

Fernández-Bonilla, Fernando

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## E-commerce: Determining factors and the importance of the e-trust

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# **E-commerce: Determining factors and the importance of the e-trust.**

Fernando Fernández-Bonilla

Universidad Carlos III de Madrid

[fernando.f.bonilla@gmail.com](mailto:fernando.f.bonilla@gmail.com)

Covadonga Gijón

UNED

[cgijon@cee.uned.es](mailto:cgijon@cee.uned.es)

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## **Abstract.**

This paper studies how to calculate the propensity of individuals to participate in e-commerce, studying the variables that affect costumers at the time of the online transactions and how to modify their inclination to it, being the most relevant variables socioeconomic and those which are related to the personal abilities of individuals, being one of the most important the e-Trust, variable of special importance in this business and that influences not only on buying or not, but also on how they relate to the bidders. In order to do this study, a Logit model is used.

**Keywords:** e-commerce, e-trust, Internet, Logit, consumers.

**JEL classification:** C01, C25, D12, L81, L86

## **1. Introduction.**

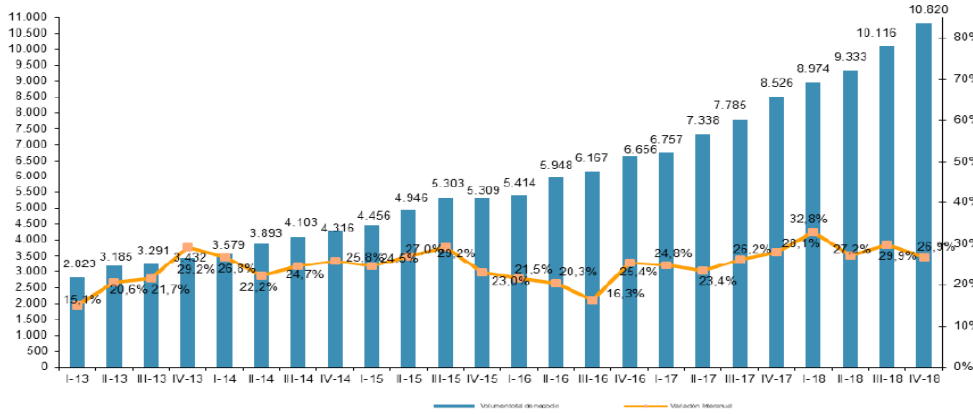
The year 2020 has brought an unprecedented situation to the lives of so many people, people confined to their homes, stores closed, all events cancelled, quarantine, and all due to one of the greatest and most contagious pandemic in recent history, something unknown since World War I and Spanish Flu, but this century between both of the illnesses has also changed the way of consumption of the humanity. Now there is a more established market economy and capitalism, human live under globalization and with most stores closed, these virus rampant, and essential stores crowded, customers were expected to seek other forms of satisfaction.

Because of this, in this new paradigm, there were not a few academics who pointed out that e-commerce was going to channel all of the demand that traditional stores would lost due to COVID-19. And they were not mistaken: the demand grew in an unprecedented way, but this growth is not going to last forever, that is way this market must attract these new clients and build a loyalty with them in order to keep them after the pandemic. According to what was said these hard times could be very useful to e-commerce as some of the new consumers would never have had contact with the telematic model of purchase before, and if they obtain satisfaction with this system they could repeat. Having all of the previous things into account, first the situation before the pandemic should be analysed to study the normal factors to encourage people to be part in the e-commerce, but also the new things that happened with the pandemic should be known to study them in future studies.

As it have been said: the individual profiles that make people most prone to e-commerce and e-trust will be analysed. This could help companies, not only for their positioning in the market, also for marketing, saving costs, maximizing their benefits, being efficient ad keeping their customers loyal by providing them with greater utility.

The data before COVID-19 estimates that the annual growth of electronic commerce in the last five years would be greater that a 20% in Spain , it also adds that the branches with the highest volume of benefits would be those related to tourism and clothing. According to BBVA Research, from 2015 to 2018, card sales are higher and the penetration rate of e-commerce exceeded 50% of the Spanish population, however traditional trade growth gradually decreased throughout this decade, so both of them can be understood as substitutes.

**EVOLUCIÓN TRIMESTRAL DEL VOLUMEN DE NEGOCIO DEL COMERCIO ELECTRÓNICO Y VARIACIÓN INTERANUAL (millones de euros y porcentaje)**



Fuente: CNMC

Figure 1. Ecommerce evolution during the last years

Source: CNMC

E-commerce has changed the way of doing business, the demand has exponentially increased and such variety has made consumers more demanding, that is explained by the advances introduced by online trading: greater variety of the available products, the approach to costumers and the versatility and marketing of the companies, that are always launching promotions to stimulate the demand, the fight for high-quality shopping experiences. All of this has forced the bidders to be more competitive, and because of that, bidders and customers seek to maximize their benefits. But, even with this optimistic view, it is important to note that the increase of online markets could have damaged SMEs, that incapable to adapt to this new field are out this new income.

And how has online shopping changed in the last 2 moths in Spain? In the search of new ways to fulfil their needs most people have become online shoppers. Although at the beginning of the quarantine data predicted, that fear, social distance, travel limitations and unemployment could ended e-commerce this was not the case, since the middle of March e-commerce has grown around 150% reaching the calling of its growth recently.

In terms of time March presented the beginning of the growth and April the highest stable growth ever. In terms of products, the first weeks of confinement, retailers, supermarkets, pharmacy products and office and school supplies took the lead. The demand was such that it reached the shortage of products like mask and toilet paper and even collapsed the online shopping pages form retailers. Later, with the previous needs were accomplished, fashion, sports, games and furniture found a large growth. Other sector such as leisure and travel have been deployed, but they are the first in revege expenses, so there are high expectation on them after COVID-19. Other thigs are also noteworthy: there has been a gender gap in consumption this quarantine, not only men bought more,

they also buy different, men are into technology and women are into fashion and furniture. Besides, it seems that a gap in Internet access has been broken, online consumption in the elderly has exceeded 75%, this is very important since it not only opens the market for them, but also would help to bridge this gap.

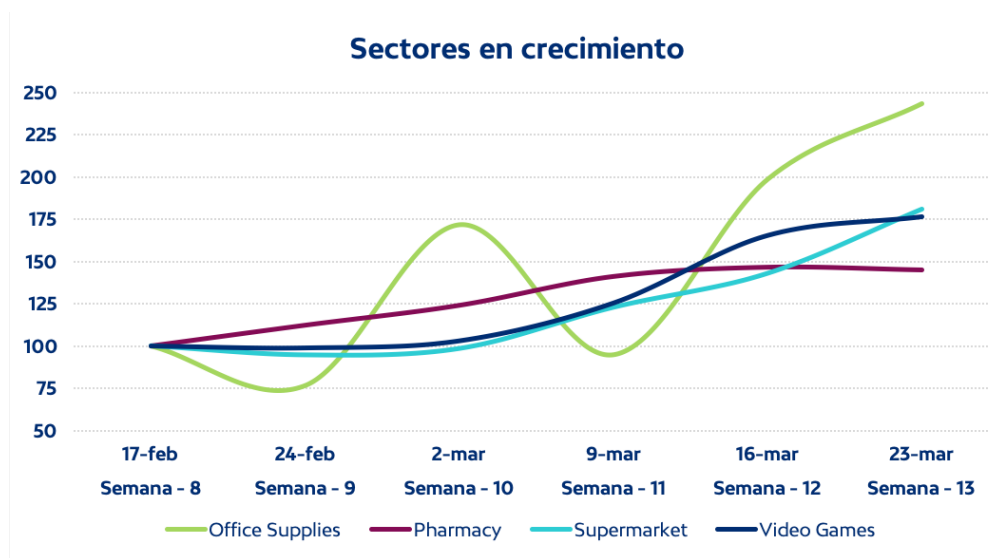


Figure 2. Ecommerce sectors evolution during COVID-19

## 2. Literature review

After looking at the current situation of e-commerce, and observing its constant growth throughout the last years and the latest experience with COVID-19, it is important to listen to experts on this subject.

E-commerce could be defined as: the commercial relationship between business and consumers to trade products and services developed through the Internet. The factors which encourage this relationship are: a greater range of products, better accessibility for people with mobility problems, overall comfort, speed and more competitive prices. Taking clients on consideration, according to the literature, there are two types of factors that are important in their propension to online consumption: the sociodemographic and socio-economic factors, inherent to the community, and those of ability, related to each individual. In the last category is involved e-Trust, e-Trust is understood as the consumer confidence in the online purchase itself, or in the company with which he is trading. It is built by marketing policies, made not only for attracting new client to a new type of consumption, but also building customer loyalty to the company. This confidence is manifested when requesting information from consumers. The image and prestige of companies are important to the confidence perceived by consumers.

In order to accomplish the objective of describing the factors that attract the Spanish public to buy online, and how they change through times, it would be valuable to see some of the experts conclusions to that specific topic.

One of the first articles related to this subject to ever be published belongs to Garín-Muñoz, and Pérez-Amaral (2011), they defined electronic commerce (e-commerce) as: “the use of the internet to buy, sell or support products and services, not only as an economic exchange, it also includes the exchange of information and post-sale support”. They also found three types of e-commerce: B2B, business, those that online seek information about products, search engines, and those that does not use internet for trading at all, traditional buyers.

Garín-Muñoz and Pérez-Amaral (2011) showed three economic models that explain how online shopping works: “Reasoned Action Theory”, “Planned Behaviour Theory” and “Technology Acceptance Model (TAM)”, this last one combines Perceived Utility (PU) by the consumer towards online shopping and Perceived Utility Facility (FPU), which is related to the simplicity of the exchange. The explanatory variables that are proposed by TAM are: sociodemographic: age, educational level, ... And Individual skills with Information and Communication Technologies (ICT): computer literacy, e-trust, computer skills, ...

Also Garín-Muñoz and Pérez-Amaral (2011) proposed a Multinomial Logit model to estimate the propensity to buy online for each type of consumer.

On their part, Valarezo, Pérez-Amaral, Garín-Muñoz, Herguera and López (2018), focused on the individual decision process that leads individuals to participate in electronic commerce with foreigners, particularly with the EU. The proposed models showed that being foreign and Factors of familiarity with ICT are very important. E-commerce is showed as something good: reduces market power, increases information exchange, increases quota of products, increases competition and encourage competitive prices, but it also presents barriers: lack of infrastructure, online illiteracy, fears and lack of confidence. These barriers and related to things such as fear of payment and share personal information or even language. They recommended carrying out political campaign in defence of consumers and against trade barriers to end the problems previously explained. This article proposed a Standard Neoclassical Utility Model, and a regression of several Logit models, these models should contain the typical e-commerce variables, and some that implies a difference of trading within the country and with foreigners.

This essay highlights the importance that computer literacy, e-trust, and computer and Internet skills have in e-commerce. Valarezo et al. (2018) also found a gender bias; being a man encourages

shopping, however, age and being a foreigner, limit online shopping, unless it is outside borders, in this case being a foreigner is positively related.

In addition, in a future article Valarezo, Pérez-Amaral, Garín-Muñoz, Herguera and López (2019) perform an economic model similar to the previous article, however, here they criticise the sociodemographic gap that is evident with online activities and encourage policies to be made, not only to increase e-commerce, but also to reduce biases and educate people with their Internet skills, these will help citizens to make a good use of it. Therefore they ensure that e-banking, e-government and e-commerce are value added services, that the first two made the third easier and that e-commerce will end up replacing traditional purchases.

Focusing on the trust part, Pestek, Resic and Nozika (2011), being focused on Spain, showed defined e-trust as: the consumer's commitment to trust that an offeror will successfully fulfil your online deal, understanding successfully as in accordance to established terms.

Pestek, Resic and Nozika (2011) states that the factor that has the biggest influence on e-trust are: accessibility of the website, privacy and security, ways in which the company protects their clients, the proper functioning of products, quality, and loyalty and treatment after the sale, those being factors that make the difference among the consumers.

Already in Spain, Martínez de Ibarreta and Gijón (2015) explained that, in this globalised world, trust in the Internet is going to be radical when it comes to understanding not only how individuals communicate with each other, but also how they consume. They begin their article with two quotes that seem specially well-defined of the world that is presented: Butler (2014): "The security of this type of transaction is very important for organizations, consumers and government. Educating consumers to use security software and better passwords is specially important in this type of business". Corritore, Kracher and Wiedenbeck (2003): "trust will be one of the keys to e-commerce, if the internet user does not trust the security of a website, he will not use it".

Martínez de Ibarreta and Gijón (2015) aims to explain why consumers act in a risk-prone way while browsing and transacting online, and particularly analysing the factors that lead them to behave in this fashion. The individual variables which explain this risky behaviour would include: e-Trust, education, the protection of computer equipment and the experience in the network.

Another way to estimate trust, would be according to the personal information that people are given, in their 2013 article, Potoglou, Patil, Gijón, Palacios and Feijóo (2013), tried to find an economic value to the personal information that we post on the Internet, the conclusions they reached coincided with the "privacy paradox": individuals are specially concerned about the use of

their date by companies on the Internet, however, they would not be willing to pay for a more efficient usage of such.

Concluding it is therefore necessary to mention a variable that may be relevant to e-commerce, a fast and quality Internet, in this sense Gijón, Whalley and Anderson (2016) article would try to measure the importance of broadband quality at the level of living, the results were not as everyone had previously thought , but they brought a variable that are must take into account.

To close this literature review block, it would be interesting to comment on some contributions that experts have found on consumer-company relations in the telecommunications sector. Gijón, Garín-Muñoz, Pérez-Amaral, López-Zorzano (2013), proposed models on costumer satisfaction, the ACSI and ECSI models, which relate customer satisfaction to three antecedents: customer expectations, value perceived and perceived quality, four in the case of the ECSI that adds image, and they ended in two conclusions: loyalty of the client , if they have been satisfied, and consumers protests, if the have not, this dissatisfaction can be manifested as a complaint or as stop buying. The ECSI model relates the complaint to a possible satisfaction of the consumer after using it, and therefore puts emphasis on the management of complaints, as future loyalty is the key objective. They concluded by saying that consumer satisfaction depends on communication and the price of the product.

With all of this information it could be possible for an attempt to be made to create a grounded and meaningful model that can guarantee a good prediction method in the propension to participate in e-commerce, and importance and impact of e-Trust in this subject, also there is going to be and attempt of measure that confidence.

### **3. Data and Methodology.**

The data that is going to be used to achieve the previous goal is the survey carried out by INE (National Institute of Statistics), “Survey on Equipment and Use of Information and Communication Technologies at Homes” using this data, we will start the dependent and explanatory variables for the study.

This survey is a cross-sectional data study, as it collects the responses of a series of individuals of one single moment in time; it collects information on the equipment in Information and Communicating Technologies in Spanish homes with individuals older than 10 years, putting special emphasis on those aged between 16 and 74. The information has been collected with 17,195 valid surveys . The study in question has been carried out from 2002, but has no comparative value until the year 2006, the year in which began to follow the methodological recommendation of the Statistical Office of the European Union (EUROSTAT). This survey in annual, it covers the



Spanish population older than 10 years old, specially those between 16 and 74, as recommended by EUROSTAT, it covers the entire Spanish geography and the way of obtain the information is through a physical interview, telephone interview or, since 2017, by a survey on the web. To be able to use this data effectively it should be shaped according to the Spanish population and then passed through the statistical work software.

Being a survey of an specialized entity we had not had representation problems yet it has adequately encompassed the distribution of men and women , representation of Autonomous Communities, the employment situation and education.

*Table 1. Demographic profile*

		2014		2019	
		Frequency	Percent	Frequency	Percent
GENDER	Male	3156	48,39	4609	47,3
	Female	51,61	51,61	5135	52,7
AGE	18-24	575	8,82	711	7,3
	25-34	1040	15,96	1022	10,53
	35-44	2011	30,83	2223	22,81
	45-54	1527	23,41	2300	23,6
	55-64	906	13,81	1994	20,46
	65-74	369	5,65	1131	11,6
	> 75	94	1,44	359	3,68
LEVEL OF STUDIES	Primary	394	6,04	849	8,7
	High School	4014	61,55	5964	61,2
	College	2038	31,25	2809	28,8
	Phd	71	1,17	122	1,3
FREQUENCY USING INTERNET	High	5248	81,24	8213	84,5
	Medium	904	13,99	1133	11,7
	Low	308	4,77	370	3,8

The aim of this econometric study has been to develop a model that can explain how individual and social factors influence the inclination to e-commerce, which variables influence this fact on a positive and negative basis and to what extent, apart from disputing the role of a-trust in this matter.

It is very common in economics to find models that represent individual's choice of discrete options, and this is one of them, in the dependent variable E-commerce there are only two options, to buy or not to buy.

The already explained Technology Acceptance Models (TAM), are the ones used by almost all studies to empirically describe the behaviour of online consumers. These bring together both Perceived Utility (PU) and Perceived Utility Facility (PUF), regarding online purchasing. In other

words, we would have a model in which the probability of accessing the utility of a service Y would depend on the perceived benefits and costs of the service. This would be a Neoclassical Utility Maximization Model that could be described as:

$$P(U|x)=P[B(Y)-C(Y)>0|x]$$

In this case the service Y is a binary dependent variable that is 1 if you buy online and 0 if you don't, meaning that the dependent variable follows a Bernoulli distribution. That means that the predicted value of Y is the probability that Y = 1 (probability of success). To model these structures we will use three models: Linear Probability Model, Probit Model and Logit Model (Wooldridge, 2010).

In order to estimate consumer behaviour when faced with the decision to buy online or not, the literature and the TAM model propose two types of variables: socio-demographic variables and variables representative of familiarity with ICTs.

The variables that should be considered separately would be:

Within the sociodemographic: A variable referred to the sex of the individual, the men variable, to see if there is any bias of this type, an age variable and the squared age to study the evolution of the age of the individuals and their inclination to E-commerce, Bachelor's and foreign variables to see if it has any relevance, and by last, variables related to the academic level of the individuals, distinguishing between primary studies, secondary studies, a degree and doctoral studies.

In regard to the socio-economics, we divide the individuals as to their promotions, being this segment between the people that earn 900€ or less, between 900€ and 1600€. The following segment until 2500€, the next until 3000 € and then the biggest salaries, a very typical division in this studies.

In relation to the variables that analyses the relation of the individuals with the ICT's, the variables which treat the ability with the user's computers oscillating between: "low", use of word processing programs; "medium", all of the tasks that involve using; spreadsheets, presentations or the use of links; "high", encompassing tasks like for example using spreadsheets at a very high level or using a video edition program, pictures or files and "very high", having programming as an option. Also, the ability of citizens on the internet is being studied because it could be a low ability if it's only used for social media and the mail. If it's used as digital media and general information, giving opinions and reviews or looking after plans, it's considered medium ability. It can be high ability if it is used to manage your money, buys or use e-banking or e-government. Lastly, there are other

types of variable such as: having Broadband access and variables of e-trust, which are: "low": less or nothing; "medium": enough and "high", a lot of trust. This final two will be used in an "e-trust estimation".

To the initial model of e-commerce, interaction variables will also be added to study its behaviour, these would be "Middle class single", single individual with normal salary, "High class single", single individual and with high salary, "High education and high e-trust", individual with studies and who trusts on the Internet, "Low PC skills and Low e-trust", individual who does not know how to use computers and does not trust the Internet and "Low PC skills and High e-trust", individual who despite not knowing how to use computers trusts the Internet. With these new variables there are interactions that give new answers that could be relevant towards the decision to buy or not online, not only for generating different socio-economic characteristics to those raised without interaction, as well as for raising attitudes towards online commerce dependent on individual training and skills. After carrying it out, they will be repeated in accordance to the 2014 data, this would help to see how the weight of the variables changes in this five-year period characterized by sustained growth in online purchases of more than 20% year-on-year. As well as a Cronbach's alpha to see the reliability of the model and if the variables included are suitable and a Wald's test to see the significance of the e-trust variables and show their true relevance in the model.

Once this relevance is analysed, the e-trust variable should be estimated the same way, making models that estimate e-trust according to socio-demographic variables, ICT literacy variables and then others related directly to e-trust, such as: "security", being positive if the individual is feeling safe on the web and have a security software, "frequency", between low, medium and high, depending in how many times a week the individual is online, and the "frequency of online shopping", linking trust with shopping and adding that buying online frequently means a bigger reliance, if it is divided in frequencies (low, medium or high), it depends of how much the individual buys in a year, and it's propension to "online storage", understanding the use of the cloud to upload your information to the Internet.

With all of this, an estimation of which variables link up an individual to a middle or high e-trust would be made, this model could be great to show that are the variables that need to be reinforced to improve the dependent variable and it is important due that is expected to have a big weight in online shopping. The results of 2014 and 2019 will be compare to see how evolved it is. To estimate this variable just like the e-commerce is estimated, the e-trust variable will be adapted, two types of models will be made using Likert's scales answers "high" and "very high "in the question about trust on the internet, thus being able to limit the study on how explicative variables interact with a

high trustiness on the internet. Therefore, there will be two types of models: those who estimate a “middle trust level” and those who estimate “high trust level”, this models will be treated the same way as the e-commerce variable.

#### **4. Empirical results.**

From the above, it can be deduced that there is a binary response model whose dependent variable would be to be part of e-commerce and the explanatory variables would be a set of socio-demographic and socio-economic variables, as well as individuality variables referring to the OCT abilities: ability with computers and with the Internet, e-trust and access to broadband.

This model will demonstrate a successful result, and will show purchase, when the dependent variable is 1, this being when the utility of e-commerce is greater than its costs and opportunity costs. We could say that the model presented would follow the following scheme:

$$\mathbf{E-commerce} = \beta_i x_i + \epsilon_i$$

Being  $\epsilon$  the unobservable error, inherent to the individual, and since we cannot estimate all the parameters that influence the decision itself and  $x$ , a set of explanatory variables that will give us information about the final decision-making. Since it is a binary variable, there are three ways for it to work: as a Linear Probability Model (MPL), a Probit Model or a Logit Model. These binary models always present heteroskedasticity (Wooldridge, 2010).

To base this case, a Logit model will be used, as it seems to be the most suitable one. Firstly, the linear probability model that would consist of subjecting the expression to Ordinary Least Squares (OLS) directly, may be adequate to see how the variables act with respect the probability of success of dependent variable, but it will not be able to estimate its exact influence since it does not intend to approximate the prediction to values 0 and 1 and may give values outside these which would not be valid. Between Probit and Logit the decision is different, they propose different estimators, both approximate their results to 0 and 1, but the Probit will use of the curve of the Normal (0.1) and Logit with the accumulated Function of a logistic, both models use the maximum plausible estimate, not the MCO, which guarantees that the estimators of the parameters are consistent and asymptotically normal. The parameters do not have individual interpretation, but the slopes can be found that indicate their influence on the decision. Both use pseudo-R<sup>2</sup>.

However, among these models the Logit model will prevail as it allows the analysis of Odds: the ratio of the probabilities, this indicates the positive or negative influence of the variables to facilitate the successful decision, this analysis divides the probabilities of success and failure giving values

between 0 and infinity, the greater, the more positive it its influence. Significance contrasts can also be made, such as Wald's.

Once the decision of the model is justified, its estimation and results will be observed, not without mentioning that the table of correlations between the variables of the model demonstrates that they are adequate for the estimation, since none exceeds the value 0.7 showing that they are independent variables from each other. The results obtained from the estimation are shown in table 2.

Table 2. Estimation results for e-commerce 2019.

	OLS	Probit		Logit		
	Coefficient	Coefficient	Odds ratio	Coefficient	Gradient	Odds ratio
Man	0,024*** (0,009)	0,163*** (0,06)	0,022	0,334*** (0,121)	0,022	1,397
Age	0,011*** (0,002)	0,056*** (0,011)	0,007	0,099*** (0,022)	0,0065	1,1043
Age <sup>2</sup>	-0,0001*** (0)	-0,0007*** (0,000)	-0,0001	-0,001*** (0,000)	-8,85692e-05	0,9986
Foreigner	-0,136 (0,027)	-0,068 (0,1665)	-0,009	-0,140 (0,327)	-0,009	0,868
Single	-0,02* (0,01)	-0,157** (0,074)	-0,0222	-0,342** (0,145)	-0,023	0,7103
High School	0,208*** (0,054)	0,694*** (0,169)	0,1004	1,21124*** (0,302)	0,0842	3,357
College	0,232*** (0,055)	0,889*** (0,175)	0,117938	1,605*** (0,315)	0,1029	4,979
Phd	0,255*** (0,058)	1,103*** (0,326)	0,0704503	2,136*** (0,675)	0,0642	8,4711
Wage 900-1600€	0,026 (0,02)	0,131 (0,101)	0,0386828	0,228 (0,1915)	0,0143	1,256
Wage 1600-2500€	0,052*** (0,02)	0,304*** (0,103)	0,0369727	0,547*** (0,1979)	0,0328	1,728
Wage 2500-3000€	0,0518** (0,021)	0,316*** (0,122)	0,0469807	0,559** (0,238)	0,0309	1,749
Wage over 3000€	0,062*** (0,02)	0,401*** (0,118)	0,0130464	0,727*** (0,232)	0,0402	2,069
Medium PC skills	0,031 (0,031)	0,088 (0,139)	0,0605578	0,1725 (0,250)	0,0121	1,188
High PC skills	0,064*** (0,01)	-0,388*** (0,0618)	-0,0167739	0,753*** (0,119)	0,057	2,124
Low Internet Skills	-0,005 (0,138)	-0,133 (0,555)	0,532767	-0,389 (1,049)	-0,0216	0,677
Medium Internet Skills	0,546*** (0,059)	1,737*** (0,205)	0,0174271	3,0406*** (0,355)	0,535	20,91
Medium e-trust	0,075*** (0,013)	0,4*** (0,066)	0,0624819	0,757*** (0,126)	0,0573	2,13
High e-trust	0,091*** (0,015)	0,657*** (0,131)	0,0622	1,29*** (0,281)	0,0565	3,636

<b>Broadband</b>	<b>0,066*** (0,021)</b>	<b>0,332*** (0,097)</b>	<b>0,0563</b>	<b>0,622*** (0,178)</b>	<b>0,0514</b>	<b>1,8632</b>
<b>Pseudo-R<sup>2</sup></b>	<b>0,137</b>	<b>0,1626</b>		<b>0,1611</b>		
<b>Wald <math>\chi^2</math></b>		<b>423,09</b>		<b>419,31</b>		
<b>n</b>	<b>4046</b>	<b>4046</b>		<b>4046</b>		
<b>PCCP</b>		<b>90,8%</b>		<b>90,9%</b>		
<b>MaxVIF</b>	<b>4,02</b>					

Notes: Standard deviation in parenthesis. \* Significant at 10%, \*\* significant at 5% and \*\*\* significant at 1%.

CIO ELECT	HOMBRE	EDAD	EXTRANJERO	SOLTERO	ESTUDIOS SECUNDARIOS	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	ESTUDIOS DE GRADO	VARIABLES EXPLICATIVAS
1	0,0446	-0,3328	-0,3328	0,123	-0,0577	0,225	0,0445	-0,1036	0,063	0,0961	0,1452	0,4597	0,3777	0,1787	0,3763	0,2242	0,106	0,1905	0,1905	0,1905	COMERCIO ELECTRONICO
	1	-0,0099	-0,0183	0,0536	0,0759	-0,0806	0,0079	0,0142	0,0204	0,0035	0,0346	0,037	0,0378	-0,0065	0,0193	0,0048	0,0378	0,0285	0,0285	0,0285	HOMBRE
		1	-0,0741	-0,4945	-0,1226	-0,0281	0,0302	-0,0144	0,0393	-0,0173	-0,0241	-0,3142	-0,3328	-0,1488	-0,1898	-0,0912	-0,0811	-0,0492	-0,0492	-0,0492	EDAD
			1	-0,0021	0,0082	-0,0326	0,0039	0,0461	-0,0315	-0,0379	-0,0535	-0,0667	-0,04	0,0092	-0,0258	-0,0193	-0,0006	-0,0742	-0,0742	-0,0742	EXTRANJERO
				1	0,0326	0,0309	-0,0042	0,0326	-0,0197	-0,0377	-0,0691	0,1646	0,17	0,0507	0,0902	0,0363	0,0255	-0,06	-0,06	-0,06	SOLTERO
					1	-0,7994	-0,1414	0,1566	-0,0234	-0,0723	-0,1821	-0,1665	-0,092	0,0025	0,0093	-0,0222	-0,0345	-0,0271	-0,0271	-0,0271	ESTUDIOS SECUNDARIOS
						1	-0,0717	-0,1869	0,0658	0,1147	0,2209	0,3259	0,2054	0,0626	0,1354	0,0863	0,0601	-0,0993	-0,0993	-0,0993	ESTUDIOS DE GRADO
							1	-0,093	-0,0187	0,0191	0,1252	0,0724	0,0505	0,0164	0,0266	0,0301	0,0083	0,0304	0,0304	0,0304	ESTUDIOS DOCTORADO
								1	-0,4462	-0,2404	-0,2903	-0,1522	-0,0984	-0,0174	-0,0439	-0,0383	-0,0428	-0,07525	-0,07525	-0,07525	INGRESOS ENTRE 900 Y 1600 €
									1	-0,1998	-0,2413	0,0781	0,0477	0,0076	0,064	0,0232	0,0149	0,0823	0,0823	0,0823	INGRESOS ENTRE 1600 Y 2500€
										1	-0,013	0,1197	0,0814	0,0309	0,0604	0,0462	0,0292	0,0732	0,0732	0,0732	INGRESOS ENTRE 2500 Y 3000€
											1	0,1867	0,1142	0,0325	0,0878	0,0689	0,0583	0,1223	0,1223	0,1223	INGRESOS MAYORES DE 3000€
												1	0,5281	0,1559	0,3012	0,1802	0,1001	0,2074	0,2074	0,2074	HABILIDADES PC MEDIAS
													1	0,1175	0,2208	0,1393	0,102	0,1444	0,1444	0,1444	HABILIDADES PC ALTAS
														1	0,2005	0,0931	0,0235	0,0334	0,0334	0,0334	HABILIDADES INTERNET BAJAS
															1	0,1927	0,0512	0,1978	0,1978	0,1978	HABILIDADES INTERNET MEDIAS
																1	-0,3569	0,1078	0,1078	0,1078	CONFIANZA EN INTERNET MEDIA
																	1	0,0459	0,0459	0,0459	CONFIANZA EN INTERNET ALTA
																		1			BANDA ANCHA

Firstly, it seems that this is a consistent model, most of the variables included have significance at 1%, therefore, they are supposed to be relevant in this decision making.

Regarding the socio-demographic and socio-economic variables, being a man is positive and significant when it comes to buying over the internet. The variables that focus on the academic level or economic level also have this relationship. However, being single or a foreigner is a handicap when it comes to participating in this business, although being a foreigner is not significant.

Observing the variables of individual characteristics in their relationship with ICT, the skills with computers and with the Internet at a medium and high level, turn out to be significant and give positive values towards decision-making. However, low level skills are not. Broadband, on the other hand, is significant and positive, and with regard to e-trust variables, these are significant and positive, with one of the greatest slopes and therefore a great weight in percentage points when it comes to supporting the decision, as well as having an odds-ratio greater than one and therefore supporting the decision in a very relevant way.

This model is adequate and very similar to those seen in the literature, but perhaps if interaction variables are added, other useful elements in decision making can be observed.

Table 3. Estimation results e-commerce 2014 and 2019

	Logit 2019			Logit 2014		
	Coefficient	Gradient	Odds ratio	Coefficient	Gradient	Odds ratio
Man	0,1622*** (0,557)	0,0304	1,176	0,414*** (0,0763)	0,080	1,5129
Age	0,068*** (0,0131)	0,0128	1,0706	0,0614*** (0,016)	0,011	1,06
Age <sup>2</sup>	-0,001*** (0,0001)	-0,0001	0,999	-0,00089*** (0,000182)	-0,0001	0,999
Foreigner	-0,101 (0,146)	0,01863	1,1	-0,173 (0,155)	-0,034	0,8407
Single	-0,0738 (0,085)	-0,0139	0,928	0,294*** (0,109)	0,0563	1,343
High School	0,5376*** (0,108)	0,1037	1,125	0,133 (0,171)	0,0260	1,1431
College	0,966*** (0,1266)	0,1625	2,62	0,755*** (0,189)	0,137	2,128
Phd	1,016*** (0,311)	0,143	2,76	1,433*** (0,549)	0,186	4,192
wage 900-1600€	0,118 (0,084)	0,0220	1,1259	0,272** (0,110)	0,0515	1,3126
wage 1600-2500€	0,393 *** (0,102)	0,0704	1,4817	0,715*** (0,143)	0,127	2,045
wage 2500-3000€	0,5328 *** (0,12)	0,0891	1,7037	0,905*** (0,158)	0,1455	2,473
wage over 3000€	0,664 *** (0,1313)	0,109	1,9442	1,215*** (0,194)	0,183	3,37245
Medium PC skills	0,8249 *** (0,068)	0,161	2,2817	0,682*** (0,105)	0,144	1,978
High PC skills	0,772 *** (0,0695)	0,140	2,1650	0,403*** (0,151)	0,0842	1,497
High Internet Skills	-	-	-	1,767*** (0,102)	0,399	5,85
Medium Internet Skills	1,91 *** (0,136)	0,438	6,8134	-	-	-
Medium e-trust	2,464*** (0,418)	0,492	11,7630	1,671** (0,846)	0,336	5,317
High e-trust	2,086*** (1,628)	0,261	14,6625	2,103** (0,852)	0,273	8,193
Broadband	0,363*** (0,0828)	0,0725	1,4377	0,2582*** (0,0856)	0,0515	1,29
Middle class	-0,067	-0,0129	0,9344	-0,221	-0,0446	0,801

<b>single</b>	<b>(0,1422)</b>			<b>(0,1779)</b>		
<b>High class single</b>	<b>-0,115</b> <b>(0,231)</b>	<b>- 0,0223</b>	<b>0,8907</b>	<b>-0,619**</b> <b>(0,289)</b>	<b>-0,134</b>	<b>0,538</b>
<b>High education level and high e-trust</b>	<b>0,764 **</b> <b>(0,331)</b>	<b>0,117</b>	<b>2,1482</b>	<b>0,710**</b> <b>(0,310)</b>	<b>0,1163</b>	<b>2,034</b>
<b>low e-trust and low Pc</b>	<b>0,521***</b> <b>(0,106)</b>	<b>0,0887</b>	<b>1,6844</b>	<b>0,450*</b> <b>(0,238)</b>	<b>0,0819</b>	<b>1,569</b>
<b>High e-trust and low PC skills</b>	<b>1,4944***</b> <b>(0,422)</b>	<b>0,2363</b>	<b>4,4568</b>	<b>0,717</b> <b>(0,8404)</b>	<b>0,1270</b>	<b>2,0346</b>
<b>Pseudo-R<sup>2</sup></b>		<b>0,3237</b>			<b>0,227</b>	
<b>Wald <math>\chi^2</math></b>		<b>3858,38</b>			<b>1324,68</b>	
<b>PCCP</b>		<b>90,8%</b>			<b>78%</b>	
<b>n</b>		<b>4046</b>			<b>4736</b>	

Notes: Standard deviation in parenthesis. \* Significant at 10%, \*\* significant at 5% and \*\*\* significant at 1%.

As indicated in the methodology, the intention after estimating the initial model was to add another model like the previous one, but introducing in it interaction variables resulting from putting together: "single and a middle wages", "single and a high wages", "high education and high e-trust", and "low internet skills and medium and high e-trust".

Once added and estimated the model provides the following results. The explanatory variables previously analysed, maintain their positive and negative relations with the purchase decision, as well as their significance. Except for "single", when the significance ceases to be positive.

The novelty lies with the interaction variables, the variables carried out with singles of different economic level turn out to be both negative with respect to the decision, since the slope that represents the marginal effect indicates this, and none of them is significant. But another destination had the variables that interact with confidence, since all three are significant, positive, and with odds ratios that indicate support for the possibility of success.

This means that the e-trust variables are relevant, significant and positive in terms of making the decision to participate in e-commerce, both separately and in interaction with other variables, socio-demographic and individual skills.

But as one of the questions in this paper focuses on the significance of this variable Internet Confidence it seems imperative to review it again. In order to do this Wald's test has been performed. The result of the test show p-values close to 0, that indicates 1% significance and therefore confirms its relevance in the proposed model



Table 4. Trust model

VARIABLES	F stat	p-value
Medium Confidence and High Confidence	19,1	1,19e-06
Broadband	18,66	8,01e-09
Training-Confidence, Low Confidence and Low PC Skills and High Confidence and Low PC Skills	15,27	6,48e-10

Afterwards, the contrast with the Broadband variable has also been made, to see its relevance as in the article by Gijón, Whalley and Anderson (2016), they had result claiming that it was not relevant in Glasgow, but in this case, Spain, it does turn out to be a significant variable.

Another aspect related to the model to be commented on is its reliability. The goodness-of-fit criteria of this model would be: pseudo-R<sup>2</sup> and the Percentage of Correctly Predicted Cases (PCCP), which give contradictory values. The first indicates a value of 0.3, which is very low and indicates an unreliable model. However, the PCCP has a value of 90%, which implies a very acceptable prediction, given this contraposition another reliability estimator is used: Cronbach's Alpha, which estimates whether the model is made with adequate variables, a contrast that appeared in the article by Pestek, Resić and Nozica (2011), this indicates that a model is reliable if the alpha exceeds 0.6, and as the result of this model is 0.74, it can be concluded that the model is reliable.

Table 5. Reliability statistics

Reliability Statistics			
Cronbach's Alpha e-commerce 2019	Cronbach's Alpha high e-trust 2019	Cronbach's Alpha e-commerce 2014	Cronbach's Alpha high e-trust 2014
0,743	0,593	0,702	0,635

To close this part of the analysis the models would be repeated with 2014 data, with the data from their respective surveys treated in the same way. These models also present numerous significant variables and, for the most part, the same relationship with the dependent variable.

The most noteworthy changes are as follows:

→ In the 2014 model, the variables of the socio-demographic and socio-economic category present greater significance and greater value in the odds ratio than in the results for 2019, although the high e-trust variable is, according to the odds ratio, of great importance. The interaction variables in 2014, even the confidence interactions, are not significant. In 2014, the single variable becomes

significant at 1% and changes the relationship to positive.

→ In 2019, the variables with the highest significance and highest odds ratio are individual ICT skills, computer and internet skills, and above all Internet Confidence seem to be much more influential in the decision to buy this year than five years ago.

→ The 2014 model seems to predict in general worse than the 2019 model, presenting much lower goodness-of-fit criteria.

All this may explain a change in trend, in a five-year period of exponential growth in this sector, e-commerce has gone from being a thing of educated people with a certain purchasing power to becoming something popular. It may also mean that ICT literacy has become more widespread, breaking down an access gap. Another important thing is that in 2019 ICT skills has a more significant influence on Internet shopping than five years ago.

After observing the results of the e-commerce models that were proposed, the relevance of e-trust variables have been demonstrated. That is why it would be vitally important, as it was mentioned in the methodology, to create a model that estimates how trustiness is built, analysing the factors that influence in it. Like it was said this models will be treated just as the e-commerce, therefore binary response models will be created and the relation of the explicative variables with the dependent variables will be estimated with “medium trustiness” and “high trustiness”, creating OLS models, probit and logit of this for 2019 and 2014, choosing the logit model because of the reasons explained before.

*Table 6. Estimation results for medium confidence (2014 and 2019)*

	2014			2019		
	Coefficient	Gradient	Odds ratio	Coefficient	Gradient	Odds ratio
<b>Man</b>	<b>-0,154**</b> (0,0746)	<b>-0,036</b>	<b>0,857</b>	<b>-0,106</b> (0,109)	<b>-0,022</b>	<b>0,8993</b>
<b>Age</b>	<b>-0,0013</b> (0,0175)	<b>-0,00031</b>	<b>0,998</b>	<b>-0,024</b> (0,023)	<b>-0,005</b>	<b>0,9757</b>
<b>Age<sup>2</sup></b>	<b>8,34e-07</b> (0,0001)	<b>1,96e-07</b>	<b>1</b>	<b>0,0004</b> (0,0002)	<b>9,04e-05</b>	<b>1,0004</b>
<b>Foreigner</b>	<b>-0,325*</b> (0,174)	<b>-0,0789</b>	<b>0,72</b>	<b>0,787**</b> (0,371)	<b>0,139</b>	<b>2,197</b>
<b>Single</b>	<b>0,0068</b> (0,091)	<b>0,0016</b>	<b>1,006</b>	<b>0,115</b> (0,135)	<b>0,0242</b>	<b>1,122</b>
<b>High School</b>	<b>0,1513</b> (0,231)	<b>0,0358</b>	<b>1,163</b>	<b>0,205</b> (0,514)	<b>0,0432</b>	<b>1,227</b>

<b>College</b>	<b>0,3084</b> <b>(0,239)</b>	<b>0,0721</b>	<b>1,361</b>	<b>0,169</b> <b>(0,519)</b>	<b>0,0356</b>	<b>1,184</b>
<b>Phd</b>	<b>0,0803</b> <b>(0,372)</b>	<b>0,0187</b>	<b>1,083</b>	<b>0,428</b> <b>(0,612)</b>	<b>0,0826</b>	<b>1,534</b>
<b>wage 900-1600€</b>	<b>0,378***</b> <b>(0,127)</b>	<b>0,087</b>	<b>1,4603</b>	<b>0,271</b> <b>(0,210)</b>	<b>0,055</b>	<b>1,3117</b>
<b>wage 1600-2500€</b>	<b>0,296**</b> <b>(0,130)</b>	<b>0,0688</b>	<b>1,344</b>	<b>0,420**</b> <b>(0,210)</b>	<b>0,085</b>	<b>1,5233</b>
<b>wage 2500-3000€</b>	<b>0,3381**</b> <b>(0,153)</b>	<b>0,0771</b>	<b>1,402</b>	<b>0,292</b> <b>(0,240)</b>	<b>0,058</b>	<b>1,3396</b>
<b>wage over 3000€</b>	<b>0,337**</b> <b>(0,154)</b>	<b>0,0772</b>	<b>1,401</b>	<b>0,370</b> <b>(0,226)</b>	<b>0,074</b>	<b>1,4487</b>
<b>Medium PC skills</b>	<b>0,0825</b> <b>(0,1318)</b>	<b>0,0196</b>	<b>1,086</b>	<b>0,524</b> <b>(0,398)</b>	<b>0,119</b>	<b>1,688</b>
<b>High PC skills</b>	<b>0,0703</b> <b>(0,192)</b>	<b>0,0167</b>	<b>1,072</b>	<b>-0,182</b> <b>(0,136)</b>	<b>-0,037</b>	<b>0,833</b>
<b>Medium Internet Skills</b>	<b>-0,0186</b> <b>(0,151)</b>	<b>-0,00439</b>	<b>0,981</b>	<b>-1,140</b> <b>(1,141)</b>	<b>-0,181</b>	<b>0,3196</b>
<b>Security Software</b>	<b>0,239*</b> <b>(0,136)</b>	<b>0,057</b>	<b>1,27</b>	<b>0,123</b> <b>(0,165)</b>	<b>0,0266</b>	<b>1,131</b>
<b>High frequency using Internet</b>	<b>-0,0929</b> <b>(0,158)</b>	<b>-0,0217</b>	<b>0,911</b>	<b>0,234</b> <b>(0,291)</b>	<b>0,0515</b>	<b>1,2646</b>
<b>Low frequency using Internet</b>	<b>-0,659</b> <b>(0,4569)</b>	<b>-0,162</b>	<b>0,51</b>	<b>-1,02</b> <b>(1,188)</b>	<b>-0,245</b>	<b>0,358</b>
<b>Recent e-commerce</b>	<b>0,0724</b> <b>(0,0905)</b>	<b>0,0171</b>	<b>0,9195</b>	<b>0,147</b> <b>(0,163)</b>	<b>0,031</b>	<b>1,158</b>
<b>Not recent e-commerce</b>	<b>-0,047</b> <b>(0,136)</b>	<b>-0,011</b>	<b>0,953</b>	<b>-0,202</b> <b>(0,382)</b>	<b>-0,0443</b>	<b>0,816</b>
<b>Online storage</b>	<b>-0,083</b> <b>(0,076)</b>	<b>-0,019</b>	<b>1,07</b>	<b>0,178</b> <b>(0,125)</b>	<b>0,0383</b>	<b>1,1960</b>
<b>Pseudo R<sup>2</sup></b>	<b>0,008</b>			<b>0,014</b>		
<b>Wald <math>\chi^2</math></b>	<b>37,004</b>			<b>29,88</b>		
<b>PCCP</b>	<b>61,7%</b>			<b>69,4%</b>		
<b>n</b>	<b>3291</b>			<b>1682</b>		

Notes: Standard deviation in parenthesis. \* Significant at 10%, \*\* significant at 5% and \*\*\* significant at 1%.

CONFIANZA	HOMBRE	EDAD	EXTRANJER	SOLTERO	ESTUDIOS I	ESTUDIOS II	ESTUDIOS III	INGRESOS I	INGRESOS II	INGRESOS III	INGRESOS IV	HABILIDAD I	HABILIDAD II	HABILIDAD III	SOFSEG	FRECINTAL	FRECINTLO	COMSPRAS I	COMPRAS II	ALMACAN	VARIABLES EXPLICATIVAS
1	0,0048	-0,0912	-0,0193	0,0363	-0,0222	0,0863	0,0301	-0,0383	0,0232	0,0462	0,0689	0,1802	0,1393	0,1927	-0,1674	0,1364	-0,124	0,061	-0,0618	0,1412	CONFIANZA MEDIA
	1	-0,0099	-0,0183	0,5306	0,0759	-0,0806	0,0079	0,0142	0,0204	0,0035	0,0346	0,037	0,0378	0,0193	-0,0473	-0,0004	-0,0139	0,01	0,0154	0,0261	HOMBRE
		1	-0,0741	-0,4945	-0,1226	-0,0281	0,0302	-0,0144	0,0393	-0,0173	-0,0241	-0,3142	-0,3328	-0,1898	0,1159	-0,2822	0,1934	-0,1408	0,1289	-0,2811	EDAD
			1	-0,0021	0,0082	-0,0335	0,0039	0,0461	-0,0315	-0,0379	-0,0535	-0,0677	-0,0408	-0,0258	0,0563	0,0095	-0,0232	-0,0565	0,0327	-0,0161	EXTRANJERO
				1	0,0326	0,0309	-0,0042	0,0326	-0,0197	-0,0377	-0,0691	0,1646	0,17	0,0902	-0,053	0,1052	-0,0705	0,0384	-0,0362	0,1513	SOLTERO
					1	-0,7994	-0,1414	0,1566	-0,0234	-0,723	-0,1821	-0,1665	-0,092	0,0093	0,0441	-0,0291	0,0027	-0,0703	0,0573	-0,0931	ESTUDIOS SECUNDARIOS
						1	-0,0717	-0,1869	0,0658	0,1147	0,2209	0,3259	0,2054	0,1354	-0,1667	0,1281	-0,0817	0,1033	-0,081	0,1851	ESTUDIOS DE GRADO
							1	-0,0593	-0,0187	0,0191	0,1252	0,0724	0,0505	0,0266	-0,0316	0,0329	-0,0176	0,0207	-0,0105	0,052	ESTUDIOS DOCTORADO
								1	-0,4462	-0,2404	-0,2903	-0,1522	-0,0984	-0,0439	0,0971	-0,0462	0,0393	-0,0698	0,0674	-0,068	INGRESOS ENTRE 900 Y 1600 €
									1	-0,1998	-0,2413	0,0781	0,0477	0,064	-0,071	0,016	-0,0341	0,0042	-0,017	0,0242	INGRESOS ENTRE 1600 Y 2500€
										1	-0,13	0,1197	0,0814	0,0604	-0,0803	0,0552	-0,0309	0,0565	-0,0552	0,0444	INGRESOS ENTRE 2500 Y 3000€
											1	0,1867	0,1142	0,0878	-0,108	0,0792	-0,0397	0,0988	-0,0582	0,1138	INGRESOS MAYORES DE 3000€
												1	0,5281	0,3012	-0,3626	0,2625	-0,1938	0,2087	-0,1574	0,3625	HABILIDADES PC MEDIAS
													1	0,2208	-0,2592	0,2325	-0,1429	0,1834	-0,1241	0,3936	HABILIDADES PC ALTAS
														1	-0,2628	0,2631	-0,2787	0,195	-0,1863	-0,2	HABILIDADES NTERNET BAJAS
															1	-0,1628	0,1457	-0,0737	0,068	-0,2004	SOFSEG
																1	-0,4651	0,155	-0,1252	0,2417	FRECINTALTA
																	1	-0,0768	0,0763	-0,1511	FRECINTLOW
																		1	-0,4684	0,1758	COMSPRAS RECIENTES
																			1	-0,133	COMPRAS A LARGO PLAZO
																				1	ALMACENAMIENTO

When we observe the obtained values of the estimations of "medium e-trust", the first thing that pops out at first sight is that there are less significant values than the obtained with e-commerce estimations, as a matter of fact, the significant values obtained in 2019 with this dependent variable correspond to the explanatory variables "foreigners" and "medium wages", also it can be added that pseudo-R<sup>2</sup> is pretty low and the PCCP falls from 70%, thereupon, with the obtained data of the survey it looks like it is impossible to be estimated, according to the recommended variables in the literature.. However, in 2014 there are more significant values, being them all related to incomes, showing a more positive slope and Odd-ratios bigger than 1, meaning this that they are positive and significant at the moment of the decision maker. It is significant in this sense the "security" variable, this has a lot of meaning because having enough ICT skills to have a security software can make you be acquainted enough to have "enough trustiness" in your online relations. In an opposite sense, the man and foreigner variables appear as significant. It should be noted that in both years the percentage of correctly predicted cases is too low, reaching the 60%, and the pseudo-R<sup>2</sup> is also very low, proving that this models are not the perfect predictors.

Table 7. Estimation results for High confidence (2014 and 2019)

	2014			2019		
	Coefficient	Gradient	Odds ratio	Coefficient	Gradient	Odds ratio
Man	0,0908 (0,0948)	0,0129	1,09	0,457 *** (0,144)	0,03006	1,58
Age	-0,0166	-0,002	0,983	0,0603 *	0,00399606	1,062

	(0,023)			(0,0310)		
Age <sup>2</sup>	5,12e-05 (0,0002)	7,33e-06	1,0001	-0,00078 ** (0,0003)	-5,20e-05	0,999
Foreigner	0,378936 (0,204)	0,0604	1,4607	-0,36 (0,4362)	-0,02087	0,695
Single	-0,1242 * (0,1172)	-0,01765	0,883	-0,001 (0,169)	-0,00018	0,998
High School	-0,39 (0,281)	-0,0567	0,676	0,178 (0,601)	0,01173	1,1955
College	-0,435 (0,294)	-0,0605	0,647	0,1602 (0,607)	0,01075	1,173
Phd	-0,087596 (0,446)	-0,0121	0,9161	0,311 (0,720)	0,0234	1,365
wage 900-1600€	-0,237354 (0,164)	-0,0329	0,7887	0,189 (0,27)	0,0129	1,208
wage 1600-2500€	-0,124 (0,169)	-0,0175	0,8825	0,1858 (0,2837)	0,0127	1,204
wage 2500-3000€	-0,137 (0,196)	-0,0190	0,8716	0,3466 (0,3158)	0,0257	1,4144
wage over 3000€	0,0508 (0,196)	0,00735394	1,0521	0,4579 (0,300)	0,0344	1,5808
Medium PC skills	0,1193 (0,179)	0,0165377	1,1267	0,0582 (0,257)	0,00378	1,05
High PC skills	-0,401	-0,0644572	0,6694	0,377 **	0,0237	1,458

	(0,252)			(0,178)		
<b>Medium Internet Skills</b>	<b>0,4883 **</b> <b>(0,229)</b>	<b>0,0605813</b>	<b>1,529</b>	<b>19,95 ***</b> <b>(0,226)</b>	<b>0,0790</b>	<b>-</b>
<b>Security Software</b>	<b>-0,3353 **</b> <b>(0,164)</b>	<b>-0,0525360</b>	<b>0,715</b>	<b>-0,1386</b> <b>(0,189)</b>	<b>-0,0095</b>	<b>0'87</b>
<b>High frequency using Internet</b>	<b>0,367</b> <b>(0,232)</b>	<b>0,0472648</b>	<b>1,444</b>	<b>0,9703 *</b> <b>(0,523)</b>	<b>0,0451</b>	<b>2,63</b>
<b>Low frequency using Internet</b>	<b>0,236</b> <b>(0,694)</b>	<b>0,0364537</b>	<b>1,2669</b>	<b>-19,56 ***</b> <b>(0,6788)</b>	<b>-0,0757</b>	<b>0</b>
<b>Recent e-commerce</b>	<b>0,349 ***</b> <b>(0,123)</b>	<b>0,0479603</b>	<b>1,41</b>	<b>0,2992</b> <b>(0,2254)</b>	<b>0,0182</b>	<b>1,348</b>
<b>Not recent e-commerce</b>	<b>-0,027</b> <b>(0,197)</b>	<b>-0,00392651</b>	<b>0,9727</b>	<b>-0,290</b> <b>(0,560)</b>	<b>- 0,0171</b>	<b>0,74</b>
<b>Online storage</b>	<b>0,302 ***</b> <b>0,0976</b>	<b>0,0435498</b>	<b>1,3538</b>	<b>0,311 *</b> <b>(0,163)</b>	<b>0,0198</b>	<b>1,36</b>
<b>Pseudo R<sup>2</sup></b>	<b>0,021</b>			<b>0,037</b>		
<b>Wald <math>\chi^2</math></b>	<b>68,17</b>			<b>62,74</b>		
<b>PCCP</b>	<b>82%</b>			<b>90,6%</b>		
<b>n</b>	<b>3291</b>			<b>2651</b>		

Notes: Standard deviation in parenthesis. \* Significant at 10%, \*\* significant at 5% and \*\*\* significant at 1%.

CONFIANZA AL	HOMBRE	EDAD	EXTRANJERO	SOLTERO	USOS SECUN	DÍAS DE GR	DÍAS DOCTO	ENTRE 900	ENTRE 1600	ENTRE 2500	MAYORES	DADES PC	DADES PC	DES NTERN	SOFTSEG	RECINTALTA	RECINTLOW	PRAS RECIE	PRAS LARGO	ALACANAME	VARIABLES EXPLICATIVAS
1	0,0378	-0,0811	-0,0006	0,0255	-0,0345	0,0601	0,0083	-0,0428	0,0149	0,0292	-0,0583	0,1001	0,102	0,0512	-0,042	0,0875	-0,0405	0,0705	-0,0449	0,0909	CONFIANZA ALTA
	1	-0,0099	-0,0183	0,5306	0,0759	-0,0806	0,0079	0,0142	0,0204	0,0035	0,0346	0,037	0,0378	0,0193	-0,0473	-0,0004	-0,0139	0,01	0,0154	0,0261	HOMBRE
		1	-0,0741	-0,4945	-0,1226	-0,0281	0,0302	-0,0144	0,0393	-0,0173	-0,0241	-0,3142	-0,3328	-0,1898	0,1159	-0,2822	0,1934	-0,1408	0,1289	-0,2811	EDAD
			1	-0,0021	0,0082	-0,0335	0,0039	0,0461	-0,0315	-0,0379	-0,0535	-0,0677	-0,0408	-0,0258	0,0563	0,0095	-0,0232	-0,0565	0,0327	-0,0161	EXTRANJERO
				1	0,0326	0,0309	-0,0042	0,0326	-0,0197	-0,0377	-0,0691	0,1646	0,17	0,0902	-0,053	0,1052	-0,0705	0,0384	-0,0362	0,1513	SOLTERO
					1	-0,7994	-0,1414	0,1566	-0,0234	-723	-0,1821	-0,1665	-0,092	0,0093	0,0441	-0,0291	0,0027	-0,0703	-0,0573	-0,0931	ESTUDIOS SECUNDARIOS
						1	-0,0717	-0,1869	0,0658	0,1147	0,2209	0,3259	0,2054	0,1354	-0,1667	0,1281	-0,0817	0,1033	-0,081	0,1851	ESTUDIOS DE GRADO
							1	-0,0593	-0,0187	0,0191	0,1252	0,0724	0,0505	0,0266	-0,0316	0,0329	-0,0176	0,0207	-0,0105	0,052	ESTUDIOS DOCTORADO
								1	-0,4462	-0,2404	-0,2903	-0,1522	-0,0984	-0,0439	0,0971	-0,0462	0,0393	-0,0698	0,0674	-0,068	INGRESOS ENTRE 900 Y 1600 €
									1	-0,1998	-0,2413	0,0781	0,0477	0,064	-0,071	0,016	-0,0341	0,0042	-0,017	0,0242	INGRESOS ENTRE 1600 Y 2500€
										1	-0,13	0,1197	0,0814	0,0604	-0,0803	0,0552	-0,0309	0,0565	-0,0552	0,0444	INGRESOS ENTRE 2500 Y 3000€
											1	0,1867	0,1142	0,0878	-0,108	0,0792	-0,0397	0,0988	-0,0582	0,1138	INGRESOS MAYORES DE 3000€
												1	0,5281	0,3012	-0,3626	0,2625	-0,1938	0,2087	-0,1574	0,3625	HABILIDADES PC MEDIAS
													1	0,2208	-0,2592	0,2325	-0,1429	0,1834	-0,1241	0,3936	HABILIDADES PC ALTAS
														1	-0,2628	0,2631	-0,2787	0,195	-0,1863	-0,2	HABILIDADES INTERNET BAJAS
															1	-0,1628	0,1457	-0,0737	0,068	-0,2004	SOFTSEG
																1	-0,4651	0,155	-0,1252	0,2417	FRECINTALTA
																	1	-0,0768	0,0763	-0,1511	FRECINTLOW
																		1	-0,4684	0,1758	COMPRAS RECIENTES
																			1	-0,133	COMPRAS A LARGO PLAZO
																				1	ALMACENAMIENTO

But it seems that the models that estimate "high e-trust", corresponding in the INE survey to the answer "a lot of confidence", suffer another fate. In 2019 the explanatory variables corresponding to the gender and age of the users are significant when estimating high trust level in the Internet, the same happened with the variable corresponding to having high wages, which has a positive influence and with a high odd ratio to having a high e-trust. Also significant and positively influencing the decision to fully trust the Internet are high Internet and PC skills, as well as frequent use of the Internet and online storage, however the "low frequency of use of Internet" variable is significant and very negative in the decision to trust the Internet.

All this implies that knowing how to use the Internet and use it, make people prone to having high e-trust. In fact, the PCCP by this model is close to 90%, although the pseudo-R<sup>2</sup>, as in the "medium level trust" model, is still very low. As far as 2014 is concerned, the model that estimates "high trustiness" also shows levels of PCCP and significance that are more interesting than the "medium trust level" model carried out five years earlier, the PCCP overcome the 80% and contribute to an opposite opinion about the reliability that pseudo-R<sup>2</sup> of 0,02 predicts, also the significance is centred on the variables of use of the ICT, which makes it an interesting model that supports the thesis that a good use of the Internet is related to having a greater e-trust, in this case are significant: the foreign variable and then the variables of use of the ICT: high Internet skills, use of security software, use of online storage and recurrent Internet purchases, all of which positively support the decision to have a high e-trust, which is understandable, except for the security variable, dropping the idea that if you have security software it is that you do not trust in using the network in a safe way.

These are the results obtained from modelling whether or not there is a high e-trust in individuals according to their socio-demographic and socio-economic variables and other ICT use variables including, on this occasion, variables relating to security, the frequency of Internet use, the ability to use ICT's and other measures such as the use of network storage.

## **5. Conclusions.**

This paper has attempted to study and analyse individual, social and personal factors and variables that bring people prone to participate in e-commerce, being one of the initial hypotheses that the explanatory variable e-trust was going to be radical in this act.

The literature review has served to know the types of e-commerce that exist, the different types of consumer, the advantages of e-commerce, the factors that influence the e-trust, how the companies achieve loyalty with their clients and other variables important in the decision of trading such as: broadband and personal information. This analysis has demonstrated which are the models on which experts rely and which are the explanatory variables that are most proposed. Due to this, a Logit model based on a Neoclassical Utility Model of a dependent variable of binary response has been made. This binary variable is 1 if the probability of buying on the Internet is high enough.

With the proposed analysis a model that seems to adequately estimate how explanatory variables influence the decision to buy online has been achieved, and from it goodness-of-fit measures were estimated. Those goodness-of-fit measures were: the Percentage of Correctly Predicted Cases and Cronbach Alpha, that estimates reliability, and both tend to undercut the initial idea. And with this model the following results were obtained:

→ On the one hand, there is a gender bias whereby men seem to be more likely to shop online than women, but it is lower than in 2014, from which one can establish it is decreasing. Being single or foreign are not significant variables but they are related negatively with online trade. The socio-economic variables and those related to the academic levels are significant and contribute in a positive way to the decision to buy online, but the odds-ratios indicate that, in 2014, their importance was greater.

→ On the other hand, those variables that represent the individual skills related to ICT are both significant and with a positive trend in the decision to take part in e-commerce, these would be e-trust, PC skills and Internet skills, the odds-ratios show that in 2019 these were more important than in 2014. This can be explained both as an increased online literacy or higher quality Internet penetration in households, this means that individuals see utility in online shopping if they can easily access it.



→ E-trust variable, as explained by the Wald test, is significant at 1% at taking decision to become e-shopper, this means that is relevant and also had positive tendency when it comes to influencing the decision. All the explanatory variables made by the interaction by e-trust and another characterise are also significant and positive in 2019. In addition to it the estimation model of this variable e-trust has provided the next results:

→ Having an average e-trust level, both in 2019 and 2014, have resulted in reliable models, as they had low adjustment measures of goodwill. From their explanatory variables the few that resulted significant in the estimation were being a foreigner and having a security software, both with a positive influence.

→ However, the dependent variable "high e-trust" is estimated in a better way, with a PCCP around 90% it seems to compensate the other measure of goodness-of-fit, the pseudo-R<sup>2</sup>, which is still very low, and these models have more variables significant with the final decision, deducing from this a more appropriate estimation. Starting with the socio-demographic and socio-economic variables, in 2019, having high wages seem to be linked to a greater e-trust, therefore a greater e-trust could be linked with high qualified jobs, in 2019, are also significant in a positive way the variables age and man finding gender bias when skiing for e-trust, in 2014, it is significant positively to be foreign. In both years, making good use of ICTs is related with having high e-trust. In 2019 using the computer and the Internet well, storing information online and using the Internet often support the idea of trust, however, not using the Internet is a handicap when it comes to trust or not. In 2014 these relationships are repeated but instead of the frequency variable being significantly positive, the frequency of online shopping is, however, this year having security software has a negative influence, since, it could implies a certain amount of mistrust.

This paper have described which are the better variables to measure the propensity of individuals to be part of e-commerce and we have analysed the relevance of the variable e-trust, which has been very useful in the estimation, both by itself and interacting with others, fulfilling our Initial Hypothesis, this variable is relevant in the decision and also is positive supporting the decision to take part on e-commerce of individuals. Once this has been seen, the confidence variable has been estimated according to what has been proposed in the literature by Gijón et al. (2013), giving models that adequately estimate the high levels of e-trust, and understanding that, the more familiar the individual is with ICTs, the more e-trust he or she is likely to be.

Finally, three types of **policy recommendations** can be derived from these conclusions:

From the point of view of the policy maker they should put in practise measures to boost ICT literacy and Internet accessibility, in order to promote the competitiveness and maximize the utility of the citizens, this benefit should come by using Internet in e-commerce and other value added services like e-government and e-banking, this measures to encourage the ICT literacy will help also e-trust, a safer us of the media by the population and improve the competitiveness of online markets in Spain putting them in the same level as Europeans. In addition, the government should reduce barriers and improve the security of online shopping to boost this business both within and outside our borders, favouring our companies, as also recommended, Valarezo et al. (2018).

In another point of view, the operators one, at first place, citizens are advised to use the Internet responsibly without abusing the risk, giving the deserving value to their data and it is recommended that they use all protection measures that the government to their partners provide. At second place, if companies want to successfully penetrate the online trade should advocate for being competitive, dynamic and dedicate their marketing strategies in this new market by attracting buyers with: data protection measures that guarantee their e-trust, using promotions and ensuring good after-sales services, as well as adequate attention to customer complaints. All of them value-added services that can help form an audience loyal to their products, as noted in Gijón et al. (2013).

#### *Limitations and possible future lines of investigation.*

At the time to approach the previous subjects the study has faced some issues, one of these has been the source of the data, the INE, since although the data has been of high quality and in accordance with world and European standards, when it comes to seeing how the opinion of households changes over the years it becomes more difficult to compare, at firstly, because the questions sometimes change, due to the evolution of the subject, and secondly because being a survey of households, not families, sometimes sample family units are lost, or respondents are changed due to changes in residence of the selected households. Above all, the shortcomings of the first limitation are exacerbated by the issue of e-trust, since some of its confidence and fraud variables change throughout the surveys, being better delimited in 2019 than in 2014.

This work has also found limitations in the estimation of e-trust due to the form in which the INE survey asks the questions and the absence of variety of questions presented in the sector of security and trust on the Internet, furthermore it does not allow to estimate the e-trust variable in a binomial way easily, which was the intention of this work, so to solve it they have been divided into high trust and medium trust, allowing to see how trust evolves.

As future lines of work possible, there are several possibilities:

- A study similar to the present one on foreign e-commerce versus e-commerce within our borders.

- The absence of data on post-COVID-19 consumption, given that we are still experiencing it, could be considered as a work that requires two parts, this pre-COVID19 and a future one that reflects the data resulting from the pandemic. Even the extension of this study in time would be appropriate since it would be observed if the new consumption patterns are permanent or if there is a tendency towards the previous situation.

- A study on how companies study penetrate the market for online trade, i.e., make this study from the demand, looking for what are the appropriate marketing strategies to gain market share, with the COVID19 some companies stop selling their production because prior to this did not have a model of online sales, this would have to change their sales model very quickly, so this way of studying to give advice to companies would be very relevant.

- A model that estimates whether or not consumers trust the Internet when buying, a model like this one whose dependent variable is Internet Trust or not, estimated with variables such as Security Software, existence of online certificates that support the offerors, through the opinions of other individuals, previous experiences of fraud and others, proposed in the literature. Following what was proposed in Potoglou et al. (2015) and Martinez de Ibarreta Gijón (2015).

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