A Study on Taiwan Consumers’ Adoption of Online Financial Services

Chih-Chia Chang\textsuperscript{a}, Po-Chien Chang\textsuperscript{b,*}

\textsuperscript{a}Chunghwa Telecom, Taiwan
\textsuperscript{b}Department of Communications Management, Shih Hsin University, Taiwan

Received 26 April 2011; Received in revised form 10 January 2012; Accepted 20 March 2012

Abstract

Despite Taiwan financial institutions’ huge investments in online financial services systems, Taiwan consumers’ adoption of online financial services has been slower than anticipated. So far, online financial services research in Taiwan is still in its infancy, hence receiving little academic attention. This suggests a need to understand Taiwan Internet users’ adoption behavior of online financial services and to identify the potential factors that may motivate or impede Taiwan Internet users’ acceptance of online financial services. The research framework of this study is constituted by the extended version of the Technology Acceptance Model (TAM2). Other variables, which have proven academically important in influencing consumers’ intentions to use information technology, were added to the conceptual framework. The results strongly support that the extended TAM (TAM2) is a valid model to predict Taiwan consumers’ intention to use online financial services and to explain the intention difference between adopters and non-adopters. The results also demonstrate that perceived privacy protection, perceived security, and consumer innovativeness not only have a significant, positive relationship with Taiwan consumers’ intention to use online financial services but also can significantly predict who is more likely to be an online financial service adopter in Taiwan. The research findings may help Taiwan financial institutions and other interested parties to formulate appropriate marketing strategies and design effective online financial services systems and accelerate the diffusion of online financial services in the future.

Keywords: Technology acceptance model, TAM 2, adoption, online financial services

1. Introduction

The Internet has transformed the traditional brick-and-mortar retail—where companies possess buildings and physical stores for operations—into e-commerce. From the marketing perspective, e-commerce is associated with providing deep information about products and company, creating consumers’ brand awareness, facilitating commercial transactions, enabling product distribution, and strengthening relationships with customers on the Web (Arens, 2006; Kolter, 2003; Laudon and Traver, 2007; Ruyter, Wetzels, and Kleijnen, 2001). Hence, the resulting changes brought about by e-commerce are reshaping and revolutionizing all business areas, including the financial services sector.

The financial services sector is one of the business areas that provides a variety of different financial services, including transfer of funds between bank accounts, applications...
for bank loans, and buying and selling foreign currency, stocks, bonds, mutual funds, and insurance (health, life, or auto insurance). Previous studies have indicated that the financial services sector has been largely driven and most affected by developments of Internet and e-commerce (Flavián, Guinaliu, and Torres, 2005; McKechnie, Winklhofer, and Ennew, 2006).

Financial institutions are opting to provide their financial services over the Internet since financial institutions can enjoy distinct benefits of providing online financial services, for example, reduced operating costs, fast market expansion, effective customer relationship management, and service quality enhancement (Flavián et al., 2005; Lee, Kwon, and Schumann, 2005; Shih and Fang, 2004; Wang, Wang, Lin, and Tang, 2003).

In Taiwan, traditional brick-and-mortar retail financial services remain the most widely accepted method for buying and using financial services. However, Taiwan’s financial institutions are facing growing pressure to cut operating costs and strengthen relationships with customers since Taiwan’s further financial deregulation, following the entry into the World Trade Organization (WTO) in 2002, has helped foreign financial institutions with strong advantages of technology, and financial innovations accelerate the entry into Taiwan financial services sector (Shih and Fang, 2004). For several years and to cope with such situations, Taiwanese financial institutions have made great efforts to build Internet-based online financial services systems and have tried to provide a wide variety of online financial services for the purpose of stimulating consumers’ adoption of and use of online financial services.

Despite Taiwan financial institutions’ huge investments in online financial services systems, Taiwan consumers’ adoption of online financial services has been slower than anticipated. Some online financial services are still in their infancy, while others are more mature. This suggests a need to understand Taiwan Internet users’ adoption behavior of online financial services and the need to identify the potential factors that may motivate or impede Taiwan Internet users’ acceptance of online financial services. The purpose of this study is to identify the potential factors that may affect Taiwan consumers’ adoption of online financial services. Both theoretical and empirical studies associated with the adoption of information technology (IT) provide a solid foundation to examine the Taiwan consumers’ adoption of online financial services technologies. Once these factors are understood and identified, it may be possible to help Taiwan financial institutions and other interested parties to formulate appropriate marketing strategies and design effective online financial services systems so that Taiwan financial institutions can accelerate the diffusion of online financial services in the future.

2. Literature

The technology acceptance model (TAM) was specially designed to explain and predict the behavior of information technology (IT) acceptance at work by specifying the determinants in belief-attitude-intention-IT usage relationships (Davis, 1989; Davis, Bagozzi, and Warshaw, 1989; Davis and Venkatesh, 2000). Davis, Bagozzi, and Warshaw (1989) stated that the goal of TAM is to provide parsimonious and theoretically justified models explaining determinants of IT adoption across a wide range of information technologies and user populations.

TAM suggests that the beliefs, perceived usefulness, and perceived ease of use, are influenced by external variables and jointly determine the attitude toward using IT. In TAM, the perceived ease of use is also identified as an antecedent factor of perceived usefulness. Then, perceived usefulness, as well as attitude toward using IT, has positive influence on behavioral intention to use IT. Finally, behavioral intention to use IT leads to actual IT use.
The research framework of this study is constituted mainly by the concept of the technology acceptance model (TAM). TAM is a well-researched model that has proven accurate and effective in predicting and explaining the determinants of actual acceptance behavior of computer software, information technology, and Internet-based information systems (Adams et al., 1992; Davis et al., 1989; Gefen and Straub, 1997; Gefen et al., 2003; Lu et al., 2003; Monsuwe et al., 2004; Ramayah and Lo, 2007; Szajna, 1994). Hence, this research model retains the major variables of TAM, namely, perceived usefulness and perceived ease of use. It is worth mentioning that, as noted previously, the extended version of TAM, TAM2, eliminated the attitude construct and re-theorized the association between beliefs and behavioral intention. TAM2 postulated that beliefs, both perceived usefulness and perceived ease of use, directly influenced the behavioral intention to adopt IT and Internet-based information systems (Davis and Venkatesh, 1996, 2000). Therefore, to be in line with TAM 2, attitude construct is removed from the research framework of this study.

2.1 Perceived usefulness and perceived ease of use

As mentioned earlier, TAM postulates that attitude toward using IT is jointly determined by two beliefs: perceived usefulness (PU) and perceived ease of use (PEOU) (Davis et al., 1989). Perceived usefulness (PU) is defined as “the extent to which a person believes that using the system will enhance his/her job performance” (Davis and Venkatesh, 2000, p. 187). In TAM, PU has positive direct impact on both attitude toward using IT and behavioral intention (BI) to use IT.

Moreover, in the extended version of TAM (TAM2), Davis and Venkatesh (1996, 2000) removed the attitude construct, re-theorizing the association between PU and BI. TAM2 posited that PU directly affects the behavioral intention (BI) to adopt IT or Internet-based information systems. Empirical evidence has shown that perceived usefulness has a significant effect on people’s intention to adopt technological innovations and significantly influence actual acceptance of technological innovations (Adams et al., 1992; Gefen et al., 2003; Lu et al., 2003; Ramayah and Lo, 2007; Szajna, 1994). So, based on the above theoretical and empirical support from the reviews, hypothesis is summarized as follows:

\( H1: \text{Perceived usefulness will positively influence Taiwanese’s intention to use online financial services.} \)

As for perceived ease of use (PEOU), it refers to “the extent to which a person believes that using the system will be free of effort” (Davis and Venkatesh, 2000, p. 187). In TAM, it is posited that PEOU positively affects perceived usefulness (PU). The reason is that effort saved by improved PEOU can enable people to do a better job or accomplish more at work, thus enhancing their job performance (Davis et al., 1989). In addition, PEOU is postulated to have a positive direct effect on attitude toward using IT and, in turn, influence consumers’ intention to adopt IT; hence, Davis et al. (1989) considered perceived ease of use a significant secondary determinant of intention.

In TAM 2, perceived ease of use, like perceived usefulness, is postulated to have a direct influence on people’s behavioral intention to adopt IT (Davis and Venkatesh, 1996, 2000). In addition, several studies have proven that perceived ease of use has a significant impact on people’s intention to use technological innovations and on actual use of new IT products (Adams et al., 1992; Gefen et al., 2003; Lu et al., 2003). Based on the previous literature, the hypothesis is proposed below:

\( H2: \text{Perceived ease of use will positively influence Taiwanese’s intention to use online financial services.} \)
2.2 Consumer innovativeness

Consumer innovativeness is defined as “the predisposition to buy new and different products and brands rather than remain with previous choices and consumption patterns” (Steenkamp et al., 1999, p. 56), and it can be used as a predictor to measure the extent to which an individual is relatively earlier in adopting an innovation (Bearden et al., 1995; Goldsmith, 2001; Goldsmith and Flynn, 1992, 1998; Steenkamp et al., 1999).

In the literature, two types of consumer innovativeness have been used as follows:

1. Global innovativeness/innate innovativeness. Im, Bayus, and Mason (2003) defined it as “an individual’s inherent innovative personality, predisposition, and cognitive style toward innovations that can be applied to consumption domains across product classes” (p. 65). It is closely related to openness of information processing, independent judgment making, inherent novelty seeking, willingness to change, and need for stimulation.

2. Domain specific innovativeness/product category specific innovativeness. According to Paswan and Hirunyawipada (2006), this refers to “the tendency to acquire new products or related information within a specific domain of interest” (p. 184); hence, domain specific innovativeness is applied to a specific product category, not to consumption domains across product categories.

According to Citrin, et al. (2000), the innovations that people adopt in the real world are more domain-specific or more oriented in the product category. Empirical evidence has also shown that global innovativeness has weak or has no correlation with certain product categories (Im et al., 2003; Paswan and Hirunyawipada, 2006), thus may be not useful and valuable for researchers to study individuals’ innovativeness within a specific domain/specific product category (Goldsmith and Hofacker, 1991). In contrast, domain specific innovativeness provides clearer explanations and more accurate predictions of consumers’ adoption behavior of innovations within a specific domain of interest (Goldsmith, 2000, 2001; Goldsmith and Hofacker, 1991). Because online financial services are viewed as IT-based innovations within specific domains (i.e., specific product category), hence, in this study we choose domain-specific innovativeness to represent consumer innovativeness construct and attempt to examine the relationship between consumer innovativeness toward online financial services and consumers’ intention to adopt online financial services.

In the field of innovation adoption and diffusion, consumer innovativeness has received considerable academic attention in serving as the driving force that leads to consumers’ actual adoption of technological innovations (Bearden et al., 1995; Goldsmith, 2001; Goldsmith and Flynn, 1992, 1998; Steenkamp et al., 1999). Prior research has also suggested that consumer innovativeness has a significant impact on consumers’ attitudes toward using IT innovations (Fenech and O’Cass, 2001; Goldsmith, 2000) and affecting consumers’ adoption behavior of IT innovations (Citrin et al., 2000; Goldsmith, 2000, 2001; Goldsmith and Flynn, 2004). Therefore, based on the previous literature, the following hypothesis is thus proposed:

H3: Consumer innovativeness will positively influence Taiwanese’s intention to use online financial services.

2.3 Perceived privacy protection

Referring to Grandinetti’s and Martin’s works, Udo (2001) redefined privacy as “the rights of individuals and organizations to determine for themselves when, how, and to what extent information about them is to be transmitted to others” (p. 165). Laudon and Traver (2007) argued that information privacy, a subset of privacy, is comprised of two claims: the claim that governments and businesses should not collect certain information and the claim that individuals are able to control the use of their personal information.
Owing to the growing technology complexity and information-processing capacity (Kelly and Erickson, 2004), privacy concerns have become a major obstacle in the development of online activities and play an increasingly important role in consumers’ adoption of technological innovations (Choi and Lee, 2003; Flavián and Guinalíu, 2006; Kelly and Erickson, 2004; Liebermann and Stashevsky, 2002; Miyazaki and Krishnamurthy, 2002). Given these potential influences, the hypothesis is stated as follows:

**H4:** Perceived privacy protection will positively influence Taiwanese’s intention to use online financial services.

### 2.4 Perceived security

Perceived security is conceptualized as “the extent to which one believes that the World Wide Web is secure for transmitting sensitive information” (Salisbury et al., 2001, p. 166). Several studies found that security is a critical factor in attracting online visitors and turning them into online buyers/users (e.g., Park and Kim, 2003), hence becoming a major impediment that may hinder the spread of electronic commerce (EC) (Flavián and Guinalíu, 2006) and strongly influencing the development of e-commerce (Chiu, Lin, and Tang, 2005; Kim and Shim, 2002; Miyazaki and Fernandez, 2001; Park and Kim, 2003). Vijayasarathy and Jones (2000) mentioned that the increase in perceived security risk is attributed to the following reasons: (a) widespread media reports on Internet fraud, (b) people’s insufficient knowledge about encryption, (c) lack of understanding of technical jargon for Internet security, (d) the absence of payment standards, (e) distrust of Internet business, and (f) concerns about credit card information.

In the field of e-commerce, there are four key dimensions to security: (a) integrity, (b) confidentiality, (c) authentication, and (d) non-repudiation. Integrity involves the impossibility of received or transmitted information being changed by unauthorized third parties. Confidentiality refers to the ability to ensure that only authorized people can see the information. Regarding to authentication, it is defined as the ability to recognize the identity of entity you are doing business with. Finally, non-repudiation is defined as the ability to prevent EC participants from repudiating/denying a certain online operation they had conducted (Flavián and Guinalíu, 2006; Laudon and Traver, 2007).

Adopting online shopping may involve a higher degree of perceived risk than adopting other new IT products (Casalo, Flavián, and Guinalíu, 2007; Salisbury et al., 2001). Most of the online companies are new to consumers, and the absence of physical contact produces feelings of uncertainty and distrust (Casalo et al., 2007). Some empirical evidences have also shown that perceived security significantly affects consumers’ loyalty toward adopting web sites (Flavián and Guinalíu, 2006), their attitudes toward using technological innovations, their intentions to use new IT products (Chiu et al., 2005; Choi and Lee, 2003; Fenech and O’Cass, 2001; Kim and Shim, 2002), and their actual use of IT innovations (Miyazaki and Fernandez, 2001). Hence, based on the above empirical support, the hypothesis is proposed as below:

**H5:** Perceived security will positively influence Taiwanese’s intention to use online financial services.

### 2.5 Company reputation

Reputation is defined as “the extent to which buyers believe a selling organization is honest and concerned about its customers” (Jarvenpaa et al., 2000, p. 48). Reputation signals consumers about how a company’s products/services compare to its competitors. Positive reputations can attract the attention of investors, reduce capital cost, and increase a firm’s
competitive advantage (Fombrun and Shanley, 1990). Hence, reputation is viewed as a crucial intangible asset to the companies.

In addition, it has been reported in prior research that company reputation indirectly or directly affects consumers’ trust (Flavián, Guinalíu, and Torres, 2005; Jarvenpaa et al., 2000; Jin, Park, and Kim, 2008), perceived risk of innovations (Grewal, Munger, Iyer, and Levy, 2003; Jarvenpaa et al., 2000; Ruyter et al., 2001), perceived product quality (Chen and Dubinsky, 2003; Shapiro, 1983; Teas and Agarwal, 2000), price expectations (Grewal et al., 2003; Standifird, 2001), and beliefs about and attitude toward innovations (Brown and Dacin, 1997; Chen and Dubinsky, 2003; Jarvenpaa et al., 2000). Based on the previous reviews, the hypothesis is proposed as follows:

\[ H_6: \text{Company reputation will positively influence Taiwanese’s intention to use online financial services.} \]

2.6 Convenience

Convenience refers to how easy customers can conduct transactions (Khalifa and Shen, 2008) and denotes the time and effort put into purchasing a product or using a service (Berry et al., 2002; Brown, 1989). Convenience can be classified into five dimensions: (a) time saving, (b) more flexibility in the timing of shopping, (c) reduction in physical effort of visiting a store, (d) reduction in aggravation, and (e) opportunity for impulse purchasing (Darian, 1987). Convenience in home shopping enhances the search efficiency of individuals by avoiding heavy traffic and saving time from waiting for long queue, looking for parking space and travelling to and from a store (Childers, Christopher, Carr, and Carsons, 2001).

Accordingly, it has been reported in past research that convenience is a major determinant of customer satisfaction (Szymanski and Hise, 2000) and consumers’ adoption of in-home and online retail shopping (Bhatnagar, Misra, and Rao, 2000; Darian, 1987; Dholakia and Uusitalo, 2002; Karayanni, 2003). Based on the reviews of prior literature, the hypothesis is stated as follows:

\[ H_7: \text{Convenience will positively influence Taiwanese’s intention to use online financial services.} \]

2.7 Internet-related experience

Prior research has suggested that previous experience of using computers and the Internet has a significant effect on online consumers’ behavioral intentions to conduct online activities (Park and Jun, 2003; Shim et al., 2001; Taylor and Todd, 1995; Yoh et al., 2003).

\[ H_8: \text{Internet-related experience will positively influence Taiwanese’s intention to use online financial services.} \]

2.8 The adoption online financial services

TAM postulated that behavioral intention serves as the major predictor of usage behavior (Davis et al., 1989; Davis and Venkatesh, 1996, 2000; Venkatesh et al., 2003). It has been reported in prior research that individuals’ actual behavior can be accurately predicted by individuals’ behavioral intention when this behavior is in the control of individuals (Ajzen, 1988; Evans, Jamal, and Foxall, 2006; Gopi and Ramayah, 2007; Pavlou and Fygenson, 2006). However, researchers have questioned the pertaining of inconsistent results by using individual’s intention as a surrogate of actual behavior (Limayem et al., 2001; Sutton, 1998; Venkatesh et al., 2002). In this study, the adoption of online financial services was conceived from the differences between adopters and non-adopters.

\[ H_9: \text{There will be significant differences in the determinants of online financial services between adopters and non-adopters.} \]
Based on the hypotheses above, the determinants of online financial services adoption include: (a) perceived usefulness, (b) perceived ease of use, (c) consumer innovativeness, (d) perceived privacy protection, (e) perceived security, (f) convenience, (g) company reputation, (h) Internet-related experience, (i) intention to adopt online financial services. Through the mediating effect of intention, the adopters and non-adopters are further classified. As shown in Figure 1, the research framework, which schematized the relationships among the variables, is illustrated in Figure 1.

![Figure 1. Conceptual framework of online financial services adoption](image.png)

3. **Research method**

3.1 **Sampling procedure**

The target population is non-student Internet users in Taiwan because Taiwan student Internet users are characterized as a group of low income/low purchasing power, which limits their abilities to purchase certain online financial products, such as stock, mutual funds, and life insurance. In addition, lacking the sampling frame of Taiwan non-student Internet users leads to the use of non-probability sampling method (Craig and Douglas, 2005); hence, the technique of convenience sampling was utilized in this study.

To effectively reach the target population, first, the Taipei metropolitan area is chosen, which is the metropolitan area in Taiwan with the biggest population (over one third of Taiwan’s population) and the highest Internet penetration rate (83.11%) (Taiwan Network Information Center [TWNIC], 2008). Then, malls and business districts which attract non-student Internet user within the Taipei metropolitan area are randomly chosen. The subjects are intercepted in the entranceway and inquired their willingness to help complete a questionnaire.

The survey was conducted between December 2008 and February 2009. For obtaining a proper sampling size, some prior studies using the non-probability sampling/convenience sampling method showed that sample respondents ranging from 102 to 200 are sufficient to yield practically significant results (Casalo et al., 2007; Chellappa and Pavlou, 2002; Chen and Dubinsky, 2003; Jarvenpaa et al., 2000; Karayanni, 2003; Udo, 2001; Vijayasarathy and Jones, 2000; Wang et al., 2003). Moreover, from the perspective of factor analysis, Field (2005) argued that “a sample of 300 or more will probably provide a stable factor solution”
Based on the above reviews, the sample of this study consisted of more than 300 (n=333) usable Taiwanese non-student Internet users. In addition, to solve the survey translation problems in the contexts of different countries, a double/back translation technique is utilized in this study. The survey questionnaire is initially developed in English and then translated into Chinese by a bilingual translator with high levels of proficiency in both English and Chinese. Finally, the Chinese questionnaire is back-translated into English by another bilingual translator proficient in English and Chinese. By doing so, the researchers can compare those two versions of the English questionnaire for any “inconsistencies, mistranslations, meanings, culture gaps, and/or lost words or phrases…this process has been described as one of the most adequate translation process” (McGorry, 2000, p. 76).

Moreover, to reduce non-response error and enhance response accuracy, prepaid financial incentives of $2.00 are enclosed with the request as a way of giving a reward for respondents’ participation and showing the researcher’s trust in participants who could possibly pocket the money and not give any usable answers (Dillman, 2007). Since this study adopted convenience sampling method and incentives, the response rate was not attainable and of less concern (Corbitt et al., 2003).

3.2 The development of research instrument

A self-administered survey questionnaire was designed to address the issues concerning Taiwan consumers’ adoption of online financial services. To ensure the content validity, most of the items on this survey questionnaire were selected and adapted from previous relevant studies (Casalo et al., 2007; Wang et al., 2003). Some of the items were developed solely to measure important concepts not discussed by prior research (Table 1).

Previous Internet-related experience is measured by the frequency that users engaged in the use of online financial services by five-point interval scale, ranging from never to very often (more than once per week). Other research items are measured on a 5-point Likert-type scale, ranging from strongly disagree to strongly agree. Sample characteristics, such as age, gender, education level, and marital status were measured in categorical responses.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Survey Questions</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous Internet-related experience</td>
<td>2-3</td>
<td>McKechnie, Winklhofer, and Ennew (2006)</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>5-8</td>
<td>Chiu, Lin, and Tang (2005); Taylor and Todd (1995)</td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>9-14</td>
<td>Chiu et al. (2005); Davis and Venkatesh (2000)</td>
</tr>
<tr>
<td>Consumer innovativeness</td>
<td>15-20</td>
<td>Citrin et al. (2000); Goldsmith and Hofacker (1991)</td>
</tr>
<tr>
<td>Perceived privacy protection</td>
<td>21-25</td>
<td>Casalo et al. (2007)</td>
</tr>
<tr>
<td>Perceived security</td>
<td>26-29</td>
<td>Chiu et al. (2005); Salisbury et al. (2001)</td>
</tr>
<tr>
<td>Company reputation</td>
<td>30-32</td>
<td>Casalo et al. (2007); Flavián and Guinaliu (2006)</td>
</tr>
<tr>
<td>Convenience</td>
<td>33-35</td>
<td>Gerrardand and Cunningham (2003)</td>
</tr>
<tr>
<td>Intention</td>
<td>36</td>
<td>Davis and Venkatesh (2000)</td>
</tr>
</tbody>
</table>
3.3 Validity and reliability of measurement instrument

Factor analysis is performed to assess construct validity (Karjaluoto, Mattila, and Pento, 2002; Ndubisi and Sinti, 2006; Park and Kim, 2003; Straub and Carlson, 1989; To and Ngai, 2006; Yoh et al., 2003). Principal component analysis (PCA) with a varimax rotation is employed. In this study, factor analysis is deemed appropriate because the Kaisers-Meyer-Olkin (KMO) measure of sampling adequacy (0.9) indicates superb sampling adequacy, and Bartlett’s test of sphericity ($p=0.000$) is significant.

The results of factor analysis show that each item has significant factor loading (i.e., factor loading $>0.4$) on only one factor and no item was found to have cross-loading (i.e., more than one significant loading)(Gefen and Straub, 2005). Also, the eight factors retained account for 73.7% of the total variance and were considered satisfactory in social sciences (Hair et al., 2006). In addition, all variables were valid from multicollinearity as both Tolerance and VIF indicators are close to 1. Based on the above, construct validity of the different subscales was confirmed. In addition, Cronbach’s alpha, “the most widely used measure” (Hair et al., 2006, p. 137), is utilized to assess the reliability/internal consistency of each subscale. The threshold value of acceptable Cronbach’s alpha is 0.7 (Hair et al., 2006; Nunnally, 1978). All of the coefficient alpha values, ranging from 0.833 for Internet-related experience to 0.937 for perceived ease of use, were higher than the threshold value of 0.7. Therefore, good reliability of various subscales is ensured (Table 2).

<table>
<thead>
<tr>
<th>Construct</th>
<th>Item Label/ Variable</th>
<th>Eigenvalue</th>
<th>Factor Loading</th>
<th>Variance Explained Percentage</th>
<th>Cumulative Percentage</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet-Related Experience</td>
<td>Q2INTE1</td>
<td>1.06</td>
<td>0.79</td>
<td>3.20</td>
<td>3.20</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>Q3INTE2</td>
<td></td>
<td>0.83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>Q5PU1</td>
<td>1.59</td>
<td>0.68</td>
<td>4.82</td>
<td>8.02</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>Q6PU2</td>
<td></td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q7PU3</td>
<td></td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q8PU4</td>
<td></td>
<td>0.74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company Reputation</td>
<td>Q30CR1</td>
<td>1.40</td>
<td>0.86</td>
<td>4.24</td>
<td>12.26</td>
<td>0.91</td>
</tr>
<tr>
<td></td>
<td>Q31CR2</td>
<td></td>
<td>0.90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q32CR3</td>
<td></td>
<td>0.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>Q9PE1</td>
<td>10.41</td>
<td>0.61</td>
<td>31.56</td>
<td>43.81</td>
<td>0.94</td>
</tr>
<tr>
<td></td>
<td>Q10PE2</td>
<td></td>
<td>0.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q11PE3</td>
<td></td>
<td>0.85</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q12PE4</td>
<td></td>
<td>0.88</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q13PE5</td>
<td></td>
<td>0.84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q14PE6</td>
<td></td>
<td>0.82</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 3. The correlation between research variables

<table>
<thead>
<tr>
<th></th>
<th>PU</th>
<th>PE</th>
<th>CI</th>
<th>PP</th>
<th>PS</th>
<th>CR</th>
<th>CV</th>
<th>INTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE</td>
<td>.628**</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI</td>
<td>.458**</td>
<td>.510**</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP</td>
<td>.284**</td>
<td>.271**</td>
<td>.425**</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS</td>
<td>.314**</td>
<td>.185**</td>
<td>.317**</td>
<td>.444**</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CR</td>
<td>.295**</td>
<td>.238**</td>
<td>.071</td>
<td>.205**</td>
<td>.036</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CV</td>
<td>.578**</td>
<td>.513**</td>
<td>.364**</td>
<td>.279**</td>
<td>.159**</td>
<td>.431**</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>INTE</td>
<td>.192**</td>
<td>.192**</td>
<td>.084</td>
<td>.030</td>
<td>.087</td>
<td>.152**</td>
<td>.160**</td>
<td>--</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).**

The correlation between variables is significant and moderately correlated ($r^2<.50$) as the evidence of discriminant validity (Table 3). After confirming the reliability and validity of research instrument, the score of each item was thus aggregated to create an composite...
scale which represents the research constructs accordingly (Hair, Black, Babin, Anderson, and Tatham, 2006).

4. Analysis and results

4.1 Descriptive analysis

The usable sample for this study includes 333 respondents. Based on the self-reported adoption behavior of online financial services, 333 respondents are divided into groups of adopters (n=217) and non-adopters (n=116) by the mean of their uses. The adopter segment accounted for 65.2% of the whole usable sample and 34.8% of the total usable sample are non-adopters. Within the group of adopters, transferring funds between bank accounts (81.57%), stocks buying/selling (34.10%), and mutual funds buying/selling (27.65%) significantly and clearly dominated other uses of online financial services, such as applications for bank loans (2.30%) and insurance buying (3.23%) (Table 4).

Table 4. Frequency of current adopters for specific types of online financial services

<table>
<thead>
<tr>
<th>Types of online financial services</th>
<th>No. of adopters</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transferring funds between bank accounts</td>
<td>177</td>
<td>81.57</td>
</tr>
<tr>
<td>Application for bank loans</td>
<td>5</td>
<td>2.30</td>
</tr>
<tr>
<td>Foreign currency (buying/selling)</td>
<td>28</td>
<td>12.90</td>
</tr>
<tr>
<td>Stocks (buying/selling)</td>
<td>74</td>
<td>34.10</td>
</tr>
<tr>
<td>Bonds (buying/selling)</td>
<td>5</td>
<td>2.30</td>
</tr>
<tr>
<td>Mutual funds (buying/selling)</td>
<td>60</td>
<td>27.65</td>
</tr>
<tr>
<td>Insurance (buying)</td>
<td>7</td>
<td>3.23</td>
</tr>
</tbody>
</table>

4.2 The demographic differences between non-adopters and adopters in the adoption of online financial services

Chi-square (\(\chi^2\)) test was used to assess whether individual demographics affect the adoption of online financial services. No significant difference was found between gender and whether the respondent was an adopter (\(\chi^2(1)=2.86, p>.05\)). As opposed to 42.2% of non-adopters, only 22.5% of adopters were under the age of 30. Concerning the highest education level, college graduates formed the largest education level group in both non-adopters and adopters (76.7% for non-adopters and 71.4% for adopters). In addition, 46.5% of non-adopters were single, while only 29% of adopters were single. At \(p<.05\), \(\chi^2\) test identified significant differences between non-adopters and adopters in terms of age (\(\chi^2(3)=15.61, p<.05\)), highest education level (\(\chi^2(2)=6.65, p<.05\)), and marital status (\(\chi^2(1)=10.18, p<.05\)) (Table 5).
Table 5. Demographic differences between online financial services non-adopters and adopters

<table>
<thead>
<tr>
<th>Demographic Category</th>
<th>Non-Adopter ((n=116))</th>
<th>Adopter ((n=217))</th>
<th>(\chi^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>47 (40.5%)</td>
<td>109 (50.2%)</td>
<td>2.86</td>
</tr>
<tr>
<td>Female</td>
<td>69 (59.5%)</td>
<td>108 (49.8%)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 under</td>
<td>49 (42.2%)</td>
<td>49 (22.5%)</td>
<td>15.61*</td>
</tr>
<tr>
<td>31-40 yrs</td>
<td>17 (14.7%)</td>
<td>57 (26.3%)</td>
<td></td>
</tr>
<tr>
<td>41-50 yrs</td>
<td>22 (19.0%)</td>
<td>46 (21.2%)</td>
<td></td>
</tr>
<tr>
<td>51 yrs+</td>
<td>28 (24.1%)</td>
<td>65 (30.0%)</td>
<td></td>
</tr>
<tr>
<td>Highest Education Level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School Grad. or Less</td>
<td>21 (18.1%)</td>
<td>31 (14.3%)</td>
<td>6.65*</td>
</tr>
<tr>
<td>College Grad.</td>
<td>89 (76.7%)</td>
<td>155 (71.4%)</td>
<td></td>
</tr>
<tr>
<td>Graduate Degree</td>
<td>6 (5.2%)</td>
<td>31 (14.3%)</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>54 (46.5%)</td>
<td>63 (29.0%)</td>
<td>10.18*</td>
</tr>
<tr>
<td>Married</td>
<td>62 (53.5%)</td>
<td>154 (71.0%)</td>
<td></td>
</tr>
</tbody>
</table>

Note: Data displayed as n (%); there were no expected frequencies/counts less than 5. *p<.05

4.2 The relationship between research factors and usage intention

Due to the concerns of non-normality in the sample distribution, the analysis of correlation (Spearman’s rho) is chosen to identify the relationship between each research factor and intention to use online financial services. The hypotheses (H1~H8) are well supported except for the relationship between company reputation (H6) and intention to use online financial service is insignificant \((p>.05)\) (Table 6).

Table 6. The correlation between research indicators and intention to use online financial services

<table>
<thead>
<tr>
<th>INTE</th>
<th>PU</th>
<th>PEOU</th>
<th>CI</th>
<th>PP</th>
<th>PS</th>
<th>CR</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention</td>
<td>.203**</td>
<td>.624**</td>
<td>.522**</td>
<td>.502**</td>
<td>.211**</td>
<td>.287**</td>
<td>.066</td>
</tr>
</tbody>
</table>

Note: **Correlation is significant at p<0.01; *Correlation is significant at p<0.05 (2-tailed)
4.3 The differences in research factors between adopters and non-adopters

To identify the differences in 9 research factors: (a) internet-related experience, (b) perceived usefulness, (c) perceived ease of use, (d) consumer innovativeness, (e) perceived privacy protection, (f) perceived security, (g) company reputation, (h) convenience, and (i) intention between adopters and non-adopters of online financial services, the test of Mann-Whitney U was employed. The results show there are significant differences in the factors of internet-related experience, perceived usefulness, consumer innovativeness, perceived privacy protection, perceived security, convenience and intention (p<.05), except for company reputation where its significant level is larger than .05 (Table 7).

Table 7. Differences in research factors between non-adopters and adopters

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean Rank</th>
<th>Mann-Whitney U</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-adopter (n=116)</td>
<td>Adopters (n=217)</td>
</tr>
<tr>
<td>Internet-related Experience</td>
<td>150.44</td>
<td>175.85</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>101.37</td>
<td>202.09</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>109.17</td>
<td>197.91</td>
</tr>
<tr>
<td>Consumer Innovativeness</td>
<td>109.41</td>
<td>197.79</td>
</tr>
<tr>
<td>Perceived Privacy Protection</td>
<td>149.67</td>
<td>176.26</td>
</tr>
<tr>
<td>Perceived Security</td>
<td>132.51</td>
<td>185.44</td>
</tr>
<tr>
<td>Company Reputation</td>
<td>163.65</td>
<td>168.79</td>
</tr>
<tr>
<td>Convenience</td>
<td>135.48</td>
<td>183.85</td>
</tr>
<tr>
<td>Intention</td>
<td>82.82</td>
<td>212</td>
</tr>
</tbody>
</table>

Note: *Significant at p<.05

4.4 Prediction of adoption behavior

A logistic regression model, given by equation below, is utilized to estimate the likelihood of each respondent adopting online financial services and to identify theoretical factors that significantly predict whether an individual adopts online financial services.

\[
\text{Logit} = \ln \left( \frac{P}{1-P} \right) = B_0 + B_1X_1 + \ldots + B_iX_i
\]

where \(P\), lying between 0 and 1, is the probability of event occurring, \(B_0\) denotes a constant, and \(B_i\) the effect of predictor variable \((X_i)\) on \(P\), represents the coefficient of \(X_i\). In this study, \(P\) represents the probability of an individual’s adopting online financial services and \(X_i\) denotes theoretical factor \(i\), for example, consumer innovativeness.

This logistic regression model accurately predicts the group membership (i.e., adopters and non-adopters). For non-adopters, this model correctly classifies 69 respondents who do not adopt any online financial services, but misclassifies 47 cases; thus, it correctly classifies about 60% of the cases (69/116). For adopters, this model correctly classifies 192 respondents who adopted online financial services, but misclassifies 25 cases, so it correctly classifies 88.5% of the cases (192/217). Overall, this logistic regression model accurately predicts/classifies 78.4% of respondents. Also, this model had Nagelkerke R² value of 0.492, that is, approximately 50% of the variation between non-adopters and adopters is explained by this logistic regression model.
In addition, the non-significant value ($p>0.886$) of the Hosmer-Lemeshow goodness-of-fit statistic ($X^2=3.660$) indicates that this logistic regression model is significantly differed from a perfect model, which can classify/fit observed data very well (Field, 2005; Hair et al., 2006; Mavri and Ioannou, 2006; To and Ngai, 2006). In other words, the proposed logistic regression model equation can satisfactorily predict an individual’s adoption behavior of online financial services.

Perceived usefulness (PU), perceived ease of use (PEOU), consumer innovativeness (CI), perceived privacy (PP), and perceived security (PS) had significantly positive associations with the probability of an individual’s adopting online financial services where $B>0$ and $p$-value <.05. On the other hand, according to the Wald test in Table 8, the original coefficients ($B$) of company reputation (CR), convenience (CV), and previous Internet-related experience (IRE) are not significantly different from zero, $p$-value >.05.

Table 8. The results of logistic regression testing

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>S.E</th>
<th>Wald</th>
<th>$df$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PU</td>
<td>1.416</td>
<td>0.311</td>
<td>20.781</td>
<td>1</td>
<td>0.000*</td>
</tr>
<tr>
<td>PEOU</td>
<td>0.842</td>
<td>0.265</td>
<td>10.076</td>
<td>1</td>
<td>0.002*</td>
</tr>
<tr>
<td>CI</td>
<td>1.107</td>
<td>0.267</td>
<td>17.243</td>
<td>1</td>
<td>0.000*</td>
</tr>
<tr>
<td>PP</td>
<td>0.516</td>
<td>0.211</td>
<td>5.944</td>
<td>1</td>
<td>0.015*</td>
</tr>
<tr>
<td>PS</td>
<td>0.546</td>
<td>0.227</td>
<td>5.798</td>
<td>1</td>
<td>0.016*</td>
</tr>
<tr>
<td>CR</td>
<td>-0.063</td>
<td>0.243</td>
<td>0.068</td>
<td>1</td>
<td>0.794</td>
</tr>
<tr>
<td>CV</td>
<td>-0.324</td>
<td>0.325</td>
<td>0.993</td>
<td>1</td>
<td>0.319</td>
</tr>
<tr>
<td>IRE</td>
<td>0.083</td>
<td>0.173</td>
<td>0.230</td>
<td>1</td>
<td>0.632</td>
</tr>
<tr>
<td>Constant</td>
<td>-8.806</td>
<td>1.448</td>
<td>36.973</td>
<td>1</td>
<td>0.000*</td>
</tr>
</tbody>
</table>

Note: *Significant at $p<.05$

However, company reputation (CR), convenience (CV), and Internet-related experience (IRE) had no significant associations with the probability of an individual’s adopting online financial services. Based on the above, the logistic regression model of this study can be proposed as follows:

$$
\text{Logit} = \ln \left[ \frac{P}{1-P} \right] = -8.806 + (1.416 \text{ Perceived usefulness}) \\
+ (.842 \text{ Perceived ease of use}) + (.107 \text{ Consumer innovativeness}) \\
+ (.516 \text{ Perceived privacy}) + (.546 \text{ Perceived security})
$$

where $P$ means the probability of an individual adopting online financial services.

The results of predictive accuracy show the logistic regression model can accurately predict group membership (i.e., adopters and non-adopters) (Table 9). For non-adopters, this model correctly classified 69 respondents who didn’t adopt any online financial services, but misclassified 47 cases; thus, it correctly classified about 60% of the cases (69/116). For adopters, this model correctly classified 192 respondents who adopted online financial services, but misclassified 25 cases, so it correctly classified 88.5% of the cases (192/217). Overall, this logistic regression model accurately predicted/classified 78.4% of respondents. Also, this model had Nagelkerke $R^2$ value of .492, that is, approximately 50% of the variation between non-adopters and adopters can be explained by this logistic regression model.
Table 9. The predicative accuracy of logistic regression modela

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
<th>Percentage correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adopter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Adopter</td>
<td>69</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>192</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. The cut value is .500

As presented in Table 10, the non-significant value (.886) of the Hosmer-Lemeshow goodness-of-fit statistic ($X^2=3.660$) indicated that this logistic regression model didn’t significantly differ from a perfect model, which can classify/fit observed data very well (Field, 2005; Hair et al., 2006; Mavri and Ioannou, 2006; To and Ngai, 2006), that is, the proposed logistic regression model equation (2) can satisfactorily predict an individual’s adoption behavior of online financial services.

Table 10. Hosmer and Lemeshow test

<table>
<thead>
<tr>
<th>Chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.660</td>
<td>8</td>
<td>.886</td>
</tr>
</tbody>
</table>

As noted, all theoretical factors except company reputation had statistically significant relationships with Taiwan consumers’ intention to adopt online financial services. Also, the results from the test of a logistic regression model indicate that all theoretical factors, excluding company reputation, convenience, and previous Internet-related experience, are considered significant predictors toward the adoption of online financial services. Although the factors such as convenience and previous Internet-related experience have shown significant relationships with Taiwan consumers’ intention to adopt online financial services, they cannot significantly predict Taiwan consumers’ actual adoption behavior of online financial services.

With regard to the relative influence of each of the theoretical factors considered, it is noteworthy that some theoretical factors had a significant influence on the likelihood of Taiwan consumers’ adoption of online financial services while others showed no clear influence on the probability of Taiwan consumers adopting the online financial services. The logistic regression model indicated that the most influential factor is perceived usefulness ($B=1.416$), followed by consumer innovativeness ($B=1.107$), perceived ease of use ($B=0.842$), perceived security ($B=0.546$), and then perceived privacy protection ($B=0.516$). On the contrary, previous Internet-related experience (IRE), company reputation (CR), and convenience (CV) were found to have no significant effect.

5. Discussions

The purpose of this study was to identify the factors that may affect Taiwan consumers’ adoption of online financial services. Prior studies associated with the adoption of information technology (IT) did not provide an empirical framework to examine the Taiwan consumers’ adoption of online financial services technologies. This
study mainly contributes to the theory of technology adoption by adapting the extended version of TAM (TAM2) to examine the adoption of online financial services in another context. Moreover, to make this study more theoretically sound and more practically robust, other variables, which have proven academically important in influencing consumers’ intention to use information technology or Internet-based information systems, were added to this framework.

According to government statistics, the adoption of online financial services is still slow. In contrast to United States, Taiwan is characterized by a high degree of uncertainty avoidance national culture (Hofstede and Hofstede, 2005). Uncertainty avoidance refers to “the extent to which people feel threatened by uncertainty and ambiguity and try to avoid these situations” (Mooij, 2004, p. 35). In general, Taiwanese are more likely to feel threatened by uncertainty and ambiguity, trying to avoid these situations, than are Americans. Also, some studies suggested that company reputation could significantly reduce the uncertainties, lower perceptions of risks, and increase the trustworthiness (Grewal et al., 2003). Based on the above, there is a potential indication that Taiwan consumers will place a great emphasis on the company reputation in order to reduce the uncertainties and risk perceptions when they purchase goods online or in physical stores. This reasonable inference might provide a satisfactory account of insignificant relationship between company reputation and Taiwan consumers’ intention to use online financial services and may explain the poor ability of company reputation to predict Taiwan consumers’ actual adoption behavior of online financial services.

Derived from the constructs in TAM2, the effect of perceived usefulness is moderate and positively correlated with Taiwan consumers’ intention to use online financial services. Hence, this research suggests that when planning/developing their online financial services systems, financial institutions in Taiwan should lay more stress on how to reduce Internet users’ task ambiguities and enhance their job performance. To increase perceived usefulness, the online financial services Web sites should (a) provide detailed and informative content of their financial services, (b) allow personalized services to be delivered, such as personalized messages and recommended lists of financial services based on consumers’ personal profiles, (c) respond in a timely manner to customer inquiries and complaints, and (d) deliver their financial services to customers as advertised.

The perceived ease of use had a moderate and positive relationship with Taiwan consumers’ intention to use online financial services and acted as a statistically significant predictor of actual adoption behavior of online financial services. This result is in line with numerous previous IT adoption studies (Adams et al., 1992; Gefen et al., 2003; Lu et al., 2003; Ramayah and Lo, 2007; Szajna, 1994). Therefore, it is recommended that Taiwan online financial services providers should make their Web sites easy to understand, to browse, to place orders, and to make payments. For instance, Taiwan online financial services providers could offer the following system features to improve their perceived ease of use: (a) few clicks to use/buy, (b) easy contact, and (c) simple service list navigation. Also, the Taiwan government should commit itself to improving network infrastructure in order to provide people in Taiwan with affordable and reliable high-speed Internet access.

With respect to the intention variable, it was found that online financial services adopters have stronger intention to use than non-adopters. This finding is in accord with the results of prior research, indicating that individuals’ actual behavior can be accurately predicted by individuals’ behavioral intention (Ajzen, 1988; Evans et al., 2006; Gopi and Ramayah, 2007; Pavlou and Fygenson, 2006). According to the extended version of TAM (TAM2) (Davis and Venkatesh, 1996, 2000), both perceived usefulness and perceived ease of use have direct influences on the behavioral intention to use IT, and then such behavioral intention will lead to actual IT adoption. Based on the above findings, this study suggested that TAM2 is a
valid model to predict Taiwan consumers’ intention to use online financial services and to explain the intention difference between adopters and non-adopters in Taiwan financial services sector.

The finding shows that consumer innovativeness is not merely moderate and positively correlated with Taiwan consumers’ intention to use online financial services but is significant in predicting whether an individual would adopt online financial services. This result is consistent with many prior innovation adoption studies (Citrin et al., 2000; Goldsmith, 2000, 2001; Goldsmith and Flynn, 2004).

Previous studies suggested that consumer innovators, characterized by high consumer innovativeness, usually act as opinion leaders, hence providing important word-of-mouth advertising to facilitate/accelerate the diffusion of new products (Flynn and Goldsmith, 1993; Goldsmith and Flynn, 1995; Im et al., 2003). They tend to spend more money, shop more frequently, and adopt more new products than later adopters (Blake, Neuendorf, and Valdiserri, 2003; Citrin et al., 2000; Goldsmith, 2000; Goldsmith and Flynn, 1995, 2005; Im et al., 2003). For these reasons, this study implies that in order to effectively attract more innovative adopters, Taiwan financial institutions should pay much attention to the improvements in their existing online financial services and making great efforts to innovate new online financial services. In addition, Taiwan financial institutions’ advertising should provide more information about innovation features of their online financial services to capture consumer innovators’ attention and form their favorable attitudes.

As for perceived privacy protection and perceived security, the results indicate that both predictors are positively associated with Taiwan consumers’ intention to use online financial services and are significant in predicting whether an individual will adopt online financial services. Such findings are in accord with previous IT adoption research (Chiu et al., 2005; Choi and Lee, 2003; Fenech and O’Cass, 2001; Flavián and Guinaliu, 2006; Kelly and Erickson, 2004; Liebermann and Stashevsky, 2002; Miyazaki and Fernandez, 2001). As a result, this study suggests that online financial services providers should give priority to the enhancement of privacy protection and system security so that consumer trust can be increased.

To reinforce customers’ perceived security of online financial services, Taiwan financial institutions have to provide necessary hardware and software, for example, the latest encryption software, firewall and operation system security enhancements, anti-virus program, digital wallets, and secure electronic billing presentation and payment (EBPP) systems. It is strongly recommended that Taiwan online financial services providers should develop a solid system security plan to assess potential security risk regularly and perform security audit routinely. Furthermore, the Taiwan government and online financial services providers should educate current and potential online financial services users about Internet privacy and security issues through free courses, print media, or TV commercials. Also, the Taiwan government and congress should dedicate themselves to providing solid, comprehensive legal protections to Web privacy and security, closely supervising industry self-regulation for online privacy and security.

6. Limitations and avenue for future research

There are some limitations occurred in this study. First, the convenience sampling method used in this study may preclude research findings from being generalized to the whole population of Taiwan online financial services users. So, future research should use these results with caution when investigating issues related to adoption behavior of
online financial services. More studies of Taiwan consumers’ adoption of online financial services must be done to confirm and expand these findings.

Second, although the extended version of TAM (TAM 2) is widely used in IT adoption studies, alternative models, such as Diffusion of Innovation (DOI) (Rogers, 2003) and Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975), might further advance the body of knowledge about technology acceptance issues and provide deep insight into adoption behavior of online financial services. Rogers’s research work on diffusion of technology innovations placed particular emphasis on perceived attributes of innovation, namely, relative advantage, compatibility, trialability, observability, and complexity (Black, Lockett, Winklhofer, and Ennew, 2001; Rogers, 2003). The Theory of Reasoned Action (TRA) was posited that attitude toward behavior and subjective norm jointly determine behavioral intention. Then, behavioral intention will lead to actual adoption (Fishbein and Ajzen, 1975).

Third, this study is cross-sectional and thus only shows a snapshot of one point in time. Future research might use a longitudinal research approach by repeating studies at regular intervals to further understanding of interrelationships and causal linkages between those theoretical factors, to help discover the differences in theoretical factors between earlier adopters and later adopters, and to examine intention change of non-adopters.

Moreover, in this study, it is found that there exist significant demographic differences between non-adopters and adopters in terms of age, highest education level, and marital status. Future research focusing on market segmentation of Internet financial services might need to further investigate those personal characteristics. Kolter (2003) described demographic variables as the most popular base for segmenting consumer markets. “One reason is that consumer wants, preferences, and usage rates are often associated with demographic variables. Another reason is that demographic variables are easy to measure” (p. 287).

Fourth, the relatively low explained variance (Nagelkerke $R^2$ value of .492) of this research may indicate a limitation, that is, the theoretical factors selected in this study might not encompass all the factors that could have a significant effect on Taiwan consumers’ adoption of Internet financial services. Hence, in order to improve ability to predict Taiwan consumers’ actual adoption behavior of online financial services, additional research efforts may be needed to take into account other influential factors suggested by prior empirical studies of Internet retail shopping from western countries, such as experiential value, hedonic motivation, and utilitarian motivation (Childers et al., 2001; Demangeot and Broderick, 2006; Mathwick, Malhotra, and Rigdon, 2001; Monsuwe et al., 2004).

Finally, as mentioned earlier, the Taiwan mobile Internet segment has displayed the fastest growth in the past 5 years, with subscribers in 2007 holding nearly 80% of Taiwan Internet users and representing 51.3% of total Taiwan inhabitants. Comparing to traditional Internet access method using telephone or cable networks, the new Internet access method via wireless mobile devices—for example, cell phone, personal digital assistant (PDA) and mobile computer—allows financial services to be extended to the environment without the telephone line or cable, providing great business opportunities for Taiwan financial institutions. Hence, it is worthy of investigating how mobile devices and wireless Web technologies, such as WiMax, influence Taiwan consumers’ perception of using Internet financial services and what theoretical factors significantly affect Taiwan consumers’ intention to use wireless financial services in future research.

Acknowledgement

The original transcript has been presented in the 2010 Pacific Asia Conference on Information Systems.
References


