Information-Processing Costs in Online Stock Trading

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INTRODUCTION

Perhaps one of the most dramatic examples in the recent growth of e-commerce is online stock trading. In the US, it has been estimated that 15% of all individual investor accounts are Internet-based, and the number of online trading accounts was expected to reach 5.4 million by the end of 1999 (Wall Street Journal, 14 June 1999). This online trading frenzy is now becoming a global phenomenon. According to J.P. Morgan, the number of online trading accounts would rise to 900,000 for six major European countries by the end of 1999 and continue to grow to 8.3 million by 2002 at the rate of 20% per quarter (Financial Times, 4 August 1999). The growth of online stock trading in Asia is equally amazing. For example, in Korea, the volume of stocks traded in cyberspace increased by 234% for the first seven months of 1999 and it was predicted to exceed 35% of the total stock trading volume by the end of 1999 (Korea Economic Daily, 21 August 1999).

However, the recent proliferation of online stock trading raises the question of whether online stock trading provides investors with better benefits than does traditional brokerage-based trading. Konana et al. (1999) posit that it is not yet clear whether online investing can provide lower costs than traditional channels. They focus on the hidden transaction costs in online stock trading and argue that the current transactional arrangements, that are not transparent to the investors, may provide online brokers with incentives to perform opportunistic behaviour such as executing high bid-ask spreads in orders, which increases the overall transaction costs of investors. Indeed, the transaction cost issue is critical in online trading, as it has been central in the development of e-commerce theory (e.g., Bakos 1998).

Compared to the transaction cost issue in online stock trading, the costs incurred to online investors before the transaction – information-processing costs – seem to have received little attention. From the viewpoint of online investors, how to lower the costs incurred before the transaction is an important issue as well. Most online investors have to process information to reach their investment decisions. In other words, they expend mental effort and time to reach a transaction decision. For example, the huge volume of information that has become available online requires that the online investors spend extra time and effort in filtering and summarizing this information, let alone the time and effort in doing their ‘homework’ such as analysing market sentiment. This paper stems from the belief that the costs for individual online investors to process information before the transaction are significant and need to be reduced as well.

Abstract

The recent proliferation of online stock trading raises the question of whether online stock trading provides online investors with better benefits than does traditional brokerage-based trading. Compared to its well-known benefits such as lowered commission costs and convenience, the costs incurred to online investors before the transaction – information-processing costs – seem to have received little attention. Due to the ‘do-it-yourself’ nature of online stock trading, individual online traders have to expend their time and effort to reach investment decisions. More specifically, online investors need to sort out the relevant online information, reprocess it to suit their investment needs, and use the refined information to calibrate their final investment decisions. Depending on an individual investor’s characteristics, the costs to reach their online transactions can vary. For some online investors, the costs can be higher than the savings in online transaction costs, thus making the overall cost of online trading no better than that of traditional trading. From this perspective, this paper describes how information-processing costs in online trading can be trade-offs for the benefits of lowered commission costs by focusing on naïve online investors who have little investment experience and market knowledge and are thus likely to have higher information-processing costs.

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transaction — information-processing costs — can affect the overall costs of online stock trading and trade off the well known benefits of online stock trading such as low transaction commission costs.

In this paper, we refer to investors who make their own investment decisions using online information as online investors. Depending on an individual investor’s characteristics, the information processing costs can vary. The investors who entirely rely on others (e.g., other individual investors, professional advisors) for their investment decisions may not have significant information processing costs to reach decisions. However, with the huge volume of information available with the introduction of online stock trading, online investors who independently make investment decisions using online information may expend considerable time and effort.

As more market information and analysis become available online, it seems natural for online investors to rely more on this information. However, using the abundant online information may not be as cheap as believed. Online information is like a raw material that needs to be processed by individual investors with directed investment plans. Online investors have to process the information at the expense of their time and effort. More specifically, online investors need to sort out the relevant online information, reprocess it to suit their needs, and use the refined information to reach a transaction decision. The amount of time and effort to go through this process varies between online investors. That is to say, for some online investors, the costs to reach their online transaction decision can be higher than the savings in online transaction costs, thus making the overall cost of online trading no better than that of traditional trading.

From this perspective, it is important for both online investors and online brokerage firms to understand what the characteristics of online investors are, how the information-processing costs vary with the investors’ characteristics, and how these costs affect the total cost of online trading. By understanding the effects of these costs, online investors can have a clearer picture of the costs or risks incurred in online stock trading and become more cautious in choosing the right investment method. By understanding these costs and their influence on different segments of consumers (online investors), online brokerage firms can refine their products and services to improve overall consumer satisfaction.

This paper describes how information-processing costs in online trading can be trade-offs for the benefits of lowered commission costs by focusing on naïve online investors who have little investment experience and market knowledge and are thus likely to have higher information-processing costs.

**INFORMATION-PROCESSING COSTS**

Online stock trading can be characterized as ‘do it yourself’ trading. Current online brokers offer an execution service to buy and sell stocks at a low commission rate. Although they also provide market information and research for a minimal price, they do not give online investors advice on what or when to buy or sell. Therefore, most online investors have to be ‘self-directed’: they have to search independently for relevant market information, reprocess the sorted information to suit their investment needs, and decide what, how much and when to buy or sell by themselves.

According to recent polls taken by popular investment information sites such as ‘Motley Fool’ (9 July 1998) and ‘The Syndicate’ (2 November 1998), about 60 to 70% of the participants rely on online sites (including websites, newsgroups and online services like AOL) as the main source for their investment information (Table 1).

Indeed, the online sites provide investors with tons of market research information and business news at virtually no cost. The amount of information now available to online investors is much larger than the information that was available before the introduction of online stock trading. However, this online information varies in quality, importance and relevancy to individual investors’ needs. Consequently, online investors have to collect and filter the information according to their needs. Collecting and reprocessing online information is not an easy task. The variety and volume of online information (i.e., information overload) can overwhelm online investors. Sorting through and summarizing the huge volume of online information from various sources can be costly both in terms of time and mental effort. The credibility of the ever-increasing information is another serious issue to be faced by online investors. They may have to spend extra effort and time to find reliable sources of information. Moreover, investors sometimes need to navigate through several websites to collect information relevant to their needs. Navigation on the web is still not an easy task. Because of poor interface design and navigation aids in

**Table 1. Preferred source of investment information**

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<td>(%</td>
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<tr>
<td>Online sites</td>
<td>Websites</td>
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<tr>
<td>78</td>
<td>45.83</td>
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<tr>
<td>Papers</td>
<td>Online services (i.e., AOL, Prodigy, MSN, etc.)</td>
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<tr>
<td>11</td>
<td>12.50</td>
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<tr>
<td>Television</td>
<td>Newsletters and email</td>
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<tr>
<td>9</td>
<td>10.42</td>
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<tr>
<td>Radio</td>
<td>Usenet newsgroups</td>
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<tr>
<td>1</td>
<td>1.04</td>
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<tr>
<td>Others</td>
<td>Traditional media sources (i.e., Newspapers, TV, etc.)</td>
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many websites, finding the right information often requires substantial time and effort. Slow Internet connections also cost time and cause frustration. Thus, there are many potential problems that cost online investors’ time and effort in collecting, integrating and refining relevant financial information.

After expending time and effort to search for information, online investors need to make important decisions on stock selection, trade quantity and trade timing. Since investment involves monetary risks, the amount of time and effort required for online investors to reach these important decisions is not like that required to buy a bottle of shampoo. Moreover, once online investment decisions are executed in the market they are irreversible. When decisions bear irreversible and significant results, decision makers tend to consider more information and use more complex and analytical decision rules, thus spending more time and mental effort on the decision (Ford et al. 1989).

Even when online investors have detailed pictures of what and when to buy or sell, they may spend time and effort to calibrate their purchase timing, quantity and price once again before they hit the transaction button. Especially when the market is very volatile, deciding the timing and the price of a limit order may not be simple. To place an order at a better price, online investors may have to check the market more frequently, thus spending more time in front of their computers. In addition, compared to the delayed-time quotes, the real-time quotes available to online investors can convey the real market volatility instantly, thus often causing more stress to investors (for information on decision-making under real-time situations, see Brehmer 1990).

Figure 1 shows how information-processing costs can be trade-offs for the benefit of lowered commission costs. Generally, the traditional commission schedule is a minimum fee plus a percentage of the total value of the transaction (Dasgupta 1998). Line A shows this traditional commission schedule. In online stock trading, the commission schedule is very simple – usually flat regardless of the total transaction value. The flat line B shows the online stock trading commission schedule. The area between lines A and B represents the benefits gained from the lowered commission cost. Line C is the cost schedule of online trading after information-processing costs are added. The slope of Line C can be positive because, as the amount of money involved in a transaction increases – with the result that the transaction becomes more significant – so does the cost of information-processing. Thus, if these information-processing costs are substantial, the area between lines A and C will be small. On top of this, if the unobservable transaction costs, compounded by the online brokers’ opportunistic behaviour (Konana et al. 1999), are also substantial, the overall cost of online trading can be as high as that of traditional stock trading.

Part of the information-processing cost is often transferred to a third party. For example, when an employee (online investor) processes market information for his/her trading purposes during work hours, the time spent on this activity is transferred to the employer who is likely to bear the costs in the form of reduced productivity. In addition to the transferred costs, the employer may bear additional costs for monitoring its employees. The recent phenomenon of ‘stockholics’ (e.g., New York Times, 20 May 1999) – people who are addicted to online trading – can grow to be a serious social and economic problem.

![Figure 1. Effect of information-processing costs on the benefits from the lowered commission costs in online stock trading](image)

**NAÏVE ONLINE INVESTORS**

‘Self-directed’ online investors can be grouped by a number of characteristics: frequency of trading, size of trading, wealth, computer (Internet) literacy, investment experience, financial knowledge and time constraints. The amount of time and effort spent on information processing will vary with these characteristics of online investors. For example, investors who are comfortable with navigating through websites will be able to search for relevant financial information more effectively than those who are poor at Internet use, thus saving their time and effort in processing the available information.

In their case study on E*Trade, Glew et al. (1998) found that, at the time of the study, typical E*Trade customers had previously been discount or deep-discount customers, thus used to make their own investment decisions. They traded frequently in high volume, had above-average income, had a high educational level, and were thus comfortable with PCs and financial investments. This demographic analysis shows that the early adopters of online stock trading seem to have had incentive to transfer their investments to the cyber accounts.

However, not all online investors have good qualifications like those listed above. Recent bullish stock markets, low commissions and increased familiarity with PCs are attracting investors into online stock trading. The amazing success stories of ordinary people in online stock trading (e.g., depicted in the TV commercials on E*Trade) and peer pressure as more people jump into online trading are pushing new investors into the fiercely competitive financial market. The exponential growth of online stock trading indicates that many people who are different from the highly qualified early adopters have also joined online stock trading.

A recent poll taken by ‘The Syndicate’ (30 November 1999) shows that more than half (52.67%) of the online
traders consider themselves to be novices or beginners in investments. Although this poll does not represent the entire online trading population, many current online investors can be referred to as naïve investors who lack experience or knowledge or both in financial investments. The information-processing costs for these naïve investors are likely to be higher than those of more advanced investors for the following reasons. First, since naïve investors do not have sufficient experience and/or knowledge of investments, it will be difficult for them to judge which information is relevant in a particular market situation. Therefore, when they encounter the huge amount of online information, they cannot easily find and sort out the right information. Second, due to the lack of investment experience, even with the relevant information, they are likely to have difficulties in combining or summarizing information to establish their investment decisions. Therefore, they are likely to expend more time and effort than experienced investors to reach their final decision. There is a body of evidence that people who lack declarative knowledge (domain-specific knowledge) and procedural knowledge (capability to apply domain-specific knowledge to produce solutions) tend to be slower in reaching a solution, regardless of the quality of the solution (Larkin et al. 1980). They also tend to need more information than experts in evaluating a problem (Johnson 1985). An experimental study on financial problem solving by Hershey et al. (1990) shows that novices attend to more information than necessary to solve the problem, thus spending more time to reach a solution. Third, they are more vulnerable to misleading rumours and information. For naïve online investors, information reliability is a serious issue. Because they lack knowledge and experience in investments, they have to spend more time and effort finding reliable information sources and improving their capabilities to distinguish correct information. Based on this discussion, the information-processing costs for naïve online investors are likely to be substantial.

In summary, due to the substantial information-processing costs, for naïve online investors the benefit from the lowered commissions will shrink substantially.

SUMMARY AND IMPLICATIONS

This paper describes how information-processing costs can reduce one of the well-known benefits of online stock trading – lowered commission costs. Information-processing costs vary with the characteristics of online investors. The costs can be higher for naïve online investors who lack experience and knowledge in investments. According to a recent New York Times survey (16 May 1999), one common trait among online investors is that the Internet emboldens them to take greater risks. The bolstered confidence of naïve investors without the support of proper information-processing skills may lead them to pay for a very expensive, irreversible lesson. From the strategic perspective of retaining longer business relationships with customers, online brokers’ ‘hand-holding’ services will be desirable. This further implies that online brokers may need a differentiated marketing approach depending on the characteristics of their customers. Online brokers can provide these naïve investors with ‘hand-holding’ services that can help them learn an efficient way of processing various kinds of information. For example, online brokers can provide customers with more personalized and directed market information and analysis so that they can minimize wasted time and effort. Some online brokerage firms have now started to provide educational web pages for novice online investors (e.g., Ameritrade). Maintaining the trust level inside chat rooms will be also helpful, since naïve customers can be exposed to possible fraud. For example, ‘Motley Fool’ (www.fool.com) runs a poll evaluating the quality of the opinions shown in their readers’ b-board.

Online stock trading brings online investors convenient and rapid access to a wealth of online information and the market. However, ironically, this can increase the information-processing costs of online investors. Now online investors can access some market/company information that was otherwise expensive in the past. Because of these restrictions – substantial cost and difficult access – the breadth of information available to individual investors was limited in the past. Since more information is now available online for free, online investors have more information to process to reach their investment decisions. In addition, because of the convenience provided by online stock trading, now online investors can spend more time in tracing the market and analysing companies. Recent trends of extended online trading hours keep many investors in front of computers even at the expense of their leisure time. International stock trading over different time zones can increase the information-processing costs in the form of fatigue and reduced productivity. Decision-making under real-time quotes can also increase the stress level of investors.

Based on the discussion of information-processing costs, it is difficult to conclude if online stock trading is a cheap, convenient way of trading. This paper proposes that more research attention should be paid to information-processing costs. Future research should be extended to find out what specific factors may influence online investors’ information-processing costs, how these factors are related to investors’ personal characteristics and how information-processing costs can be reduced to make online stock trading more efficient. Despite the potential influence of information-processing costs on the overall cost of online stock trading, little empirical work has been done. More empirical work is needed to discover the characteristics of online investors, to understand their behavioural patterns, and to validate the methods for reducing information-processing costs in online stock trading.
References


