

# The use of ICT in European households: a comparative study

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**The use of ICT at home has spread extensively throughout Europe, albeit with differing intensity in each country. Based on Eurostat data, this observatory outlines the importance of computer use, of the internet and its ends during the recent recession, comparing European countries.**

## 1. Introduction

The internet has become an integral part of the daily life for most Europeans and is used to carry out a large number of tasks that people consider to be everyday. In early 2014, 78% of people in the European Union (EU) aged between 16 and 74 were regular internet users. However, its distribution was far from being uniform between countries. In the case of Denmark, Luxembourg, the Netherlands, Sweden and Finland, nine out of ten people were internet users in 2014. At the other end of the distribution scale were Portugal, Greece, Italy, Bulgaria and Romania, where the proportion was under two thirds.

The number of people who have never used the internet fell from 30% in 2009 to 18% in 2014. The EU's digital agenda would appear to be meeting the digital inclusion targets set in 2010, which declare that the percentage of people who have never used the internet should not exceed 15% by 2015.

Another EU digital agenda target that has been reached concerns the frequency of internet use. In 2010, a target was set that at least 75% of people would be regular internet users (at least on a weekly basis) by 2015. This frequency level was reached in 2014, with 65% of people using internet on a daily basis, with a further 10% using it weekly. Nevertheless, the geographical distribution was uneven, as the percentage of people using internet on a daily basis varied between 60% in Romania to around 95% in Scandinavian countries and Luxembourg.

This observatory seeks to answer the question as to whether consumers in European countries use the internet in a similar way or if the availability of access has any relationship to its use. Furthermore, a number of studies have shown that people with the same level of internet access make use of it in different ways (Brandtzæg, 2010 and Hargittai, 2010). "Internet means different things to different people and is used in different ways for different purposes" (Selwyn et al., 2005, p. 7). There will also be geographical differences in internet use when examining frequency of use, its purpose and the profile of the typical active user within the period of the recession (2008-2013).

Results show that computer and internet use increased considerably between 2008 and 2013, reaching an approximate percentage of 80% and 78% in 2013, respectively. The frequency of computer and internet use has also

increased. In 2013, 60% of Europe's population used a computer on a daily basis, with daily internet use standing at 61.5%. This can be explained by the availability of other alternatives, such as mobile devices. There is evidence of a strong positive relationship between the trend to having a computer and internet at home and their use. These results confirm that household is the primary access point for both computers and the internet. Country by country, there is greater use in Scandinavian countries and Luxembourg, compared to countries in southern and eastern Europe, such as Bulgaria, Cyprus, Greece, Italy, Malta and Portugal.

As far as the activities undertaken on the internet, stages of use also differ. Obtaining information is a popular answer, one given by 80% of internet users in 2013. While some activities require a higher level of training or experience, such as online banking, e-commerce and e-governance, these increased enormously between 2008 and 2013 and occupied a significantly high place on the tale of usage, nearly 60% in 2013. There is not a common pattern between countries which distinguish those that use activities more than others, with each activity requiring its own analysis.

As far as the socio-demographic characteristics of the individuals that use the internet on a daily basis are concerned, the typical profile is of a young male aged between 16 and 24, with a good education (to university level), who is either still studying or in work, with a high income and the best possible internet connection.

The rest of the observatory is organised as follows: In Section 2, we describe the databases used, any pertinent variables and the transformation procedure and how they were built. In Section 3, we summarise and explain the main results obtained. The main conclusions drawn from the research are presented in Section 4. The Appendix offers further information of interest.

## 2. Survey on the information society

The statistical data on the use of Information and Communication Technologies (ICT) can be found in the survey entitled Community Statistics on the Information Society (CSIS), and is produced on the basis of Regulation (EC) No. 808/2004 of the European Parliament and of the Council concerning Community statistics on the information society.

In this observatory, special attention is given to the questions relating the use of ICT, the frequency of their use and for what purpose. The number of countries covered by the comparison is subject to the availability of Eurostat data<sup>1</sup>.

In general, the specimen questionnaire proposed by Eurostat is used in the member states. However, there are some slight differences in translation, reference periods and treatment of questions without answers, so some results tend to be difficult to compare among countries if the original information is used. It is necessary to make some adjustments to ensure a greater degree of uniformity and comparability. In order to study the question of social inclusion, a series of socio-demographic characteristics of those surveyed was compiled: In Figures A1 and A2 in the Appendix, we set out a summary of the variables affecting access to ICT and the socio-demographic characteristics of households, together with a brief definition thereof.

The decisions taken by people regarding the availability and use of ICTs are sequential, and this is reflected in the design of the questionnaire. Internet use requires a suitable device, which may be available in the place of residence. This device has traditionally been the computer in its varied forms. However, this device has greater competition among internet users, given the growth of other well-known alternatives such as smartphones and tablets. Despite this, the availability of a computer in the household can still be considered as a good first approximation to use of ICT.

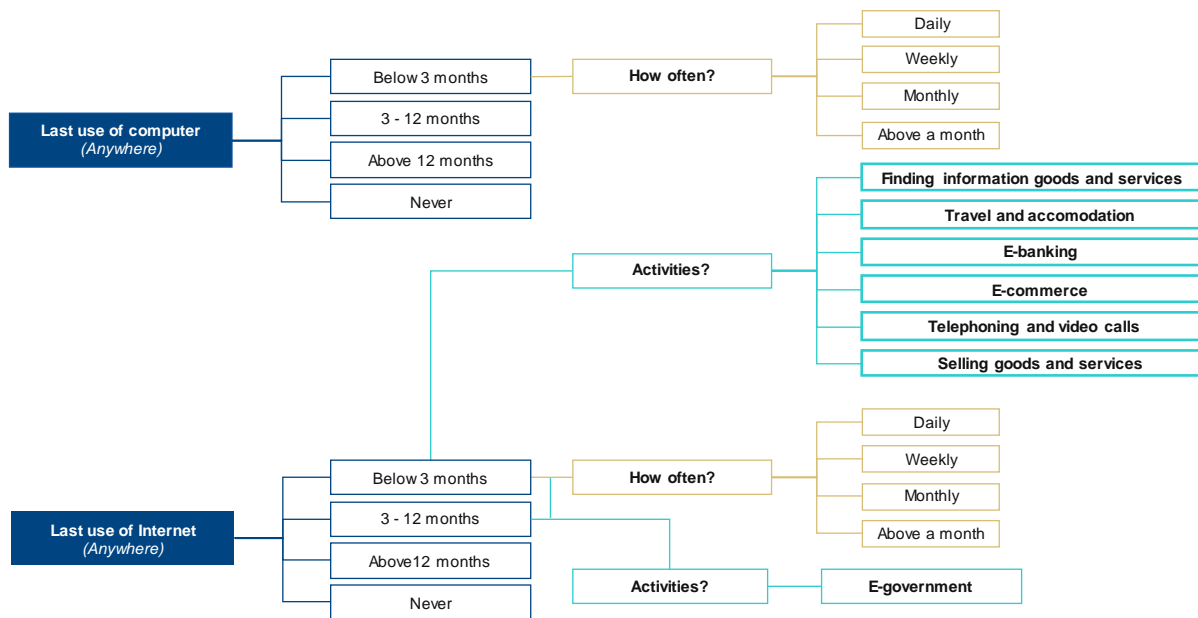
The key point in this section lies not only in the use that people make of their computers and the internet, but also the frequency and purpose of the use thereof. Figure 1 shows a summary of the sequence followed in decision making regarding computer and internet use.

If a computer or the internet is used, this might have been for different periods of time. Among all the available possible answers, the options have been limited to three time scales: use in a period of under 3 months, in the last 3 to 12 months, and in a period of over one year.

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<sup>1</sup> For further details on the number of people surveyed by country and by year, as well as the nomenclature that refers to each country used in the tables of the document, see Adame et al. (2016).

**Figure 1** Graphic summary with the variables of interest



Source: BBVA Research, based on CSIS (Eurostat)

In both cases there are also new answer options for those who respond in the affirmative when asked if they have used a computer or the internet in the past 3 months. We should distinguish between daily, weekly and monthly computer/internet use. Similarly, information is available on the activities of people who have used the internet in the past three months, comparing those who have searched for information on goods and services, travel and accommodation, online banking, e-commerce, and communications activities (phone and video calls).

Information is also available on internet users who have interacted with the state administration in order to complete formalities online (e-government), although in this case the time frame extends to those who used the internet in the past 12 months.

### 3. Results

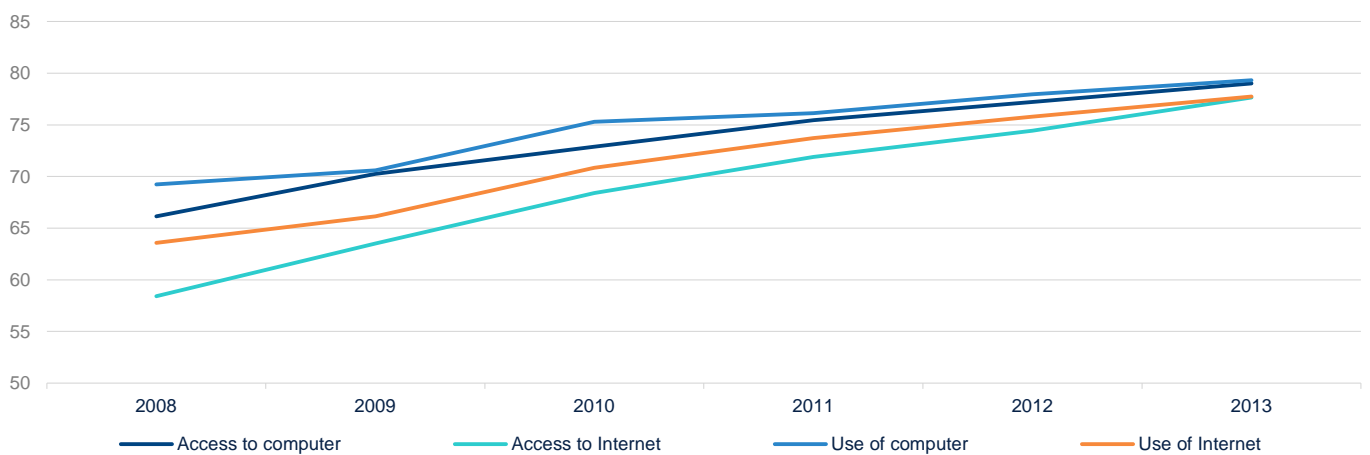
This section offers information on computer and internet use, the frequency thereof and the types of activities undertaken over the past three months, except in the case of online government administration formalities, where the period of application covers a whole year. The observatory also outlines the socio-demographic profile of the most frequent internet users, as well as the possible differences that exist between geographic areas (NUTS 1) in each country.

For the overall analysis of European countries, we have only selected those countries for which there is information covering all the years under consideration (23 countries, E-23<sup>2</sup>), in order to produce comparable results over time.

#### 3.1 Access to a computer and the internet and their use by individuals

There has been a trend toward an upward convergence between domestic internet and computer access and their use in Europe, as can be seen in Figure 2. This result would seem to confirm a “democratising effect” of the internet phenomenon which reaffirms the idea of the Information Society.

**Figure 2** Evolution of home access to a computer and the internet and the use that people make of them (%) (23 countries)



Source: BBVA Research, based on CSIS (Eurostat)

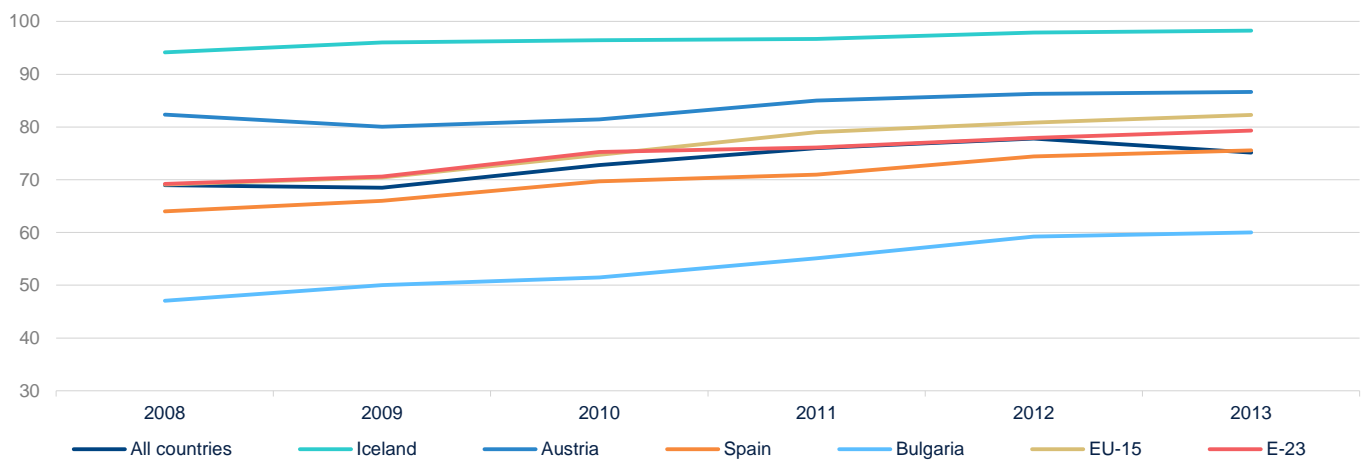
<sup>2</sup> "E-23" consists of the following countries: Austria (AT), Belgium (BE), Bulgaria (BG), Cyprus (CY), Denmark (DK), Estonia (EE), Greece (EL), Spain (ES), Finland (FI), France (FR), Hungary (HU), Ireland (IE), Iceland (IS), Italy (IT), Luxembourg (LU), Latvia (LV), Malta (MT), the Netherlands (NL), Norway (NO), Portugal (PT), Sweden (SE), Slovenia (SL) and Slovakia (SK).

Access to a computer at home has continued to increase, going from approximately 66% in 2008 to near 80% in 2013. Access to the internet has experienced a similar rise, with growth at a higher rate than the computers. The percentage of homes with access to the internet has risen from just under 58% in 2008 to over 77% in 2013, reducing the gap between computer and internet availability in the home from 8 percentage points (p.p.) to below 3 p.p.

The use of computers and the internet by individuals rose considerably from 2008 to 2013. As in the case of access, the gap between computer and internet use has gradually fallen to 3 p.p. in 2013. Computer and internet use in 2008 was higher than the access levels. This difference fell to virtually zero in 2013. This confirms that the greater use of services available on these platforms has resulted in a search for greater comfort and accessibility to them in the home.

There are significant differences country by country within Europe in terms of the percentage of the population who had used a computer in the past 12 months, although this gap has shrunk (Figure 3).

**Figure 3** Evolution of computer use in Europe (%)



Source: BBVA Research, based on CSIS (Eurostat)

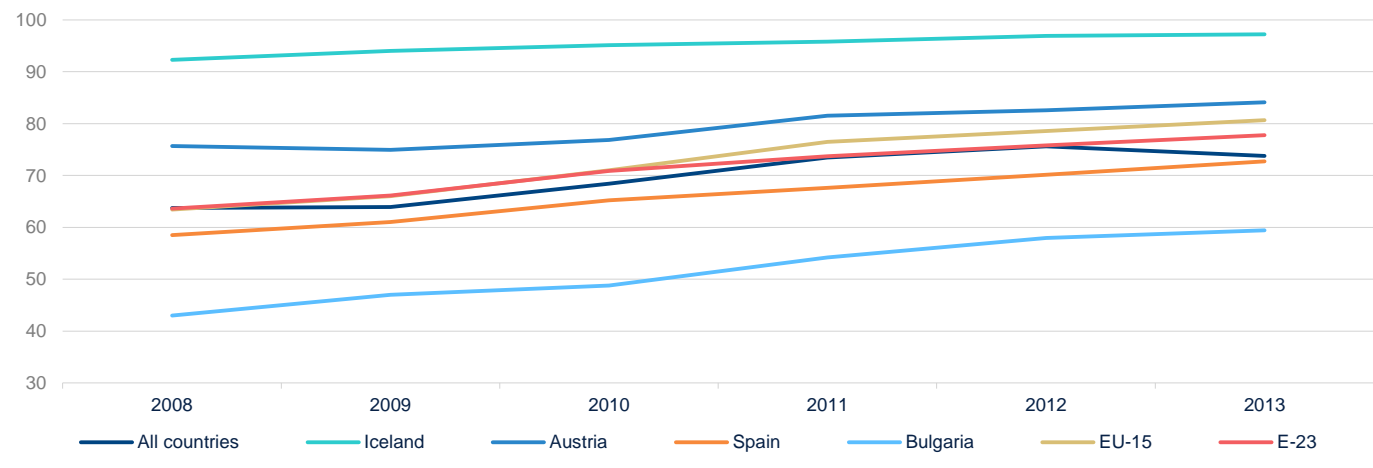
Iceland is the European country in which computer use was found to be most widespread, with virtually the entire population confirming they were users. The level was almost 100% in 2013, an increase on levels that were already very high in 2008 (96%). At the other end of the scale was Bulgaria, where less than half the population used a computer in 2008 (47%), and it has increased to 60% in 2013.

This process of convergence between countries at opposing ends of the scale tends to be due to the nature of percentages and the result of the individual characteristics of the aforementioned countries. This can also be seen in other countries that are mid-way on the scale, such as Austria and Spain. Spain is below the EU-15 average (excluding Germany), with a percentage of 61% of people who used a computer in 2008, compared to 82% in Austria. In 2013, the percentage for Spain was 75%, while Austria was slightly below 87%.

By establishing the comparison between the different subgroups of countries within Europe, the use of computers in the EU-15 (excluding Germany) has increased 12 p.p. between 2008 and 2013, rising to above 82% in 2013. This percentage is slightly higher than the E-23 level (80%). In the case of the data from all the countries available, the fall in the percentage of use is the result of the inclusion of countries such as Lithuania, Poland, the Czech Republic and Romania in 2009, as well as Turkey in 2013, which have affected the overall average.

As can be observed in Figure 4, the evolution in the use of the internet over the past 12 months is parallel to that of computer use. The percentage of people using the internet in the past 12 months has increased more than computer use, with the gap between the two decreasing. This would seem to suggest a higher level of complementarity in the use of the two platforms.

**Figure 4** Evolution of internet use over the past 12 months in Europe (%)



Source: BBVA Research, based on CSIS (Eurostat)

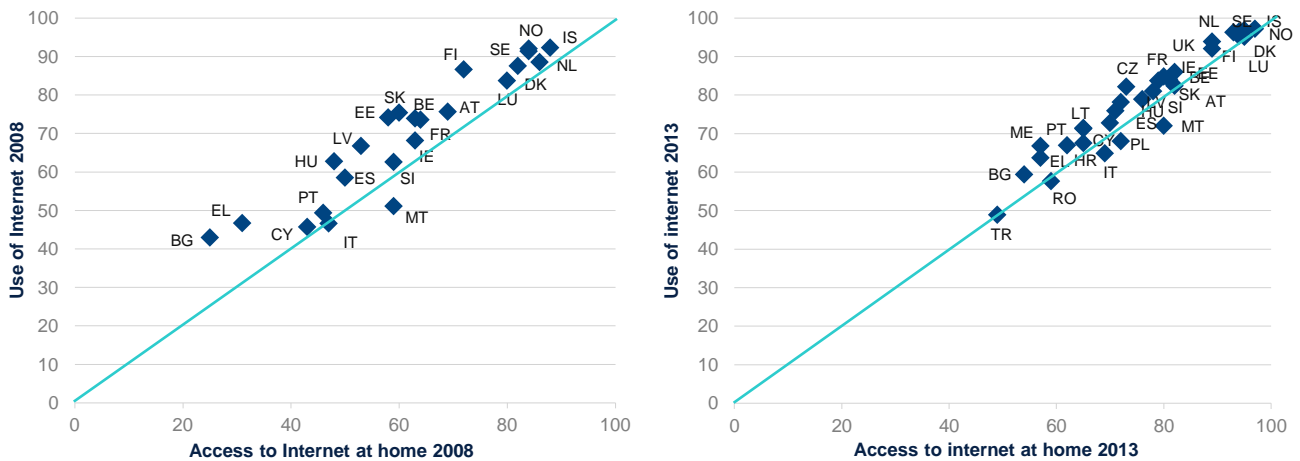
Iceland is the country in which the highest percentage of the population uses the internet on a daily basis (97.2% in 2013 compared to below 91% in 2008). Bulgaria is at the other end of the scale, with the percentage of people using the internet rising from 43% in 2008 to 59.4% in 2013. Internet use in Bulgaria has increased more than computer use has, as numbers using the former were lower than those using the latter in 2008. The closing of this gap has also occurred in other countries that are mid-way on the scale, such as Austria and Spain. In the case of Spain, the percentage grew by over 14 p.p. to 72.7% in 2013, while in Austria, the increase was almost 8.5 p.p., rising to 84.1%.

As far as the situation in the different sub-groups of countries is concerned, the evolution is similar to that of computer use, with a 2013 figure of over 82% in the EU-15 (excluding Germany), nearly 80% in the E-23 and over 75% as all the countries in the observatory are included.

Figure 5 shows the relationship between access to internet at home and individual internet use over the past 12 months. In general, the percentage of individuals using the internet is greater than the percentage of homes with internet access, above the bisecting line of the first quadrant. One explanation for this is that people use the internet in

a number of places other than the home (for example, at work or at school or university). However, there are some exceptions (such as Italy and Malta), where the percentage of homes with internet access is higher than the number actually using the internet.

**Figure 5** Households with internet access and internet use by individuals (%), 2008 and 2013



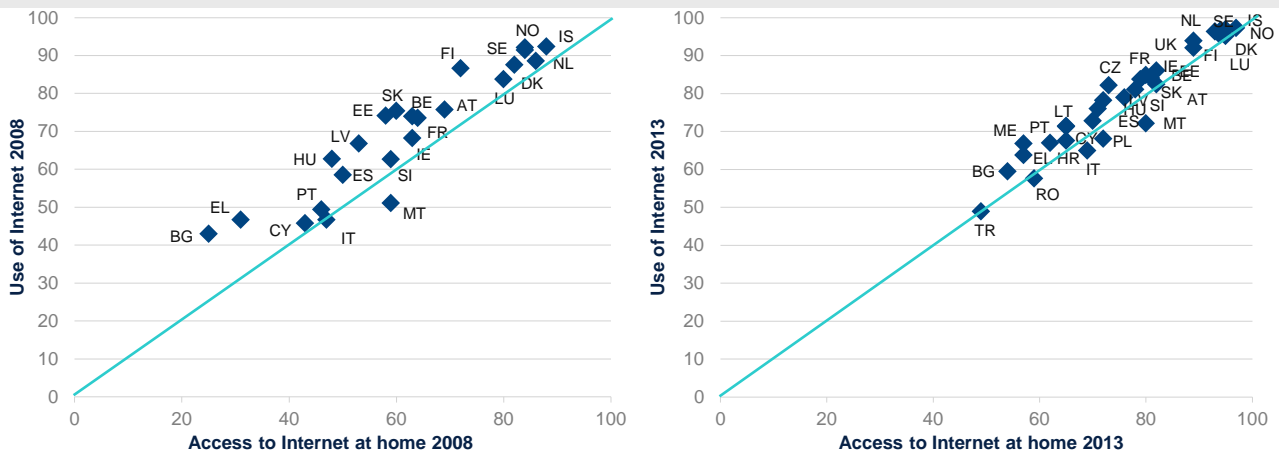
Source: BBVA Research, based on CSIS (Eurostat)

By comparing the results from 2008 and 2013, a double concentration phenomenon can be seen. A first concentration process toward values that are increasingly higher on both axes, reflecting a reduction in the gaps with countries that are higher on the scale, in both internet access and use. A second process of concentration toward the bisecting line, confirming the notion that internet use is becoming something which is increasingly normal in people's daily activity, making home internet access something as necessary as having a television or any other normal domestic electrical appliance.

This concentration phenomenon continues to maintain its structure in three large groups of countries which are well segmented geographically in terms of internet access and use. Using cluster analysis, there is a first group at the forefront, with high levels of internet access and use consisting of Scandinavian countries (Denmark, Finland, Iceland, Norway and Sweden) and Luxembourg in 2008. The United Kingdom joined this group in 2013 (for whom there were no figures available in 2008). At the other end of the scale were Bulgaria, Cyprus, Greece, Italy and Portugal in 2008, joined in 2013 by other countries for whom there were no figures available in 2008 such as Croatia, Lithuania, Macedonia, Romania, Poland and Turkey. Only one country changed group between 2008 and 2013: Spain was part of the intermediate group in 2008, although it dropped down to the lower group in 2013.



**Figure 6** Individual use of computers and the internet (%), 2008 and 2013



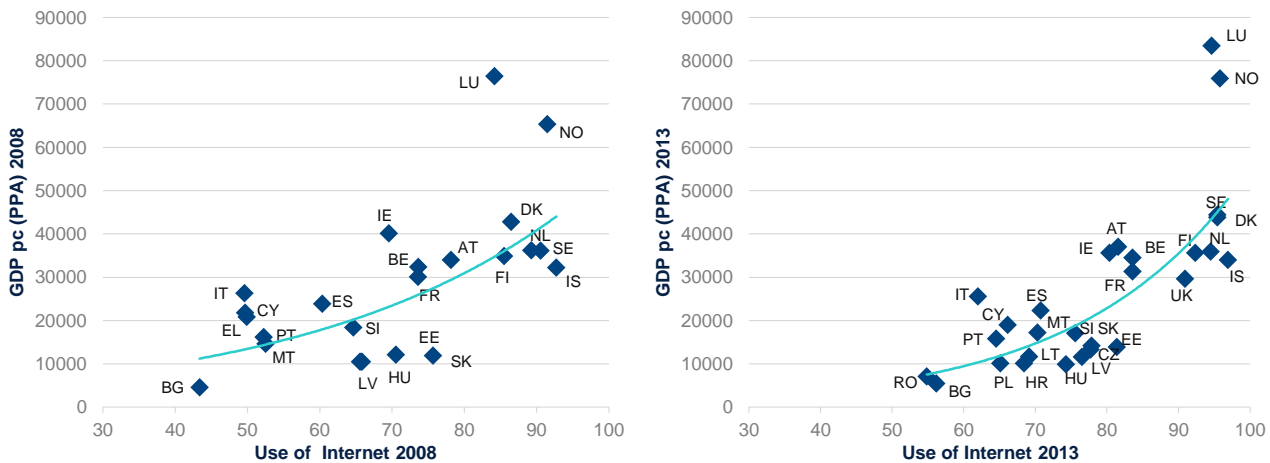
Source: BBVA Research, based on CSIS (Eurostat)

By relating the use of computers and the internet (Figure 6), we can see a large part of the similarities that were shown in the earlier comparison. Special mention should be made of the concentration toward the bisecting line between 2008 and 2013, to the extent that use of the computer and internet are practically at the same level in all countries.

If cluster analysis is employed to look at use variables, the result does not change in the case of the leading group (Scandinavian countries, Luxembourg and the United Kingdom). There are small differences in the mid-level and lower groups. Malta joined the lower group in 2008, although in 2013, it became part of the mid-level group. Another difference is that Spain remained in the mid-level group in both 2008 and 2013.

Arellano et al. (2016) argue that use of the internet over time has become an indicator of economic development, represented by GDP per capita, on a world level. This indicator has significantly increased over time. If, at the close of the 20<sup>th</sup> century, internet use represented an indicator in itself of economic development, two decades later, its use is a necessary indicator of development, although not one that is in itself sufficient. Figure 7 shows this by focusing on countries in Europe where the trend curve is steeper. This result suggests a clear process of standardisation: in 2013, only internet use levels approaching 100% identifies the economies with the highest GDP per capita. However, lower levels (between 60% and 90%) do not allow us to distinguish as clearly between internet use and economic development, unlike the situation in 2008.

**Figure 7** Internet use (%) and GDP per capita (PPA) in 2008 and 2013



Source: BBVA Research, based on CSIS (Eurostat)

### 3.2 The frequency of computer and internet use

We have focused on computer and internet use over the past 12 months, confirming the reduction of the gaps between European countries. In this section we analyse the frequency of use in order to confirm if this standardisation process also occurs in other time frames. The information is divided into six mutually-exclusive bands based on use.

A general approximation is shown in Figure 8, which shows at the evolution of the percentage of computer and internet users as well as the make-up of their frequency of use across the E-23 countries.

As far as computers are concerned, the percentage of people that use them has continually increased from 70% in 2008 to just under 80% in 2013. Daily computer use has increased at a faster rate than general use, rising from 48.1% of the total population in 2008 to 60.6% in 2013. As a result, nearly 7 out of 10 people who used computers did so on a daily basis in 2008, a figure which in 2013 rose to 75%.

Other use frequencies showed a slight fall between 2008 and 2013, dropping to below 20% overall. The evolution of this distribution is consistent with the inclusion of new people as computer users, especially among younger members of society (known as “digital natives”), in the group recording the highest use. The downward trend among the highest use frequencies would seem to suggest that the rest of users has a certain stability in terms of frequency of use, affected by demographic movements.

**Figure 8** Evolution of and changes to the frequency of computer and internet use (%) (E-23 countries)

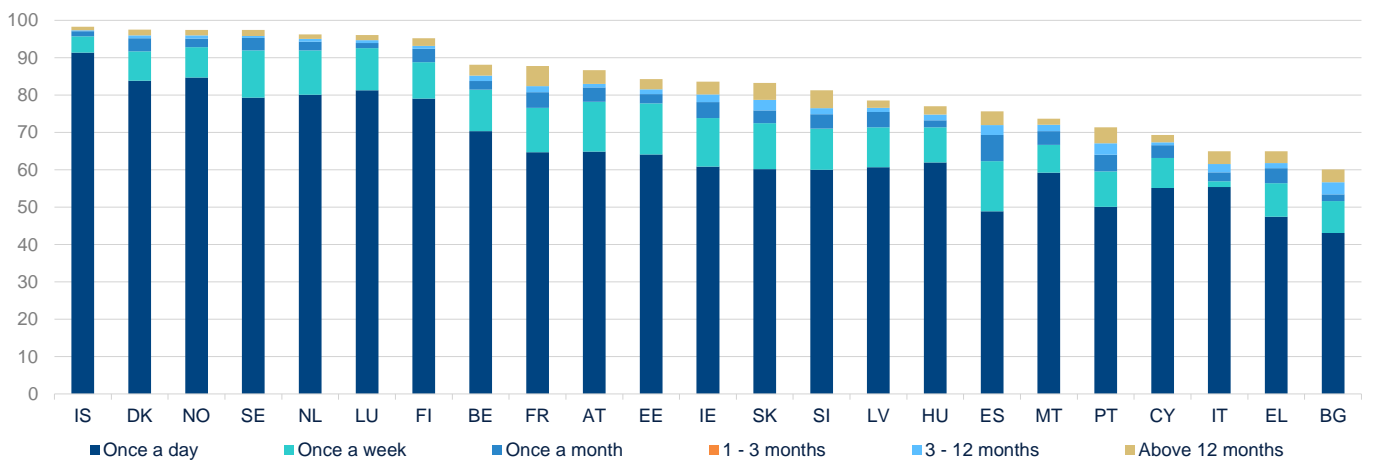


Source: BBVA Research, based on CSIS (Eurostat)

Two-thirds of internet users used this platform on a daily basis in 2008. In 2013, that proportion had risen to 75% of internet use. In 2013, daily internet use is higher than daily use of computers, indicating that other devices such as smartphones and tablets are increasingly used as alternatives to computers when going online.

Figures 9 and 10 present a breakdown of country-by-country computer and internet use based on different frequencies in 2013.

**Figure 9** Breakdown of computer use frequency (%) in 2013 (E-23 countries)



Source: BBVA Research, based on CSIS (Eurostat)

Scandinavian countries, Luxembourg and the Netherlands have both the highest levels of computer use and the highest daily use. In all these countries, computer use is above 95%, with only minor differences between the highest (Iceland – 98,2%) and lowest in this group (Finland – 95,2%). Through cluster analysis, frequency of use in this leading group can be broken down into three differentiated sub-groups, especially in the lowest frequency: Iceland

(with a daily use above 90%), Denmark and Norway (with a daily use percentage of just under 84%) and other countries (where daily use stands at around 80%). Differences are very small in the frequencies in each of the sub-groups studied.

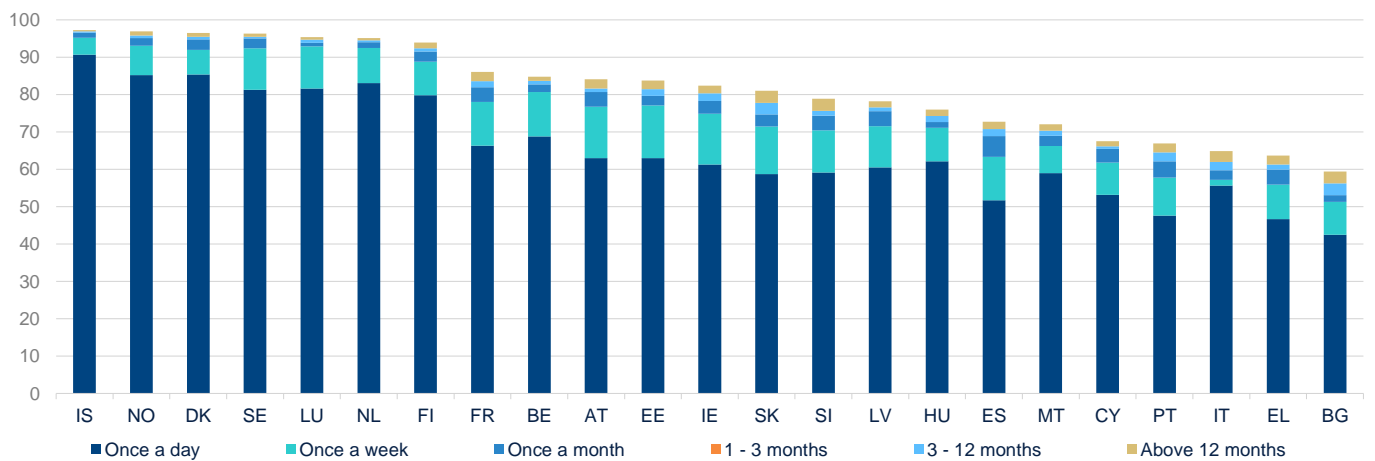
At the other end of the scale are Bulgaria, Cyprus, Greece, Italy, Malta and Portugal, with a total percentage below 75%. Cluster analysis divides this group of countries into three sub-groups: Cyprus and Italy have more concentrated daily use than the others, Greece Portugal are mid-way on the scale, with a higher joint concentration than the highest frequencies marked by Cyprus and Italy, while Bulgaria lags behind due to its specific characteristics (just 60% of use).

Spain is just above this lowest group, with 75.6% of the total population using a computer on a daily basis. Frequency distribution is similar to Portugal and Greece, where less than 50% use a computer everyday. Only Bulgaria is lower, with under 43%.

As far as internet use is concerned, there are no major differences compared to computer use. On an aggregate level, computer use is marginally higher than internet use in all the countries that are studied. However, there was a certain disparity in the difference between the frequency of daily use, where Denmark, Spain, France, the Netherlands and Sweden show bigger differences in use in favour of the internet (between 1.5 and 3 p.p.), while Cyprus and Portugal record the highest differences in favour of computer use (between 2 and 2.5 p.p.).

Aggregate percentages show country groupings that are identical to computer use. Something similar happens with the distribution of internet use frequencies. These results confirmed the connection between both types of use on a country level.

**Figure 10** Breakdown of internet use frequency (%) in 2013 (E-23 countries)



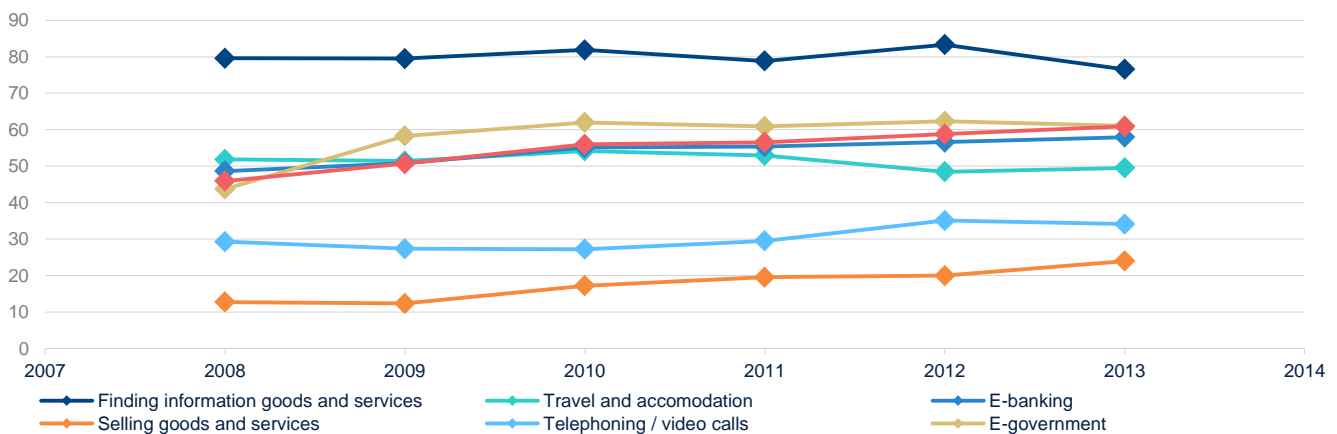
Source: BBVA Research, based on CSIS (Eurostat)

### 3.3 Reasons for internet use

Figure 11 shows the evolution of the seven most common online activities across the E-23 countries among those who had used the internet in the previous three months. While there are other reasons for using the internet, they can be included with the seven shown here. Furthermore, for reasons of continuity, other kinds of activities have been omitted due to a lack of information for the 2008-2013 period.

Searching for information on goods and services is the most common activity for those using the internet. It represents around 80% of internet users, with a constant evolution over time. Next come four activities with use percentages of between 40% and 60%. Three of them increased between 2008 and 2013: administration formalities (also called e-government), online banking and e-commerce. The use of the internet for travel and accommodation fell slightly to around 50%.

**Figure 11** Evolution of and changes to reasons for internet use (%) (E-23 countries)

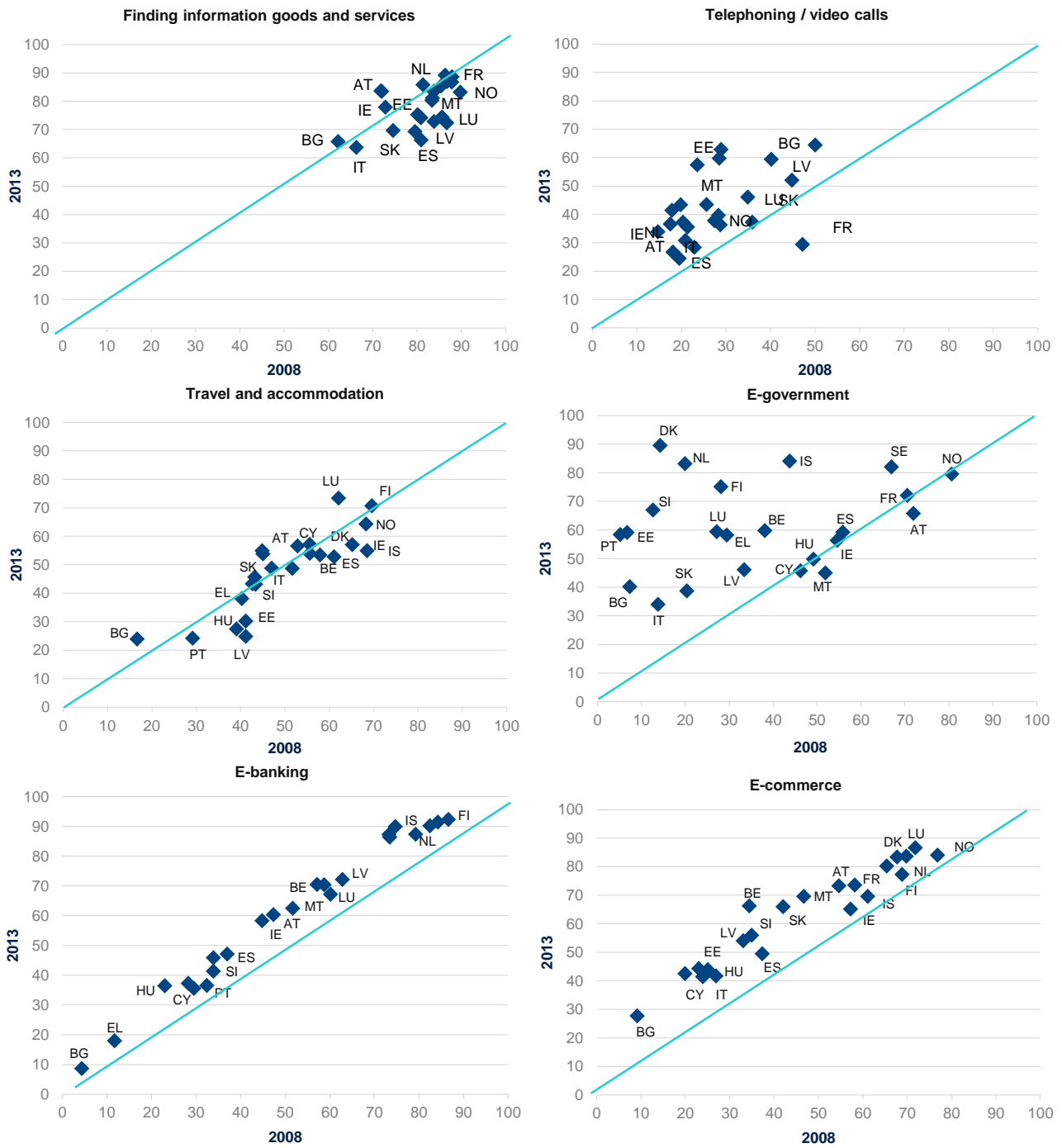


Source: BBVA Research, based on CSIS (Eurostat)

Internet use related to communications (phone and video calls) and the sale of goods and services is less common, although increasing in importance. This growth was notable in the case of the sale of goods and services, where internet use doubled between 2008 and 2013, rising from 12.7% to 24%. In the case of communications, access was less significant, increasing from 30% in 2008 to 35% in 2013.

Figure 12 shows a scatter plot country-by-country comparison of 2008 and 2013 for six of the seven studied activities, including the bisecting line of the first quadrant. The sale of goods and services has been left out due to data representativeness issues (as this is the activity considered least important by internet users).

**Figure 12** Reasons for internet use (%), 2008 vs. 2013 (E-23 countries)



Source: BBVA Research, based on CSIS (Eurostat)

The different reasons studied show the complexity that use of a platform as powerful as the internet represents. Each reason was included on a different level, primarily determined by the level of technological development that the internet has meant. The search for information is one of the main reasons for internet use, along with email communication. Another reason that has become popular faster than others is e-commerce, especially for travel and accommodation. The economic development associated with e-commerce has gone hand-in-hand with the expansion of internet use to other operations related to ICT, such as online banking and e-government. These activities are experiencing a boom, reflecting the clearest example of the existence of the digital divide between EU countries. Finally, technological improvements are allowing newer, better forms of communication at a more competitive price, incentivising new forms of communication that are yet to fully materialise in Europe and which are still at a stage prior to e-commerce and online banking. This general argument, which is shown in Figures 11 and 12, requires some qualification, depending on the country.

The search for information on goods and services reflects a situation marked by stability and a certain uniformity among the EU countries that were studied. The differences that exist would appear to be due to factors beyond the scope of ICT development in this area. Cluster analysis shows four sub-groups of countries. A first sub-group (consisting of Austria, Greece and Ireland) in which there is significant growth of internet users for this reason. A large second group of countries (Belgium, Cyprus, France, Hungary, the Netherlands and Scandinavian countries), with percentages above 80% and with uneven performance from 2008 to 2013. A third group of countries in which the importance of this activity fell in the period from 2008 to 2013 to between 65% and 80%. Spain, together with Malta, is in this group, with the most pronounced fall of over 14 p.p., from 81% to 66.3%. Finally there is a fourth group, made up of Bulgaria and Italy, slightly further behind, with percentages between 60% and 65%.

There has been a slight overall fall in travel and accommodation online use, partly related to the negative effects of the 2008 recession and the lower disposable income. Cluster analysis highlights three large groups of countries, based mainly on figures from late 2013. In this leading group are the Scandinavian countries, Spain, France, Ireland, Luxembourg and the Netherlands, with percentages greater than 50%. Nevertheless, their evolution has been very uneven. Luxembourg underwent rapid growth and recorded the highest percentage in 2013, over 73%, higher than Finland (where the figure was just under 70%), the leading country in 2008. Like Finland, Denmark and Sweden also show a modest rise in their percentage. At the other end of the scale were Norway and the Netherlands (which fell more than 4 p.p.), Spain (more than 8 p.p.) and Iceland (nearly 14 p.p.). The lowest percentages are recorded in Bulgaria, Estonia, Hungary, Latvia and Portugal, which barely reached 30% at best in 2013. This group is divided into two sub-sets: Bulgaria and Portugal have grown, while the other three countries have seen a major drop in their percentages compared to 2008, falling more than 10 p.p.

The evolution of internet use to carry out state administration formalities offers a dichotomous view of the situation, one which does not appear to have any relationship to the north-south divide evident in other cases. On the one hand, this activity increased considerably between 2008 and 2013 in a number of countries, in line with the commitment of their governments to new channels of communication and administration. This was the case with Denmark (over 75 p.p.) and the Netherlands (over 63 p.p.), then Slovenia, Estonia and Portugal (with increases between 50 and 55 p.p.),

followed by Finland and Iceland (over 40 p.p.) and finally Bulgaria, Luxembourg and Greece (around 30 p.p.). Other countries were, to a greater or lesser extent, further ahead in this regard in 2008 and have stayed relatively stable over this period (as is the case with Spain, Cyprus, France, Hungary, Ireland and Norway) or which have fallen off to some extent (Austria and Malta).

The only two activities in which all countries have improved when comparing 2008 and 2013 are e-banking and e-commerce. The growth in online banking is rather more uniform than is the use of e-government, with Iceland leading the way with 15 p.p. and Portugal bringing up the rear with 4 p.p. The differences between countries can be seen in the percentages of use, with a significant lack of uniformity that did not come down between 2008 and 2013. According to cluster analysis, four groups of countries can be identified. The first group is composed by the Scandinavian countries, Estonia and the Netherlands, with percentages of use of over 85% in 2013. The differences from 2008 to 2013 in this group have shrunk, as the countries that led the way in 2008 (Estonia, Finland and Norway) have grown by around 6 p.p., while other countries have grown at a faster rate, more than double in the case of Denmark and Iceland.

At the other end of the scale there are two groups of countries. Bulgaria and Greece recorded very low percentages (less than 18% in 2013). It would seem that this area of use barely moved over the period of the study. Ahead of these two countries were Cyprus, Italy, Portugal and Hungary (with percentages below 40% in 2013 and growth under 9 p.p., except Hungary which grew over 13 p.p.), and Spain, Slovakia and Slovenia (with percentages over 50% in 2013 and growth above 11 p.p., except in the case of Slovenia, which grew 7 p.p.).

The use of e-commerce in the E-23 countries has quite a lot in common with the use of online banking services. Apart from the improvement in all the countries studied between 2008 and 2013 (its growth is generally higher than that of e-banking), we can also see a high level of dispersion among countries in 2008 which did not come down in 2013. In fact, to a great extent, there was a significant grouping together of countries (evidenced through cluster analysis) which was similar to the situation with online banking. The countries with the highest percentages were the Scandinavian countries (except Iceland), the Netherlands and Luxembourg, with levels above 77% in 2013. Except in the cases of Finland and Norway, which grew around 8 p.p., the other countries in the observatory increased by over 13 p.p.

The country that made the least use of e-commerce is Bulgaria, with a percentage below 30% in 2013. Then come two sub-groups of countries, the first with percentages between 40% and 44% (Cyprus, Italy, Estonia, Greece, Hungary and Portugal) and the other at around 50% (Spain, Slovenia and Latvia).

The use of the internet for the purposes of communication (phone and video calls) shows a state of development that is at an earlier stage than the previously mentioned reasons in general terms, with important differences from country to country. As a result, the geographic distribution of this type of internet use across Europe is very different to other reasons, as shown by cluster analysis. The percentage of internet users carrying out this activity increased in all countries except France between 2008 and 2013. The increase is quite uneven, with Cyprus, Estonia and Iceland



worthy of special mention, with rises between 31 and 34 p.p. These three countries are above Slovakia and Latvia in 2008, although they are slightly below the leader Bulgaria, with a percentage of over 64% in 2013. The countries with least weight in this are Austria, Spain, Finland and France, with percentages below 30% in 2013. In terms of the evolution within this group, we should highlight France, which fell almost 18 p.p. compared to 2008.

### 3.4 The socio-demographic characteristics of the daily internet user

This section seeks to show the importance of carrying out in-depth analysis of the socio-demographic characteristics of people who use ICT, especially the daily use of the internet. Figure 13 shows the percentage of daily use of the internet by Europeans in 2013 based on gender, age, educational level, employment situation, income level and the population density in the place where they live. It also shows how the level of daily internet use varies depending on the availability of domestic internet access and the type of connection they have (narrow band, broadband or 3G connection). In this figure, the X axis represents the European average of daily internet use, which in 2013 stood at 61.43% of the population.

It is clear that men use the internet on a daily basis to a greater extent than women, although the difference is small (below 5 p.p.). As far as age is concerned, we can see use behaviour as an inverted parabola, confirming the image of digital natives. Maximum use corresponds to the 16-24 year-old age group. Around 90% of this group used the internet on a daily basis in 2013. The next group is people under the age of 15. In 2008, this group recorded internet use that was 10 p.p. below the average level. In 2013, the level of daily internet use among those under the age of 15 was 20 p.p. above average.

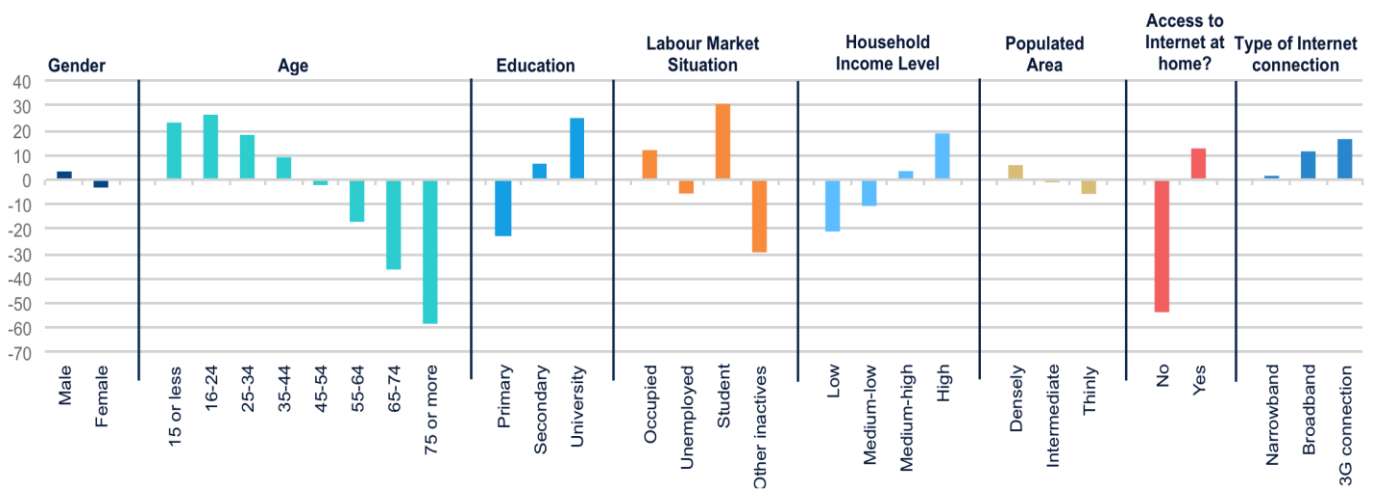
People aged 35 to 44 use the internet on a daily basis more than average, although the difference is below 10 p.p. As far as the over-45s are concerned, daily internet use levels are below average, with increasing differences with respect to the mean as the age range gets older. At the end of the scale in this regard, among the over-75s, under 2% uses the internet on a daily basis. This result confirms the digital divide that exists between generations in terms of internet use and the importance that age has when adopting technologies such as internet, as Alonso and Arellano (2015) argue in the case of Spain.

The digital divide is not limited to age, it is also evident when a person's level of education is taken into consideration, as Alonso and Arellano (2015) point out, and which is backed up by the figures in Figure 13. People with university education are far more likely to use the internet on a daily basis. Around 90% of people with a university degree use the internet daily, 25 p.p. above the average. People with secondary education are slightly above the average, with around 70%. At the other extreme are people with only primary level education. Only 35% of these people use the internet on a daily basis, a figure which differs from the average to a similar extent as do those with the highest qualifications.

The explanation for this latter distance is not only a question of one's educational background. A person's educational level is related to their age and other socio-economic factors, such as their employment status. The breakdown of this final variable in part reflects the complexity of internet use. Students are an important group here, over 30 p.p. above

the average. Those in employment also use the internet on a daily basis to an extent that is higher than the average figure (around 10 p.p. more). Meanwhile, the proportion of the unemployed and other inactive people (including the retired and those doing unpaid work in the home, among other groups) who use the internet on a daily basis is below average. In the case of the other inactive group, the difference is almost 30 p.p. This confirms the notion that internet use depends on a combination of factors which go beyond gender, age and educational background.

**Figure 13** The socio-demographic characteristics of the daily internet user in Europe, 2013



Source: BBVA Research, based on CSIS (Eurostat)

Domestic income level as shown in quartiles highlights a positive correlation with daily internet use. People with a high income show a daily internet use that is nearly 20 p.p. above the average level. This difference falls to less than 5 p.p. in the case of people with a medium-high income. People with a medium-low income are over 10 p.p. below the average, with the difference for those in the lowest age group twice that. This connection is explained in the same way that the discrepancies relating to the level of education are, as the link between daily use and income also includes other unknown variables, such as those that relate to employment and professional status, among other factors.

The place of residence in terms of population density does not appear to have a significant bearing among the options considered in the observatory. The proportion of people who live in densely populated areas is slightly higher than average compared to people who live less populated areas. Nevertheless, the deviation of these levels from the average is never more than 10 p.p. This overall result does not exclude the existence of relevant differences in the use of ICT which may conceal aspects related to conditions of life in large cities and very rural areas.

As far as socio-economic characteristics are concerned, the result also shows the approximate importance of the availability of ICT at home, although this has been more extensively covered in Adame et al. (2016). As proposed in BBVA (2015, 2016), internet use forms a part of a sequential process, one which begins with availability and which may end with subsequent decisions such as e-commerce and e-banking. People living in homes where there is an

internet connection go online on a daily basis over 10 p.p. more than the average. These results show a link between maximum availability of a service and a frequent use thereof.

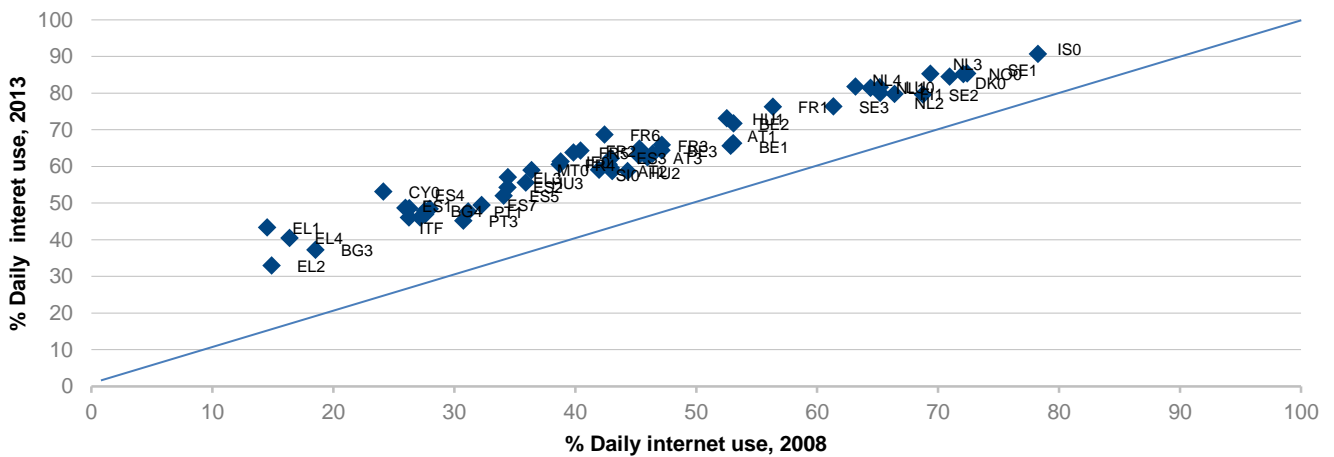
The better the quality of the connection, the more likely people are to make frequent use of the internet. People with a 3G connection record a daily use of the internet that is 18 p.p. higher than the European average, while individuals with a narrow band connection use the internet on a daily basis on a level similar to the average.

These overall results in Europe show the complexity of the internet use phenomenon and these characteristics require a more in-depth study, not only on an overall level but also on a country-by-country basis, to confirm the existence of general and specific trends to help member states in the development of their and the EU's digital agendas.

### 3.5 Geographical breakdown of internet use and its frequency

This section seeks to confirm whether trend differences in the document regarding internet use and its frequency on a country-by-country basis are also present in other smaller frames of reference, such as NUTS 1<sup>3</sup>. Figure 14 shows that all areas have increased in terms of daily internet use between 2008 and 2013, as they are above the bisecting line of the first quadrant. Furthermore, territorial units recording lower levels in 2008 are those with the highest increase in daily internet use between 2008 and 2013, given that the differences on the vertical axis with respect to the bisecting line are greater in areas situated more to the left compared to those situated more to the right.

**Figure 14** Daily internet use based on NUTS 1 in 2008 and 2013 (% of the total number of people)

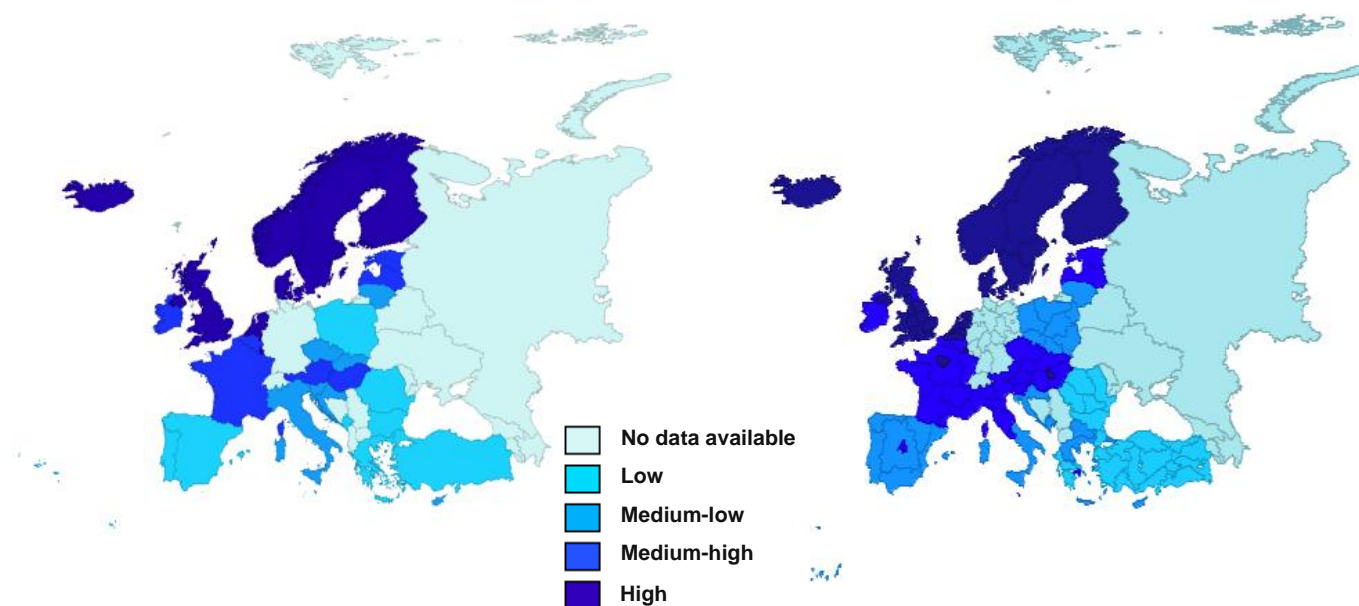


Source: BBVA Research, based on CSIS (Eurostat)

3 For further information on the classification, denomination and nomenclature of NUTS, see the Eurostat website: <http://ec.europa.eu/eurostat/web/nuts/overview>

Map 1 shows distribution in daily internet use on both a country-by-country and territorial basis. Country-by-country internet use distribution is similar to that mentioned in Section 3.2.

**Map 1** Daily internet use in 2013, by country and by region



Source: BBVA Research, based on CSIS (Eurostat)

Comparing the country and region maps shows two differentiated country groupings. The first group of countries highlights the influence of both organisational structures and levels of per capita income. In countries such as Spain, France, Greece and Hungary, there are territorial units associated with the capitals of each country which show daily internet use percentages that are clearly higher than other regions in the country in question. In the case of Italy there is divide between north and south associated with economic questions. In other countries, there was a greater uniformity between areas. Consequently, it is clear that there is no single pattern of behaviour between NUTS in the same country, while the situation in a country determines the units therein.

## 4. Conclusions

This observatory proposes an approximation regarding the use that consumers make of ICTs in Europe via the internet and the computer, using geographic factors during the economic recession. This observatory outlines a complementary vision to that proposed by Adame et al. (2016), in which the focus of attention centres on the availability of technology in the household. It also makes a first approximation to the different activities that the internet offers society in order to better understand the importance of the Information Society in Europe.

Despite the recession in Europe, the use and frequency of use of ICT has increased, specifically the use of the computer and the internet, while the differences between countries has shrunk. The use of computers and the internet between 2008 and 2013 has risen from 69.2% to 79.3% and from 63.6% to 77.8% of the population, respectively. In the same time frame, the proportion of people who use them on a daily basis has grown from 42.1% to 60.6% in the case of the computer, and from 48.1% to 61.5% in the case of the internet.

This convergence of computer and internet use and frequency of use is tied in with an increase in home computer ownership and internet access, as Adame et al. (2016) have highlighted. This confirms that the best way to incentivise internet use is via access promotion and implementation programmes in the household. These programmes make more sense in countries such as Bulgaria, Cyprus, Greece, Italy, Malta and Portugal, compared to Scandinavian countries, Luxembourg and the Netherlands, which have higher levels of computer and internet use and frequency of use. The differences between countries in northern and southern Europe fell between 2008 and 2013, while the influence which per capita income might have on these differences has also fallen.

Another relevant aspect is the reason for using the internet, i.e. the activities undertaken online. If we follow the arguments put forward by Alonso and Arellano (2015), the process of adopting each activity is at different stages. In a situation of full development and stable evolution there are information searches (80% on average in 2013) and those for travel and accommodation (50%). Other activities such as online banking, e-commerce and e-governance can be characterised by the expansion they underwent from 2008 to 2013, with use levels at nearly 60%. Activities related to communications (phone and video calls) and the sale of goods and services are in an initial growth phase, undergoing expansion.

Results confirm that there are differences between countries in each activity, with no clear common pattern linking them. While e-banking and e-commerce show similar internet use behaviour patterns (following a north-south distribution), the situation is different with information searches, travel and accommodation, e-governance and communications. Factors that are as important and yet disparate as the economic situation, the level of development and the availability of ICT, the workings of the public administration, as well as social questions, would seem to condition these results.

As far as the socio-demographical characteristics of daily internet users are concerned, the profile of the consumer is related to the figure of the early adopter (Alonso and Arellano, 2015) and the typical online banking and e-commerce user in Spain (BBVA, 2015, 2016). The most significant group here consists of young men aged between 16 and 24,

with university education, who is either still studying or in work, with a high income and the best possible internet connection.

Differences in internet use are not only exclusive to the countries. The NUTS 1 that they consist of also show divergent usage. It is clear that there is no single pattern of behaviour between the territorial units in the same country, while the situation in a country determines the areas therein. Europe still has a long way to go before it can stand out as a whole among the international powers in the field of use of ICT. The path to follow on the supply side starts with the full development of a digital single market that contributes to the free circulation of technology and increased competition among telecommunications companies that can be translated into an increase in ICT innovation in Europe. It is also necessary to increase investment in infrastructure and networks so as to be able to provide service and deliver the latest technology to all the regions of Europe.

On the demand side, we should take note of the fundamental role that education plays in enabling individuals to develop sufficient skills to be able to interact and prosper in an ever more digital world. It should be remembered that a large number of individuals do not use the internet because they lack training in the use of ICT. Consequently, it is necessary to put in place effective education programmes in order to avoid the co-existence in Europe of “digital natives” and the “digitally displaced”, and to make possible a real digital integration regardless of economic level, age or place of residence.

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## Appendix

**Table A1** Definition of the variables of interest

Variable	Question	Definition
<b>COMP</b>	Do you or anyone in the household have access to a computer at home?	Dummy: 1 Yes - 0 No
<b>IACC</b>	Do you or anyone in the household have access to the Internet at home?	Dummy: 1 Yes - 0 No
<b>CU</b>	Did you last use a computer within the last 3 months?	Dummy: 1 Yes - 0 No
<b>IU</b>	Did you last use the Internet within the last 3 months?	Dummy: 1 Yes - 0 No
<b>CFU</b>	How often on average have you used a computer in the last 3 months?	Daily, weekly, monthly, 1 - 3 months

Source: BBVA Research, based on CSIS (Eurostat)

**Table A2** Definition of the socio-demographic variables of interest

Variable	Characteristics	Definition
<b>Gender (sex)</b>	2 groups	1 Male - 0 Female
<b>Age (agecls)</b>	8 age groups	Individuals aged 15 or less (1), 16 - 24 (2), 25 - 34 (3), 35 - 44 (4), 45 - 54 (5), 55 - 64 (6), 65 - 74 (7) and 75 or more (8)
<b>Education (isced)</b>	3 education levels	1 Primary , 2 Secondary, 3 University
<b>Labor market situation (empst)</b>	4 groups	1 Occupied, 2 Unemployed, 3 Student, 4 Other inactives
<b>Income level (hh_iq)</b>	4 quartiles of household income	1 Low quartile, 2 Medium-low quartile, 3 Medium-high quartile, 4 High quartile
<b>Population density (deg_urba)</b>	Population density in 2013	1 Densely populated area, 2 Intermediate density area, 3 Thinly populated area

Source: BBVA Research, based on CSIS (Eurostat)



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