Chapter 7
Product Differences and E-Purchasing: An Empirical Study in Spain

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7.1 Introduction

E-commerce is gradually changing the way in which many goods and services are sold and bought in most countries. This phenomenon, made possible by the internet, has attracted the attention of retailers, marketers, researchers and policymakers.

The number of internet users has grown significantly over the last few years, from 361 million users worldwide in 2,000 to 1,575 million by the end of 2008 (Internet World Stats 2008). This rapid growth in the number of internet users has promoted the belief that the web represents a huge marketing opportunity. However, there is much evidence to suggest that initial forecasts of the value in business-to-consumer (B2C) sales were over-optimistic. Despite the growing popularity of e-commerce over the last few years, online purchases continue to increase at a slower pace than expected. Many researchers assert that the failure in predictions may be the consequence of a limited understanding of e-consumer purchasing behavior.

The goal here is to contribute to a better understanding of consumer behavior by taking into account the fact that not all products or services are equally suitable for selling online. For different products, the internet shows diverse suitability as a shopping medium. Therefore, mixing categories in e-shopping behavior research may yield inconclusive or inconsistent results. For example, a consumer may be more likely to purchase software online but less inclined to acquire clothing; his

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overall e-shopping intention will be some unknown mixture of high intent and low intent. This heterogeneity is account for by disaggregating by product categories.

This chapter identifies the factors that distinguish internet users who have purchased specific products and services (e.g., books, music and computers) on the internet from those who have not. This approach reduces the heterogeneity resulting from different product types. Two broad categories of variables as possible determinants of internet purchases are explored: socio-demographic factors (i.e., gender, age and education), and the so-called webographic factors (i.e., computer and internet literacy, internet exposure, internet confidence).

This chapter is of interest to advertisers for two reasons. First, some products may be more natural to promote on the internet than others. Second, knowing the profile of buyers, in general, and of buyers of particular products and services on the internet, in particular, allows advertisers to develop effectively and target their advertising efforts. Here, identifying consumers' characteristics that are associated with the likelihood of making specific purchases are identified. In fact, the knowledge of these factors may be of use for creating segmentation and promotion strategies.

Earlier literature studied consumer behavior for specific products or services. Books and music are the most common choice of online products in these studies (e.g., Foucault and Scheufele 2002; Gefen and Straub 2004; Liu and Wei 2003; Zentner 2008). There are also papers on the online sales of groceries (Hansen et al. 2004; Henderson and Divett 2003). Travel-related products have also been studied (Young Lee et al. 2007; Athiyaman 2002). Bhatnagar et al. (2000) studied the adoption of 14 types of online products and services. Kwak et al. (2002) explored the factors that may potentially influence consumer online purchases of nine different types of products.

However, most of these studies have limitations derived from the datasets used. In many cases, the authors used data from internet-based surveys or telephone interviews designed for the objectives of the study. The problem with those datasets is that the sample is usually drawn from a homogeneous group lacking the desired representation. In this sense, the present study has the advantage of being based on a survey conducted by the Spanish Statistics Institute which is representative at the national level.

The chapter is organized as follows. In the next section, the penetration of B2C e-commerce in Spain overall and by product types is established. This is followed by a brief review of the literature and the theoretical framework used in order to explain the consumer behavior of Spanish online shoppers. A descriptive analysis of the data follows in the next section. The empirical model and the results are discusses next. Finally, the last section contains the main conclusions and possible lines of further research.

7.2 Online Shopping in Spain

Before studying the behavior of internet shoppers in Spain, it is useful to have a general picture of the Spanish market size and its recent evolution. Given that the evolution of e-commerce is dependent on the evolution of internet users, data are shown with respect to the level and evolution of both variables.

E-commerce in Spain is not popular. In fact, just 13 % of individuals were involved in e-commerce activities during the last 3 months of 2007. This is well below the average figure for the EU27 (23 %).

However, in recent years, e-commerce in Spain has been rapidly increasing. The volume of sales reached 4,700 billion Euros during 2007, up 71.4 % over the 2006 figure. The evolution during the period 2000–2007 is shown in Fig. 7.1.

The key determinants of this spectacular increase in the volume of sales are the corresponding increase in the number of internet users and internet shoppers. However, average annual spending increased at a much lower rate of about 13.8 % over the 2006 level. Figure 7.2 shows the evolution of both variables: percentage of internet users and percentage of internet users who have purchased online.

When looking at specific categories, it appears that tourism-related products and tickets for entertainment are the most popular products for online purchases. Other important types of products are books, electronics, software, clothing and hardware, followed by home apparel and films. The remaining products, with a demand level lower than ten percent of internet shoppers, are food, financial services and lotteries. Figure 7.3 shows these figures for 2007.

If one looks at the ranking of products in terms of online purchasing popularity, the two most popular categories (Travel and Entertainment) are services rather than goods. One possible explanation for this is that the popularity of internet
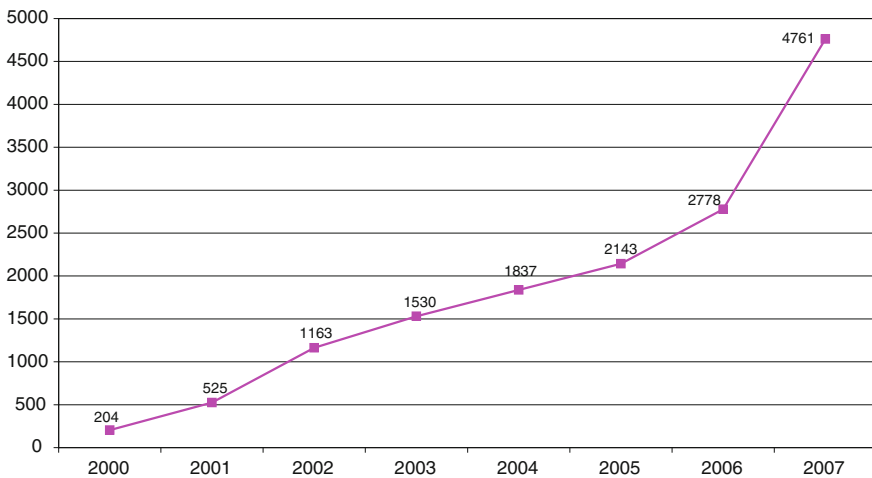

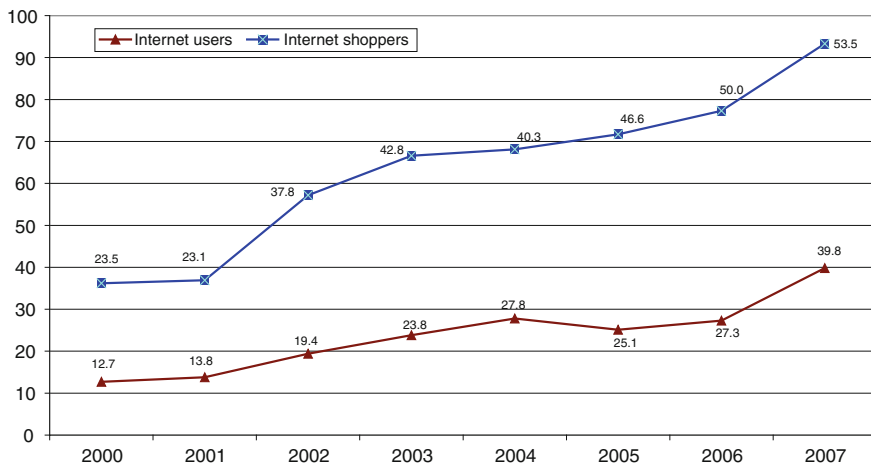**Fig. 7.1** Volume of e-commerce B2C (million of euros)

Fig. 7.2 Percentage of internet users and internet users who have purchased online
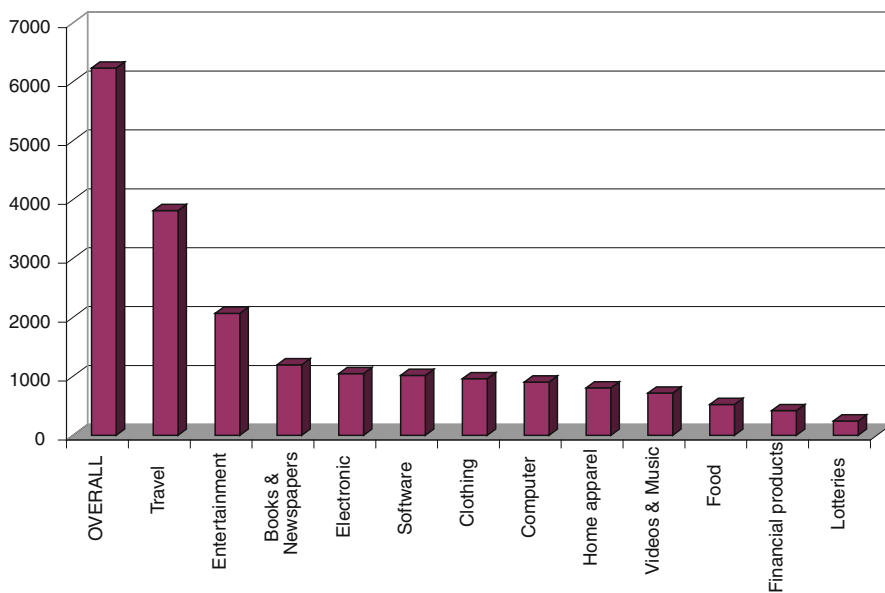
Fig. 7.3 Internet shoppers (in thousands): overall and by product type

purchases depends negatively on the consumer's perceived risks, and the perceived risks are different depending on the product type. In general, consumers tend to be more concerned about the risks involved when purchasing goods rather than services online; because, when purchasing goods online, the risks that consumers tend to perceive are risks associated with the acquisition of services plus the risks

related to delays in delivery, difficulties in predicting quality, and whether they will receive what they ordered.

The third most important category in terms of popularity is Books and Newspapers. This category belongs to the goods category. However, for this specific type of good (standardized or homogeneous), there is no uncertainty about the quality of the product that the consumer will receive. That means that the consumer's perceived risks will be lower than for other goods, and hence, its popularity is higher.

It is not surprising that travel-related products rank first in terms of popularity. In fact, it is well known that the travel industry was one of the first industries to undertake business online and is perhaps the most mature industry in the B2C e-commerce area. On the other hand, the popularity of travel-related products is not specific to Spain. When looking at the ranking of products in terms of popularity in European countries, one finds that travel-related products are the most popular product in 12 of 30 countries.

For purposes of comparison, Fig. 7.4 shows the profile of internet purchases for the case of Spain and the EU27.

7.3 Literature Review and Theoretical Framework

The benefits and limitations of the internet for consumers have been widely discussed and documented in both the popular press and academic journals (Krantz 1998; Mardesich 1999). Consumer e-commerce favors a professional transparent
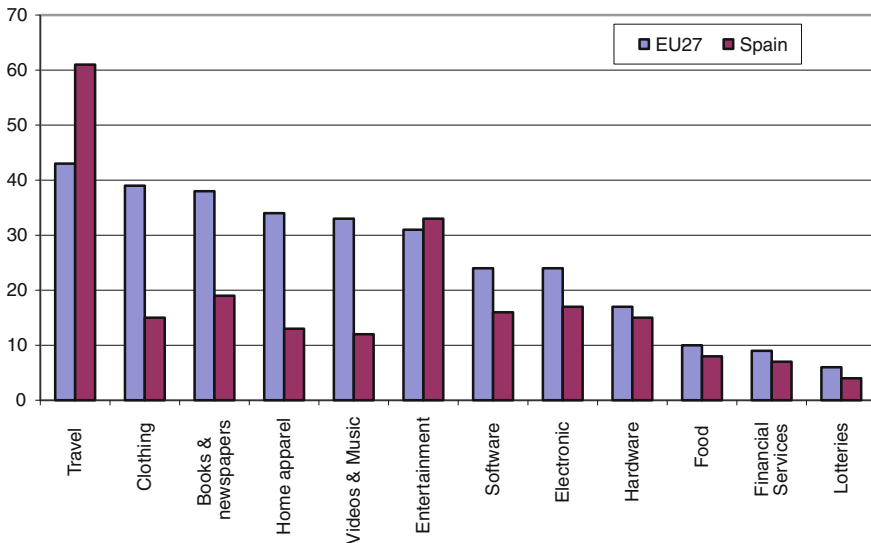

Fig. 7.4 Ranking of internet purchases by products

Table 7.1 E-commerce: benefits and barriers for consumers

Benefits	Barriers
Potentially cheaper retail prices	Necessary IT skills and competencies
Convenience	Cost of platforms and access
Greater product variety and information about that variety	Existing social group values, attitudes and ways of life
Time saving	Ease of using e-commerce sites
Provision of hard to find goods	Lack of trust and concerns regarding the reliability of services
Instant delivery of certain products (e.g., software, electronic documents, etc.)	Lack of service/product information and feedback

market, offering greater choice, cheaper prices, better product information and greater convenience for the active consumer. But this new medium is not without its limitations. Some of the barriers are the reduced opportunities for sensory shopping and socialization, and postponement of consumption or enjoyment of tangible products until they can be delivered. Table 7.1 shows a catalog of benefits and barriers found in previous research.

Current internet sales figures for different products and services may be a reflection of the channel's strengths and weaknesses. Books, music, travel, computer hardware, and software are some of the best-selling items on the internet (Rosen and Howard 2000). The success of these products can be attributed to a match of fit between their characteristics and those of the electronic channel. Several studies have addressed this interaction between product type and channel characteristics (Peterson et al. 1997; Girard et al. 2002; Korgaonkar et al. 2004). This can be done by formally incorporating a product and service classification into the analysis (Peterson et al. 1997).

A number of different classifications have been proposed in the literature. Nelson (1970) distinguished two types of products (search and experience products), depending on whether the attributes can be fully ascertained prior to use or cannot be determined until the product is used. According to this classification, the probability of adopting e-shopping will be higher for search products than for experience products.

Although Nelson's classification is useful, Peterson et al. (1997) proposed a more detailed classification system in which products and services are categorized along three dimensions that are even more relevant in the context of the internet. The three dimensions are:

- Cost and frequency of purchase: from low cost, frequently purchased goods (e.g., consumable products such as milk) to high cost, infrequently purchased goods (e.g., durable products such as automobiles).
- Value proposition: tangible and physical products (e.g., clothing) versus intangible and service-related products (software).
- Degree of differentiation: branded products versus generic products.

With this classification, Peterson et al. (1997) concluded that products and services that have a low cost are frequently purchased, have intangible value proposition, and/or are relatively high on differentiation are more amenable to be purchased over the internet. Phau and Poon (2000) applied this classification system in an empirical study and found similar results.

Taking into account the different suitability of products for online purchases, this study investigates the key factors to explain online shopping behavior on a product-by-product basis. The explanatory variables of the proposed model belong to two broad categories: socio-demographic and the so-called webographic characteristics of the potential online shopper.

The results will enable consideration of the factors affecting all the categories of products in a similar or different way.

7.3.1 Socio-Demographic Factors

Consumer demographics are among the most frequently studied factors in online shopping research. The effects of gender, age, education, and culture of consumers on online shopping behavior have been investigated in Bellman et al. (1999), Li et al. (1999), and Swaminathan et al. (1999), among others.

The study of how gender relates to the purchase decision has always been of interest to the academic world, as women make the purchase decision in many product categories. However, the new shopping channel provided by the internet seems to yield a different, if not opposite, gender pattern. Such a change in gender pattern in the online shopping environment has been explained by using different models or factors, including shopping orientation, information technology acceptance, product involvement, product properties, and perceived risks. The results of this study will provide information on how gender affects adoption of online purchasing, depending on the product in question.

The effects of age on the adoption of e-shopping have been widely studied, but there are discrepancies among the results. For example, some studies identified a positive relationship between consumer age and the likelihood of purchasing products online (Stafford et al. 2004), whereas others reported a negative relationship (Joines et al. 2003) or no relationship (Rohm and Swaminathan 2004). Such a discrepancy might be caused by the use of different groups of products for the study, by the use of simple versus multiple regression models, or by the use of nonrepresentative samples. This study gives us the opportunity to help clarify these results by considering how different products may be influenced by age.

Traditionally, internet users were reported as having high levels of education. However, the changing demographics among internet users indicate increasing web usage across education levels. This study assesses to what extent the level of studies is supposed to have a positive effect on actual e-shopping adoption. The hypothesis is that, *ceteris paribus*, more educated people are more likely to adopt online shopping for several reasons. First, the kind of products available online

will probably be more suited to their tastes. Second, the higher level of studies probably makes it easier for them to use the internet. The results of the study will reveal if education has the same effect for all the products or if there are some categories of products that are more influenced than others.

7.3.2 Webographic Factors

Even though socio-demographic factors must be considered as predictors of online shopping behavior, computer and internet-related webographic characteristics seem more closely related to actual online purchase behavior. The selected explanatory variables in this case are computer literacy, internet literacy, internet exposure, and internet confidence.

Consumers' computer/internet literacy refers to their knowledge of the computer and the internet and the nature of their usage. Education and information technology training (Liao and Cheung 2001) and internet knowledge (Goldsmith and Goldsmith 2002; Li et al. 1999) were found to positively impact consumers' e-shopping adoption. Thus, according to the findings of previous work, one would expect positive effects of both variables (computer literacy and internet literacy) on actual e-shopping adoption. Moreover, for these variables, it would be interesting to know whether the effects differ depending on the type of product in question.

Previous studies have consistently found that the actual use of e-shopping is positively associated with internet usage (e.g., Bellman et al. 1999; Forsythe and Shi 2003). Therefore, the expectation is to find a positive relationship between the frequency of use of the internet (Internet exposure) and e-shopping adoption.

It is likely that heterogeneous consumer perceptions of the risks and benefits of internet influence whether or not they will adopt this channel for shopping. The expectation is that the higher is the level of internet confidence, the higher will be the likelihood of making purchases online. The results of this study should enable one to determine whether the level of internet confidence affects the adoption of internet purchasing for all the products in the same or different way.

7.4 Data Analysis

In this study, the unit of analysis is the individual consumer. Data are from the 2007 Survey on Information and Communications Technologies Equipment and Use in Households,[1] conducted by the Spanish Statistics Institute. The focus of the

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[1] The ICT-H 2008 Survey on Information and Communication Technologies Equipment and Use in Households has been carried out by the National Statistics Institute (INE) in cooperation with

study is a sample of 8,837 individuals who have used the internet during the last three months.

Among the respondents, there were 50.8 % males and 49.2 % females, and 33.3 % with a bachelor's or higher degree. A majority of the respondents (43.2 %) was in the 30–44 age category, and 55.4 % said they used the internet at least 5 days per week.

The dataset distinguishes between the following categories of products:

 1. Travel and holiday accommodation.
 2. Tickets for events.
 3. Books, magazines, e-learning material.
 4. Electronic equipment (including cameras).
 5. Computer software (including video games).
 6. Clothes and sporting goods.
 7. Computer hardware.
 8. Household goods (e.g., furniture, toys, etc.).
 9. Films and music.
10. Food and groceries.
11. Stocks, financial services, insurance.
12. Lotteries and bets (gambling).

Table 7.2 gives a detailed characterization of consumers for different categories of products. It is important to note the variability of the characteristics depending on the product under consideration.

According to the gender of the consumers, the participation of men ranges from a maximum of 76.9 % (hardware) to a minimum of 46.2 % (food/groceries).

Age profiles appear different for different categories. For instance, although the majority of online buyers belong to the 30–44 age group, large differences have been found depending on product types. For instance, people between 30 and

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(Footnote 1 continued)

the Statistics Institute of Cataluña (IDESCAT), the Statistics Institute of Andalucía (IEA), the Statistics Institute of Navarra (IEN) and the Statistics Institute of Cantabria (ICANE) within the scope of their respective Autonomous Communities. The Survey follows the methodological recommendations of the Statistical Office of the European Communities (Eurostat). It is the only source of its kind whose data are strictly comparable, not only among Member States of the Union, but also among other international scopes. The Survey (ICT-H 2008) is a panel-type data survey that focuses on persons aged 10 and above residing in family dwellings and collects information on household equipment related to information and communication technologies (television, telephone, radio, IT equipment) and the use of computers, the internet and e-commerce. Interviews are carried out in the second quarter of the year, by telephone or by personal interview. For each Autonomous Community, an independent sample is designed to represent it, given that one of the objectives of the survey is to facilitate data on that breakdown level. Although the population scope has not varied as compared with previous surveys, it is important to mention that, for the purpose of achieving greater comparability with the data published by Eurostat, the results published on the INE website refer to dwellings inhabited by at least one person aged 16–74 and persons of that same age group. Likewise, the data concerning minors refer to the group aged 10–15 (the group researched previously was aged 10–14).

Table 7.2 Data description. Percentages of internet purchasers by characteristics

Characteristics	Overall (2,989)	Travel (1,807)	Entertainment (977)	Books (605)	Electronics (511)	Software (486)	Clothing (483)	Hardware (438)	Home (409)	Films/music (357)	Food (234)	Financial services (209)	Lotteries (110)
Age													
≤18	2.3	0.9	1.1	1.7	2.2	2.5	4.1	2.5	1.2	2.8	0.4	0.0	0.0
19–29	26.1	24.9	26.5	23.6	31.9	22.2	34.4	26.9	21.5	29.4	14.5	16.7	28.2
30–44	47.8	48.9	49.5	50.6	44.0	51.9	47.2	51.8	54.5	47.6	63.2	55.5	50.0
45–64	22.7	24.2	21.8	23.5	21.1	22.8	14.1	18.0	21.3	19.0	19.7	27.8	20.0
≥65	1.1	1.1	1.0	0.7	0.8	0.6	0.2	0.7	1.5	1.1	2.1	0.0	1.8
Gender													
Male	57.2	52.6	55.3	63.1	71.2	71.8	59.6	76.9	61.4	69.2	46.2	75.6	64.5
Female	42.8	47.4	44.7	36.9	28.8	28.2	40.4	23.1	38.6	30.8	53.8	24.4	35.5
Level of studies													
Primary	2.1	1.5	1.3	0.0	0.0	0.6	1.0	2.1	1.2	0.8	2.1	0.5	2.7
1st level of secondary	10.7	7.0	5.8	1.2	1.8	7.8	14.3	8.0	9.8	6.7	4.3	2.9	10.9
2nd level of secondary	26.3	24.1	23.5	6.0	8.6	27.8	27.7	26.9	26.7	28.3	21.8	20.1	38.2
Vocational education	14.6	14.2	12.7	21.5	29.4	15.8	18.2	15.8	19.3	17.4	12.0	11.5	10.0
University	46.3	53.0	56.6	59.7	42.7	47.9	38.7	47.3	43.0	46.8	59.8	65.1	38.2
Computer literacy													
Low	10.3	10.2	7.3	6.9	4.7	4.1	7.7	4.3	8.6	5.3	7.3	2.9	5.5
Medium	29.7	46.9	44.1	39.8	32.5	33.1	41.0	29.0	38.4	35.3	46.6	37.8	38.2
High	42.1	25.1	28.8	29.1	32.3	32.7	32.5	29.2	28.1	30.5	27.4	29.7	30.9
Very high	17.9	17.7	19.9	24.1	30.5	30.0	18.8	37.4	24.9	28.9	18.8	29.7	25.5

(continued)

Table 7.2 (continued)

Characteristics	Overall (2,989)	Travel (1,807)	Entertainment (977)	Books (605)	Electronics (511)	Software (486)	Clothing (483)	Hardware (438)	Home (409)	Films/ music (357)	Food (234)	Financial services (209)	Lotteries (110)
Internet literacy													
Low	16.2	15.9	12.2	10.1	6.5	2.1	10.6	5.0	13.7	7.0	14.1	7.2	9.1
Medium	35.6	36.0	32.8	32.7	26.2	28.2	34.4	23.5	30.6	24.9	36.3	30.6	30.9
High	32.3	31.9	36.9	32.2	40.5	41.6	36.6	43.6	36.2	40.9	34.2	38.3	38.2
Very high	15.9	16.2	18.1	25.0	26.8	28.2	18.4	27.9	19.6	27.2	15.4	23.9	21.8
Internet exposure													
Daily	75.2	78.7	80.7	85.5	81.0	83.7	78.7	84.2	78.0	84.0	82.1	92.8	80.9
Weekly	19.4	16.4	15.0	12.1	13.3	14.6	17.4	14.4	18.6	12.0	14.1	6.2	13.6
At least 1 a month	4.6	4.0	3.7	1.8	4.5	1.4	3.5	1.1	3.2	3.1	3.0	1.0	5.5
Not every month	0.9	0.8	0.6	0.7	1.2	0.2	0.4	0.2	0.2	0.8	0.9	0.0	0.0
Internet confidence													
Low	13.1	12.1	8.0	7.8	7.8	9.1	12.2	7.1	11.0	6.7	11.5	5.3	9.1
Medium	57.1	55.5	55.2	56.4	53.6	53.9	56.1	55.0	54.5	51.3	54.7	57.4	44.5
High	26.0	28.2	31.1	29.9	34.2	31.9	26.9	32.9	29.8	35.6	28.2	30.6	40.0
Very high	3.8	4.3	5.7	6.0	4.3	5.1	4.8	5.0	4.6	6.4	5.6	6.7	6.4

In parentheses, below each category, is the total number of internet purchasers

44 years of age represent 44 % of internet buyers of electronic equipment. At the other end, people in that age group represent 63 % of internet buyers of food/groceries.

The profile of online buyers in terms of level of studies also differs by product type. For example, in the case of lotteries, 38.2 % of buyers have a university degree. At the other end, people purchasing financial services on the web who have a university degree represent 65.1 % of the total.

7.5 Model Specification and Results

When consumers make e-shopping decisions, they are confronted with a binary choice, such as whether or not an online purchase is made (e.g., Bellman et al. 1999; Bhatnagar et al. 2000; Lohse et al. 2000; van den Poel and Buckinx 2005), multiple categorical choices, such as the frequency of e-shopping (treated as a nominal variable by Koyuncu and Bhattacharya 2004), or conventional store versus internet versus catalog.

This work is interested in studying the key factors for purchasing online on a product-by-product basis. A separate model is elaborated for each category of products. The dependent variable in each of the models is a binary variable that takes the value 1 if the individual decides to purchase the product online and 0 otherwise. Logistic regression models are used to estimate the conditional probability of the dependent variable.

The results indicate if consumer behavior is similar for all categories of products or, on the contrary, the determinants depend on the category in question.

Table 7.3 summarizes the variables used in the analysis, while Table 7.4 shows the main results for each of the 12 categories, as well as the overall results.

In Table 7.4, we show elasticities of probabilities to illustrate the signs and magnitudes of the effects of the main determinants of web purchasing for the 12 categories of products, as well as overall. The significance of each variable is shown with the t-ratio below each elasticity value.

In order to facilitate the reader's interpretation of these results, the main findings are summarized in terms of the effects of the potential determinants over the likelihood of being an internet buyer.

Gender: Gender plays an important role in web purchasing in many categories, as well as overall. In general, men are more likely than women to be online buyers. However, as expected, the effect of gender is mixed. The likelihood of purchasing on the internet for product categories like food/groceries and travel-related products is higher for women. However, computer hardware and financial services are more likely to be bought by men.

One possible explanation of these results is that for product categories where men have more experience as shoppers (for example, hardware, software, and electronics), being male significantly increased the probability of purchase, while

Table 7.3 Explanation of variables

Dependent variable		1 if buyer; 0 if non-buyer
Explanatory variables		Explanation
Demographic factors	Gender	1 if male; 0 if female
	Age	Five (5) age groups are considered: <18; 19–29; 30–44; 45–64; ≥65
	Level of studies	The years of study required to obtain the degree of the respondent
Webographic FacTORS	Computer literacy	Self-elaborated index obtained from eight different routines the respondent may be able to do
	Internet literacy	Self-elaborated index obtained from eight tasks on the web that the respondent may be able to perform
	Internet exposure	Number of days that the respondent uses internet during the month
	Internet confidence	Self-elaborated index obtained as an average of the confidence of the respondents to the following questions: give personal information through the web, Give personal information in a chat room, Give e-mail address, Download programs/music, internet banking

Table 7.4 Average of individual elasticities of probabilities

Explanatory variables	Overall	Travel	Entertainment	Books	Electronics	Software	Clothing	Hardware	Home apparel	Films/music	Food/groceries	Financial services	Lotteries
Gender	0.05	−0.08	—[2]	0.11	0.24	0.23	—	0.38	—	0.21	−0.24	0.38	—
	(2.41)[1]	(−3.02)		(2.23)	(4.46)	(4.18)		(6.33)[1]		(3.45)	(−3.37)	(4.40)	
Age (19–29)	0.11	0.29	0.13	—	0.12	—	—	—[2]	0.20	—	—	3.63	0.46
	(5.19)	(6.32)	(2.98)		(2.31)				(2.40)			(22.69)	(2.01)
Age (30–44)	0.32	0.65	0.35	0.19	0.27	0.32	—	0.17	0.66	—	0.50	6.95	0.98
	(8.29)	(7.81)	(4.27)	(4.20)	(2.73)	(6.02)		(3.90)	(4.58)		(5.90)	(23.94)	(2.25)
Age (45–64)	0.17	0.38	0.18	0.12	0.18	0.19	−0.11	—	0.34	—	0.18	3.94	0.53
	(7.50)	(7.86)	(3.82)	(3.70)	(3.10)	(5.23)	(−3.49)		(3.98)		(3.20)	(23.97)	(2.12)
Age (≥65)	0.01	0.02	—	—	—	—	−0.04	—	0.03	—	0.03	—	0.06
	(1.61)	(3.79)					(−2.03)		(2.76)		(2.62)		(2.08)
Level of studies	0.95	1.46	1.86	2.01	0.52	0.82	0.44	0.79	—	1.23	1.51	2.15	—
	(11.02)	(11.86)	(10.64)	(8.90)	(2.24)	(3.43)	(2.11)	(3.19)		(4.67)	(4.30)	(5.20)	
Computer literacy	0.23	0.17	0.25	0.28	0.63	0.44	0.28	0.73	0.49	0.31	0.44	0.70	0.69
	(6.21)	(3.18)	(3.60)	(3.09)	(6.21)	(4.16)	(2.90)	(6.43)	(4.68)	(2.61)	(3.73)	(5.21)	(4.10)
Internet literacy	0.35	0.34	0.38	0.54	0.65	0.97	0.37	0.62	0.39	0.70	—	—	—
	(9.30)	(6.59)	(5.42)	(6.08)	(6.78)	(9.59)	(3.90)	(5.91)	(3.74)	(6.16)			
Internet exposure	0.54	0.73	0.66	0.96	0.32	0.67	0.72	0.73	0.63	0.62	0.96	1.87	0.66
	(11.91)	(10.70)	(6.58)	(6.55)	(2.33)	(4.17)	(5.17)	(4.26)	(4.25)	(3.45)	(4.56)	(5.32)	(2.28)
Internet confidence	1.01	1.18	1.36	1.15	1.10	0.92	0.81	1.05	0.97	1.37	1.30	1.56	1.82
	(16.71)	(14.54)	(12.43)	(8.37)	(7.40)	(5.94)	(5.50)	(6.43)	(6.13)	(7.81)	(6.38)	(6.93)	(6.31)
N. obs = 8,837	LR χ^2_{10} = 984.66[3]	LR χ^2_{10} = 1405.18	LR χ^2_8 = 900.58	LR χ^2_8 = 685.66	LR χ^2_9 = 581.49	LR χ^2_8 = 669.60	LR = χ^2_7 = 3 06.65	LRχ^2_7 = 637.27[3]	LR χ^2_8 = 303.98	LR χ^2_7 = 427.83	LR χ^2_8 = 230.26	LR χ^2_8 = 377.29	LR χ^2_7 = 108.64
	Pseudo R² = 0.1755	Pseudo R² = 0.1570	Pseudo R² = 0.1466	Pseudo R² = 0.1554	Pseudo R² = 0.1489	Pseudo R² = 0.1779	Pseudo R² = 0.0818	Pseudo R² = 0.1828	Pseudo R² = 0.0918	Pseudo R² = 0.1431	Pseudo R² = 0.1065	Pseudo R² = 0.1917	Pseudo R² = 0.0918
Age (max. Probability)	44.1[4]	45.4	42.8	45.1	42.7	47.1	31.0	41.9[4]	47.2	42.8	45.1	44.4	42.8

[1] t-ratios in parentheses

[2] The insignificant variables have been deleted and the corresponding equations have been re-estimated

[3] LR is the likelihood ratio test for the joint significance of all the explanatory variables. Under the null of joint insignificance of all the explanatory variables, it is distributed as χ^2 with the number of degrees of freedom equal to the number of variables tested

[4] The last row contains the age for which the probability of purchase is highest. This has been obtained from an alternative formulation of the basic logit model in which we used age and age squared as explanatory variables

in categories such as food and groceries, tickets for events and travel-related services, the effect of being male was significantly negative.

Age: The results suggest that age is a good predictor of web purchasing in many categories, as well as overall. The only exception in the 12 product categories studied was films and music. For the rest of the categories, the likelihood of purchasing on the internet increases with age up to a certain point and then decreases.

A possible explanation is that, as people mature, they learn more through experience about the products in the marketplace and form more confident opinions about what suits their tastes and what does not. Since they know what they need, they do not have to feel and touch and be reassured by a salesperson that what they are purchasing is really what they need. Through experience they gain the confidence to choose products through their own initiative.

A second reason that older people might find internet stores more attractive is because their lives are typically more time constrained. As people climb higher in their professional careers, the demands on their time increase, forcing them to look for retail formats where they have to spend the least time. For this, the internet is ideal. The reader should keep in mind that these consumers are already using the internet. Thus, elderly individuals who may have an aversion to computers and the internet are not included in the study.

A third reason might be the positive correlation between income and age. Since income is not available in the dataset, the coefficient of age may be isolating the effect of income as well as the effect of age.

Finally, in the last row of Table 7.4, the age for which the probability of making a web purchase is a maximum.[2]

Education: Education is an important determinant of online shopping behavior overall, and for most of the studied categories. With the exception of lotteries and home apparel, a positive and significant relationship between level of education and probability of purchasing on internet existed. The highest elasticity values were found for financial services (2.15), books, magazines and e-learning material (2.01), tickets for events (1.86), travel and holiday accommodation (1.46), and food/groceries (1.38).

Computer literacy: All the studied categories show a positive and significant relationship between the computer skills of the consumer and the probability of purchasing online. The highest effects of computer literacy on the likelihood of being an online shopper occur for products like computer hardware (0.73), financial services (0.70), and electronic equipment (0.63).

As consumers accumulate computer skills, these products cease to be a black box and become more like any other tool that consumers use every day. Hence, we expect consumers with greater computer experience to be more favorably inclined to shopping online.

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[2] To do so, different model was used including the original variable age and also the square of the age to allow for a nonlinear effect.

Internet literacy: According to the results, the likelihood of purchasing on the internet increases as the consumer's experience on the internet increases. These results apply to all the categories except for financial products, lotteries and food/ groceries. In this case, the highest elasticities to internet literacy correspond to computer software (0.97) and films/music (0.70).

In addition to risk, there may be individual characteristics and idiosyncrasies that affect the likelihood of purchasing on the internet. As consumers become more knowledgeable, their perception of risk decreases. Therefore, consumers with greater knowledge would tend to be less risk-averse. On the other hand, the likelihood of shopping online increases with internet literacy.

Internet exposure: A positive and significant relationship of this variable and the probability of purchasing online exists. This applies to all the 12 categories, as well as overall. In this case, financial services and books, magazines and e-learning material show the highest elasticity values (1.81 and 0.96, respectively).

Internet confidence: The level of trust of consumers in the internet is found to have a large impact on the probability of purchasing online. The results show that this variable has a positive and significant effect for all the considered product categories, as well as overall.

Some of the estimated elasticities are higher than 1 (food and groceries, 1.30; films and music, 1.37; books and magazines, 1.15; computer hardware, 1.05; electronic equipment, 1.10; financial services, 1.56; travel and holiday accommodation, 1.18; tickets for events, 1.36; lotteries, 1.82). Elasticities below 1 are found for the following categories: home apparel, clothing and sporting goods, and computer software. However, even in these cases, the estimated values are relatively high and significant.

7.6 Conclusions

The main objective of this work was to identify the factors that distinguish internet users who have purchased specific products and services on the internet from those who have not. First, it was found that demographic and webographic factors are important determinants of the probability of purchasing online. However, the empirical analysis shows that the impact of the considered variables differs depending on the type of product. Thus, the results confirm the central premise of the paper that product characteristics influence the consumer decision of using the internet for purchasing purposes.

Overall, men are more likely to purchase than women. However, products and services that are more popular among women and others are identified than are more popular among men. Food, travel-related products and tickets for entertainment are bought more intensively by women, while men are more likely to buy hardware, software and electronic products.

For most products, the probability of purchase increases with age up to a certain point, at which it starts decreasing. An alternative model was estimated in which a quadratic term was included in age to allow for a nonlinear response. This permits one to estimate the age that gives the maximum probability of purchase by the different categories. These ages vary between 31.0 for clothing and 47.1 for software.

Education generally has a positive and significant effect on the probability of purchase of most categories of products, although it varies by categories. The highest elasticities were found for financial services, books, travel-related products, entertainment and food/groceries.

All the categories show a positive and significant relationship between the computer skills of the consumer and the probability of purchasing online. The highest impact of computer literacy is on computer hardware, lotteries, financial services and electronic equipment.

The results show that internet skills are a good predictor of the probability of web purchasing for most of the considered product categories. With the exception of food and groceries, financial services and lotteries, internet literacy has a positive and significant impact on the likelihood of purchasing online.

The frequency of use and the level of trust of consumers in the internet are also found to have a large impact on the probability of purchasing online, although in varying degrees according to the categories. For instance, internet confidence has a high impact in all categories, with high values of the elasticities in all the groups and values greater than 1 in most.

According to the empirical findings presented, the future evolution of B2C e-commerce in Spain would be dependent on the penetration of the internet, the familiarity of consumers with the use of computers and the internet, and also the trust of individuals in the security of the internet. The results thus suggest that providing consumers with secure web systems and making the use of online trading easier would improve their acceptance of e-shopping.

These results should be useful for retailers in order to devise marketing strategies and for policymakers to decide if and how to promote e-commerce to close the gap between Spain and the European Union.

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