



The Rodney L. White Center for Financial Research

The Structure of the US Equity Markets

Marshall E. Blume

06-02

The Wharton School
University of Pennsylvania

The Rodney L. White Center for Financial Research

The Wharton School
University of Pennsylvania
3254 Steinberg Hall-Dietrich Hall
3620 Locust Walk
Philadelphia, PA 19104-6367

(215) 898-7616

(215) 573-8084 Fax

<http://finance.wharton.upenn.edu/~rlwctr>

The Rodney L. White Center for Financial Research is one of the oldest financial research centers in the country. It was founded in 1969 through a grant from Oppenheimer & Company in honor of its late partner, Rodney L. White. The Center receives support from its endowment and from annual contributions from its Members.

The Center sponsors a wide range of financial research. It publishes a working paper series and a reprint series. It holds an annual seminar, which for the last several years has focused on household financial decision making.

The Members of the Center gain the opportunity to participate in innovative research to break new ground in the field of finance. Through their membership, they also gain access to the Wharton School's faculty and enjoy other special benefits.

Members of the Center

2001 – 2002

Directing Members

**Ford Motor Company Fund
Geewax, Terker & Company
Morgan Stanley
The Nasdaq Stock Market, Inc.
The New York Stock Exchange, Inc.**

Members

**Aronson + Partners
Bear, Stearns & Co., Inc.
Exxon Mobil Corporation
Goldman, Sachs & Co.
Spear, Leeds & Kellogg**

Founding Members

**Ford Motor Company Fund
Merrill Lynch, Pierce, Fenner & Smith, Inc.
Oppenheimer & Company
Philadelphia National Bank
Salomon Brothers
Weiss, Peck and Greer**

17-Mar-02

The Structure of the US Equity Markets

Marshall E. Blume¹
The Wharton School
The University of Pennsylvania

¹ Comments and advice were received from the following: Paul Bennett, Robert Eisenbeis, Dean Furbush, Adam Goldberg, Michael Goldstein, Richard J. Herring, Kenneth Kavajeca, Bernard Madoff, Peter Madoff, Tim McCormick, John Moran, Gus Sauter, Jeremy Siegel, James Shapiro, George Sofianos., and Hans Stoll. I thank them for their comments, many of which challenged my views. Sometimes, I changed the text in response to their comments and sometimes not. Thus, none of the views expressed in this paper should be attributed to any of these individuals.

Abstract

In 1975, Congress directed the SEC to develop a national market system in which all orders to buy or sell equities would interact. A national market system abhors fragmentation and assumes that one market will best serve the needs of all investors. Such an assumption does not capture the realities of modern markets. Investors have different needs and different markets will develop to serve these needs. Markets are non anonymous, and in such markets, the very concept of “best price” is not defined. Fragmented markets are a natural result of competition. Within the US, the sharing of trade and quote information among markets helps to mitigate any deleterious effects of fragmentation. The markets of tomorrow will be global. In a global market, the SEC will have to give up its goal of a national market system and focus on other issues. For example, it will be a challenge to provide just the sharing of trade information across borders. Further, technology will allow a market center or order-gathering function to be located anywhere in the world. This threat of relocation will place constraints on US regulators, and global trading will make it more difficult for US authorities to regulate investment practices and to protect US investors.

I. Introduction

Equity markets worldwide are in a state of change. Technology and the Internet have had and will continue to have a profound impact on the structure of the equity markets. Recent rulings from the SEC have unleashed new competitive forces that will challenge established markets.

To date, the cost and awkwardness of the settlement processes across nations have restrained global competition, but these processes are changing. As cross-border settlement becomes cheaper and easier, global trading may increase and US regulators will need to adapt to this new environment.

The 1975 Amendments to the Securities Exchange Act of 1934 set as a national goal that all securities should be traded in a national market system. This goal has shaped much of the SEC's thinking since that time, but this goal may collide with some of the ongoing structural changes occurring in the equity markets, both domestically and worldwide. As argued below, a national market system represents a naïve and parochial view of the way in which equities trade. It is incompatible with how the markets are developing and will develop.

A national market system abhors fragmentation as fragmentation limits interaction among order flow. Yet, fragmentation is at the heart of competition. New competition creates fragmentation, but significant fragmentation will occur only if the competition is successful. If the competition is extremely successful, existing markets will decline and fail, resulting ultimately in less fragmentation.

To be effective in this increasingly global world, the SEC will have to give up its goal of a national market system, begin to recognize the global nature of the equity

markets, and shape its regulatory thrust to the regulatory issues of a global market. The SEC and other US regulatory authorities will have to coordinate their activities with those of other nations.

In future years, a firm like Microsoft will trade worldwide. Investors in Africa, Asia, Australia, Europe, and South America will be able to buy US stocks during their normal business hours in their local currency. Of great significance to US regulators is that an US investor will be able to trade US stocks in foreign markets. By so trading, US investors may be able to circumvent some US regulations legally and to hide some questionable, and possibly illegal, activities from US surveillance.

The movement towards global trading has begun and will continue. When global trading becomes a reality, an investor will choose the country and currency in which the trade takes place. A US investor will be able to trade with just a click on any market that provides advantages over those in the US. Still, it is quite possible that the bulk of the trading in a security will remain in the domestic market. To be successful, a market requires a critical mass of liquidity. Since the domestic market already has that mass, it is difficult, though not impossible, for another market to establish itself.

Monitoring and regulating this movement to global trading will be one of the major regulatory challenges over the next decade. It will require that domestic regulators coordinate their efforts with those of other countries.

A non-exhaustive list of challenges in regulating worldwide trading include: the oversight of a global settlement system, the prevention of fraud, the maintenance of transparency, the enforcement of stockholder rights, the collection of taxes, and the integration of disparate and perhaps contradictory laws.

Sections II and III describe the legislated national market system and its limitations. Since the concept of a national market system underlies much of current US regulatory efforts, it is important to understand this concept and its limitations. Sections IV through VI highlight the current organization of the markets, including the consolidated reporting of information, the participants, and regulations. Sections VII and VIII examine some of the major issues of the day and argue that these issues will change as trading becomes increasingly global. The final section offers some thoughts about the future.

II. The Legislated National Market System

The 1975 Amendments to the Securities Exchange Act of 1934 directed the SEC to establish a national market system. This directive has shaped much of the regulatory effort of the SEC since that time and still does.

To quote the Amendments, “The Commission is directed . . . to use its Authority . . . to facilitate the establishment of a national market system for securities.”² The Amendments are less clear as to what constitutes a national market system. However, the Amendments observed that “[t]he linking of all markets for qualified securities through communication and data processing facilities will foster efficiency, enhance competition, increase the information available to brokers, dealers, and investors, facilitate the offsetting of investors’ orders, and contribute to the best execution of such orders.”³ Further, a national market system should provide “[t]he opportunity . . . for investor’s orders to be executed without the participation of a dealer.”

² Sec 11 A. (a) (2) of the 1975 Amendments.

³ Sec 11 A. (a) (1) (D) of the 1975 Amendments.

Thus, the concept of the national market system involves a link of some type among the various markets. It certainly included the idea of price priority over all markets. Price priority requires that no market execute a trade at a worse price than available on another market. Thus, if one market posts an offer to sell at \$20.00 for ABC, no investor should pay more than \$20.00 in another market.

The amendments were silent on the issue of time priority within price. Time priority requires that in the presence of two or more offers to sell at the same price, the offers be executed in the time order in which they are submitted. Similar time priority applies to bids.

At the time, some observers like Morris Mendelson, R. T. Williams, and Jay Peake took it for granted that a national market system would include time priority. In response to an SEC request for proposals, they outlined in 1976 the major components of a consolidated limit order book, or CLOB. A CLOB works as follows: Some investors submit limit orders to a centralized book. The orders in this book are executed according to price-time priority. Other investors submit market orders to be executed against these limit orders. To provide strict price-time priority, all trades must take place through this CLOB; no orders can be executed outside the CLOB. In their model, all orders are anonymous.

On the surface, this system appears to be eminently fair. Any investor who submitted a limit order would be assured that his or her order would be executed according to price-time priority. Any investor who submitted a market order would receive the best price available at the time.⁴ No one would have an unfair advantage.

⁴ It is not generally pointed out that in a CLOB market orders themselves would never cross within the best bid and offer as there is zero probability that two market orders would arrive simultaneously in such an

This model of interaction still governs SEC thinking. In its recent concept release on market fragmentation,⁵ the SEC requested comments on six possible actions, ranging from the least intrusive, more disclosure of execution quality, to the most intrusive, an electronic integration of all limit orders for a specific security with the goal of preserving price-time priority across all markets. This last alternative echoes the early discussion of a centralized limit order book with the important exception that certain orders would be exempted, such as institutional orders crossed in the upstairs markets. The effect of this exception is that some orders would be allowed to trade ahead of limit orders in the central book, an effect that some would interpret as contrary to the intent of the 1975 Amendments.

The subsequent release on order routing disclosure opted for greater disclosure of order execution quality.⁶ In this release, the SEC further observed that “[M]any commenters [on the release on market fragmentation], especially institutional investors, supported a nationwide system of price/time priority.” Additionally, these commenters expressed “serious concern about market fragmentation.”

III. The Fallacy of “One Market Fits All”

Underlying the call for a national market system is the proposition that there is one best price at any point in time and that that price is best achieved in one type of market structure. In this view, fairness demands that an investor submitting a market order receive this best price. The following will argue that the very concept of a best price is not well defined and that investors might rationally prefer different types of

electronic market. The crossing of two market orders within the bid and offer as occurs within the NYSE because market orders are often not executed immediately.

⁵ No. 34-42450, File No. SR-NYSE-99-48

⁶ No. 34-43084, File No. S7-16-00

markets. Even the concept of fairness can only be defined only within a specific market structure.

Further, competitive markets will become fragmented in response to the diverse demands of investors. Some investors will prefer one type of market, while others will prefer other types. No single market structure will satisfy the needs of all investors. Some fragmentation is a natural result of competition.

A. Trade Price versus Net Price

The debate about best price has virtually always centered on the trade price, that is, before commissions. In the trading of most NYSE-listed stocks, the broker typically adds a commission. In the trading of NASDAQ-listed stocks, an investor often pays just the trade price, but today, many investors are increasingly paying a commission in addition. In the end, the price that an investor pays or receives is the net price, the trade price adjusted for commissions.

To state the obvious, the price of ultimate concern to an investor is this net price, not the trade price. In the traditional model where an order-gatherer receives an order and then sends it to a different market for execution, the trade price and commission are uniquely defined, as each is determined in separate markets, and focusing on each market provides valid information. However, in a vertically integrated firm that acts both as an order-gatherer and as a market maker, the distinction between trade price and net price becomes blurred. For any net price, the trade price is somewhat arbitrary since the commissions can always be adjusted upwards or downwards as necessary.

In today's world, the NYSE asserts correctly that a market order submitted to it is often executed within the NBBO (National Best Bid and Offer) when the spread is two or

more ticks. Thus, by submitting an order to the NYSE, an investor might obtain what is termed “price improvement.” But an investor might rationally prefer sending an order to another market that does not offer “price improvement” if the net price from using that market is less than the net price from using the NYSE.

But the issue is more complicated. To obtain price improvement on the NYSE, there can sometimes be a delay in execution of 30 seconds and occasionally more. Other markets, which might not provide as much price improvement as the NYSE, may provide quicker execution. A retail customer might choose to forgo the possibility of obtaining a better net price, or even a better gross price, in return for a quicker execution. Indeed, a survey conducted by Sanford C. Bernstein & Co., Inc., found that 58 percent of on-line traders rate immediacy of execution as more important than a favorable price in evaluating the quality of a trade execution.⁷

B. Different Needs

Implicit in the desirability of a national market system is one of two assumptions: The first assumption is that **all** investors prefer such a market. Yet, investors have different needs; as suggested above, some investors place a high premium on speed of execution. But the needs of investors differ much more than this simple example indicates. Some investors, and some major ones at that, prefer a non-anonymous market and will try to trade only with investors that they know. These investors would not want a national market system, whose very essence is anonymity.

The second assumption is that a national market system offers externalities that would greatly enhance national wealth. Such externalities might include enhanced liquidity that could lead to a reduced cost of capital. This paper will not address this

issue as we do not currently have a national market system and such externalities have not yet been established as empirically important.

At the time of the call for a national market system, there was little recognition that some investors possess unrevealed information. Bagehot was perhaps the first to recognize that some investors do sometimes possess such information and to analyze how such unrevealed information would affect market prices.⁸ He assumed an anonymous market structure much like that envisioned by the national market system. Glosten and Milgrom formalized Bagehot's insight.⁹

The effects of unrevealed information are simple but profound. Glosten and Milgrom proposed an anonymous market in which a market maker posts a bid for one share, a price at which it is willing to buy, and an offer for one share, a price at which it is willing to sell. The market maker acts competitively and thus sets the bid and offer at levels such that its expected profit is zero. The market maker faces no explicit costs, such as fees, clerical expenses, and so on. In this model, the spread arises solely to protect the market maker against losses to knowledgeable traders, not to cover the direct costs of being a dealer.

After the market maker posts a bid and an offer, an investor arrives and decides whether to hit either the bid or the offer. There are two types of investors: uninformed traders who need to trade for reasons of liquidity and informed investors who possess unrevealed information about the true price of the security. Although more restrictive

⁷ "Weekly Notes." Bernstein Research (New York: Sanford C. Bernstein & Co., Inc., May 12, 2000).

⁸ Walter Bagehot, "The Only Game in Town," *Financial Analyst Journal*, 1972, v28(1), 80-84.

⁹ Lawrence R. Glosten and Paul R. Milgrom, "Bid, Ask and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders," *Journal of Financial Economics*, 1985, v14(1), 71-100

than necessary, the following assumes that the informed trader knows the true value of the security to which the market price will move in the near future.

This model assumes that a liquidity trader will always trade, while an informed trader will trade only if it is to his advantage. To illustrate the decision of an informed trader, assume that the bid is 20 and the offer is 20.10. If the informed trader knows that the price will move to 19, he would certainly sell the stock at the bid of 20. If he knows it will move to 20.05, he would not trade. If he knows that the price will move to 21, he would buy at 20.10.

The market maker who trades with an informed trader always loses. To break even on average, the dealer will set the bid and offer to recoup from liquidity traders what is lost to informed traders. In an anonymous market, liquidity traders lose and informed traders win.

In this market, there is a unique bid and offer. What makes this bid and offer unique is the anonymity of the investor. The market maker does not know whether the investor is informed or uninformed. If an investor could credibly identify himself as uninformed, that investor would receive a better price, and there would not be a single price. Thus, some investors would prefer non-anonymous markets in which they could obtain better prices. In a non-anonymous market, the transaction prices depend upon the identity of the buyers and sellers. There is no unique fair price as there is in an anonymous market, such as a CLOB.

Indeed, this is exactly what has transpired in the trading of stocks within mutual fund complexes and some other large institutional investors. For instance, firms like Vanguard or Barclays Global International routinely trade stocks from one fund or

account to another in response to additions and redemptions.¹⁰ In the case of Vanguard, the trade price is the last trade. Since the last trade could be at the bid or the offer or in between, the average trade price will be near the mid point of the bid and offer. Both funds or accounts will on average receive better prices than through the traditional markets. The trades are clearly motivated by liquidity and should receive better prices than they would in an anonymous market.

Quite apart from reasons of anonymity, institutional investors often have orders for which they feel that they will obtain better execution through other markets than the primary one. Institutions routinely use the upstairs market to trade large blocks of stock. The upstairs market maker may find another side for the trade to cross or act as principal and work the order later.¹¹

C. Innovation

Competition breeds innovation. Some innovations are designed to meet special needs. An example is Posit, which is designed to provide low-cost execution for trades that need not be immediate. Other innovations provide direct competition to existing markets. An example is the highly successful Nasdaq 100 Trust, which the American Stock Exchange pioneered. Other market centers, like the NYSE and Island, now trade this instrument. Such competition undoubtedly reduces cost.

Competition and innovation can lead to fragmentation. Significant fragmentation results only if the innovation is successful, and not all innovation is successful. An example is the failed Optimark. Yet, if innovation is truly successful, such innovation

¹⁰ Neither the Consolidated Tape Association nor NASDAQ reports these trades.

¹¹ Grossman, Sanford J., "The Informational Role of Upstairs and Downstairs Trading." *Journal of Business*, 1992, v65(4), 509-528.

may even drive other trading arenas out of business and, after the transition process, result in less fragmentation.

IV. The Binding of Markets

Though it is natural for markets to fragment along the needs of different groups of investors, the near simultaneous reporting of quote and trade information has bound together the US equity market centers. Thus, US investors of both small and large means have reasonably good knowledge of what is happening in all market centers.

US investors now take for granted the consolidated reporting of information. Some major television stations routinely provide a sampling of last trade prices and volume of stocks listed on both the NYSE and NASDAQ.¹² The web pages of many trading portals provide real-time quotes and last trade prices to investors.

Whether the US investor has all the information that would be useful in evaluating market centers is an open question. There is no standard as to what should be made available and at what time intervals, and markets differ widely in what is disclosed and when. To list some examples, the US corporate bond market is a fragmented dealers' market with virtually no trading information available to the public, even with delays. The London equity market allows a market maker to delay the reporting of large trades. Some markets, such as the US futures market, do not report volume as it occurs.

V. The Structure of US Markets Today

The New York Stock Exchange and NASDAQ are the two primary listers of US equities. As of December 31, 2000, NASDAQ listed 4721 issues with a market value of 3.6 trillion dollars, and the NYSE listed 2,862 issues of common stock with a market

value of 12.3 trillion dollars. Thus, the total market value of equities listed on both the NYSE and NASDAQ was 15.9 trillion dollars.

A. The Investors

According to the flow of funds, the total market value of all equities other than mutual funds held by US investors totaled 17.1 trillion dollars as of December 31, 2000—somewhat more than the 15.9 trillion dollars reported by the two major market centers. Part of this difference may be due to direct holdings of foreign stocks by US investors in excess of the direct holdings of US stocks by foreigners. Another part of this difference may be due to the inclusion in the flow of funds of non-listed equities and equities listed on the American Stock Exchange.

Again according to the flow of funds, individuals held directly 6.5 trillion dollars or 38 percent of the total market value of equities held by US investors.¹³ These direct holdings are highly concentrated, with millionaires holding 52 percent of all individually held stock.¹⁴ In addition to these direct holdings, many individuals also have significant beneficial holdings of equities through mutual funds and pension funds.

Estimates of individual trading are subject to much error. However, if one attributes all prints for NYSE-listed stocks of less than 2100 shares to individuals, the trading of individuals would represent 7.5 percent of the consolidated share volume of

¹² The last trades reported are a filtered list of all trades. To display all trades would make the information unreadable. Still, this filtered list does provide a retail investor with sufficient information to judge whether a trade occurred at a reasonable price.

¹³ Table L.213 in the Flow of Funds, dated September 18, 2001, reports that households own 7042.9 billion dollars of equities as of December 31, 2000. In the Flow of Funds, households include non-profits. In 1996, the household sector held 4642.1 billion dollars, of which 338.3 represents non-profits. The year 1996 was the last year for which breakout is available. Thus, the equity holdings of non-profits represent roughly 7 percent of the household sector. If they represent the same proportion today, the dollar amount owned by the household sector should be reduced by 7 percent to yield the number in the text.

¹⁴ Michael Goldstein and Igor Krutov, "The Future of Money Management," (New York: Sanford C. Bernstein & Co., Inc., 2000).

NYSE-listed stocks as of August 2000.¹⁵ Interestingly, this share is somewhat less than the corresponding percentage of 9.9 percent in 1996. Since the trades of individuals are generally small, individuals would account for a much greater proportion of the number of trades as distinct from volume.

Estimating retail volume on NASDAQ is also difficult as institutions are more likely to split their orders into a number of smaller orders, and thus the number of small orders is not as good a measure of retail trading as it is for NYSE-listed stocks.

However, Sanford C. Bernstein & Co., Inc., has estimated that as of March 31, 2000, retail customers, including day traders, represented more than 60 percent of Nasdaq share volume.¹⁶ This estimate indicates that retail trading plays a greater role in Nasdaq-listed stocks than in NYSE-listed stocks.

In 1999, 78.7 million individuals owned stock directly or indirectly through mutual funds.¹⁷ Despite the press given to Internet trading, only 11 percent used the Internet to buy or sell stocks in 1998. These individuals tended to be younger (median age of 41), more affluent (median investment in equities of \$127,600), and better educated than the typical investor.¹⁸ The percentage of investors using the Internet is undoubtedly greater today as the number of on-line brokerage accounts has doubled from 1998 through 1999.

Institutional investors have investment discretion over a greater proportion of equity investments than individuals. In turn, rich individuals account for a

¹⁵ E-mail from Julie Fryer, New York Stock Exchange, October 15, 2001. A “print” is a report of the number of shares traded at a specific price at a specific time. The number of shares traded in a print can represent more than one trade.

¹⁶ Bernstein Research Weekly Note (New York: Sanford C. Bernstein & Co., Inc., March 31, 2000).

¹⁷ Equity Ownership in America (Investment Company Institute and Securities Industry Association, Fall 1999)

¹⁸ Ibid, p. 29.

disproportionate share of individually held stock. For NYSE stocks, institutions account for a much greater portion of the volume than do individuals. In contrast, individuals may be more active traders of NASDAQ stocks than are institutions.

In interpreting these retail trading numbers, it should be pointed out that only a limited number of retail customers trade actively. According to a recent survey, only 3 percent of individuals owning equities traded more than 12 times in 1998.¹⁹ Thus, the high percentage of retail volume on NASDAQ is concentrated in a limited number of individuals.

Investors in US stocks are a disparate group: There are institutional investors, households with substantial assets, a large number of households with limited assets, day traders, less active traders, foreign investors, and so on. All of these represent different constituencies, and it should be expected, as has occurred, that different ways of trading will evolve to satisfy their varying needs.

B. The Industry

Trading stocks involves three primary functions: The first function is the gathering of trading orders. The second function is the execution of these orders. The third function is the settlement of the trades. For the most part, these functions today reside in different organizations.

The cost structures and the social externalities of these three functions differ. Further, each entails different regulatory issues.

The firms that gather orders range from full-service brokers, such as Merrill Lynch and Morgan Stanley, to deep discount brokers, such as Freetrade.com. There are a large number of these firms. As of October 25, 2001, Yahoo! listed 268 full-service

firms, 141 discount firms, 70 day trading firms, and 116 Internet trading firms. Some firms may be listed more than once, but the number of order-gatherers is still large. That there are so many firms indicates that entry is easy and that there are not substantial economies of scale.

In contrast to the order-gathering firms, many fewer organizations execute trades. NYSE-listed stocks are traded in various market centers, but the NYSE is the dominant market. In 2000, the NYSE captured 82.88 percent of the consolidated tape volume of NYSE-listed stock; the five regional exchanges captured 8.82 percent, and NASDAQ capture 8.30 percent. Since each NYSE-listed stock is assigned to a single specialist, fragmentation of trading in NYSE-listed stocks is limited.

The trading of NASDAQ-listed stocks is spread over many more market centers. There are two principal types of market centers: market makers and ECNs. As of June 2000, there were an average of 14.9 market makers per listed-stock, while for the top one percent of issues by dollar volume, there were an average of 72.6 market makers.

Although these numbers seem large, there is a high degree of concentration of order flow in any stock in a limited number of market makers. Further, all of these market makers are linked together electronically. Some of these links are bilateral, while others, such as SOES, are provided by Nasdaq.

A major barrier to a new market center is obtaining a critical mass of order flow. New markets face a formidable challenge in attracting the needed order flow to thrive: witness the failed Optimark or the Arizona Stock Exchange, which has now suspended operations. To displace an existing market, the new market center must offer significantly better services than the established markets.

¹⁹ Ibid. p. 29.

The settlement process is even more centralized. In the US, the Depository Trust & Clearing Corporation is the focal point for this transferring of ownership from one entity to another. In addition to the mechanics, the DTCC guarantees the contra party risk. In anticipation of the discussion below, the problems that must be overcome in establishing a global settlement platform include: one, different settlement periods across nations interacting with differences in time zones; two, the meshing of legal and regulatory process among countries; and three, minimizing the contra party risk in settling trades across nations. Of course, these problems are interrelated.

VI. Regulation

In recent years, the SEC has been extremely active in encouraging competition across market centers. These initiatives have had the most impact on NASDAQ, but they will ultimately have a major impact on the NYSE as well.

There are three main initiatives: the Manning rules, the order display rules, and ATS (alternative trading system) rules. Although each of these addresses different aspects of the market place, their total impact can be understood only through their interaction.

A. The Manning Rules

The Manning rules require that a market maker in NASDAQ stocks execute a customer's limit order before executing an order for its own account. Assume a market maker receives a limit order to sell 100 shares at \$20.00 and then receives a market order to buy 100 shares. Prior to the Manning rules, the market maker could have sold 100 shares to the market order from its own inventory at \$20.00, leaving the limit order unfilled. Under the Manning rules, the market maker has to execute the market order

against the customer limit order of \$20.00 unless the market maker improves the price by selling at a price less than \$20.00.

The Manning rules thus assure a customer that if he or she has placed a limit order with a market maker and that market maker receives a market order that can be matched with the limit order, the limit order will be executed unless the market maker betters the price. If the market maker has two or more limit orders at the same price, they will be executed in time priority.

What the Manning rules do not provide is time priority across all market makers for Nasdaq stocks at a given price. Thus, an investor faces the possibility that a newly submitted limit order at the same price to another market maker will be exercised before his or her earlier submitted limit order.

Under the Manning rules, the probability of an execution of a limit order depends upon the order flow received by the market maker. As the order flow to a market maker increases, the probability of a limit order being executed also increases. Prior to the Manning rules, there was no assurance of execution.

B. Order Display Rules

Though the Manning rules were a step forward in protecting the investor, a market maker or an ECN still had no obligation to display a limit order that improved the NBBO. Thus, if the NBBO were a bid of 20 and an offer of 20.10 and a market maker received a limit sell at 20.05, the market maker had no obligation to display the better offer. However, if the market maker received a market buy, the Manning rules required that the market maker exercise the order against the limit sell of 20.05 or improve the price.

The Order Display Rules, which were published in 1996, require that a market center (market maker, ECN, or an exchange) that receives a bid or offer that betters the NBBO take one of three actions: One, execute the limit order immediately against its own inventory. Two, display the better price as part of its own quote. Three, send the limit order to another market maker who would then have the same three choices.

Importantly, the Order Display rules require that the quotes of ECNs be integrated into the NBBO. For technical reasons, the quotes of some ECNs for NYSE-listed stocks have not been fully integrated into the NBBO. The immediate effect of the order display rules was to narrow the spreads on NASDAQ stocks, as the quotes of ECNs were frequently better than other quotes. Even if ECN quotes were not displayed, the spreads might still have narrowed, as retail customers realize that their better limit order would now be displayed and possibly hit.

The combined effect of the Manning rules and the order handling rules has likely increased the probability that retail and institutional limit orders that equal or improved the NBBO would be executed. As far as this author knows, no study in the public domain has addressed the magnitude of this probability.

C. Alternative Trading System

The Alternative Trading System ruling made it easier to establish a new exchange, and as of October 25, 2001, the SEC approved Archipelago's application. Island's application is still pending. Archipelago is a for-profit company and will provide increased competition to the non-profit NYSE.

As an aside, it is useful to pause to consider the difference between an ECN and an exchange. As mentioned above, ECNs are broker-dealers regulated by NASD; they

match public orders and do not act as principals. Both the ECN form of organization and an exchange have advantages and disadvantages. A major advantage of an ECN is that NASD performs the regulatory function and frees the ECN from this activity. A major advantage of an exchange is that it receives what is termed “tape revenue.” Such tape revenue comes from the sale of quote and last trade data to public vendors. This can represent between 20 to 40 percent of an exchange’s revenue. The tape revenue for trades executed on an ECN goes to Nasdaq. Another advantage of an exchange is that it may have more latitude in setting its own rules.

VII. Competition, Fragmentation, and Price-Time Priority

A CLOB is the only way to maintain strict price-time priority across all limit orders. All orders would have to pass through this CLOB; otherwise, a crossed institutional order, for instance, might be exercised ahead of an already submitted limit order to the limit order’s disadvantage. Such a CLOB would eliminate fragmentation, but it would also place a straightjacket on competition.

Competition is incompatible with a CLOB. Competition requires fragmentation. Price-time priority cannot be preserved in a fragmented market. Thus, there is a tradeoff among competition, fragmentation, and price-time priority.

Transparency across market centers helps mitigate the effects of fragmentation. Last trade and quote reporting provide a great deal of transparency across US market centers, but market centers are not fully transparent. For example, investors cannot compare market centers on their speed of execution or on the fill rate of limit orders. It is fully consistent with competition for regulators to assess the adequacy of current disclosure practices and then to require that more or less information be disseminated. In

this regard, the SEC has mandated the each market center publish summary data that may allow a better comparison of execution quality across markets for orders of less than 10,000 shares.

Strict price-time priority is inconsistent with competition. In a competitive world, an investor can expect only that his or her limit order will have a reasonable probability of being executed in a timely manner. What is reasonable and what is timely will vary from one investor to another and probably should not be regulated. However, the investor should have access to the information required to compare the quality of execution of limit order across market centers, and, as mentioned above, the SEC is now mandating the disclosure of data that may allow such comparisons.

For NASDAQ-listed stocks, the Manning rules guarantee that a limit order submitted to any individual market center, a marker maker or ECN, will be exercised according to strict price-time priority within that market center. Thus, the probability that a limit order submitted to a particular market center will be exercised in a timely fashion depends upon the magnitude of the order flow going to that market center. The magnitude of the order flow going to a particular market depends upon both the overall order flow in a particular stock and the concentration of that order flow among the top market makers.²⁰

For NYSE-listed stocks, the issue is more complicated. First, there is no attempt to preserve price-time priority across registered exchanges. Second, trading on the NYSE itself does not always conform to price-time priority across all trades, even though time priority within the limit order book itself is maintained. As one example, a clean cross

could take place at the price of a previously submitted limit order. As another example, the trading rules of the NYSE sometimes permit a floor trader with a newly arrived order to trade in front of a previously submitted limit order. The latter example does not necessarily expose the NYSE to criticism. Trading practices on the NYSE are complex. Floor traders have certain advantages over those off the Exchange, and one of these is that they can sometimes trade ahead of previously submitted limit orders. Giving certain advantages to floor traders may encourage the interaction of more orders on the floor of the NYSE, thereby decreasing fragmentation and increasing the probability that limit orders will be executed. Whether such externalities in enhancing liquidity exist is an empirical question.

In its proposed rules on order disclosures, the SEC has expressed a concern that payment for order flow may limit competition. It is a common practice for order-gathering firms to receive payment for sending their retail order flow to specific market centers regardless of their quotes. The market center paying for order flow agrees to execute the purchased order flow at the NBBO or send it to another market for execution. In the extreme if all orders were preferenced, a market center would have no incentive to better the NBBO as such an action would attract no additional order flow.

Current trends in the market structure for trading stocks may mitigate any non-competitive aspects of paying for order flow. The Manning rules and the SEC order on the display of customer limit orders have gone a long way in democratizing the trading process and removing the advantages that market makers have had, particularly in the trading of NASDAQ stocks. If the NBBO is a bid of 20 and an offer of 20.10, a retail

²⁰ Additionally, if there is a demand for timely execution of limit orders, some market makers could respond by developing procedures to provide such execution as a function of trades occurring in other

investor who wishes to buy can either hit the offer and buy at 20.10 or place a limit order to buy at 20.05. The market center receiving this limit order can execute it immediately against its own inventory, display the quote, or send it to another market center. If the market center retains the order without execution and then receives a market order to sell, the limit order would be exercised unless the market center bettered the price.

The probability that the limit order is exercised depends upon the proportion of order flow that the market center receives. Interestingly, under the Manning rules, a market center that sends a limit order to another market center for execution is still obligated to execute that limit order if it receives a market order unless it improves the price. In this case, the market center that originally received the limit order is supposed to recall the limit order and execute it.

Additionally, the cents portion of stock prices has been converted from fractions to decimals. Although decimalization certainly makes it easier for the non-professional investor to understand prices, the more important effect is the reduction of the minimum tick size from 1/16 to one cent. According to Wayne Wagner of the Plexus group, the smaller tick size has already translated into tighter spreads to the direct benefit of retail customers. With narrower spreads of often a penny or two, market centers have already reduced the amount they will pay for each flow, making payment for order flow less important in attracting order flow. Thus, at this time, it is premature to prohibit payment for order flow. It may well be that the competitive rules that the SEC has already put into place, decimalization, and the growing use of screen-based trading by retail customers will make the issue of payment for order flow moot.

VIII. Global Trading

market centers. Madoff Investment Securities has stated that it has implemented such procedures.

The US equity markets are currently in a state of change. The SEC has unleashed new competitive forces. It is very much concerned with market fragmentation, price-time priority, and competition among market centers. These are all concerns about a domestic market. But the markets for US equities are becoming increasingly global, and that is where US regulators need to focus their attention.

Certainly within ten years and probably within a much shorter period of time, the trading of the larger and more active stocks will be worldwide. Today, a Japanese investor can buy a US stock on a US market in US dollars during US trading hours. Tomorrow, the same Japanese investor will be able to buy a US stock in yen during Japanese business hours. The physical location of the market center where the trade occurs will not matter. The market center could be in Japan, the US, or the Cayman Islands. Indeed, technology will make the location of the market center, the currency, and the time of trade a matter of choice.

Today, a major hindrance to the development of a global market is the settlement mechanism. ADRs (American Depositary Receipts) were developed to allow US investors to buy foreign stocks on US markets in US dollars. A bank such as Bank of New York would buy shares of a foreign stock, hold them in trust, and issue an ADR representing a claim on a given number of shares of the stock. The ADR could be traded in US dollars on US markets. The bank would convert dividends in foreign currency to US dollars and pay them. A holder of an ADR could obtain the underlying stock for a fee and with some delay. As a consequence, the only real market for ADRs was in the US.

Currently, both the NYSE and NASDAQ are developing market structures to trade any stock in any nation in any currency. These new developments are in their infancy, but they point the way to the future. When Chrysler merged with Daimler Benz to form Daimler-Chrysler, the NYSE wanted to retain the primary listing and trading of the new company in New York as did Frankfurt. An ADR was out of the question, as it would recognize that Frankfurt was the primary market. The solution was to create a global share that could be traded in Germany and the US in local currency and whose dividends were also paid in local currency.

One hindrance in developing this global share was the settlement process. Currently, Germany has a t+2 settlement period, while the US has a t+3 settlement period. Further, there is a difference in time zones. Even if the settlement period becomes the same across countries at t+1 as currently envisioned, the settlement times of each side of a trade between an US investor and a German investor will still be different. To bridge this gap, funds or stocks need to be borrowed, increasing the cost of settlement and adding to contra party risk. Another hindrance was the difference in regulatory rules between the US and Germany, which had to be harmonized.

Once it becomes cheap and easy to clear and settle trades across borders, there will be increased trading across borders. But local markets will still have the critical order flow that will allow them to maintain their dominance. They will lose this dominance only if they do not respond to the needs of their investors or if domestic regulatory authorities impose excessively burdensome regulations. If so, other markets, perhaps in foreign countries, will develop.

IX. The Future

The US equity markets are in a state of transition. For the next several years, the impact of globalization should be minimal. The order handling rules, the enabling of alternative trading systems, and decimalization with the corresponding reduction in tick size have placed everything into play. The SEC is now requiring additional disclosure from market centers that will allow retail customers to make more informed judgments as to execution quality. This additional disclosure will enhance the competition for retail order flow.

Without the historical baggage of existing exchanges, new exchanges may provide sufficiently competitive trading services to attract a critical mass of order flow. Alternatively, new exchanges may be the catalyst that causes the existing market centers to react with better services, thereby preserving their market shares. In either case, investors benefit.

In the longer term, national borders will no longer confine the trading of domestic securities to their home market. Today, a major barrier to trading US equities worldwide is the settlement process. Technologically, the order-gathering function or a market center can be established today anywhere in the world, but the settlement process across borders, which is today cumbersome and costly, is the barrier to locating these functions outside the US. As the market centers across nations become more familiar with the settlement process, the cost of settlement will go down. Further, just as banks in this country locate their credit card activities in states with favorable laws, order-gathering firms and market centers will be able to locate their activities in any country of choice. Likewise, US investors will be able to enter orders through an order-gathering portal in any country.

The ramifications of global trading will be profound. With global trading, stocks of any country will be traded worldwide at low cost. It may be that the main market center for any stock will remain in the home country of that stock, but if the market center is not responsive to the needs of investors or if the rules and regulations in the home country become burdensome, the trading of the stocks of that country can and will move to another country.²¹ The threat to move to another country will limit the ability of the SEC and other regulators to impose their will. This threat would be mitigated if some investors prefer to keep their trading in this country on the belief that the US regulatory framework provides enhanced protection against fraud, manipulation, and so on.

In a global market, US regulators will face new and challenging issues. Examples include:

How will the US ensure the integrity of the settlement process across nations?

Insider trading laws and their enforcement differ from one country to another. How will the US enforce its own laws?

If US retail investors begin to trade non-US equities in foreign markets, what steps should US regulators take to protect such investors?

Stockholder rights differ from one country to another. Will a company that discloses information in the US according to US rules be subject to litigation in another country that has different rules?

What regulatory authority, if any, will protect a US investor who buys a US stock through an electronic portal located outside the US?²²

²¹ When Sweden imposed a transfer tax in 1986 initially on stocks but subsequently expanded to options and futures, trading on the Stockholm Stock Exchange almost ceased as investors moved their trading activities to Wall Street and London. This tax was repealed on April 15, 1990, and trading returned to Sweden. This shift in markets occurred even without a global settlement system. As another example, the US imposed in 1963 the Interest Equalization Tax on foreign bonds purchased in the US. Almost immediately, the Euro-Bond market developed for trading such bonds to avoid this tax. Importantly, the market did not return to US when the tax was eliminated.

²² The Wall Street Journal of August 16, 2000, carried a story of a few European investors who were duped into overpaying for some US stock issued under Regulation S and their inability to recover any damages due to “[r]egulatory [I]imbo.”

The US currently regulates margin through the lenders, not the investors who use margin. Will individuals be able to bypass US regulations on margin?

The US relies heavily in ensuring tax compliance upon Forms 1099 that report the receipt of dividends and sales. In a global trading environment, how will the IRS maintain this reporting process?

Although the equity markets in the US are fragmented, the consolidated reporting of last trades and quotes provides a great deal of transparency. If a firm like Microsoft can be traded in any country, how can such transparency be maintained?

As global trading becomes a reality, the regulatory bodies in the US will face new challenges. The concept of a national market system with price-time priority, or even just price priority, will bend to the realities of a global market. It is imperative that US regulatory bodies change their focus from the regulation of a domestic US equity market to the challenges of regulating in a global market.