



Obstacles to online shopping: Impact of Gender and Internet Security Issues

Ahu GENİŞ-GRUBER¹

M. Sinan GÖNÜL²

Bedri Kamil Onur TAŞ³

Abstract

In the latest technology era, the widespread usage of internet enabled individuals to interact continuously and led to altered buying behavior patterns. Literature focuses on the critical effects in the field. Among many antecedents to online shopping, previous studies point out two important obstacles: (i) acceptance and tendency to use technology in accordance with gender perceptions and (ii) internet security problems. This study analyzes the impact of these two prominent factors on e-commerce utilization by studying the effects of these factors through primary and secondary data; a survey designed specifically for this analysis and the cross-country data from Eurostat. The findings show that while internet security problems significantly impact online shopping behavior, the evidence is mixed for the impact of gender. The results of this paper provide insights for a successful e-commerce transaction and identify important obstacles to be avoided for an efficient e-commerce system.

Keywords: Online shopping, e-commerce, credit card fraud, gender effect

Jel Classification Codes: L81, L86

Çevrimiçi Alışverişteki Engeller: Cinsiyet ve İnternet Güvenliğinin Etkileri

Özet

Güncel teknoloji çağında, internetin yaygın kullanımı bireylerin sürekli etkileşim içinde olmasını sağlamış ve farklı alışveriş davranışlarına yol açmıştır. Literatürdeki çalışmalar, bu alandaki önemli etkileri ortaya çıkarmaya odaklanmıştır. Bu bağlamda, çevrimiçi yapılan alışverişi etkileyen unsurlar arasında iki önemli engel göze

¹ TOBB University of Economics and Technology Department of International Entrepreneurship

² Corresponding Author: M. Sinan Gönül, Department of Business Administration, Middle East Technical University, Üniversiteler Mah., Dumlupınar Blv. No:1, 06800 Çankaya Ankara Turkey, e-mail:msgonul@metu.edu.tr

³ TOBB University of Economics and Technology Department of Economics

çarpmaktadır: i) Cinsiyet algısına bağlı teknolojiyi kabul etme ve kullanma eğilimi ve ii) İnternetteki güvenlik sorunları. Bu çalışma, göze çarpan bu iki unsurun e-ticaretin kullanımına olan etkilerini Eurostat'ın ülkeler arası verisini kullanarak ve de bu çalışma için özel olarak tasarlanmış bir anketin sonuçlarını analiz ederek incelemektedir. Bulgular, internetteki güvenlik sorunlarının çevrimiçi alışveriş davranışını oldukça etkilediğini göstermektedir. Cinsiyetin etkileri ise daha karmaşıktır. Bu çalışmanın sonuçları başarılı bir e-ticaret işlemi için gerekenler hakkında fikir vermekte ve verimli bir e-ticaret sistemi için kaçınılması gereken önemli engelleri göstermektedir.

Anahtar Kelimeler: Çevrimiçi alışveriş, e-ticaret, kredi kartı sahtekarlığı, cinsiyet etkisi
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1. INTRODUCTION

E-commerce includes all business activities that use internet technologies (Schneider, 2007). E-commerce does not only mean shopping on the part of Internet, but includes many other activities, such as business trading with other businesses and internal processes that companies use to support their buying, selling, hiring, planning activities (Schneider, 2007). The rapid increase in use of internet eventually changed the way of obtaining goods and services for consumers. Both academic literature and everyday media strongly indicate that e-commerce has become a common way for purchasing, shopping and witnessed wide-spread recognition all over the world (Forsythe and Chun, 2000; Malone, Yates and Benjamin, 1987; Moodley and Morris, 2004).

There are two schools among scholars with regard to e-commerce advantages. Proponents of the perceived benefits of e-commerce, who are also known as e-commerce optimists (Goldstein and O'Connor, 2000; Mann, 2000; Moodley and Morris, 2004) argue that through e-commerce, participation in international trade and accession to larger and global markets is achieved. Thus, e-commerce will likely replace retail shopping as the primary medium for trade and consumer shopping in the near future. On the other hand, opponents of e-commerce have exemplified many barriers pertaining to both organizations and individuals that may hinder e-commerce from achieving that goal (Le, 2002; Luo, 2002; Todaro and Smith, 2003). Among these factors, a highly prominent one is the presence of internet security problems.

The presence of gender differences of the individuals who participate in online buying behavior complicates the impact of the important obstacle on e-commerce. In the literature, "Gender Marketing" concept dictates that females and males respond differently to different marketing strategies (Jaffe, 2007).

Therefore, when analyzing the impact of internet security problems, gender differences should be taken into account.

Recent studies examine the relationship between gender and the internet (Dholakia and Kshetri, 2002; Forsythe and Chun, 2000; Rodgers and Harris, 2003) and between gender and technology acceptance (Ajzen and Fishbein, 1980; Davis, Bagozzi, and Warshaw, 1989; 1992; Venkatesh and Davis, 2000), however a direct study on the effects of gender differences and internet security problems on e-commerce participation is lacking. Starting from this point of research, this study aims to fill this gap by conducting an empirical investigation in the venue.

The aim of this study is fourfold: (a) To explore the effects of gender differences on individual online buying behavior; (b) To explore the interaction between the presence of internet security problems and the tendency to participate in online shopping; (c) To utilize data from both primary (a survey specifically constructed for the purposes of the paper) and secondary (Eurostat dataset) sources for an encompassing perspective; (d) To propose suggestions for the improvement of online purchase.

The secondary data source, the information society statistics of Eurostat, provides a reliable cross-country data about e-commerce behaviour of 26 different European countries and contains direct questions about gender and internet security problems. This dataset has many distinctive features involving) cross-culture data of 26 countries ii) annual data iii) more than 300000 individuals are surveyed each year about their internet and e-commerce behaviour (time series follow-up), iv) detailed information about consumers. The study also conducts a custom-made survey as primary data source to cross-check the Eurostat estimates and implications.

The organization of the paper is as follows. Section 2 provides literature review enriched with the primary research Hypotheses. In Section 3, the research methodology is explained. The results of the statistical analysis are conveyed in Section 4. Section 5 presents the conclusions, implications of the results and directions for the future research.

2. LITERATURE REVIEW AND RESEARCH MODEL

Several important obstacles thwart e-commerce from becoming the main venue of retail shopping. On the organizational side, the literature indicates these obstacles as; the absence or relative weakness of legal system which

enforces contracts and rules of loan payment (Todaro and Smith, 2003), information asymmetry (Le, 2002), lack of information (Milgrom and Roberts, 1992), lack of telecommunication infrastructure (Frempong and Stark, 2005) and electronic payment system constraints (Mbarika and Okoli, 2003).

On the consumer side, internet security problems construct the biggest challenges for e-commerce, which generally occur in the form of online shopping. Internet security problems can be identified as credit card fraud (Jenning, 1996; Swaminathan, Kraut, Leprowska-White and Rao, 1999; Misra and Rao, 2000; Rowley, 1996; Bhatnagar, Misra and Rao, 2000; Udo, 2001), virus attack and abuse of private information (Badie and Higby, 2001; Grummert, 2000; Luo, 2002; Swaminathan et al, 1999), lack of trust (Grabner-Krauter, 2002; Hutchinson and Warren, 2002; Luo, 2002; Torkzadeh and Dhillon, 2002), physical interpersonal relationship requirements (Rauch, 2001), cultural factors (Lee and Turban, 2001; McKnight, Cummings and Chervany, 1998; McKnight and Chervany, 2001) and social factors among demographic factors, economic factors and various perceptions and behavioral patterns of different genders. Bosnjak, Galesic and Tuten (2007) also identify personality as an important determinant of online shopping decision.

Besides the factors mentioned above, previous studies emphasize the importance of the impact of gender on e-commerce. Gender is an antecedent factor in information processing (Darley and Smith, 1995; Meyer-Levy and Meheswaran, 1991), shopping habits and credit card use (Hayhoe, Leach, Turner, Bruin and Lawrence, 2000), perception of advertising (Widgery and McGaugh, 1993), online shopping (Grummert, 2000; Rainie, 2002) and internet usage (Laudon and Trevor, 2007).

Gender differences exist in both technology acceptance and user behavior. The variation between the genders lies in perceptions of technology, where subjective norms and ease of use influence female's perceptions (Venkatesh and Morris, 2000; Venkatesh, Morris, and Ackerman, 2000). The expectation regarding technology level in workplace among females is found to be lower than the expectation of males (Hackett, Mirvis, and Sales, 1991).

In terms of internet utilization, gender differences play a significant role, as females use internet for personal assistance and education more than males, and males use internet more for entertainment and leisure purposes (Jackson, Ervin, Gardner, and Schmitt, 2001). In this era, the number of female and male internet users does not show a significant divergence. At the same time, numbers of

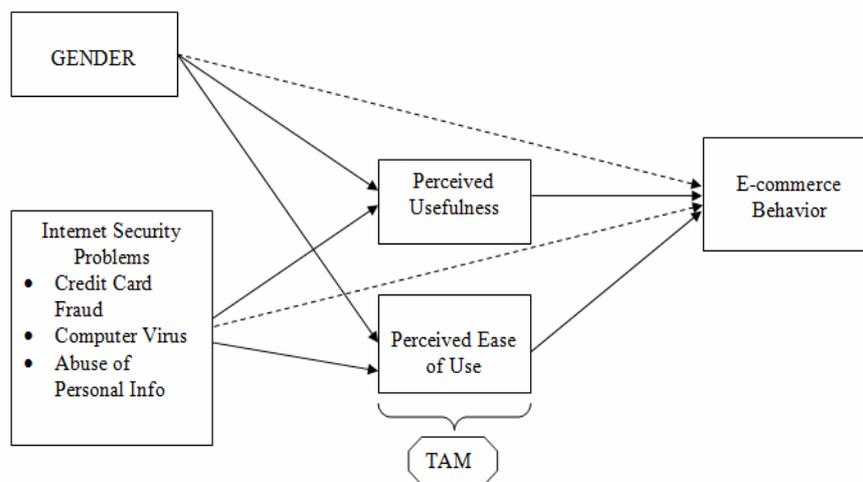
females and males searching in internet for a product are similar; however their purchase decisions are driven by various aspects, like distinct expectations, shopping experience and collectivist approach (Davies and Lsung, 1995; Doney, Cannon and Mullen, 1998; Wong and Tam, 2000).Hwang (2010) investigates the normative and affective factors based on Theory of Reasoned Action and self determination theory by testing the moderating effects of gender to clarify the gender role in e-commerce adoption. Hasan (2010) analyzes the gender differences on online shopping attitudes. Sociolinguists suggest that online purchase and communication, including e-commerce, should be investigated with gender as a central social aspect (Tannen, 1991; Yates, 2001). Tannen (1995) suggests that male patterns of communication tend to be more based on the notion of social hierarchy, while female patterns tend to be network oriented. Research argues that female and male value different capabilities in e-commerce, with women focusing more on trust-worthiness and assurance and the ability to share opinions and ideas and men focusing more on value gained through the purchase (Awad & Ragowsky, 2008; Cho & Jialin, 2008; Rodgers & Harris, 2003).

On the relationship between technology acceptance and e-commerce behavior, the perceptions of trust seem to be an important factor. Reichheld and Schefter (2000) indicate that trust is a more important issue than the price of products on the web and e-commerce behavior is an essential part of information technology. Ciganek and Jarapatruin (2004) suggest that gender differences play a significant role in the cognitive processes of individuals which in turn influence their trust perceptions towards an e-merchant.The "Integrated Model of Trust and Technology Acceptance Model (TAM) presented by Gefen, Karahanna and Straub (2003) investigates the link between perceptions of trust and the dimensions of the TAM model. Their findings imply that trust affects perceptions of usefulness and is simultaneously influenced by perceptions of ease of use, hence revealing the intertwined and complex nature of the relationship between the two concepts. Recent studies conducted on the link further reinforce that, through multiple channels and means, trust affects e-commerce behavior and is an inherent, inseparable part of the technology acceptance process that may not be easy to think in isolation (Ha and Stoel, 2009; McCole, Ramsey and Williams, 2010).

Based on these discussions, it can be argued that gender and internet security problems are two major factors that influence e-commerce adoption

and behavior of individuals. In this regard, in figure 1, we propose the following theoretical model that provides the basis for the empirical analysis of this paper.

Figure 1: Research Model of Empirical Analysis



Gender may affect e-commerce behavior through different channels. First, as Venkatesh and Morris (2000) present, males and females differ significantly in technology adoption. Therefore gender might be a significant factor in the TAM model leading to different perceptions of usefulness and ease of use. And through these differences in technology adoption, gender differences might significantly alter e-commerce behaviors of individuals. Secondly, as Ciganek and Jarapatruin (2004) suggest owing to distinct cognitive processes between the genders, there will be differences in their various decision making processes thus their e-commerce behavior will be affected through more indirect and entangled ways such as formation of trust and information search tendencies. On this issue, Cleveland, Babin, Laroche, Ward, and Bergeron (2003) indicate that females acquire more information cues than males before making decisions to purchase a product while males use the recommendation of experts when making a purchasing judgment. Similarly, Ciganek and Jarapatruin (2004) find that guarantee policy and assurance of privacy is among the major antecedents of online purchasing for females while for males trend in the positive/negative reviews of experts is the major component. In this manner, there will be a link

between gender and e-commerce behavior, but the exact cause and nature of the influence will be based on a multitude of factors.

Based on these discussions our first hypothesis is as follows:

H₁: Gender differences have an influence on the acceptance of online purchasing technology.

And this leads to our second hypothesis that inquires the link between gender and online purchasing decisions.

H₂: Gender differences have an influence on online purchasing behavior.

Udo (2001) states that: "The public lack of confidence in online information technology (IT) is not merely about security of value, but also about trust in the information society. Privacy and security concerns are the number one reason Web users are not purchasing over the Web." As also suggested by this comment, internet security problems may have a direct impact on online purchasing decisions. At the same time, internet security problems may be a critical factor that shapes the perceptions (perceived usefulness and perceived ease of use) about online shopping technologies and through these perceptions they may indirectly influence online purchasing behavior. The lower section of Figure 1 displays these interactions between internet security problems and e-commerce behavior.

Combining these arguments, we convey our third and fourth hypotheses

H₃: Internet security problems (credit card fraud, virus attack, abuse of private information) have significant negative effects on the acceptance of online purchasing technology.

H₄: Internet security problems (credit card fraud, virus attack, abuse of private information) have significant negative effects on online purchasing behavior.

The details of the methodology to investigate these hypotheses are as follows:

3. RESEARCH METHOD

3.1. Data

The data used in this study can be separated into two sections: (1) The cross-country dataset of Eurostat Information Society Statistics and (2) a tailor-made survey conducted among 184 university students.

3.1.1. Eurostat Information Society Statistics:

Eurostat dataset is constructed from cross-country surveys which possess sufficient number of observations to represent the entire populations. More than 300.000 people are surveyed each year to construct yearly percentages per country. The information society surveys include gender information and questions about internet security problems. The dataset used for this study consists of two sections:

1) *E-commerce by Gender*: E-commerce data for 26 EU countries is used in the analysis and involves annual data. E-commerce usage among females and males are used as dependent variables in the regression analysis. The variable definition includes the following: Individuals having ordered and bought goods or services for private use over the Internet in the last three months; females and males, age group of 16 to 74.

2) *Internet Security Problems Encountered by Individuals*: Internet security problems are used as explanatory variables in the regression analysis. The data is taken from Eurostat information society statistics. Data for 26 EU countries is used in the analysis and involves annual data. The variables are indexed with respect to the population by dividing the variables to individuals. Eurostat contains questions about three major security problems:

a) Credit Card Fraud: Percentage of individuals with Internet that encountered fraudulent payment; credit or debit card use.

b) Harmful Computer Virus Attack: Percentage of individuals with Internet that encountered computer virus resulting in loss of information or time.

c) Abuse of Personal Information Sent on the Internet: Percentage of individuals with Internet that encountered security problems due to abuse of personal information sent on the Web.

3.1.2. Survey Data:

In order to enhance the findings from the Eurostat data and to overcome the shortcomings of using secondary data, a questionnaire tailored for the research questions was designed. Moreover, Eurostat does not contain any data regarding the technology acceptance model, therefore to test the relationship of the technology acceptance process as proposed in our model we especially required data specifically collected for the purpose. The questionnaire collected demographic data mainly in terms of gender, inquired the presence and frequency of e-commerce participations in terms of online buying/shopping,

involved questions that are adopted from Davis (1989) to inquire technology acceptance (i.e perceived usefulness & perceived ease of use) and involved questions about the frequency and importance of security problems encountered during these experiences. A sample survey is attached in the appendix.

A total of 184 university students responded the survey. The survey was conducted in a controlled environment, where researchers were present the whole time to monitor the process and to clarify any issues and questions that had risen during the survey. Among the surveyed students, 52% were males and 48% were females. All of them were between the ages of 18-22 and formed a fairly representative sample.

Due to the presence of missing data, we used pairwise deletion and accordingly some of our analysis could not make use of the data from all the 184 participants. Our investigations showed that the missing data had no pattern and can be considered completely arbitrary.

3.2. Method of Analysis

For the empirical analysis, t-test, Panel Data Regression with random effects and Binary Logistic Regression methods are implemented. Random effects method is selected by the Hausman test, which is the commonly accepted technique for choosing between fixed and random effects models of panel data.

In order to investigate the impact of gender on e-commerce behavior of individuals, the study uses tests of equality of means between two samples as female and male. In addition, artificial regression methodology is implemented to measure the difference in the percentages of e-commerce conducted by females and males. The following regression equation is estimated using OLS (ordinary least squares) regression:

$$Ecommerce_{i,t} = \beta_0 + \beta Female_Dummy_{i,t} + \varepsilon_{i,t}$$

β in the regression equation above measures the effect of being a female on e-commerce behavior compared to being a male since the dummy variable has the value of 1 if the individual is female and 0 if he is a male. Thus, if β is significant and negative the analysis concludes that females conduct less e-commerce compared to males which is the first hypothesis.

The analysis of the impact of internet security problems (credit card fraud, virus attack, abuse of private information) on e-commerce behavior is conducted by using the random effects method. The study implements the random effects method in order to be able to take into account the cross-country differences. The coefficients of the following equation are estimated:

$$Ecommerce_{i,t} = \beta_0 + \beta Security_Problem_{i,t} + \varepsilon_{i,t}$$

The equation above is estimated for e-commerce by females and males and different types of security problems. β in the regression equation above that measures the effect of the security problem on e-commerce behavior. Thus, if β is significant and negative, then the analysis concludes that the security problem significantly decreases online purchases which is in line with the second hypothesis.

When analyzing the survey data, the study uses OLS regression for the technology acceptance process (i.e. perceived usefulness and perceived ease of use) and logistic regression methodology to investigate the antecedents of probability of purchasing online. The following equations are estimated:

$$Perceived_usefulness_i = \beta_0 + \beta_1 Credit_Fraud_i + \beta_2 Virus_i + \beta_3 Abuse_i + \beta_4 Female_Dummy_i + \varepsilon_i$$

$$Perceived_ease_of_use_i = \beta_0 + \beta_1 Credit_Fraud_i + \beta_2 Virus_i + \beta_3 Abuse_i + \beta_4 Female_Dummy_i + \varepsilon_i$$

$$Online_i = \beta_0 + \beta_1 Female_Dummy_i + \varepsilon_i$$

$$Online_i = \beta_0 + \beta_1 Perceived_usefulness_i + \beta_2 Perceived_ease_of_use_i + \beta_3 Credit_Fraud_i + \beta_4 Virus_i + \beta_5 Abuse_i + \beta_6 Female_Dummy_i + Control_Variables_i + \varepsilon_i$$

$Online_i$ is the dummy variable that is 1 if the surveyed students purchased goods online and 0 if not. Thus, the logistic regression examines the factors that affect the probability of purchasing online (probability that $Online_i$ variable is 1). $Perceived_usefulness_i$ is the first dimension of the technology acceptance model that is obtained by taking the average score of questions 8, 9, 10 and 11 for each participant. $Perceived_ease_of_use_i$ is the second dimension of the

technology acceptance model that is obtained by taking the average score of questions 12, 13 and 14 for each participant. These questions in the survey are direct adaptations from the technology acceptance scale developed by Davis (1989).

$Credit_Fraud_i$, $Virus_i$ and $Abuse_i$ are ordered value variables constructed using the answers to the following question on the survey: “Please indicate how frequently you have encountered them in your own shopping experience by giving each statement an appropriate value between 1 and 7.” Number 7 indicates very frequently and number 1 indicates very rarely. $Credit_Fraud_i$ is the variable that measures the credit card fraud on online purchase decisions. $Virus_i$ is the variable that shows the threat of computer virus attacks. Finally, $Abuse_i$ is the variable that measures the experience related with the abuse of private information. $Control_Variables_i$ are quality of delivered product, delivery time of the product and price of the product. Control variables are variables between 1 and 7 which show their importance for online purchase decisions. In these control variables 1 denotes very rarely and 7 denotes very frequently.

4. Results

4.1. Analysis of Eurostat Data

a) Impact of Gender on e-commerce:

Table 1 displays the descriptive statistics of e-commerce by females and males. From the table it can be seen that the mean, median and standard deviation are different among females and males.

Table 1
Descriptive Statistics of Ecommerce by Gender
Percentage of the individuals in the population
who had ordered/bought goods or services for private use

	Mean	Std. Dev.	Median	Maximum
Female	12.99%	11.88%	8.50%	43.00%
Male	17.58%	14.74%	11.00%	52.00%
E-commerce activities by females & males equal?			$t_{252} = -2.79, p = 0.006$	

The p-values of the test statistics (to test the null hypothesis that the means of e-commerce by females and males are equal) are very close to zero. The test concludes that the means of e-commerce by females and males are significantly different, thus providing support for H_2 .

Table 2 measures the difference between e-commerce of females and males using OLS regression methodology presenting the result of the artificial regression designed to gauge the difference in the means of female and male e-commerce behavior. The coefficient of the female dummy variable is significant and negative. This result indicates that females engage in lower e-commerce activities. Females conduct almost 5% less online purchases compared to males.

Table 2
Impact of Gender on E-commerce

$$Ecommerce_{i,t} = \beta_0 + \beta_1 Female_Dummy + \varepsilon_{i,t}$$

	β_i	t-value (dof)	Coeff. significant?
Constant	17.58	15.14 (263)	p < 0.01
Gender	-4.59	-2.79 (263)	p < 0.01
Overall meaningfulness of the regression		F _{1,263} = 7.77, p < 0.01	
R-Squared		2.9%	
Number of observations		265	

b) Impact of Internet Security Problems on e-commerce:

Table 3 displays the descriptive statistics of internet security problems encountered by individuals who used the internet. A quick glance on the table shows that individuals mostly have problems about viruses.

Table 3
Descriptive Statistics of Internet Security Problems

Percentage of the individuals in the population who had encountered internet security problems

Security Problem	Mean	Std. Dev.	Median	Maximum
Credit Card Fraud	0.95%	0.88%	0.75%	3.90%
Harmful Computer Virus Attack	26.50%	10.3%	26.80%	50.80%
Abuse of personal information sent on the Internet	3.27%	3.42%	2.25%	18.50%

Table 4 investigates how internet security problems encountered by individuals affect e-commerce by females and males. This table designates that all three internet security problems significantly and negatively impact e-commerce by both females and males, thus providing support for H_4 . Credit card fraud has the highest effect on e-commerce by both females and males. Virus attack has the lowest effect.

Table 4
Impact of Internet Security Problems in E-commerce (Random Effects)
(all individuals)

	All Individuals		
Credit Card Fraud	-24.10 (2.52)*		
Harmful Computer Virus Attack		-0.61 (3.83)**	
Abuse of personal information sent on the Internet			-4.75 (2.93)**
Constant	15.1 (6.36)**	16.62 (7.82)**	15.46 (6.97)**
R-Squared	%20	32%	24%
Number of observations	52	63	58

The first numbers in the cells are *regression coefficients* (β_i). The numbers in paranthesis are the absolute values of z statistics (of the tests whether coefficients are different than 0).

* significant at 5% ; ** significant at 1%

Table 5 examines whether the impact of internet security problems is different among females and males. Table 5 indicates that internet security problems affect individuals in an equal manner regardless of their gender.

Table 5
Impact of Internet Security Problems in E-commerce (Random Effects)
 (male and female individuals)

	Female			Male		
Credit Card Fraud	-22.62 (2.57)*			-24.37 (2.28)*		
Harmful Computer Virus Attack		-0.53 (3.55)**			-0.67 (3.43)**	
Abuse of personal information sent on the Internet			-5.29 (3.09)**			-5.95 (2.90)**
Constant	13.14 (6.33)**	14.41 (7.49)**	13.95 (6.93)**	17.50 (6.23)**	19.60 (7.51)**	18.80 (7.00)**
Overall R-Squared	21%	32%	24%	20%	31%	22%
Number of observations	50	57	54	51	58	55
Number of countries	24	26	25	24	26	25
Wald Statistic	6.61**	12.60**	9.55**	5.19**	11.77**	8.39**

The first numbers in the cells are *regression coefficients* (β_i). The numbers in paranthesis are the absolute values of z statistics (of the tests whether coefficients are different than 0).

* significant at 5% ; ** significant at 1%

4.2. Survey Analysis

This section uses the survey data to investigate the hypotheses about gender and internet security problems. Table 6 describes the survey responses. All the first seven variables reported in the table utilized a 7-point scale, so for all them the ratings are in the range of 1 to 7. For the description of the last two variables, *perceived_usefulness_i* and *perceived_ease_of_use_i* please refer to next section.

Table 6
Descriptive Statistics of Survey Results

	Price	Fraud	Privacy	Virus	Quality	Physical examine	Delivery time	Perceived usefulness	Perceived ease of use
Mean	4.82	3.41	3.60	3.52	3.97	4.25	3.96	3.98	4.14
Median	5	3	4	3	4	4	4	4.12	4.33
Std. Dev.	1.69	2.12	1.93	1.87	1.76	1.86	1.75	1.53	1.61
Observations	180	178	177	178	175	176	177	182	182

a) *Impact of Gender and Internet Security Problems on Technology Acceptance Process:*

The variables that represent the two dimensions of the technology acceptance are *perceived_usefulness_i* and *perceived_ease_of_use_i*. These variables are obtained by averaging the ratings provided for the several questions mentioned in the methodology part, all of which utilize 7-point scales and thus these variables themselves turn out to be in the range of 1 to 7. In this respect, OLS regressions have been run on these variables to investigate their relationship with gender and internet security problems. Table 7 represents the results of these regressions:

Table 7
Impact of Gender & Internet Security Problems on Technology Acceptance

<i>Perceived_usefulness_i = β₀ + β₁Credit_Fraud_i + β₂Virus_i + β₃Abuse_i + β₄Female_Dummy_i + ε_i</i>			
	<i>β_i</i>	t-value (dof)	Coeff. significant?
Constant	4.61	17.40 (171)	p < 0.001
Credit Card Fraud	-0.20	-2.35 (171)	p = 0.02
Harmful Computer Virus Attack	-0.01	-0.16 (171)	n.s
Abuse of personal information sent on the Internet	0.06	0.53 (171)	n.s
Gender	-0.19	-0.81 (171)	n.s
Overall meaningfulness of the regression		F _{4,171} = 3.03, p = 0.019	
R-Squared		6.6%	
Number of observations		175	
<i>Perceived_ease_of_use_i = β₀ + β₁Credit_Fraud_i + β₂Virus_i + β₃Abuse_i + β₄Female_Dummy_i + ε_i</i>			
	<i>β_i</i>	t-value (dof)	Coeff. significant?
Constant	4.89	17.72 (171)	p < 0.001
Credit Card Fraud	-0.17	-1.88 (171)	p = 0.06
Harmful Computer Virus Attack	-0.11	-1.26 (171)	n.s
Abuse of personal information sent on the Internet	0.10	0.95 (171)	n.s
Gender	-0.30	-1.27 (171)	n.s
Overall meaningfulness of the regression		F _{4,171} = 3.19, p = 0.015	
R-Squared		6.9%	
Number of observations		175	

Based on these results, it can be argued that credit card fraud is the only factor that affects the technology acceptance process, and its effect is only

marginal ($p = 0.06$) for perceived easiness to use online shopping technology. The negative coefficients for both variables indicate that the higher the frequency of credit card fraud experienced, the less will be the perceived benefit of online shopping, and to a lesser degree the perceived easiness of engaging in one. These findings support hypothesis H_3 . On the other hand, gender does not seem to influence any of the dimensions of technology acceptance. Thus, the hypothesis H_1 is rejected.

b) Impact of Gender and Internet Security Problems on Online Shopping:

The online shopping behavior of the survey participants is operationalized by the variable, $Online_i$ which is constructed by using the answers to question 4 on the survey: “Have you ever purchased goods online?” The $Online_i$ variable is 1 if the answer is yes and 0 if it is no. Table 8 represents, the number of individuals who have responded “no” and “yes” to this questions (as grouped by the gender).

Table 8
Descriptive Statistics of Gender and Online

The number of individuals who have responded as “no” and “yes” to the question “Have you ever purchased goods online?” The numbers in parenthesis are row percentages.

	Purchased online?		Total indiv. (row)
	No	Yes	
Male	31 (33.7%)	61 (66.3%)	92 (100%)
Female	42 (47.2%)	47 (52.8%)	89 (100%)
Total indiv. (columns)	73	108	181

By using this variable, first of all, a binary logistic regression will be run to investigate the general relationship between the gender variable and online shopping behavior along similar lines with the analysis conducted on Eurostat data. The results of this regression are given in table 9.

Table 9
Impact of Gender on Online Shopping Behavior

$$Online_i = \beta_0 + \beta_1 Female_Dummy + \varepsilon_i$$

	β_i	z-value	Coeff. significant?
Constant	0.68	3.07	p = 0.002
Female Dummy	-0.56	-1.84	p = 0.06
All slopes are zero?	Reject with p = 0.06		
Number of observations	181		

As Table 9 indicates, resembling to the findings obtained from the analysis of Eurostat data, there seems to be a relationship between the gender and the online shopping behavior of consumers. Even though, marginal significance levels (for 0.05 significance) indicate the weakness of the link, the negative sign of the coefficient of the female dummy signals that female consumers have a lower probability of shopping online than male consumers. A female consumer is approximately half likely (odds ratio = 0.57) to engage in online shopping when compared against male counterparts. This finding conveys a weak evidence to support H_2 .

Second, we will investigate whether internet security problems will influence the online shopping behavior as measure by the $Online_i$ variable. In conducting this logistic regression analysis, we will also include the technology acceptance variables (perceived usefulness and perceived ease of use) to control for their mediating/moderating effects. We will also include the control variables of quality of the product, delivery time and the price, which might be important factors in online purchasing decisions. Additionally, the gender variable is also included in order to attempt a deeper investigation on the weak link between the gender and online shopping experience. Since technology acceptance process might have a mediating/moderating effect on the relationship, once it is controlled for, a clearer picture might be obtained. Table 10 displays the results of this binary logistic regression.

Table 10
Impact of Gender & Internet Security Problems on Online Shopping Behavior

$$Online_i = \beta_0 + \beta_1 Perceived_usefulness_i + \beta_2 Perceived_ease_of_use_i + \beta_3 Credit_Fraud_i + \beta_4 Virus_i + \beta_5 Abuse_i + \beta_6 Female_Dummy_i + Control_Variables_i + \varepsilon_i$$

	β_i	z-value	Coeff. significant?
Constant	-3.06	-3.26	p = 0.001
Perceived usefulness of online shopping tech.	-0.04	-0.18	n.s.
Perceived ease of use of online shopping tech.	1.01	4.28	p < 0.001
Credit Card Fraud	-0.37	-2.13	p = 0.03
Harmful Computer Virus Attack	0.01	0.04	n.s.
Abuse of personal information sent on the Internet	-0.15	-0.69	n.s.
Gender	-0.14	-0.31	n.s.
Quality of Product Problem	0.07	0.43	n.s.
Delivery Time Problem	-0.02	-0.16	n.s.
Price	0.30	1.78	n.s.
All slopes are zero?		Reject with p < 0.001	
Number of observations		172	

An examination of the table indicates that online purchasing decisions are significantly influenced by the credit card fraud problem as well as the perceived ease of use of the relevant technology. Credit card fraud has a negative coefficient indicating that when the users experience a problem in that venue, their probability of making an online purchase significantly decreases (odds ratio = 0.69). In this respect, H_4 is supported. A positive coefficient for the perceived ease of use of the technology indicates that the easier online purchasing is perceived, the higher the probability that a consumer will engage in one (odds ratio = 2.75). The other dimension of the technology acceptance model, perceived usefulness of the online shopping technology does not seem to affect the e-commerce behavior and neither does the gender, even when both dimensions of the technology acceptance process are controlled for. This finding is clearly against hypothesis H_2 . In terms of the control variables, none of them seems to have an impact on the online purchasing behavior as well.

5. Discussion and Conclusions

By using multi-country data of Eurostat and cross-checking the findings with survey conducted, the empirical analyses tried to shed some light on the notion that gender and internet security problems are important antecedents of online purchase technology adoption and online shopping behavior.

In terms of gender effects, there seems to be mixed findings. Even though analysis based on Eurostat data suggested that gender is a significant determinant of online shopping behavior and that female consumers tend to shop less frequently online when compared to male consumers, the analysis based on our survey data did not reveal any strong impact of gender on the acceptance of online shopping technology (as observed in the dimensions of perceived usefulness and perceived ease of use). Very similar results are also observed (i.e. no significant impact of gender) on the odds that a consumer will engage in online shopping when the effects of technology acceptance dimensions and internet security problems are controlled for. On the other hand, when gender is regressed only against online shopping behavior, there seems to be a weak link between the two concepts. There are two possible explanations for these apparently contradictory findings.

First of all, these distinct results might be based on the limitations of our survey sample. Not only the number of students, but also the variety of students is perceived as an important limitation for our study. The survey is conducted with 184 university students. And these students are private university students from business administration and economics departments in Ankara. In that respect, purchasing online is not a foreign transaction to them. At the same time, given their generation, regardless of them being males or females they all have a strong affinity with internet and online technologies. However, Eurostat data is collected on a much wider and representative sample and includes males and females of quite diverse interests, backgrounds and ages.

Second, based on the discussions of Reichheld and Scheffer (2000), Gefen, Karahanna and Straub (2003), Ciganek and Jarapatruin (2004) there are cognitive differences between the two genders and these differences might lead to distinct decision making processes and distinct patterns of trust formation regarding e-commerce activities. So the roots of the differences between the two genders in terms of online purchasing behavior might originate from deep sociological and cognitive reasons and trying to examine the relationship solely in terms of technology acceptance might only constitute a very small piece of the bigger picture. Definitely, we require more studies that involve specifically constructed questionnaires and research designs to disentangle the complex nature of this relationship.

In terms of the internet security problems, our analysis based on Eurostat data and our own survey consistently reveal that credit card fraud seems to be biggest obstacle in front of the online shopping endeavors. Not only consumers

become quite hesitant to shop online because of their fear of credit card fraud, but also their acceptance of the online shopping technology is adversely affected. As a result of this security problem, their perceptions on the usefulness and the perceived simplicity of using this technology seems to be poorer. As a remedy against this problem, the online shopping web sites should be employing more advanced and encompassing security measures against leak of credit card information and better algorithms to minimize erroneous authorizations. At the same time, the presence of these precautions and the prudence of the e-merchant on this issue should be conveyed in an evident, adequate and easy-to-understand manner to the consumers purchasing from the web site in order to minimize their fear of fraud. Another viable alternative for the e-merchant might be working with well-known and highly recognized payment authorization companies such as PayPal instead of deploying their own credit card charging services on their web sites.

Future research in this area should elaborate on the current findings by expanding the questionnaire to include a more representative number of e-commerce participants and extend the results to a wider audience with more diverse backgrounds. Particularly, future work should incorporate more elegant data collection instruments and research designs to elaborate on the effects of gender differences on e-commerce technology adoption and e-commerce behavior. Additionally, future studies should also take note of cultural differences and investigate the impact of cultural perceptions on online shopping behavior and look for cultural factors that lead to distinct propensities to purchase e-products and e-services.

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Geniş-Gruber-Gönül-Taş/Obstacles to online...

APPENDIX

1- What's your gender?

Male Female

2- Please select the most suitable answer.

I have a **broadband (high-speed) internet connection** like ADSL, cable and satellite at home.

I don't have a **broadband (high-speed) internet connection** at home, but I illicitly share a **wireless broadband connection** I find in the neighborhood.

I have a **normal (low-speed) internet connection** (i.e., modem and telephone) at home.

I don't have any internet connection at home.

3- Do you own a personal credit card?

Yes, more than one Yes, only one No

4- Have you ever purchased goods online?

Yes No

5- If your answer to the 4th question is "yes", how many times have you shopped online in the last three months? (Please indicate a number)

.....

6- If you own one or more credit cards, are you using at least one of them for online shopping?

Yes No

For the following statements please indicate your degree of agreement by giving each statement an appropriate value between 1-7.

7- I prefer **online** shopping to **retail** shopping.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

8- Buying goods online would enable me to do shopping more **quickly**.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

9- Buying online enables me to **shop anytime** (i.e., availability of shopping 7/24).

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

10- Buying online is **convenient** (i.e., I can shop by comfortably sitting in front of a computer instead of shopping by going out and spending physical effort on retail stores).

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

11- Buying goods online would enhance my **effectiveness** on shopping.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

12- Buying online is **easy** for me.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

13- I find it **simple** to **check and compare different** sellers in online shopping.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

14- In general, the **procedures** during online shopping are **easy-to-follow and understandable**.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

15- Buying goods online would allow me to find **reasonable prices** for products.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

16- There is a **larger variety of products** available online than through retail channels.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

17- I feel a **sense of achievement** when I **successfully complete a technologically complicated procedure** such as online shopping.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

18- I have to see and examine a product before I can buy it.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

19- Some reasons that **hinder online shopping** are provided below. Please indicate how **frequently** you have encountered them in **your own shopping experience** by giving each statement an appropriate value between 1-7.

a) Credit card fraud

Very rarely 1 2 3 4 5 6 7 Very frequently

b) Abuse of private information

Very rarely 1 2 3 4 5 6 7 Very frequently

c) Virus attacks

Very rarely 1 2 3 4 5 6 7 Very frequently

d) Quality of the delivered product

Very rarely 1 2 3 4 5 6 7 Very frequently

e) Not being able to physically examine the product before purchase

Very rarely 1 2 3 4 5 6 7 Very frequently

f) Delivery time of the product

Very rarely 1 2 3 4 5 6 7 Very frequently

20- Some reasons that **hinder online shopping** are provided below. Please indicate how **important** they are for **your own shopping experience** by giving each statement an appropriate value between 1-7.

a) Credit card fraud

Not important at all 1 2 3 4 5 6 7 Very important

b) Abuse of private information

Not important at all 1 2 3 4 5 6 7 Very important

c) Virus attacks

Not important at all 1 2 3 4 5 6 7 Very important

d) Quality of the delivered product

Geniř-Gruber-Gönül-Tař/Obstacles to online...

Not important at all 1 2 3 4 5 6 7 Very important

e) Not being able to physically examine the product before purchase

Not important at all 1 2 3 4 5 6 7 Very important

f) Delivery time of the product

Not important at all 1 2 3 4 5 6 7 Very important

THANK YOU FOR YOUR TIME AND COOPERATION!!!!!!