

# **An Overview of Financial E-Commerce**

Dannel Te-Shan Wang  
Graduate Business Administration Program  
California State Polytechnic University - Pomona

Shin-Herng Chu  
California State Polytechnic University - Pomona  
Finance, Real Estate, & Law Department  
mchu@csupomona.edu

Drew Hwang  
California State Polytechnic University – Pomona  
Computer Information Science Department  
chwang@csupomona.edu

## **Abstract**

This study examines the benefits and problems arising from the electronic brokerage services and the electronic investment banking processes. Some important benefits of the electronic financial services include greater transparency, more unprecedented opportunities for innovation and competition increase in trading volume, and creative methods for risk reduction. Problems about online broker-dealers and electronic investment banking include lack of direct contact between investor and broker, and glitches in the technology that inconvenient the end users. In the equity market, the channel of distribution through online IPO is limited when compared to traditional public offering through underwriters.

One important problem with financial e-commerce is the security and privacy problem. The security issue of online trading business can be divided into two parts: hardware security and software security. Hardware security problems involve network corruption, system crash, communication problem between networking servers and execution servers. Software security problems involve hacking, insider fraud, and account information theft. Brokerage firms use multiple security mechanisms to deal with these problems. These security mechanisms include: (1) Account and password control. This is the basic security control. (2) Encryption of transaction data. Transmission of data online always involves security flows.

Government as well as online financial service providers needs to take responsibilities to educate and communicate with investors to help them understand the benefits and risks of electronic financial services. To create a healthy investment environment is also vital to the future development of an electronic equity market.

## **1. Introduction**

Today, the Information Technologies have achieved wide spread acceptance as one of the means to allow an organization to improve efficiency and productivity, to

become more responsive to the changing market in which it operates by developing, producing, and selling new products and to provide better levels of service to its customers. The Internet and the electronic data processing have also made a considerable impact on the financial industry. These technological advances change the ways of doing business in the financial markets.

One of the most successful examples of electronic commerce in financial markets is the electronic brokerage service. In particular, the electronic on-line ordering system (e-trading) has increased the efficiency of information flows and the trading process. The official trading hours can no longer limit security traders; investors are able to trade in global equity markets across different time zones, which may enhance their liquidity position. The electronic investment banking process is another example of electronic commerce that affects the traditional underwriting business. When raising capital, issuing companies can avoid underwriting spread and directly access capital markets through on-line initial public offering.

The purpose of this study is to examine major issues that are related to the e-commerce in the financial markets. We will examine the benefits and problems arising from the electronic brokerage services and the electronic investment banking processes. This study will also address the security and privacy problem, which is an important limitation to the development of financial e-commerce.

## **2. Advantages and Disadvantages of Electronic-trading and Investment Banking**

### **2.1. Advantages of the Electronic-Trading System**

The electronic trading of securities on the web has dramatically increased. Over the past few years, on-line securities sales went from zero, to more than a third of all retail trades [1]. Mutual funds have also taken a prominent position on the Internet, moreover, web-based

advisory services are provided. The benefits of the electronic trading include:

*(a) Operational Capability and Efficiency are Increase*

In the 1960s, many broker-dealers choked on the vast streams of paper flooding their back offices. It violates the SEC anti-fraud provisions to accept or execute any order for the purchase or sale of a security, if the broker-dealer do not have the personnel or facilities to enable it to promptly execute and consummate all of its securities transactions<sup>1</sup>. This is no longer a problem with the new information technologies; however, the network and server's capability are of concern. The good news is servers and networking bandwidth are less costly and their prices could only go lower in the future.

Most broker-dealers use powerful microcomputers to support their market making and brokerage functions. These workstations allow individuals to simultaneously perform multiple trade support functions, such as order management, monitoring net long or short positions in specific securities, calculating profit or loss real-time, analyzing risk and receiving market data [2]. Other trade support functions include trade reporting, records of completed transactions, links to back-office systems and order routing to various execution points. In addition, some broker-dealers provide order transmission capabilities to their registered representatives, correspondent broker-dealers or customers to permit them to electronically transmit all relevant information concerning an order to the broker-dealer's trading desk.

*(b) Cost Efficiency*

Since the whole trading process mainly concerns with the information flow, the difference between traditional trading and electronic-trading is the change of intermediary. Electronic trading technology is cost efficient, the start-up costs as well as the operating costs are lower than the traditional trading system. Electronic trading technology changes the dynamics of the marketplace. It removes at least three physical constraints imposed on markets. First, the physical space constraint no longer exists. The floor members on the tradition stock exchange have time and place advantages over those off the exchange floor in the past. With the electronic trading system, investors trade in the cyberspace, time and place advantages of the floor member become less significant.

With Internet and the e-trade system, investors can (1) place their orders anytime anywhere with Internet connection, (2) get instant information of their investing objects and also get the full information service from the online brokerages, and (3) lower their trading cost [1]. The lowering trading cost is evident from Graph 1.<sup>2</sup> The commission on a per share basis decreased from 8.1 cents in 1991 to 6.2 cents in 1998 for exchange-listed stocks, and from 7.4 cents in 1995 to 6.3 cents in 1998 for over the counter stocks. The electronic trading process plays

an important role in the reduction of trading commissions. For investment companies and brokerage firms, they could (1) increase their appearances though Internet, (2) attract the Internet age customers to broaden their customer base, and (3) decrease the management and human resource cost would be decreased [1]. In addition, Electronic trading reduces the transaction cost, especially in high volatility stocks. This is evident from Graph 2.<sup>3</sup>

*(c) Better Information Dissemination*

In 1996, an estimated 30 million households owned a personal computer (or about 25% of all households in the country)[3]. A 1995 survey showed that ownership of personal computers among mutual fund shareholders exceeded the national average<sup>4</sup>. The growing use of personal computers and the Internet by the public has not been lost on the financial services community. A recent list of investment management firm web sites includes over 200 entries [4].

Through Internet, investors can easily obtain information from the market listed companies, on-line brokerage firms, on-line financial advising service companies and etc. Any information disseminated through Internet is instant. Investors may subscribe to a variety of services offering access to real-time market data, company profiles and earnings reports, mutual fund data, and news services over the Internet. In addition, most of the leading commercial on-line services receive data feeds from information vendors and provide such information to their clients.

The exchange-listed companies have aggressively used new technologies to communicate with their shareholders, as well as to deliver prospectuses and other required information to shareholders. Investment companies use new technologies to provide their shareholders with the opportunity to communicate with them electronically. The on-line brokerage firms provide financial advices, trading reports, market status and some other information services to their customers easily through electronic medias. With enhanced information dissemination technology, markets become more efficient.

*(d) Better Customer appeal and focused marketing*

With information technologies, financial institutions can analyze their clients' trading behavior, understand and better satisfied their needs. The electronic trading system will improve customer appeal. Market participants can be geographically dispersed since they don't have to be located on the premises. Electronic trading technology allows foreign investors to access the U.S. equity markets.

Many companies believe that Internet technology offers a valuable forum for communicating with current and potential shareholders [5]. According to a National Investor Relations Institute ("NIRI") survey, over 95% of companies with over \$1.5 billion in market capitalization,

<sup>1</sup>L. Unger, "Technology and Regulation The Road Ahead" <http://www.sec.gov/news/speech/spch343.htm>

<sup>2</sup>Graph source: Greenwich Association

<sup>3</sup> Graph source: Plexus Group, 1999

<sup>4</sup> Gavis, "Investment Company Institute, Fundamentals, Mutual Fund Research in Brief, 1995

and over 75% of companies with under \$1.5 billion in market capitalization, either already have or soon plan to establish a web site.

*(e) Market Without Boundary*

The electronic trading made possible a more efficient global equity market. Investors can hedge their investments in different stock markets worldwide. For instance, small investors can buy British Telecom's ADR in NYSE and hedge this investment by selling British Telecom in LSE. Cross-border equity flows have increased dramatically. Gross cross-border equity transactions, including all foreign purchases and sales of corporate securities in the United States, increased from under \$93 billion in 1980 to over \$1.5 trillion in 1994<sup>5</sup>.

## **2.2 Disadvantages of the Electronic-Trading System**

Although electronic trading system provides many benefits to the capital markets, relative to the traditional trading system, it is not without shortcomings. A major disadvantage of the electronic trading is the service quality is not as good as traditional trading. The e-trade system lacks interpersonal communications. Security advising is one of the responsibilities of a broker-dealer. For the unskilled investors, they may need assistance from brokerage firms' professional advices; the e-trade system is not able to provide face-to-face consultation. In addition, because on-line brokerage firms use e-trade system to lower their costs, they may not hire enough employees to deal with emergent difficulties.

Today, complaints against online broker-dealers include (1) brokers fail to process orders or delay their execution and investors experience difficulty in accessing their accounts or contacting their brokers; (2) brokers making errors in processing orders, in account records, or investors experiencing execution problems. Most of these complaints against online brokers involved glitches in the technology.<sup>6</sup>

## **2.3. Advantages of Electronic-Investment Banking**

Raising capital on-line has clear benefits, for example, it is quick and broad in dissemination of information. The Internet provides companies direct access to a huge pool of investors and prospective investors. The Internet enables a company to distribute its offering materials to the broadest possible audience and to solicit interest in its securities without regard to location. This has proved a boon for new businesses without an established investor base as well as for established corporations seeking to leverage their name recognition on a global basis.

The use of electronic media to disseminate offering materials has some obvious economic advantages. It can reduce costs associated with the capital formation process, printing and distribution costs as well as advertising and promotion expenses. Electronic offering materials can also be supplemented and updated more efficiently and economically. These savings have significantly reduced the cost of capital, particularly for smaller businesses where such costs take a significant part out of the total offering proceeds.

One of the common complaints about underwritten offerings is the imprecision of the pricing process. In order to ensure the complete sale of securities, the lead underwriter and the investment bankers may under-price the offering securities to attract investors. One way to eliminate the under-pricing in the initial public offering process is to use the online "auction" pricing approach. In theory, this auction process should result in the maximum amount of offering proceeds for the company, while ensuring a more equitable distribution of offering shares.

## **2.4. Disadvantages of Electronic Investment Banking**

Most concerns involved in online initial public offering (IPO) are around three subjects: channel of distribution, liquidity issue, and education of participant investors. Underwriters normally acted as a "gatekeeper" in the security offering process. They conduct due diligence about the issuer and the offering, participate in preparing the registration statement, make pricing decisions, and provide research and aftermarket support. Without an underwriter, investors must rely on the issuer to carry out these responsibilities. Issuers would also retain sole liability for material omissions and misrepresentations. Compare to traditional public offering, online public offering can't provide as the same quality financial services and disclosures as traditional ones.

The channel of distribution through online IPO is limited. The purpose of public offering is to distribute securities to the public investors. However, it is difficult for online public offering to do the "massive" distribution. Currently, the online underwriting accounts for two percent of all initial public offering capital. According to the survey of Credit Suisse First Boston Technology Group, until year 1999, there were only five online underwriting players in the online underwriting business.

For the online public offering market, because of the small percentage of whole underwriting market and distribution problems, the issuing shares in the market are scares. Moreover, because participant investors are relative fewer than the traditional public offering, liquidity is reasonable lower than traditional ones. Until Internet-based services develop established customer bases and access to a liquid market for secondary trading, they pose little threat to traditional investment banks.

---

<sup>5</sup> U.S Treasury Department.

<sup>6</sup> Laura Unger, "Investing in the Internet Age: What You Should Know and What Your Computer May Not Tell You", <http://www.sec.gov/news/speech/spch342.htm>

### 3. Security and Privacy Issues

There are limits and challenges of new web-based information technology to equity market. Among them, the most important one is the security issue. Investors would only invest their money in a secured environment, and this privacy concern applies to the entire e-commerce. In this section, we will discuss the current security mechanisms for the online investment, the tools and applications that online brokerage firms use to protect their customers, and we will also discuss the privacy issue.

#### 3.1 Privacy and Security Issues

Approximately thirty broker-dealers currently offer online trading. Most of these are discount brokers, and they offer a substantial discount on commissions for their clients [6].<sup>7</sup> The number of firms offering on-line trading will continue to grow, as compliance and security problems being resolved. Most broker-dealers require their customers to use an Internet browser that supports encryption, assuming this level of encryption to be sufficient to protect their information flows. Therefore, how to ensure the security in the online trading environment is important for the online brokerage firms to attract the perspective customers.

The security issue online trading business can be divided into two parts: hardware security and software security. First, hardware security problems involve network corruption, system crash, communication problem between networking servers and execution servers [1]. Among them, network corruption and system crash are mainly relates with online brokerage firms' systems capacity. The communication problem between networking servers and execution servers is mainly related to how brokerage firms manage their information systems. Today, with the advanced network technology, cost of bandwidth and processing devices is low and they are no longer serious concerns.

Software security problems involve hacking, insider fraud, and account information theft [1]. Brokerage firms use multiple security mechanisms to deal with these problems. These security mechanisms include: (1) Account and password control. This is the basic security control. (2) Encryption of transaction data. Transmission of data online always involves security flows. In order to ensure the integrity and confidentiality of data, the following mechanisms are used:

(a) *Secured Socket Layer (SSL) & Transport Layer Security (TLS)*

SSL/TLS providers a range of security services for client-server session. This security mechanism can provide server authentication, confidentiality, integrity, and client authentication [6]. By implementing SSL/TSL, brokerage firms can ensure that third party will not manipulate orders made from their customers. In

addition, with client authentication feature implemented, brokerage firms can ensure the source of orders.

(b) *Data Encryption Standard (DES)*

DES was adopted by United States federal standard in 1977.<sup>8</sup> DES is a block cipher operates on 64-bit blocks of data and employs a 56-bit key. DES can also ensure the integrity of transmitted data [6]. The demise of DES as a cryptosystem suitable for commercial use resulted primarily from its comparatively small key space.

(c) *Firewall*

Firewall is the most powerful and commonly used mechanism for online security. It is a system that enforces access control policy between two networks. The firewall determines which inside services can be accessed from the outside and vice versa. The firewall can be thought as a pair of mechanisms: one to block traffic and one to permit traffic. The firewall system performs like a guard watching the network traffic.<sup>9</sup> Firewall can provide can effectively prevent network intrusions and hacking.

### 4. Conclusion

While the full effect of recent technological developments remains to be seen, these developments have significantly changed the ways in which many investors obtain information about their investments and conduct financial transactions. Overall, recent advances in technology have brought greater transparency, provided unprecedented opportunities for innovation and competition, facilitated tremendous increases in trading volume, and made possible the development of methods to reduce risk. There are many benefits the information technology brings to the equity market, both for trading and investment banking.

The effective use of technology is the key to maintain active and competitive equity market. Technology has infused our equity market and its participants with a new and greater drive to compete. Equity market is being challenged every day to reexamine their business models, to reevaluate their services, and, in some cases, to reinvent itself. The pace of change and the strength of the securities markets generally have enabled investors to more directly participate in the securities markets.

Online brokerage has significantly changed the dynamics of the marketplace, causing one of the biggest shifts in individual investors' relationships with their brokers. It provides investors with tools to analyze information, and to act quickly on this information. Investors who use the online investing tools need to be more educated. Government as well as online financial service providers needs to take responsibilities to educate and communicate with investors to help them understand

---

<sup>7</sup> Merrill's Mixed Up Internet Trading Strategy, Bank Technology News, June 1997.

---

<sup>8</sup> U.S Department of Commerce, Data Encryption Standard, Federal Information Processing Standards Publications FIPS PUB46

<sup>9</sup> Source: 3com Co., "Network Security", 2000.

the benefits and risks of investing online. To create a healthy investment environment is also vital to the future development of an electronic equity market.

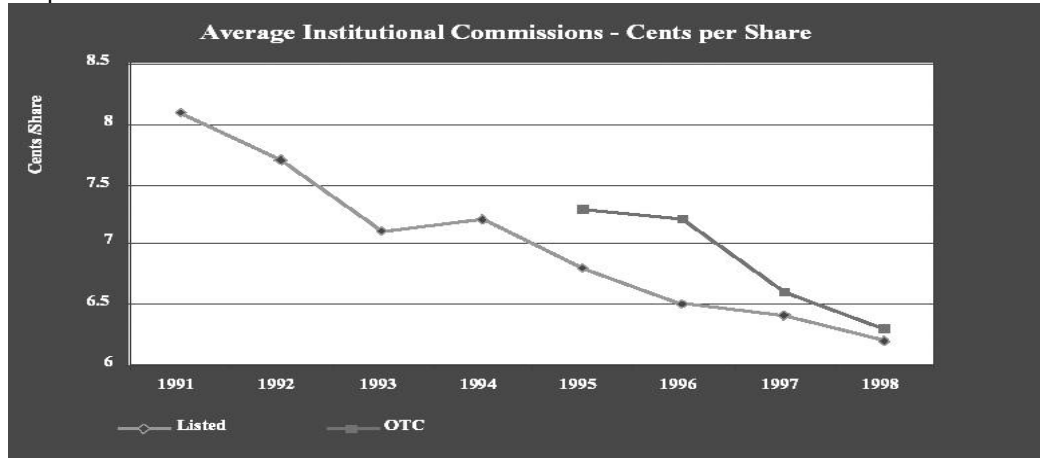
### **Reference**

- [1] Yungi Chen, Junghao Huang, “ Internet Security Trading”, 1999.
- [2] Kathryn George, “To Build or to Buy a New Trading System”, *Traders Magazine*, Feb. 1997.

- [3] Robert A. Robertson, *Personal Investing in Cyberspace and the Federal Securities Laws*, 1996.
- [4] Cliff Alexander, “Compliance in Cyberspace”, *The Investment Lawyer*, June 1997.
- [5] Rivel Research Group, “Utilizing Technology in the Practice of Investor Relations” Aug 1999.
- [6] Ford, Warwick, and Michael S. Baum, “Secure Electronic Commerce”, second edition, 2000.

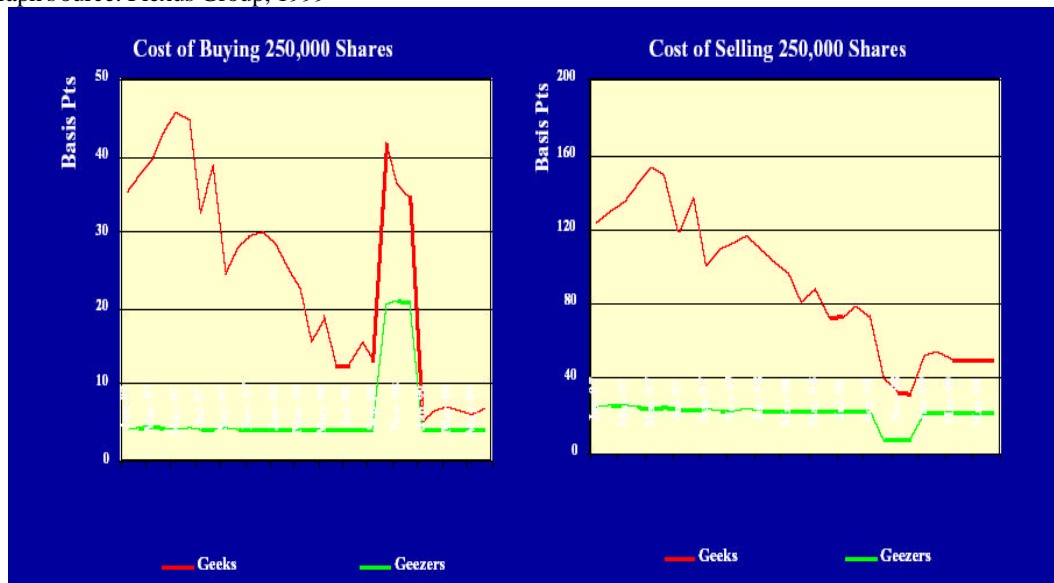
Graph 1 Average Trading Commissions

Graph source: Greenwich Association



Graph 2 Transaction Costs of High Volatility Stock

Graph source: Plexus Group, 1999



Geeks: Amazon, AOL, Lyco's, Netscape and Yahoo.

Geezers: General Electric, Exxon, IBM, Coca-Cola, & General Motors