WILL STOCK INVESTORS USE MOBILE STOCK TRADING? A BENEFIT-RISK ASSESSMENT BASED ON A MODIFIED UTAUT MODEL

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ABSTRACT

The purpose of this study is to investigate the determinants of stock investors' intention towards using mobile stock trading. Based on a modified UTAUT (unified theory of acceptance and use of technology) with risk perceptions, a comprehensive research model was proposed. An empirical survey with a valid sample of 329 stock investors was conducted in Taiwan to test the research model. The analysis results of PLS reveal three positive determinants (i.e., performance expectancy, effort expectancy, and social influence) and three negative determinants (i.e., security risk, economic risk, and functional risk) that significantly influence stock investors' behavioral intention to use mobile stock trading. Furthermore, the results of moderating effect analysis indicate that gender differences moderate the effects of social influence on behavioral intention to use mobile stock trading, while age differences moderate the impact of effort expectancy on mobile stock trading use intention. This implies that to facilitate the intention to use mobile stock trading, securities firms need to consider stock investors' technological perceptions and risk perceptions of this type of trading. The findings of this study not only have important implications for m-commerce research, but also provide insights for securities firms and developers of mobile stock trading systems.

Keywords: M-commerce, mobile stock trading, UTAUT, perceived risk, information technology adoption

1. Introduction

Facing a highly competitive business environment, securities firms have invested heavily in information technology (IT) to enhance their competitive advantage [Allameh & Jafari 2010; Hameed et al. 2010]. Recently, mobile stock trading, an innovative transaction platform allowing stock investors to trade via mobile devices, has been implemented by most securities firms to enhance customer (i.e., stock investor) service. The development of mobile stock trading has followed on from Internet stock trading, which, in turn, followed on from self-service stock trading. While similar in many respects to Internet-based stock trading, mobile stock trading provides stock investors with specific benefits, such as real-time financial market information, account inquiries, and mobile trading without human brokers regardless of the investor's location [Cruz et al. 2010; Koenig-Lewis et al. 2010; Shen et al. 2010].

Despite the tremendous growth and future potential of mobile devices and the mobile Internet, mobile stock trading is still in its infancy, leaving a great deal of room for development. However, the nature of mobile devices[2] generates several limitations for the use of the mobile stock trading service. First, mobile device screen size is small with limited display resolution. Second, compared with a computer, data entry via a mobile device is inconvenient. Third, system functions and interfaces are simplified. Fourth, mobile device power is limited, making it difficult for

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[2] The transaction platform of mobile stock trading is a mobile device. Since the mobile phone is the most popular mobile device and has high penetration rates throughout the world, we focus on the mobile stock trading conducted through mobile phones.

stock investors to monitor stock market for extended periods of time [Bouwman et al. 2007; Kim et al. 2007; Hameed et al. 2010]. These limitations frequently require users to expend more time and effort in completing a task on a mobile device than they do by using a personal computer, such as desktop and laptop. Hence, these limitations mentioned above may prevent users from switching to mobile-based trading [Wang et al. 2009; Lin et al. 2011]. While Internet-based stock trading [e.g., Teo et al. 2004; Ramayah et al. 2009; Singh et al. 2010] and several types of mobile-based financial services [e.g., Bouwman et al. 2007; Kim et al. 2007; Hameed et al. 2010] have been extensively studied, there has been very little research into the factors affecting stock investors' intentions to use mobile stock trading.

A better understanding of stock investors' usage intention would have great practical value, not only for managers of securities firms seeking to manage more effectively the implementation of mobile stock trading, but also for mobile stock trading practitioners who wish to assess stock investors' demands for mobile stock trading and improve their services. Clearly, there is a strong need to understand why stock investors are willing or reluctant to use mobile stock trading by developing and empirically examining a comprehensive model of stock investors' behavioral intention to use mobile stock trading. With that motivation, the main research question that this study seeks to address is: Why are stock investors willing or reluctant to use mobile stock trading? What factors affect their intention?

Therefore, the purpose of this study is to identify the factors affecting stock investors' intentions to adopt mobile stock trading in order to promote this service successfully. A research model is proposed from the perspectives of the unified theory of acceptance and use of technology (UTAUT) [Venkatesh et al. 2003] and users' risk perceptions. UTAUT is a comprehensive model widely adopted to explain an individual's acceptance and use of a technology [Baron et al. 2006; Chen & Chang 2011; Venkatesh & Zhang 2010]. Recently, UTAUT has also been employed to explain mobile services, such as mobile technologies [Park et al. 2007], mobile learning [Wang et al. 2009], mobile shopping services [Yang 2010], mobile banking [Yu, 2012], and location-based services [Zhou 2012]. As mobile stock trading represents an emerging mobile service, this study also employs UTAUT to identify the factors affecting stock investors' intentions to adopt mobile stock trading. This will both enrich extant research on UTAUT and advance our understanding of stock investors' intention towards mobile stock trading. Hence, the research model is proposed based on the main constructs of UTAUT.

Perceived risk refers to an individual's subjective expectation of potential problems while conducting financial transactions over mobile IT artifacts. Since some risks exist in the process of mobile financial services, such as data input mistakes, software failure, connectivity loss, and privacy issues [Mallat et al. 2008; Cruz et al. 2010; Koenig-Lewis et al. 2010], perceived risk plays a significant role in inhibiting users from adopting mobile-based financial services [e.g., Chen 2008; Luo et al. 2010; Hsu et al. 2011]. Hence, we argue that perceived risk may disincline stock investors from using mobile stock trading. Although prior research assumes perceived risk to be the key antecedent of mobile IT acceptance, most of the studies adopt a single construct to evaluate the risk perceptions of users [e.g., Mallat 2007; Zhou 2012]. However, perceived risk is a multifaceted concept; different risk facets may be perceived independently of one another as each arises from different sources [Featherman & Pavlou 2003; Forsythe et al. 2006]. Consequently, in contrast to the existing research, our study extends the UTAUT's applicability to the context of mobile stock trading by incorporating multifaceted risk perceptions into the model.

In addition to the mobile stock trading features, the effects of stock investors' gender and age will be investigated because previous studies have shown that age and gender play an important role in the patterns of IT adoption. For example, older age has been revealed to be associated with difficulty in allocating attention to complex or novel IT artifacts [Venkatesh et al. 2003]. Furthermore, male and female users have different views of IT-based services. Females will use IT-based services more frequently for personal and emotional matters, while males tend to use them for accomplishing tasks [Venkatesh et al. 2003; Yang & Lee 2010; Cha, 2011]. Our findings help explain poorer-than-expected uptake of existing mobile stock trading systems. By explaining the factors influencing behavioral intention toward using mobile stock trading, the findings presented here can help researchers and practitioners develop more acceptable mobile stock trading systems. Moreover, our results can provide insights into best practice for addressing IT users' concerns regarding the risks involved in using innovative technologies.

The rest of the paper is organized as follows. We begin by reviewing the literature on UTAUT and perceived risk. Next, we present the research model and hypotheses. The methodology and results of hypothesis testing are then presented. The paper concludes by discussing the study's implications for future research and practice, and offering suggestions for future research.

2. Theoretical Background

2.1. Unified Theory of Acceptance and Use of Technology (UTAUT)

The acceptance of mobile stock trading represents a fundamental managerial challenge. Securities firms need to adopt a holistic approach to assess potential uptake of mobile stock trading and understand the drivers of the mobile-based service acceptance. This information allows securities firms to proactively develop solutions targeted at populations of stock investors that may otherwise be less inclined to adopt mobile stock trading. Since mobile stock trading is a kind of innovative service utilizing information systems accessed through mobile technologies, this study suggests that the unified theory of acceptance and use of technology (UTAUT) could be adopted to explain stock investors' behavioral intention. UTAUT integrates multiple models of user acceptance theory and therefore offers the most comprehensive model currently available to researchers in this space [Baron et al. 2006; Wang et al. 2009]. In UTAUT, four core determinants of intention and usage - performance expectancy, effort expectancy, facilitating conditions and social influence - are developed from eight adoption theories [Venkatesh et al. 2003].

Having attracted increasing attention in recent years, UTAUT has been used to investigate user acceptance of mobile-based IT artifacts. For example, Baron et al. [2006] developed an extended UTAUT model to investigate consumer acceptance of short message service (SMS). Wang et al. [2009] proposed a revised UTAUT model to study factors affecting user intention to use mobile learning applications. Yang [2010] proposed a revised UTAUT model for studying user acceptance of mobile shopping services in the United States. Chen and Chang [2011] proposed a revised UTAUT model (incorporating the anxiety construct) to investigate factors affecting user acceptance of mobile phones with built-in near-field communication (NFC) capability. Yu [2012] developed an extended UTAUT model (incorporating perceived credibility, perceived financial cost and perceived self-efficacy) to investigate mobile banking adoption. Zhou [2012] developed an extended UTAUT model (incorporating privacy concern, trust and perceived risk) to investigate location-based services usage. Since UTAUT is a comprehensive model which has been adopted by several previous studies to successfully predict users' usage intention toward mobile-based service, it serves as a robust basis for identifying the determinants of stock investors' intention to use mobile stock trading.

2.2. Risk Perceptions

Perceived risk is widely considered to be one of the potential obstacles to acceptance of mobile-based financial services [Chen 2008; Luo et al. 2010; Hsu et al. 2011]. Users specifically see risk in potential uncertainty arising from data input errors, software failures, connection loss, and privacy loss [Mallat et al. 2008; Cruz et al. 2010; Koenig-Lewis et al. 2010]. Moreover, given increasing reports of mobile Internet hacking, potential users may fear that an unauthorized party will gain access to their financial accounts and cause serious financial damage [Shen et al. 2010; Wessels & Drennan 2010; Hsu et al. 2011]. Mobile stock trading is a type of mobile-based financial service. As trading equities through mobile devices requires stock investors to provide certain private information, there is a risk to the investors of exposure to opportunistic hackers who can then use the information to access their trading accounts, delete data or make unauthorized trades. As a result, investors may choose to forgo the potential benefits of using mobile stock trading.

Considerable empirical research has found that peoples' intention to use mobile-based financial services is affected by their perception of risk. For example, Mallat [2007] found that perceived risk is a serious barrier to the adoption of mobile payment systems. Later, Mallat et al. [2008] found that perceived risk is an important determinant in the use of mobile ticketing services. Investigating the perceived obstacles to the adoption of mobile banking services among Brazilian Internet users, Cruz et al. [2010] concluded that perception of risk was one of the key barriers. Koenig-Lewis et al. [2010] found that increased perceived overall risk reduces behavioral intention to use mobile banking services among young consumers. From a cost-benefit perspective, Shen et al. [2010] found that consumers' risk perceptions influence the adoption of mobile banking services. Similarly, Wessels and Drennan [2010] identified high perceived risk as a key inhibitor of consumer acceptance of mobile phone banking.

Perceived risk is a multifaceted concept in which different risk facets may be perceived independently of one another as each arises from different sources [Featherman & Pavlou 2003; Forsythe et al. 2006]. In the context of mobile financial services, people perceive risk from several facets, the most prevalent of which are security risk, economic risk, and functional risk. Perceived security risk of mobile financial services lies in the perception of potential harm due to electronic fraud or hacker attacks. Previous studies have found that many people believe that they are vulnerable to identity theft while using mobile financial services [Mallat 2007; Wessels & Drennan 2010]. Perceived economic risk arises from the perception of possible economic loss due to transaction error or faulty operation. Previous studies have found that many people are afraid of losing money through such mistakes while performing financial transactions over the mobile platform [Koenig-Lewis et al. 2010; Luo et al. 2010]. Perceived functional risk lies in the perception of possible lack of service reliability or accessibility. Previous studies have

found that many people are apprehensive that a failure of service systems or disconnection from the mobile Internet will occur while conducting financial transactions via mobile devices [Shen et al. 2010; Wessels & Drennan 2010].

3. Research Model and Hypotheses

Venkatesh et al.'s [2003] UTAUT is adopted as a primary theoretical framework to examine stock investors' acceptance of mobile stock trading. However, since the mobile stock trading context differs in some ways from the traditional IT context, not all constructs of UTAUT may fit the specific context of mobile stock trading. Hence, as mentioned in section 2, it is necessary to integrate the risk perceptions into the modified UTAUT model to propose our research model. As mobile stock trading is still in its infancy, few stock investors have actually used such a system. Therefore this study uses behavioral intention as a dependent variable in the early stage of mobile stock trading acceptance research. Two constructs pertaining to UTAUT, i.e. use behavior and experience, are excluded from our proposed model. In addition, facilitating conditions, the antecedent variable of use behavior, is excluded because there is no significant association between the facilitating conditions and behavioral intention in the UTAUT model. Furthermore, since this study investigates the adoption of mobile stock trading in a voluntary usage context, the voluntariness, a moderator variable in UTAUT, is also excluded.

Previous studies on mobile financial services usage behavior have found that people's concerns about risk-related issues are key determinants for the adoption of a particular mobile financial service [Laukkanen & Kiviniemi 2010; Luo et al. 2010]. Perceived risk is regarded as a person's perception of potential uncertainty and adverse consequences of engaging in a given activity [Forsythe et al. 2006; Littler & Melanthiou 2006; Bland et al. 2007; Im et al. 2008]. Though customers may perceive a given service as being valuable, their intention to adopt the service may be reduced by their perception of risks associated with using the service. In the context of mobile stock trading, the service platform is the mobile-based IT artifact composed of mobile Internet, mobile devices and mobile systems. Conducting stock transactions through mobile IT devices may be associated with negative results not found in traditional formats, including increased data entry errors, electronic data interception and unstable wireless connections. Stock investors' perceptions of the risks involved in mobile stock trading may impede their intention to use such a system. Considering the context in which mobile stock trading occurs, this study incorporates risk perceptions into UTAUT to produce a clearer explanation of why stock investors adopt or resist mobile stock trading.

3.1. Hypotheses Derived From UTAUT

Venkatesh et al. [2003] defined performance expectancy as the extent to which individuals believe that utilizing a certain information system will help to improve their performance. The construct of performance expectancy is developed through the aggregation of five performance-related constructs: perceived usefulness, extrinsic motivation, job-fit, relative advantage and outcome expectations. In the context of mobile stock trading, the construct of performance expectancy is conceptualized as the extent to which stock investors believe that mobile stock trading will improve their transaction performance. The construct encapsulates the notion that mobile stock trading is capable of appropriately providing the intended services. In other words, performance expectancy is stock investors' instrumental value of using mobile stock trading. Therefore, one can presume that the instrumental value of using mobile stock trading, such as the enhancement of stock trading efficiency, the increment of convenience in stock trading, may inform performance expectations for mobile stock trading and that the anticipation of such benefits will influence the behavioral intention to use mobile stock trading[3]. Thus, we propose the following hypothesis:

H1: Stock investors with high performance expectancy for mobile stock trading will have greater behavioral intention to use mobile stock trading.

Based on the findings of previous studies [Morris & Venkatesh 2000; Venkatesh & Morris 2000; Venkatesh et al. 2003], gender and age are theorized as playing a moderating role on the impact of performance expectancy on behavioral intention to use an IT artifact. In terms of gender, previous studies found that males tend to be more task-oriented (i.e., focus on task accomplishment) than females [Wang et al. 2009; Constantiou & Manhke 2010; Cha 2011]. Venkatesh et al. [2003] argued that, given their highly task-oriented nature, males may be more likely to rely on performance expectancy when determining whether or not to adopt an IT artifact. Accordingly, we expect the effects of performance expectancy to be more salient to males. Moreover, in terms of age, previous studies found that young adults may place greater importance on extrinsic rewards than older people [Hall & Mansfield 1975; Plude & Hoyer 1986]. Drawing upon these previous findings, Venkatesh et al. [2003] argued that, given their highly extrinsic reward-oriented nature, young adults may be more likely to rely on performance expectancy when determining whether or not to adopt an IT artifact. Accordingly, we expect the effects of performance expectancy to be more salient to young investors (i.e., stock investors). Thus, we propose the following hypotheses:

[3] The construct of behavioral intention to use mobile stock trading is conceptualized as the strength of stock investors' intention to use mobile stock trading to conduct stock transactions.

H1a: Performance expectancy will influence behavioral intention to use mobile stock trading more strongly for males than for females.

H1b: Performance expectancy will influence behavioral intention to use mobile stock trading more strongly for young investors than for older investors.

Venkatesh et al. [2003] defined effort expectancy as the extent to which individuals believe that learning to use a certain information system will not require significant effort. Previous studies have broadly found that effort expectancy for using an information system is a significant antecedent of behavior intention to use the information system [e.g., Venkatesh & Morris 2000; Wang et al. 2009; Deng et al. 2011]. In the context of mobile stock trading, the construct of effort expectancy is conceptualized as the extent to which stock investors believe that learning to use mobile stock trading will not require significant effort. Effort expectancy of using mobile stock trading is the stock investors' evaluation of how much effort is required to learn how to use and engage with a mobile stock trading system. Therefore, behavioral intention to use mobile stock trading is expected to increase if stock investors believe that mobile stock trading is easy to learn and use.

H2: Stock investors with high effort expectancy for mobile stock trading will have greater behavioral intention to use mobile stock trading.

Based on previous findings [Venkatesh et al. 2003; Wang et al. 2009], the influence of effort expectancy on behavioral intention will be moderated by gender and age. Previous studies on IT adoption found that females tend to be more anxious than males about IT use [Morris & Venkatesh 2000; Venkatesh et al. 2003]. Venkatesh et al. [2003] argued that higher levels of IT anxiety among females can be expected to lead to reduced self-efficacy, which in turn could lead to increased perceptions of the effort required to use IT. Accordingly, previous studies tend to suggest that effort expectancy will be a stronger determinant of personal intention to adopt an IT artifact for females than for males [Venkatesh et al. 2003; Wang et al. 2009]. Thus, we expect effort expectancy to be more salient to females. Moreover, previous studies found that increased age is likely to reduce the intention to process complex stimuli or allocate attention to task-relevant information [Plude & Hoyer 1986; Morris & Venkatesh 2000]. Drawing upon these findings, Venkatesh et al. [2003] argued that, given their tendency to avoid complex stimuli, older people are more likely to rely on effort expectancy when determining whether or not to adopt a given IT artifact. Accordingly, we expect effort expectancy to be more salient to older investors. Thus, we propose the following hypotheses:

H2a: Effort expectancy will influence behavioral intention to use mobile stock trading more strongly for females than for males.

H2b: Effort expectancy will influence behavioral intention to use mobile stock trading more strongly for older investors than for young investors.

Venkatesh et al. [2003] defined social influence as the extent to which individuals perceive that their peers expect them to use a certain information system. This construct suggests that people's IT acceptance behavior is influenced by whether they believe their peers expect them to follow or reject certain behaviors. Prior researchers have found that social influence is an important predictor of behavioral intention to use a certain information system [e.g., Baron et al. 2006; Wang et al. 2009]. It is expected that people's behavioral intention to use a given IT-based service is influenced by their peers' opinion of that service [Karahanna et al. 1999; Venkatesh & Davis 2000]. In the context of mobile stock trading, the construct of social influence is conceptualized as the extent to which stock investors perceive that their peers expect them to use mobile stock trading. Given that mobile stock trading is still very new, investors are expected to be influenced by their peers' perceptions of the quality and capabilities of such services. Thus, we propose the following hypothesis:

H3: Stock investors who perceive a high degree of positive social influence (i.e., supportive of mobile stock trading) from their peers will have a greater behavioral intention to use mobile stock trading.

Based on the findings of previous studies [Venkatesh et al. 2003; Wang et al. 2009], the impact of social influence on behavioral intention will be moderated by gender and age. Previous studies found that males tend to disregard others' opinions, while females tend to view the opinions of others as opportunities to enhance their decision-making capabilities [Wang et al. 2009; Constantiou & Manhke 2010; Cha 2011]. Venkatesh et al. [2003] argued that females tend to be more sensitive to the influence of their peers and therefore social influence will be more salient when forming an intention to use an IT artifact. Thus, we suggest that females are more likely than males to factor peer opinions into the overall process of deciding whether or not to adopt mobile stock trading. Moreover, previous studies have found that affiliation needs increase with age [Rhodes 1983; Morris & Venkatesh 2000]. Drawing upon these previous findings, Venkatesh et al. [2003] argued that older people are more likely to rely on social influence when determining whether or not to adopt an IT artifact. Accordingly, we expect social influence to be more salient to older investors and so propose the following hypotheses:

H3a: Social influence will affect behavioral intention to use mobile stock trading more strongly among females than males.

H3b: Social influence will affect behavioral intention to use mobile stock trading more strongly among older investors than young investors.

3.2. Hypotheses Derived From Risk Perception

Previous research on mobile financial service has found that concerns about risk-related issues are one of the key determinants for the adoption of a mobile financial service [Laukkanen & Kiviniemi 2010; Luo et al. 2010]. Perceived risk is regarded as the perception of uncertainty and adverse consequences resulting from engaging in a given activity, such as using a particular service [Forsythe et al. 2006; Littler & Melanthiou 2006; Im et al. 2008]. Conducting stock transactions through mobile-based IT may be associated with negative results that are not found in more conventional transaction formats. For example, mobile transactions may be more prone to data entry errors, electronic data interception and unstable data connections [Mallat et al. 2008; Cruz et al. 2010; Koenig-Lewis et al. 2010]. In the context of mobile financial services, people perceive several facets to risk, the most prevalent being security, economic and functional risks [Cruz et al. 2010; Koenig-Lewis et al. 2010; Wessels & Drennan 2010].

Kalakota and Whinston [1996] define a security threat as one which creates "*a circumstance, condition, or event with the potential to cause harm to personnel or network resources in the form of destruction, disclosure, modification of data, denial of service, or fraud, waste, and abuse*" (p. 59). In the context of mobile stock trading, security threats can manifest either through attacks on mobile network data transmissions or through unauthorized access to user accounts. In this study, security risk is conceptualized as stock investors' perception of potential harm resulting from electronic fraud or hacker attacks while using mobile stock trading. Previous studies have found security risk to be the main obstacle to the adoption of mobile financial services and have suggested that the greatest challenge to the mobile financial service provider will be earning the trust of customers over their security concerns [Luarn & Lin 2005; Misra & Wickamasinghe 2004; Mallat et al. 2008]. Thus, we propose the following hypothesis:

H4: Stock investors perceiving high security risk in mobile stock trading will have less behavioral intention to use mobile stock-trading.

In the context of mobile stock trading, the construct of economic risk is conceptualized as stock investors' perception of the possibility of economic loss due to transaction error or incorrect operation when using mobile stock trading. Previous studies have found that many people resist using mobile financial services because they fear such losses [Koenig-Lewis et al. 2010; Wessels & Drennan 2010; Hsu et al. 2011]. Given that the primary input device is a small touch screen with limited display resolution, users are legitimately concerned that input errors will be easily made and difficult to detect. Traditional stock trading methods (e.g., telephone-based stock trading) generally involve another party (i.e., stockbrokers) manually verifying the accuracy of the transaction information, but such safeguards is rarely available in mobile stock trading, leading to feelings of uncertainty and fear. Thus, we propose the following hypothesis:

H5: Stock investors who perceive a high economic risk for mobile stock trading will have less behavioral intention to use mobile stock-trading.

In the context of mobile stock trading, the functional risk construct is conceptualized as stock investors' perception of the possibility of service unavailability or malfunction. Previous studies have found that many people resist using mobile financial services because of concerns about such failures [Cruz et al. 2010; Shen et al. 2010; Hsu et al. 2011]. Moreover, research has found that many people who resist using mobile financial services tend to presume that mobile devices, operating systems and networks are inherently unstable and worry that transactions may be interrupted, paused, or delayed [Mallat et al. 2008; Cruz et al. 2010; Koenig-Lewis et al. 2010]. Thus, we propose the following hypothesis:

H6: Stock investors who perceive a high functional risk for mobile stock trading will have less behavioral intention to use mobile stock trading.

Females have been found to generally be more risk averse than males [Arch 1993; Bajtelsmit & Van Derhei 1997; Byrnes et al. 1999]. In the context of online service use, previous studies have found that females perceive a significantly higher likelihood of negative outcomes than males and view the consequences of negative events to be more severe [Van Slyke et al. 2002; Garbarino & Strahilevitz 2004; Riedl et al. 2010]. Since females tend to be less assertive or aggressive than males [Venkatesh et al. 2003; Wang et al. 2009], it is likely that females' behavioral intention to use a new online service (e.g., mobile stock trading) will be more heavily influenced by their perceived risk than it would be for males. Thus, we propose the following hypotheses:

H4a: Security risk will influence behavioral intention to use mobile stock trading more strongly for females than for males.

H5a: Economic risk will influence behavioral intention to use mobile stock trading more strongly for females than for males.

H6a: Functional risk will influence behavioral intention to use mobile stock trading more strongly for females than for males.

With regard to risk, it has also been observed that increased age generally coincides with reduced appetite for risks and increased aversion to uncertainty [Hofstede 1980; LaGrange & Ferraro 1989; Byrnes et al. 1999]. There is evidence to support the notion that older people are less accepting of unfamiliar trading methods while young adults are generally more open to trying new methods (e.g., online transactions) and more accepting of potential risks [Morris & Venkatesh 2000; Falk et al. 2007]. Consequently, we expect that the effect of perceived risks on mobile stock trading acceptance will be moderated by age, with the effect being stronger for older investors. Thus, we propose the following hypotheses:

H4b: Security risk will influence behavioral intention to use mobile stock trading more strongly for older investors than young investors.

H5b: Economic risk will influence behavioral intention to use mobile stock trading more strongly for older investors than young investors.

H6b: Functional risk will influence behavioral intention to use mobile stock trading more strongly for older investors than young investors.

Based on the hypotheses above, we propose a research model (Figure 1) and evaluate it empirically in mobile stock trading settings.

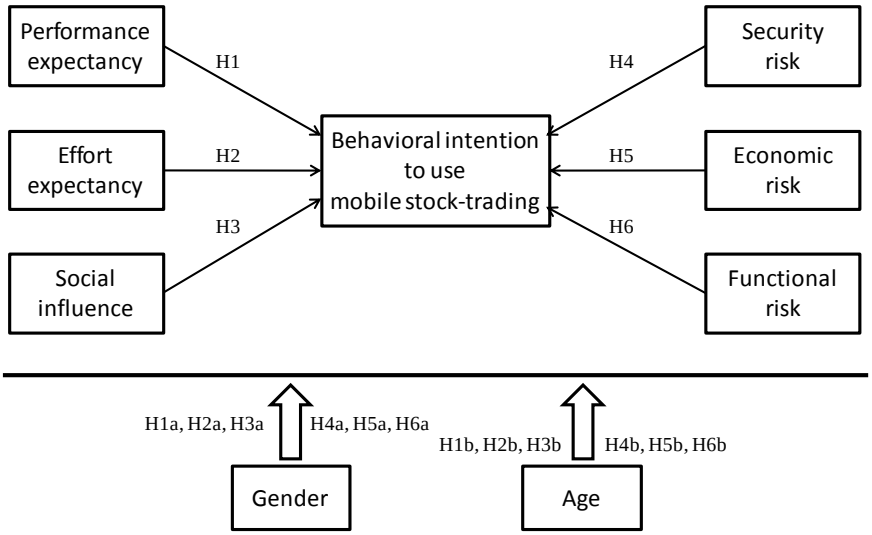

Figure 1: Research Model

4. Research Methodology

4.1. Measures

The items used to measure four latent variables, namely performance expectancy, effort expectancy, social influence, and behavioral intention, were adapted from Venkatesh et al. [2003]. The items for the three constructs, namely security risk, economic risk, and functional risk, were adapted from previous studies [e.g., Mallat 2007; Koenig-Lewis et al. 2010; Luo et al. 2010; Shen et al. 2010; Wessels & Drennan 2010]. The original items used in this study are listed in Table 1.

Table 1: Survey Items, Factor Loadings and Reliability Estimates

Items	Factor loadings	Cronbach's Alpha	Composite Reliability
(PE) Performance Expectancy		0.910	0.937
PE1: Using mobile stock trading would enhance my stock trading efficiency.	0.902		
PE2: I feel mobile stock trading is useful.	0.887		
PE3: Using mobile stock trading would increase the convenience of stock trading.	0.879		
PE4: Using mobile stock trading would enable me to accomplish stock trading more quickly.	0.884		
(EE) Effort Expectancy		0.874	0.913
EE1: Learning how to use mobile stock trading would be easy for me.	0.868		
EE2: I expect to find mobile stock trading clear and understandable.	0.869		
EE3: It would be easy for me to become skilful at using mobile stock trading.	0.843		
EE4: I would find mobile stock trading easy to use.	0.828		
(SI) Social Influence		0.881	0.918
SI1: I feel people around me would encourage me to use mobile stock trading.	0.874		
SI2: People who are important to me would think that I should use mobile stock trading.	0.867		
SI3: I will discuss mobile stock trading with my peers.	0.851		
SI4: In my environment, people who use mobile stock trading have more prestige than those who do not.	0.843		
(BI) Behavior Intention		0.917	0.942
BI1: I intend to use mobile stock trading in the future.	0.895		
BI2: I predict I would use mobile stock trading in the future.	0.875		
BI3: I plan to use mobile stock trading in the future.	0.901		
BI4: I will use mobile stock trading for my stock trading needs.	0.891		
(SR) Security Risk		0.906	0.934
SR1: I would not feel secure conducting stock trades via mobile stock trading systems.	0.888		
SR2: I am worried that others might be able to access my mobile stock trading account.	0.878		
SR3: I would not feel secure sending sensitive information across mobile stock trading systems.	0.891		
SR4: I would not feel totally safe providing personal information over mobile stock trading systems.	0.868		
(ER) Economic Risk		0.911	0.938
ER1: I am uneasy about using mobile stock trading because I may lose money due to incorrect operation.	0.888		
ER2: I am uneasy about using mobile stock trading because I may lose money due to a careless mistake.	0.869		
ER3: I am uneasy about using mobile stock trading because I may lose money due to system processing errors.	0.904		
ER4: When transaction errors occur, I am concerned that the securities broker may not compensate my loss.	0.896		
(FR) Functional Risk		0.913	0.939
FR1: Mobile stock trading systems may not perform well because of the limited processing power of mobile devices.	0.895		
FR2: Mobile stock trading systems may not perform well because of system failure.	0.876		
FR3: I am uneasy about using mobile stock trading because stock transactions may fail due to the unstable nature of mobile devices, mobile operating systems or mobile networks.	0.901		
FR4: I am concerned that mobile stock trading services cannot meet my needs due to poor functionality or system malfunctions.	0.839		

To ensure the content validity of the scales, the selected items must accurately represent the concept about which generalizations are to be made. Therefore, a content validity panel was convened to reconsider the items collected from previous studies to determine the applicability and semantics of each item. The panel members in this study consisted of six managers from securities firms and two professors whose research focuses were on mobile financial services. The adoption criterion depended on the CVR (content validity ratio)[4]. This study followed

[4] CVR = [n-N/2] / [N/2], n: the sum of frequency for scoring 2 or 3, N: total number of members in the panel.

Lawshe's [1975] suggestion that the CVR of each item must exceed or equal 0.75[5]. Useful comments were incorporated to measure the seven constructs of our research model.

4.2. Data Collection

Due to the lack of a reliable sampling frame, it is difficult to conduct random sampling for all potential mobile stock trading users in Taiwan. Thus, this study collected sample data using a non-random sampling technique (i.e., convenience sampling). To establish contact with appropriate study subjects (i.e., stock investors), twenty-six stockbrokers from five securities firms in Taiwan helped to email invitation letters to their customers with a message explaining the need to understand their behavioral intention to use mobile stock trading. The invitation letter also linked to a website where respondents could fill out an online questionnaire. This online survey, which yielded 657 responses, was available for five weeks following the mailing of the invitations. Once incomplete responses and missing values had been removed, a sample of 329 valid responses was obtained (50.07% valid response rate) from a variety of respondents with different levels of experience in stock trading and mobile device usage. The respondents had an average of 11.25 years of stock trading experience and 4.54 years of mobile device usage experience. The characteristics of the respondents are depicted in Table 2.

Table 2: Characteristics of the Respondents

Characteristic	Number	Percentage (%)
Gender		
Female	136	41.3
Male	193	58.7
Age		
18 – 25	93	28.3
26 – 35	114	34.7
36 – 45	55	16.7
46 – 55	59	17.9
Above 55	8	2.4
Security firm		
Pacific Securities Co., Ltd.	62	18.8
Jihsun Securities Co., Ltd.	47	14.3
KGI Securities Co., Ltd.	91	27.7
Yuanta Securities Co., Ltd.	75	22.8
President Securities Co., Ltd.	54	16.4
Mobile device		
Smart phone	278	84.5
PDA (personal digital assistant)	3	0.9
Others	37	11.3
None	11	3.3

5. Analysis Results

Partial least squares regression (PLS) was used to evaluate the proposed research model and the relevant hypotheses. The PLS method can be applied to simultaneously estimate both the measurement model and the structural model [Chin et al. 2003]. This study divides the analysis of the research model into two steps: 1). an assessment of the properties of the measurement model; 2). an assessment of the structural model (testing of the hypotheses). Data analysis through PLS was conducted with SmartPLS 2.0 (M3) software [Ringle et al. 2005].

5.1. Measurement Model Assessment

The measurement model was assessed via PLS. Individual item reliability was assessed by examining the loading of each item to their respective constructs. Table 1 shows that all item loadings are above 0.8, indicating that more than half of the variance is captured by the constructs. The internal consistency reliability of each construct was assessed by Cronbach's alpha and the composite reliability (CR). A score of 0.70 or above is an acceptable value of internal consistency for exploratory research [Barclay et al. 1995]. Table 1 shows the Cronbach's alpha (ranging from 0.874 to 0.917) and CR values (ranging from 0.913 to 0.942) for each construct. All indicators were above the recommended level of 0.70, indicating adequate internal consistency.

[5] Lawshe (1975) proposed that if the number of members in the panel was eight, the CVR must be greater than 0.75.

Table 3 shows the average variance extracted (AVE) and the square root of the AVE, along with the correlations between the constructs. The percentage of variance captured by a construct is given by its AVE. Convergent validity is demonstrated as the AVE values. All AVE values pertaining to each construct were higher than the suggested threshold value of 0.50 (with actual values ranging from 0.715 to 0.791). A construct is considered to be distinct from others if the square root of its AVE is greater than its correlations with other latent constructs [Barclay et al. 1995]. Comparison of the square root of the AVE (bold figures on the diagonal) with the correlations among the constructs indicates that each construct is more closely related to its own measures than to those of other constructs, thus supporting discriminant validity.

Table 3: Convergent and Discriminant Validity

Construct	Average variance extracted (AVE)	PE	EE	SI	BI	SR	ER	FR
PE	0.778	**0.882**						
EE	0.715	0.311	**0.846**					
SI	0.726	0.347	0.235	**0.852**				
BI	0.791	0.391	0.316	0.331	**0.889**			
SR	0.770	-0.334	-0.269	-0.272	-0.429	**0.877**		
ER	0.779	-0.341	-0.281	-0.273	-0.441	0.452	**0.883**	
FR	0.783	-0.330	-0.271	-0.266	-0.434	0.476	0.471	**0.885**

Note: Diagonal elements (bold) are the square roots of AVE by latent constructs from their indicators.

Average variance extracted (AVE): Σ(Li2)/(Σ(Li2) + Σ(Var(Ei)), Li = factor loading, Var(Ei) = error variance

5.2. Structural Model Assessment and Hypotheses Testing

Figure 2 shows the PLS analysis results with standardized path coefficients in the research model. As expected, hypotheses derived from UTAUT were all supported. Three antecedent variables, including performance expectancy, effort expectancy, and social influence, have significantly positive effects on behavioral intention to use mobile stock trading. The path coefficients are 0.206 ($p<0.001$), 0.126 ($p<0.05$), and 0.102 ($p<0.05$), respectively. Moreover, hypotheses derived from risk perception were also supported. Hence, the other three antecedent variables, including security risk, economic risk, and functional risk, all have significantly negative effects on behavioral intention to use mobile stock trading. The path coefficients are -0.226 ($p<0.001$), -0.211 ($p<0.001$), and -0.198 ($p<0.01$), respectively. The research model accounted for 69.4% of the variance in behavioral intention.

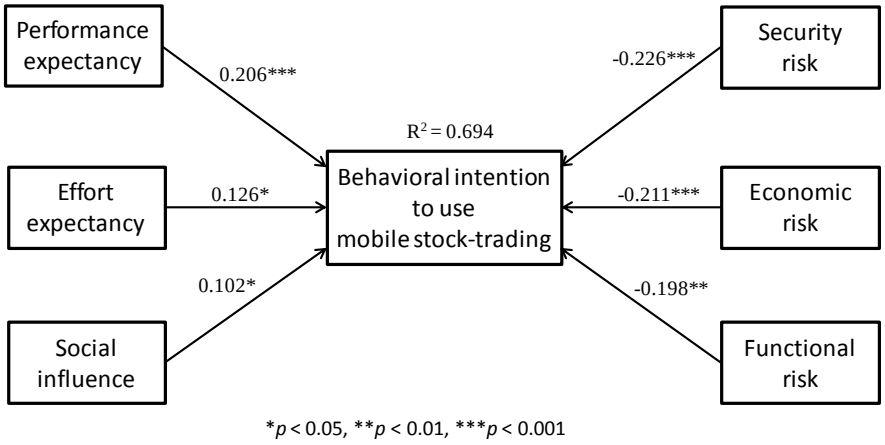

Figure 2: PLS Results for All Respondents

In order to test the moderating effects of gender (H1a – H6a), the sample was divided into male and female groups. Then the research model was tested again with each sub-group. For the female group, the model accounted for 71.2% of the variance in behavioral intention (see Figure 3). While the path coefficients for the PE-BI, EE-BI, SR-BI, ER-BI and FR-BI links in the model were significant in the female group, the path coefficient for the SI-BI link was not. For the male group, the model accounted for 68.7% of the variance in behavioral intention, and the hypotheses derived from UTAUT and risk perception were all significant (see Figure 3).

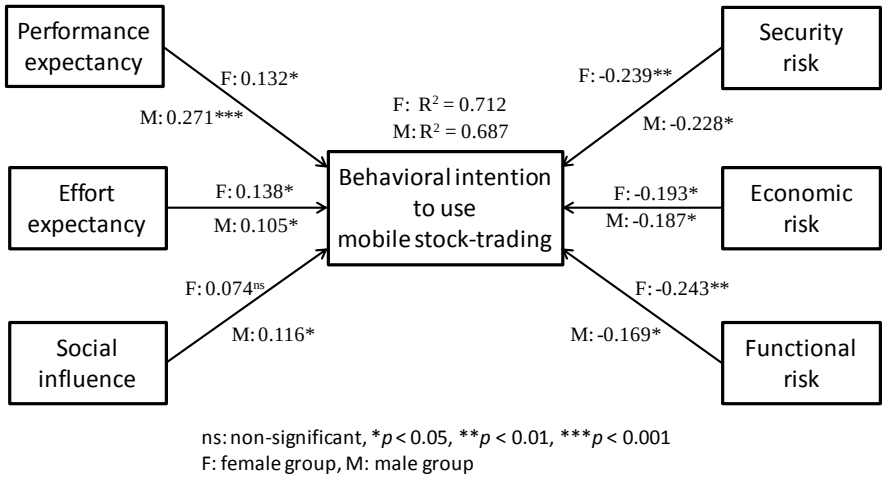

Figure 3: PLS Results for Female and Male Groups

To explore the effect of age differences, we divided the sample respondents into two groups, the older group consisting of those over 35 years and the young group of those no more than 35 years old. For the older group, the research model accounted for 72.9% of the variance in behavioral intention, and the hypotheses derived from UTAUT and risk perception were all significant (see Figure 4). For the young group, the proposed model explained 67.1% of the variance in behavioral intention, and the path coefficients for the PE-BI, SI-BI, SR-BI, ER-BI and FR-BI links in the model were significant. However, the path coefficient for the EE-BI link was not significant for the young group (see Figure 4). Next, we examined how gender and age differences moderated the effects of performance expectancy, effort expectancy, social influence, security risk, economic risk and functional risk on behavioral intention to use mobile stock trading.

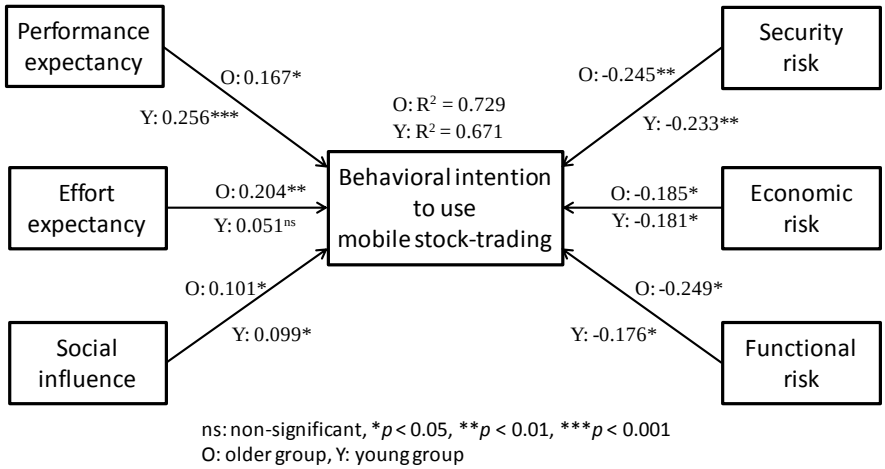

Figure 4: PLS Results for Older and Young Groups

We conducted two multi-sample tests to examine the effects of both gender and age differences on the strength of the path coefficients. The analysis was undertaken using a procedure advocated by Chin [2000], and documented by Keil et al. [2000]. This approach treats the estimates of the re-sampling in a parametric sense, through t-tests. A

parametric assumption is made and the standard errors are taken for the structural paths provided by the PLS software in the re-sampling output. The t-test is then manually calculated to determine the differences in paths between groups. This statistical comparison was carried out as follows:

$$t_{spooled} = \frac{(PC_1 - PC_2)}{\sqrt{[\frac{(N_1-1)^2}{(N_1+N_2-2)} \times SE_1^2] + [\frac{(N_2-1)^2}{(N_1+N_2-2)} \times SE_2^2]} \times \sqrt{(1/N_1 + 1/N_2)}}$$

where $t_{spooled}$ = t-statistic with (N1 + N2 – 2) degrees of freedom

N_i = sample size of the dataset for gender i or age i

SE_i = standard error of path in the structural model of gender i or age i

PC_i = path coefficient in the structural model of gender i or age i.

Table 4 presents the analysis results for gender and age differences. The differences between the path coefficients of the female group and those of the male group are not significant except for the link SI-BI. It is surprising that the path coefficient between social influence and behavioral intention is not significant in female group. As this result is contrary to H3a, Hypotheses 1a, 2a, 3a, 4a, 5a and 6a are not supported. As expected, effort expectancy is found to be a stronger predictor of behavioral intention for older investors (older: significant; young: non-significant), thus supporting Hypothesis 2b. However, the path coefficients for the PE-BI, SI-BI, SR-BI, ER-BI and FR-BI links have no significant differences between the older and young groups. Thus, Hypotheses 1b, 3b, 4b, 5b and 6b are not supported.

Table 4: Results of Gender and Age Differences

Gender difference				
Path	Standardized path coefficients	Hypothesis	$t_{spooled}$	Testing result
PE → BI	Female = 0.132; Male = 0.271	Male > Female	-1.6771	Not Supported (Non-Significant)
EE → BI	Female = 0.138; Male = 0.105	Female > Male	0.5921	Not Supported (Non-Significant)
SI → BI	Female = 0.074; Male = 0.116	Female > Male		Not Supported (Reverse Significant) Female: non-significant, Male: significant
SR → BI	Female = -0.239; Male = -0.228	Female > Male	-0.0993	Not Supported (Non-Significant)
ER → BI	Female = -0.193; Male = -0.187	Female > Male	-0.0532	Not Supported (Non-Significant)
FR → BI	Female = -0.243; Male = -0.169	Female > Male	-0.5768	Not Supported (Non-Significant)
Age difference				
Path	Standardized path coefficients	Hypothesis	$t_{spooled}$	Testing result
PE → BI	Older = 0.167; Young = 0.256	Young > Older	-1.0075	Not Supported (Non-Significant)
EE → BI	Older = 0.204; Young = 0.051	Older > Young		Supported (Significant) Older: significant, Young: non-significant
SI → BI	Older = 0.101; Young = 0.099	Older > Young	0.0277	Not Supported (Non-Significant)
SR → BI	Older = -0.245; Young = -0.233	Older > Young	-0.1041	Not Supported (Non-Significant)
ER → BI	Older = -0.185; Young = -0.181	Older > Young	-0.0346	Not Supported (Non-Significant)
FR → BI	Older = -0.249; Young = -0.176	Older > Young	-0.5824	Not Supported (Non-Significant)

6. Implications and Conclusions

6.1. Determinants of Intention to Use Mobile Stock Trading

Although previous studies have proved the UTAUT model can provide a stronger explanation for users' acceptance of IT than the other competing models (e.g., TAM) [Venkataesh et al. 2003; Venkatesh & Zhang 2010], there is less UTAUT-based research than TAM-based research. Consequently, many prior UTAUT-based studies have highlighted the need for more investigation into the validity of UTAUT in various IT contexts [Chen & Chang 2011; Yu 2012; Zhou 2012]. Moreover, as noted earlier, most previous studies adopted a single construct to evaluate users' risk perceptions. However, if our study had used a single-faceted construct only to measure stock investors' risk perception, it would have been unable to fully reveal the stock investors' decision process relating to mobile stock trading acceptance. Therefore, based on the UTAUT and multifaceted risk perceptions, this study proposed a comprehensive research model to explore the factors affecting stock investors' intention to use mobile stock trading.

Based on an empirical survey, the analysis results indicate that six constructs, performance expectancy, effort expectancy, social influence, security risk, economic risk and functional risk, were all significant determinants of behavioral intention to use mobile stock trading. It is worth noting that compared to UTAUT, the three added constructs associated with risk perceptions (i.e., security risk, economic risk, and functional risk) also have significant effects on stock investors' intention to use mobile stock trading. Thus, this study has successfully extended the applicability of the UTAUT in a mobile stock trading context by incorporating risk perceptions (i.e., security risk, economic risk, and functional risk) into UTAUT's existing nomonological structure. The findings of this study provide several important implications for mobile stock trading researchers and practitioners.

Consistent with the propositions of Venkatesh et al [2003], this study revealed that the three constructs derived from UTAUT (i.e. performance expectancy, effort expectancy and social influence) have significantly positive influences on behavioral intention to use mobile stock trading. Performance expectancy was shown to be an important predictor in determining intention to use mobile stock trading. It is therefore believed that stock investors with high performance expectancy are likely to have increased intention to use mobile stock trading. To promote stock investors' performance expectancy of mobile stock trading, securities firms should focus on providing more valuable system functions and higher quality information. For example, mobile stock trading systems should provide advanced stock analysis tools to support investors in determining appropriate trading strategies, such as stock analysis, stock market charts, and stock screens. Mobile stock trading systems should also allow stock investors to conduct customized analyses, thus enabling them to make informed investment decisions about their investment strategies. In addition, with regard to the information quality of mobile stock trading systems, securities firms need to improve the responsiveness of mobile stock trading systems in fulfilling orders and providing corresponding feedback. Moreover, the information provided by such services must be adequate, reliable, useful, and timely, because information quality is an important indicator for assessing the value of a particular mobile stock trading system.

Analysis results of this study also showed effort expectancy to have a significantly positive influence on stock investors' intention to use mobile stock trading. This means that the majority of stock investors will consciously evaluate the degree of effort required to engage in mobile stock trading. Mobile-based services face several limitations, such as small screen size, limited display resolution, less convenient data entry, less sophisticated functions and interfaces, and limited processing power [Bouwman et al. 2007; Kim et al. 2007; Hameed et al. 2010]. The small screen limits the "display" of the interface, thus potentially prompting users to perceive the system as difficult to use. Therefore, securities firms need to improve the way the functions are arranged in mobile stock trading systems in order to reduce the level of effort required of the user. User interfaces can be better designed by simplifying data entry through the use of intuitive input mechanisms, such as touch screen menus, handwriting recognition and natural language processing. Firms can also provide their customers with personalized interfaces adapted to the user's specific device, tasks and preferences.

An additional study finding was that compared to the impact of performance expectancy, effort expectancy has a weaker effect on intention to use mobile stock trading. We suggest that there are two possible reasons why effort expectancy has a smaller role in mobile stock trading acceptance than has been hypothesized in the original UTAUT model (i.e., Venkatesh et al. 2003). The first possible reason is that mobile IT has advanced rapidly, leading to increasing reliance on mobile devices (e.g., mobile phone and tablet PC) by people in virtually every aspect of daily life. As a result, stock investors have rich mobile device usage experience, which largely reduces the effect of effort expectancy. The second possible reason is that our sample is mainly young investors (63% of subjects). In Taiwan, most young people are experienced mobile IT users [TWNIC 2012] with relatively high mobile IT self-efficacy. Consequently, operating mobile stock trading is not difficult for them.

In addition, since social influence was found to have a significantly positive impact on behavior intention to use mobile stock trading, securities firms should be aware of the importance of social influences in attracting new users. Once stock investors become familiar with mobile stock trading, they may begin to persuade those within their peer group to adopt it. Thus, firms should focus on promoting mobile stock trading to potential early adopters who tend to have a higher level of acceptance of new technologies. Stock investors may be influenced by stock brokers, colleagues, families, and stock investor friends to adopt mobile stock trading. When most people around a focal stock investor have adopted mobile stock trading to trade, the focal stock investor is likely to use the mobile IT. Therefore, securities firms should provide incentives to early adopters to use social influence as a lever to promote mobile stock trading.

The results of this study also show that the three added risk-perception constructs (i.e., security risk, economic risk, and functional risk) all have significantly negative impacts on behavior intention to use mobile stock trading. Consistent with prior research [e.g., Mallat 2007; Koenig-Lewis et al. 2010; Luo et al. 2010; Shen et al. 2010; Wessels & Drennan 2010], this study confirmed that users' risk perceptions play a significant role in determining

behavioral intention to use IT artifacts. With regard to security risk, this study identified this type of perceived risk as the most important inhibitor to the adoption of mobile stock trading. This underscores the fact that concerns about fraud and identity theft are foremost in the minds of investors when choosing whether or not to adopt mobile stock trading. Thus, providing encryption and strong authentication to prevent fraud and identity theft should be a priority in the implementation of mobile stock trading.

With regard to economic risk, this study found that this type of perceived risk is the second most important inhibitor to the adoption of mobile stock trading. At present, mobile stock trading transactions lack the assurance provided by stockbrokers in traditional settings (such as telephone-based stock trading). On the other hand, stock investors usually have difficulty in asking for compensation when transaction errors occur, which may explain why many stock investors resist adopting mobile stock trading. Finally, this study also found that functional risk has a negative influence on the behavioral intention to use mobile stock trading. This implies that stock investors will worry about potential transaction interruptions, pauses or delays when trading via mobile stock trading system. This worry may defeat the intention of engaging in mobile stock trading in the first place. Thus, minimizing malfunctions and downtime will increase the willingness of stock investors to conduct transactions via mobile stock trading.

6.2. Moderating effects of Gender and Age

The findings of this study indicate that while the proposed determinants of the acceptance of mobile stock trading adequately explain stock investors' behavioral intention to use mobile stock trading, partial effects of these determinants will be moderated by stock investors' gender and age. For both gender groups, all determinants of behavioral intention to use mobile stock trading were significant with the exception of social influence in the female group. In addition, for both age groups, all determinants of behavioral intention were significant, although the effect of effort expectancy was stronger in the young group.

We found that while the effects of performance expectancy, security risk, economic risk and functional risk on behavioral intention were significant, no gender or age differences were found to exist. That is, regardless of the stock investor's gender or age, those with high performance expectancy for mobile stock trading had a stronger intention to use such services, while those with high perceptions of security, economic and functional risk regarding mobile stock trading had a weaker intention. Based on these findings, a universally acceptable strategy for promoting the use of mobile stock trading is to allow potential users to perceive mobile stock trading systems as beneficial and risk-free. This can be accomplished in two ways – through system development and marketing. In the development of mobile stock trading systems, securities firms should focus on practical functions and key features that are frequently required in stock transactions. On the marketing side, securities firms should accentuate system functionality which caters to the various stock trading needs of different investors. Potential users can also be won over by addressing their concerns about risk. While building a truly risk-free mobile stock trading transaction environment is a very difficult undertaking, system developers should implement risk-reduction strategies to provide potential users with confidence. This study suggests that firms should consider focusing on the prevention of intrusion, fraud and identity theft by building secure firewalls, strengthening encryption and implementing authentication and verification mechanisms to prevent such crimes. The study also suggests that securities firms could develop trust-building mechanisms, such as providing service guarantees, increasing familiarity through advertising, and supplying long-term customer services. Mobile environments are inherently more difficult to authenticate and control, and mobile traders may require a form of transaction guarantee to justify the risk of using such services.

In examining the moderating effects of gender differences on the determinants of behavioral intention, we had an unexpected result: the effect of social influence on behavioral intention was significant for males, but non-significant for females. This new finding, which is contrary to prior research [Venkatesh et al. 2003], may be due to females being less curious about relatively advanced and complex mobile stock trading technologies, reducing the likelihood of their being influenced by peers in the early stages of mobile stock trading development. Previous studies argued that females care less about the issues of advanced and complex IT adoption, resulting in females rarely discussing these issues with their peers [Wang et al. 2009; Wang & Wang 2010; Terzis & Economides 2011]. Based on the findings, this study suggests that securities firms might first target male investors in promoting newly developed mobile stock trading, by providing professional services attractive to male investors, such as customized investment consulting services. Once male investors adopt mobile stock trading, they can use their social influence to encourage their peers to follow suit, thus facilitating the diffusion of mobile stock trading. For female investors, securities firms could provide promotion activities that provide immediate benefits, such as discounts on transaction fees when using mobile stock trading. Such benefits will encourage female investors to pay attention to the issues of mobile stock trading.

Examination of the impact of age differences on the determinants of behavioral intention revealed that users' age moderate the effect of effort expectancy on behavioral intention. Our findings are consistent with prior research

which found that effort expectancy is a stronger predictor of IT usage intention among older people than among the young [Venkatesh et al. 2003]. However, inconsistent with the UTAUT, the effect of effort expectancy was significant for older investors only. One possible reason for this phenomenon is that as young investors tend to have a higher degree of computer self-efficacy, effort expectancy has no significant influence on their decision making in terms of mobile stock trading adoption. According to our findings, to increase the use of mobile stock trading among older investors, securities firms should improve the user friendliness of system interfaces through touch screens, handwriting recognition and even speech recognition (as in the Siri iPhone application). In addition, they should design specific functions to facilitate older users' operations. For example, the system could provide customized font size and font style for ease of reading [Bernard 2001; Goodman et al. 2005]. Given such mechanisms, older users are likely to perceive mobile stock trading systems as being less challenging to use, and will thus be more likely to use them. As older users become increasingly familiar with the operation of mobile stock trading systems, they will encourage diffusion of such systems amongst their peers through social influence.

6.3. Limitations and Future Research

While the research model was proposed based on theoretical inference and was tested through an empirical survey, there are several limitations that should be taken into consideration when generalizing the results of this study. First, the survey used in the study was conducted utilizing web-based forms and employed non-random convenience sample, because gathering a larger sample using random sampling method would be costly. Although the online survey allowed us to collect data without geographical constraints, the resulting sample was limited to respondents with Internet access. Thus, to enhance generalizability, future research needs to collect survey data using different methods.

Second, the model measured in the study was cross-sectional and so measured perceptions and intentions at a single point in time. However, perceptions change over time as individuals gain experience [Venkatesh & Davis 2000; O'Neill 2003], with implications for researchers and practitioners interested in predicting mobile stock trading uptake patterns over time. Additional research is needed to evaluate the validity of the model and our findings. A dynamic model or longitudinal evidence would not only help to predict beliefs and behavior over time, but would also enhance our understanding of the causality and interrelationships between key variables in the acceptance of mobile stock trading.

Third, the construct of use behavior was excluded from our proposed model. Not investigating actual usage behavior is not a serious limitation as there is substantial empirical evidence that supports the causal relationship between behavioral intention and use behavior [Venkatesh & Davis 2000; Venkatesh & Morris 2000]. However, behavioral intention is only partially useful as their correlation with actual usage behavior is low and mediated by many other variables. Thus, future research focusing on use behavior is needed to extend our discussion.

Acknowledgment

This work was supported in part by the National Science Council of the Republic of China under the grants NSC 101-2410-H-251-003 and NSC 98-2410-H-126-001.

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