other proprietary trading firms "largely have replaced more traditional types of liquidity providers in the equity markets."[182] As the found: "[t]he use of certain strategies by some proprietary firms has, in many trading centers, largely replaced the role of specialists and market makers with affirmative and negative [market making] obligations."[183] The SEC

> the reduction in costs and trading errors, enhancement of operational efficiencies, and other benefits associated with risk management. Eventually, day-trading firms who originally sought greater market access to NASDAQ, as well as brokerage firms, began hustling to set up ECNs; and the growth rate of ECNs has skyrocketed since1997. The growth of these ECNs in the late 1990's led to the wider use of algorithmic trading and eventually the rise of independent high frequency trading firms.

Michael J. McGowan, *The Rise of Computerized High Frequency Trading: Use and Controversy*, 16 DUKE L. & TECH. REV. at ¶11 (2010) (footnotes omitted).

[179] The growth of the ECNS and the demise of the traditional commodity and stock exchange floor operations is described in Jerry W. Markham and Daniel J. Harty, *For Whom the Bell Tolls: The Demise of Exchange Trading Floors and the Growth of ECNs*, 33 IOWA J. CORP. L. 865, 897 (2008).

[180] The NYSE has dropped its role of specialists and supplanted them with "designated Market Makers" and "Liquidity Providers," the latter not having market making obligations. *See*, New York Stock Exchange, *NYSE Equities Membership Types*, http://usequities.nyx.com/membership/nyse-equities/types (accessed on March 20, 2013).

[181] Floor trading has not ceased entirely and at least one exchange, the London Metals Exchange, continues to operate as it has in the past. In 2014, that exchange fined some members for failing to stay seated in their assigned seats during trading session, blocking the views of other traders. Francesca Freeman, *LME Fines Nine Traders . . For Standing up*, http://blogs.wsj.com/moneybeat/2014/07/21/lme-fines-nine-dealers-for-standing-up/ (accessed on July 22, 2014).

[182] *Market Concept Release*, 75 Fed. Reg. at 35--.

[183] 75 Fed. Reg. at 3607. *See also*, Scott S. Powell and Rui Gong, *Wall Street's New Race Toward Danger*, *Baron's*, March 8, 2010. ("unlike registered broker-dealers, many HFT players aren't regulated or committed to the capital requirements toward market making in particular stocks").

noted, however, that those traders did seek to earn "profits . . . from … the spread by buying at the bid and selling at the offer."[184] As the SEC further noted:

> Highly automated exchange systems and liquidity rebates have helped establish a business model for a new type of professional liquidity provider that is distinct from the more traditional exchange specialist and over-the-counter ('OTC') market maker. In particular, proprietary trading firms and the proprietary trading desks of multi-service broker-dealers now take advantage of low-latency systems and liquidity rebates by submitting large numbers of non-marketable orders (often cancelling a very high percentage of them), which provide liquidity to the market electronically.[185]

3. The SEC Responds

The SEC regulated ECNs under its Regulation ATS (Automated Trading Systems), which was adopted in 1998 and required such trading platforms to register with the agency as broker-dealers.[186] However, traders on such platforms were not required to so register unless they were making a market in the securities they were trading.[187]

SEC Chairman Arthur Levitt, Jr. also contended that electronic trading should be centralized in a manner that would allow the public display of orders to all market participants. Concerns were also raised over the fragmentation of the marketplace due to

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[184] *Id.*

[185] *Market Concept Release*, 75 Fed. Reg. at 3599. (emphasis supplied).

[186] 17 C.F.R. §242.3000 *et seq*. See, Jerry W. Markham and Daniel J. Harty, *For Whom the Bell Tolls: The Demise of Exchange Trading Floors and the Growth of ECNs*, 33 IOWA J. CORP. L. 865, 897 (2008) (describing the scope and background of Regulation ATS)..

[187] Broker-dealer registration has not been required for "traders" and "investors" who are trading for their own accounts even though their trading is a part of their regular business and even if their trading is a highly active and for speculative purposes. *See generally*, VI *Louis Loss, et al., Securities Regulation* 514 (4th ed. 2011) (describing the distinction between a dealer that is required to register as a dealer and a trader). Among the HFTs not required to register were hedge funds and proprietary trading operations dealing for the trader's own account. However, in *In the Matter of OX Trading, LLC*, Fed. Sec. L. Rep. (CCH) ¶80,405 & ¶80,406 (2013), the SEC found by consent that a firm was required to be registered as a dealer under the Securities Exchange Act of 1934 because it was acting as a "liquidity provider" on the Chicago Board Options Exchange, Inc. (CBOE).

the numerous ECNs then operating. Those concerns led to new regulations that were promulgated under authority included in the Securities Exchange Act of 1934 in 1975, which authorized the SEC to work toward a single marketplace for trading securities, i.e., a "National Market System" (NMS).[188] Before the growth of electronic trading, the SEC had taken some timid steps toward such a system.[189] However, concerns over electronic trading set the SEC on a course that set the stage for the now ongoing concerns over HFTs.

In 2005, the SEC adopted Regulation NMS that created a complex set of order priority and disclosure rules that were intended to level the electronic trading playing field. As one source notes"

> The SEC adopted a system that put the premium on speed in execution at a specific price, without considering the effect it would have upon the balance between market professionals' duties and responsibilities to customers and the effects on the market in general. Regulation NMS essentially shifted the duties from the specialists and market makers to the traders themselves by imposing rules that required brokers to execute orders in the fastest manner possible, prompting brokerage firms and exchanges to interconnect and develop

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[188] The concept of a central market system began with a letter from the SEC to Congress in 1971 in which the SEC stated that states that "a major goal and ideal of the securities markets" was the "creation of a strong central market system for securities of national importance in which all buying and selling interest in these securities could participate and be represented under a competitive regime." *Institutional Investors Study, Report of the Securities and Exchange Commission* (Part I), H.R. Doc. No. 64, 92d Cong., 1st Sess. xxiii (1971). The Martin Report in 1971 to the NYSE (*The Securities Markets, A Report, With Recommendations by William McChesney Martin, Jr., submitted to the Board of Governors of the New York Stock Exchange* (Aug. 5, 1971)), a SEC Statement in 1972 on the future structure of the securities markets (CITE) and a SEC statement in 1973 on the structure of a central market system (CITE) laid the groundwork for legislation enacted in 1975 that directed the SEC to work toward a "national market system." *See*, JERRY W. MARKHAM & THOMAS L. HAZEN, BROKER-DEALER OPERATIONS UNDER SECURITIES AND COMMODITIES LAW §2:16 (2012) (describing that legislation). The statutory language chose to term this new market structure as a national market system instead of a central market system. It may have been that the lack of success with a central market system in the Soviet Union rendered that term politically suspect.

[189] For a long time, a centerpiece of this new national market system was the Consolidated Last-Sale Reporting System, a.k.a., known as the "Consolidated Tape," that began in 1975. It reported all last sales on the NYSE, the American Stock Exchange and various regional exchanges. *Stuart Bruchey, Modernization of the American Stock Exchange (1971-1989)* 63 (1991). The SEC also required the development of an Intermarket Trading System (ITS) that linked exchanges trading the same stocks and required those stocks to executed at the best price available on any exchange within the ITS. *Russell O. Wright, Chronology of the Stock Market* 61 (2002).

sophisticated computer systems to route trades in a maze-like fashion.[190]

Regulation NMS sought to assure that customers trading on exchanges and other market centers received the best available price for their securities on any market where the securities are traded. Regulation NMS required broker-dealers to execute customer orders at the "national best bid or offer" (NBBO).[191] Another "improvement" in the NMS envisioned by the SEC was the "decimalization" of stock market quotes. This meant that stocks could be traded by using quotations with a spread as small as a penny versus the historical minimum of minimum quote size of one-eight of a dollar.[192] This change initially had the effect of allowing specialists and markets to widen their spreads. However, as electronic competition grew spreads were narrowed by amounts lower than the traditional eighths. This had the effect of undercutting market maker profits and discouraging them from making commitments for two sided continuous markets.

As the SEC noted in 2008, electronic trading "has reduced the advantages once enjoyed by floor brokers and specialists. The NYSE also claimed that "the informational advantage has shifted 'upstairs' where orders are now first 'shopped' within a firm and then to others before being sent to the floor for execution . . . ."[193]

In response to concerns over HFTs, the SEC issued a market a concept release in January 2010 (Market Concept Release").[194] It sought comment on whether and how

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[190] Bradley J. Bondi, *Memo To Michael Lewis: The Excesses Of High-Speed Trading Are A Direct Result Of SEC Micromanagement*, Forbes, Aril 29, 2014 available at http://www.forbes.com/sites/realspin/2014/04/29/memo-to-michael-lewis-the-excesses-of-high-speed-trading-are-a-direct-result-of-sec-micromanagement/ (accessed on June 8, 2014).
[191] *See*, Securities Exchange Act Release No. 51808 (June 9, 2005) (adopting Regulation NMS).
[192] Trading in "eighths" was a historical carryover of the peso that was widely circulated in America before the Civil War. That coinage was broken down into eights, and gave rise to the term two bits which was equal to a quarter. Spanish Dollar, http://en.wikipedia.org/wiki/Spanish_dollar (accessed on Oct. 12, 2014).
[193] Notices, SEC, 73 Fed. Reg. 64379-80 (Oct. 24, 2008) (footnote omitted).
[194] SEC, *Concept Release on Equity Market Structure*, 75 Fed. Reg. 3594 (Jan. 21, 2010).

HFTs should be defined and regulated. The SEC noted that HFTs were interacting with other investors in various ways, but deferred action on regulating any particular type off trade. Instead, the Market Concept Release launched a broad based review by the SEC of the current equity market structure. The SEC was seeking to determine whether its rules had kept pace with the growth of electronic trading, including the role of flash orders and other HFT practices.[195] That review is still underway as of the date of this writing.

HFTs were allowed for a time to have "naked" or "sponsored" access to market centers, allowing them direct access to those marketswhere they interfaced with customer orders. This naked access allowed unregistered high frequency traders to access an exchange's trading facilities without broker-dealer intermediation or supervision.[196] The SEC imposed risk supervision requirements on the broker-dealers that had offered naked access. [197] That rule effectively curbed naked access.

The SEC Market Concept Release also considered concerns over dark pools. The SEC noted that, "[i]n general, dark pools offer trading services to institutional investors

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[195] SEC, *Concept Release on Equity Market Structure*, 75 Fed. Reg. 3594 (Jan. 21, 2010).

[196] As the SEC noted:

> Over the past decade, the proliferation of sophisticated, high-speed trading technology has changed the way broker-dealers trade for their own accounts and as agent for their customers. In addition, customers--particularly sophisticated institutions--have themselves begun using technological tools to place orders and trade on markets with little or no substantive intermediation by their broker-dealers. This, in turn, has given rise to the increased use and reliance on 'direct market access' or 'sponsored access' arrangements. Under these arrangements, the broker-dealer allows its customer--whether an institution such as a hedge fund, mutual fund, bank or insurance company, an individual, or another broker-dealer--to use the broker-dealer's market participant identifier ('MPID') or other mechanism for the purposes of electronically accessing the exchange or ATS. With 'direct market access,' as commonly understood, the customer's orders flow through the broker-dealer's systems before passing into the markets, while with 'sponsored access' the customer's orders flow directly into the markets without first passing through the broker-dealer's systems. In all cases, however, whether the broker-dealer is trading for its own account, is trading for customers through more traditionally intermediated brokerage arrangements, or is allowing customers direct market access or sponsored access, the broker-dealer with market access is legally responsible for all trading activity that occurs under its MPID.

Risk Management Controls for Brokers or Dealers With Market Access, 75 Fed. Reg. 4007, 4008 (Jan. 26. 2010) (footnotes omitted).

[197] *See,* 17 C.F.R. §240.15c3-5.

and others that seek to execute large trading interest in a manner that will minimize the movement of prices against the trading interest and thereby reduce trading costs."[198] There were, however, inequities that resulted from these competing trading venues. For example, traders may be able to have their orders filled on a dark pool, "while those on publicly displayed markets go unfilled, even though dark pools use the information from publicly displayed markets to price the dark pool transactions."[199]

This disparity is compounded when dark pools share trading information with other dark pools, allowing them to "function like private networks that exclude the public investor."[200]The SEC proposed rules to limit such exclusions by dark pools but has not acted to date on those proposals.[201] The SEC created a large trader reporting system that required large traders to register with the SEC.[202] It also began enforcing its trade reporting requirements for HFTs,[203]

The SEC additionally proposed a new Regulation SCI (Systems Compliance and Integrity) to force electronic trading platforms to enhance their programs for preventing

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[198] 75 Fed. Reg. at 3599 (footnote omitted).

[199] SEC Fact Sheet, *Strengthening the Regulation of Dark Pools* (Oct. 21, 2009), available at http://www.sec.gov/news/press/2009/2009-223-fs.htm (visited on April 21, 2012).

[200] *Id.*

[201] *Id.*

[202] *Id*. FINRA has proposed a rule that would require developers of computer algorithms for HFTs to register with FINRA. It also proposed additional trade reporting requirements for dark pools. Sarah N. Lynch, *Wall Street Regulator Unveils Proposals for Dark Pools, Bond Markets*, (Sept. 19, 2014, available at http://www.reuters.com/article/2014/09/19/us-financial-regulations-finrarules-idUSKBN0HE25G20140919 (accessed on Sept. 29, 2104).

[203] *In the Matter of Scottrade, Inc.*, Fed. Sec. L. Rep. (CCH) ¶80,469 (S.E.C. 2014), the SEC found by consent that the respondent had failed to file accurate blue sheet information. The SEC noted that:

> Section 17 of the Exchange Act imposes on broker-dealers recordkeeping requirements that are essential to the Commission's ability to enforce the federal securities laws and to protect investors. To ensure the continued effectiveness of the Commission's enforcement and regulatory programs, broker-dealers must comply with, among other things: Rule 17a-25, requiring that broker-dealers submit electronically securities transaction information upon request by the Commission's staff; Rule 17a-4(j), requiring broker-dealers to furnish promptly true, complete, and current copies of those records upon request by the Commission's staff; and Rule 17a-4(f)(3)(v), requiring broker-dealers to have an audit system that provides for accountability regarding the inputting of records required to be maintained and preserved.

Id.

system crashes.[204] The SEC also began more closely monitoring electronic trading platforms.[205]

4. Futures Markets and Electronic Trading Concerns

Like the stock markets, the futures markets had resisted automation, but automation soon superseded traditional floor operations and introduced the HFT to those markets.[206] Like the SEC, the CFTC issued a broad concept release seeking comment on regulations needed to prevent market disruptions by automated trading systems as the result of order errors or computer glitches.[207] The CFTC concept release also sought to create a regulatory structure for electronic trading platforms and HFTs.[208] Among other

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[204] *See*, Scott Patterson, *SEC Delays Action on Wall Street Safeguards*, Wall ST. J., Oct. 8, 2014 (describing this proposed regulation). The industry was also stepping up its monitoring of HFT trading. JPMorgan Chase announced on July 21,2014 that it was creating a unit of some 150 employees to monitor electronic trading that might affect its business and to advise clients trading on electronic trading platforms. Emily Glazer, *J.P. Morgan Puts Electronic Trading in the Spotlight*, Wall St. J., July 22, 2014, at C3.

[205] For example, in *In the Matter of New York Stock Exchange LLC*, Fed. Sec. L. Rep. (CCH) ¶80,615 (2013), the SEC found by consent that an exchange and its affiliates had implemented rules that created a new or modified business practice without approval by the SEC. This included providing colocation services, failing to execute mid-point passive liquidity orders in an approved manner, and improperly distributing closing order imbalance information.

[206] See, Jerry W. Markham and Daniel J. Harty, *For Whom the Bell Tolls: The Demise of Exchange Trading Floors and the Growth of ECNs*, 33 IOWA J. CORP. L. 865 (2008) (describing that resistance and transformation).

[207] *Concept Release on Risk Controls and System Safeguards for Automated Trading Environments*, 78 Fed. Reg. 56542 (Sept. 12, 2013).

[208] The CFTC has described the interrelated roles of electronic trading platforms and automated trading systems as follows:

> Automated trading environments have developed in tandem with automated systems for both the generation and execution of orders. Systems related to the generation of orders ("automated trading systems" or "ATSs") operate at the beginning of the order and trade lifecycle; they reflect a set of rules or instructions (an algorithm) and related computer systems used to automate the execution of a trading strategy. ATSs may operate as automated execution programs designed to minimize the price impact of large orders; achieve a benchmarked price (e.g., volume-weighted average price and time-weighted average price algorithms); or otherwise execute instructions traditionally provided by a human agent. They may be employed by a range of market participants, with varying degrees of sophistication, for both proprietary and customer trading. For example, buy-side firms (such as mutual funds and pension funds) may use automated systems and execution algorithms to "shred" one or more large orders (called "parent order") into a series

things, the CFTC concept release noted with respect to the development of automated trading systems (ATS) that:

> In addition to greater automation and decreased latency, derivatives markets are increasingly characterized by a high degree of interconnection. ATSs and algorithms deployed to trade particular products often interact directly and indirectly with ATSs and algorithms active in other markets and jurisdictions. Increased interconnectedness is facilitated by electronic access to real-time pricing information, automated order execution, and some standardization in communication protocols at various trading platforms. ATSs can quickly execute strategies across multiple markets within very short periods of time. Often, cross-market activity is driven by latent arbitrage opportunities and faster access to multiple markets has led to a proliferation of strategies that seek to identify and trade on the basis of these relationships.[209]

The CFTC adopted some regulations to deal with the risks posed by this new trading environment. It required futures commission merchants (FCMs) and swap dealers and major swap participants that are clearing members of an exchange to establish automated pre-order risk-based limits on position and order size and margin requirements for all proprietary and customer accounts.[210] Among other things, the CFTC was also considering whether to require registration of HFT's and identification of their algorithms so that the agency could monitor them for possible disruptive practices or market threats.[211]

6. Trading Abuses: "Spoofing" and "Layering"

> of smaller trades ("child orders") to be executed over time. Such systems can include additional algorithms to micro-manage the size, frequency and timing (often randomized) of child orders. In addition to automated execution, ATSs may also operate market-making programs; opportunistic, cross-asset and cross-market arbitrage programs; and a number of other strategies.

Concept Release on Risk Controls and System Safeguards for Automated Trading Environments, 78 Fed. Reg. 56542, 56544 (Sept. 12, 2013) (footnotes omitted).

[209] Id. at 56547-8 (footnotes omitted).

[210] 17 C.F.R. §1.73 and 17 C.F.R. §23.609.

[211] *Concept Release on Risk Controls and System Safeguards for Automated Trading Environments*, 78 Fed. Reg. 56542, 56559-60 (Sept. 12, 2013)

A by-product of HFTs has been a number of trading abuses, such as "spoofing," that seek to mislead or take advantage of other competitors. Spoofing may take several forms. Initially, it was a fraud scheme that falsified the source of emails in order to give the appearance that a company had announced news that would affect its stock price. This allowed the perpetrator of the scheme to trade in advance of that movement.[212] This term was also later applied to trading schemes in which HFT place orders that they intended to cancel before execution in order to entice other traders into the market.[213]

Spoofing as a trading technique has a history. Previously called "flash" trades, such orders were cancelled immediately upon communication or withdrawn if not executed immediately after communication.[214] Flash trades were criticized by many.[215] However, such practices were specifically authorized by one of the SEC National Market System (NMS) rules, which allowed exchanges to exclude flash orders from consolidated quotation data disclosures. [216]The SEC found that, "[f]or those seeking liquidity, the flash mechanism may attract additional liquidity from market participants who are not willing to display their trading interest publicly."[217] The SEC did express concern that such trading could be abusive and provide an advantage to professional traders over smaller traders, but deferred a decision to ban such orders entirely because of their potential value

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[212] *See*, SEC v. Dorozkho, 574 F.3d 42 (2d Cir. 2009) (addressing such a scheme. *See also, Jerry W. Markham, Law Enforcement and The History of Financial Market Manipulation,* 334-335 (2014) (further describing such schemes).

[213] *See, Jerry W. Markham, Law Enforcement and The History of Financial Market Manipulation*, 334-335 (2014) (describing the background of spoofing concerns).

[214] 74 Fed. Reg. 48632 (Sept. 23, 2009).

[215] *See, "Flash" Trading Controversy in U.S. Raises Issue of Front-Running*, Reuters, Aug. 7, 2009) (describing this controversy, available athttp://blogs.reuters.com/financial-regulatory-forum/2009/08/07/flash-trading-controversy-in-us-raises-issue-of-front-running/ (accessed on Oct. 12, 2014).

[216] 17 C.F.R. §602(a)(1)(i)(A).

[217] 74 Fed. Reg. 48632, 48638 (Sept. 23, 2009). Securities Exchange Act Release No. 34-60684, 74 Fed. Reg. 48632 (Sept. 23, 2009). S

to the market.[218]

The SEC's concerns over the value of flash orders was justified. For example, traders might enter orders to "ping" the market like a submarine seeking out possible dangers or target opportunities? Pinging appears to be a legitimate practice that should be allowed for traders, but should flash orders so large in volume as to overload competing platforms be allowed?[219] Instead of trying to define the difference between good and bad flash trades, the SEC began to regulate such trading through enforcement actions. Those actions attacked spoofing trades designed to increase the national best and offer (NBBO) by not displaying customer orders at prices that were better than a market maker's NBBO posts. This practice charged as being in violation of SEC rules on limit order displays.[220]

The SEC also began charging "layering" as an improper trading practice. Layering appears to be simply a more robust form of flash trades, but which the SEC views to be fraudulent. The SEC has stated that:

> In general, layering occurs when a trader creates a false appearance of market activity by entering multiple non-bona orders on one side of the market, at generally increasing (or decreasing) prices, in order to move that stock's price in a direction where the trader intends to induce others to buy (or sell) at a price altered by the non-bona orders.[221]

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[218] *Concept Release on Equity Market Structure*, 75 Fed. Reg. 3594 (Jan. 21, 2010).

[219] See, Gregory Scopino, *The Questionable Legality of High-Speed "Pinging" and "Front Running" in the Futures Markets*, 47 Conn. L. Rev. -- (2015) (questioning the role of pinging)

[220] In the Matter of Frazee, 2003 SEC LEXIS 632 (S.E.C.).

[221] In the Matter of Birem Corp., 2012 WL 6587520 (S.E.C.). The SEC has also described layering as follows:

> Layering concerns the use of non-bona fide orders, or orders that the trader does not intend to have executed, to induce others to buy or sell the security at a price not representative of actual supply and demand. More specifically, a trader places a buy (or sell) order that is intended to be executed, and then immediately enters numerous non-bona fide sell (or buy) orders for the purpose of attracting interest to the bona fide order. These non-bona fide orders are not intended to be executed. The nature of these orders is to induce, or trick, other market participants to execute against the initial, bona fide order. Immediately after the execution against the bona fide order, the trader cancels the open, non-bona fide orders, and repeats this strategy on the opposite side of the market to close out the position.

In the Matter of Hold Brothers On-Line Investment Services, LLC, 2012 SEC LEXIS 3029 (S.E.C.).

HFTs were also criticized for using complex orders to game other aspects of the SEC's NMS. One particularly unwieldy aspect of SEC Regulation NMS is its prohibition against quoting a "locked" market in which the buy and sell quotes are the same. In theory the trades should cross and execute but do not because one or the other party may not want to pay the exchange fee associated with the execution.[222] That prohibition gave rise to various trading strategies to avoid the effect of that locked market prohibition, including complex "hide not slide" orders that were criticized in the press.[223] The hide-not-slide orders were designed to give priority to undisplayed orders when the market unlocked.[224] The SEC has also sought sanctions where a trading platform uses customer information for its own trading advantage.[225]

Mary Jo White, the SEC Chair, announced in June 2014 that she had directed the SEC staff to formulate rules that would identify and prohibit disruptive HFT trading strategies during volatile market conditions. She stated that the SEC "should not roll back the technology clock or prohibit algorithmic trading," but that it had to assess "the extent to which specific elements of the computer-driven trading environment may be working against investors rather than for them."[226] White also questioned "whether the

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[222] Cameron Smith, *Stock Investors Can Handle the Truth*, Wall St. J., June 3, 2014, at A11.

[223] See, Scott Patterson & Jenny Strasburg, *For Superfast Stock Traders, A Way to Jump Ahead in Line*, Wall ST J., Sept. 19, 2012 at A1 (describing these orders).

[224] *See*, *Id.* (describing this practice).

[225] A Citigroup, Inc. affiliate agreed to pay $5 million to settle SEC charges that it failed to protect the confidential information of customers trading on its ECN, LavaFlow Inc. That information involved non-displayed orders and was given to a Citigroup affiliate for its trading. Michael Calia, *Citigroup Unit's Fine is a Record*, Wall St. J., July 26-26, 2014, at B5. *See als*o, In the Matter of LavaFlow, Inc., Fed. Sec. L. Rep. (CCH) ¶80,652 (2014). In *In the Matter of Liquidnet, Inc.*, Fed. Sec. L. Rep. (CCH) ¶80,626 (2014), the SEC by consent sanctioned a dark pool that was registered as an ATS for sharing confidential information about customer trading with a business unit outside the dark pool.

[226] Mary Jo White. *Enhancing Our Equity Market Structure*, Address before Sandler O'Neill & Partners, L.P. Global Exchange and Brokerage Conference New York, N.Y. June 5, 2014., available at http://www.sec.gov/News/Speech/Detail/Speech/1370542004312#.VD_QakvP4pE (accessed on Oct. 16, 2014).

increasingly expensive search for speed has passed the point of diminishing returns."[227] She stated that the SEC would also be examining "mechanisms designed to minimize speed advantages." [228] White further indicated the SEC might impose affirmative market making obligations on HFTs, as had been done in the past to offset the time and place advantages of market makers and specialists on the NYSE and Nasdaq. [229]

Like the SEC, the CFTC encountered concerns over HFT trading practices. Section 747 of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank) allowed the CFTC to attack "spoofing" (bidding or offering with the intent to cancel the bid or offer before execution).[230] Section 747 also allowed the CFTC to attack other "disruptive" trading practices, such as violating the bids and offers of other traders and "banging the close."[231] The CFTC subsequently issued an interpretation of the scope of the prohibition in Section 747 of Dodd-Frank. Among other things that interpretation sated that its prohibitions apply to any trading that involves buying at a price that is higher than the lowest available price or selling at a price that is lower than the highest available price.[232] The CFTC has also brought spoofing charges against traders and

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[227] *Id.*
[228] *Id.*
[229] *Id.*
[230] Section 747 of Dodd-Frank amended Section 4c of the Commodity Exchange Act of 1936 (CEA), 7 U.S.C. §6c. Section 4c had previously prohibited certain improper trading practices such as "wash" sales, "accommodation" trades and "fictitious" trades. *See*, 13 JERRY W. MARKHAM COMMODITIES REGULATION: FRAUD, MANIPULATION & OTHER CLAIMS, Ch. 14 (2014) (describing those practices). See *also* , 23A JERRY W. MARKHAM & THOMAS L. HAZEN, BROKER-DEALER OPERATIONS UNDER SECURITIES AND COMMODITIES LAW §9:17.80 (2014) (describing spoofing).
[231] 7 U.S.C. §6(c). Banging the close involves manipulating the closing price of a futures or options contract in order to reduce margin requirements or to affect the price of a cash market position. See, In the Matter of DiPlacido, Comm. Fut . L. Rep. ¶30, 970 (C.F.T.C. 2008), aff'd sub nom., DiPlacido v. CFTC, 2009 U.S. App. LEXIS 22692 (2d Cir. 2009), cert denied, 2010 U.S. LEXIS 2461 (2010) (a pre-Dodd-Frank case attacking such practices as manipulation).
[232] *Interpretive Guidance and Policy Statement on Antidisruptive Practices Authority*, 78 Fed. Reg. 31,890 (May 28, 2013). The CME Group also adopted a rule prohibiting disruptive trading practices such as quote stuffing that seeks to overwhelm the quotations of another market participant, disorderly trading during closing periods, and spoofing. *CME Group Files Rule to Prohibit Disruptive Practices*, 46 Sec. Reg. & L. Rep. (BNA) 1797 (Sept. 15, 2014).

one trader was indicted for such activity after settling with the CFTC.[233]

V

INFORMATION IS A COMMODITY

There has been much argument over whether HFTs add value to the market by enhancing liquidity.[234] However, that debate seems bit pointless since, as volume figures indicate,[235] HFTs are supplanting the traditional market makers on both the stock and futures exchanges. Criticism of HFT trading practices that may be abusive are a matter of appropriate regulatory concern, but that begs the questions of what is abusive and how such practices should be regulated.

Identification of an abuse is itself problematic, since not every advantage or stratagem is abusive even if it provides advantage to its user at the expense of others.

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[233] Kara Scannell & Gregory Meyer, *Trader Faces Criminal Spoofing Charges*, Financial Times, Oct. 2, 2014). Questions have been raised over whether that spoofing actually injured anyone other than other HFTs. Matt Levine, *Prosecutors Catch a Spoofing Panther*, BloombergView, Oct. 2, 2014, available at http://www.bloombergview.com/articles/2014-10-02/prosecutors-catch-a-spoofing-panther (accessed on Oct. 10, 2014). Another trader settled a CFTC manipulation case for $1.56 million, which charged that the trader repeatedly entered and cancelled orders that he did not plan to have executed in order to provide the false appearance of liquidity in wheat futures contracts. *Broker Agrees to Pay $1.56M in Manipulation Case*, 46 Sec. Reg. & L. Rep. (BNA) 1969 (Oct. 6, 2014). The commodity exchanges were also bringing numerous spoofing claims against traders. Gregory Meyer & Kara Scannell, *Chicago Lawmakers Get Tough on 'Spoofing*,' Fin. Times (London), Oct. 8, 2014.

[234] For example, s the CBOE has claimed that: "[g]enerally speaking, the evolution of high frequency trading has helped limit spreads and increase market liquidity -- efficiencies that benefit all market participants." "High Frequency Trading: Progress or Problem?" http://www.cboe.com/AboutCBOE/MediaHub/high-frequency-trading/views.aspx, accessed on May 15, 2013). *See also e.g.*, Markus Baldauf and Joshua Mollner, *The Private Value of Speed: Systematic Advantages of Fast Liquidity Providers*, Stanford University Economics Department, May 29, 201; Lauren Oppenheimer and John Vahey, *The Need For Speed*, *Capital Markets Initiative*, July 2013; Matthew O'Brien, *Everything You Need To Know About High Frequency Trading*, The Atlantic, April 11, 2014; Matthew Philips, *How The Robots Lost: High Frequency Trading's Rise and Fall*, Bloomberg BusinessWeek, June 6, 2013; Bradley Hope, A High-Speed Trader Looks to Slow Down Critics, Wall St. J., Oct. 15, 2014, available at http://online.wsj.com/articles/a-high-speed-trader-looks-to-slow-down-critics-1413318872?mod=dist_smartbrief (accessed on Oct. 15, 2014)..

[235] *See*, *supra* nns. --.

Pinging for example seems legitimate since it is merely seeking out trading interest but when does pinging become illegal spoofing? Once identified as a abusive, prohibited practices could be spotted by regulatory authorities through their own algorithms. [236] That would add certainty to the market and free traders of guessing what is or is not permitted.[237] In the meantime, the regulators are bringing cases on an *ad hoc* basis that add little to the debate over the proper role and regulation of HFTs.[238]

This focus on treading abuses is actually masking the real concern of regulators, which is that HFTs are taking advantage of asymmetrical access to information gained by their high speed trading abilities. This concern has even spawned proposals to slow down the HFTs and thereby remove their high speed advantages. One proposal would label HFTs as "e-specialist brokers" and handicap those registrants by preventing them from using exchange data feeds. This would prevent the HFts from getting a jump on other traders.[239]

Another approach is to slow everyone down to the same speed. For example, IEX is a dark pool that uses a 350 micro-second delay for orders entered into its system for execution in order. That delay seeks to equalize trading opportunities and preclude the front running of customer orders.[240] IEX was also seeking to compete with the dark pools by allowing trading for free where buy and sell orders match. Others trades on IEX were

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[236] FINRA seems to be moving in this direction. *FINRA Board Oks Proposals on Dark Pools, Algorithmic Trading, Fixed Income Markets*, 46 Sec. Reg. & L. Rep. 1825 (Sept. 22, 2014).

[237] *See, Jerry W. Markham, Law Enforcement and The History of Financial Market Manipulation*, 334-335 (2014) (describing such an approach). *See also*, Gregory Scopino, *Do Automated Trading Systems Dream of Manipulating the price of Futures Contracts? Policing Markets for Improper Trading Practices by Algorithmic Robots*, 66 Fla. L. Rev. -- (2015) (advocating a supervisory requirement for firms with HFTs).

[238] For example, the SEC trumpeted its prosecution of an HFT over a net capital violation. *See, HFT Firm Agrees to Record SEC Fine For Alleged Violations of Net Capital Rule*, 46 Sec. Reg. & L. Rep. 1824 (Sept. 22, 2014).

[239] *Report: "E-Specialist" Label Can Reduce HFT Issues*, 46 Sec. Reg. & L. Rep. (BNA) 1775 (Sept. 15, 2014).

[240] Scott Patterson, *Regulator Hired by Upstart Firm*, Wall St. J., June 17, at C5.

assessed a fee of nine cents per 100 shares and their were no maker/taker payments to encourage liquidity by HFT orders. Broker-dealers would be given priority over other traders, including HFTs.[241]

A number of other fixes for HFT trading have been proposed, including a widening of tick sizes for market quotes. That would be a reversal of a prior SEC action that reduced tick sizes to a penny from the traditional 1/16 and 1/8 of a dollar. Moreover, wider spreads are an indication of an illiquid and inefficient market, so why require inefficiency? The SEC was also considering a requirement that trades be conducted on dark pools only at prices better than those available on public markets. [242]

Again, these efforts are directed toward the creation of a level playing field for all traders. However, as history has shown, traders have always sought information advantages that will allow them to profit at the expense of slower competitors. It would seem passing strange to historians if governments had prohibited the use of mirrors, smoke signals or courier pigeons in trading securities. Similarly banning fast ships and express coaches would also be laughable to us today if such action had been taken in order to curb the advantages of speculators.

This misguided attack on informational advantages is fueled by the SEC's fixation on insider trading, which it initially based on a theory that unequal access to

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[241] Bradley Hope, *IEX Plan Aims to Drain 'Dark Pools*,' Wall St. J., July 7, 2014 at C1.

[242] Andrew Ackerman & Bradley Hope, *SEC Set to Spur Exchange Trading*, Wall St. J., May 27, 2014, at C1. See also, Andy Kessler, *High-Frequency Trading Needs one Quick Fix*, Wall St. J., June 16, 2004, at A15 (One fix for NMS was suggested as requiring "best execution, rather than best price and by increasing decimalization to minimum five cent spreads. See, Jeff Castura *et al*., *Market Efficiency and Microstructure Evolution in U.S. Equity Markets: A High-Frequency Perspective*, Aug. 30, 2010 (discusiing role of HFTs in narrowing spreads), available at http://finlin.wharton.upenn.edu/department/Seminar/micro/Litzenberger_transient_vol5_2010.pdf (accessed on Oct. 10, 2014).

information that is used to trade stocks is fraudulent.[243] However, an insider trading charge requires proof of some misappropriation of information or obtaining or using information in breach of a fiduciary duty.[244] However, HFTs are neither misappropriating information nor breaching any fiduciary duty. Moreover, the Supreme Court has rejected the SEC's claims for equal access to information even in insider trading cases. The Supreme Court held in *Chiarella v. United States*,[245]thus held that "[a] duty to disclose . . . does not arise from the mere possession of nonpublic market information." [246] "Moreover, neither the Congress nor the [Securities and Exchange] Commission ever has adopted a parity-of-information rule. Instead, the problems caused by misuse of market information have been addressed by detailed and sophisticated regulation that recognizes when use of market information may not harm operation of the securities markets."[247] This should signal a focus on rules that attack particular trades that are fraudulent and not on the facts that one trader is faster than another or has better information.

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[243] The equal access to information insider trading theory had been created out of whole cloth by the SEC in a 1961 consent order in Cady, Roberts & Co., 40 S.E.C. (1961). Such a doctrine had been rejected at common law. *See*, Goodwin v. Agassiz, 186 N.E. 659 (Sup. Mass. 1933). The SEC had not posited such a theory until the 1961 consent decree, *See*, JERRY W. MARKHAM, LAW ENFORCEMENT AND THE HISTORY OF FINANCIAL MARKET MANIPULATION, 138 (2014) (describing this development). The SEC then began using insider trading cases as the centerpiece of its enforcement efforts. *See e.g.*, SEC v. Texas Gulf Sulphur Co., 401 F.2d 833 (2d Cir. 1968), *cert. denied sub nom.*, Coates v. SEC, 394 U.S. 976 (1969).

[244] United States v. O'Hagan, 521U.S. 642, 667-677 (1987).

[245] Chiarella v. United States, 445 U.S. 222 (1980).

[246] 445 U.S. at 235.

[247] 445 U.S. at 233. *See also*, Dirks v. SEC, 463 U.S. 646 (1983) (further circumscribing the SEC's equal access to information theory). In *United States v. Finnerty*, 533 F.3d 143 (2d Cir. 2008). the Second Circuit affirmed the dismissal of the defendant's convictions for interpositioning or front running of customer trades because there was "no evidence that Finnerty conveyed an impression that was misleading, whether or not it could have a bearing on a victim's investment decision in connection with a security." 33 F.3d at 149. The Court further stated that:

> It may be that Finnerty unfairly profited from superior information. But "not every instance of financial unfairness constitutes fraudulent activity under § 10(b)." *Chiarella v. United States*, 445 U.S. 222, 232, 100 S. Ct. 1108, 63 L. Ed. 2d 348 (1980). And characterizing Finnerty's conduct as "self-evidently deceptive" is conclusory; there must be some proof of manipulation or a false statement, breach of a duty to disclose, or deceptive communicative conduct. "Section 10(b) is aptly described as a catchall provision, but what it catches must be fraud." *Id.* at 234-35.

[247] 533 F.3d at 150.

The equal access to information theory has also been solidly rejected in the futures markets beginning early in the country's history. In an 1817 decision written by Justice John Marshall in *Laidlaw v. Organ*,[248] the Supreme Court held that a purchaser of tobacco had no duty to disclose to the seller the buyer's prior non-public knowledge of the signing of the Treaty of Ghent. Tobacco prices increased substantially when the existence of the treaty became publicly known.[249]

Congress amended the CEA in 2008 to adopt the approach taken in *Laidlaw v. Organ*. Congress then added a proviso to the anti-fraud provisions of Section 4b of the CEA,[250] which states that its prohibitions do not require disclosure of:

> nonpublic information that may be material to the market price, rate, or level of the commodity or 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.[251]

Section 753 of the Dodd-Frank Act added language to the CEA that is modeled after Section 10(b) of the Securities Exchange Act of 1934,[252] which is used by the SEC for its insider trader cases.[253] However, Section 753 of Dodd-Frank also adopted the language from the 2008 legislation that proscribes the CFTC from adopting regulations that would include insider trading concepts such as those advocated by the SEC.

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[248] Laidlaw v. Organ, 15 U.S. 178 (1817).

[249] In rejecting that claim, Justice Marshall's opinion tracked that of the proviso added to Section 4b of the CEA. He stated:

> The question in this case is, whether the intelligence of extrinsic circumstances, which might influence the price of the commodity, and which was exclusively within the knowledge of the vendee, ought to have been communicated by him to the vendor? The court is of the opinion that he was not bound to communicate it. It would be difficult to circumscribe the contrary doctrine within proper limits, where the means of intelligence are equally accessible to both parties. But at the same time, each party must take care not to say or do anything tending to impose upon the other.

15 U.S. at 195.

[250] 7 U.S.C. §6b.

[251] 7 U.S.C. §6b(b).

[252] 78 U.S.C. §78j(b).

[253] Section 753 of Dodd-Frank also added a new special provision price manipulations through "false reporting,"

Section 753 of Dodd-Frank prohibits any "manipulative or deceptive device or contrivance" in violation of CFTC rules adopted within one year of the enactment of Dodd-Frank. The CFTC promulgated Rule 180.1[254] to implement that provision. In doing so, the CFTC refused to adopt a broad SEC insider trading prohibition because of the *Laidlaw* like language in Section 753 of the Dodd-Frank Act. The CFTC stated that it is not a violation Rule 180.1 "to withhold information that a market participant lawfully possesses about market conditions . . . either in an anonymous market setting or in bilateral negotiations . . . ."[255] The CFTC thus recognized "that unlike securities markets, derivatives markets have long operated in a way that allows for market participants to trade on the basis of lawfully obtained material nonpublic information.[256]The CEA's approach to asymmetrical access to information should apply equally to informational advantages from high speed trading.

There are sound reasons why information should not be regulated in the absence of fraud. Information is a commodity that has value and for which its holder deserves payment. This simple and basic concept is found everywhere in markets and in daily commerce. Consider the purchase of a newspaper bought by a reader to obtain the information it contains. We all happily pay our doctor bills to obtain the information provided by the doctor's diagnosis. Teachers are paid to disseminate information, as are store clerks, computer programmers and preachers. So why should special knowledge obtained by a trader be any different. Traders holding asymmetrical information or speed advantages should be rewarded for their effort and not punished.

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[254] 17 C.F.R. §180.1.
[255] CFTC, *Prohibition on Manipulative and Deceptive Devices*, 76 Fed. Reg. 41398, 41402 (July 14, 2011).
[256] *Id*. at 41403.

Market moving information should be given equal dignity with any other article of commerce. This means, for example, that exchanges should be able to charge access fees for the information they provide without regulation by a fee setting agency like the SEC.[257] If exchanges want to charge higher fees for better access, then they should be allowed to do so. Exchanges exist because of the information they disseminate, and they should be compensated for that service. That same logic applies to exchange colocation services for which the exchanges charge fees.[258]

Similarly, exchange incentive fees that vary for "makers" of orders and those charged to "takers" of orders, which have engendered much criticism, should also be left to the trading platforms to set. Those incentives are intended to encourage liquidity and are desirable and provide information that is valuable to the market. After all, the specialists and Nasdaq market makers had long profited from the spread between purchase and sale orders. They were applauded for doing so because of the liquidity they provided to the market. HFTS are no less entitled to rewards for providing liquidity.

Further, as the SEC has noted, "[i]nvestors need not, . . . always be price-takers and accept whatever prices the other side of the market is offering at the moment. They can participate in price competition by submitting limit orders to obtain *better* prices than

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[257] In *NetCoalition v. SEC*, 715 F.3d 342 (D.C. Cir. 2013), the D.C. Circuit dismissed a case seeking to require the SEC to suspend the fee setting rules of exchanges for the acquisition of proprietary market data. The court noted that in an earlier decision it had set aside the SEC's approval of an exchange rule because of faulty reasoning. However, the Dodd-Frank Act subsequently removed the requirement that the SEC approve such fees.

[258] Interestingly, the Securities Industry and Financial Markets Association (SIFMA), the primary trade organization representing the broker-dealer community is advocating the elimination or sharp reduction of exchange access fees. SIFMA is also urging the imposition of a requirement that all users of market data have access to data at the same time. *See*, http://www.sifma.org/newsroom/2014/sifma-publishes-recommendations-for-enhancing-fairness-stability-and-transparency-in-us-equity-markets/ (accessed on July 25, 2014) (accessed on Oct. 10, 2014).

the market is offering."[259] Ironically, the SEC further observed that:

> Whatever their particular trading strategy, investors that participate in price competition by offering immediate liquidity in a security are seeking primarily to interact with investor order flow on the other side of the market. Assuring an opportunity for this type of direct interaction between investors without the intervention of a dealer is one of the principal objectives of the national market system.[260]

The HFTs in all events do not need to be slowed down. This is an era of computers and advocating a return to ink quills and foolscap is nonsense. Thee HFT is simply another step that began with courier pigeons and smoke signals and now microwaves. One can only wonder what the next generation will bring to the long running effort to gain trading advantage by faster information media.

VI

CONCLUSION

The use of high-speed methods for the transmittal of information in order to obtain an edge on trading over other traders is a practice that is as old as the markets

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[259] *Commission's Request for Comment on Market Fragmentation*, 65 Fed. Reg. 10577, 10581 (Feb. 28, 2000). The SEC also noted that:

> Another type of implicit transaction cost reflected in the price of a security is short-term price volatility caused by temporary imbalances in trading interest. For example, a significant implicit cost for large investors (who often represent the consolidated investments of many individuals) is the price impact that their large trades can have on the market. Indeed, disclosure of these large orders can reduce the likelihood of their being filled. Consequently, large investors often seek ways to interact with order flow and participate in price competition without submitting a limit order that would display the full extent of their trading interest to the market. Among the ways large investors can achieve this objective are: (1) To have their orders represented on the floor of an exchange market; (2) to submit their orders to a market center that offers a limit order book with a reserve size feature; or (3) to use a trading mechanism that permits some form of "hidden" interest to interact with the other side of the market. A market structure that facilitates maximum interaction of trading interest can produce price competition *within* displayed prices by providing a forum for the representation of undisclosed orders.

Id. (footnotes omitted, emphasis in original).

[260] *Id*. at 10581 (footnote omitted).

themselves. From carrier pigeons to laser technology, time has shown that information is a valuable commodity that traders naturally use to seek a profit. By doing so they are transmitting that information to the market through their trading and provide market liquidity and better market efficiency.