



The importance of perceived trust, security and privacy in online trading systems

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Abstract

Purpose – The purpose of this paper is to test an augmented technology acceptance model (TAM) in the online financial trading context. This research aims to investigate how e-investors are influenced by perceived trust, security, and privacy jointly with traditional TAM constructs.

Design/methodology/approach – The research examines e-investors' behavioral intention to use online dealers' and stockbrokers' services. The model suggests that perceived trust jointly with perceived usefulness and perceived ease of use are important antecedents of intentions; the hypotheses are statistically tested using structural modeling.

Findings – The results from this study suggest that perceived trust, usefulness and ease of use are important issues in online trading systems. The findings suggest that online financial dealers and stockbrokers must improve the security of the online system since e-investors form perceptions about its perceived security and when these perceptions are confirmed, their trust is enhanced and consequently they are more likely to use these online services particularly if the financial information is useful for their purposes.

Research limitations/implications – The findings of the present study have various implications for research as well as practice. First, perceived trust, perceived usefulness and perceived ease of use are critical to the success of an online trading system. Second, perceived privacy did not influence users' beliefs in trust. Since perceived trust and perceived usefulness are the most important antecedents of behavioral intention, managers can increase e-investors' usage intention by improving their beliefs in how the online trading system can enhance their performance and effectiveness using a system with enough security mechanisms. The major limitation is that trust is examined as a single-dimension construct.

Originality/value – This paper is one of the first that has empirically tested the link between trust, security, privacy, usefulness, ease of use and behavioral intention in the online trading context.

Keywords Trust, Data security, Privacy, Communication technologies, Electronic commerce

Paper type Research paper



1. Introduction

Traditional investing has experienced a revolution due to the rise of e-trading services that enable investors to use the internet to conduct secure trading. Like a traditional broker, an online broker executes trades for an investor in exchange for commissions. The primary difference between an online broker and a traditional broker is that the online broker provides electronic, usually internet-based access to client accounts, thus, the physical presence of a broker is inexistent because everything is done online. The use of online trading increased dramatically in the mid- to late-1990s with the introduction of affordable high-speed computers and internet connections, and now investors can buy and sell stocks from more than 100 online brokers with a click

of mouse. Online financial trading websites offer retail investors the ability to trade products in different financial markets. These sites offer direct access to options, futures, foreign currencies, indexes, stocks, and bonds on many financial markets. Online trading is well established and highly developed in the European market. The penetration of e-trading accounts is growing among European investors.

In this research, we define online trading as the act of placing buy or sell orders for financial securities and/or currencies with the use of a brokerage's internet-based proprietary trading platforms. An online trading site is a brokerage house that allows e-investors to buy and sell stocks and obtain investment information from its web site.

Studies of the adoption of the information systems (IS) domain have attempted to explain the relationship between user attitudes, satisfaction and behavioral intention to use and system usage (Gefen and Straub, 1997, 2000; Venkatesh, 2000; Venkatesh and Davis, 2000; Gefen, 2003; Hsu and Lu, 2004; Ong *et al.*, 2004). The technology acceptance model (TAM) proposed by Davis (1989) and Davis *et al.* (1989) has been widely used in explaining the adoption of information technologies (IT) and usage. TAM predicts user acceptance of any technology to be determined by two factors: perceived usefulness and perceived ease of use. TAM, derived from the theory of reasoned action (TRA) (Fishbein and Ajzen, 1975), posits that user perceptions of usefulness and ease of use determine behavioral intention toward using the system.

Researchers have studied how online customers develop their trust toward companies without any face-to-face interaction with direct or indirect with some employee. Further, in the context of online shopping, users have traditionally been hesitant to send personal information through internet (Hoffman *et al.*, 1999). Our paper is one of the first to extend the analysis of the influence of perceived trust, perceived security and perceived privacy in the online trading context.

Studying the acceptance and use of IT has been the focus of many studies in IS research (Baroudi *et al.*, 1986; Hartwick and Barki, 1994; Igarria and Tan, 1997a; Agarwal and Karahanna, 2000; Jiang *et al.*, 2002; Hsu and Chiu, 2004; Shih, 2004). Prior studies have used TAM to predict users' behavior in the online banking context (Chan and Lu, 2004; Pikkarainen *et al.*, 2004; Lai and Li, 2005; Cheng *et al.*, 2006) although online trading covers a wide variety of activities that differ from online banking.

Our primary objective was to examine the influence of perceived trust on the TAM constructs. A secondary objective was to confirm the influence of perceived usefulness, perceived ease of use on intentions to use online trading websites. Therefore, our objective was to validate an augmented TAM instrument in a new context – use the internet for online trading –, and what factors facilitate or impede their use.

2. Theoretical background

2.1 The technology acceptance model

Davis (1989) applied to the IS domain a well-known model in the social psychology domain – the TRA – (Fishbein and Ajzen 1975), which posits that a person's action is a function of that person's behavioral intention. The theory of planned behavior (TPB) (Ajzen, 1988, 1991) can be considered an extension of the TRA. It posits that behavioral intention is jointly determined by attitude and subjective norm, similar to TRA, but with the addition of perceived behavioral control.

According to TAM (Davis, 1989), both perceived usefulness and perceived ease of use influence the attitude of individuals towards the use of a particular technology,

while attitude and perceived usefulness predict the individuals' behavioral intention to use the technology. Perceived usefulness is also influenced by perceived ease of use, since perceived ease of use can indirectly affect the acceptance of technology through perceived usefulness, while behavioral intention is also linked to subsequent adoption behavior. Finally, behavioral intention to use an information system is expected to lead to actual usage.

TAM posits that perceived usefulness and perceived ease of use are the major determinants of IS acceptance. Perceived usefulness was defined as "the degree to which a person believes that using a particular system would enhance his/her job performance", and perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of physical and mental effort" (Davis, 1989, p. 320). Many studies of user acceptance have validated the model empirically (Mathieson, 1991; Taylor and Todd, 1995; Venkatesh, 2000; Venkatesh, Davis, 1996, 2000; Venkatesh and Brown, 2001; Venkatesh *et al.*, 2003). However, in recent studies the attitude construct has been dropped from the original TAM and they found that perceived usefulness and perceived ease of use explained a large portion of the variance for intention to use IT (Gefen *et al.*, 2003).

Further, these two beliefs are likely to be subject to the influences of external variables – constructs such as management support (Igarria and Tan, 1997a); subjective norm (Taylor and Todd, 1995; Karahanna *et al.*, 1999); Technological factors (Wu *et al.*, 2007); social influence processes (Venkatesh and Davis, 2000), or culture across countries (Straub, 1994).

Since online consumers are concerned about privacy and security issues, these constructs have been included in previous studies in the e-commerce context to assess user's perceptions. In these studies significantly and positively affected individual attitudes toward e-shopping have been demonstrated (Shih, 2004; Belanger *et al.*, 2002; Shankar *et al.*, 2002).

Research predicting the behavior of online banking users has also used an augmented TAM to predict user intentions to use online banking (Pikkarainen *et al.*, 2004). They included usefulness, ease of use, privacy and security, enjoyment, information on online banking and quality of internet connection. The findings of the study indicated that perceived usefulness and information on online banking on the web site were the main factors influencing online banking acceptance, thus, more studies on privacy, security, and trust issues are required.

2.2 Perceived trust

Trust allows the expression of an expectation about the future behavior of a person based, in many cases, on previous interactions. Trust has been examined in many disciplines, including social psychology, e-commerce, and e-banking. From the social psychologist perspective, trust is characterized in terms of the expectation and willingness of the trusting party engaging in a transaction. Mayer *et al.* (1995) defined trust as behavioral, based on one person's beliefs about the characteristics of another person. Since, in a virtual environment, the degree of uncertainty of a transaction is higher than in a traditional setting, trust becomes an important factor.

Trust should be a particularly critical factor in an online context in which the consumer does not have direct control over the actions of the vendor. Lack of trust of online businesses is one of the main reasons for customers from not engaging in

commercial transactions on the web (Hoffman *et al.*, 1999; Lee and Turban, 2002; Pavlou, 2003). Therefore, the user's feelings of trust toward an e-service are an important determinant in considering his/her intentions to use, and usage behaviors related to any e-service.

Trust can be based on the rational appraisal of an individual's ability and integrity, and on feelings of concern and benevolence, thus, trust is a multidimensional concept. Mayer *et al.* (1995) defined benevolence as the extent to which a trustee is believed to intend to do good to the truster, beyond his/her own profit motive. They defined integrity as the truster's perception that the trustee will adhere to a set of principles or rules of exchange acceptable to the truster during and after the exchange. These factors increase confidence that a transaction will be successfully completed and help reduce awkwardness, complexity and uncertainty, and increase confidence in the abilities of the other person.

Since customers who trust are more likely to make an online purchase, the importance of trust as a key facilitator of electronic commerce is increasingly being recognized in academic and practitioner communities (Bhattacharjee, 2002; Gefen, 2003; Flavián and Guinaliú, 2006).

Online trust is generated through consumers' positive interactions with an online vendor's web site (Jarvenpaa *et al.*, 2000). When consumers feel comfortable interacting with a web site, they are likely to develop trust in the web site, and trust becomes the key strategy for dealing with uncertainty and fear (Hoffman *et al.*, 1999; Jarvenpaa *et al.*, 1999). In these uncertain situations, consumers' perceptions of a site's information accuracy, ability and willingness to perform expected activities, and conformance between saying and doing contribute to trusting the site (Koufaris and Hampton-Sosa, 2004).

2.3 Perceived security

Since personal and financial information can be intercepted and used for fraudulent purposes, online investing involves greater security concerns than conventional trading; users need a sense of security when conducting financial transactions, and it is still one of the major barriers to e-commerce growth (Wang *et al.*, 1998; Furnell and Karweni, 1999; Jarvenpaa *et al.*, 1999; Gefen, 2000; Lee and Turban, 2002). Perceived security was defined as a threat that creates a circumstance, condition, or event with the potential to cause economic hardship to data or network resources in the form of destruction, disclosures, modification of data, denial of service, and/or fraud, waste and abuse (Kalakota and Whinston, 1997, p. 853).

Security, which involves the use of technical advancements like cryptography, digital signatures and certificates aimed at protecting users from the risk of fraud, hacking or "phishing", has a positive influence on the intention to purchase online (Ranganathan and Ganapathy, 2002; Yousafzai *et al.*, 2003; Kim *et al.*, 2008; Lian and Lin, 2008). But what is relevant for the acceptance of e-commerce is not the objective security of the electronic channel as transaction medium but the subjective risk perception of the consumer (Klang, 2001; Grabner-Kräuter and Kaluscha, 2003). Thus, when online vendors have implemented security mechanisms, consumers tend to believe that online purchasing is safe.

Laforet and Li (2005) found the issue of security to be the most important factor that motivated Chinese consumer adoption of mobile banking. In the context of online

trading, network and data transaction attacks or attacks through unauthorized access to the e-investors' accounts could be a substantial barrier preventing the adoption of online trading practices.

2.4 Perceived privacy

Perceived privacy is the possibility that online companies collect data about individuals and use them inappropriately (Jarvenpaa and Toad, 1996). There is growing concern regarding security issues and the use of information given online in terms of the privacy of personal information and the unintended uses of it. Customers are reluctant to enter their personal information when the sites ask for it, because they are concerned about the interception and misuse of information sent over the internet and how their data is used. Thus, online consumers hesitate to disclose any personal or financial information to companies because they feel that these companies could make unauthorized use of it or divulge it to other organizations (Lim, 2003). Castañeda *et al.* (2007) measured the bi-dimensionality of the internet privacy concern. They considered that the first dimension is related to concern for the data-collecting process itself, while the second refers to the inadequate use of this information by the online company.

Trusting beliefs determine consumer attitudes toward online companies. These beliefs encapsulate concerns related to privacy and subsequent use of consumer information by the vendor (Liu *et al.*, 2005; Salam *et al.*, 2005). Thus, when security and privacy policies are clearly disclosed, consumers increase their trust, which in turn enables online transactions (Chellappa and Pavlou, 2002). Other empirical studies suggested that perceived privacy is a critical factor in consumers' acceptance of online services (Hoffman *et al.*, 1999; Doolin *et al.*, 2005; Mukherjee and Nath, 2007; Poon, 2008). Therefore, in this study we will test whether privacy concerns decrease the investment behaviors of online trading customers.

3. The proposed model and research hypotheses

The research model (Figure 1) is an extension of Davis' TAM, and includes perceived trust as an external variable affecting user acceptance of online trading services. As shown in Figure 1, the research model posits that the exogenous variable affects users directly, and also through the intermediary variables like perceived usefulness and perceived ease of use. We considered two variables as sources of perceived trust: perceived security and perceived privacy.

3.1 Perceived usefulness and perceived ease of use

There is extensive empirical literature that has demonstrated that perceived ease of use directly and positively influences behavioral intention to use and also influences intentions indirectly through perceived usefulness (Agarwal and Prasad, 1999; Davis *et al.*, 1989; Igarria and Tan, 1997b; Venkatesh, 1999). In the e-services domain, the findings of the prior research demonstrate the positive relationship between perceived usefulness, perceived ease of use and intention to use (Hu *et al.*, 1999; Hong *et al.*, 2001; Gefen *et al.*, 2003; Wang and Tang, 2003). Hence, this leads to the following hypothesis:

- H1.* Perceived usefulness has a positive effect on intention to use online trading services.

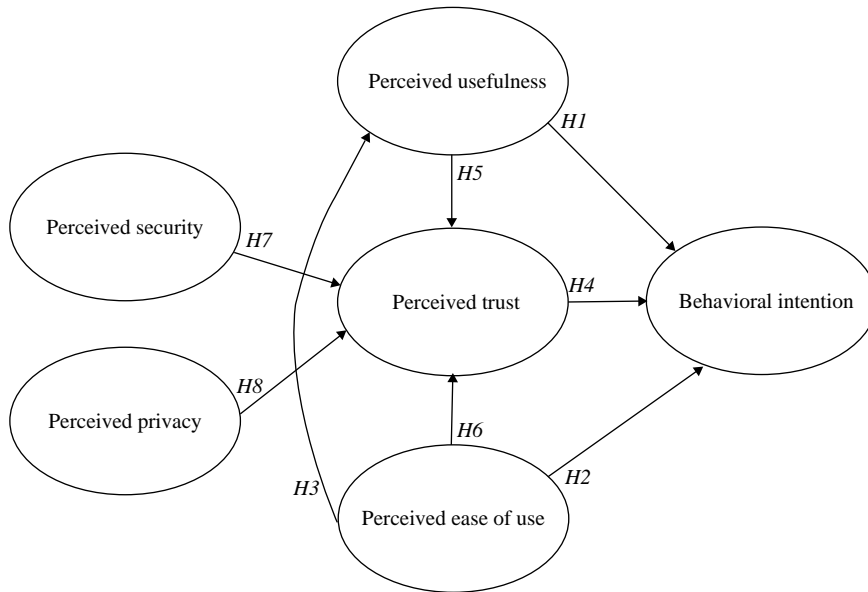


Figure 1.
Research model

- H2. Perceived ease of use has a positive effect on perceived usefulness in the online trading services.
- H3. Perceived ease of use has a positive effect on intention to use online trading services.

3.2 Perceived trust

Chen and Barnes (2007) demonstrated that different levels of trust propensity moderated perceptions toward the web site with respect to online initial trust, which in turn was affected by perceived usefulness, perceived security and perceived privacy and, finally, purchase intention was determined by online initial trust and familiarity with online purchasing. The importance of trust in e-services is vital to the transactions because the degree of uncertainty in a virtual environment makes the user more vulnerable. Therefore, in our study the e-investors' confidence in the online dealer and stockbrokerage determine the intention to conduct their securities transactions.

In the e-commerce context, empirical research has shown that trust in online vendors increases people's intention to use the vendors' web site (Bhattacharjee, 2002; George, 2002; Mukherjee and Nath, 2007) and also in the e-banking domain (Casaló *et al.*, 2007). Bhattacharjee (2002) found that trust has a positive effect on an individual's willingness to conduct transactions with an online bank. George (2002) empirically showed that the more trustworthy individuals believe the internet to be, the more positive their attitudes about purchasing over the internet. Casaló *et al.* (2007) showed that web site security, privacy and usability – a construct similar to perceived ease of use and perceived usefulness – had a direct and significant effect on consumer trust in a financial services web site. They also stated that consumer trust was

positively related to relationship commitment, and trust was a key mediating factor in the development of relationship commitment in the online banking context. Therefore:

H4. Perceived trust has a positive effect on intention to use online trading services.

H5. Perceived usefulness has a positive effect on perceived trust.

H6. Perceived ease of use has a positive effect on perceived trust.

3.3 Perceived privacy and security

George (2002) reported that belief in the property view of privacy was associated with negative attitudes toward internet purchasing. The positive relationship between security and attitude towards online shopping was empirically tested by Vijayasathy (2004) and O'Cass and Fenech (2003). Ranganathan and Ganapathy (2002) and Lian and Lin (2008) have shown that in other constructs studied, such as innovativeness or internet self-efficacy, security and privacy were found to have a greater effect on consumer acceptance of online shopping. According to Flavián and Guinaliú (2006), the development of trust affected the intention to buy but that trust was particularly influenced by the security perceived by consumers regarding the handling of their private data.

Similarly, Mukherjee and Nath (2007) identified that the privacy and security features of the web site along with shared values are the key antecedents of trust, which in turn positively influences the behavioral intentions of customers. In this sense, the influence of privacy and security on users' acceptance has been supported by several authors in the context of e-banking services (Sathye, 1999; Liao and Cheung, 2002; Poon, 2008). Therefore:

H7. Perceived security has a positive effect on perceived trust.

H8. Perceived privacy has a positive effect on perceived trust.

4. Empirical methodology

A survey was employed in this paper to test the hypotheses discussed in the previous sections. The data collection method used and the items selected for each of the constructs are presented in the following sections.

4.1 Data collection

The sample consisted of 180 students in an advanced undergraduate course in financial markets at one medium-sized university in south-western Spain. The course was part of the core curriculum required for all business students. For one month they used two online trading services (www.igmarkets.es and www.renta4.com) as part of the course requirements. The two online trading companies offer practice web-based accounts with a virtual budget of €100,000 and €10,000, respectively. With these budgets, each student worked individually making securities transactions – buying and selling – with stocks, indexes, futures, options or foreign currencies during the period mentioned, thus, it was an excellent way to evaluate the online trading system because they could behave as e-investors. On the last day of the course, a questionnaire was given to each student to collect the data. A total of 103 usable questionnaires were collected. Among the respondents, 55 were female and 48 were male. A majority of the respondents (76) had more than six years' internet experience.

4.2 Measures

The measures used in this paper were mainly adapted from relevant prior studies. All items were measured using a seven-point Likert-type scale with anchors from “strongly disagree” to “strongly agree”. Items for perceived usefulness and perceived ease of use were adapted from prior work by Davis (1989). Scales of perceived security and perceived privacy were measured by the items derived from Cheung and Lee (2001), Ranganathan and Ganapathy (2002), O’Cass and Fenech (2003), and Flavián and Guinalíu (2006). Scales of perceived trust were adapted from Jarvenpaa *et al.* (2000), McKnight *et al.* (2002), and Koufaris and Hampton-Sosa (2004). Items measuring continuance intention were adapted from prior work by Mathieson (1991) and Bhattacharjee (2001).

5. Data analysis

5.1 Measurement validation

The reliability of a measure is that part containing no purely random error (Carmines and Zeller, 1979). The reliability of a research instrument concerns the extent to which the instrument yields the same results on repeated trials. Reliability was examined using the composite reliability values and Cronbach’s α . Composite reliability is a measure of the overall reliability of a collection of heterogeneous but similar items. Similarly, Cronbach’s α measures how well a set of items or variables measures a single unidimensional construct. Cronbach’s α coefficient ranges in value from 0 to 1, the higher the score, the more reliable the generated scale is. Nunnally (1978) has indicated 0.7 to be an acceptable reliability coefficient but lower thresholds are sometimes used in the literature. Table I shows composite reliability and Cronbach α levels above 0.7, which demonstrates adequate construct reliability.

Convergent validity is used to evaluate the degree to which two or more measures that theoretically should be related to each other are, in fact, observed to be related to each other Table II. Convergent validity was evaluated for the measurement scales using two criteria suggested by Fornell and Larcker (1981). First, all factor loadings should be significant and exceed 0.70. The factor loadings are the correlation coefficients between the survey items (variables). Factor loadings are the basis for imputing a label to different factors. Second, the average variance extracted (AVE) for each construct should exceed the variance due to measurement error for that construct (i.e. should exceed 0.50). AVE measures the amount of variance captured by a construct in relation to the variance due to random measurement error. AVE varies from 0 to 1, and it represents the ratio of the total variance that is due to the latent variable. According to Bagozzi (1991), a variance extracted of greater than 0.50 indicates that the validity of both the construct and the individual variables is high. Most factor loadings

| | AVE | Composite reliability | Cronbach’s α |
|-----------------------|------|-----------------------|---------------------|
| Behavioral intention | 0.74 | 0.90 | 0.83 |
| Perceived ease of use | 0.55 | 0.78 | 0.71 |
| Perceived privacy | 0.70 | 0.87 | 0.79 |
| Perceived usefulness | 0.56 | 0.83 | 0.74 |
| Perceived security | 0.59 | 0.86 | 0.76 |
| Perceived trust | 0.56 | 0.84 | 0.75 |

Table I.
AVE and reliability

(Table III) of the model variable items were above 0.7, except for the first item of perceived security and the second item of perceived trust, whose loadings were slightly below the required minimum; the first item of perceived privacy was eliminated due to the negative value. The AVE reported in Table I exceeds 0.50, confirming that it measures the construct validity of the model.

Discriminant validity is the extent to which measures of theoretically different constructs should not correlate highly with each other. For an adequate discriminant validity, the square root of the AVE should exceed the intercorrelations of the construct with the other constructs in the model (Fornell and Larcker, 1981). As shown in Table II, the square root of the variance shared between a construct and its items was greater than the correlations between the construct and any other construct in the model. These low correlations are evidence for validity.

5.2 Partial least squares (PLS) path modeling

Data analysis was conducted with partial least squares (PLS), with the use of VisualPls v.1.04. Like covariance-based approaches such as LISREL, PLS is a structural equation model (SEM) approach and belongs to a family of techniques that some researchers call the second generation of multivariate analysis (Fornell and Bookstein, 1982). SEM is a statistical technique for testing and estimating causal relationships using a combination of statistical data and qualitative causal assumptions. PLS regression is a recent technique that generalizes and combines features from principal component analysis and multiple regressions. Its goal is to predict or analyze a set of dependent variables from a set of independent variables or predictors. The purpose of PLS regression is to predict Y from X and to describe their common structure Figure 2.

PLS path modeling avoids many of the restrictive assumptions underlying maximum likelihood techniques (Fornell and Bookstein, 1982). Since, PLS is component-based it does not require multivariate normal data, places minimum requirements on measurement levels, and is good for small samples (Chin, 1998; Hulland, 1999).

A PLS application requires a minimum sample size 10 times greater than the construct with the largest number of formative indicators or the number of independent constructs directly impacting on a dependent construct. Using the second criteria, this application of PLS therefore requires a minimum sample size of 80, which is exceeded by our sample size of 103. PLS uses the bootstrapping method (Chin, 1998) to calculate the standard errors and thereby assesses the significance of the structural coefficients. The bootstrap procedure approximates the sampling distribution of an estimator by resampling with replacement from the original sample. The number of

| | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1. Behavioral intention | <i>0.86</i> | | | | | |
| 2. Perceived ease of use | 0.34 | <i>0.74</i> | | | | |
| 3. Perceived privacy | -0.13 | -0.23 | <i>0.84</i> | | | |
| 4. Perceived usefulness | 0.36 | 0.28 | -0.13 | <i>0.75</i> | | |
| 5. Perceived security | 0.38 | 0.38 | -0.43 | 0.18 | <i>0.76</i> | |
| 6. Perceived trust | 0.48 | 0.43 | -0.28 | 0.37 | 0.42 | <i>0.75</i> |

Table II.
Discriminant validity

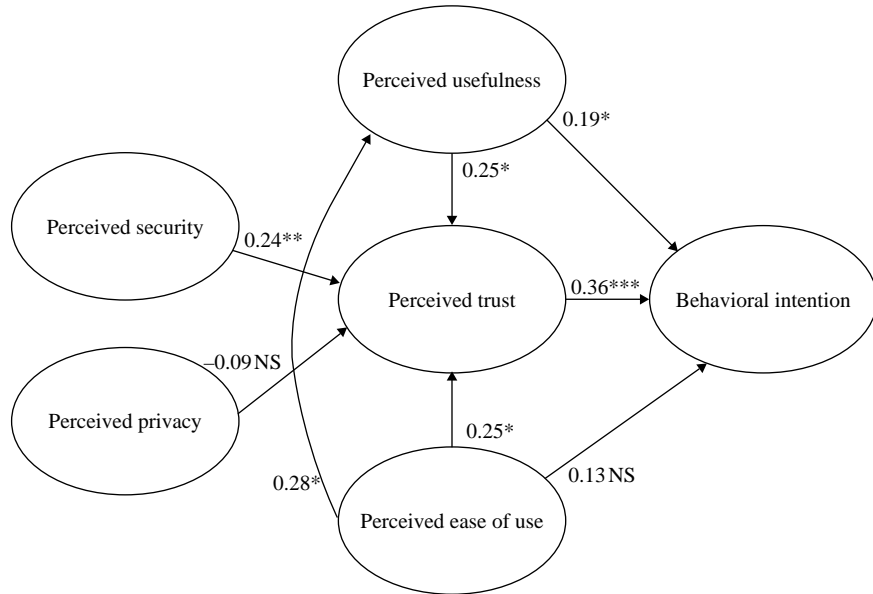
Note: diagonal elements in italic (the square root of AVE)

| | | Online trading systems |
|---|-------|------------------------|
| <i>Behavioral intention</i> | | |
| I will use the online trading systems on a regular basis in the future | 0.91 | |
| I will frequently use the online trading systems in the future | 0.90 | |
| I will strongly recommend others to use | 0.77 | |
| <i>Perceived usefulness</i> | | |
| I would find online trading systems useful in conducting my securities transactions | 0.73 | |
| Using online trading systems would make it easier for me to conduct securities transactions | 0.84 | 105 |
| Using online trading systems enable me to accomplish securities transactions more quickly | 0.80 | |
| Using online trading would improve my performance in conducting securities transactions | 0.81 | |
| <i>Perceived ease of use</i> | | |
| Learning to use online trading systems is easy for me | 0.75 | |
| It would be easy for me to become skillful at using online trading systems | 0.79 | |
| My interactions with the online trading systems are clear and understandable | 0.77 | |
| <i>Perceived trust</i> | | |
| The online trading systems are trustworthy | 0.78 | |
| The online trading systems have a good reputation as financial dealer and stockbroker | 0.66 | |
| The online trading systems are competent and effective as financial dealer and stockbroker | 0.76 | |
| I do not doubt the honesty of the online trading systems | 0.80 | |
| <i>Perceived security</i> | | |
| I think the online trading systems have sufficient technical capacity to ensure that the data I send cannot be modified by a third party | 0.64 | |
| The online trading systems have enough security measures to protect my personal and financial information | 0.83 | |
| When I send data to the online trading systems, I am sure that they will not be intercepted by unauthorized third parties | 0.75 | |
| I think the online trading systems have sufficient technical capacity to ensure that no other organization will supplant its identity on the internet | 0.83 | |
| <i>Perceived privacy</i> | | |
| I am concerned that the online trading systems will use my personal information for other purposes without my authorization | -0.72 | |
| I think that too much of my personal and financial information will be collected by the online trading systems | 0.78 | |
| I am concerned about the privacy of my personal and financial information during a transaction | 0.78 | |
| My personal and financial information will be shared with other entities without my authorization | 0.80 | |

Table III.
Outer loadings

cases in the original data set is almost irrelevant, since we are trying to approximate the distribution of the parameter estimates. Standard errors of parameters were calculated on the basis of 500 bootstrapping samples. Significance[1] is determined against an ordinary *t*-statistic table using the number of bootstrap runs as the degree freedom.

H1 tested the relationship between perceived usefulness and behavioral intention. The relationship was positive (path coefficients = 0.19, $p < 0.05$). Path coefficients measure the amount of effect of one variable on another in the path model. The estimated path coefficient between perceived ease of use and intention was not significant (path = 0.13, ns) and the relationship between perceived ease of use and usefulness



Notes: p -values: *0.05; **0.01; ***0.001

Figure 2.
PLS results

was positive and significant (path = 0.28, $p < 0.05$), thus, $H2$ was rejected and $H3$ was supported. $H4$ tested the relationship between perceived trust and behavioral intention, a positive and strong relationship was found (path = 0.36, $p < 0.001$). We found a direct positive impact of perceived usefulness and perceived ease of use on perceived trust, (path = 0.25, $p < 0.05$, t -statistic = 2.17; path = 0.25, $p < 0.05$, t -statistic = 1.87, respectively), therefore, $H5$ and $H6$ were supported. $H7$ indicates a positive effect between perceived security and perceived trust (path = 0.24, $p < 0.01$), thus, the hypothesis was supported. $H8$, on the effect of perceived privacy on perceived trust, was not supported by the data (path = -0.09, ns). The percentage of variance explained[2] (R^2) of behavioral intention was 28 and 31 percent of perceived trust. Of perceived usefulness, however, it was only 8 percent.

6. Discussion

The purpose of this study is to test an augmented TAM model on intention to use online trading systems, and it is one of the few attempts to investigate e-investors' acceptance of online financial dealers and stockbrokers services. Specifically, the model postulated the influence of perceived security and perceived privacy on trust, and the relationship between these constructs and the traditional TAM constructs.

The current investigation has shown a positive relationship between perceived ease of use and usefulness and perceived usefulness and behavioral intention. That is, if the use of the online trading systems is free of effort and when the e-investors can achieve their goals easily, they will tend to perceive the system as more useful. The results also indicate that e-investors will use the online trading system only if they perceive that its use will enhance their performance and the effectiveness of their financial transactions.

However, perceived ease of use did not influence behavioral intentions. This can be explained by the fact that web tools are user-friendly and very easy to use. For example, Venkatesh *et al.* (2003) found that perceived ease of use was significant only in the initial stages of learning to use various applications. However, after one month the relationship became insignificant. In addition, this finding is consistent with others that show that perceived ease of use does not influence intentions to use web services (Teo *et al.*, 1999; Childers *et al.*, 2001; Chan and Lu, 2004; Pikkarainen *et al.*, 2004; Cheng *et al.*, 2006). Therefore, in the online trading context, e-investors are more concerned about the performance of their securities transactions than about difficulties in learning how to use the services.

The empirical results suggest that the most important antecedent of behavioral intentions is trust. Therefore, e-investors tend to increase their motivation to use the services of online financial dealers and stockbrokers when these companies are perceived as honest. Perceived trust leads the e-investors to be willing to believe that the online financial dealers are able to provide them with the services offered. For instance, trusting perceptions directly influence the decision to use their e-services, which is consistent with prior studies (Bhattacharjee, 2002; Kim *et al.*, 2008).

Perceived usefulness was a more important determinant of perceived trust than ease of use, suggesting that a more useful web site can encourage e-investors to trust in it, and if the site is easy to navigate will also increase willingness to trust. This is supported by the findings in prior studies. For example, Gefen *et al.* (2003) empirically showed that online customers' trust can increase when the web site is easy to navigate. Koufaris and Hampton-Sosa (2004) found that perceived usefulness and ease of use of the web site were significant antecedents of initial trust in the company.

A useful online trading system helps e-investors to search for profitable transactions quickly, providing them with full and detailed information about the stock exchange situation, useful information that may mitigate e-investors doubts, allowing them to accomplish effective and efficient online securities transactions. Furthermore, a useful online trading system will attract e-investors to engage in transactions directly, and also indirectly, through a higher perception of trust.

Perceptions of high security of the online trading system facilitate the trust in the online financial dealer and stockbroker, which is consistent with previous research. For example, Koufaris and Hampton-Sosa (2004) also demonstrated that perceived security control of the site strongly influenced initial trust in the company. If the e-investors are less concerned about unauthorized use of or illegal access to their personal and financial data by third parties, they will have greater trust in the online system, which in turn will lead to higher intention to use it. Thus, online financial dealers and stockbroker should improve their web security features in order to enhance the e-investors' trust in the online trading system.

Surprisingly, perceived privacy was not a determinant of perceived trust. A possible explanation is that experienced internet users are more familiar with security technologies, they easily recognize features such as certificates or encryption keys. Since these security characteristics guarantee almost total privacy, the relative importance of privacy concerns for these users is lower. Thus, the trust in the online trading company, jointly with the presence of security features, drives the decision to disclose personal and financial information with less discomfort. This finding provides further support for prior research. Thus, Belanger *et al.* (2002) argued that users

generally understand the concept of security better than privacy because security is a more concrete concept, and they also showed that security features were more important than privacy statements. Kim *et al.* (2008) empirically showed that security protection mechanisms are more important in consumers' behavior than privacy. Pavlou and Chellappa (2001) found that the influence of perceived privacy was weak in comparison with the strong influence of perceived security on trust. Additionally, the concern about privacy is referred to the control over secondary use of information provided to the online trading company. Since prior research has shown that the reputation of the online company is highly valued by users (de Ruyter *et al.*, 2001), the effect of privacy on trust might be moderated by e-investors' perceptions of the reputation of the online company.

7. Conclusion and limitations

To conclude, when the perception of security is high and the commercial relationship is long (e.g. online trading), trust is a key determinant of behavioral intention, hence, e-investors tend to provide more personal and financial information with less concern. Online trading systems managers must improve the security of the target system. Thus, security features should be considered an important issue during the online trading system's design because e-investors are more favorably inclined toward using it when they perceive that the information provided during the securities transactions is secure, and third parties will not have access to it. Trust, perceived usefulness and perceived ease of use also play an important role, thus, managers should develop a system that provides up to date and relevant financial information with good user interface consistency.

Our paper had some potential limitations. One was that trust was examined as a single-dimension construct because the aim was to extend an augmented TAM model to the online trading environment, not to increase our knowledge about the multidimensional aspects of trust. Therefore, future research into online trading systems may include separately the dimensions of trust for a better understanding. Second, the generalization of the study's findings should be accepted with caution since the sample used for the survey consisted entirely of undergraduate students in an advanced course of one university and they do not represent the general online trading population.

Notes

1. For a typical test, the following t -values correspond to a given level of significance (df = 500): $3.107 \sim p < 0.001$ (99.9 percent significant level); $2.334 \sim p < 0.010$ (99 percent significant level); $1.648 \sim p < 0.050$ (95 percent significant level); $1.283 \sim p < 0.100$ (90 percent, usually considered as not significant).
2. According to Cohen (1977, p. 83) the effect size is small for $R^2 = 0.10$, medium for $R^2 = 0.30$ and large for $R^2 = 0.50$.

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