Consolidation in the Global Equity Market
An Historical Perspective

James J. Angel

Georgetown University
Room G4 Old North
Washington, D.C. 20057
(202) 687-3765 (voice)
(202) 687-4031 (fax)
angelj@gunet.georgetown.edu

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Comments Welcome

I wish to thank the numerous traders and exchange employees who have suffered my endless questions and spent numerous days showing me around their markets.

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Abstract:

The world equity market is evolving rapidly due to changes in technology, changes in regulations, and falling barriers to international trade. This paper examines international competition in the global equity market in the light of the historic competition in the U.S. between exchanges. The demise of dozens of U.S. stock exchanges provides some insight into the future landscape of the world equity market.

The NYSE gained its dominant position in industrial stocks in the U.S. by aggressively using the then new technology of the stock ticker to disseminate NYSE price information and attract order flow. The reduction in communication costs brought about by the stock ticker and the telegraph led to a classic case of a technology-based shakeout of the U.S. equity markets.

Once it achieved dominance, the NYSE competed with a fortress approach: refuse to cooperate with other exchanges, and its natural liquidity advantages allowed it to dominate. This strategy is not as practicable in light of changes in the equity markets. The NYSE has been forced to share price information via the consolidated tape and the ITS. The regional exchanges and third market dealers have sustainable positions as a result of a regulatory environment in the U.S. that promotes competition between exchanges and allows the internalization of order flow.

The same improvements in communications, along with falling regulatory barriers to international trading in equities, may well remove the need for a stock exchange in each country. Already, a large fraction of the trading in European shares takes place in London. Eventually, the question will not be "Does Germany need three stock exchanges?" but "Does Europe need three stock exchanges?" The world equity market is evolving into a few dominant markets with smaller players surviving in niches created by the regulatory environment.

There has been considerable debate over how the equity markets should look in the future. It should be remembered that there is no one particular market structure that is best for all stocks. For example, auction markets seem to be uncompetitive with dealer markets for trading very small stocks, as seen by the death of the AMEX ECM and various incubator markets in Europe.

This paper also includes an appendix with historical information about deceased U.S. stock exchanges.

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"*Sometimes I have the impression that national stock exchanges are regarded like national airlines. A country needs one to prove its autonomy. That is no longer valid. There are no boundaries any more except in our minds.*"

Otto Nageli, Swiss Exchanges[i]

Continuing reductions in communication costs and the relaxation of regulatory barriers are dramatically reshaping equity markets around the world. Exchanges around the world are introducing new trading technologies, merging with competitors, and even changing their form of organization. Competitors to the traditional exchanges have entered the market with new technologies, and exchanges are invading each others markets in an attempt to capture order flow.

Where are we going from here? What will the global equity market of the future look like? This paper examines current changes in the world equity markets in light of the historical consolidation that has been taking place in the United States.

[i] Quoted in Hall (1997)

The history of competition in the U.S. equity markets provides some useful insights into the emerging structure of the world equity market. The United States is littered with the corpses of dead stock exchanges. Virtually every major commercial city once had at least one if not more stock exchanges. These exchanges traded the stocks of locally based firms as well as large national firms of interest to local investors. However, these exchanges in cities such as Pittsburgh or New Orleans are now barely memories, ghosts in the competitive landscape of today's equity markets. They became extinct as new technology and a changing regulatory environment changed the competitive landscape. The few remaining regional exchanges survive as a result of a regulatory environment which promotes competition among markets and facilitates the use of regional exchanges by brokerage firms wishing to internalize order flow.[ii]

This same trend is occurring globally. The reduction in communication costs and the fading of regulatory barriers are leading to a gradual consolidation of world equity markets. On the other hand, cultural barriers such as language barriers, time zones, and regulatory actions will create sustainable niches for smaller markets.

The next section reviews some of the basic economics of securities markets and stresses the often overlooked point that markets are costly to operate. Financial markets also have significant network externalities, leading to the possibility that they are close to natural monopolies. Yet, markets for different securities have evolved into quite different market structures.

Then this study looks at the rise of the NYSE as well as its competitors. I pay special attention to the regional exchanges and how they have survived during a period of consolidation

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[ii] Internalization refers to the practice in which a brokerage firm acts as a dealer and trades with its own customer at the current quote. For example, suppose that the best bid and offer on a stock were $10.00 bid and $10.25 offered. If a brokerage internalized a sell order it receives in the stock, it would buy the stock from its customer at $10.00 and not route the order through an exchange, hoping to sell the stock quickly to another one of its customers at $10.25. In effect, the process of internalization puts the brokerage firm into competition with stock exchange specialist and other market makers who trade the stock.

in financial markets. The regulatory environment which forces the NYSE to share information and which allows brokerage firms to internalize order flow gives the regionals and the third market dealers a sustainable position.

Finally, I look at the implications of this for the global equity market. As a highly-regulated industry, it will continue to be shaped by government policies. Yet, the economic benefits from further international integration mean that the barriers to international trading will continue to fall. There will continue to be a push toward international consolidation, especially within free trade blocks such as NAFTA and the EU.

I. The Economics of Security Markets

A. Basic Functions of a Market

Most basic texts on securities markets describe two basic functions of a securities market: First, the market has to match buyer and seller. Second, the market provides a mechanism for discovering the price. This price information is a valuable output from a market since it sends important signals to others about the value placed on the securities traded. However, there is a third function of security markets that is often overlooked: it must make money for the people who organize the market. If the market does not provide sufficient compensation to its organizers, they will not provide the services needed to operate the market.

It is also easy to overlook that a market must also provide trustworthy mechanisms to fix problems when they occur and insure the integrity of the market. Investors want trades to settle as scheduled without worrying about failing to receive payment or receiving forged stock certificates. Although these are often taken for granted in developed equity markets, the lack of such basic infrastructure has been an impediment to the development of equity markets in many developing countries.

B. Network Externalities

Financial markets also contain network externalities.[iii] Briefly, the desirability of a market is increased by the number of people who are attached to it. An investor faced with choosing between two rival markets for executing an order will rationally pick the market with the highest likelihood of filling that order at the best price -- usually the one that is likely to have the most orders already. Thus, traders will naturally send their orders to the market with the most “liquidity.” This is one reason why competitors to existing financial markets have a hard time getting started: Even if they have a theoretically "better" market mechanism, without order flow the new market has no liquidity and thus cannot attract order flow. It is a classic chicken and egg problem.[iv]

C. Tradeoffs Between Low Costs and Liquidity Incentives

A successful market walks a delicate and complex tightrope between low costs and liquidity-enhancing services. Obviously, investors would like to have a market that is inexpensive to use. *Ceteris paribus*, every investor would like to save on transactions costs.

However, investors also want a liquid market in which they can trade quickly at a fair price. In general, this means a market that brings as many buyers and sellers together as possible. This requires expenditures for communications and other physical facilities, as well as substantial investments in human capital. Furthermore, markets often provide incentives for agents to act as market makers and provide liquidity. These incentives can take several forms. One form may be the ability for members of the market to make more money by having an informational advantage over non-members by having faster access to quotes. Trading rules may also be designed to give members an advantage over outsiders, by requiring outsiders to go through members who charge commissions, or by providing rules that give an advantage to

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[iii] See Economides (1988, 1996) for more on network externalities and their application to financial markets.

[iv] The situation facing an entrant to the market for equities is similar to that of a futures exchange wishing to launch a new contract which rivals an existing contract. See Black (1986) for a lucid discussion of the challenges involved.

certain traders. For example, the NYSE specialist who keeps the order book in a stock has a quasi-monopoly on market making in that stock on the NYSE floor, in exchange for which he or she promises to maintain a fair and orderly market and let the public trade ahead of the specialist.

These incentives to provide liquidity are costly to outsiders. Thus, a successful market has to weigh the value that these incentives for liquidity provide against the business that can be lost by operating a high cost market.

D. Diversity of market participants

Although it is common to think of an equity market as a single market subject to network economies, it is important to remember that the different investors in a market may often prefer very different market structures. A retail investor is concerned primarily with the execution quality for small, infrequent trades. Small investors generally prefer a market mechanism that broadly disseminates their willingness to trade because they know that their small orders are, individually, not going to impact the market. On the other hand, large institutional investor are generally more interested in the capacity of a market to handle large block trades. They would not want to widely publicize the entire size of their desire to trade because doing so would move the price against them.

E. Centralized Exchange versus OTC

One question about the organization of financial markets is why some financial instruments such as equities generally trade on organized exchanges and other instruments such as fixed income and foreign exchange generally trade in an over-the-counter dealer market. To understand why some instruments trade on organized exchanges and others do not, it is important to remember that the
intermediaries who form an exchange do so to further their own economic interests. Although some new equity market mechanisms, such as POSIT, have been started by entrepreneurs attempting to make money by matching trades, most existing equity markets have been formed by brokers and/or dealers who make the bulk of their income from their brokerage and trading operations, not from their ownership of the market mechanism.

The key to whether these intermediaries will gain from forming an exchange lies in the nature of trading. Traders wishing to execute a trade face a tricky disclosure problem because the knowledge that they want to trade is valuable information that may move the price against them. They must disclose enough information about their desire to trade in order to find the other side of the trade, while minimizing the price impact of their trade. Ideally, a trader would like to know everyone else's trading intentions while not revealing his or her own. This could result in a prisoners' dilemma: The best outcome would be if all traders revealed their information, although each trader would be better off not revealing.

Exchanges generally require a certain amount of disclosure from their members, who must reveal some information about orders and trades. For example, a broker may be expected to bring a customer's order to the crowd on a trading floor or to otherwise submit it into the market mechanism. Likewise, the information that a trade has taken place is quickly known to the members of the market and often disseminated to the world. By requiring this kind of information disclosure, the exchange provides a solution to the prisoners' dilemma.

Information is likely to be much more valuable in equity markets than in fixed income or foreign exchange markets because information is much more asymmetric in equity markets. The likelihood that a customer order contains significant information is remote in the foreign exchange or fixed income markets. However, traders in equity markets are keenly aware of the danger of informed trading. Thus, it is plausible that the prisoner's dilemma is worse in equity markets than in other markets. It makes sense that the intermediaries would benefit from a market which forces information to be pooled via the exchange mechanism because it reduces their losses from asymmetric information.

F. Previous Research into the Competition Between Markets

Most of the academic research into rivalry between markets has looked at the rivalry between the NYSE and the AMEX or between the NYSE and Nasdaq. Primarily, academics have looked at bid-ask spreads or other data on stocks in the various markets in an attempt to

determine which type of mechanism is "better" in some sense, or have looked at event studies of firms which have moved from one market to another. There is a voluminous literature in this area and it will not be covered here.[v]

Rather little has been done on the competition between different markets for order flow in the same stocks. With the recent questions raised in the United States by the Markey committee hearings and the SEC's Market 2000 study, long overdue attention is now coming to this area from the academic community. Recent studies by Lee (1993), Petersen and Fialkowski (1994), Blume and Goldstein (1997), and others look at the differences between markets in the quality of executions experienced by investors.

Harris, McInish and Wood (1993) make the argument that the NYSE is intentionally trying to raise the costs to rivals by not displaying accurate quotes. They use the SuperDot data provided by the NYSE to document that the specialists do not always display limit orders that are between the posted quotes. This uncertainty as to where the true market it makes it harder for those outside of the primary market to compete with it.

G. Regulation of securities markets

There have been three distinct phases of securities regulation. I call the earliest phase “Pre-regulation,” which existed in the United States prior to the passage of the Securities Act of 1933. The pre-regulation phase did not attempt to regulate securities markets directly, but relied upon the general laws that governed business transactions to resolve any disputes. The philosophy was one of laissez-faire toward the securities markets.

The second phase, which I call “Regulation,” was embodied in the U.S. with the passage of the Securities Act of 1933 and the Securities Exchange Act of 1934. The regulatory mind set of this phase was that the stock market was a natural monopoly that had to be closely regulated. Indeed, in some countries such as France the market was a monopoly by law. In the regulation

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[v] Some examples of the rich literature on listings include ......

phase, government regulators passed judgement on the minutiae of market operation. A simple business decision such as extending the trading day by 30 minutes needed to be approved by the SEC.[vi]No. SR-CHX-96-13, May 31, 1996 The regulatory burden faced by an equity market became a significant barrier to entry to the stock exchange market in the U.S. Entities offering stock transaction services go out of their way in the U.S. to call themselves broker-dealers and not stock exchanges so that they have lower regulatory burdens.

The global trend towards privatization and deregulation in other industries is now moving us into a third phase, which I call, for lack of a better term, "Deregulation." In the United States, the National Securities Market Improvement Act of 1996, which gives the SEC broad power to exempt firms from regulation, reflects this trend. In this phase, the paradigm is that equity markets are firms which should be allowed to compete with each other like any other firm. Regulation should be designed to enhance competition between markets, allowing both entry and exit from the market. Although the network economics of a market often allows one market to dominate others, sufficient competition still comes from other markets, both foreign and domestic, to provide an acceptable outcome.

II A Brief History of Equity Markets in the United States

In order to understand where the equity markets are going, it is important to understand how they arrived in their present condition. Space does not permit a comprehensive history of the world equity markets in this brief essay, but I will sketch a few important lessons from the United States experience here.[vii]

[vi] See, for example, SEC Release No.34-37265 Order Granting Accelerated Approval of Proposed Rule Change and Amendment No. 1 and Notice of Filing and Order Granting Accelerated Approval of Amendment No. 2 by the Chicago Stock Exchange, Incorporated Relating to the Modification of the Hours of the Exchange's Primary Trading Session and the Establishment of a Post Primary Trading Session., File

[vii] For more information about the history of the U.S. equity markets see Sobel (1965, 1970,

Joint stock companies were relatively rare during the United States colonial period in the 18th century. Charters from the royal government were hard to get. Thus, there were not many shares in circulation in the colonies. In England, the equity market had gone into a period of decline after the collapse of the South Sea bubble, according to Mirowski (1981). The American revolution saw the issuance of a large amount of debt by the new U.S. government its states. Given the precarious financial condition of the new government, the paper traded at a large discount to face value. However, the large amount of it in circulation gave rise to speculation in the paper and many merchants began dealing in it. Furthermore, the governments of the states realized that corporations were necessary for their economic well being and began to issue a large number of charters. This led to the formation of prototypical stock markets in Philadelphia in 1790 and New York in 1792. Much attention has been given to the famous Buttonwood Agreement in New York in which a group of dealers agreed to trade only among themselves and to charge a minimum commission, from which the New York Stock Exchange dates its founding. As Sylla (1995) points out, this was partly a reaction to the New York State ban on public security auctions which took place following a market crash in February and March 1792: the founding of the exchange as a private club was designed to evade the rules against public auctions.

However, the early activities of the exchange were still quite informal and it was not until the formation of the New York Stock and Exchange Board in 1817 that the NYSE adopted formal rules. Interestingly enough, the stock market in the U.S. evolved quite differently than in London. The London dealers adopted a policy of relatively easy entry into the business and an easy listing policy. However, brokers were not allowed to serve as dealers. In the U.S., the NYSE adopted a policy of exclusive membership and high listing standards that forced a large number of securities to trade outside the exchange. However, brokers could also serve as market makers. See Michie (1986) and Sylla (1995). Perhaps this had something to do with the legal

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1972, and 1975).

environment in the U.S.: time bargains were not enforceable in court, so the exclusivity of the exchange allowed for the creation of a private dispute resolution mechanism. This exclusivity also created rents for the existing members. A member who refused to honor a trade or engaged in other unacceptable trading practices risked expulsion from the club. Thus, the value of membership became a *de facto* performance bond guaranteeing that trades would settle properly and the rules of the market would be followed.

As the United States expanded during the 19th century, stock exchanges also arose in other cities. The firms listed on these exchanges were usually local firms with local investors, although they also executed trades for local investors in the shares of national companies. The barriers to communication gave local markets a geographic edge in trading shares of local companies: Dealers would be unwilling to trade stocks from companies in distant cities because they would be at an information disadvantage compared with those in the local city.

It was by no means guaranteed that the NYSE would become the dominant equity market in the U.S. The NYSE is not the oldest stock exchange in the U.S. The Philadelphia exchange is older, and the early NYSE rule book was patterned after Philadelphia's. Nor was the NYSE's dominant position in equities guaranteed by the growth of New York City. In other countries, notably Italy and Brazil, the dominant market is not in the largest city. The NYSE got a late start in the trading of industrial stocks because it refused to list them, so it lost the first mover advantage. The Boston Stock Exchange was actually the dominant market for the emerging industrial stocks in the 19th century. The NYSE gained its dominant position through its aggressive use of the then new technology of the stock ticker and the telegraph to disseminate NYSE price information and to attract order flow. This increase in order flowed allowed it to provide a more liquid market than its competitors, leading to still more order flow, resulting in a classic technology-based shakeout of the industry.

The advent of modern communications and transportation changed the competitive nature of the industry. With the telegraph and the stock ticker, it was possible to disseminate price information -- and orders -- quickly over long distances. This gradually eliminated the

geographic barriers that protected many of the regional exchanges.

The New York Stock Exchange has from the beginning faced competition on its home turf. Outsiders were constantly attempting to trade NYSE-listed stocks outside of the club. See Garvey (1944) for more information. The typical NYSE response was to attempt to punish those who dealt with the rival exchanges. Members were not allowed to trade on the rival exchanges. Since price information was necessary for those wishing to trade NYSE stocks, the NYSE took steps to reduce the information available to outsiders, particularly the crowd that wished to trade in the street outside the exchange. Telephones were not permitted on the exchange floor.

Part of the behavior of the NYSE can be attributed to the need to make stock market investing respectable. At a time when many viewed the ownership of common equities to be a form of gambling, it was necessary to run a clean establishment. Thus, high listing standards and disclosure requirements for listed firms, along with rules of conduct for the market that placed customer orders ahead of members, were important for establishing a respectable reputation.

In recent years, the response of the NYSE to the competitive challenges has been consistent with its history. It has followed a strategy of focusing exclusively on its core business of equities, although it has made half-hearted efforts in options, bonds, and futures. It has invested extensively in automating its existing mechanisms while keeping the basic structure of its trading system the same. It has responded slowly to innovation in other areas such as stock index futures by coming up with its own basket product that flopped, and it has competed with the newer crossing networks by operating after hours crossing sessions.

The NYSE has been conservative in making changes in its market mechanism with automation. As pointed out above, a successful market is an extremely complex information system. Its trading mechanisms provide a variety of incentives for members to provide liquidity. If those incentives are tampered with, a market may lose its competitive advantage of liquidity to other markets. Thus, it is not surprising that an apparently successful market will follow the adage "If it ain't broke, don't fix it." The experience of the NYSE with its Automated Bond System (ABS) provides a serious warning sign: The ABS is a fully computerized trading system

that provides a consolidated limit order book for trading in NYSE listed bonds. It is also irrelevant in today's bond market, where most of the business is done over-the-counter. Yet the NYSE was once primarily a bond exchange, and in the nineteenth century resisted trading such speculative securities as industrial shares. If the NYSE could lose the bond business, it could also lose the stock business.

The governance system of the NYSE provides some understanding of its behavior. The exchange itself is not a profit-maximizing entity, but is controlled by its members who are profit maximizing entities, but who may also have substantial interests outside the exchange. For example, NYSE member Merrill Lynch is a member of the NYSE and also acts as a specialist in some NYSE-listed stocks. Yet, it also belongs to other equity exchanges as well as options and futures markets. Suppose the NYSE were to put forth a proposal to expand its presence in derivatives. The proposal might be a positive NPV for the NYSE from a narrow perspective, but it would inflict losses on the other derivatives markets. The members of the other derivatives markets who are also NYSE members would oppose the plan. This diversity of the economic interests of the members thus makes it difficult for the exchange to take steps that might seem to make sense to outsiders, such as to enter derivative businesses.

The NYSE, however slowly, has responded to threats in its core business. In response to competition from crossing systems, it has instituted its own after-hour crossing sessions which are doing respectable volume. It has tinkered with its hours of operations, although its plan to extend the trading day even further by opening at 9:00 AM was scuttled after a revolt by west coast firms.

A. The Growth and Decline of Regional U.S. Exchanges

With the growth of the U.S. economy in the nineteenth century, stock exchanges sprang up in every major city. The local exchanges provided a market for local residents who wanted to trade national stocks, and provided a secondary market for the equity issues of local firms. The

high cost of communications provided these markets with local quasi-monopolies.

Improvements in transportation and communication led to a classic technology-based shakeout of the exchanges.[viii] Improvements in the telegraph and stock ticker allowed orders to be easily routed to the exchange with the best price. In particular, the New York Stock Exchange seized on the stock ticker to spread information about its activities across the country.

Changes in regulation also led to the demise of many regional stock exchanges. One of the first acts of the newly formed Securities and Exchange Commission in 1934 was to investigate trading practices on the stock exchanges, and it started investigating many of the regionals. Soon after the Securities Exchange Act of 1934 became effective on October 1, 1934, the New York Produce Exchange, the New York Mining Exchange, the Boston Curb Exchange, and the California Stock Exchange closed within two months following SEC (1935) investigations. The Hartford Stock Exchange also closed at this time, although its death was blamed on the institution of long-distance telephone service between New York City and Hartford.

Another problem that the regionals had was that the new U.S. government securities regulations of the 1930s placed a higher regulatory burden on listed firms then on unlisted firms. This made it even harder to compete with over-the-counter dealers in smaller stocks. A small firm that might previously have considered listing on a regional could have been dissuaded by the higher disclosure requirements.

Walter (1957) reported that by 1944 the majority of the shares traded in seven large regional exchanges were in multiply traded (e.g. NYSE-listed) issues. On the Philadelphia exchange, over 91 percent of the volume was in multiply traded issues by 1952. Most of the business in the smaller stocks had shifted to the OTC market. In Walter's words, "The evidence at hand indicates that regional exchanges are currently little more than poor relations to their over-the-counter counterparts." By the time of the Walter study, the regionals saw themselves as

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[viii]See Klepper and Simons (1993,1997) for more about technology based shakeouts in industry.

"independent branches of national exchanges."

Although their original franchise in local stocks was lost to the OTC and their franchise in local trading of national stocks was lost to the Big Board, the regionals have managed to survive on the crumbs dropped by the NYSE. Back in the days of fixed commissions, NYSE rules prohibited giving up any part of the commission except to exchange members. However, the regional exchanges permitted more liberal give-ups, giving rise to the soft dollars seen today.

With the demise of fixed commissions in 1975, the regionals were once again threatened with extinction. However, the 1975 “National Market System” amendments to the Securities Exchange Act led to the institution of the Intermarket Trading System (ITS), which allowed the regionals to carve out a viable niche once again. The ITS (along with the Consolidated Quotation System) gave the regionals access to the NYSE’s quotes and the ability route orders to any of the U.S. stock exchanges in search of the best price. The regionals were now able to provide executions at least as good as the posted quotes on New York. Brokerage firms discovered that the could internalize order flow by owning regional specialists, and now the majority of specialist posts on the regional exchanges are owned by or affiliated with brokerage firms. Thus, most of the regionals have sustainable competitive positions that are likely to last until there is some major change in the U.S. regulatory environment.

In recent years the NYSE has targeted international listings, which have more than doubled in recent years and now account for about ten percent of the listings on the NYSE. Not only has the NYSE attracted foreign listings, but it has also captured a significant market share (a mean of 29% according to Smith and Sofianos, 1997) in the trading of many of these stocks, and the majority of the market share in some stocks such as Telmex. The NYSE has been particularly effective in grabbing market share in the stocks from emerging markets in its own time zone.

B. The Rise of Nasdaq

The Nasdaq market grew out of the fragmented over-the-counter market in the United

States. The National Association of Securities Dealers (NASD) was founded in 1938 at the behest of the U.S. government to provide a Self Regulatory Organization (SRO) for the trading of over the counter stocks. The OTC market was a dealer market with no centralized price reporting. Investors wishing to trade a given OTC stock faced an expensive search process of contacting several dealers to find the best price for a stock. The National Association of Securities Dealers Automated Quotation System (NASDAQ) was started in 1971 to provide a means for the dealers to quickly disseminate quotes to each other via computer screens. Gradual improvements to the system included the reporting of trades within 90 seconds.

The improvements in the liquidity of the Nasdaq market have resulted in an increase in the

number of stocks traded on the Nasdaq system and the volume of trade on it. Indeed, several very large firms such as Intel and Microsoft have chosen not to list on the NYSE even though they easily meet NYSE listing requirements. Nasdaq now claims a higher number of shares traded than the NYSE, although the dealer nature of the market make it difficult to compare volume figures directly between the two markets.

Nasdaq represents the largest competitor for NYSE order flow. However, Nasdaq actually represents several different competitors in the market for order flow in NYSE-listed stocks. Crossing networks such as POSIT and Instinet operate their systems as NASD broker-dealers and so their trades are counted as Nasdaq trades. Nasdaq is also the home of famous third market dealers such as Bernard L. Madoff Investment Securities, which makes markets in a large number of NYSE listed stocks and pays for order flow.

The dealer nature of the Nasdaq market combined with the ease with which one can become a Nasdaq market maker, makes it easy for brokerage firms to internalize the order flow that they generate in Nasdaq-listed stocks. This gives the brokerage firms higher financial incentives to market these stocks since they can potentially earn the bid-ask spread as well as the commission on orders that they generate. Small firms tend to prefer the marketing advantages that this “sponsorship” provides. However, Nasdaq has historically had higher bid-ask spreads

than the NYSE. For the largest firms, however, the upstairs market for block trades is pretty much the same for NYSE-listed as it is for Nasdaq-listed stocks. See Aggarwal and Angel (1997) for more on listing decisions by firms.

C. The Traditional Regionals Today

The Chicago Stock Exchange is the largest of the traditional regional exchanges. Its floor brokers do a substantial business in putting together block trades, and it is also competitive in retail order flow. Chicago has also made use of the investment that it has made in its own trading systems and now sells trading systems to other stock exchanges around the world. They are located in the same Chicago office complex as the CBOE and the Cincinnati Stock Exchange. In 1996 the Chicago stock exchange extended its trading hours and now closes 30 minutes later than the NYSE's 4:00PM (ET) close.

The Pacific Exchange is a strange beast. Born of the 1957 merger of the San Francisco and Los Angeles Stock Exchanges, the Pacific still maintains two floors with two specialists for each stock, one on each floor. The Pacific trades options in San Francisco; its trading volume and open interest comparable to Philadelphia. Charles Schwab has a major presence on the Pacific and has purchased several specialist firms there.

One way in which the Pacific takes advantage of the three hour time difference between it and New York and stays open one hour later than the NYSE, becoming the only auction market open from 4:00 until 5:00 PM Eastern time. However, the Pacific has not really capitalized on this advantage and does not attempt to become the primary market at that time. Volume in the last hour represents a tiny fraction of its volume. I have spent time on both floors of the Pacific and have noticed that many specialists leave after the New York close and put their clerks in charge for the last hour.

The Cincinnati Stock Exchange is an interesting story. It started off like most of the traditional regional exchanges in the nineteenth century and was the first exchange to list Procter and Gamble. It had refused an offer to merge into the Midwest Exchange when it was founded

through a merger of other exchanges in 1949. It was also withering away like the other smaller regionals, and by 1966 its volume was less than a tenth of that in Philadelphia. In 1978 Weeden Holdings attempted to make the Cincinnati into an automated market. The Cincinnati exchange was to be a fully computerized exchange with no trading floor and low transaction costs. It would operate as a pure limit order book market with price and time priority for its orders, a finance professor's dream. The computer itself was located in Jersey City, New Jersey. The SEC approved the "pilot" program in 1978. Weedon sold the exchange to Control Data in 1979. Gaining order flow was difficult, and the exchange nearly died when Merrill Lynch pulled out in 1983. Later that year Control Data pulled out, and B&K Securities emerged as the controlling force and the exchange limped along for several years. The CBOE gained control of a majority of the seats of the exchange in 1987 so that its members could trade shares through the Cincinnati, and discussed around-the-clock trading. The computer operations moved to the CBOE building in Chicago. The Cincinnati is now housed in Chicago in the same building as the Chicago Stock Exchange.

In 1991 the Cincinnati changed its rules to allow preferencing. Brokerage firms can now choose to route order flow to any firm it wants as long as the firm promises to match the best consolidated quotes. Essentially, brokerage firms use the Cincinnati to internalize orders that they would not be able to internalize otherwise because of NYSE Rule 390.[ix] Subsequently, its market share has increased and its volume now exceeds Philadelphia and Boston. The other exchanges are protesting and making plans to establish similar rules.

The Boston Stock Exchange has the distinction of being the only stock exchange in the U.S. with a view, being located on a high floor of an office building in Boston. Unfortunately, this view is obscured by the equipment of the exchange for most of those working on the

[ix] NYSE Rule 390 prohibits member firms from trading NYSE stocks off of a stock exchange, which prohibits them from internalizing the orders. In 1979 the SEC passed Rule 19c-3 which allows such off-exchange trading for stocks listed on the NYSE after 1979. Consequently, the stocks trades that are printed on Cincinnati are primarily for "Rule 390" stocks which cannot be directly internalized by the brokerage firms.

exchange. The Boston is perhaps in the weakest position of the regionals, with a small market share and no derivatives business. However, Fidelity's large involvement makes it unlikely that the exchange will disappear soon. Boston has mimicked the Cincinnati's preferencing proposal with its own Competing Specialist Initiative.

The Philadelphia Stock Exchange is the oldest stock exchange in the U.S., tracing its origins to 1790. It is also the smallest of the regionals in terms of equity volume, although its options volume is comparable to the Pacific, and it has a strong position in currency options.

The Amex still has not overcome its century old image problem. The Amex grew out of the crowd of brokers who did not belong to the NYSE and who traded the speculative stocks that did not qualify for listing on the NYSE. They transacted their business out in the street and were known as curb brokers. The Curb Exchange moved in doors in 1921 and provided an exchange for companies that did not meet NYSE listing requirements. As companies grew to meet NYSE requirements, they would usually move their listing to the NYSE.

The rise of Nasdaq has seriously cut into the niche that the Amex filled. Many companies felt that the Nasdaq market filled their needs well enough that they did not need the Amex, or even the NYSE for that matter. Thus the number of listings on the AMEX and AMEX's share of total U.S. equity volume have fallen drastically in recent decades. In much the same way as Nasdaq has taken a substantial fraction of the volume in NYSE-listed stocks, it has also taken a similar fraction of AMEX volume as well.

The AMEX has responded, either out of necessity or out of its tradition of listing securities that the NYSE would not, by listing a large number of innovative securities and by launching new products. The Amex scored a hit with the Americus Trusts, which separated a companies returns into lower risk "Primes" and option-like "Scores." Unfortunately, the regulators did not allow the product to continue. The Amex has also listed various put and call warrants on different stock indices,

The AMEX has also ventured into new areas, some of which have been tremendous successes and some complete flops. The AMEX successfully entered the options business and is

second to the CBOE in terms of option volume. Its attempt to trade stocks that were also listed in New York flopped. Its attempt to enter the futures business failed and was sold to the NYSE and became part of the New York Futures Exchange. The AMEX opened its Emerging Companies Market (ECM) for smaller firms in an attempt to compete with Nasdaq, but it failed to draw enough interest and was scrapped in 1995, reminiscent of the failure of the New York Mercantile's attempt to start the National Stock Exchange in the 1960s.[x]

D. The Fourth Market

Several entrepreneurs have entered the stock trading business in an attempt to compete with the existing players. These entries into the transaction market are sometimes called the “fourth market” after the three other major players in the market for NYSE-listed stocks: The NYSE, the regionals, and Nasdaq.

Instinet, owned by Reuters, offers an electronic system in which institutional investors can place orders and effectively bypass the exchanges. Instinet is a registered NASD broker dealer, so its trades are printed on the tape as NASD trades, thus avoiding the regulatory burden imposed on registered exchanges in the United States. Instinet also provides a means for institutions to bypass Nasdaq market makers and accounts for a substantial fraction of the volume in Nasdaq-listed stocks. In many respects, Instinet performs services similar to the inter-dealer brokers found in bond markets and in the London Stock Exchange, by allowing dealers to trade anonymously with each other to manage their inventory. Instinet also operates the Crossing Network, which allows institutions to cross portfolios of stocks at New York prices.

POSIT started off as a joint venture of BARRA and Jeffries, and is now owned by ITG. It runs five crossing sessions per day in which the price is the midpoint of the best bid and offer quotes. POSIT has been quite successful, and its daily trading volume is now larger than many of the traditional regional exchanges. The Chicago Stock Exchange started its own matching

[x] See Aggarwal and Angel (1997) for more about the AMEX ECM.

system, but it failed to attract sufficient order flow.

AZX, the Arizona Stock Exchange, started off as Wunsch Auction Systems. Unlike the crossing systems which use NYSE prices and do not discover a price, the AZX system runs a single price auction in which investors can see the bids and offers; it thus has much higher transparency than the NYSE open, for example. Interestingly enough, the AZX is registered with the SEC as an exempt exchange due to its small size, which exempts AZX from many of the filing requirements that the SEC imposes on exchanges. This small size exemption was generally used by many now-defunct tiny exchanges such as the Wheeling Stock Exchange which had tiny volumes.

III. International Competition

London

The London Stock Exchange also provides competition for New York. U.S. issues are actively traded in London both during regular London hours and during U.S. trading hours, although a large part of the action in London stems from block trades that are arranged in the U.S. and crossed in London to avoid U.S. reporting requirements.

It is interesting to note that the NYSE viewed the London Stock Exchange as a serious competitor as far back as 1911, when it took steps to inhibit joint account trading between New York and London.

Toronto

Many large Canadian issues are jointly listed on both U.S. and Canadian exchanges. Toronto has just closed its equity floor and moving to a completely computerized exchange. Having visited both the New York and Toronto floors, it is not hard to see why Toronto computerized and the NYSE has not. On the New York floor, there is still a tremendous amount of information about the order flow on the floor. The specialist may know that broker A is

working a large buy order and tell him to talk to broker B, who is working a large sell order in the same stock. Brokers who are working large orders often provide information about orders to the specialist, such as "There is more to follow," or "That's all there is." The interactions between the members on the exchange floor form a repeated game such that information effects help to reduce the asymmetric information problem that market makers face.

The Toronto floor was different. The small stocks were already completely computerized in the Toronto system. Most of the order flow for the large firms was routed electronically to the registered trader's (Canadian for specialist's) book. Even large orders that were called in to the floor are often handed to the order book clerk for execution in the electronic book without being seen by the specialist. Thus, it is little surprise that there was no need to continue with a physical trading floor, when the exchange members can do the same work from their offices.

Speaking of Toronto, one interesting aspect is that the priority rules attached to limit orders were different between the floor stocks and the CATS stocks. For the CATS stocks, limit orders are executed according to pure price and time priority, but for the floor stocks, only the first order to better the existing quote gets priority -- all other orders share pro-rata.

Toronto's recent switch to decimal pricing with a $.05 tick size was designed in part to compete with the U.S. market for order flow in the interlisted stocks, although Toronto's market share in the interlisted stocks did not change much. There are still severe nontariff barriers which make it hard for U.S. retail investors to trade outside the United States. Toronto is not part of the ITS system, and Toronto quotes are not included in the calculation of the best bid and offer and brokerage firms use to determine best execution for a stock.[xi]

Other foreign exchanges such as Tokyo also trade some U.S. stocks, although they tend to trade only the largest multinational firms and even then trading volumes are small compared with the volumes in the U.S.

[xi] See Ahn, Cao, and Choe (1997) for more about Canada's switch to decimal stock prices.

IV. Implications for the Future

The global equity markets will continue to be molded by the twin forces of technology and regulation. The evolution of competition in the U.S. equity markets has some clear lessons for the evolution of competition in the rest of the world, especially in Europe. In the 19th century, the slow speed of communication and transportation served as a natural barrier to interstate trading in securities; there were few, if any, legal barriers. With rapid communication, the regional exchanges lost the exclusive franchises that had been bestowed upon them by their geographic location. Gradually, the regionals were obsolete as the business shifted to New York. However, regulatory changes resulting from the 1975 National Market System amendments to the Securities Exchange Act led to the Intermarket Trading System, which allowed them to compete with New York. A regulatory climate that allowed brokerage firms to internalize order flow means that the regionals and other trading venues are likely to stick around a long time.

Europe already has access to the advanced communication and information systems that have led to a consolidation of exchanges in the U.S. Indeed, there has been a similar consolidation with the countries of the European Union. Regional stock exchanges have closed in England, Germany, Italy, and Switzerland. The Nordic Securities Market is a formal association of the exchanges in Denmark, Finland, Iceland, Norway, and Sweden, and there is talk of consolidating trading operations in those countries.

However, the regulatory climate in Europe will have a major impact on the shape of the market. Although the Investment Services Directive appears to allow greater competition between European markets by allowing financial service firms to conduct business throughout the EU and by allowing markets to provide electronic access to their facilities throughout the EU, it remains to be seen whether other regulatory developments will create umbrellas protecting the weaker national markets or not. The exchanges in Europe have been converging toward automated centralized order-driven markets. Most of the trading floors have been replaced with electronic systems.

The consolidation that occurred in the U.S. is being observed in Europe and will probably be observed in other countries as regulatory barriers continue to fade and communication continues to improve. The markets with the best liquidity in a particular security will dominate the other markets, although niche players will continue to survive, especially if they are fostered by the local regulatory environment.

Regulation has had a visible impact on the development of equity markets in the formerly communist nations. Often, the design of the equity market in such countries has been dictated by government fiat rather than by market forces. On the other hand, in Russia several exchanges have opened up.

India is an interesting case, in that the National Stock Exchange of India has now surpassed the Bombay Stock Exchange in volume. Given the enormous liquidity advantages of the dominant market, it is quite rare for an entrant like the National Stock Exchange to supercede an established exchange like the Bombay. It appears that dissatisfaction among the brokerage community with the performance of Bombay provided the opportunity for the National Stock Exchange.

There will likely be a serious consolidation in India, where over 20 stock exchanges now compete. As India's equity market and communication infrastructure improves, and it moves more toward the deregulation phase, it is likely that there will be several

It remains to be seen whether the emerging countries in Africa develop their own serious equity markets or whether the established liquidity of South Africa dominates the continent. It is primarily the regulatory regimes of the emerging markets in Africa that will determine this. With an already large and liquid market in a nearby time zone, it would be difficult for new markets to succeed without some kind of niche created by government regulation. However, the relatively slow progress to date in creating successful free trade blocks in Africa could provide just this niche.

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Appendix I :

A Necrology of Defunct or Renamed U.S. Stock Exchanges

Baltimore Stock Exchange

Merged with Philadelphia in 1949.

Boston Curb Exchange

Closed in 1935 subsequent to an SEC investigation (SEC Release 76)

Buffalo Stock Exchange

Suspended operations in 1936 as a result of low trading volume. (SEC Release 547, 1125).

California Stock Exchange (Los Angeles)

Closed in 1935 subsequent to an SEC investigation (SEC Release 76)

Chicago Curb Exchange

Suspended trading March 14, 1938;

Cleveland Stock Exchange

Merged into Midwest in 1949. The Cleveland floor stayed in business until at least 1957 if not longer.

Colorado Springs Stock Exchange

Organized in 1925 as a successor to the Colorado Springs Mining Exchange, the Colorado Springs Exchange was exempted from registration as a national stock exchange because of its small trading volume. Trading gradually declined and stopped altogether in December 1966. The exchange changed its name to the International Stock Exchange, although it never resumed trading.
(SEC release 8622, June 10 1969)

Consolidated Stock Exchange (New York City)

Founded in New York City in 1883 by the merger of the National Petroleum Exchange, the Mining Stock Exchange, the Miscellaneous Securities Board, and the Petroleum and Stock Board. The Consolidated handled mining and speculative shares that the NYSE would not touch, and also traded in odd-lots which the NYSE did not trade in at the time. The Consolidated also traded in NYSE-listed shares as well, and was thus treated by the NYSE as a serious rival. The Consolidated developed a seamy reputation as the exchange where bucket-shops would conduct business. It collapsed in the 1924 following a series of scandals.

Detroit Stock Exchange

Did not accept initial proposal to become part of Midwest in 1949. One of few exchanges not to merge into another exchange. When it closed on June 30, 1976 it was trading 405 stocks, but only four of those were exclusive listings. (Detroit News, September 13, 1996).

Denver Stock Exchange

Withdrew its registration as a stock exchange April 15, 1936 (SEC Release 606).

Hartford Stock Exchange

Closed within two months of long distance service between New York and Hartford on November 18, 1934. (SEC release number 76). This was also shortly after the Securities Exchange Act became effective so it was a good time to throw in the towel.

Honolulu Stock Exchange

This exchange was exempt under the low-volume exemption, and ceased trading on December 30, 1977. (SEC release 15323, November 14, 1978). Archives are maintained by the state of Hawaii.

Intermountain Exchange

Formerly the Salt Lake City Exchange, the Intermountain ceased operations on October 31, 1986, subsequent to an SEC investigation that found deficiencies in its operations. Its shell was bought by the Comex but is still dormant.

Minneapolis-St. Paul Stock Exchange

Merged into the Midwest Stock Exchange in 1949.

Milwaukee Grain & Stock Exchange

Stopped trading March 31, 1938.

Los Angeles Curb Exchange

Merged into the Los Angeles Stock Exchange on November 1, 1934 (SEC Release 78, January 11, 1935)

Los Angeles Stock Exchange

Joined with San Francisco Stock Exchange in 1957 to form the Pacific Stock Exchange. Note that two trading floors are still being maintained. (Note: Pittsburgh maintained a separate trading floor for five years after merger into Philadelphia-Baltimore-Washington Exchange).

Louisville Stock Exchange

Dissolved July 30, 1935 (SEC release 386, October 1, 1935)

Midwest Stock Exchange

Created in 1949 through a merger of the Chicago, Minneapolis St. Paul and Cleveland Stock Exchanges, it changed its name to the Chicago Stock Exchange in 1993.

Minneapolis-St. Paul Stock Exchange

Merged into the Midwest Stock Exchange in 1949.

National Stock Exchange ("Erie Board")

Formed at the behest of Cornelius Vanderbilt and Daniel Drew in 1869 after the Erie Railroad was refused listing on the NYSE for its refusal to issue financial reports. It died late in

the year.

National Stock Exchange

This one was started by the New York Mercantile exchange to fill a perceived gap between the AMEX and the OTC market. Originally granted SEC approval on August 16, 1960 and became inactive on January 31, 1975 (File No. 10-53) Release No. 11744

New Orleans Stock Exchange

Merged into Midwest Stock Exchange (now Chicago) in 1959. (Ceased trading on October 30, 1959 according to SEC Release 6153, December 24, 1959). Building was located on Carondelet St.

New York Curb Exchange

The New York Curb exchange moved indoors in 1921 and was later renamed the American Stock Exchange. See Robert Sobel's books, *The Curbstone Brokers*, and *Amex: A History of the American Stock Exchange, 1921-1971*, as well as Stuart Bruchey's *Modernization of the American Stock Exchange: 1971-1989* for more on the Amex.

New York Evening Exchange

There were several evening exchanges that sprang up during the Civil War. Hamon (1865) reports on one that had the apparent blessing of the NYSE. However, it closed by the end of 1865 after the NYSE threatened to expel any members who traded on the evening exchange.

New York Mining Exchange

Opened on December 21st, 1863 to trade in mining stocks. (Hamon, 1865) Since these stocks were considered extremely speculative, they were not eligible for listing on the NYSE.

New York "Open" Board

This was a competitor to the NYSE that emerged around 1863. It merged with NYSE in 1869 after the NYSE made its seats salable and created more seats for sale. It was famous for allowing continuous trading at time when the NYSE only had periodic call markets.

New York Petroleum Stock Board

Opened February 1, 1865 according to Hamon (1865). Later merged into the Consolidated.

New York Produce Exchange

Stopped trading by February 28, 1935 (SEC Release 76) subsequent to SEC investigation.

New York Real Estate Securities Exchange

Voted to terminate operations on May 12, 1941. (Release 2923, June 4, 1941)

Pittsburgh Stock Exchange

Founded in 1894, although it traced its roots to the boom that followed the striking of oil in Pennsylvania in 1859. In 1955, direct telephone linkage was made to the Philadelphia

exchange, and members were allowed to become associate members of PBW (Walter, 1957). Merged with Philadelphia-Baltimore-Washington in 1969 but maintained a separate trading floor until 1974.

Richmond Stock Exchange

Voluntarily dissolved, April 21, 1972. (SEC Release 9602, May 11, 1972) This was one of the low-volume exempt exchanges.

Seattle Mining Exchange

Merged with Seattle Stock Exchange on October 1, 1935

Seattle Stock Exchange

This exempt exchange voted to discontinue its operations on October 1, 1942 (SEC Release 3344, December 11, 1942).

St. Louis Stock Exchange

Merged into Midwest, 1949, although St. Louis floor was still open at the time of the Walter (1957) study.

Salt Lake Stock Exchange

Changed name into Intermountain Stock Exchange in 1972.

San Francisco Curb Exchange

Merged with San Francisco Stock Exchange close of business April 30, 1938.

San Francisco Mining Exchange

First organized in 1862 under the name San Francisco Stock and Exchange Board. It became the San Francisco Mining Exchange in 1927. It was shut down in the 1960s by the SEC for "numerous and repeated violations involving issuers, members and officials of the Exchange" (SEC Release 7870, April 22, 1966). Appears to have actually stopped trading between August 1967 and July 1968 based on SEC releases.

San Francisco Stock Exchange

Merged with Los Angeles Stock Exchange in 1957 to form the Pacific Coast Exchange. Unique among the regionals, the Pacific Exchange still maintains separate trading floors in Los Angeles and San Francisco. The options floor is in San Francisco.

Standard Stock Exchange of Spokane, Wash.

An exempt low-volume exchange, it ceased trading on May 24, 1991. (SEC Release 34-29422) Founded in 1897, it primarily traded gold and silver mining stocks and was known for its penny stocks. Although trading boomed in the early 1980s with the rise in gold and silver prices, the slump in gold and silver prices in the late 1980s and early 1990s led to the demise of the exchange. The low trading volume made it uneconomic to pay for needed modernization needed to implement new SEC rule changes designed to prevent penny stock fraud.

Washington Stock Exchange (D.C.)

Merged into Philadelphia-Baltimore-Washington in 1953. (See Walter (1957) for details of consolidation.)

Wheeling Stock Exchange

Wheeling was one of the exchanges that had a low volume exemption from SEC registration requirements. When it ceased doing business on April 30, 1965, it traded 11 stocks, 8 of which were also listed on the NYSE. (SEC Release 7590)

Notes