Exploring Trust on Internet: the Spanish case

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Abstract
This paper explores what are the determinants of the trust on Internet for Spaniards. In the first part of the paper we make a brief review of the literature and in the second part we work with the Spain WIP survey. We found that cybertrust is developed within the institutions of the society and does not depend on demographic characteristics of the individuals.

Keywords: internet, trust, cybertrust, ICT, sociodemographics; Spain.

Introduction

There is a remarkable degree of consistency in the concept of Trust across disciplines; the critical common components across the definitions are *confident expectations* and a *willingness to be vulnerable.* Trust in social science involves at least two agents; one who wills to securely become vulnerable to the other one. The second agent could also be understood as a context, such as the Internet.

The trusting process begins when an individual[1] perceives indications that suggest a situation may be worth trusting. A first step towards Trust is the fulfillment of certain social rules of behavior. Trust is typically built gradually through extensive ongoing interactions that enable individuals to create reliable expectations of what other persons or organizations may do. Over time, reliance on these forms gives way to a reliance on experience. Such experience is a necessity for true trust to develop. Trust is much easier to maintain than it is to get started and is never hard to destroy.

In order for trust to occur, individuals first rely on certain forms (as protocols) being followed. In order for trust to exist, there must also be some risk. human interactions with the trusted party with secure identification, whether face-to-face or by any other means, was a precondition for trust to exist. Usually, the lack of the secure identification in an interaction through the Internet, or in most of the computer-mediated communications is a key technological paradigm to creation of trust between agents.

It could be argued that **trust in the global net** is closely connected with a greater level of certainty or confidence and security of the Internet. Otherwise, the net massive perpetuation would no have taken place. We suggest that **experience in the use of Internet and trust in institutions** are good

[1] All along the paper, we make reference to an individual, agent, or person as the subject of the trusting process. This do not mean that Trust can be between two institutions.

alternative means of explanation. Last but no least, other previous estimates of Internet access suggest that trust in the Internet remains high enough to continue supporting its diffusion.

However, we will show that trusting the net does not imply trusting the information available in it. Anyone can lie on Internet. Nicknames and false date are very difficult to check. Actually, web auction sites like Amazon.com and E-bay.com have develop different strategies in order to raise their coustomers´ confidence on the products offered. These two enterprises believe they owe their success to the reputation systems. They enable to foster trust among strangers by creating long term relationships based on past events. The so called "shadow of future" appears to be an incentive for good behavior.

Finally taking into account the difference above mentioned and the econometric results we suggest **Cybertrust-Index**. We would also like to check if there is connection between each them and the level of internet use in the country. We expect to find a positive relationship between a country's cyber trust and the level of Internet use. Alternatively, a negative relation between the country's level of potential cyber trust growth and the level o Internet use is bound to arise.

Definition of trust

As we suggested before, trust is a context-dependent multidimensional social concept whose relevant significant dimensions depend on the circumstances of the interaction. Some authors have conceptualized trust in cognitive or behavioral terms. The last aspects deal with the behavior that increases one's own vulnerability to others under conditions of interdependence, whereas the former deal with context-related beliefs about the trusted party that provide the context and justification for this behavior.

In general, research suggests that the cognitive aspects of trust deal with the beliefs that the trusted subject will behave ethically and will carry out expected commitments under conditions of vulnerability and dependence. Adopting this approach, it is possible to define trust as existing when one party has confidence in the exchange partner's reliability and integrity. On the other hand, emphasizing behavioral intent, trust is defined as a willingness to rely on an exchange partner in whom one has confidence.

Trust[2] also is defined as "assured reliance on some person or thing: a confident dependence on the character, ability, strength, or truth of someone or something." However, the most conventional usage defines trust as "[…] a firm belief in the reliability or truth or strength etc. of a person or thing. [...] a confident expectation. […] reliance on the truth of a statement etc. without examination" *(Oxford English Dictionary*).

[2] (Webster's Dictionary)

Trust involves two parties: the trustier and the trusted. Trust itself is based on a circular relation between risk and action, both being complementary requirements. It is an attitude which allows for risk-taking decisions. A review of the economic literature on trust found that the existence of *uncertainty* between the agents involved was one factor present in most definitions of trust (Dutton et al. 2003). In order for trust to exist, there must also be risk. Without trust, risk is paralyzing; interaction simply does not take place. If the level of trust surpasses the threshold of perceived risk, then the trustier will engage in the [risk-taking in relationship]. Trust, then, enables action in the face of risk.

Trusting the net

It is important to recognize that trust is understood by most parties to be a dynamic process. Trust deepens or retreats based on experience. Consequently, trust is weak in initial interactions, growing stronger over time.

Human interaction and identification with the trusted party, whether face-to-face or by any other mean that fosters confidence and security, is a precondition of trust. This *social context* is an important characteristic of trust because it is usually built through constructive interactions with *other people*. Consequently, direct or indirect human contact should contribute to build trust. Deliberately avoiding the creation of a social interaction and making the relationship devoid of a social presence reduces trust.

A key assumption is that computer-mediated communication, such as over the Internet, will undermine trust because it eliminates face-to-face interaction and the identification between agents. The commercialization of the Internet may well be regarded as a phase where such a new technological paradigm emerged.

Moreover, risks linked to Internet well out of the economic sphere (the socio-economic sub-system) and are reinforced by the lack of institutional arrangements. Faced with this double risk entrepreneurs must have substantial trust in order to overcome these risks and innovate. It is the high level of market uncertainties and absence of established "best practices" that turns the innovation extremely risky for entrepreneurs.

However, empirical evidence relating to the impact of ICTs on trust is still sparse and contradictory. Previous estimates of Internet access suggest that trust in the Internet remains high enough to continue supporting its diffusion.

Theoretically, it is argued that trust works as a cultural resource, making economic exchange and transactions more productive by reducing its costs. Trust, not only does reduce transaction costs but it also enhances the flow of information. Trust as a cultural resource raises the overall innovative capacity of a social system, since it allows economic and also political agents to take advantage of their extended

potential for action. The matching process between the socio-economic and the socio-institutional sub-systems may therefore be substantially accelerated, leading to a faster diffusion of the new technological style. Trust is of fundamental importance for this to happen.

As shown in Figure 1 users' experiences on the Internet might then raise or lower their level of 'cyber trust'. Trust is likely to shape what is done online, such as whether a person shops, banks electronically or cyber chats with others (Urban, and Sultan 2000). There are strong arguments that trust can be enhanced by making effective use of the vast amount of information and new forms of online social networks available through Internet-based interactions.

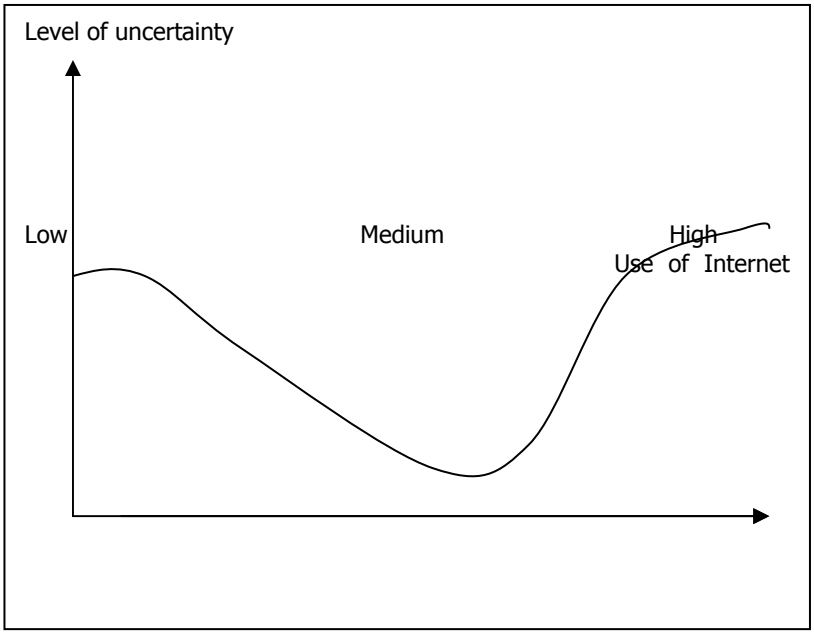


Figure 1: Experience and Uncertainity on Internet

Someone could feel tempted to think that trust in the net will be enhanced as a person learns more about the technology. However, this is not a must. Information can create, rather than reduce, uncertainty. Donald MacKenzies (1999:43-6) suggested that people with few o no contact at all with technology are likely to feel that technology is not trustworthy. On the opposite side, those in constant connection with the net, such as web developers or content producers, are not expected to rely on the net either. They are likely to understand and deal with some background issues concerning privacy and security. Finally, usual users who are not aware of the perspective internet threats are expected to feel little uncertain about it.

Trust the net's information

Trust in the information provided by the global net is closely connected with its level of certainty and reliability. In order to verify what is the perception of people about the reliability and accuracy of information on Internet, we collect the answers given to the question: **"How much of the information on Internet do you think is reliable and accurate?**". There are five possible answers: all of it, most of it, about half of it, a small part of it and none of it.

Figure 2 shows the distribution of answers that the individuals give for the 2003 and 2005 survey. The distribution is similar through both years. However, there is a reduction of the reliability of information from 2005 to 2003. Spaniards become less confident about *most* of the information found on Internet, and the share of Spaniards declaring that they are not confident about the information on Internet has growth from 2003 to 2005.

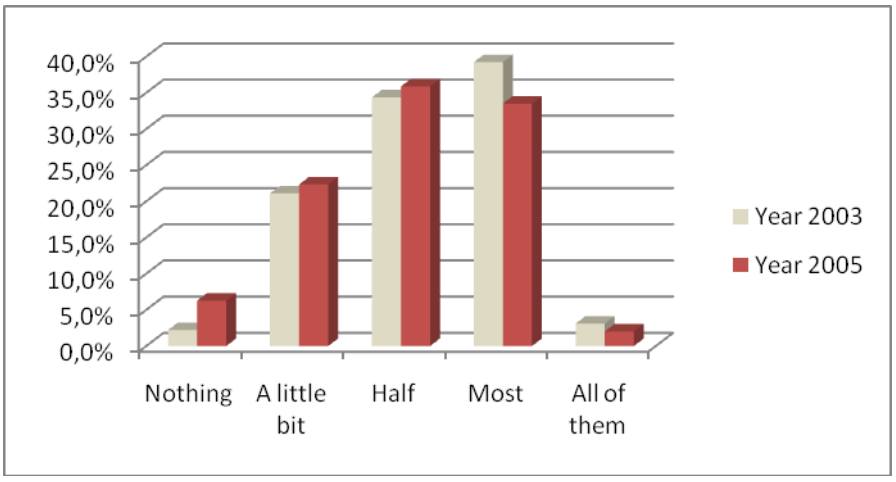


Figure 2: Information on the Internet

More than 70% in both samples considered information on the internet reliable. Notice that in this case, the individuals do not exchange any kind of information. Moreover, they are able to choose the source of information. In another words, if an individual trusted before in the information provided by the Spaniard news paper "El País", there is nothing that suggest that they will mistrust the digital webpage of "El País".

In order to explore for variables explaining the answer given by the Spaniards during the 2003 and 2005 WIP survey, we use an ordinal regression model based[3] on McCullagh(1980).

[3] The ordinal regression model is a generalization of the general linear model where the dependent variable does not follow a normal continuous distribution function.

Formally the econometrical specification of the ordinal model is

$$Y = g(\alpha + \beta X) + \varepsilon$$

Where g(.) is the function that break the linear relationship between the independent X and the dependent Y. Notice that in our case the dependent variable might be either of 5 categories. Indeed, the requirement of introducing a non-linearization is product of the ordinal answers. The ordinal model is presented as,

$$f(Y) = \alpha + \beta X$$

Where f(.) is known as the link function. The vector of parameters $\alpha=\{\alpha_1,\ldots,\alpha_5\}$ are thresholds for each of the categories which are correspondents to the intercept in linear regression models, and X are the set of independent variables.

The values of the parameters β are the same for all the categories. The differences between the categories are captured by the α's. These differences imply that the results will be a set of parallel lines or planes-one for each category of the dependent variable Y.

There are many possible link functions and we choose one of them according to the distribution of the dependent data. Given the distribution of the answers we have choose the inverse of the Cauchy distribution function because the answers are not evenly distributed and there is neither concentration in the higher values nor in the lower ones[4]. Moreover we have explored with a probit and a logistic link function, obtaining lower performance than with Cauchy distribution.

The independent variables

The independent variables are composed by age, gender, years of schooling and household's income. A variable representing whether the individual is an internet user or not; a variable that captures the experience of the user on Internet and the square of the experience variable to capture the certainty through. The experience is measure as the number of years the individual has been using internet.

The *certainty trough* (Mackenzie 1999, Figure 1) relate the years of experience using Internet with the certainty that people have about the net. Those with no knowledge about internet, are likely to be more uncertain about the uses of internet, while those who knows better Internet, have knowledge about the multiple problems, therefore they are more uncertain about it. Users with middle experience are less aware of the complexity of the technology, but more confident than newcomers. Therefore, they are willing to trust on Internet. Notice that the relationship between experience and trust is supposed to be nonlinear. Therefore, we include the square of experience to capture this nonlinearity.

[4] Although similar to a normal distribution function, the Cauchy distribution has heavier tails

Trust on Institutions is based on a principal component analysis for categorical data to the question[5] where the individuals were asked to give their degree of trust on a set of eight institutions.

We compute two dimensions that explain more than 60% of the variance of the answers. The first dimension capture whether people trust on institutions. The second dimension captures how positivist is the individual. Thus positive values of this last dimension means that individual believe in science, where negative values mean that individual trust on religious and government.

We present the results of our estimation in Table **1** and Table **2**. In the specification there are three dummy variables that capture what is the relationship between the individual and the technology.

The last two rows of the tables are the likelihood of the model. Higher is the likelihood, better is the model compared to a naive model. The last rows, the test of location parameters, capture whether the individuals really make a difference between their ordinal questions. In all the cases in our table the individuals really make difference between their five questions that they answer.

[5] In the WIP survey for Spain, the Q1220.

Table 1: Estimated parameters for 2003[6]

	Reliability and Accuracy of Information in Internet					
Age	-0.004 (0.60)	-0.002 (0.81)	0.004 (0.62)	0.004 (0.674)	0.001 (0.925)	0.00 (0.96)
Sex (Male)	0.334 (0.08)	0.399 (0.07)	0.354 (0.113)	0.376 (0.096)	0.37 (0.09)	0.391 (0.08)
Education	0.057 (0.10)	0.061 (0.179)	0.028 (0.562)	0.028 (0.556)	0.044 (0.364)	0.044 (0.362)
Household's Income	0.022 (0.872)	0.029 (0.848)	0.0 (0.99)	0.006 (0.968)	0.003 (0.986)	0.005 (0.976)
Internet User			0.579 (0.021)	0.566 (0.01)		
Internet Experience					0.152 (0.103)	0.185 (0.052)
Internet Experience Square					-0.012 (0.200)	-0.013 (0.156)
Trust in Institutions		0.319 (0.006)	0.362 (0.002)	0.349 (0.004)	0.354 (0.003)	0.342 (0.005)
Positivist		0.171 (0.165)	0.159 (0.199)	0.142 (0.254)	0.162 (0.19)	0.145 (0.245)
Does not like Tech				-0.980 (0.473)		-1.03 (0.448)
Tech Indifferent				-0.618 (0.653)		-0.716 (0.60)
Like Tech				-0.451 (0.743)		0.628 (0.684)
-2 Log Likelihood[7]	6.934 (0.13)	12.03 (0.06)	17.44 (0.015)	21.803 (0.026)	14.93 (0.06)	18.48 (0.102)
Test of Location Parameters	22.74 (0.03)	26.46 (0.09)	32.84 (0.04)	65.01 (0.001)	31.37 (0.143)	53.22 (0.03)

[6] In parenthesis there is the p-value of the null hypothesis that the parameter is zero.
[7] This is a likelihood ratio test of the model against one in which all parameter coefficients are 0 (except the intercept, if included). If the significance of the test is small (i.e., less than 0.05) then the model outperforms the naïve model

Table 2: Estimated parameters for 2005

	Reliability and Accuracy of Information in Internet					
Age	-0.008 (0.26)	-0.007 (0.384)	0.001 (0.931)	0.001 (0.89)	0.000 (0.978)	0.001 (0.943)
Sex (Male)	-0.011 (0.959)	0.187 (0.458)	0.108 (0.672)	0.115 (0.661)	0.076 (0.77)	0.074 (0.781)
Education	0.053 (0.086)	0.110 (0.008)	0.078 (0.071)	0.073 (0.097)	0.074 (0.085)	0.068 (0.121)
Household's Income	0.583 (0.00)	0.554 (0.001)	0.481 (0.004)	0.479 (0.005)	0.448 (0.008)	0.445 (0.009)
Internet User			0.741 (0.015)	0.736 (0.018)		
Internet Experience					0.273 (0.004)	0.27 (0.005)
Internet Experience Square					-0.016 (0.055)	-0.015 (0.064)
Trust in Institutions		0.49 (0.00)	0.516 (0.00)	0.501 (0.00)	0.516 (0.0)	0.501 (0.0)
Positivist		0.181 (0.205)	0.217 (0.13)	0.268 (0.06)	0.211 (0.142)	0.259 (0.077)
Does not like Tech				1.711 (0.038)		1.768 (0.031)
Tech Indifferent				1.69 (0.04)		1.738 (0.036)
Like Tech				2.029 (0.03)		2.04 (0.033)
-2 Log Likelihood	31.106 (0.0)	37.984 (0.00)	44.203 (0.00)	53.44 (0.00)	48.77 (0.00)	58.104 (0.0)
Test of Location Parameters	22.19 (0.035)	92.48 (0.00)	563.7 (0.00)	-	89.95 (0.0)	90.484 (0.0)

Analysis of the results

The general significativity of the model is good. The likelihood test for both years, in almost all the cases is significative. Therefore the variables that we use in the model contribute to explain the trust on information. In all the cases, in both years, the last line of the tables shows that there are differences between the opinions of people about the trust on the information.

Notice that for both periods the age of the individuals is not significant. It does not contribute to explain the people's trust.

For 2003, males think that that the information in Internet is reliable and accurate. For the 2005 survey, this is not clear, and the variable becomes statistically not significant.

Education is significative for the 2005 but it is not the case for the 2003 survey. For the 2005 period, it is possible to say that the higher is the education, the higher is the level of reliability that users have about information.

Household's income is one of the strongest variables to explain the trust of people in internet's information. Higher the household's income, higher is the opinion about the accuracy and reliability of information in Internet. However, the estimated parameters are not significative for year 2003.

Trust on Institutions and whether the interviewed is user or not of Internet are relevant variables to explain individual opinion about information. Both are positive and significative.

Notice that the attitude of the individuals to the technology has the correct intensity. Less technophobe an individual lower is his opinion about information on the Internet. On the other hand, more willing to use technology is the individual means that he trusts on the information on the Internet. However, in all the cases this parameters are not significative, therefore we can not assure that this is a causal effect.

In this model, we did not find evidence of the "certainty trough" mentioned in McKenzie (1999). The coefficient of the square experience is negative. Thus, although experience contribute positively to increase the opinion about the reliability, the negative coefficient of the square indicates that when individuals are less experienced and more experienced their opinion is lower than the group of individuals with an average experience. In other words, we obtain the opposite result to the "certainty trough".

People trust the information in net ... and the net itself?

Internet represents a set of services for individuals. It is more than just information. Indeed, trust on Internet is different from trust in the information available on the Internet. We now want to show that individuals do not relate the trust on the information on Internet with the trust on the Internet. We use as a proxy of **people's trust on Internet**, the answer to the question: **how much do they trust on the**

people that lead or "make" Internet. Although this answer does not capture directly the trust of the individuals on the Internet, it can be used as a proxy to obtain that information.

Using this proxy of trust or Internet, we compute a non-parametric correlation test[8] (Spearman's rho) with the answers available for the question of trust on the information on Internet.

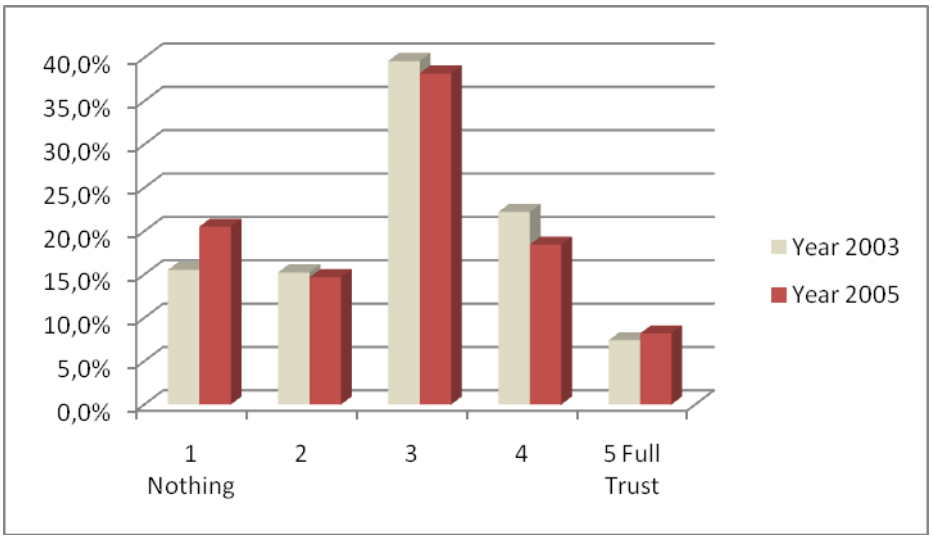
Table 3: Correlation between trust on Information and trust on Internet

	2003	2005
Spearman's rho	0.256	0.313
Significance p-values	0.0	0.0

According to the results shown in Table 3 we conclude that although the correlation for both years is positive and significative, it is low. Therefore, it seems to be no correlation between the opinion of people about the trust of the information on the Internet and our proxy of trust on Internet itself.

This lack of correlation leads us to estimate the model of the previous section using as dependent variable the **Trust on Internet** declared by individuals.

Figure 3: Distribution of answers about the Trust on the people that lead Internet



In this case, instead of using a Cauchy (the inverse of Cauchy) link function, we use a Logit link function because the answers of the people are evenly distributed. Although for both years there is a higher

[8] See the classic work by Charles Spearman (1904).

concentration on the centre, the answers are more evenly distributed than for the case of trust on the information of the Internet.

However, we explore the performance of the models using both links functions. In all the cases the logit link function obtains higher performance than the Cauchy link function.

Table 4: Estimation parameters 2003

	Trust on the Internet					
Age	-0.007 (0.324)	-0.006 (0.403)	-0.001 (0.908)	-0.001 (0.909)	-0.004 (0.57)	-0.005 (0.51)
Sex (Male)	-0.086 (0.660)	0.09 (0.649)	-0.056 (0.787)	0.06 (0.77)	0.062 (0.767)	0.062 (0.766)
Education	0.11 (0.001)	0.099 (0.007)	0.066 (0.086)	0.024 (0.104)	0.073 (0.57)	0.070 (0.069)
Household's Income	0.078 (0.563)	0.087 (0.54)	0.035 (0.806)	0.024 (0.868)	0.034 (0.815)	0.02 (0.889)
Internet User			0.642 (0.007)	0.769 (0.002)		
Internet Experience					0.178 (0.046)	0.207 (0.02)
Internet Experience Square					-0.011 (0.193)	-0.01 (0.157)
Trust in Institutions		0.722 (0.0)	0.78 (0.0)	0.765 (0.0)	0.771 (0.0)	0.751 (0.0)
Positivist		0.409 (0.0)	0.41 (0.0)	0.42 (0.0)	0.411 (0.0)	0.42 (0.0)
Does not like Tech				-0.268 (0.754)		-0.26 (0.75)
Tech Indifferent				-0.055 (0.949)		-0.06 (0.94)
Like Tech				0.262 (0.806)		0.24 (0.81)
-2 Log Likelihood	17.346 (0.002)	59.63 (0.0)	67.107 (0.0)	70.6 (0.0)	64.58 (0.0)	67.35 (0.0)
Test of Location Parameters	21.47 (0.044)	12.536 (0.81)	18.50 (0.617)	26.19 (0.79)	27.74 (0.27)	32.42 (0.63)

Table 5: Estimation parameters 2005

	Trust on the Internet					
Age	-0.024 (0.001)	-0.026 (0.001)	-0.018 (0.036)	-0.016 (0.061)	-0.021 (0.011)	-0.02 (0.021)
Sex (Male)	-0.158 (0.479)	-0.094 (0.698)	-0.172 (0.486)	-0.180 (0.475)	-0.158 (0.524)	-0.183 (0.468)
Education	0.031 (0.313)	0.078 (0.042)	0.04 (0.323)	0.025 (0.541)	0.049 (0.223)	0.033 (0.419)
Household's Income	0.440 (0.002)	0.268 (0.091)	0.158 (0.332)	0.169 (0.304)	0.167 (0.305)	0.178 (0.277)
Internet User			0.921 (0.002)	0.971 (0.001)		
Internet Experience					0.231 (0.012)	0.241 (0.01)
Internet Experience Square					-0.015 (0.072)	-0.015 (0.068)
Trust in Institutions		1.085 (0.0)	1.16 (0.0)	1.173 (0.0)	1.129 (0.0)	1.141 (0.0)
Positivist		0.612 (0.0)	0.621 (0.0)	0.611 (0.0)	0.607 (0.0)	0.592 (0.0)
Does not like Tech				0.512 (0.490)		0.635 (0.389)
Tech Indifferent				0.788 (0.295)		0.856 (0.253)
Like Tech				0.195 (0.822)		0.252 (0.77)
-2 Log Likelihood	29.042 (0.0)	91.179 (0.0)	100.68 (0.0)	100.51 (0.0)	98.479 (0.0)	98.252 (0.0)
Test of Location Parameters	13.339 (0.345)	19.84 (0.342)	23.98 (0.29)	35.315 (0.359)	32.125 (0.12)	45.21 (0.14)

Analysis of the results

The general significativity of the model is good. The likelihood test for both years, in almost all the cases is significative. Therefore the variables that we use in the model contribute to explain the trust on information. In all the cases, for the two years, the last line of both tables shows that the differences between the opinions of people about the trust on the information might not be significative.

Notice that almost for both years the age and the sex of the individuals is not significant. They do not contribute to explain people's trust on Internet. Only the age of individuals for year 2005 is significative and negative.

Education is significative for some specifications and with positive sign, indicating that the higher the education, the higher the trust on internet. However, the significativity disappear when we introduce internet experience and the preferences for technologies.

Household's income maintain a positive sign, although it loss significativity as compared to the results obtained when we explain the trust of people on internet's information. The trust on internet increases with household's income. In the assessment of this proposition we have to take into account that it is not statistically significative.

Trust on Institutions and whether the interviewed person is user or not of Internet are relevant variables to explain individual opinion about internet. Both are positive and significative, independently of the specification.

Notice that individual technology preferences has the correct signs. Less technophobe an individual lower is his trust on Internet. However, in all the cases this parameters are not significative, therefore we can not assure that this is a causal effect.

Last but not least, we did not find again in year 2005 evidence of the "certainty trough" mentioned in McKenzie (1999) for the trust on internet. The coefficient of the square experience is negative. This shows evidence that people who have little or vast experience in the use of Internet seem to feel more uncertain about the net than those who have average level. However, the significativity of our estimations are not high in all the cases, therefore this is not definitive evidence.

Summary of the econometric results

There are many interesting results coming out of our explorations of the both concepts of trust related to Internet: trust on the information and trust on Internet itself measure as the trust on the people leading Internet.

First, neither age nor sex plays a definitive role explaining the concepts of trust that we have used in our specifications. This result suggests that the trust on Internet is independently of demographic characteristics. Therefore, the cybertrust of the society might be the result of the cultural interaction. In another words, cybertrust is constructible within a society.

On the positive side, we found that both variables, experience in the use of Internet and trust in institutions, are key factors to explain why people trust Internet and make use of the information it provides.

As regards **Education** and **Household's Income** they are sign consistent but there are caveats related to their significativity. The sign consistency indicates that the higher the education and household's income, the more accurate and reliable is the opinion of people on Internet information and the more is their trust on Internet.

We believe that education not only spreads technical knowledge to students but it also teaches them rules of behavior that foster order and confidence among the members of a society. This contributes to fight against the uncertainty they feel about people they are not familiar with.

The previous reasoning can be extended to understand why people trust or not institutions. In 1973[9], Richard Cole tries to identify the variables that determine the political trust. He finds out that the level of education fostered the level of trust in government. These findings are not surprising at all. Actually, Dahl states that trust is a fundamental seed to create organizations through which citizens can promote their goals.

Taking into account the ideas above mentioned, we conclude that education fosters trustworthiness in Internet, which is a hand-made product of our modern society. Actually net is just a modern way to meet people we are not acquaintance with. But for the social rules fostered by education, uncertainty would undermine every expected human relationship of any kind either personal or commercial.

Finally, would expect to find a low level of trust both in the information available on Internet and in Internet itself in countries whose institutions are not perceived as trustful by the voters. Those who cannot trust political institutions will rarely trust unknown people on the net they cannot even give a glance to.

[9] Cole Richard; Towards a Model of Political Trust : A casual Analysis; American Journal of Political Science; 1973

A Simple Cyber trust-Index

Based on the results provided by the previous econometric analysis we move one step further. Although there is no strong relation between trust in the information provided by the Internet and Internet itself, it is an undisputed fact that an individual making commercial transactions trusts the net. Nobody can deny that he must trust the information available on he web site through which he is purchasing. However, the individual should feel confident about the whole net; this also includes being sure that his personal information will be kept secret and that his computer will not get damaged after doing his shopping either. From now on, we will refer to this as *cyber trust*.

We therefore believe that a simple measure that captures cyber trust in a certain country is the ratio of number of users that make commercial transactions in Internet out of the number of people who have access to Internet.

It could be argued that someone just making use of a computer connected to internet may trust the information available. However, he does not feel safe enough to enter his personal necessary to execute commercial transactions through the net, and this is the difference we want to capture with our index.

Thus, the **Cyber trust-Index** is computed as,

$$I_1 = \frac{B}{U}$$

where B is the number of buyers and U the number of people who have access to Internet. According to the definition of buyer and the definition of Internet user the index takes values between cero and one.

A simple case occurs if an individual declares that he makes shopping through Internet, for instance his secretary buys for him through Internet airplane tickets, but he declares himself as a non Internet user. However, this man has access to the net.

This **Cyber trust-Index** has caveats:

1. it is biased toward countries offering a better Internet commercial infrastructure,
2. it is too simple and,
3. although it captures trust in a very narrow sense - the trust the users have to shop on Internet- this is a very good proxy.

However, the index has some advantages:

1. it is simple;
2. the data to compute it can easily be obtained to compare the valves across Countries,
3. although is not the best index, it is still meaningful;
4. It captures cyber-trust among users and non-users.
5. it enables to compare results among countries.

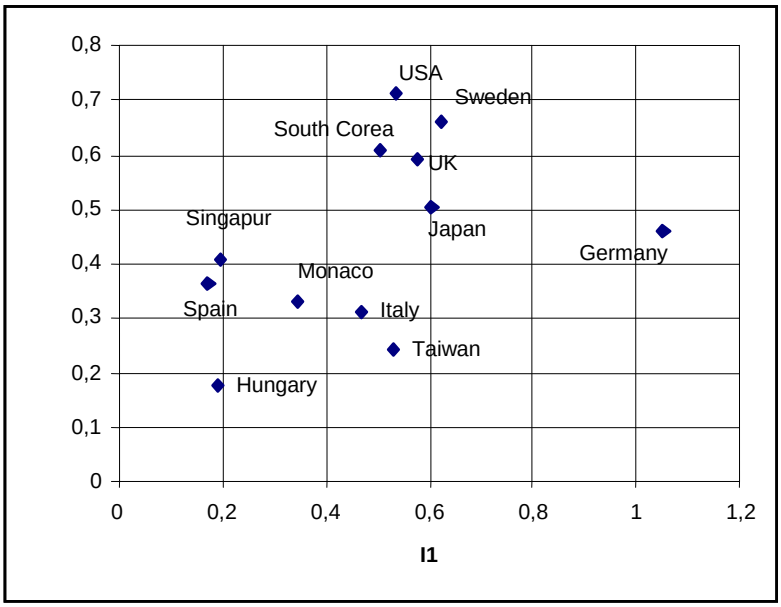
When the index is compared against the proportion of internet users we obtain the bidimensional table presented in Table 6 which makes a classification of different type of economies.

Table 6: Classification according to proportions of users and the trust index.

Internet Use	(high, low) These countries need strategies to develop the trust on Internet. They have a very high potential, although it has to be developed.	(high, high) These countries lead Internet development.
	(low, low) Countries where few people use Internet and few trust on Internet to make shopping through it.	(low, high) Countries where Internet does not have a widespread use, but people trust on it to make commercial transactions. It is a country with a high potential.
	Cyber Trust (I_1)	

According to the data availability we compute the index values for twelve countries: USA, Sweden, South Korea, UK, Japan, Singapore Germany, Spain, Monaco, Italy, Taiwan and Hungary. In Figure 4 we present the distribution of the countries into the representation of Table 6.

Figure 4: Trust and proportions of users



Notice from Figure 4 that the results strengthen the conclusions obtained in the econometric analysis. The proportion of users and the cyber trust is higher in countries whose GDP per capita in higher and those whose institutions trustworthy. The United States is an excellent example and Hungary is the opposite case. As regards Spain, this country follows Hungary´ s steps. The Spanish GDP per capital is rather low compared to the rest of the countries taken into account and the number of riots is one of the highest of the group

GDP per capita [10]	**2004**
Japan	38,609
United States	36,655
Sweden	28,858
United Kingdom	26,363
Singapore	24,164
Germany	23,705
Italy	19,352
Spain	15,343
Hungary	5,413

Country	**CPI**[11]
Singapore	9,3
Sweden	9,2
United Kingdom	8,6
Germany	8,2
USA	7,5
Spain	7,1
Japan	6,9
Hungary	4,8
Italy	4,8
South Korea	4,5

Last but no least, Figure 4[12] shows that the majority of the countries are spread through the main diagonal of the scatter. This reinforces the intuition that as more the users of internet are, the greater is the trust on it. Other pattern that is present in the data, is the concentration of I1 when the proportion of Internet users is higher than 0.5. Below the proportion of 0.5, the trust is low and more widely spread.

Conclusions

This paper has the purpose of finding out the variables that explain better the trust of individuals on Internet services. We use two measures of trust: people's reliability on information found on Internet and the perception of how trustworthy are the individuals who administrate Internet. Both measures capture different concepts of trust on the net. The last gives a general perception of trust on the services provided by the net whereas the former gives a measure of trust on a service on Internet.

Despite these differences, we found that education, household's income, the trust that individuals have on institutions in general and to be an internet user contribute positively to both concept of trust. Notice that it might be some endogenous effect between education, trust in institutions and internet use.

The results do not verify the certainty trough hypothesized by McKenzie, although they do not refute it. The evidences suggest that more possibilities the users have to use internet, higher is its trust on it. However,

[10] GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2000 U.S. dollars. Source: World Bank national accounts data, and OECD National Accounts data files.

[11] The 2004 Corruption Perceptions Index, compiled at the University of Passau on behalf of Transparency International. For information on data and methodology please consult the press release and the framework document at www.transparency.org or ICGG.ORG

[12] The case of Germany is special, because it presents a I1 higher than 1. Although we present a rationale for the case of the index higher than 1, it is a special case.

the fact that people who trust on institutions in general are more ready to trust on Internet indicates that trust (at least in its very first steps) might be related to personalities, more than to demographic, social or economics characteristics.

Besides this, we found across countries, that higher the proportion of users, higher is the chance of finding user who trusts on Internet to make commercial transactions.

In conclusion, trust on Internet seems to be a developing process in societies. As more requirement and services are used through Internet, more trust on Internet people develop. It does not help to search on demographic characteristics the sources of explanations of trust (at least in this initial stages).

There is a remarkable degree of consistency in the concept of Trust across disciplines[1]; the critical components present in the different definitions found are confident expectations and a willingness to be vulnerable. In order for trust to exist, there must also be some risk. human interactions with the trusted party with secure identification, whether face-to-face or by any other means, was a precondition for trust to exist. Usually, the lack of the secure identification in most of the computer-mediated communications is a key technological paradigm to creation of trust between agents.

This paper has the purpose of finding out the variables that explain better the trust of individuals on Internet services. The carried out W.I.P survey carried out in 2003 and 2005 in Spain shows that individuals state a clear difference between trust in the global net and trust in the information available in it. The former is closely connected with a greater level of certainty or confidence and security of the Internet while the latter speaks for itself.

Despite these differences, we found that education, household's income, the trust that individuals have on institutions in general and to be an internet user contribute positively to both concept of trust. Notice that it might be some endogenous effect between education, trust in institutions and internet use.

Last but not least, the econometric results do not verify the certainty trough hypothesized by McKenzie, although they do not refute it. The evidences suggest that more possibilities the users have to use internet, higher is its trust on it. However, the fact that people who trust on institutions in general are more ready to trust on Internet indicates that trust (at least in its very first steps) might be related to personalities, more than to demographic, social or economics characteristics.

Finally, taking into account the difference above mentioned and the econometric results, it is an undisputed fact that an individual making commercial transactions trusts the net and the information available on he web site through which he is purchasing. We refer to this as cyber trust and therefore developed a Cyber trust-Index.

We calculated an index of cybertrust for a set of countries, according to data availability. The results suggest a possitive relatiship between cybertrust and the proportion of Internet users. Moreover we found

that countries whose GDP per capita was higher and whose institutions were more trustworthy had higher level of trust an proportion of users.

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