A STUDY ON TAIWAN CONSUMERS’ ADOPTION OF ONLINE FINANCIAL SERVICES

Chih-Chia Chang, Investor Relations, Chunghwa Telecom, Taipei, Taiwan, R.O.C., bg22332@gmail.com
Po-Chien Chang, School of BIT & Logistics, RMIT University, Melbourne, Australia, jeffery.chang@rmit.edu.au

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 demonstrated 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: Taiwan; Technology Acceptance Model; TAM 2; Adoption; Online financial services
1 INTRODUCTION

In Taiwan, traditional brick-and-mortar retail financial services remain the most widely-used method for buying and using financial services. However, most financial institutions are facing growing pressure to cut operating costs and consolidate 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 & Fang, 2004). After coping with such situations in years, 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 REVIEW

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, & Warshaw, 1989; Davis & 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 two 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 & Straub, 1997; Gefen et al., 2003; Ramayah & Lo, 2007; Szajna, 1994). Hence, this research model retains the major variables of TAM, namely, perceived usefulness and perceived ease of use. 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. Based on prior studies, those variables include (a) perceived privacy protection, (b) perceived security, (c) convenience, (d) previous Internet-related experience, (e) company reputation, and (f) consumer innovativeness.

It is also 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 &
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 & 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; Szajna, 1994). So, based on the above theoretical and empirical support from the reviews, hypothesis is summarized as follows:

**H1**: Perceived usefulness will significantly 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 & 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 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). Based on the previous literature, the hypothesis is proposed below:

**H2**: Perceived ease of use will significantly 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 (Goldsmith, 2001; 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 & Hirunyawipada, 2006), thus may be not useful and valuable for researchers to study individuals’ innovativeness within a specific domain/specific product category (Goldsmith & 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 & 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 (Goldsmith, 2001; Steenkamp et al., 1999). Prior research has also suggested that consumer innovativeness has a significant impact on consumers’ attitudes toward using IT innovations (Goldsmith, 2000) and affecting consumers’ adoption behavior of IT innovations (Citrin et al., 2000; Goldsmith, 2000, 2001; Goldsmith & Flynn, 2004). Therefore, based on the previous literature, the following hypothesis is thus proposed:

**H3:** Consumer innovativeness will significantly 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 & 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 & Lee, 2003; Flavián & Guinaliu, 2006; Kelly & Erickson, 2004). Given these potential influences, the hypothesis is stated as follows:

**H4:** Perceived privacy protection will significantly 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 & Kim, 2003), hence becoming a major impediment that may hinder the spread of electronic commerce (EC) (Flavián & Guinaliu, 2006) and strongly influencing the development of EC (Chiu, Lin, & Tang, 2005; Kim & Shim, 2002; Park & 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.

Adopting online shopping may involve a higher degree of perceived risk than adopting other new IT products (Casalo, Flavián, & Guinaliu, 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 & Guinaliu, 2006), their attitudes toward using technological innovations, their intentions to use new IT products (Choi & Lee, 2003;
Fenech & O’Cass, 2001; Kim & Shim, 2002), and their actual use of IT innovations (Miyazaki & Fernandez, 2001). Hence, based on the above empirical support, the hypothesis is proposed as below:

**H5:** Perceived security will significantly 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 & 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, & Torres, 2005; Jarvenpaa et al., 2000; Jin, Park, & Kim, 2008), perceived risk of innovations (Grewal, Munger, Iyer, & Levy, 2003; Jarvenpaa et al., 2000), perceived product quality (Chen & Dubinsky, 2003; Teas & Agarwal, 2000), price expectations (Grewal et al., 2003), and beliefs about and attitude toward innovations (Jarvenpaa et al., 2000). Based on the previous reviews, the hypothesis is proposed as follows:

**H6:** Company reputation will significantly influence Taiwanese’s intention to use online financial services.

2.6 Convenience

Convenience refers to how easy customers can conduct transactions (Khalifa & Shen, 2008) and denotes the time and effort put into purchasing a product or using a service (Berry et al., 2002). 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, & Carsons, 2001). Accordingly, it has been reported in past research that convenience is a major determinant of customer satisfaction (Szymanski & Hise, 2000) and consumers’ adoption of in-home and online retail shopping (Dholakia & Uusitalo, 2002; Karayanni, 2003). Based on the reviews of prior literature, the hypothesis is stated as follows:

**H7:** Convenience will significantly 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 & Jun, 2003; Shim et al., 2001; Yoh et al., 2003). Hence, the following hypothesis is proposed as follows:

**H8:** Internet-related experience will significantly influence Taiwanese’s intention to use online financial services.

2.8 Intention to Use Online Financial Services

Intention is defined as “a person’s location on a subjective probability dimension involving a relation between himself and some action” (Fishbein & Ajzen, 1975, p. 288). TAM postulated that behavioral intention serves as the major predictor of usage behavior (Davis et al., 1989; Davis & Venkatesh, 1996, 2000). 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). Based on the above reviews, the hypothesis is formulated as follows:
H9: There will be significant differences in the determinants of online financial services between adopters and non-adopters.

Based on prior studies, those variables 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, and (j) adopters and non-adopters of online financial services. As shown in Figure 1, the research framework is thus illustrated (Figure 1).

Figure 1. Conceptual framework of online financial services adoption

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 & 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. Finally, the subjects are intercepted in the entranceway and inquired their willingness to help complete a questionnaire.

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; Chen & Dubinsky, 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” (p. 640). Based on the above reviews, the sample of this study consisted of more than 300 (n=333) usable Taiwanese non-student Internet users.
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). Some of the items were developed solely to measure concepts not discussed by prior research.

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.

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).

3.3 Validity and reliability of measurement instrument

Factor analysis is performed to assess construct validity (Park & Kim, 2003; Straub & Carlson, 1989; To & 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 >.4) on only one factor and no item was found to have cross-loading (i.e., more than one significant loading). Also, the eight factors retained accounted 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.

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). 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 1).
Table 1. 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 differences in research determinants between adopters and non-adopters

To identify the differences in 9 research determinants, the test of Mann-Whitney U was employed. The results show there are significant differences in the variables 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 2).

Table 2. Differences in the research determinants 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

4.3 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. Only the relationship between company reputation (H6) and intention to use online financial services is insignificant (p>0.05) (Table 3).

Table 3. The correlation between research indicators and intention to use online financial services

<table>
<thead>
<tr>
<th></th>
<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>
<td>.514**</td>
</tr>
</tbody>
</table>

Note. ** Correlation is significant at p<0.01; * Correlation is significant at p<0.05 (2-tailed)

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.

\[
\text{Logit} = \ln \left[ \frac{P}{1-P} \right] = B_0 + B_1 X_1 + \ldots + B_i X_i
\]

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 $R^2$ 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). 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, $B>0$, $p<.05$. On the other hand, according to the Wald test in Table 6, the original coefficients (B) of company reputation (CR), convenience (CV), and previous Internet-related experience (IRE) are not significantly different from zero, $p>.05$ (Table 4).

**Table 4. The results of logistic regression testing**

<table>
<thead>
<tr>
<th></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 service. Based on the above, the logistic regression model of this study can be proposed as follows:

$$\text{Logit} = \ln \left[ \frac{P}{1-P} \right] = -8.806 + (1.416 \text{ Perceived usefulness}) + (.842 \text{ Perceived ease of use}) + (1.107 \text{ Consumer innovativeness}) + (.516 \text{ Perceived privacy}) + (.546 \text{ Perceived security})$$

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.
Online shopping has become popular in Taiwan, ranked among the top four of Taiwan’s Internet activities (MIC, 2007). In contrast to the acceptance rate of the Internet and the adoption rate of online shopping, the adoption rate of online financial services is still very low. The above evidence may account in part for why Internet-related experience and convenience concerns do not function as major determinants/significant predictors of an individual’s adoption of online financial services.

In contrast to the United States, Taiwan is characterized by a high degree of uncertainty avoidance national culture (Hofstede & 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; Michaelis et al., 2008). Based on the assumptions 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 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; Szajna, 1994). In addition, 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, they 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 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; Pavlou & Fygenson, 2006). According to the extended version of TAM (TAM2) (Davis & 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 also 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 & 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 (Goldsmith & Flynn, 1995; Im et al., 2003). They tend to spend more money, shop more frequently, and adopt more new products than later adopters (Citrin et al., 2000; Goldsmith, 2000; Goldsmith & 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 (Flavián & Guinaliu, 2006; Kelly & Erickson, 2004). 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 encryption software, firewall and operation system security enhancements, anti-virus program, and secure electronic billing presentment and payment (EBPP) systems. It is strongly recommended that Taiwan online financial services providers should develop a solid 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. 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 & Ajzen,1975), might further advance the body of knowledge about technology acceptance issues and provide deep insight into adoption behavior of online financial services. 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 to further understanding of interrelationships and causal linkages between those theoretical factors. Lastly, the relatively low explained variance (Nagelkerke $R^2$ value of .492) of this research may indicate a limitation. Hence, 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 & Broderick, 2006).

References


