Senior citizens and Internet technology

Reasons and correlates of access versus non-access in a European comparative perspective

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Abstract If offline older citizens remain offline they will become increasingly disadvantaged from a socio-ecological point of view, as the Internet's societal pervasiveness progresses. We study reasons for non-use and the frequency, intensity, and, the socio-demographic correlates of Internet use of older citizens in Europe. Theoretical relationships on the individual and societal level are ascertained. The Eurobarometer of 2003 offers a range of variables to explore the diffusion of Internet technology among 55+ year-old people in Europe. Descriptive statistics and population average models are used to identify the correlates of Internet access. Within the population segment of older citizens, age continues to have a differentiating effect, net of marital, occupational, and educational status for Internet access. Model replications show that only a few of the net coefficients differ in size. Decisions to remain offline are mainly based on private access possibilities, motivational indifference, and deficient knowledge. Existing socioeconomic inequalities regarding Internet access crystallise within the older population, particularly in the Southern regions of Europe. A claim is made for a necessity to maintain efforts to close the digital age gap.

Introduction

In the European Union, the aging of the population is one of the major challenges most of its member states have to face over the course of the next decennia. Enhanced life expectancy and decreasing fertility rates result in an increased number and proportion of older adults. The Internet offers myriad contents and services that may enhance the quality of life, social participation, and societal inclusion of online senior citizens, currently understood as an aspect of “the making of successful aging” (Czaja and Lee 2007). This study focuses on the question how within the older population age is related to the use of Internet technology.

Technology adoption lags are unproblematic regarding the use of “common” household technology; whether or not people have access to microwaves, motion detectors, or washing machines is, more or less, a matter of personal choice. Technology avoidance becomes problematic, though, with respect to Internet technology. Increasingly, public and private services are accessible (exclusively) via the Internet. Several of these online services are particularly helpful to counterbalance some of the physical, psychological, and social impairments that sometimes occur together with progressing age (Baltes 2001; Selwyn et al. 2003).

Without claiming to offer an exhaustive list recent developments include public alerts on health issues, daily advice, local advertisements, time tables for public transit, connectivity to family members and friends, social support, interactive play, online banking, downloadable travel tickets, software downloads, online information on healthcare services or professional support, chat rooms for senior citizens, a European internet portal for health information and health hazard alerts, internet newspapers, and last but not least, senior citizen list-servers that keep groups up to date

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with relevant online activities and which help to build up social networks (Loges and Jung 2001; BAGSO 2006; European Union 2006; Czaja and Lee 2007).

What is more, the idea of holding online political elections is starting to take shape and some policy issues are exclusively discussed on the net. The symbolic character of setting up a computer at home is often underestimated, too (Mollenkopf 1998a, p. 231). Essentially, using a normal but “youthful” technology like the Internet demonstrates belonging to an up-to-date group with a modern lifestyle (Mollenkopf 1998b). Taking all these issues into consideration, it seems as if the importance of the ability to partake in the information society can hardly be underestimated.

Thus far, the diffusion of computers and the Internet into society has passed by older adults. In 2000, only 13% of the people older than 65 years in the US reported having Internet access (NTIA 2000). In 2005, 61% of the 55–74-year-old people in Europe reported never to have used a computer or the Internet (Demunter 2006; Ottens 2006). Empirical studies on technology adoption confirm concise negative relationships between use of computer and Internet and the age of a person (e.g., Sackmann 1996; Cutler et al. 2003; Korupp and Szydluk 2005). What most empirical studies on the relationship between Internet use and age lack, however, is a socially differentiated and explicit focus on the older segment of the population, a comparative view on how age affects Internet use considering the varying socioeconomic background of people, and, last but not least, hypotheses driven approaches to investigate this particular relationship. The results presented here offer unique comparative insights in the net effects of age, considering people’s individual backgrounds with regard to spatial, socioeconomic, and demographic settings. Before turning to empirical issues, however, some theoretical relationships are discussed.

Theoretical background

The domain of “gerontechnology” is theoretically clustered into several different analytical areas. Mollenkopf (2004) differentiates firstly, a cluster called *compensation* technology. Here technology is used to make up for sensory losses or functional limitations; secondly, “daily life” technology covers devices for rehabilitation to improve temporary or interim sensory losses or functional limitations; thirdly, and our current focus, a cluster exists tackling everything from “low” household to “high-tech” computer and Internet devices.

Research on the latter considers two developmental lags that currently are producing an area of social tension (Riley and Riley 1989; Riley et al. 1994; Lawton 1998). On the

one hand, an *individual lag* occurs if social structure and the environment changes more rapidly than people’s abilities (Lawton 1998). This is the case if Internet diffusion advances more swiftly than the online skills of senior citizens. Generally, new technologies need to be designed in a way that reflects possible cognitive and perceptual limitations so that elderly people may profit from using them (cf. Vercruyssen et al. 1996). Part of this *individual lag* is countered by political measures to support older citizens’ online activities (Mollenkopf 1997). For instance, like a number of other countries Germany has an Internet portal where training courses, online competitions, or general online information are offered to a “generation 50+” (BAGSO 2006). On the other hand, a *structural lag* exists concerning the mismatch between the changing capabilities of older persons and the opportunity structures of modern societies (Riley and Riley 1989; Riley et al. 1994). Here, social structure and institutions fail to keep pace with changes in individual abilities (Cutler 2006). Today, the so-called *young-old*, for example, do not match the common societal images of senior people: On average, elderly people today are healthier, better educated, and wealthier compared to earlier cohorts.

In line with this view, it does not suffice to explain lower access rates of senior citizens merely by linear “age”. Considering a childhood environment bare of technology or stocked with rudimentary household technology only, age group effects may offer equivalent explanatory power (Sackmann 1996; Hardy and Baird 2003). To pinpoint these different social realities within varying ages, a distinction between middle-aged, young and old senior citizens has to be made.

Additionally, individual biographical experiences, and socialisation or compositional effects may be responsible for any observed age differences in technology usage. A number of women, for instance, lack technical experience or leave it up to the other sex to deal with technological matters. As the proportion of women increases within higher age groups, average Internet versatility perhaps may decrease with age, although age is not the causal explanation; gendered and historically specific socialisation effects may crystallize with respect to age differences in Internet use. What is more, individual characteristics like education and labour force participation may explain part of the observed correlation with age (Korupp et al. 2006; Dobransky and Hargittai 2006). Thus far, a connection between aging effects and compounding effects of gender and socioeconomic background is pending explanation with regard to Internet use.¹

¹ Panel or life history data are needed to discern such effects. With the data used here we cannot distinguish between age and cohort effects. To our knowledge, publicly available panel information on the Internet use of older adults in Europe does not exist.

In the existing literature, a number of additional socioeconomic characteristics have been identified that correlate with the propensity of Internet use. As the Internet is an intrinsically interactive technology—covering direct as well as lagged communication—it seems especially important to consider existing social ties at home. If there are (at least) two people living in a home, the exchange of information on Internet technology may become more interesting and entertaining—but it also may become less necessary. However, research shows that Internet *laggards* often live alone (Korupp and Szydlik 2005). Even when controlling for other socio-demographic variables and compositional effects at an advanced stage of life, primary social ties may prove important for individuals to remain involved in using the Internet.

Limitations to take up gainful employment may present another obstacle and reason for belonging to the group of *laggards* who use new technologies late or never. In myriad jobs, the Internet has become a common if not essential tool, increasing employed people's likelihood to go online (Demunter 2006; Korupp and Szydlik 2005).² Variations in the labour market participation or merely labour market availability may help to identify group differences to become and remain involved with Internet technology.

Another general finding is that the development of the digital divide parallels that of economic inequality (Bucy 2000; DiMaggio et al. 2001; Korupp and Szydlik 2005; Korupp 2006).³ In a typology of Internet users it is suggested that educational level enhances general levels of interest (Mollenkopf and Kaspar 2005). Internet skills may count as part of a general education—easier to acquire for people who already have a high level of formal schooling (Korupp 2006). Therefore, educational level probably will be positively related to the propensity of senior citizens to use the Internet.

How can we explain the existence of non-user patterns in relationship to age? What sort of consequences for Internet access might be connected to specific patterns of socioeconomic background? The first goal of this paper is to identify the prevalent reasons for not using the Internet; the second objective is to explore empirically in how far the Internet access of older citizens is determined by their

socioeconomic background as reviewed above. Both objectives are followed up by a European comparative empirical approach for the segment of the older population in order to substantiate our analytical findings by model replications.

Data and methods

Our analyses are based on the Eurobarometer of 2003 (no. 59.2), a large representative survey of the European population (ZA 2006). Data were collected between May and June in 2003 and include completed surveys on a total of 16,161 people. The sample we analyse is restricted to represent the middle-aged and senior population, 55 years and over, in 15 European Countries ($N = 5,091$).⁴

Within comparative European empirical research it has become common to differentiate between various welfare regimes (e.g., Ferrera 2000; Räsänen 2006). Following this approach, four types serve to establish a theoretically guided regional distinction within European countries (Euro15) used in our analyses: The Nordic, Continental, Liberal, and Mediterranean region. The Nordic countries (including Denmark, Finland, and Sweden) are exemplary for issuing extended social benefits, reinforcing gender equality, and striving for full employment. Continental countries (including Austria, Belgium, Germany, France, Luxembourg, and The Netherlands) accentuate a conservative “breadwinner” model with high institutional benefits encouraging motherhood, while striving for full employment (of men) and offering measured social benefits. Liberal countries (including England and Ireland) offer modest social benefits only, while encouraging full employment and gender equality. Mediterranean countries (Portugal, Spain, Italy, and Greece) incorporate a high measure of reliance on family networks and offers modest social benefits, accentuated by a traditional Catholic culture (Esping-Andersen 1990; Arts and Gelissen 1999, 2002). The utilization of these four regions improves the spatial categorization and enhances the reliability of our results by the way of model replication.

In studies on the digital divide we often observe basic and crude categorizations of the senior population segment (e.g., Demunter 2006). The three age categories we form (55–64, 65–74, and 75+ years) discern the “middle-aged” from the “young” and the “old” senior age. Distinguishing

² The social reality of the middle-aged population also entails that many will be likely to be living together with teenage children, a fact that has been proven to increase older people's likelihood to use computers and Internet (see Korupp and Szydlik 2005). We thank an anonymous reviewer for emphasising this point. Unfortunately, we are unable to follow up on this issue in our European comparative model, because the data does not contain this information.

³ The terminology “digital divide” is defined as a division between individuals and households at different socio-economic levels, here in connection with the use of the Internet (cf. Korupp and Szydlik 2005).

⁴ Included are (in alphabetical order): Austria, Belgium, Denmark, Germany, Finland, France, Great Britain, Greece, Italy, Ireland, Luxembourg, Northern Ireland, Portugal, Spain, Sweden, and The Netherlands. The empirical results presented for the respective countries are based on representative data (ZA 2006). Additional empirical replications of our model with the European Social Survey from 2004 yielded similar results to the ones presented here.

the “middle-aged”, “young” and “old” senior citizens may allow for a more detailed view, since large socialization variations exist between these three groups (Sackmann 1996). For instance, within the 55–64-year-old we are sure to find a large enough group of actively employed people to capture the offsetting effects of labour market activity (Künemund and Kolland 2007). The 2003 survey also includes questions about the reasons for non-use and use of computer and Internet and questions as to where, how often, and how many hours per week the Internet was used. Additionally, non-users were asked how they might be encouraged to use the Internet; and how they thought it would change their daily life if they did. All respondents were asked what kind of information they would like to find on the net, how they would use the Internet, and what sort of training they would require to use the Internet.

Results

Reasons for not using the Internet

The key reasons ticked by senior citizens for not using the Internet are shown in Table 1. Categories are roughly assorted in an ascending order.⁵ In Table 1, the most common reasons for non-access are the categories “no computer at home” and “not interested”, although regional and age group differences exist. In-home computer access seems to be less important in the south of Europe compared to the rest of the Euro15. The two motives may be categorized indicating a *lack of means* and *motivational indifference*. Lack of means is a smaller and motivational indifference is a larger issue within the young and old senior population, compared to the middle-aged population.

For the option “PC is too expensive” (last row) we also find regional and age differences. Only 1.5% of the senior citizens in the Mediterranean countries ticked this option while the other column percentages range between 8 and 10% (see Table 1). In southern Europe, a lack of means seem to be less decisive for older people’s offline choice. In part, this may reflect a higher proportion of elders living in co-residence with their adult children in the southern countries (Kohli et al. 2005).

Comparing age groups, the expense of the Internet or a computer is less often ticked as a reason to remain offline by young and old seniors compared to middle-aged people. The reason may be twofold. For instance, financial concerns seem to be less crucial for senior citizens compared to middle-aged people. On the other hand, it may simply be the case that a lack of knowledge about the Internet also includes a lack of knowledge about its price. Respondents were not asked to offer a price estimate on how high they estimated the cost of Internet.

We also find pronounced differences between the three age categories for offline people ticking that they “do not know what it is” (middle-aged: 8%, young seniors: 13%, and old seniors: 18%). Thus, a minority would prefer to use the Internet but cannot afford it. A majority does not invest in Internet technology because they are not interested or lack knowledge about it.

Another important category for not using the Internet is “missing skills”. Nearly 20% of the non-using senior citizens in the Euro15 region perhaps might be persuaded to go online if they were instructed on how to use the Net. With regard to the aging process in Europe this is an alarming percentage. The same holds for about 8 to 18% of the respondents who ticked the next category “I do not know what it is”. These individuals might be induced to go online, too, if they were to receive substantial instructions on the functioning of the Internet.⁶ The reason “too complicated” is ticked by almost 12% of the non-users within the Euro15 region (with small variations between age groups). On average, about 7% of the non-users do not access the Internet because they do not believe the contents on the Web to be useful.

In sum, the descriptive results indicate that roughly 32–38% of the senior non-users simply lack opportunity. Between 10 and 20% of the non-users report skill related reasons, a minority considers the information on the Net to be useless, and only 3–9% of the non-users report financial concerns as their main motivation for remaining offline. Country differences tentatively point into the direction that less familiarity with computers prevails in the Mediterranean region.

Socio-demographic correlates of Internet access

In order to examine the socio-demographic correlates of Internet access our analytic model includes a binary dependent variable on Internet use and several independent variables on socio-economic background: the already mentioned three age categories, marital status, educational

⁵ We discuss items that were ticked by more than 5% of the senior population. Other items that non-users were able to choose were: “I have no time”, “I have no computer at work”, “there is no public access point”, “the technical barriers are too high”, “the Internet is not secure enough”, “existing language barriers”, “problems with the provider”, “other reasons”, respectively, “unspecified” (question 47, 59.2 Eurobarometer survey).

⁶ Note, that these percentages cannot be added because multiple responses were possible.

Table 1 Reasons of senior citizens for not using the Internet

	Nordic	Continental	Liberal	Mediterranean	Euro15		
					Age (years)		
					55–64	65–74	75+
No computer at home	49.7%	39.2%	48.0%	23.9%	38.0%	35.1%	31.6%
Not interested	21.3%	35.8%	24.1%	39.6%	30.5%	37.6%	37.8%
Missing skills	20.1%	16.4%	26.3%	21.2%	21.1%	18.4%	18.8%
Don't know what it is	8.9%	8.3%	6.8%	21.7%	8.4%	13.6%	18.3%
Too complicated	7.7%	14.7%	10.1%	8.5%	13.5%	10.7%	10.7%
Contents not useful	6.5%	9.0%	7.7%	3.6%	7.3%	7.1%	5.7%
WWW too expensive	8.3%	7.8%	9.0%	3.4%	9.4%	6.3%	2.5%
PC is too expensive	10.1%	8.3%	10.6%	1.5%	8.8%	5.3%	4.1%
N	169	2152	556	1591	1,595	1,729	1,144

Source: Eurobarometer 59.2 (May–June 2003), weighted data

level, occupational background, and gender. Table 2 presents the weighted cell percentages for the variables used in the analyses.

People living in a Nordic welfare regime generally have the highest number of computer and Internet users (Räsänen 2006). We see a similar result in Table 2. In the North, we observe the highest percentage of “silver surfers”. On average, 22.3% of the senior population in Europe are computer and 16.8% are Internet users (Euro15) with large differences between age groups. Unsurprisingly, the highest user percentages for computer and Internet can be identified amongst the youngest of our three age groups (35%, respectively, 26%). Among the young senior citizens we observe a percentage of nearly 15% (computer) and 12% (Internet) users. On average, only 11% of the old senior citizens use the computer and roughly 8% use the Internet.

About 36% of the individuals in our data are 55–64-year old, approximately 39% are between 65 and 74 years old, and 25% are 75 years and older.⁷ Between 55 and 65% of the respondents live with a partner, while 3–4.5% report never to have had a partner. For marital status, too, an aging effect may be observed, where older seniors more often report not having a partner compared to middle aged people. The percentages of people reporting never to have had a partner remain rather steady within age groups.

The next variable describes current occupational status.⁸ On average, the category ticked most often is “retired”, less

often by middle-aged people (41%), and more often by young and old seniors (80%, respectively, 90%). Large regional differences exist regarding the percentage of homemakers. In Northern Europe, only 1.1% (otherwise 12–16%) of the people report to be a homemaker. Self-reported unemployment rates are at a 3% level, except for the Mediterranean where roughly 1% identified themselves as unemployed. In the Euro15 region, 6.7% are blue-collar workers, again with considerable differences between regions. In the Nordic and Liberal countries, 10.4%, respectively, 13.8% are blue-collar workers. In the Continental and Mediterranean countries we find 5.6%, respectively, 4.4% of the people in this group. Between 7 and 9% of the older citizens are self-employed in most of Europe. Only in the Continental type countries this percentage is lower, with on average 3.6%. Between 2 and 5% of the older population are white-collar workers. The percentage of managers varies considerable with 8.6% in the North, 3.2% in the Continental, 4.5% in the Liberal, and 2.1% in the Mediterranean countries. The Euro15 average is 3.3%.

Educational level has a prearranged ordinal scale containing three groups.⁹ Altogether, 53.8% of the respondents have up to 15 years of education, 31.6% between 16 and 19 years of formal schooling and 14.6% have 20 and more years of education. Measured this way, educational level is distributed unevenly in the Euro15 region. The Northern countries show the highest percentage of senior citizens with 20 and more years of education, while the other countries display a higher percentage of respondents with only up to 15 years of education. We also observe average differences between age groups in the Euro15 region. The younger the age group, the higher the percentage of people with a higher education (+20 years). Partly, the middle-aged people already enjoyed the advantages of the

⁷ The age of the respondents in the models ranges between 55 and 96, with a mean of 68 years and a standard deviation of eight years (Table not shown).

⁸ Analysing current occupational status serves to compare effects of retirement and unemployment to paid employment without an unnecessary inflation of the model variance (e.g., using educational/occupational level and income), and it serves as a rough indicator for financial resources.

⁹ We excluded a small group of current students ($n = 12$).

Table 2 Column percentages of the variables used in the analyses

	Nordic	Continental	Liberal	Mediterranean	Euro15			
					Age (years)			All
					55–64	65–74	75+	
Computer users	45.4	21.7	35.4	13.2	35.0	15.4	10.9	22.3
Internet users	36.9	15.3	33.1	8.0	26.1	12.3	7.5	16.8
Age (years)								
55–64	27.8	36.3	35.1	36.0	100.0	0.0	0.0	35.7
65–74	38.5	36.5	42.7	40.3	0.0	100.0	0.0	38.7
75+	33.7	27.2	22.2	23.7	0.0	0.0	100.0	24.6
Marital status								
With partner	55.6	56.1	59.3	64.1	71.5	56.3	42.1	59.1
Never partner	4.5	3.2	4.5	2.9	3.3	3.8	2.6	3.4
No partner	39.9	40.7	36.2	33.1	25.1	39.9	55.3	37.5
Occupation								
Retired	63.4	71.1	55.5	65.3	41.2	79.9	89.1	66.4
Homemaker	1.1	11.7	12.0	15.9	17.0	12.0	5.8	12.6
Unemployed	2.6	2.6	2.8	0.9	4.3	0.5	0.7	2.1
Blue collar	10.4	5.6	13.8	4.4	13.5	2.2	2.3	6.7
Self-employed	9.0	3.6	7.1	7.3	10.5	3.2	1.0	5.6
White collar	4.9	2.1	4.3	4.1	6.7	1.0	0.6	3.2
Manager	8.6	3.2	4.5	2.1	6.9	1.2	0.6	3.3
Educational level								
Up to 15 years	29.1	44.8	58.4	68.6	44.0	58.3	63.7	53.8
16–19 years	21.3	40.6	32.1	19.8	37.6	28.3	26.4	31.6
+20 years	49.6	14.6	9.5	11.6	18.4	13.4	9.9	14.6
Gender								
Men	44.4	43.4	44.9	44.1	48.9	42.6	37.4	43.9
Women	55.6	56.6	55.1	55.9	51.1	57.4	62.6	56.1
N	1,087	2,100	560	1,344	2,046	1,868	1,171	5,091

Source: Eurobarometer 59.2 (May–June 2003), weighted data

educational expansion during the 1960s, showing up as measurable effect 40 years later, as the numbers in Table 2 indicate.

The results for the variable *gender* indicate that we have a higher percentage of women than men in our set of data. This ratio shows the respective share of woman and man in the population. In part, the uneven share may be allotted to the mainly male victims of WWII and the higher life-expectancy of women, particularly within the old senior group.

Multivariate results

Two groups of individuals are compared in our analytical model: users and non-users of the Internet in Europe. In such a socio-economically varied region like Europe, we assume random effects to exist at country-levels that *nest*

or *embed* all individuals within the 15 European countries included in our analyses. A population averaged model with a method of generalized estimation equations (GEE) is used to consider average random country effects while statistically computing the model coefficients (Hosmer et al. 2000). This model is well-suited for describing large groups of subjects. The odds ratios in this table show the effect sizes for groups of subjects rather than for individuals.

As we opt to put an emphasis on regional variation, coefficients are displayed for four regions and a generalized Euro15 model. The Wald χ^2 test at the bottom of Table 3 indicates that all the analytical models fit the data fairly well, albeit to varying degrees. We notice that the best model fits are achieved for the Nordic and Continental countries and the Euro15 model. Nonetheless, the lower Wald χ^2 test values for the Liberal and the Mediterranean groups are quite acceptable.

Table 3 Odds Ratios for the Internet Use of Older Citizens in Europe (Euro15)

Number of groups	GEE population averaged model (Z Values)				
	Nordic 3	Continental 7 ^a	Liberal 2	Mediterranean 4	Euro15 16 ^a
Age (years)					
55–64 (<i>R</i>)	1	1	1	1	1
65–74	0.62* (2.6)	0.57** (3.5)	0.63* (2.0)	0.62 (1.5)	0.63** (4.9)
75+	0.22** (5.2)	0.31** (4.5)	0.49* (2.2)	– ^b	0.30** (7.2)
Marital status					
With partner (<i>R</i>)	1	1	1	1	1
Never partner	0.49 (1.8)	0.52 (1.5)	0.37* (2.1)	2.43 (1.5)	0.60* (2.4)
No partner	0.48** (4.8)	0.60** (3.2)	0.37** (3.6)	0.74 (0.8)	0.56** (6.3)
Occupation					
Retired/homemaker (<i>R</i>)	1	1	1	1	1
Unemployed	3.00** (2.7)	0.78 (0.6)	2.60 (1.6)	1.95 (0.6)	1.62* (2.2)
Blue collar	1.90** (2.7)	1.76* (2.5)	0.6 (1.4)	0.40 (0.9)	1.44** (2.8)
White collar	7.71** (5.3)	3.88** (4.4)	4.53** (3.0)	4.75** (3.6)	4.49** (8.8)
Managers	17.19** (6.8)	4.91** (5.7)	2.57* (2.0)	8.41** (4.5)	5.80** (11.0)
Self-employed	2.02** (2.6)	3.00** (4.2)	2.17* (2.4)	6.04** (4.6)	2.44** (6.6)
Educational level					
Up to 15 years (<i>R</i>)	1	1	1	1	1
16–19 years	2.82** (4.3)	1.96** (3.8)	2.88** (4.1)	6.64** (4.7)	2.46** (7.9)
+20 years	4.34** (6.8)	7.00** (9.8)	8.33** (5.3)	8.59** (5.1)	5.66** (11.0)
Gender					
Men (<i>R</i>)	1	1	1	1	1
Women	0.58** (3.2)	0.82 (1.4)	0.98 (0.4)	0.66 (1.5)	0.78** (2.3)
Wald χ^2	220	212	59	63	432
<i>N</i>	1,087	2,100	560	1,344	5,091

Source: Eurobarometer 59.2

^a Germany is included as East and West Germany^b Due to a small number of cases in the 75+ age category, the model only converges with two age categories in this country cluster* = $p < 0.05$; ** = $p < 0.01$

We expected to find net differences in the level of Internet use within the older population depending on their age group. In Europe (Euro15), young senior citizens (65–74 years) are only two-thirds as likely to access the Internet compared to the middle-age group (55–64 years). The old senior citizens are only one-third as likely to access the Internet in comparison to the middle-aged population (see Table 3).

The use of the Internet as an interactive technology is supposed to be enhanced by the existence of social networks (and vice versa). With no better alternative in the data, we use “marital status” as a rough indicator. In Europe (Euro15), senior citizens without a partner are significantly less likely to access the Internet. Only in the Mediterranean countries the coefficient for never having had a partner points into the opposite direction.

Regarding occupational status, it was posed that participation in the labour force would yield higher odds to use

the Internet because of the increase in people’s social ties through work relations and thus more opportunities to interact on the Internet. We also pointed out that myriad jobs today require online skills. Accordingly, the empirical net coefficients in Table 3 show white-collar workers, managers, or self-employed people to have significantly higher odds to go online. In the Nordic region, retirement seems to be the cutting edge for remaining offline. Even if unemployed, though people in the North have significantly higher odds to access the Internet.

Educational level is essential when assessing the probabilities of people for accessing the Net. Accordingly, in all models a significant positive correlation exists between educational level and Internet access. In the Euro15 model, the variable “gender” indicates significantly decreased Internet access levels for female persons. Odds are decreased in all of the regions, though a significant net effect is identified only in the North. The non-significance

of the gender effect in the other regions tentatively may hint either towards an increased importance of educational level or towards a decreased importance of gender roles within the senior population segment.¹⁰

Discussion

Computers are becoming pervasive throughout society. Since several years, a trend towards an increased distribution of vital information via the Internet can be observed and this trend is unlikely to stop in the near future. With our current work we can partly answer the question why older citizens do not use the Internet, in a European comparative perspective. Additionally, some answers are sought as to how individual socioeconomic background determines the likelihood of the Internet access of older adults. To date, many studies focus on the evaluation of local instruction programs for the older segment of the population. A growing number of studies construct a sound theoretical basis for research on the use of gerontechnology, but without the appropriate empirical models to observe the net aging effects of the proposed relationships. In part, our current study fills this research gap for theory based empirical research on the Internet use of senior citizens in Europe.

Regarding our first research question, the core reasons for not accessing the Internet are assorted along three main categories: *lack of a device*, *motivational indifference*, and *deficient knowledge*. Thus, our results underline former empirical findings that senior citizens prefer to have a computer at home to access the Internet (e.g. Selwyn et al. 2003). On average, financial concerns seem to play a minor role, probably due to today's decreasing costs for computers and Internet. However, this aspect cannot be ignored, because especially those in financial need may profit from new technologies.

Additionally, it might be possible that if people select a *lack of device* as one of their reasons to remain offline it may partly be because of a lack of *service* (Sackmann 1996). Appropriate assistance to choose a computer model, hardware, software, or custom-tailored support for proper installation routines may lower the hurdles to overcome this problem. In this context, another stumbling block may be a need of adequate instructions to make learned decisions after a computer is purchased and set up at home (e.g., security issues, automatic downloads, freeware access, or malfunctions). In conclusion, feigning non-interest at times

may serve as a protection from alleged claims of—to date legitimate—notional inactivity.

Although we cannot disregard the fact that a small percentage of non-liners holds that costs are too high, the results show that the expenses for computers and Internet are not at the very centre of the question on how to overcome non-access within the older population segment. Based on expected policy and commercial effects, one might have anticipated a more thorough support to introduce basic computer technology at senior citizens' homes. Current results lead us to conclude that adequate modes for lowering possible thresholds and setting up Internet connections at home can be labelled "insufficient", at best.

Turning to our second question, answers were sought as to how socioeconomic background influences Internet access at an advanced stage in people's life. Firstly, except within the Mediterranean region, our results show that considerable net differences exist between "young" and "old" senior citizens. Secondly, the existence of primary social ties in the household—other things being equal—enhances the likelihood of older people to access the Internet. Earlier results from an event history analysis for Germany indicate an even stronger positive influence for using the Internet via the presence of teenage children at home, compared to living with a partner (e.g. Korupp and Szydlik 2005). Further research will have to focus on the meaning of social ties for becoming a technology adopter. Thirdly, in the older population segment, employment and occupational status positively influence people's odds to use the Internet. As soon as older adults retire, their propensity to access the Internet seems considerably reduced, at least in a cross-sectional perspective. Additionally, higher education levels usually imply higher odds to be online. And, last but not least, women are on average less likely than men to access the Internet. Earlier studies show, though, that gender roles do not seem as pronounced at an advanced age as compared to younger age groups (ibid.).

Altogether, the empirical models support most of our theoretical notions, although some findings have to be hedged with a few caveats. First of all, we cannot rule out that interactions exist between the socio-economic background of individuals and unmeasured psychological and cultural variables. An indication for this may be that the best model fit is achieved for the Nordic region, where most of the senior Internet users are found. We may be observing a psychological momentum or social normalities where people in some countries feel more obliged to adopt new technology perhaps because part of their national industrial production is based on manufacturing them.

Secondly, the results show that socioeconomic differences exist in all of the four spatial regions, albeit to different degrees. The digital divide is most accentuated in

¹⁰ A replication of the current model carried out with the European Social Survey (2004) showed consistently significant gender effects at an advanced life stage, nevertheless requiring additional empirical support.

the Mediterranean region where strong relationships can be identified between education and Internet access. On the one hand, the finding may point to a tight knit between inequality and access. On the other hand, our results also show that in Western European populations the average educational level has increased in younger age groups. Taken together, these two issues lead us to the tentative conclusion that regional differences may become less pronounced in the future. Still, from our point of view, more efforts should be made to encourage life-long learning in the older segment of the population.

It remains undetermined how future generations of “silver surfers” will look like. Some studies rate future developments positively because coming generations will get used to new technologies throughout their lifetime (Mollenkopf 2004). Others take a rather hesitant point of view stating that today as well as in the past the pace of change through generational exchange has remained overstated. In every generation the needs and requirements of elders change as they advance into old age (Selwyn et al. 2003). Given the increasing speed of technology development, to some extent a structural lag in old age might become a permanent characteristic of modern times—as long as facilities for lifelong learning at an advanced stage of life remain underdeveloped.

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