

Determinants of Digital Divide among Italian Provinces. Generational and Gender Digital Divide in Italy

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Introduction

The analysis of the diffusion of the Internet, taking into account different social and cultural activities, and different political fields, highlights the existence of the “Digital Divide”, that is the digital gap among those having material and cultural resources to exploit the new technologies and those that do not, or that do not have the ability to adapt to the rapid changes that characterize the Internet today. Even if researchers, organizations and governments acknowledge the existence of the digital divide, there have been theories attempting to identify the possible causes of this phenomenon. Many researchers have acknowledged that the differences concerning Internet use among countries are fundamentally related to economic variables such as Internet access costs and per capita income. Starting from these argumentations, the Institute of Informatics and Telematics of the National Research Council of Pisa (IIT-CNR) has decided to analyze the diffusion of the Internet among individuals and compare the respective penetration rates at a geographical level. This in order to verify the possible presence of a Digital Divide in Italy and analyze the factors that determine it, taking into consideration not only economic variables but also, demographic, technological variables.

Purpose of the study and method

The main purposes of this research are:

- The creation of new reliable indicators to measure the Digital Divide and the diffusion of the Internet in Italy (this is due to the impossibility of calculating the exact number of Internet users). In order to analyze the diffusion of the Internet and the Digital Divide in Italy, we have used the domain name in the ccTLD “.it”. The “domain name” indicator represents a valid alternative to the indicator commonly used: the Internet host, both being endogenous¹ and objective² (Zook, 2001).- Description of the heterogeneity of the diffusion of the Internet within a country and not only among different countries. In order to find a solution to the second problem, many studies concerning the

diffusion of the Internet have been made at an International level with the purpose of studying the gaps between rich or poor countries, or among industrialized countries. Our research intends to fill this gap by subdividing the market a priori, on the basis of the geographical area (provinces), in order to verify if the respective penetration rates are different in the Italian geographical areas. If this hypothesis is verified, it will be necessary to evaluate the factors that determine the gap at a provincial level.

Results

In order to identify the existence of the Digital Divide among natural persons, domain names registered by individuals were subdivided according to sex and age. Men register the highest penetration rates (Number of domains registered by Individuals/Number of individuals) compared with women, in all age brackets (see table 1).

Furthermore, in Italy the most representative age bracket in the domain names registration is people in the 34-41 years age bracket for both sexes. However, women register more domain names than men in older age brackets (42 and older), while the domain names registered by men are mainly distributed in younger age brackets (from 18 to 41).

Table 1. Generational and Gender Digital Divide.

| Range | Number of domains Women % | Number of domains Men % | Number of domains Total % | PR Women 10000 Women | PR Men every 10000 Men | PR Total every 10000 Individuals |
|-------|---------------------------------|-------------------------------|---------------------------------|-------------------------------|---------------------------------|---|
| 18-25 | 4.93 | 6.42 | 6.15 | 9.89 | 56.47 | 33.67 |
| 26-33 | 21.60 | 23.19 | 22.90 | 33.06 | 158.97 | 96.63 |
| 34-41 | 26.84 | 27.03 | 27.00 | 34.22 | 155.13 | 95.13 |
| 42-49 | 21.07 | 20.47 | 20.57 | 28.20 | 125.95 | 76.92 |
| 50-57 | 13.29 | 12.41 | 12.57 | 20.97 | 92.74 | 56.21 |
| 58-65 | 7.75 | 6.84 | 7.00 | 13.08 | 56.41 | 34.02 |
| > 65 | 4.52 | 3.64 | 3.80 | 3.18 | 16.27 | 8.66 |
| Total | 100.00 | 100.00 | 100.00 | | | |

In order to analyze the factors that determine the Digital Divide in Italy we have used a linear multiple regression model where the dependent variable is represented by the log of domain names registered in the 103 Italian provinces (Italy is subdivided into 103 administrative units called provinces) and the regressors used in the analysis are demographic, economic and infrastructural variables. These regressors have been extracted from various sources (Istat-Italian National

¹ That is, generated by the same technology.

² That is, based on real and incontestable data.

Statistical Institute, Infocamere and Tagliacarne Institute) which provide data at a provincial level. In order to estimate the parameters of the model we used the ordinary least squares (OLS) estimator. Our results (see table 2) show that per capita GDP, a variable used to measure the wealth of a province, the number of registrars in a province (company or firms which make synchronous registrations of domain names on behalf of Registrants in accordance with the regulations for assignation and management of domain names in the ccTLD “.it”), the index of presence of telecommunication networks and old age index are significant ($P < 0.05$). These results are in accordance with what stated in literature (Massenot et al. 2008), (Kauffman et al, 2005), infact Andrés et al., (2008) show that the impact of Internet Service Providers proves to be significant in expressing the diffusion of the Internet in a country (see also, Stoneman, 1983 and Kiiski and Pohjola, 2002).

Table 2. Determinants Of Diffusion.

F = 47.809, $p < 0.01$ adjusted $R^2 = 0.647$

| Model | Unstandardized coefficients | | Standardized coefficients Beta | t | Sig. | Collinearity statistics | |
|---|-----------------------------|------------|-----------------------------------|--------|------|-------------------------|-------|
| | B | Std. Error | | | | Tolerance | VIF |
| (Constant) | 2.859 | .120 | | 23.815 | .000 | | |
| Per capita Gross Domestic Product | 1.104E-05 | .000 | .185 | 2.516 | .013 | .639 | 1.566 |
| Index of presence of telecommunication networks (Italy=100) | .003 | .001 | .368 | 5.367 | .000 | .778 | 1.266 |
| Number of Registrars | .004 | .001 | .454 | 6.232 | .000 | .652 | 1.533 |
| Old age index | -.002 | .001 | -.195 | -2.893 | .005 | .760 | 1.317 |

Notes: The dependent variable is represented by the log of domain names registered by individuals. In the model we used OLS estimator. The regressors are significant at 5-percent level.

The other variables, such as the log of importation, a variable used as proxy to determine the trade openness of the provinces, entrepreneurial density, density of the population, number of foreigners/inhabitants and the jobless rate of a given province, did not prove to be significant in expressing the diffusion of the Internet in Italy. Furthermore, as shown in table 2, there are no problems of multicollinearity (the VIF values - Variance Inflation Factors - of the variables are all < 2). Moreover, the Durbin Watson test, used to verify the errors independence assumption, do not assume critical values and it is equal to 1.864. As regards the homoscedasticity assumption, the normality and linearity assumptions are all quite respected. Nevertheless, by the analysis of the residuals, the presence of outliers and leverage points is inferred and it should be taken into consideration. Moreover, there are units for which Di, Cook's distance, is greater than 1 and therefore can be considered influential observations (observations whose exclusion modifies the estimates of the least squares).

Conclusions, limitations and future research

Our research shows, in Italy provinces with a high per capita GNP, a high number of technological

infrastructures, a lower old age index and a higher number of registrars are more inclined to use the new technology. In our analysis we have used the least squares estimator OLS in the regression model, however the disadvantage of the OLS is that a number of restrictive assumptions have to be made to guarantee its consistency. We should also consider that the Internet is a dynamic and not static phenomenon; the variables taken into account in the model will have to vary over time. In order to determine the factors that cause the Digital Divide among Italian provinces it is very important to consider also the network externalities. Andrés et al. (2008) show that the influence of network externalities (measured in terms of the lag of the number of Internet users of a given country) is crucial to explain the diffusion of the Internet. In conclusion, it would be important to analyze the various policies adopted by the Institute of Informatics and Telematics (organization that assigns and manages domain names in the ccTLD “.it” in Italy) over time.

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