Internet shopping and Internet banking in sequence

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Abstract

This paper presents an empirical investigation into the factors that shape the propensity to use the Internet for shopping and banking through application of bivariate probit regression techniques to data sourced from a survey of 259 respondents in Athens, Greece. Based on the observation that Internet banking usage typically requires familiarity with Internet shopping, we estimate the marginal effects of the determinants of Internet banking use conditioned on the determinants of Internet shopping use.

Our results suggest that not controlling for this conditioning will bias estimates and could lead to incorrect policy-recommendations. For instance, personal capacity is found to be an important determinant of the propensity to use Internet banking in a non-sequential approach but it is found to have no significant effect after conditioning. In particular, our results suggest that policy-makers should emphasise usefulness attributes of computer-based innovations when attempting to increase the use of the Internet for banking by people who already use the Internet for shopping.

Keywords: Internet banking; Internet shopping; adoption rate; bivariate probit regression; conditional marginal effects

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1. Introduction

The Internet represents a huge source of information that can be organized and retrieved in many different ways based on individual users needs (Mahajan *et al*., 2000). It facilitates communication and shopping through computer-mediated environments and it is a market where a large variety of new technologies and interdependent products are introduced (Mahajan *et al.*, 2000; Varadarajan and Yadav, 2002). It can also be a discontinuous innovation process and lead to new product developments. Following the introduction and acceptance of Internet shopping, new technological interfaces developed by banks, such as Internet banking, are innovative delivery and communication channels where new products and services are introduced. These innovations have facilitated interaction and the building of relationships between banks and their customers (Tapp and Hughes, 2004).

New technologies and especially the developments of self-service technologies present several challenges for banks in terms of their customer relationships. Banks that offer Internet banking services can benefit from lower costs due to the utilization of less human and physical resources and the potential of economies of scale in bank operations (Shi *et al*., 2008). Consumers' transferring their decision making processes from traditional offline to online can engender cost and time savings benefits (Shi *et al*., 2008) at the expense of various risks (Durkin, 2007). Consequently banks need to alter their operations and internal and external communication media, and such major changes can encounter resistance.[1]

A number of articles present investigations of the determinants of Internet use for a variety of services. Such studies typically examine either one Internet service in isolation or assume away structure or order between Internet services. This paper purports that there is a sequence of Internet usage choices, with consumers first becoming familiar with the Internet for their shopping experience and, once proficiency in this area has been achieved, consumers will then consider using the Internet for banking services. Based on the idea of a conditional and sequential link between Internet shopping and Internet banking we proceed to examine empirically the factors that influence the rate of Internet banking adoption. Our results strongly support the assumption of association between Internet banking and Internet shopping, and once sequencing has been integrated into the modelling approach we identify potential conflicting results and important policy levers.

The paper is structured as follows. The next section presents a review of extant literature and our conceptual model. Section 3 details the data and the modelling approach. Section 4 is a discussion of findings and implications, and Section 5 concludes.

2. Theoretical background

Innovations can be defined in terms of the amount of behavioural change necessary to use the innovation effectively; they can be classified along a continuum from the least to the most disruptive which is related to the extent to which the innovation is functionally new (Robertson, 1971). Technological innovations can be discontinuous (Moore, 1991), are typically viewed as being rooted in new information and computer-based technologies, and can disrupt existing patterns of behaviour (Fitzsimmons and Fitzsimmons, 2011; Littler,

[1] For example, customers do not always welcome technology or they may increasingly use a combination of banking methods. The theoretical literature on diffusion research of such technological innovations is well-developed but it lacks empirical evidence on non-adopter behaviour and focuses mainly on mental behaviour (Hernandez *et al*., 2009). There is limited evidence on the possible differences between pre-adoption and usage behaviour (Hernandez and Mazzon, 2007).

2001; Veryzer, 1998b). Their usage can involve a very high degree of technological uncertainty, a sequence of innovations based on the core application, a longer development process, and a greater distance from the end user in terms of customer familiarity with the innovation and the time it takes to evolve (Veryzer, 1998a, 1998b). Thus, technological innovations can require a change in the behaviour of potential adopters and the development of new skills.

The introduction of the core application of the Internet (i.e. linking computers in networks) has spawned a sequence of Internet based innovations that have facilitated communication and shopping. Such innovations include Internet shopping and Internet banking that required major behavioural changes by potential adopters in their business and personal relationships. Internet shopping is now widespread and typically includes books, cosmetics, consumer durables and service operations, such as retailing, entertainment and travel. Internet banking is also available and requires a more sophisticated application of Internet technologies to satisfy consumers' banking needs, and it differs from other self-service innovations in financial services since it requires major changes in behaviour (i.e. a completely new way of consumer banking).

An order of succession

There may be a logical dependence of engagement with innovations, and usage of Internet shopping and Internet banking may be a prime example. This paper purports a sequence of events whereby individuals make a series of decisions:

1) Decide (consciously or otherwise) to use the Internet;
2) After some familiarity of use with the Internet has been achieved, a next step in using the Internet is for shopping;
3) After some familiarity of use with the Internet for shopping has been achieved, a next step in using the Internet is for banking.

Decision (1) is beyond the scope of this paper. This paper examines empirically the factors that contribute to decisions (2) and (3) for a sample of Internet users.

The decisions above are each associated with different, albeit potentially sequential innovations that require interaction with technological interfaces and necessitate a degree of behavioural change by potential adopters. The conceptual framework for this study, shown in Figure 1, illustrates that someone must adopt the Internet first, and then must adopt Internet shopping as a prerequisite to deciding whether to adopt Internet banking. The ordering purported in Figure 1 corresponds to both the sequence of introduction of the above technological interfaces (shopping and banking) and the degree of the behavioural change required by potential adopters to use these functional innovations. As a result, there is a sequence of two dichotomous decisions addressing the respective conditional link:

{Insert Figure 1 about here}

Factors influencing rates of adoption

The rate of adoption refers to the frequency of new users of the innovation out of its market potential (Rogers, 2003). Diffusion research has explicitly considered the communication process for the diffusion of a technological innovation using mathematical models (e.g. Bass, 1969; Fourt and Woodlock, 1960; Lilien *et al*., 1992; Mansfield, 1961). Following these classic works, a number of models have been developed to capture other dynamics of the innovation diffusion process, such as the influence of the marketing mix on new product diffusion (Mahajan *et al*., 1990, 2000).

The Bass model and its revised forms have been used in marketing for forecasting innovation diffusion (i.e. the lifecycle dynamics of a new product) in retail service and consumer durable goods, among others (Mahajan *et al*., 1990). However, some of the assumptions underlying the Bass model have been questioned, such as that market potential remains constant over time and that adoption is an individual decision (Lilien *et al*., 1992). Moreover, to explain consumer acceptance diffusion research has focused on i) the perceived attributes of an innovation and ii) the potential adopter's characteristics. The empirical literature emphasises the importance of gender, age and income differences (e.g. Gan *et al*., 2006) but offers little consistency on the importance of other individual characteristics in explaining adoption of an innovation (e.g. Wang *et al*., 2008), and this inconsistency may be based on the variety of research contexts, the nature of the innovation, the sample's representation of the target population and the geographic context. The research also indicates that the perceived attributes of an innovation are stronger predictors of adoption than the personal characteristics of potential adopters (Gatignon and Robertson, 1989; Lockett and Littler, 1997; Moore and Benbasat, 1991; Rogers, 2003). Although the perceived attributes of an innovation can be used to explain adoption rates, researchers have devoted little effort in examining how these factors affect adoption rates (Rogers, 2003).

Within the context of Internet-based innovations, the literature has examined empirically the factors that influence consumer attitudes and their effects on intentions towards adopting these services. Many of these studies are based on the works of Rogers (2003) (innovation characteristics), Davis (1989) and Davis *et al*., (1992) (technology acceptance model - TAM), Parasuraman (2000) (technology readiness index - TRI), Dabholkar (1996) (service quality) and extensions and combinations of these theories. In addition, the constructs of perceived risk (Bobbitt and Dabholkar, 2001; Cunningham *et al*., 2005; Curran and Meuter, 2005), interactivity (to understand future buyer-seller activities in the electronic marketplace) (Sawhney *et al*., 2005; Varadarajan and Yadav, 2002; Yadav and Varadarajan, 2005a; Yadav and Varadarajan, 2005b), human interaction (Gilbert *et al*., 2004; Makarem *et al*., 2009; Simon and Usunier, 2007), perceived ability/capacity (Bitner *et al*., 2002; Ellen *et al*., 1991; Walker *et al*., 2002), time and energy savings (Walker and Johnson, 2006), aspects of service convenience (Berry *et al*., 2002) and consumer demographics and personal characteristics (Dabholkar and Bagozzi, 2002; Elliott and Hall, 2005; Lee *et al*., 2010) have all been found to be important factors in explaining adoption.

The above studies and related theories could be examined in order to identify what influences the initial adoption of innovations (Mahajan *et al.*, 2000) but equally there is space to examine post-adoption or usage behaviour (Hernandez *et al.*, 2009; Mahajan *et al.*, 2000), which is particularly important for service innovations that are used frequently after adoption. The construct of an e-service quality is an important factor contributing to repeat purchases from websites (Zeithaml *et al*., 2002) and the measurement of this construct must rest on perception data which is based on the use (adopters) or non-use (non-adopters) of the Internet for shopping. The most frequently found e-service quality perception factors are: reliability, privacy/security, site design, ease of use, responsiveness, control, accessibility, speed of delivery, enjoyment and accuracy (Bobbitt and Dalholkar, 2001; Jauda *et al*., 2002; Jun and Cai, 2001; Shamdasani *et al*., 2008; Zeithaml *et al*., 2002).

There are some overlaps between aspects and constructs with reliability, privacy and security concerns being aspects of trust (Yousafzai *et al*., 2009) and with reliability also being an aspect of perceived risk (Curran and Meuter, 2005). Davis's constructs of usefulness and ease of use are similar to Rogers' constructs of perceived relative advantage and complexity, respectively, while aspects of relative advantage and convenience are related. Rogers' compatibility construct is broadly defined and captures knowledge aspects, such as personal ability/capacity and cultural values.[2]

There is limited empirical evidence on non-adopter behaviour, which is particularly important for situations where adopters of the core application, such as the Internet, have not adopted or have adopted only some of its applications. The next section presents an empirical development of the adoption model to test for and explain a sequential link between adoption rates of Internet shopping and adoption rates of Internet banking, and hence to fill this gap in the literature.

3. Data and method

This study draws on a data set collected via questionnaires distributed to organizations in Athens, Greece, and has been described in detail in Patsiotis *et al*. (2012). That study employed categorical data to capture respondent demographics and 7-point Likert scales to measure respondent perceptions on characteristics of innovation. Descriptions of the variables used in this study are presented in Table 1.

{Insert Table 1 about here}

Modelling approach

Our proposition is that there is a clear sequence of decisions relating to the adoption of computer-based innovation technologies: first the Internet user must make the decision to use the Internet for shopping (Yes = 1; No = 0) and then make a similar decision to use the Internet for banking (Yes = 1; No = 0). These two dichotomous choices are traditionally modelled separately as dependent variables in regression; we continue to do this but we model them simultaneously initially and then sequentially.

An alternative way to think about these questions is to consider it as a (potential) sample selection issue: if these are sequential decisions then individuals who are not Internet shoppers are much less likely to consider the Internet for banking. Hence any efforts to identify the contributory effect of explanatory variables on the decision to use the Internet for banking services may produce biased results, as part of the sample are not considering using the Internet for banking, as they have not first engaged enough in shopping on the Internet. Therefore, estimates of the effect of explanatory variables on Internet banking should be conditional on the factors that influence adoption of the Internet for shopping.

An appropriate method to employ in this instance is the bivariate probit regression approach and conditional marginal effects can be obtained where P(Internet Banker = 1 | Internet Shopper = 1). Given marginal effect estimates of this conditional probability, it

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[2] Some of these constructs may not be relevant to usage behaviour. For instance, technology readiness factors focus on consumer traits and personal orientation, such as innovativeness, but do not necessarily predict technology usage (Meuter *et al*., 2003). Human interaction may be an inhibitor to Internet shopping and Internet banking and is related more to pre-adoption behaviour. As people use a combination of shopping modes, Internet facilities may only serve as a substitute channel for users and hence it is less likely for Rogers' observability to be an important factor (Black *et al*., 2001; Lassar *et al*., 2005). Conversely, Rogers' trialability construct (the lack of trial opportunities to start using Internet banking) may be an important inhibitor to adoption.

would be possible to identify whether respondent demographics and perceived attributes contribute either to the decision to participate in Internet banking or to the decision to participate in Internet shopping, or to both decisions.

We adopt the formal model for estimating the probabilities according to Greene (2003). Let y_{1i} be a latent variable that denotes the probability that an individual is an Internet banker, which is dependent on a range of contributory factors, X_{1i}. Also let X_{2i} be a latent variable that denotes the probability that the individual is an Internet shopper, where this is also dependent upon a range of factors, X_{2i}. The model is represented as follows:

$$y_{1i} = \beta_1 X_{1i} + \varepsilon_{1i}$$
$$y_{2i} = \beta_2 X_{2i} + \varepsilon_{2i}$$

where the values for y_{1i} are observable and related to the following binary dependent variables, on the basis of the following conditions:

$Internet\ banker_i = 1, if\ \ y_{1i} > 0$ $\qquad$ $Internet\ banker_i = 0, if\ \ y_{1i} \leq 0$

and

$Internet\ shopper_i = 1, if\ \ y_{2i} > 0$ $\qquad$ $Internet\ shopper_i = 0, if\ \ y_{2i} \leq 0$

where $Internet\ shopper_i = 1$ denotes that the individual is an Internet shopper, and $Internet\ banker_i = 1$ denotes that the individual is an Internet banker. The errors $(\varepsilon_{1i}, \varepsilon_{2i})$ are assumed to have the standard bivariate normal distribution, with $V(\varepsilon_{1i}) = 1 = V(\varepsilon_{2i})$ and $Cov(\varepsilon_{1i}, \varepsilon_{2i}) = \rho$. Thus the individual's probability of being an Internet banker can be written as:

$$P(Internet\ banker) = P(Internet\ banker_i = 1, Internet\ shopper_i = 1)$$
$$= P(X_{1i} < x_{1i}, X_{2i} < x_{2i})$$
$$= \int_{-\infty}^{x_{2i}} \int_{-\infty}^{x_{1i}} \phi 2(z_{1i}, z_{2i}; \rho) dz_{1i} dz_{2i}$$
$$= F(\beta_1 X_{1i}, \beta_2 X_{2i}; \rho)$$

where F denotes the bivariate standard normal distribution function with correlation coefficient ρ.[3] The bivariate probit model has full observability if $Internet\ banker_i$ and $Internet\ shopper_i$ are both observed in terms of all their four possible combinations [i) '*Internet banker*$_i$ = 1, *Internet shopper*$_i$ = 1', ii) '*Internet banker*$_i$ = 1, *Internet shopper*$_i$ = 0', iii) '*Internet banker*$_i$ = 0, *Internet shopper*$_i$ = 1', and iv) '*Internet banker*$_i$ = 0, *Internet shopper*$_i$ = 0']. Category (ii) is always equal to zero in our sample. If there is a clear sequence

[3] Greene (2003) shows that the density function is given by: $\phi_2 = e^{-(1/2)(x_{1i}^2 + x_{2i}^2 - 2\rho x_{1i} x_{2i})/(1-\rho^2)} / 2\pi(1-\rho^2)^{1/2}$.

of decisions in adopting Internet shopping and then Internet banking then it is appropriate to deem this to be a naturally constrained complete set of observations and effectively provides us with full observability in our data. It is known that full observability leads to the most efficient estimates (Ashford and Sowden, 1970; Zellner and Lee, 1965).

The following section presents the results from application of the bivariate probit method to the case explained above, and specifically will discuss the conditional marginal effects obtained from $P(\textit{Internet Banker}_i = 1 \mid \textit{Internet Shopper}_i = 1)$.

4. Results

A sequential structure

Figure 2 shows the structure of our purported sequential structure. It shows that approximately one-third of Internet users do not use the Internet for shopping. More importantly for our research, it illustrates that no one uses the Internet for banking if they do not use the Internet for shopping. In our sample, less than 30 percent of respondent use the Internet for banking, and this represents more than 40 percent of the respondents who use the Internet for shopping. Figure 2 corroborates the perspective that the decisions to use the Internet for shopping and for banking may be sequential as it is in line with the proposition that using the Internet for shopping is a prerequisite for using the Internet for banking.

{Insert Figure 2 about here}

We draw our data from Patsiotis *et al*.'s (2012) study which captures the multidimensional nature of each construct, but inclusion of all dimensions in our regression approach would produce excessive multicollinearity and potentially incorrect coefficient estimates due to included variable bias.[4] To circumvent these problems we apply principal component analysis to each construct as a data reduction technique. We retain each construct's principal component and use these as regressors into our bivariate probit analysis.[5] Table 2 presents descriptions of these principal components.

{Insert Table 2 about here}

Bivariate regression results

Our regression results are presented in Table 3. They indicate there is a very strong association between the choices to use the Internet for shopping and to use the Internet for banking; this is illustrated by the highly statistically significant result of the log-likelihood of rho ($chi^2 = 43.2469$, $p < 0.000$).

{Insert Table 3 about here}

Our initial regression is the choice to use the Internet for shopping. The results corroborate extant literature by illustrating that males and the higher educated are more likely

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4 The empirical findings of this study have several limitations. These refer to the chosen geographic context, the chosen predictors for modelling, the cross-sectional nature of the survey, and the possible non-response bias considering that sample respondents may not represent the working population.

5 See Churchill and Iacobucci (2002) for a description of the principal components approach.

to use the Internet for shopping. Moreover, the results show that greater enjoyment (significant at the 10 percent level) and greater personal capacity both enhance the likelihood that an individual will use the Internet for shopping, while greater perceived risks negatively influence the likelihood that a person will use the Internet for shopping, all given that they are already Internet users. The positive influences observed, and especially on enjoyment, are in line with empirical findings that emotions influence positively usage behaviour (Martin *et al*., 2008; Shamdasani *et al*., 2008; Watson and Spence, 2007; Wood and Moreau, 2006).

Different factors are important in enhancing the likelihood that an Internet user will use the Internet for banking. Greater enjoyment and greater ease of use both enhance the likelihood that an Internet user will also use the Internet for banking; conversely, lower perceptions of usefulness and a lack of trial will both diminish this likelihood. Although the core application is the same, usage of subsequent innovations may be influenced by different factors and therefore proceed to estimate a sequential model.

Conditional marginal effects

Set within a bivariate probit regression approach, it is possible to examine our proposition that the equations should be estimated in sequence. Accordingly, Table 3 also presents two sets of marginal effects estimates corresponding to those which are not based on a sequential approach (i.e. unconditional) and those that are based on a sequential approach (i.e. conditional). Several points are worthy of emphasis here. First, there is a slight disagreement on which variables enhance the likelihood that an Internet user will use Internet banking as the significant coefficients corresponding to education and time-energy are not significant at tradition level of acceptance within the unconditional set up. These findings suggest that time-energy and higher education affect the likelihood of using the Internet for banking and not only the decision to use the Internet for shopping, as would be inferred under the unconditional approach. Perhaps these results are reflecting the possibility that having higher education increases the speed of learning new innovations and therefore increases the likelihood that an Internet user will more quickly adopt Internet banking facilities. The greater coefficient estimates for the time-energy variable when the structure is conditional also emphasises the increasing importance of speed when using the Internet for banking transactions.

Second, when the variables have been identified as being highly statistically significant, the coefficients estimates corresponding to the condition approach are typically much larger than for the unconditional approach. This suggests the standard unconditional approach leads to coefficient estimates that are biased towards zero (i.e. having no effect), and therefore underestimates their impact on the likelihood of using the Internet for banking. The clearest example of this bias corresponds to having post-graduate education, where the marginal effect is more than four-times greater under the conditional approach relative to the unconditional approach. A lack of trail has a much greater hindering effect on using the Internet for banking under the condition approach, being almost 50 percent greater than expected under the unconditional approach.

Third, the empirical observation that there is a negative influence of usefulness on Internet banking use offers new evidence on Internet banking usage behaviour; indeed our empirical estimates suggest that usefulness is the most important lever for policy formation, and emphasising the usefulness of Internet banking could lead to the greatest amount of new Internet bankers. Moreover, the negative effects of usefulness on Internet banking adoption rates contrasts with existing research on the influence of usefulness on customer intentions and usage toward technology-based service offerings (TAM model and extensions: Gilbert *et* *al.*, 2004; Hernandez *et al.*, 2009; McKechnie *et al*., 2006; Ozdemir and Trott, 2009). In a study comparing Internet banking acceptance to older self-service technologies for banking, such as the ATM and phone, Curran and Meuter (2005) found that ease of use and usefulness are not important predictors of Internet banking, although there are important for the adoption of ATM. They concluded that for an innovation to be successful, i.e. reach the majority of potential customers, it must be both useful and easy to use. Thus, the low adoption rates of Internet banking may be associated with the negative influence of usefulness. Considering that usefulness is similar to relative advantage and that relative advantage has been found to be one of the strongest predictors of an innovation's adoption rate (Rogers, 2003), the negative effect of usefulness on Internet banking propensity may further explain low adoption rates. Another explanation for the negative influence of usefulness on Internet banking is that Internet shoppers may perceive Internet banking to be less useful when compared to alternative channels, such as the ATM, and therefore not interesting for further consideration.

Fourth, a lack of trial of Internet banking is found to be strongly associated with non-usage behaviour, which could be difficult to circumvent as trialability of Internet banking cannot readily be experienced before adoption. In our study, although Internet banking users are positively influenced by ease of use, enjoyment, and to some extent value time-energy savings, usefulness and lack of trial explain non-use. Thus, Internet shoppers may not be fully aware of the usefulness aspects of Internet banking use. This is supported by the negative influence of lack of trial, i.e. less or no opportunities to understand how it works do not add knowledge on the usefulness aspects.

It may also be the case that customers use a combination of banking methods other than the online. The literature supports a multi-channel integration (Coelho and Easingwood, 2003; Zeithaml *et al*., 2009). Earlier results indicate that consumers have a preference for a mix of delivery channels rather than exclusive reliance upon anyone single channel (Howcroft *et al*., 2002), and new delivery channels tend to complement rather than replace the existing ones (Hughes, 2006). Finally, it is interesting in the results of this study that interactivity, and any perceived risks, security and privacy concerns do not influence adoption rates. This also contrasts empirical research on the preceding influences. It may be the focus of extant work on pre-adoption behaviour, compared to the method adopted in this study examining usage behaviour, that explains their non-importance.

5. Conclusion and implications

This study examined empirically the conditional link between Internet shopping and Internet banking in order to identify key factors influencing Internet banking adoption rate. The focus was on the behaviour of Internet users that adopt and use Internet shopping first in order to decide whether to use the Internet for their banking needs.

The application of bivariate probit regression analyses revealed that for those with Internet shopping experience, the probability of using Internet banking services is positively affected by customer perceptions on enjoyment, ease of use, and time-energy savings, and negatively influenced by usefulness and lack of trial. The results of this study support the presence of a conditional link, and suggest Internet shopping and Internet banking should be examined sequentially. Empirical research usually examines diffusion theories within the context of one technological innovation. The results of this study strongly support the proposition that diffusion research should examine new technological innovations sequentially when they are based on a core application and the adoption of the first would probably lead or not to the adoption and use of the second.

The above findings suggest further research inquiry and practical implications for service providers. Future research could further apply the sequential modelling approach in similar service contexts (e.g., smart phone, personal assistance shopping) and in other geographic areas exhibiting different adoption rates. This is particularly applicable when technological innovations are introduced, or have been introduced, sequentially in the market, and there is a lack of an accurate sample frame. Usage behaviour could be examined further to identify the most relevant predictors and confirm the key influences revealed by this study. As the chosen innovations are in the market for some time now, different factors might be more important influences to their adoption rates. This would facilitate a better understanding of non-usage behaviour too. In addition, longitudinal studies based on panel data could provide better indication of the future direction of the conditional link and the most important influencing factors.

Finally, the evidence provided in this research study on the conditional link between Internet shopping and Internet banking suggests that even though the basis of a technological interface is the computer, new services developed through this can have different perceived characteristics. Thus, banks should be aware that Internet banking use presents unique characteristics compared with the other alternative channels as well as with related services. Bank customers that use the Internet for shopping but not for banking should be informed for the usefulness aspects of online banking, as well as be given the opportunity to experience how it works, given the perceived lack of trial. In particular, the usefulness aspects should be examined further through a comparison of the alternative methods for banking. It may be that some customers find Internet banking to be less useful when compared to other method(s), or they may not be fully aware of its benefits. Existing users of Internet banking facilities value the enjoyment aspects, so service providers should make the experience enjoyable so as to sustain positive emotions. As a result, good knowledge of the behaviour of users would facilitate their effort to understand those likely to be new users and incorporate this understanding in their marketing strategy to develop a more targeted communications policy that would generate useful customer feedback.

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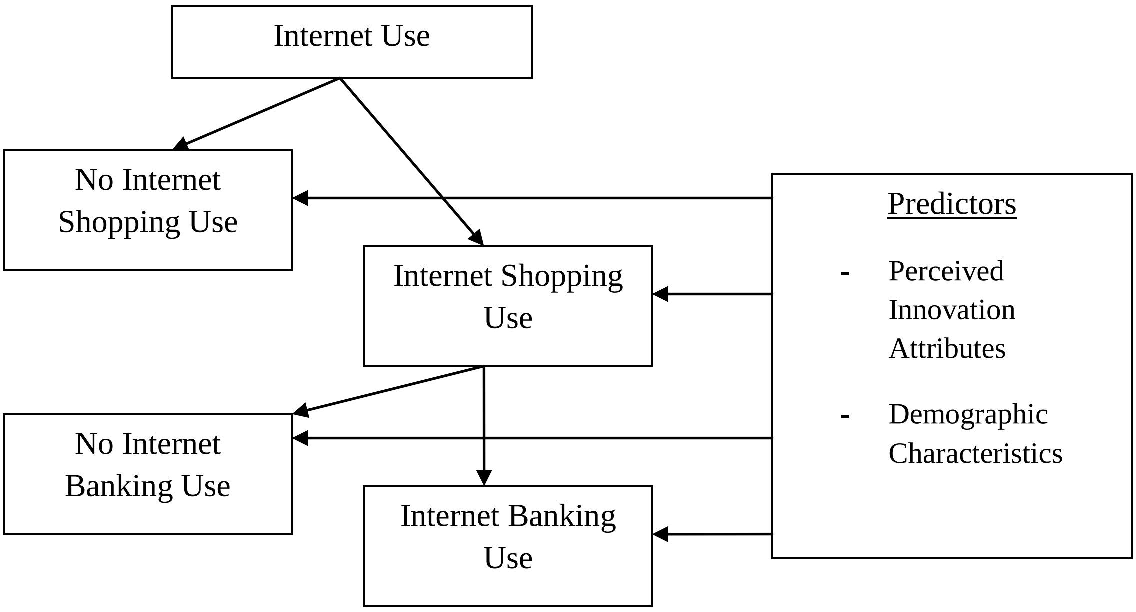

Figure 1: Conceptual framework

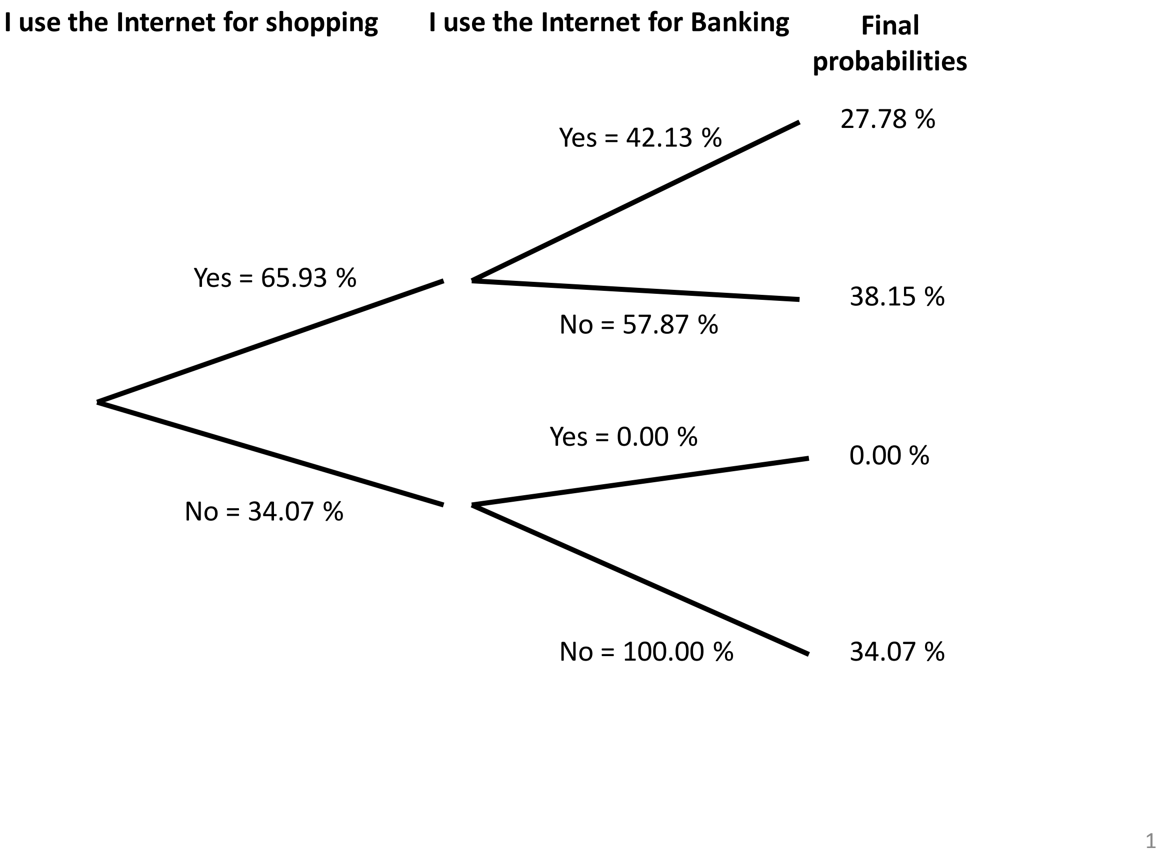

Figure 2: Tree diagram

Table 1. Description of non-principal component variables

Variables	Description
Dependents:	
- Internet shopping use:	Binary = 1 if someone uses; 0 non-use
- Internet banking use:	Binary = 1 if someone uses; 0 non-use
Independent	
Individual characteristics:	
Gender (binary)	1 if male (47%); 0 if female (53%)
Age (years)	18-25 (26.3%); 26-35 (41.5%); 36-45 (20%); 46-55 (7.8%); 56-65 (4.4%)
Education	School (3.7%); College (20%); University (43%); Postgraduate (33.3%)

Table 2: Results of principal components analysis

	Enjoyment	Time and energy	Ease of use	Usefulness	Interactivity	Personal capacity	Perceived risks	Privacy concerns	Security concerns	Lack of trial
Loadings	7a, b, c	8g1, 2, 3, 4	8h, i, j	8g5, e, f	9 (all 33)	10b, c, d, e	11a, b, c	11d1, 2, 3	11d4, 5, 6	11e, f, g, h, i, j
Eigenvalue	2.263	2.594	1.483	1.753	13.343	2.474	2.265	2.421	2.348	4.022
Proportion (%)	0.754	0.649	0.494	0.584	0.404	0.619	0.755	0.807	0.783	0.670

Table 3: Estimates of probit regressions

	Unrelated bivariate probit			Unconditional marginal effects			Conditional marginal effects		
	Coef.	Std. error	p	dy/dx	Std. error	p	dy/dx	Std. error	p
Internet shopper									
Male	0.627	0.193	**0.001**						
Age: 18-25	0.110	0.228	0.630						
Age: 26-35		*Control variable*							
Age: 36-45	0.1600	0.269	0.552						
Age: 46-55	-0.057	0.401	0.887						
Age: 56-65	0.106	0.452	0.815						
Education School	0.4500	0.460	0.328						
Education College	0.189	0.234	0.420						
Education Degree		*Control variable*							
Education Post-grad	0.969	0.262	**0.000**						
Enjoyment	0.128	0.074	**0.082**						
Time and energy	-0.035	0.079	0.659						
Ease of use	0.124	0.096	0.199						
Usefulness	-0.134	0.095	0.160						
Interactivity	0.035	0.032	0.273						
Personal capacity	0.272	0.075	**0.000**						
Perceive risks	-0.309	0.100	**0.002**						
Privacy	0.190	0.116	0.102						
Security	-0.137	0.102	0.177						
Lack of trial	0.040	0.065	0.538						
constant	-0.165	0.203	0.417						
Internet banker									
Male	0.589	0.226	**0.009**	0.168	0.065	**0.009**	0.148	0.083	**0.075**
Age: 18-25	-0.156	0.291	0.591	-0.043	0.077	0.577	-0.077	0.109	0.480
Age: 26-35		*Control variable*			*Control variable*			*Control variable*	
Age: 36-45	0.776	0.292	**0.008**	0.256	0.106	**0.016**	0.285	0.099	**0.004**
Age: 46-55	0.144	0.475	0.761	0.043	0.148	0.772	0.065	0.187	0.729
Age: 56-65	1.002	0.494	**0.042**	0.360	0.192	**0.060**	0.382	0.170	**0.025**
Education School	-0.653	0.678	0.335	-0.338	0.098	0.160	-0.319	0.263	0.224
Education College	-0.135	0.295	0.647	-0.037	0.077	0.634	-0.079	0.108	0.464
Education Degree		*Control variable*			*Control variable*			*Control variable*	
Education Post-grad	-0.164	0.252	0.514	-0.045	0.068	0.504	-0.196	0.090	**0.029**
Enjoyment	0.291	0.093	**0.002**	0.082	0.026	**0.002**	0.098	0.036	**0.006**
Time Energy	0.137	0.093	0.140	0.039	0.026	0.138	0.059	0.033	**0.078**
Ease Of Use	0.225	0.110	**0.041**	0.064	0.031	**0.038**	0.072	0.039	**0.066**
Usefulness	-0.316	0.101	**0.002**	-0.089	0.029	**0.002**	-0.107	0.036	**0.003**
Interactivity	0.004	0.037	0.909	-0.001	0.010	0.909	-0.003	0.013	0.817
Personal Capacity	0.127	0.095	0.180	0.036	0.027	0.177	0.013	0.035	0.699
Perceived Risks	-0.109	0.103	0.292	-0.031	0.029	0.291	-0.001	0.040	0.975
Privacy	0.051	0.110	0.640	0.014	0.031	0.640	-0.005	0.042	0.898
Security	-0.025	0.099	0.798	-0.007	0.028	0.798	0.009	0.037	0.816
Lack Of Trial	-0.231	0.073	**0.002**	-0.065	0.022	**0.003**	-0.097	0.030	**0.001**
constant	-1.154	0.234	**0.000**						
Rho	1	5.21e-09							
Log Likelihood	-191.55								

Notes: *N*=259; bold font highlights statistical significance at the 10% confidence level. Likelihood-ratio test of rho=0, $chi^2(1) = 43.2469$, Prob > $chi^2 = 0.0000$.