

**THE LOCAL DIGITAL DIVIDE IN SPAIN: A TERRITORIAL ANALYSIS OF  
THE INTERNET PENETRATION IN THE SPANISH HOUSEHOLDS****José Miguel Giner Pérez ([giner@ua.es](mailto:giner@ua.es))****M<sup>a</sup> Carmen Tolosa Bailén ([mc.tolosa@ua.es](mailto:mc.tolosa@ua.es))****Department of Applied Economy and Political Economics****University of Alicante****P.O. Box 99, E-03080 Alicante (Spain)****Abstract**

The digital divide that it is affecting to rich and poor countries, is also manifested inside the countries, among local and rural areas. The use of the new technologies could cause that as much the inhabitants as the enterprises of the rural areas had the same means and opportunities that in the big cities; the use of Internet and the e-labour could increase the dynamism of the rural areas and to compensate the important delocalisation problem. But it is evident that the digital divide persists, and the access to the ITC increases the differences between the urban and the rural areas.

In this sense, the aim of this research is to elaborate an explanatory frame of the penetration of Internet in Spain, incorporating the territorial dimension, given the shortage of existing evidence in the local scope. For it, after the introduction, in the second section we carry out an analysis of the variables that influence in the penetration of Internet in feature of the urban or rural localization of the households starting from the data corresponding to the “Survey on Equipment and Use of Information and Communication Technologies in Households” of Spanish Statistical Institute (SSI). The tabulation of these micro-data will allow us to elaborate explanatory models of the penetration of Internet in the Spanish households. Firstly, we elaborate an exploratory analysis based on cross-tabs with statistical tests. Secondly, this research contributes to the literature by explaining the level of ICT (internet) adoption through a logit-model with several variables: income, demographical variables, human capital and location of users (urban versus rural areas). In the third section, we carry out a revision of the role that the different governments are playing in the design of the appropriate policies to push the Society of the Information. Lastly, the paper concludes with the principal conclusions.

**Keywords:** Information Society, Internet penetration, Information and Communications Technologies, digital gap, rural development.

## 1. Introduction.

It is an evident fact the transformations that are affecting to the economy in all the levels and that they are changing the form to think and to work, aspect that we have already highlighted in previous works (Giner and Tolosa, 2001; Giner and Tolosa, 2004; Giner, Tolosa and Fuster, 2004; Giner, Tolosa and Fuster, 2006). We are advancing toward a society based on the knowledge like principal production factor and motor for the growth, the competitiveness and the employment and in this scenario, Information and the Communication Technologies (ITC) constitute a fundamental element.

The use of the new technologies opens new possibilities as for the access to the formation and the knowledge (e-learning), the organization of the work (e-labour or telework), the leisure, the organization of the government and the public services (e-government) or the public health (e-health). However, the Society of the Information can contribute to increase the differences among those that have and those that don't have access to the benefits of the new technologies. Therefore, although the development technological enhancement the quality of life is also font of new inequities, with the result that to reduce them has transformed into a pre-emptive objective for most of the governments, before the evidence that the ITC and the Society of the Information are determinant elements for the economic advance and the enhancement of the productivity.

Most studies have revealed astonishing differences in Internet and computer penetration between North America and Europe, on the one side, and African and Asian countries on the other (see Chinn and Fairlie, 2004 for a comprehensive survey of this literature). These large disparities have been explained referring mainly to differences in income, but also to human capital, telecommunication infrastructures (Dasgupta et al., 2001; Oyelaran-Oyeyinka and Lal, 2003; Pohjola, 2003; Wallsten, 2003), demographical variables and regulatory regimes (Wallsten, 2003).

Less investigation has been devoted to the local dimension of the phenomenon as indeed digital inequalities do not divide only developed from developing countries but also regions within the same country (*Local Digital Divide*, see for instance Gareis and Osimo, 2004; Ramsay, 2004). Both developed and developing countries suffer from severe regional disparities in ICT adoption. Evidence has been provided with reference to United States of America (NTIA, 2002; Mills and Whitacre, 2003), Canada

(Dryburgh, 2001), Portugal (Nunes, 2004), Spain (Billon and Lera, 2004), Italy (Bonaccorsi et al., 2002; Bonaccorsi et al., 2005; Assinform, 2004), China (Qingxuan and Mingzhi, 2002; Wensheng, 2002).

The digital divide, that it supposes a dividing line among persons that use the new technologies and those that don't have access or they don't know how to use them, besides affecting to rich and poor countries, it is also manifested, inside the countries, among local and rural areas. The use of the new technologies could cause that as much the inhabitants as the enterprises of the rural areas had the same means and opportunities that in the big cities; the use of Internet and the work to distance or telework could increase the dynamism of the rural areas and to compensate the important delocalisation problem. But it is evident that the digital divide persists, and the access to the ITC increases the differences between the urban cores and the rural areas.

This digital divide, besides being related with aspects of technological character, is reflective of socioeconomic factors and structural (level of development of the infrastructures of telecommunications) limitations. Therefore, an important aspect is to enumerate the causes that cause it to try to contribute possible solutions. Among the causes it would be necessary to mention:

- Shortage or non-existence of infrastructures of telecommunications. If we speak of areas in those that the population's great part doesn't have access to a telephone line, the Internet access is complicated. A possible solution would be to use other access technologies like broadband connections through the electric network. This would improve the access of the users in isolated areas, since the electricity it arrives to 100% of the citizens. "Without a doubt, the grade of development of the communication infrastructures, particularly those that allow the access for broadband to Internet, have conditioned in an important way the use of this technology on the part of the inhabitants of the rural means and a standard of unequal access has propitiated (although the public intervention is modifying it)" (in García and Abellán, 2005, p.135).

- Shortage of economic resources to have equipments and to connect to Internet. When to these factors we add the low development of the infrastructures, the network access could be made in places of public access to Internet. The importance of these access

points outside of the home resides in that would allow avoiding the digital divide in the areas with more delay in the access.

- Absence of technical knowledge as well as of the knowledge to carry out a good use of the new technologies. In this sense, it would be necessary to motivate the basic formation or what has been denominated digital literacy, mainly for the population with more exclusion risk. If together to the lack of the necessary knowledge we add the lack of interest it affects to 68% of the households (that the Report eSpain 2006 highlights), the solution goes by the "organization and realization of performances for the development of the interest as well as of formation to the future Internet users..." (Fundación France Telecom España, 2006, p.84).

- Lack of institutional capacity, in front of which it would be necessary to continue impelling the support politicians to the development of the Society of the Information.

In this sense, the aim of this research is to elaborate an explanatory frame of the penetration of Internet in Spain, incorporating the territorial dimension, given the shortage of existing evidence in the local scope. For it, after the introduction, in the second section we carry out an analysis of the variables that influence in the penetration of Internet in feature of the urban or rural localization of the households starting from the data corresponding to the "Survey on Equipment and Use of Information and Communication Technologies in Households" of Spanish Statistical Institute (SSI). The tabulation of these micro-data will allow us to elaborate explanatory models of the penetration of Internet in the Spanish households. In the third section, we carry out a revision of the role that the different governments are playing in the design of the appropriate policies to push the Society of the Information. Lastly, the paper concludes with the principal conclusions.

## **2. Territorial analysis of the grade of development of the Society of the Information and of the penetration of Internet in Spain.**

In the first place, to measure the grade of development of the Society of the Information and of the penetration of Internet in our country, we pass to analyze diverse indicators of penetration of the Society of the Information that have been obtained starting from the primary micro-information of the "Survey on Equipment and Use of Information and Communication Technologies in Households" by SSI. We distinguish two types of

indicators (Table 1): persons that have used the computer in the last three months and persons that have used Internet in the last three months.

As for the first indicator, analyzing for typology of the municipality, the use of the computer is more broadcasted in the urban municipalities than in the rural ones. In this last case, the typical user is male (the men's 43,73% in front of 36,69% of the women), young (80,70% of those that have ages understood between the 15 and the 24 years), with university education (88,95% of those uses the computer) and workers (56,58%). The profile socio-demographic of the user of the computer also repeats when we analyze the inhabitants of the urban municipalities. However, differences exist among the urban and rural indicators. We can appreciate a bigger differential among the men that use the computer (33,98% more than urban users than rural) than among the women (29,14% more than urban users). The differences in the use of the computer among urban and rural municipalities are enlarged with the user's age increases, except in the last age stratum. For example, half of the urban population with ages understood between the 45 and the 54 years have used the computer in front of a third part of the rural population belonging to this age stratum; or the urban population's 28,19% from among 55 and 64 years has used the computer in front of the rural population's 13,50%. For labour status the biggest differences between the rural dimension and the urban dimension as for the use of the computer find them in persons that don't work (127,39%). On the other hand, the number of urban users that they work overcomes in 24,48% to the number of rural users.

In second place, we centre in the use of Internet. More than 15,5 million persons they use Internet, of which 11,3 millions belong to urban municipalities and 4,2 millions are inhabiting of rural areas (the data it was extracted of the *Survey on Equipment and Use of Information and Communication Technologies in Households, SSI*). We could say that the Internet users of the local areas (table 1) are men (the men's 52,48%), youths between 15 and 24 years (the youths' of this age stratum 82,98%), 83,84% of persons that possess university studies and 61,41% of persons that work. These characteristics socio-demographics also repeat for the Internet users of the rural municipalities, with percents that ascend to 38,02%, 75,02%, 85,11% and 47,89%, respectively. However, also in these indicator aspects that make that the rural dimension differs of the urban dimension can highlight. For sex, the biggest differential is given in the men (the urban Internet users overcome to the rural ones in 38,03%). For age, the percent of urban

Internet users is superior to that of the rural ones, however, the biggest differences among the different types of municipalities are observed in the population that overcomes the 55 years. For ended studios, the biggest differential is in the primary (149,30%) education, although in all the cases the percent of urban Internet users overcomes that of the rural ones, except in the case of the university students (85,11% of the rural ones in front of 83,84% of the urban ones). And if we keep in mind the labour status, in the two cases we find differences of more than 28% between the urban dimension and the rural dimension.

Lastly, we want to centre our attention in the use of Internet distinguishing according to the access place (Table 2). The principal access places of Internet when it is about the total data as when they are analyzed according to the localization of the municipality are the household and the working centres. Except for in the access from the household, from the working centre and other places, the percents that make reference to the rest of access points are bigger in the case of the rural municipalities. It is necessary to highlight, when the accesses are analyzed from the public centres, the importance that has this variable in the rural environment, concretely 15,49% of the rural inhabitant's connects from this type of centres in front of 10,28% of the urban inhabitants. The importance of the access point's public in the rural areas is consequence of the performances that are carrying out from the different Administrations to push the Society of the Information in the rural world, like we will analyze in the next section.

The objective of the next study is to determine which variables explain the use of Internet. (USENET). This variable is of a binary nature (1 = use Internet; 0 = no).

In relation to the explaining variables, six possible variables were considered that could, in accordance with a review of the literature, explain the use of Internet. Variables refer to income, demographical variables, human capital and location of users (urban versus rural areas):

- GDPpc, income per cápita of the region (NUTS2) of the location of users.
- SEX (1 = male; 0 = female).
- AGE (1 = 15-34; 2 = 35-64; 3 = > 65).
- FORMATION (1 = basic studies; 2 = secondary studies; 3 = university studies).

- LABOUR (1 = yes; 0 = no).
- URBAN (1 = the location of the user is urban area; 0 = rural area).

The results of the estimations are presented in Table 3. Given the binary nature of the dependent variable (use of Internet), the estimations have been carried out using a logit model. The alternative use of a probit model leads to very similar results. The vector of the estimated parameters reflects the impact that the independent variables have on the probability of the use of Internet.

The results show the influence that income, sociodemographic characteristics and location of the users (urban-rural) have on the use of Internet. First, a greater probability of using Internet by males, non older people, high level studies, with labour and location in urban areas is confirmed. The coefficients corresponding to the variables (SEX, FORMATION, LABOUR, URBAN) are significant and positive. The coefficients corresponding to the variable AGE are significant and negative.

With the aim of examining whether there are differences in the characteristics of the users with regard to the location, the sample was stratified into two groups corresponding to the location in urban versus rural areas.

The results of the estimations show that, within each stratum, there aren't substantial differences in the characteristics of the persons that use Internet.

### **3. The role of the Public administrations: initiatives to reduce the digital divide.**

In this section we will to describe the different initiatives that have been carried out from European Union and in Spain, so much at central level as regional, to impel the Society of the Information.

In December of 1999, European Commission adopted the Initiative *eEurope. A Society of the Information for all*. The objective consisted on spreading the Information Society to all the inhabitants of European Union and all the European enterprises, especially to the small and medium enterprises (smes). The initiative was taken to the practice in the frame of two successive plans: *eEurope 2002*, based on three priorities: a more quick, cheaper and safer Internet, investment in persons and in the formation, and foment of the use of Internet; and *eEurope 2005*, centred mainly in the broadcast from the

broadband access to competitive prices, the security of the networks and the development of the use of the ITC on the part of the Public Administrations.

In June of 2005, European Commission submitted a new strategy, *i2010, European Society of the Information for 2010*, centred in three priorities: realization of an European unique space of the information that offers affordable and safe broadband communications, rich and diversified contents and digital services; the push of the innovation and of the investment in the investigation activities on the TIC; and an European society of the information based on the inclusion that it pioneers the growth and the employment and that of precedence to the enhancement of the public services and of the quality of life.

The strategies to push the Society of the Information in Spain beginning with the *Plan Info XXI (2001-2003)*, that include projects to push the development of the Society of the Information and their approach to the citizens.

Later, it's presents *España.es (2004-2005)*, with the objective of to extend the use from the new technologies to the daily activities of the citizens with the so much implication of the public sector like of the private one. The program has three lines: to reinforce the offer of contents and services to favour the demand, to improve the accessibility offering access points public and making an effort in formation and communication, and to connect to the smes to these services.

Lastly, in November of 2005, it's approves the *Plan 2006-2010 for the Development of the Society of the Information and of Convergence with Europe and Autonomous Communities ("Plan Avanza")*. This *Plan Avanza* searches the convergence with the European countries as regards Society of the Information increasing the penetration of the new technologies and of Internet in the Spanish society improving the productivity and competitiveness of the enterprises and deleting the digital divide existing.

On the other hand, it is a fact the importance that the Autonomous Communities have acquired in the development of the Society of the Information (Table 4) and that it has contributed to reduce the differences in the principal indicators of penetration of the ITC in the Autonomous Communities.

In connection with the isolation of the rural areas in the Internet and the Society of the Information also they are carrying out the different performances from publics different instances.

With the purpose of guaranteeing the egalitarian access to the communication networks for the citizens that live in far away and less developed areas, Ministry of Agriculture, the Spanish Federation of Municipalities and the Public Organization *Red.es* subscribed, in March of 2003, an Agreement of Collaboration for the setting the program *Rural Internet*. This program has provided Internet access in broadband to numerous populations that didn't have covering thanks to the installation of centres of public access that they allow the citizens of the municipalities' beneficiaries to connect gratuitously to the new technologies with a connection of quality. After *Rural Internet* a new program, *Telecentros*, carried out in November of 2004 arise whose precedence continues being to improve the Internet access levels in broadband. Therefore, the objective of the program is to facilitate the access to the new technologies of the rural populations and of the less integrated communities. The *telecentros* facilitates the knowledge of the new technologies: from learning how to manage the computer that is to navigate for Internet. These *telecentros* is defined as a space that has wired computer equipment to the Network and with persons with formation that they offer the Internet connection, carry out the maintenance of the centre and activities to those that the population connects in a free way or to a very low price. In Spain the first *telecentro* opens up in 1997 in Gordexola (Vizcaya) and the first network that it binds to several it is constituted formally in Asturias in 2000. The Program 2006 closed with 2.675 telecentros installed in all Spain that they count with more than 17.000 computers of public and free use wired with broadband. 85% of the telecentros is located from among in rural towns, benefiting to more than 5 million persons. It is expected that the telecentros number is of 3.018 at the end of 2007.

On the other hand, and pioneered by Ministry of Industry, Tourism and Commerce, a national program, the *Program of Extension of the Broadband, 2005-2008* is oriented to grants (support financially and loans without interest) to operators of telecommunications to motivate investments in equipment and infrastructures that allow to extend the broadband covering in rural and isolated areas without covering or with faulty covering. It is with it about to develop the economic development of these areas and to incorporate to their citizens and enterprises to the Society of the Information. To January of 2007, the *Plan of Extension of the Broadband* has engaged this technology to 5.405.211 persons in 5.289 municipalities from Spain. This program benefits to eleven Autonomous Communities (Andalucia, Asturias, Aragon, Baleares, Canarias, Cantabria,

Comunidad Valenciana, Castilla-La Mancha, Castilla y León, Galicia and Murcia); the Autonomous Communities that don't participate in this initiative have own programs for the same goal.

#### **4. Conclusions.**

The use of the new technologies implies the appearance of a digital divide that is so much consequence of the low development of the infrastructures, as of the cost of the equipment and of the connection, as well as of the shortage of the necessary knowledge and the necessity of a bigger pulse on the part of the institutions.

When we deepen in the analysis of the use of the computer, of the use of Internet for municipality typology, in all the cases the user's profile is for the most part male, young, student and with superior education, although they are apparent the differences that exist among the urban and rural indicators. These data reflect the necessity to act in the rural areas.

Lastly, after enumerating the initiatives that have been carried out from the different public administration levels (European, national and autonomous) to push the Society of the Information (work so much to improve the status of Spain like to end with the isolation of the rural areas) we conclude that, although it is acting in this sense, it is much to do if we analyze the differences that separate us of the best countries of our environment and the persistent digital divide between the rural world and the urban one.

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### **Useful information in Internet.**

*Hacia la Europa basada en el conocimiento. La UE y la Sociedad de la Información*

<http://ec.europa.eu/publications/booklets/move/36/es.pdf>

*eEurope2005: una Sociedad de la Información para todos*

<http://europa.eu/scadplus/leg/es/s21012.htm#eEurope>

*i2010. Una Sociedad de la Información europea para el crecimiento y el empleo*

<http://europa.eu/scadplus/leg/es/s21012.htm#eEurope>

*Plan Avanza*

<http://www.planavanza.es>

*Telecentros Program*

<http://www.telecentros.es/> and <http://internetrural.red.es>

Table 1 Internet penetration indicators								
	Persons has used the computer in the last three months				Internet users in the last three months			
	Total	Urban	Rural	U/R (%)	Total	Urban	Rural	U/R (%)
Total					42,10	46,00	34,3	134,11
Sex:								
Male	53,49	58,59	43,73	133,98	47,51	52,48	38,02	138,03
Female	43,95	47,38	36,69	129,14	36,90	39,94	30,45	131,17
Age:								
15-24	85,02	87,19	80,70	108,04	80,32	82,98	75,02	110,61
25-34	71,56	74,13	65,84	112,59	64,45	66,99	58,78	113,97
35-44	61,16	66,14	50,96	129,79	50,01	55,00	39,79	138,23
45-54	45,08	50,72	33,34	152,13	36,24	41,16	26,00	158,31
55-64	23,55	28,19	13,50	208,81	18,32	22,44	9,40	238,72
65-74	6,82	9,53	2,03	469,46	4,51	6,54	0,93	703,23
>75	2,09	2,73	1,06	257,55	1,14	1,46	0,63	231,75
Formation:								
Basic studies	12,44	14,15	9,92	142,64	9,28	10,72	7,18	149,30
Secondary studies (1)	37,6	39,4	34,47	114,30	28,97	30,44	26,39	115,35
Secondary studies (2)	72,73	72,87	72,36	100,70	63,31	63,60	62,50	101,76
Professional formation	78,06	79,25	75,56	104,88	69,61	71,19	66,31	107,36
University studies	89,18	89,24	88,95	100,33	84,11	83,84	85,11	98,51
Others	28,02	33,29	18,57	179,27	20,08	21,46	17,59	122,00
Labour status:								
With labour	66,19	70,44	56,58	124,48	57,26	61,41	47,89	128,21
Without labour	29,31	31,76	24,93	127,39	25,42	27,62	21,51	128,37

Note: Information about persons in percentages (en %): second semester of 2005.  
**Source:** Survey on Equipment and Use of Information and Communication Technologies in Households (micro-information) of Spanish Statistical Institute (SSI) and authors' elaboration.

Table 2 Internet access places (%), second semester-2005				
	Total	Urban	Rural	U/R (%)
Principal housing	65,32	68,18	57,60	118,37
Others housings (family, friends)	29,33	29,19	29,70	98,28
Labour place	44,56	46,53	39,26	118,52
Formation Place	15,78	14,82	18,35	80,76
Public centre	11,69	10,28	15,49	66,37
Enterprise of internet access	14,06	13,63	15,24	89,44
Other places	2,84	3,07	2,21	138,91

**Source:** Survey on Equipment and Use of Information and Communication Technologies in Households (micro-information) of Spanish Statistical Institute (SSI) and authors' elaboration.

Table 3 Results of the estimations (Logit model). Dependent variable: USENET						
	(1) (All)		(2) (Urban)		(3) (Rural)	
	B	Exp(B)	B	Exp(B)	B	Exp(B)
C	-2,625	0,072	-2,207	0,110	-2,875	0,056
GDPpc	0,010	1,010	0,008	1,008	0,015	1,015
SEX	0,567	1,763	0,578	1,783	0,546	1,726
AGE	-0,808	0,446	-0,776	0,460	-0,884	0,413
FORMATION	0,907	2,477	0,894	2,446	0,931	2,537
LABOUR	0,166	1,180	0,255	1,291	-0,022	0,979
URBAN	0,330	1,391				
N	19432		11951		7481	
Prediction Group (%)						
USENET=0	83,0		80,5		88,3	
USENET=1	80,2		81,6		74,8	
Global	81,8		81,0		83,7	
R <sup>2</sup> Nagerkelke	0,585		0,573		0,592	

Note: All coefficients are statistically significant al 99% level of confidence. All models are statistically significant (Log likelihood, Omnibus test, Hosmer y Lemeshow test).  
**Source:** Survey on Equipment and Use of Information and Communication Technologies in Households (micro-information) of Spanish Statistical Institute (SSI) and authors' elaboration.

Table 4 Plans of the Autonomous Communities (Regional Governments).	
Andalucía	Plan de Innovación y Modernización de Andalucía (PIMA2010)
Aragón	I Plan Director para el desarrollo de la SI en Aragón (2004-2007) y I Plan Director de Infraestructuras de Telecomunicaciones de Aragón
Asturias	Plan eAsturias 2007
Baleares	Plan de Ciencia, Tecnología e Innovación de las Islas Baleares 2005-2008
Canarias	Plan Canarias Digital (2000-2006) y Plan Estratégico para la Sociedad de la Información (2000-2006)
Cantabria	Plan Estratégico de la Sociedad de la Información en Cantabria (2002-2006)
Castilla-La Mancha	Plan Estratégico de Telecomunicaciones y de la Sociedad de la Información (2006-2010)
Castilla y León	Estrategia Regional para el desarrollo de la Sociedad de la Información (2003-2006) y III Plan Director de Infraestructuras y Servicios de Telecomunicaciones (2004-2006)
Cataluña	Plan Director de Infraestructuras de Telecomunicaciones (2005-2008), Plan Director de Servicios y Contenidos (2005-2008) y Plan de Investigación e Innovación (2005-2008)
Comunidad Valenciana	Estrategia Avantic (2004-2010)
Extremadura	Infodex. Plan Estratégico Regional de Desarrollo de la Sociedad de la Información en Extremadura
Galicia	Plan Estratégico de Desarrollo de la Sociedad de la Información (se espera su presentación para finales de 2006)
La Rioja	Estrategia Riojana para la Sociedad de la Información
Madrid	I Plan para el Desarrollo de la Sociedad Digital y del Conocimiento en la Comunidad de Madrid, "Madrid Comunidad Digital"
Murcia	Plan para el Desarrollo de la Sociedad de la Información en la Región de Murcia 2005-2007,

<b>Table 4</b>	
<b>Plans of the Autonomous Communities (Regional Governments).</b>	
	“Región de Murcia SI”
Navarra	II Plan de Actuación para la Promoción de la Sociedad de la Información y las Telecomunicaciones (2005-2007)
País Vasco	Plan Euskadi en la Sociedad de la Información
Ceuta	Desarrollo de una red de banda ancha dentro del convenio de Ciudades Digitales
Melilla	Incorporación a la eAdministración dentro del convenio de Ciudades Digitales
<i>Source:</i> eSpain 2006 and authors’ elaboration.	