Internet-Based Trading and Open Outcry Markets: The Changing Roles of Options Exchanges and Market Makers

John L. Teall, Pace University, New York, New York.
Vassilios Gargalas, Lehman College, CUNY, Bronx, New York.
Tzyy Jeng Wu, Lehman College, CUNY, Bronx, New York.

Abstract

This paper discusses the impact of Internet technology, electronic exchanges and Alternative Trading Systems on the major options exchanges and how specialists and market makers are adapting to these changes. Exchanges, which previously constituted natural monopolies due to scale economies and their regulatory roles, are now under assault by a variety of electronic markets, from both within and outside of the United States. We argue that exchanges are responding with major technological innovations of their own and the investing public is currently benefiting from this competition as well as the wider array of services offered by the parallel systems. However, these new Internet-based systems do present major risks in that they threaten existing regulatory frameworks and, because they are largely untested under extreme scenarios, they threaten safeguards designed to prevent collapse of securities markets.

Introduction

On April 20, 2005, the New York Stock Exchange dropped a bombshell on the investing public, announcing its intent to be taken over by Archipelago. In a single sweep, the NYSE would be merged, privatized, expanded into derivatives and have its springboard for the switch to electronic trading. The larger options markets have traditionally emphasized roles of the specialist and market makers who conduct auction markets and maintain liquidity for off-floor traders, as in stock markets. Since the founding of the Chicago Board Options Exchange (CBOE) in 1973, exchange markets have brought together widely dispersed brokers, dealers and individual investors in options, creating highly organized, visible and regulated environments intended to facilitate trading and price discovery. These crucial services are costly and have been paid for through combinations of dealer spreads and assorted fees. These payment and specialist systems are under attack by rapidly developing electronic trading and Internet-based systems that drastically reduce these dealer spreads. In those markets where off-floor trading directly competes with exchanges, off-floor trading systems are able to free ride on reputation-enhancing expenditures incurred by open outcry exchange markets. The open-outcry markets conducted by exchanges continue to promote price discovery and liquidity but are under intense pressure from
off-floor sites both from within the U.S. and from other countries. Increasing market shares enjoyed by off-floor markets appear to be reducing the participation of specialists and market makers, reducing their profitability. This paper discusses the impact of new trading technologies on open-outcry options markets and exchange and regulator responses to these technologies.

The traditional floor-based options exchange in the U.S. centers around a specialist (known as a market maker on the CBOE) with a regular "trading crowd" that focuses its energies on a small number of series of option contracts. Floor brokers enter the crowd with orders initiated by larger off-floor traders while smaller and routine orders are more likely to be routed electronically to the specialist or market maker. In addition to trading on her own account, the specialist has a specific exchange function; she is charged with the responsibility for maintaining an orderly, liquid and fair market for each of the securities in which she specializes. She and her employer are evaluated by the exchange based on her discharge of those responsibilities. Members of the floor-trading crowd are expected to improve the market by offering higher bids to buy and lower offers to sell.

To better understand issues facing options exchange markets, we should define Alternative Trading Systems (ATS) and distinguish them from exchanges. Most of these ATS systems are Internet-based. However, as we will see shortly, this distinction between floor-based and Internet-based systems is not entirely clear. Some observers have simply defined the ATS as an electronic proprietary market or “fourth market” that is maintained by a third party with a limited SRO (Self-regulatory Organization) function. The SEC defines an Alternative Trading System (ATS) to be an automated system that centralizes, displays, crosses, matches or otherwise executes trading interest, but is not currently registered with the Commission as national security exchanges or operated by a registered securities association. However, the SEC later redefined the term “exchange” to include “any organization, association, or group of persons that: (1) Brings together the orders of multiple buyers and sellers; and (2) uses established non-discretionary methods (whether by providing a trading facility or by setting rules) under which such orders interact with each other, and the buyers and sellers entering such orders agree to the terms of a trade.” Under this new definition, at least several ATSs might be considered to be exchanges, even if they are not traditional "brick and mortar" exchanges.

Figure 1 depicts the routing process for a typical electronic or Internet-based discount broker transaction. The process for a “brick and mortar” broker would be the same except that client access to the broker is by telephone. ATS transactions usually eliminate the broker from the process. Internalized orders are executed by the broker itself, where orders never reach an outside market.
Historical Overview

The natural monopoly power associated with exchange-based open outcry stock markets owes its early existence to a nearly complete absence of technology and communications systems. Investors were far too dispersed to conduct unaided securities transactions and security traders required a central physical meeting site. This site, or exchange enabled large networks of local broker offices to execute securities transactions on behalf of these widely dispersed investors. New York's Wall Street district provided an excellent venue for this purpose and the individual exchanges filled specific niches in the securities markets. Exchanges were private mutual organizations owned by members representing brokerage firms and investment institutions and were regulated by individual states prior to passage of the Securities Exchange Act of 1934. Shortly after passage of this Act, the SEC gained authority over the exchanges that, in turn, monitored and regulated their members.

As telecommunication technology advanced in the early decades of the 20th century offering market access to millions of investors, U.S. securities markets nearly self-destructed, only to be salvaged by regulatory authorities and intense efforts by exchanges to curb market abuse. Exchanges now facilitate monitoring for regulatory compliance in much the same manner that they had facilitated trading. Many of the reputation-enhancement, supervisory and regulatory functions undertaken in the market are centered around exchanges that bear significant related costs. Off-floor trading systems do not bear such significant expenses. While electronic
technologies developed over the course of the 20th century mitigated some part of the necessity for central trading floors, the broker-dealer systems (e.g., NASDAQ) and other automated trading systems were still required to link dispersed investors. Nonetheless, open outcry exchanges, specialists and market makers played and still play important roles in liquidity maintenance, price discovery, regulation and supervision even if investors can avoid payment for some of these services by using screen-based trading to route their transactions away from the exchanges.

Until the mid-1970’s, brokerage firms maintained their monopoly with a system of fixed transactions fees. All of their transactions were routed through the principle exchanges and off-floor markets. Exchanges had limited competition for securities listings. The primary sources of competition among securities brokers were in the arrays of services that they offered. After the price controls were lifted, the market saw formation of a number of discount brokerage houses that unbundled non-transactions services such as research and were able to offer drastically reduced execution costs. The market segmented to an extent, with some firms offering only transaction executions and others offering the full array of brokerage house services. However, the vast majority of transactions were still routed through the principle exchanges and off-floor markets. Specialists and market-makers were largely unaffected by these changes except to the extent that their employing firms were affected.

More recent technological developments in telecommunications, wireless communications and the Internet have imposed enormous competitive pressures on U.S. securities exchanges. With the electronic NASDAQ system beginning in 1971, competition from foreign fully-automated exchanges trading U.S. Securities (e.g., Eurex), development of fully automated exchanges in the U.S. (e.g., the ISE) and the Instinet, Island and Posit systems that allow direct trading between institutions, exchanges have been forced to accept and even innovate technological development to survive. This has been true particularly for markets for derivative securities, with options and futures markets leading the development.

Options trading took place entirely over the counter until the 1973 opening of the Chicago Board Options Exchange (CBOE). The nature of options trading lends itself to technological development at every stage of the trading process. First, because of option-trading strategies' emphasis on relative valuation and stochastic processes, the valuation and portfolio analyses require mathematical analyses that are computer-based. Maintenance of these strategies requires abilities to rapidly trade in and out of multiple positions simultaneously, relying on electronic communication technologies capable of handling larger amounts of data instantaneously. Technologies offered through the Internet offer these capabilities, forcing exchanges to anticipate and quickly improve on developments in order to compete.
Competition among options exchanges continues to intensify, fostered by a myriad of new technologies and the introductions of equity option multiple listings beginning in the fall of 1999. Adding to the fray is the International Securities Exchange, which was launched in May 2000 as the first fully electronic exchange in the U.S. The ISE has been trading options with well-established markets on other exchanges. In addition to the ISE, well-established foreign exchanges such as Euronext and Eurex electronically trade contracts on U.S. equity instruments, further intensifying competitive pressures on major U.S. options exchanges. In fact, practically all European and Asian securities and derivatives exchanges are currently electronic. Most derivative products are originated in OTC markets that are huge but fragmented, yet these OTC markets still impose substantial competitive pressures on exchange markets, in part because of the efficiencies arising from the technologies that they employ. This increased competition has led to a number of important results including narrowing spreads (8% between 1999 and 2000 according to an SEC study; also see Battalio, Hatch, and Jennings [2003]), highly uncertain futures for competitors and the development and implementation of innovative quotations and trading systems.

Options exchanges have innovated substantial technological advances to maintain and even anticipate developments in other markets. For example, among the exchange-initiated technological advances include NASDAQ’s automated exchange, SuperMontageSM and the New York Stock Exchange investment in six Onyx2e visualization supercomputers in its 3D visualization operation center. Options exchanges have experienced launching of the Chicago Board Options Exchange (CBOE) proprietary order routing and quotations HyTS Terminals that offer trading desks point-and-click access (CBOEdirect) to all exchanges on one screen. Such point-and-click trading systems provide for instantaneous filling and confirmation of orders at the best prices along with transparency of trades. The American Exchange has responded with its AMEX New Trading Environment (ANTE). Several exchanges are providing for Remote Market Makers (RMM's) and electronic-Primary Market Makers (e-PPM's) such as the Philadelphia Exchange PHLX XL and Remote Competing Specialist System and the Pacific Exchange PCX Plus that allows for both floor-based and remote market makers. These systems facilitate trading by off-floor investors and enhance liquidity by expanding the membership of market makers. These systems offer market makers direct access to the trading floor, enabling them to participate in the provision of market liquidity and subjecting them to the same market-enhancing responsibilities without requiring their physical presence.

Regulators have made significant efforts to keep pace with technological innovations. For example, the development of National Market System plans continue as the SEC required each options exchange to file a national market system plan to be implemented by 2003. In addition,
The Options Linkage Authority and the Options Price Reporting Authority have been launched, intending to increase market efficiency, enhance competition, facilitate offsetting of investor’s orders, and contribute to the best executions. In addition to the SEC oversight of exchanges, private regulatory bodies have been created by organizations representing financial institutions. The most significant of these, the International Swaps and Derivatives Association (ISDA), plays a crucial role in regulating ATSs and has held substantial regulatory power over non-exchange derivative markets since the 2001 Caiola vs. Citibank decision assured its enforcement power.

Barriers to Entry

The natural monopoly enjoyed by traditional “brick and mortar” markets has been enhanced by a number of barriers to entry. Overhead outlays are required for large investments in office facilities, communications equipment, fixed exchange fees and memberships, broker training and licensing and building client bases. Each of these overhead outlays are accompanied by significant time lags, increasing times required for recapturing initial investments. In addition, traditional brokerage offices experience significant returns to scale (see Stigler [1961] and Hasan and Malkamalki [2001]), making it almost impossible for smaller and newer firms to compete against larger better-established firms. Each of these barriers to entry into the securities brokerage business applies to the creation of overhead-intensive “brick and mortar” securities exchanges and markets. For example, in the late 1990’s, the Chicago Board of Trade and the New York Merchantile Exchanges constructed new futures pits that cost $180 and $228 million, respectively. However, recent electronic and other technological developments, particularly the Internet substantially relieve these barriers to entry. First, the majority of prospective clients already have Internet access and usage skills. Transactions costs are substantially reduced through use of equipment already installed in client homes. Whereas the typical U.S. customer stock transaction executed through a phone call has a variable cost of about $1, its cost is reduced to just $0.02 executed online. Similar disparities exist in open-outcry and electronic markets. For example, the open outcry LIFFE charged about $1.50 per for long and short positions on the Bund futures contract in the late 1990’s; its electronic German competitor DTB charged only $0.66 for the same contract. Open outcry exchanges in the United States charge fees of approximately $1.50 contract (see Cavaletti [1997]).

More significantly, overhead expenses for Internet brokers run approximately 1 percent of assets, as opposed to 2-3 percent for brick-and-mortar offices. Time required for Internet brokerage firm start-ups is substantially reduced relative to brick and mortar start-ups. In addition, the Internet and other technological advances have reduced economies of scale for
brokerage firms. For example, as the Internet has replaced “cold-calling,” the fixed costs of seeking and soliciting the business of small clients have dropped significantly. Furthermore, clients of electronic brokers trade far more frequently than those of full-service brokers, with some estimates ranging to 10-25 times as frequent (Varian [1998]). Hence, smaller individual investors are able to play larger roles in securities markets at smaller costs. The increased participation of smaller investors enables them to replace specialists and market makers, at least to some extent, in the provision of liquidity to the market. In addition, the reduction of scale economies has increased competition among brokerage firms, in large part because so many of their services (e.g., advice, loans and cash management) could be unbundled and commoditized through automation. Some of these services require very little initial capital outlays and no unique technology.

Reduced brokerage commissions substantially increased competition in the brokerage industry as reduced costs of service provision have softened barriers to entry. Brokerage commissions and fees have fallen from an average of $52.89 per trade in early 1996 to $15.67 in mid-1998. By 2000, a few online brokerage services had temporarily reduced their commissions to zero. This particular scenario is interesting and quite controversial because it seems to be a direct result of order flow payments, where brokerage firms receive their compensation from electronic exchanges and ATSs in payment for order flow. Many Internet brokerage firms currently maintain commission levels below $10 per transaction. Barriers to entry based on ownership of physical facilities are disappearing, and existing firms are being forced vary their product lines and to merge into other institutions.

The relief of entry barriers has equally impacted exchanges. New for-profit exchanges are finding that they can compete very effectively with older exchanges that have traditionally focused on maintenance of highly credible markets and related regulatory and supervisory functions. For example, the International Securities Exchange (ISE) has operated as a very successful fully automated for-profit exchange. In 2005, the ISE launched an initial public offering of its stock that was well received by the market. Other exchanges are in various stages of demutualization (the CME has completed its; The NYSE has announced its intent to demutualize) as competition intensifies. This demutualization trend results from increasingly intense competition arising from entry barrier reductions, the ability to realize profits through improved efficiency and the shift of focus from regulating and monitoring activities to maintenance of profitable activities.

Combinations, alliances and mergers between exchanges have also enabled smaller and less efficient markets to compete against larger ones. These combinations have enabled
exchanges and markets to mutually benefit from one another’s technological resources. Some of these combinations have been domestic such as OneChicago, LLC, an alliance created by the Chicago Board Options Exchange and Chicago Merchantile Exchange to trade equity futures contracts and the Pacific Exchange and the Archipelago Exchange merger. On the international scene, the New York Mercantile Exchange opened a satellite open-outcry trading floor in Dublin for trading in a Brent crude oil futures contract and mergers among exchanges in other countries such as Euronext (formed by combining bourses in Amsterdam/Brussels/Paris/LIFFE/BVLP) and Eurex (combining the Deutsche Börse AG/SWX Swiss Exchange. Each of these latter combinations offered improvements in investors’ abilities to trade on a global basis.

**Liquidity and Quality of Execution**

A market is said to be liquid when prospective purchasers and sellers can transact on a timely basis with little cost or adverse price impact. One might argue that the exchange mandated responsibility of the specialist to provide liquidity in one-sided markets confers a liquidity advantage to the exchange while less-costly access might swing the advantage to the electronic market and its institutional participants. Bid-offer spreads are generally considered to be good indicators of liquidity, with narrow spreads indicating that price impacts of trading will not be severe. Many of the studies of electronic versus open-outcry trading have used on bid-offer spreads as a liquidity metric (e.g., Porter and Weaver [1997], Battalio, Greene and Jennings [1997] and Kumar and Shastri [1998]. Shyy and Lee [1995] found spreads to be wider in electronic markets than in open-outcry markets; Pirrong [1996] found the opposite. Pirrong argues that miscommunications and misunderstandings between trade participants reduce efficiency of open-outcry markets and that these issues are avoided in electronic markets. Several studies have found that the time to execute trades is certainly reduced in electronic markets. In addition, screen-based trading has facilitated after-hours markets. Now, a number of exchanges are offering investors opportunities to trade after normal business hours.

The evidence concerning the provision of liquidity by open-outcry exchange markets relative to electronic markets is both ambiguous and mixed (e.g., Pirrong (1996), Breedon and Holland (1997)). Some electronic systems have driven floor-based open outcry markets from contention. For example, Breedon and Holland describe how during 1997-'98, the computerized Eurex drew practically 100% of the trading in German Bund futures from the open outcry LIFFE which had held a 70% market share. By 2000, LIFFE had abandoned open-outcry entirely for LIFFE CONNECT, a fully automated system. However, LIFFE did retain the bund options contracts, probably because of the more complicated strategies associated with them. In 1998,
MATIF operated its open outcry and electronic systems simultaneously. Within two weeks, the computerized system had taken all volume from the open outcry markets that had to be closed. The Hong Kong Futures Exchange and the Sydney Futures Exchange both abandoned open-outcry during this same period. Frino et al. [2004] found that spreads narrowed on the Sydney and Hong Kong Exchanges; spreads widened on the LIFFE. In addition, according to Frino et al., bid-ask spreads on all three exchanges appear to widen in response to price volatility at a faster rate under electronic trading than with open-outcry trading, suggesting that the specialist-based system may offer better price continuity in periods of uncertainty.

On the other hand, open outcry markets have been particularly successful in the U.S. One of the difficulties of screen-based trading is the ability to efficiently disseminate significant amounts of information concerning trades. While it is easy enough for screens to display bid and offer prices, most do not readily display order sizes. Open outcry participants are able to more easily communicate verbally order sizes, order types and combinations as well as other more complicated trade details. Such matters grow in importance when trade sizes are larger or when, for example, an options trader is attempting to leg into a spread or other position. While screen-based trading provides for a greater level of anonymity, many traders prefer a market where their counterparties can be identified. Furthermore, most markets are far more active during the conduct of open-outcry than during the after hours electronic periods. It is not clear the extent to which traders simply prefer to trade during “regular work hours.” In addition, Sarkar and Tozzi [1998] argue that open-outcry exchanges provide for more liquidity in more active markets while newer, less active issues are less likely to be found in open-outcry markets.

In an interesting study, Bakos et al. [2000], with $60,000 provided by the Salomon Brothers Center at New York University, opened a series of accounts at various full-service, discount and electronic securities brokers. Their commissions for 100-share lots averaged $7.50 for electronic brokers and $47 for full-service voice brokers. They found that full-service brokers were more likely to route orders to the principle exchanges than electronic brokers and that such orders were more likely to be improved. However, for smaller orders, these price improvement advantages are more than offset by the higher brokerage commissions. Hence, specialists and market makers on exchanges were able to provide better order executions while brokers using electronic markets charged smaller commissions. It appeared that smaller investors fared better with discount electronic brokers while larger transactions resulted in better after-commission executions on the principle exchanges.

One of the more troubling aspects of electronic brokerage transactions is that customers do not normally have a say in order routings and that orders need not necessarily be routed to the
markets with the best prices. Many electronic markets have agreements with particular exchanges and markets to route transactions through them. These exchanges and market makers pay for order flow that might result in worse prices for clients. For example, in 1999, the Knight/Trimark Group paid $138.7 million for order flow, with over 10% of this sum received from Ameritrade, a large electronic brokerage firm (Bakos et al. [2000]). Specialists and market makers resent this controversial practice of order flow payment and many discount brokerage clients seem unaware of it.

**What the Future Holds**

The new technology employed by Internet-based markets, electronic exchanges and ATSs along with technological responses by principle exchanges all offer many opportunities to the investing public. Transactions costs have been drastically reduced and new products and services are regularly offered. Trading hours have been extended to 24 hours 7 days per week, investors have more opportunities to invest on a global basis and there appear reduced opportunities for market manipulation, including front-running and instances where market makers cooperate rather than compete for trades.

However, how are specialists and market makers affected? Specialists and market makers are all members of their exchanges and either own or lease their seats. As was the case for brokerage firms in the 1970s when fixed commissions were eliminated and brokerage firms found themselves under assault by newly formed discount houses, “brick and mortar” exchanges are suffering reductions in seat values as more order flow is routed off floors. This obviously directly impacts seat owners. To combat this, exchanges must use their more substantial resources and franchise value to innovate and compete. Exchanges will continue the demutualization process to raise funds to compete more effectively and current seat owners will probably profit in this process. In addition, exchanges will list more contracts as off-floor facilities draw business from them and market makers will probably need to make markets for larger numbers of securities.

However, the changing regulatory and supervisory roles of specialists and market makers are in flux. Can and will for-profit exchanges discharge SRO obligations as effectively as they did before they demutualized? Government regulators must continue to reconsider the roles of exchanges, Internet-based markets and ATSs in the regulatory process. Already, we are observing seeds or potentially major scandals and litigation resulting from occurrences such as payment and other consideration for order routing and the creation and marketing of products used to circumvent regulation or fiduciary responsibility (e.g., collars). In addition, we might expect to see increased risk-taking by exchanges as intensified competition forces them to search for new
niches, products and customers.

Many observers argue that "brick and mortar" or open outcry offers more opportunity for large order price improvement by trading crowds and are often better for more complex orders. Some argue that open outcry markets provide for back-up for when electronic market spreads widen. It appears that Internet-based and other electronic markets have the “efficiency edge” under normal circumstances, but it is not clear that they will serve adequately or even survive significant market shocks and crashes such as the one that occurred in 1987.
References


