

Chapter XII

Evolution of Online Financial Trading Systems: E-Service Innovations in the Brokerage Sector

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Abstract

This chapter focuses on the theme of e-service innovation in financial electronic markets. The discussion will cover the theories of “technology bundling” and how bundling creates value-added in servicing electronic markets. More specifically, this chapter looks at innovations created through e-service bundling for online brokers connected to various financial electronic markets. The proliferation of different e-trading systems raises the question of which systems provide better service to online stock traders. Many online brokers (e-brokers) now provide low-cost transactions and financial research capabilities, so where is the next level of innovation? The objective of this chapter is to show that several innovations in broker e-services are critical in the following areas: (a) how order processes are efficiently managed in financial e-markets; (b) how responsive e-trading systems are in handling trading rules and regulations; (c) how different systems address unique niches in financial e-markets; and (d) improving systems stability and reliability.

Background

Introduction

In this chapter, we start analyzing an entire sector (the brokerage service sector) rather than one particular business organization in order to understand the case studies. The reason for using the entire sector as the *unit* of analysis is that the e-service problems and challenges are similar for the entire sector and is not unique to one organization alone (see next section, which discusses the problem of this sector). More so, the best way to illustrate the e-service innovations of online brokers, we need to relate their unique e-service solutions to the problem facing the entire sector.

E-service in this chapter is defined as the service provided by electronic brokerage systems used to facilitate the buying and selling of publicly traded corporate stocks and financial securities online. If you want to own/buy shares of stocks in companies like Microsoft or IBM, you can trade their shares electronically through e-brokerage systems like Scottrade, E-Trade, and Ameritrade. By trading shares online, you are using an electronic service similar to an online auction system, where sellers and buyers bid for the prices of different stocks and financial securities. Buyers want to get the cheapest prices and sellers want to sell at the highest prices, and the electronic trading systems help them with that objective. This is a critical e-service for the trillion-dollar global financial market, where stocks, futures, options, bonds, foreign exchange, and commodities are traded daily. These electronic brokers do not necessarily own stocks or financial securities. They process the orders electronically by channeling the orders through different networked financial market systems via the New York Stock Exchange, the London Stock Exchange, the Shanghai Stock Exchange, and many other stock exchanges around the world.

Another critical e-service that needs to be defined is the service that assists online investors and traders to make informed decisions whether to buy or sell stocks and when to execute such trade. E-brokers provide bundled e-services like real-time news reports, real-time charting of stock price movements, the demand and supply of stocks, stock analyst ratings, and research on the company's financial health. This is how different e-services are "bundled" to help facilitate critical decisions in electronic financial markets. Different information systems, software applications, real-time databases, and networking technologies are used in the bundling of e-services.

In previous studies (Yap & Lin, 2001), the transaction capabilities of online trading systems as well as their knowledge-based components have been explored. These studies showed that earlier Web-based trading systems took one to three minutes to execute market orders; whereas more current systems can execute orders in one to three seconds. Transaction speed is not the real issue anymore. The real concern is whether traders are getting the "best price" for their trade executions. The demand for financial research and knowledge-base services online also needs to be more innovative to distinguish the uniqueness of e-services provided by different e-brokers. So the issue is what more can e-brokers provide their clients? In what areas can e-service innovation take place in the online brokerage sector? To get an idea of where innovation needs to happen, the problems of the online brokerage sector needs to be defined. Only then can we see how innovations in technologies and its bundling can provide solutions to such problems.

Defining the Problem in the Online Brokerage Sector

The problems with the electronic services provided by most online brokerage outfits are threefold: (1) *Not all systems comply with the U.S. Securities and Exchange Commission (SEC) Trading Require-*

ments (rules and regulations). Most information systems used for financial trading have loopholes in terms of preventing traders and investors from breaking SEC rules and U.S. government laws. This is important because many amateur traders are not familiar with laws governing the trading of financial instruments in U.S. financial markets. Breaking the law could be very costly and may prevent a trader from trading stocks again. This is a very serious problem not adequately addressed by e-service systems in the brokerage sector. (2) *There is a need to connect fragmented financial electronic markets to reflect more realistic stock quotes*. There are financial e-trading systems that are not as broadly networked to different financial electronic markets as other systems. This means that if your online brokerage service is only connected or bundled to two electronic financial markets while another online brokerage service is bundled to eight electronic financial markets, then your online broker's system may not be able to get you the best "buy" and "sell" price for your stocks like the more connected/networked e-brokers can. Many traders have complained that their orders were not executed at the price they wanted, even if they saw that their stocks momentarily hit those price ranges. This happens when an online trading system is only connected to a few electronic markets. (3) *Problem with systems stability and reliability*. Some online brokerage systems are not very stable and reliable, and therefore disrupting e-service more often during the electronic trading process. This is also a very serious problem. Imagine if your stock went down from \$21.50 to \$17.63 and you could not sell it because your online broker's system was down for three hours. One of the purposes of this study is to test some of the more popular trading systems for more than a year and see how they hold up over time.

Methodology

This research employs the "case research" methodology. The researchers were involved in the actual

use of the financial trading system and so data was acquired on a firsthand basis. The research uses the interpretive approach, which is essentially based on the unique experience of the user. The researchers gather the findings from direct experience and day-to-day interaction with the trading systems, its inherent technological features, and the customer support provided by the e-broker when the system is not working properly.

To be able to do an in-depth analysis, the researchers opened four separate accounts so that four different popular e-trading systems can be tested and compared. However, due to limited space in writing this chapter, we can only cover two cases discussing two different e-trading systems. The two cases chosen for this chapter offered the more innovative e-services in the industry at the time of data gathering. Each e-trading system was used for more than a year. More than 50 trades were conducted on each system, with a frequency of at least once each week. Several systems features were explored to see what value it provided the user. Trading online naturally meant that the researchers acquired their information/data firsthand. To validate and confirm some findings, the researchers also engage in dialogues with trading communities through message boards with user reviews.

Setting the Stage

The Strategic Role of IT in the Creation of Electronic Markets: A Theoretical Framework

Ciborra (1993) argued that information technology can be used to lower transaction cost, and in turn, enable the creation of cost-efficient electronic markets. Bakos (1991) emphasized that IT-driven electronic marketplaces can lower the "buyer's search costs" as well as the seller's cost.

Bakos (1998) said that electronic markets lead to a more efficient "friction-free" market,

because electronic markets match sellers' offer to the buyers' preferences more efficiently than physical markets. The more buyers and sellers there are in an electronic market system, the smoother (less friction) the market mechanism will be in determining a realistic price for goods and services. If we examine global consumer e-markets with millions of users like eBay, prices of goods or services are realistically determined by the supply and demand forces created by multitudes of buyers and sellers. On the other hand, electronic financial markets have been fragmented into smaller electronic market systems called *Electronic Communication Networks* (ECNs). These financial e-markets have not been as unified, integrated, and as far-reaching as eBay. So, it is not as "friction-less" because price gaps occur in fragmented markets. That is why "arbitrage trading" occurs in financial e-markets. In finance, arbitrage trading is the practice of taking advantage of price gaps/differentials in stocks, options, bonds between two or more financial markets.

Friedfertig and West (1998) enumerated different financial electronic market systems used for trading stocks, to include Instinet, Island, and NASDAQ's Small Order Entry System (SOES). The *National Association of Securities Dealers Automated Quotation System* (NASDAQ) was the first, and as of this writing, the largest electronic stock market. While electronic financial markets have been fragmented, there have been initiatives to start integrating different e-market trading systems. In 2005, NASDAQ acquired Instinet (Ryan, 2005). After that, the Associated Press (2006) reported that the New York Stock Exchange (NYSE) has merged with Archipelago Holdings, a Chicago-based company that owns an electronic market exchange system called ARCA-Ex. The NYSE, a 213-year-old traditional stock exchange, finally adopted its own electronic market system in 2006.

Bakos and Brynjolfsson (2000) argued that the bundling of information goods, systems, and technology is advantageous for service provid-

ers as bundling information goods increases the value of a set of goods to the clients/users of the information systems. The bundling of information goods and systems is reflected in the changes seen in financial markets like the merger of Instincts with NASDAQ and ARCA-Ex with NYSE. The purpose of bundling of information goods enabled by information technology relates to Ciborra (1993) and Malone, Yates, and Benjamin's (1987) arguments that information technology brings down the cost of transaction and coordination in electronic markets. In this study, we believe that e-brokerage firms have bundled different information goods, systems, and technology to make their e-services highly innovative and competitive.

This research looks at two e-brokers and investigates if their online trading systems have been "bundled" in such a way that their system can simultaneously transact and access live data from several financial e-markets. The other aspect of "bundling" that will be studied is how various software applications have been combined to provide a comprehensive electronic service to traders/investors. This research believes that the e-trading system with the best bundled information goods, functions, and systems capabilities will provide the best value to traders/investors.

The Changing Service Environment in the Online Brokerage Sector

Considering that instantaneous transaction speed and financial research are already standard capabilities in most e-brokerage services, systems developers for e-brokers need to recognize other unique innovative e-service capabilities that are really needed in this service sector. The following are critical issues to consider:

Order Process Flow - First, there is the issue of how buy and sell orders are channeled to various electronic trading systems and whether traders are getting the "best price" for their orders. The question is to what extent are online trading systems linked to different electronic markets to

process orders and get traders the best price for their orders?

Targeting Niche Markets - Second, what differentiates one e-service from another? In what ways do different systems cater to various types of traders? E-brokers need to take advantage of market segmentation and cater to different types of clients/traders.

SEC Regulation - Third, there have been several changes in government rules and regulations that could penalize online brokerage firms if trader violates those SEC rules. The chapter will determine whether there are some loopholes in the systems that are disadvantageous to traders.

Systems Reliability and Security - Finally, there is an increasing risk of system failure and security breaks. Are trading systems as reliable? How are online brokers providing clients safe guards and fail safe systems?

Current Issues in the Stock Market Prompting Changes in Online Trading Services

The growth of electronic markets has caused market fragmentation as alternate market centers are “balkanizing” the order flow process and encouraging internalization. *Internalization* is the situation where brokers buy the stock from their own internal sources or inventory instead of buying from the larger open market. It is not good for orders to be executed in isolated small markets rather than in bigger, more unified, and networked e-markets. Roberts, Pittman, and Reeds (2000) stated this appropriately in their article.

Recent advances in technology and changes in securities regulation have sparked the development of a growing number of alternative market centers. These market centers include regional exchanges and alternative trading systems.

Advancements in technology and regulatory changes have made it possible for these market

centers to attract order flow by offering narrower spreads and improved trading efficiencies, including speedier and more reliable executions... The SEC is concerned that fragmentation of the markets has caused or will cause too many customer orders to be executed in isolation, rather than interacting with other market orders.

The objective of having an electronic market is providing accessibility to as many market segments as possible; however, the growing fragmentation or balkanization of electronic markets appears to limit the order flow process from reaching a wider market given time execution constraints. Moreover, the larger the volume of the trade, the more difficult it is for the online system to match, buy, and sell volumes.

For example, an online brokerage firm may not find 1,000 shares of stocks being sold lower than \$20.20/share in their own e-market system, even though another seller in an alternate e-market center may be selling it at \$20.00/share. Due to execution time constraint, the system may be able to get the best bid at the fastest execution within its own internal order flow (that is \$20.20) but not across other market centers. So, theoretically, the buyer is forced to pay \$20.20 instead of only \$20.00 and therefore paying \$0.20/share more (or \$200 for 1000 shares) due to the inability of an electronic market system to search several other electronic market systems for a better price given the constraint of execution time.

Electronic markets seem to be getting more fragmented due to the proliferation of different electronic trading systems in the form of Electronic Communication Networks (ECNs), such as Instinet and Archipelago. Routing orders across different electronic markets can be inefficient in terms of getting the best price of a stock; hence the temptation of brokers to internalize orders. Traditional markets like NYSE and AMEX behave more like a singular unfragmented market where trading occurs on the floor among a network of human specialist.

Figure 1. Balkanized or fragmented e-markets (left) and unified single market (right)

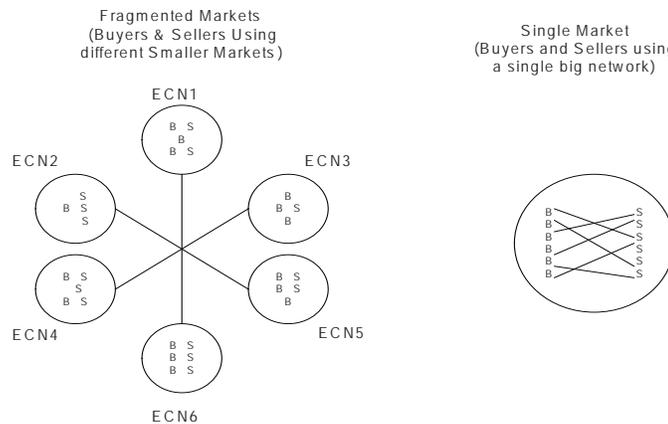


Figure 1 compares and illustrates fragmented markets (such as ECN1 or ECN2) vs. a single market. In fragmented markets, buyers (B) and sellers (S) may not be properly matched. Some markets have more buyers than sellers or vice versa. If an e-trading system just executes orders within one or two ECNs, their clients may not always get the best traded price.

If an online system can access all ECNs, then it gives its clients the opportunity to access a bigger e-market. In effect, it is unifying all smaller e-markets to a single e-market.

Diversifying E-Services by Targeting Niche Markets

There are different types of traders or investors in the stock market. Different financial brokerage firms target different types of traders or investors. The following are different groups of traders/investors:

1. Long-term investors – investors who “buy and hold” and keep their stock portfolio for months or years.
2. Swing traders – traders who do not keep stocks for more than a week. They take advantage of the upswing and downswing of stock prices over the course of a few days.
3. Pattern Day traders – traders who buy and sell stocks during the same day. They sell stocks at the end of the day, whether they make money or not.
4. Micro-day traders – a growing number of traders who only buy and sell within a few minutes or seconds. They do not even hold stocks for an hour. Their objective is to take advantage of small fluctuations in the market and make a small profit spread with these fluctuations.
5. Penny stock and small cap traders – traders who trade only micro-caps or small caps stocks. Micro-cap stocks are often referred to as penny stocks because they can be traded for less than a dollar. Small caps stocks are also cheap and usually below \$5.
6. Large cap and middle cap traders – a group of traders who believe that they should only buy stocks above \$10 or \$20. They believe that micro-cap and small cap stocks are cheap for

a reason; they are risky and trading for what they are worth.

7. Institutional traders – these are large institutions that invest their capital in stocks, like banks, insurance, and mutual fund companies.

Securities and Exchange Commission (SEC) Rules and Regulations

SEC has a number of trading rules that brokers must follow or force its clients to follow. For example, SEC has already limited day trading activities. Pattern daytraders need to have at least \$25,000 in their account to meet SEC requirements. This took effect in 2001. Cadway (2001) summarize these new rulings:

As some of you might be aware, the NASD has come out with some new margin rules for day-trading accounts effective September 28th, 2001. Among these rules is the requirement for all pattern daytrading accounts to have a minimum equity of \$25,000.

Stock traders have two general paths in trading stocks. One path is to buy low and sell high, while another path is to sell high and buy low (short selling). Selling high and buying low is the processing of shorting a stock. Technically, the trader just borrowing stocks from his broker when he/she short sells a stock that he/she does not own. Sooner or later, the trader must buy stocks to repay or return or cover what he/she borrowed from his/her broker (This is known as “buy to cover”). For a trader to borrow stocks from a broker, the broker must have an inventory of that stock. If the broker does not have an inventory of a particular stock and still lets the individual trader borrow it on paper, then the broker is violating SEC rules by practicing “naked shorting.” While naked shorting is illegal, e-brokers are known to

violate it all the time. Data show that brokers still allow traders to do naked shorting.

How responsive are online trading systems to SEC rules and regulations? Could users of these systems be allowed to break SEC rules and regulations or does the system stop them from breaking the rules or doing anything illegal? The question is: how are online trading systems keeping up with these SEC rules? Does the trading system inform you if you are violating SEC rules or not?

Systems Reliability

The speed cycle of the trading process is assumingly faster today than it was in the late 1990s with the significant jump of retail traders joining the online trading scenario. The sheer volume of trading may be taxing the trading system of different brokers and also the systems used by different ECNs. The research initiative intends to find out how reliable the systems are.

Dogsofthedow.com posts certain feedback from users of online systems. Some of the feedbacks citing technical problems with online brokers are as follows:

After 2 months of technical issues I have closed my account today. I have lost several thousands of dollars in one day because the price of a particular stock that I shorted...was not at current prices but the day before.... I have filed a fraud complaint on April 20, 2004 with the SEC.”

I've had an account with [xxx] since Oct 2002 and have seen a steady decrease in online reliability. Emailed complaints are answered with form letter responses and after hours trading seem to be farther and farther over the horizon. The problems seem to stem from poor technology implementation and overwhelming the systems with new subscribers before adequately architecting for the heavier load.

From firsthand experience, the research intends to discover how frequent the systems go down and how fast the brokers can bring their systems back running again.

CASE DESCRIPTION

Case One: E-Broker One

E-Broker One (*real name of company withheld*) was launched in 1996 as a discount online brokerage firm, and it quickly gained popularity with its guaranteed one minute execution in 1999. E-Broker One has survived the tight competition among deep discount online brokers. E-Broker One has incorporated new changes into their systems from 2002–2006 which allowed it to offer a system unique to other systems. Over the years, the E-Broker One's system has evolved from a simple transaction processing system to a system that includes several new capabilities.

Order Process Flow

The E-Broker One's system offers three choice of routing orders: (1) INET system, (2) Supermontage, one of NASDAQ's stock market trading systems, and (3) Market Maker, the order gets redirected to a Market Maker handling the particular stock being traded (see Figure 2).

For traders, INET and NASDAQ's Supermontage provide more transparent order routing flows. INET and NASDAQ have their own Web-based system for reflecting orders in real time. So, traders can immediately validate that their orders are posted. Figure 3 shows streaming quotes from INET. The Market Maker route is less transparent because, as most traders know, market makers have notoriety for manipulating trades.

In the E-Broker One trading system, once you choose to place your order in INET e-trading system (an ECN), the INET system has a program,

Figure 2. Three order routing for E-Broker One

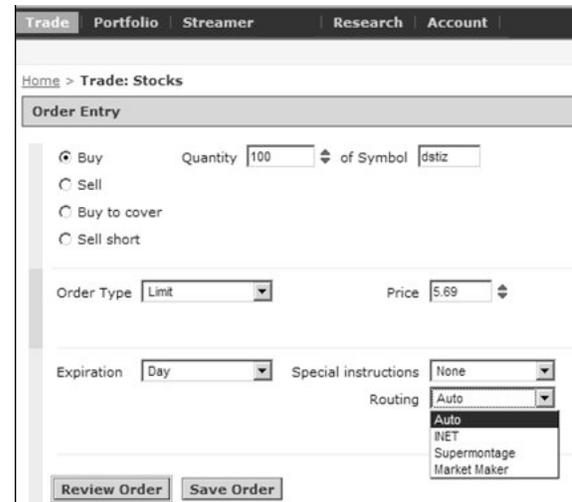


Figure 3. Java Applet showing real-time buy/sell orders



both Java and HTML-based, that will immediately reflect your buy or sell order (see Figure 3).

For traders, it is an instantaneously gratifying experience on their part to see that the order they placed via an online broker's system is reflected immediately in ECNs like INET. The order flow then becomes very transparent and credible.

The transparency of the order flow insures that there is no arbitrage by e-brokers, and that

orders are executed directly by the ECNs trading system.

Niche Market

The E-Broker One system has a couple of tools that are not found in any other e-brokerage firms. One of them is a tool called Quotescop. Even if a trader is looking at NASDAQ Level II data, it still takes some time to figure out dynamic mov-

ing order volume on the buyer and seller sides. Quotescop provides a more graphic representation of both price and volume. Figure 4A shows how Quotescop depicts the buying forces on the left side of the pie and the selling forces on the right side of the pie. And traders can also see the prices where most buyers and sellers are putting their trades.

Quotescop is a tool that extracts real-time trading data and converts that data into a real-

Figure 4a. E-Broker One's Quotescop: a visual representation of volume

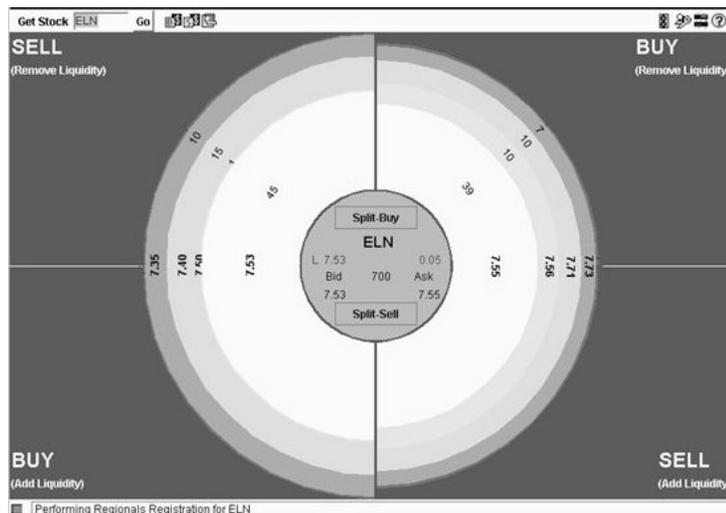
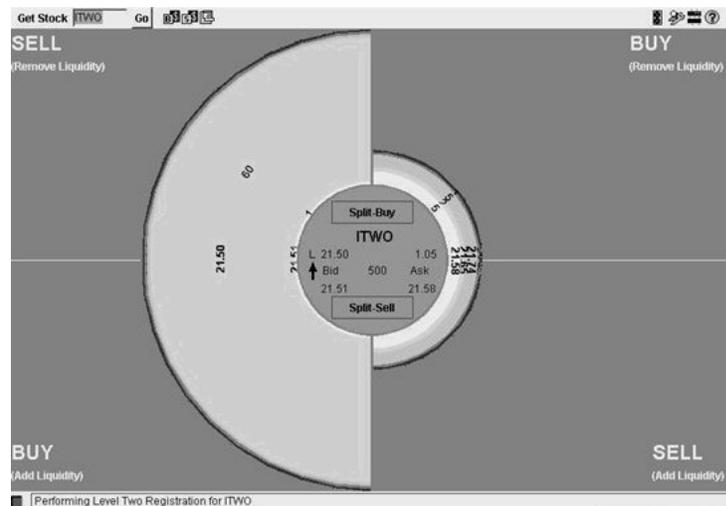


Figure 4B. Quotescop depicting a bigger left side of the pie due to buying pressure



time graphic representation of the trading volume and price every few seconds. Quotescop is represented by a dynamic pie chart that has two sides. The left side represents the total buyer's volume, while the right side represents the total seller's volume. The volume at each price level is also represented in different colors. It allows traders to make a quick decision to either buy or sell stocks. In Figure 4A, the buying and selling pressures are seen as almost equal forces with the left and right sides of the pie almost even. However in Figure 4B, the buying force (the left side of the pie) is seen as more powerful than the sell side (the right side of the pie).

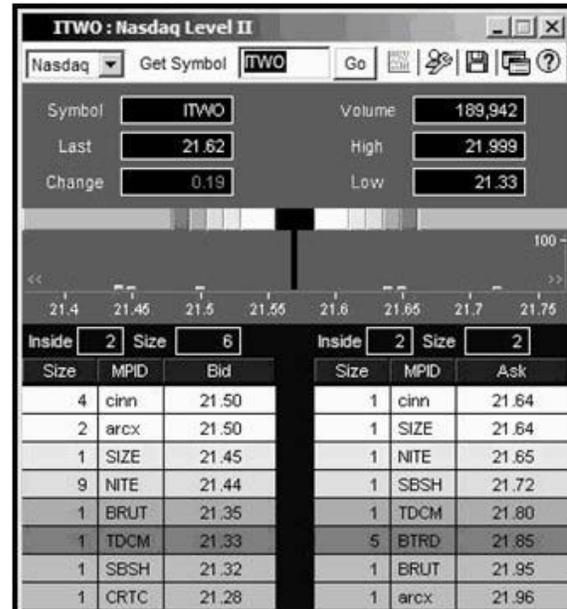
Monitoring the buying and selling volume at different price levels in Quotescop is much more simplified with the fast changing graphic format than watching NASDAQ's level II. However, NASDAQ Level II, which E-Broker One also provides, gives traders a sort of microscopic tool to determine the market makers' buying and selling activities. E-Broker One's NASDAQ Level II interface is shown on Figure 5.

For traders, NASDAQ Level II information is important because it lists different market makers who may be scalping for stocks at cheaper prices and selling them a few cents higher. NASDAQ Level II also gives some hint if certain market makers are manipulating prices by dumping a huge amount of share at higher prices, only to buy them back at lower prices. After all, playing the stock market is like a poker game and the more information that is transparent, the better for traders.

Trade Trigger is a feature that E-Broker One introduced in 2004 (Figure 6). This is one of the more advanced automatic programs made available for retail traders. Programmed trading is not new for the professional trader; however E-Broker One has brought it to the mainstream.

E-Broker One's trade trigger can be programmed to buy and sell stocks based on stock or major index movements. For example, if the Dow Jones index loses 50 points, a trader can

Figure 5. E-Broker One's NASDAQ Level II interface



automatically sell stocks. Or if the NASDAQ falls below the 2000 level, then a sell trigger can be activated. Figure 6 shows the Trade Triggers interface of E-Broker One. Not only can a trader set trades based on index movements, but a trader can set trailing stops. Trailing stops are important when a trader wants to trigger a buy or sell order that trails price movements dynamically.

For example, if a trader bought a stock at \$7.00 and it is now \$7.85. The trader may decide that his target is to sell it at \$8.00. However, he is thinking that it may still go up to \$8.50. With other online trading systems that only give an option to buy/sell at market or limit price, the trader has no recourse but to set his sell order at \$8.00. With trailing stops, the trader can set a trigger to sell at \$8.00 or even higher. For example, the stock hits \$8.00 but continues to go up to \$8.10, \$8.20, \$8.30, or \$8.60. The trader can set a \$0.10 trailing stop, so when the stock keeps on going up, the stop sell order also follows it going up. If the stock suddenly goes up from \$8.00 to \$8.60, the

trailing stop follows it \$0.10 behind. If the price is at \$8.60, the trailing stop should be at \$8.50, while at \$8.40 the trailing stop is \$8.30. Now when the stock does not go up anymore and starts to fall down from its high of \$8.60 to \$8.50, the sell order is executed at \$8.50. The trailing stop halts when the price movement does not go higher.

Trailing stops also work for buying stocks. If a trader wants to buy a stock at \$7.50, the trader can set a trailing stop so that if the stock falls down to \$7.00, he could buy it at a lower price. Trailing stops are useful if a trader cannot monitor the trading screen all day.

Although E-Broker One charges \$10.99 per trade, free access to Quotescope, NASDAQ Level II, and Trade Triggers tools actually puts them cheaper than other e-brokers.

Lastly, E-Broker One also caters to traders on the go. They have a WAP-enabled Web site for wireless devices such as Palm Pilots, Blackberries, and mobile phones that have Internet access. The simplified interface for mobile devices is seen in Figure 7.

Figure 6. Trade triggers

Home > Trade: Create Trade Triggers

Create View

Specify a market condition, then create an order or an alert that will trigger once that condition is met

When this condition occurs:

Stock Index

Index: Condition: Operator: Amount:

Do the following:

Trigger an order Trigger an alert

| Action | Quantity | Symbol | Order Type | Price |
|----------------------------------|----------------------|----------------------|------------------------------------|----------------------|
| <input type="text" value="Buy"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="Limit"/> | <input type="text"/> |

Expiration:

Send an email notification to:

Set this trigger to expire on: (up to 60 days from today)

Notify me days before this trigger expires.

To summarize the usefulness of these tools:

- Quotescope and NASDAQ Level II are excellent tools for daytrading and swing trading because traders can make better decisions with how information is presented to them in real time, thereby enabling them to make quick decisions to sell, hold, or buy.
- Trade triggers are good tools for all non-day-traders because it allows investors and traders to automate the trading for them in ways that other online systems do not offer.
- E-Broker One seems to have a well-balanced system as it provides diverse tools that cater to the needs of different types of investors and traders.

SEC Ruling

E-Broker One has one of the more comprehensive help information for SEC rules (Figure 8). While its system does not automatically stop traders from violating SEC rules, their information is extensive and well organized regarding the rules.

For new traders who feel that it is too cumbersome to read through voluminous amounts of information in the Help Center, this is still not the best solution for SEC violation avoidance.

Figure 7. Trading on the go

| Tools | Help |
|---------------------------------|---|
| Login | Advanced Stock Order Help |
| Quotes | Action: <input type="text" value="Buy"/> |
| Symbol Lookup | Quantity: <input type="text" value="100"/> |
| Market Info | Symbol: <input type="text" value="intl"/> |
| Open an Account | Terms: <input type="text" value="Limit"/> |
| Advantages | Good For: <input type="text" value="Day"/> |
| Terms | Special: <input type="text" value="No Special Instructions"/> |
| Help | Price: <input type="text" value="10.50"/> |