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DETERMINANTS OF THE DIGITAL DIVIDE: EVIDENCE FROM FRANCE

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The COVID-19 crisis accelerated the digital transition and reinforced the existing digital divide. This paper aims to identify the determinants of internet inequalities in access, usage, and type of usage in France and the reasons behind the lack of access to the internet. Using French Institute of Statistics (INSEE) surveys between 2007 and 2019 and pseudo-panel methodology, we show that generation, education, and income are significant determinants of the probability of having an internet access and to use it. However, disparities in the type of internet use are less pronounced. The fight against the digital divide in France must therefore be directed at facilitating access to an Internet connection. The two main barriers are the lack of skills and the cost of internet access. Hence, we recommend investing in digital education and providing financial support to bridge the digital divide.

JEL Codes: L86, L96, O33.
Keywords: Digital Divide, Internet Use, Internet Access, Pseudo-Panel Methods, France.

1. INTRODUCTION

In 2019, the OECD (2019) highlighted that: *"safe digital technologies improve the lives of those who have the skills to use them."* The correct use of digital technologies can facilitate access to essential services such as health, education, banking, and administrative services. One year later, the COVID-19 crisis and the many resulting lockdowns accelerated the digital transition and reinforced the need to access and use digital tools.[1] The OECD (2020a) points out that digital inequalities have increased during the crisis and should be addressed. For this purpose, it is necessary to identify the individuals most affected by the digital divide and the determinants of these inequalities. This paper investigates the French digital divide by exploring three different research issues. What are the determinants of the inequalities in internet access and use? Are there digital disparities in the variety and type of internet use? Finally, what are the reasons for not accessing the internet?

¿Cuáles son los determinantes de las desigualdades en el acceso y uso de Internet? ¿Existen disparidades digitales en la variedad y tipo de uso de Internet?

The digital divide refers to disparities in access and use of digital technology between individuals. It raises multiple issues. From a macroeconomic perspective, digital inequalities can hinder the digital transition and, therefore, its impact on productivity and economic growth. Eichengreen (2015) argues that the effect of technology depends strongly on its range of applications and use by economic actors. Reducing digital inequalities is also an issue for the well-being of households. The OECD (2019) emphasizes that digital literacy facilitates social participation in various areas. For instance, public services are increasingly present online and medical teleconsultations are on the rise and help improve

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[1]The digital transition refers to the diffusion of digital technologies in the economy and society, both in terms of adoption and use by economic agents.

healthcare access. Digital illiteracy is also an obstacle to employment as an increasing number of jobs require basic digital skills (Berger and Frey, 2016). In fact, Eynon, Deetjen, and Malmberg (2018) point out that digital access and usage contribute to social class mobility. In 2019, 67,5% of French people considered the internet necessary to feel integrated into our society.[2] While digital technology improves the well-being of those who use it (Pénard, Poussing, and Suire, 2013), it tends to exclude those who do not, whether concerning participation in society or the labor market.

In recent years, France has made progress in reducing the digital divide. In 2019, 85.2% of the French population used the internet at home, compared to only 51.2% in 2007, placing France at the OECD average (OECD, 2020b). This improvement can be attributed to a combination of factors, such as the time required for technology to be adopted and the government's commitment to fighting the digital divide. In line with OECD countries, the first public policies focused on investing in high-speed Internet infrastructure throughout the territory. It was the objective of the "law in the fight against the digital divide" in 2009, the national broadband program of 2010, and the "France Très Haut Débit" plan of 2013. Investment has also been made to equip schools with appropriate digital tools to improve students' digital skills and prevent the digital divide among the younger. In 2018, the French government implemented a national strategy for inclusive digital. It proposes, among others, digital passes which allow access to digital courses and digital advisors to help to perform administrative tasks online. However, despite important progress, the digital divide still exists in France. It is essential to investigate if the time effect is still at play and if public policies in place are adequate to address the reasons behind non-access to the internet and help the concerned population. The issue is all the more important since the French government aims to digitize all public services, which can reinforce the existing inequalities (Défenseur des droits, 2019).

This paper contributes to the existing literature by addressing several of its limits. While previous studies have highlighted that the factors contributing to the digital divide vary across countries, there have been limited contributions on this issue in France. Most research uses cross-sectional data because of the difficulty of interviewing the same individuals each year to create a panel survey. As a result, temporal evolution is ignored while the digital transition is ongoing. This paper applies pseudo-panel methodology (Deaton, 1985) using French Institute of Statistics (INSEE) household surveys on Information and Communication Technologies (ICT) from 2007 to 2019. This methodology allows using panel methodology with repeated cross-sectional data and, therefore, captures the temporal evolution of digital consumption over thirteen years and the characteristics of the French case. To this aim, we consider cohorts formed according to their generation instead of individuals.[3] This approach in terms of cohorts allows capturing intra and intergenerational inequalities, highlighting that those born closer to the diffusion of digital technologies are more likely to have access to and use the internet. Furthermore, we study several levels of the digital divide. We provide an in-depth empirical investigation of the determinants of inequality in internet access and use. The diversity of online activities in which individuals engage can create opportunities. Therefore, we also focus on internet users

[2] `https://www.data.gouv.fr/fr/datasets/barometre-du-numerique/`, downloaded in July 2022.

[3] A generation is a group of individuals born in the same period. In a second time, we form the cohorts according to gender and generation to investigate a potential gender digital gap.

and explore whether disparities exist in the variety and type of internet usage (administrative and banking services, social media, leisure, e-commerce, collaborative economy, and job search). It provides a profile of those most affected by the digital divide regarding access and diversity of internet use. Identifying barriers to digital access is essential to establishing effective public policies to reduce the digital divide. Hence, we also focus on individuals who do not have internet access at home and investigate the reasons behind their lack of access to the internet.

Our results highlight significant inequalities between generations. The younger ones have better access to and use of the internet than the older ones. The access and use of digital technology have been improving over time for all French population. In addition, intra-generational inequalities appear through income and education levels. A gender gap in favor of men emerges, but only for older generations. The household size impacts only the probability of accessing the internet at home, not its usage. Our results also show that population density is not a determinant of the digital divide in France, suggesting that digital infrastructure is not an important barrier to digital access in France, as the internet relatively well covers the French territory. If there is a rural/urban digital divide, it concerns the quality of the internet. Indeed, access to broadband internet, such as fiber, is not uniform throughout the territory. Intra-generational inequalities are no longer apparent when one focuses on internet users to study the diversity and type of internet usage. The probability of individuals engaging in an online activity depends mainly on their generation. Finally, we highlight that not accessing the internet because of a lack of skills and interest mainly concerns the older generations, while the young ones are more likely not to have the internet because the cost of the equipment or the internet connection is too expensive. In light of our results, we discuss public policies implemented in France to reduce the digital divide. While investments are made to improve digital skills and provide access to quality infrastructure, a financial support policy, such as equipment checks to rent or purchase a computer, is missing.

The remainder of this paper is structured as follows. Section 2 provides a literature review of the determinants of the digital divide. Methodology and data are presented in Section 3. Section 4 presents the empirical results. Section 5 discusses the results in the context of French public policies and Section 6 concludes.

2. LITERATURE REVIEW

The digital divide was first studied as a problem of access to ICT. Goolsbee and Klenow (2002) studied the determinants of computer adoption in the United States of America (USA) in 1997. They found strong local spillover effects in computer diffusion, such as living in an area with a high proportion of computer ownership and having a friend or family member who owns a computer. As computers became more widespread, studies turned to the adoption of more recent technologies. Prieger and Hu (2008) investigated the determinants of broadband access in the USA. They highlighted that the demand for broadband access is higher for individuals with high incomes and levels of education and lower for individuals from ethnic minorities. Reddick, Enriquez, Harris, and Sharma (2020) obtained similar results, but, studying the case of San Antonio, they point out that digital disparities are often perceived as a rural/urban divide, there are inequalities within cities. A second level of the digital divide rapidly came to light: the disparities in usage once the individual has access to digital equipment (Hargittai, 2002). Indeed, access is a necessary but not sufficient condition for the effective use of digital technologies.

Furthermore, Montagnier and Wirthmann (2011) point out that the main determinants of digital access and use can differ. Considering 18 European countries, Canada and South Korea, in 2008, they identified income level, children's presence in the home, and living in an urban area as the main determinants of computer and internet access. Internet use, on the other hand, is more influenced by age, economic inactivity, and education. Korupp and Szydlik (2005) find that computer and internet usage in Germany between 1997 and 2003 mainly depend on education, computer use at work, income, having teenagers or young adults in the home, gender, and being born in the *"computer"* generation. Helsper (2010) identifies a digital gender gap in internet use in favor of men that is smaller among young people. Nevertheless, that research also points out that this difference between young and old is not only due to a generational effect but also depends on different life stages (occupation and marital status). Schleife (2010) observes disparities in internet use between German counties. She demonstrates that these disparities are not explained by differences in population density but rather by differences in the composition of individual characteristics of each county. Besides the socio-demographic characteristics, Goldfarb (2006) emphasizes the university's major role in the diffusion of digital technology. Its impact is even more significant as the individual's income is lower.

Once an individual has access to and uses the internet, disparities in the mode of use may exist between individuals. Using a survey conducted in 2001 in the USA, Goldfarb and Prince (2008) showed that while income is a key determinant of digital adoption, lower-income individuals tend to spend more time online when they do have internet access. They explained this result by the differences in the opportunity cost of leisure time. Age negatively impacts internet use and the time spent online. Pantea and Martens (2013), Haight, Quan-Haase, and Corbett (2014), and van Deursen and van Dijk (2014) find similar results for low-income individuals in France, Germany, Italy, Spain, and the United Kingdom (UK), migrants in Canada, and individuals with disabilities in the Netherlands, respectively. Hitt and Tambe (2007) highlight that a high-quality infrastructure, such as broadband access, increases the time spent online. Nevertheless, these disparities in time spent online are not necessarily inequalities. This is especially true as digital overuse, which is more frequent among individuals with a low level of education, harms well-being (Gui and Büchi, 2021). Consequently, studies have turned to the *"quality"* of use rather than its quantity. Hence, Pantea and Martens (2013) and van Deursen, van Dijk, and Ten Klooster (2015) point out that individuals with a high level of education and the older use the internet for improving their human capital, while those least educated and the younger do so for leisure. In the same line, Elena-Bucea, Cruz-Jesus, Oliveira, and Coelho (2021) point out that the most educated have greater use of online services (banking, submitting government forms, making medical appointments, and taking online courses). Social network adoption is more influenced by age. Consequently, digital inequalities emerge from the diversity and ways of using the internet, not from the average online time.

Some authors focus on the reasons behind digital exclusion. Eynon and Helsper (2011) point out that the reasons for not using computers depend on the individual's socio-demographic characteristics. Younger people are more likely to suffer from financial constraints, while older people are more likely to have a lack of interest. Using British and Swedish surveys between 2005 and 2013, Helsper and Reisdorf (2017) also observe that the reasons for the digital exclusion among non-users and ex-users differ over time and between countries. The main reason for the non-use of the internet was a lack of interest

for the British and Swedish. The lack of skill and internet access were also important determinants. Ex-users in both countries mention a lack of interest. However, many British ex-users no longer use the internet because of the cost, which is different for Swedish ex-users. Finally, the reasons for the non-use of the internet may vary over time. Between 2005 and 2013, the importance of non-access to the internet and lack of skills as barriers to internet use declined in Great Britain but not Sweden. In contrast, a lack of interest is increasingly mentioned in both countries as a reason for not using the internet.

In this paper, we study the different digital levels highlighted above (internet access, use, variety of usage, and reasons for non-access) by focusing on the French case. We investigate whether the determinants highlighted in other countries, such as income, level of education, household size, and population density, are also determinants of the French digital divide. We stand out from the literature by our methodological approach. We use pseudo-panel methods to consider the temporal evolution of digital diffusion between 2007 and 2019. As being born close to the spread of digital is an important factor in internet adoption and use, we study inequalities within and between generations.

While this paper focuses on the first two levels of the digital divide, there is also a third level which concern the inequalities in the outcomes of digital use (Scheerder, van Deursen, and van Dijk, 2017). Online activities, especially leisure, are often provided for free, making it difficult to measure the utility gained. Goolsbee and Klenow (2006) estimate the welfare gains from internet use based on time spent online and a utility model. Pantea and Martens (2016) apply their methodology to France, Germany, Italy, Spain, and the UK, controlling for household characteristics. They find that the utility gain from spending time online for leisure is higher for low-income individuals in all countries. In general, individuals with lower levels of education, men, younger individuals, and individuals living alone benefit more from online leisure. The significance of these variables is country dependent. Using a life satisfaction survey in Luxembourg, Pénard, Poussing, and Suire (2013) show that internet users are more satisfied with their lives than non-users. However, they highlight disparities among users: the influence of the internet on well-being is more substantial among the youngest and the poorest individuals. Bartikowski, Laroche, Jamal, and Yang (2018) find that the perceived effect of digital technology is weaker for ethnic minorities than for other users. Castellacci and Tveito (2018) also indicate that the impact of digital use on well-being depends on individual characteristics such as psychological functioning, capabilities, and framing conditions. Finally, Lythreatis, Singh, and El-Kassar (2022) note that further levels of the digital divide may cover algorithmic awareness and data inequality.

3. METHODOLOGY AND DATA

3.1. *Pseudo-Panel methods*

The empirical methodology used in this paper is based on a panel model. This makes it possible to control for individual heterogeneity (Baltagi, 2013). The general model to estimate is:

$$y_{it} = x_{it}\beta + \alpha_i + \lambda_t + \epsilon_{it} \quad (1)$$

$$i = 1, ..., N; t = 1, ..., T$$

where y_{it} is the dependent variable for the individual i at time t, x_{it} a vector of explanatory variables for individual i at date t, β a vector of parameters to be estimated associated with

the explanatory variables, α_i the fixed effect of individual i, λ_t the time fixed effect for each period t, and ϵ_{it} the *independent and identically distributed (i.i.d)* error term.

The annual ICT Household survey used in this paper does not survey the same individuals yearly. Since the samples differ every year, we do not have panel data but 13 individual cross-sections. Thus, we use the pseudo-panel method theorized by Deaton (1985) to overcome this problem. This method allows the use of independent cross-sectional data in a panel model and is used to address various issues in economics.[4] For this purpose, individuals are no longer considered, but the focus is on cohorts. These cohorts represent groups of individuals with common fixed characteristics over time. In our case, these characteristics are generations; their common characteristic is to have been born in the same period. In the second step, we form cohorts according to generation and gender.

The principle of pseudo-panel is to replace the individual variables of the panel model with their intra-cohort means. Equation (1) is transformed as:

$$y^*_{ct} = x^*_{ct}\beta + \alpha^*_c + \lambda_t + \epsilon^*_{ct} \tag{2}$$

$$c = 1, ..., C; t = 1, ..., T$$

where for a variable z, $z^*_{ct} = E(z_{it}|i \in c)$, y^*_{ct} is the expectation of the dependent variable for cohort c at survey date t, x^*_{ct} a vector of the expectations of the explanatory variables for cohort c at survey date t, β a vector of parameters associated with the explanatory variables, α^*_c the fixed cohort effect, λ_t the time fixed effect for each period t, and ϵ^*_{ct} the *i.i.d* error term.

The true values of y^*_{ct} and x^*_{ct} are not known. Only the average of the values observed in the sample for the individuals of the same cohort are known and can be used. The model is then:

$$\overline{y}_{ct} = \overline{x}_{ct}\beta + \overline{\alpha}_c + \lambda_t + \overline{\epsilon}_{ct} \tag{3}$$

$$c = 1, ..., C; t = 1, ..., T$$

where for a variable z, $\overline{z}_{ct} = \frac{1}{n_{ct}} \sum_{i \in c} z_{it}$ and n_{ct} the number of observations in cohort *c* at time *t*.

To avoid measurement errors, Verbeek and Nijman (1992) demonstrate that starting from 100 individuals per cohort, the calculated averages tend towards their true value. They advise that cohorts comprise at least 200 individuals to avoid measurement errors. Estimation biases are then negligible. Nevertheless, increasing the cohort size reduces the number of cohorts in the panel and increases the heterogeneity within each cohort. It may increase the estimator's variance and decrease its efficiency. It is, therefore, necessary to make a trade-off between cohort size and the number of cohorts to avoid any measurement error. Moreover, fixed effects can be considered constant over time if the criteria for selecting our cohorts is stable over time and if each cohort is large enough as specified

[4]Pseudo-panel methods are often used to analyze household behavior because the same individuals are rarely interviewed in surveys every year. Gardes, Duncan, Gaubert, Gurgand, and Starzec (2005) use it to compute elasticities of food consumption, Bernard, Bolduc, and Yameogo (2011) household electricity demand, and Imai, Annim, Kulkarni, and Gaiha (2014) to identify determinants of child nutritional status. Pseudo-panel is also used with other data such as real estate transactions (Baltagi, Bresson, and Etienne, 2015).

by Verbeek and Nijman (1992). When the three conditions are respected (large enough cohorts, enough cohorts, and stable selection criterion for cohorts), the model (3) may be estimated as a regular panel with fixed effects. We estimate the pseudo-panel model with a Least-Squares Dummy Variable estimator. To highlight the relevance of the pseudo-panel in this paper, we also estimate the model with pooled data where the observations are the individuals of the survey. It enables us to demonstrate which biases and errors are avoided with the pseudo-panel. Cross-sectional data has limitations in that explanatory variables are restricted to the survey questions, which can result in omission bias. Using fixed-effect panel methodologies to estimate the model helps reduce the resulting endogeneity bias (Cameron and Trivedi, 2005). Indeed, this bias is captured by the time-invariant fixed cohort α_c effects. Moreover, aggregating the data reduce the correlation between our explanatory variables and the fixed effect (Gardes, Duncan, Gaubert, Gurgand, and Starzec, 2005). We, therefore, assume that our explanatory variables are uncorrelated with the error term.

Our dependent variables are initially qualitative, such as y_i equals 1 when the individual performs the task (e.g., has access to the internet) and 0 if not. The dependent variable is logit transformed in order to obtain a linear logit share equation. The dependent variable is now a logarithm of the share ratio, and the model is linear in parameters, allowing us to estimate the model as a regular panel model. The estimated model is:

$$\ln(\frac{\bar{y}_{ct}}{1-\bar{y}_{ct}}) = X_{ct}\beta + \alpha_c + \lambda_t + \epsilon_{ct} \tag{4}$$

with $\ln(\frac{\bar{y}_{ct}}{1-\bar{y}_{ct}})$ the explanatory variable of cohort c at date t, X_{ct} is a vector of average explanatory variables for cohort c at survey date t, α_c the cohort fixed effect, λ_t the time fixed effect, and ϵ_{ct} the *i.i.d* error term.

3.2. *Data and descriptive statistics*

3.2.1. *Cohorts*

This paper uses the annual ICT Household Survey conducted by INSEE for the European survey program between 2007 and 2019. For the first three years, individuals were mainly interviewed by telephone, although a complementary survey was conducted in 2008 and 2010 by mail and online. Since 2011, individuals have been drawn from the data of the Housing Tax and can be interviewed by phone, mail, or online. In order to improve representativeness, INSEE corrected potential coverage bias between 2007 and 2010 using new weights calculated in 2012. INSEE regularly uses the survey to provide an overview of digital consumption by the French and Eurostat for international comparisons. It collects information on individual and household characteristics, access to ICT, use of computers, use of the internet, ICT skills, and security on the internet. Households living in French Overseas Departments are not surveyed before 2009. As a consequence, we only consider households residing in metropolitan France. Moreover, we only take into account individuals aged from 24 to 82. Indeed, young people are poorly represented in the survey as they are usually interviewed when financially independent. Individuals surveyed after age 82 (the average life expectancy in France) no longer represent their generation, as wealthier individuals tend to live longer. This restriction enables us to have a relatively stable population over time and use pseudo-panel methods. In addition, we consider cohorts present in the 13 years of our sample to work on a balanced panel.

To have non-biased and efficient estimators in a pseudo-panel, we have to make a trade-off between the size and the number of cohorts. Therefore, we must adjust the cohort definition depending on the studied sub-population. First, when studying inequalities in access and use on the whole population, we compose cohorts of two-year generations. In total, we have 23 cohorts per year, corresponding to 299 observations. On average, a cohort is composed of 288 individuals, and only 20 cohorts, representing 6,7% of the sample, are composed of less than 100 individuals (Table B.1), preventing measurement errors (Verbeek and Nijman, 1992). It may be difficult to capture gender specificity in a pseudo panel by including a variable for gender since a dummy variable represents the percentage of individuals in the cohort with a specific characteristic. For gender, this will be approximately 50% of each cohort. Consequently, we estimate a second model where cohorts are distinguished by generation and gender. This increases the number of cohorts and decreases the number of individuals in each cohort. In order to have enough individuals in each cohort, we consider five-year generations, resulting in 36 cohorts per year for 216 observations. Each cohort comprises 346 individuals on average, and 12 cohorts are less than 100 individuals, representing 5% of the sample (Table B.2). In the second part, we restrict the sample to internet users and, in the third, to those without internet access. We use cohorts of five-year generations composed, on average, of 537 individuals to study the diversity of internet uses among those who use it (Table B.3). To investigate the reasons for non-access to the internet with a sole focus on the population without internet connection at home, we consider ten-year generations composed, on average, of 281 individuals (Table B.4). As a robustness check, we re-estimate all models by changing the cohort composition but always respecting the Verbeek and Nijman (1992)'s conditions.

3.2.2. *Dependent variables*

To analyze inequalities in digital access and use, we consider two questions from the survey: does the individual have access to an internet connection at home (*Access*), and does he use the internet (*Use*)? Access to the internet can be a fixed and mobile connection. In the second part, we restrict the study to internet users. We aim to analyze whether disparities in use are also present when individuals access and use the internet. We consider seven usages of the internet: (i) accessing online banking services, (ii) filling out or sending administrative forms, (iii) buying goods online, (iv) doing leisure activities (radio, music, television, games), (v) creating a profile or posting messages on social media, (vi) searching for a job, and (vii) selling products online. We have chosen these activities for their diversity and because they are present for most of the survey year. Some are more related to leisure or social interaction, others to commercial activities such as buying and selling goods online. The rest is linked to online organizational services such as job search, administrative, and banking services. In the last part, we restrict the sample to individuals who do not have internet access at home to investigate the reasons behind digital exclusion. The purpose is to understand the different barriers to digital access according to socio-economic characteristics. We consider the four main reasons for not having internet access at home: (i) equipment or access is too expensive, (ii) internet is not needed, (iii) insufficient household skills, and (iv) security or privacy reasons.[5] All dependent variables are described in Table A.1 in the appendix.

[5]Between 2007 and 2019, among individuals who do not have an internet connection at home, only 6% report that it is because of a lack of digital infrastructure. Therefore, we do not take this reason into account.

3.2.3. *Explanatory variables: possible determinants of the digital divide*

In this section, we present some statistic descriptive on the possible determinants of internet access and use. Table I shows that the diffusion and adoption of digital technologies is an ongoing process. It also underlines the importance of considering the temporal dimension in our study. Between 2007 and 2019, households with internet access at home drastically increased from 47% to 86%. Internet users have increased similarly as only 51% of French people over the age of 15 used the internet in 2007 compared to 85% in 2019. The difference between access and use is that an individual may have access to the internet at home but not use it because the subscription belongs to another household member. Alternatively, an individual may not have access to the internet at home but uses it outside the home (e.g., at work or in a public library). We can also observe that access has increased more rapidly than use. Before 2011, the share of users was higher than the number of individuals having an internet connection at home. Since 2011, this trend has been reversed.

TABLE I

SHARE OF FRENCH WITH AN INTERNET CONNECTION AT HOME (ACCESS) AND WHO HAVE USED THE INTERNET IN THE YEAR (USE) BETWEEN 2007 AND 2019 (IN %)

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Access	47.5	55.7	51.6	61.0	75.1	78.8	78.4	83.2	82.9	84.9	84.2	87.1	86.9
Use	51.2	59.1	53.1	62.9	73.7	78.6	77.7	82.5	83.1	83.8	83.8	85.1	85.2

Source: INSEE annual household survey on ICT between 2007 and 2019. Only individuals over 15 years old and living in metropolitan France are considered.

Access to and usage of the internet can also differ from one individual to another. Table II reveals that the average characteristics of individuals vary depending on whether we study the entire population or only those who have access to and use the internet. For instance, the average age is lower when we only consider individuals who have access to and use the internet. Figure 1 displays the share of individuals who have used the internet according to age in 2007 and 2019. We observe that internet use decreases with age but increases over time. We observe a similar trend for different online activities among internet users, even though the utilization rates have not increased similarly for all activities, and the gaps between individuals of different ages are not always as pronounced. Figure 2 illustrates the evolution of internet use by different generations over time. It shows an upward trend for all generations. In other words, digital use increases with time, regardless of age. Several other trends are also observable. First, the younger the generation, the higher the internet use. It reflects the trend that younger generations have grown up with digital tools. Furthermore, younger generations have relatively similar internet use despite their different ages, enhancing the digital lag of the older generations. Therefore, pseudo-panel methods are appropriate for our research questions since generation and time are essential determinants of digital consumption.

As emphasized in the literature review section, others variables can influence internet access and use. There are more internet users among individuals with a high level of education (Table II). Between 2007 and 2019, 95% of those with a degree beyond the second year of university used the internet, compared to only 58% of those with less than a high school diploma. Standard of living and education appear to facilitate access and use of digital technology, which is unsurprising since the two main barriers to home internet access are the lack of skills and cost. Moreover, the average number of people

TABLE II

DESCRIPTIVE STATISTICS

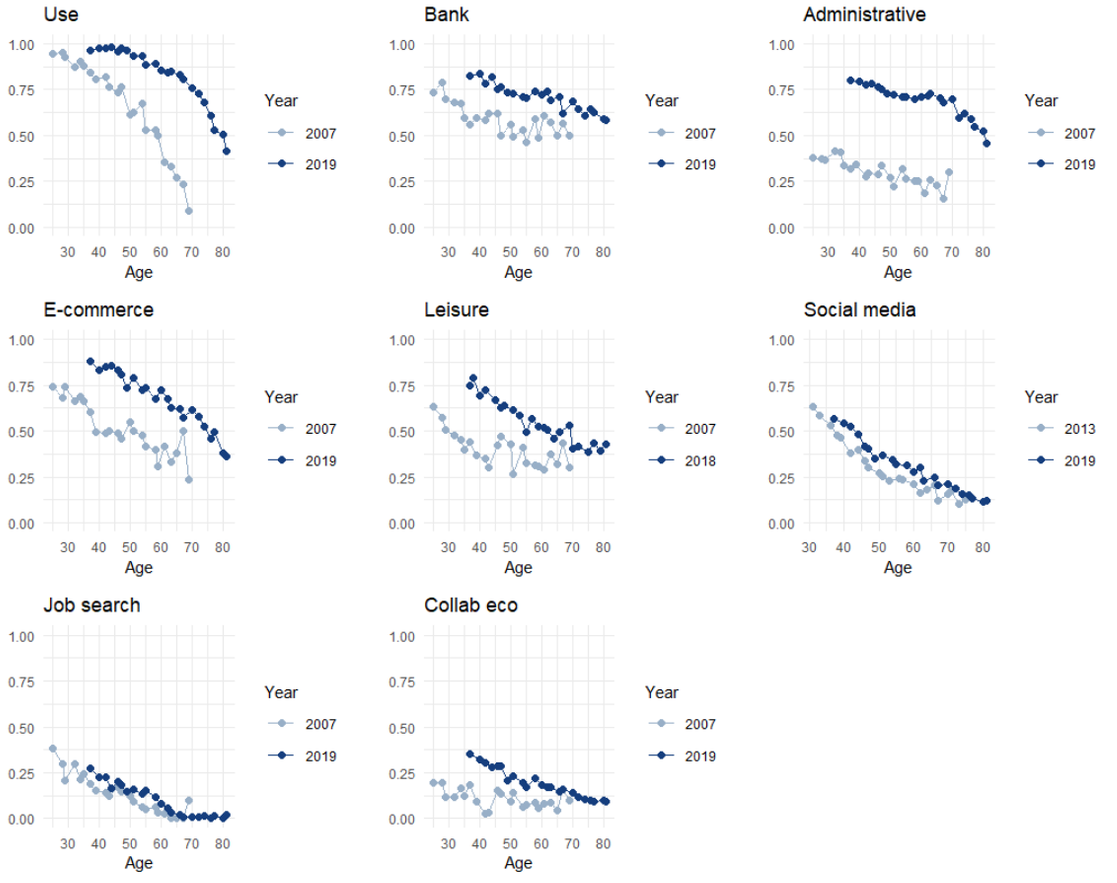
Variable	**All**	**Use**	**Access**
Age (mean)	54.3	52.1	52.6
Women (%)	50.2	49.5	49.5
Household size* (mean)	1.92	1.98	2.01
Monthly income			
- less than 1000€(%)	9.29	6.60	6.27
- between 1000 and 1500€(%)	17.1	13.8	13.8
- between 1500 and 3000€(%)	39.5	39.8	40.1
- more than 3000€(%)	34.1	39.8	39.7
Education level			
- Low (%)	52.2	43.3	45.1
- Middle (%)	26.8	31.3	30.4
- High (%)	21.0	25.3	24.5
*Urban unit size***			
- rural area (%)	25.1	24.6	24.7
- 2,000 to 4,999 residents (%)	6.81	6.68	6.71
- 5,000 to 9,999 residents (%)	6.07	5.98	5.98
- 10,000 to 19,999 residents (%)	5.10	4.97	5.00
- 20,000 to 49,999 residents (%)	6.50	6.28	6.30
- 50,000 to 99,999 residents (%)	7.26	7.05	7.07
- 100,000 to 199,999 residents (%)	6.29	6.29	6.24
- 200,000 to 1,999,999 residents (%)	22.8	23.2	23.1
- Paris (%)	12.9	14.8	14.7

Notes: INSEE annual household survey on ICT between 2007 and 2019. All the variables are described in Table A.2 in Appendix A.
*Number of persons over 15 years old in the household.
**Percentage calculated for the 2013-2019 period.

over 15 years old in the household is higher when considering only those with home internet access or use rather than the entire population. The entourage can influence the probability of accessing and using the internet. Even if the lack of infrastructure is not one of the main reasons for the lack of access to the internet at home, we examine the impact of the location of residence. To this aim, we first studied the effects of the living region population density of the individual. Population density may be considered a proxy of the urban area and digital infrastructure. Indeed, *"white spots"*, i.e., territories not covered by any internet operator, are often located in areas with a low population density. Since 2013, the INSEE ICT survey has provided information on the size of the urban unit where the surveyed individual lives. We, therefore, estimate our model with another specification over a shorter period (2013-2019) but with more precise information on the place of residence.

The explanatory variables of our study are chosen according to the trends highlighted in this section, the literature described in section 2, and the variables available over the thirteen years of the survey. Therefore, we consider generation, income and education level, gender, household size, the population density of the region, and the size of the urban unit as potential determinants. The description and source of all variables are presented in

Figure 1: Share of individuals who have used the internet (among the whole population) and different online activities (among the population who use the internet) according to the age



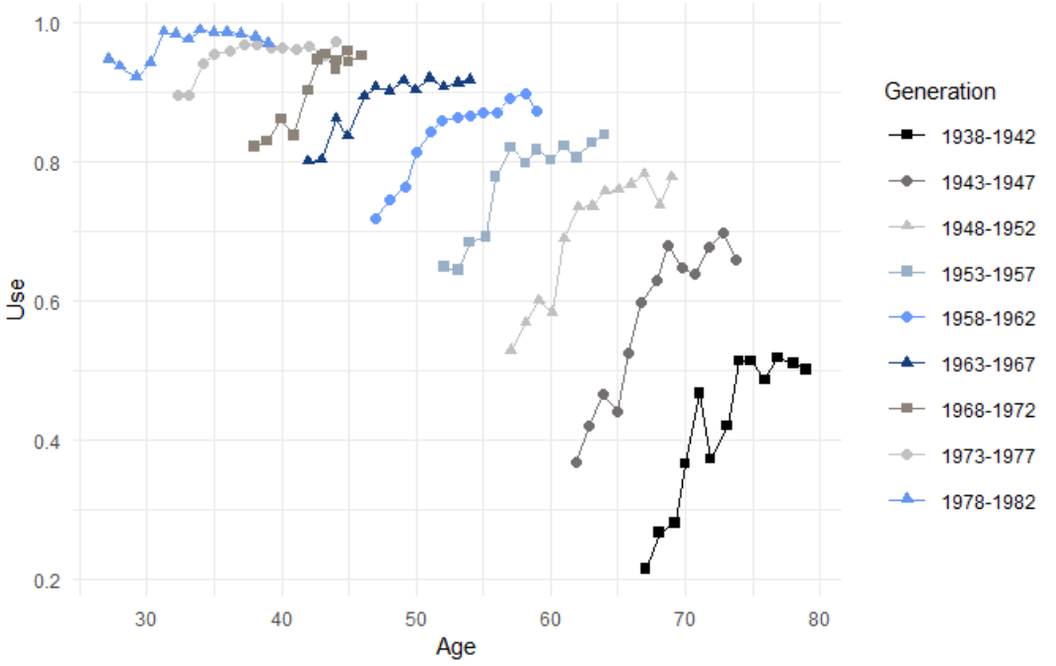
Source: INSEE annual household survey on ICT. All the variables are calculated among the internet users, except for the variable Use, where the whole population is considered. Variables are described in Table A.1 in Appendix A.

Table A.2 in the appendix.

4. EMPIRICAL RESULTS

This section presents the estimation results of the determinants of the digital divide in France. As a reminder, we estimate the equation (4), and the dependent variables change according to the digital divide level studied. Four models are estimated. Models (1) and (3) consider the variable income level, while in models (2) and (4), we include only the level of education as income and education levels are highly correlated. Models (3) and (4) are estimated only between 2013 and 2019 and consider the size of the urban unit instead of its density. The first sub-section studies internet access and use inequalities for the whole population. In addition to the pseudo-panel estimation, we also estimate the four models with a pooled logit where observations are individuals, not cohorts. It enables us to show what the pseudo-panel methods bring compared to pooled data regressions in the paper context. The second subsection focuses on disparities in internet use among internet users. The last sub-section studies individuals who do not have the internet at home. Finally, we also perform robustness checks by changing the cohort definition. Results tables are presented in Appendix C.

Figure 2: Share of individuals who have used the internet in the year according to age from one generation to another



Source: INSEE annual household survey on ICT between 2007 and 2019.

4.1. *Inequalities in digital access and use*

Results estimations of internet access and use determinants are presented in Table C.1 in Appendix C. First, we find significant inter-generational inequalities for all models (Table C.1). Cohort-fixed effects highlight that the younger the generations, the greater their advantage in accessing and using internet (Figures 3 and 4). These inequalities are more substantial among older generations and are more pronounced in use than in access. Indeed, an individual can access an internet connection at home but not use it. All the time-fixed effects in all the models of Table C.1 are significantly different from zero and increase with time (Figures 5 and 6). Access and internet use have increased over time regardless of the individual's characteristics. Nevertheless, a plateau seems to be reached for usage: time-fixed effects between 2014 and 2019 are not significantly different. This is not the case for time-fixed effects for access, even if the increase has been slower in the past few years. These results highlight the need for public policies to reduce the digital divide. Note that time-fixed effects can also capture the improvement in the territory's internet coverage or the decrease in the price of hardware and internet connection (Arcep, 2022).

In line with the literature, we find intra-generational inequalities. The income bracket and the level of education are significant drivers of digital access and use. More specifically, earning more than 1500 euros per month is a significant determinant of digital access and use.[6] The level of education is also a determinant of digital access and use,

[6]Performing a Wald test, we find that estimated coefficients associated with the variable "monthly income between 1000 and 1500 euros" and "monthly income of less than 1000 euros" are not statistically different.

Figure 3: Cohort effects for Access

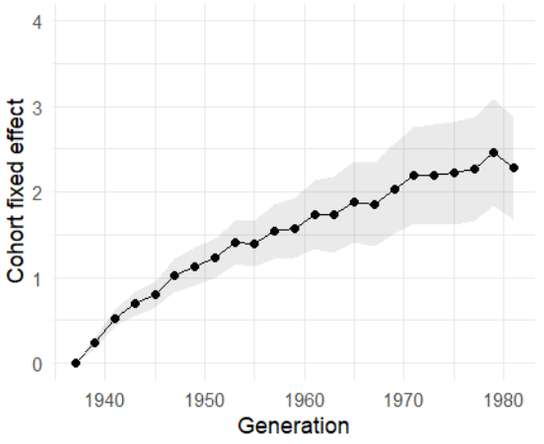
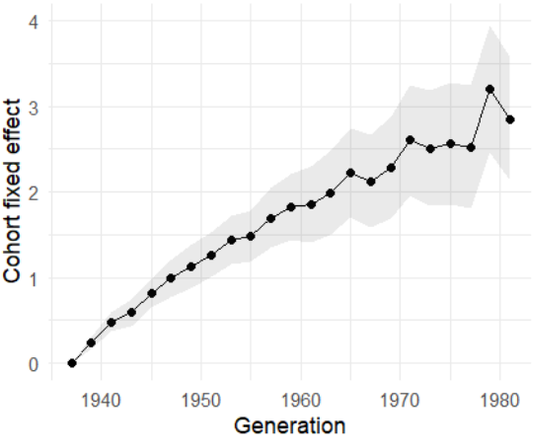


Figure 4: Cohort effects for Use



Notes: The 1937-1938 generation is the reference cohort. Each fixed effect is to be compared to this cohort. A positive fixed effect significantly different from 0 means that the generation has an advantage in digital access and use over the 1937-1938 generation. The grey area represents the 95% confidence interval of fixed effects for each generation of the models (2) and (2') in Table C.1.

especially for individuals with a degree higher than a high-school diploma.[7] The comparison of the R-squared suggests that the impact of education appears to be more important for the use than the access. On the contrary, income level is a more significant determinant of access than internet use. Indeed, a lack of financial resources can be a barrier to household internet access. However, once a household has access to the internet, the main obstacle to its use is the lack of digital skills.

The household size is only positively significant in model (1) in internet access estimation (Table C.1). It suggests that many people over 15 in a home can make it easier to access the internet but does not impact the internet's use. Indeed, a household can have an internet connection because a member uses it, even if the surveyed individual does not use it themselves. Our result differs from Korupp and Szydlik (2005), who found that having teenagers or young adults at home was a determinant of computer and internet access in Germany between 1997 and 2003.

None of our measures of urbanization (density and size of the urban unit) are significant regardless of the estimated model (Table C.1).[8] Our results show no difference between living in Paris and rural areas. The area of residence has no impact on digital access and usage. This result is consistent with Schleife (2010), who demonstrates that internet use among German counties is not explained by differences in population density but rather by differences in the composition of individual characteristics in each county. The digital divide is more prevalent in rural areas because, on average, the population is older and has

[7]Estimated coefficients associated with the variable middle level and high level of education are not statistically different for access and use estimations.

[8]As a robustness check, we tested all the models by changing the urban unit size's reference and the division of the urban units into five urban units instead of nine (rural area, between 2,000 and 19,999 inhabitants, between 20,000 and 199,999 inhabitants, between 200,000 and 1,999,999 inhabitants, and Paris). Results remain unchanged.

Figure 5: Time fixed effects for Access

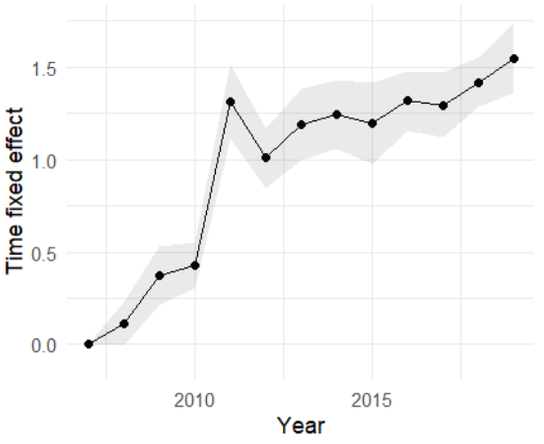
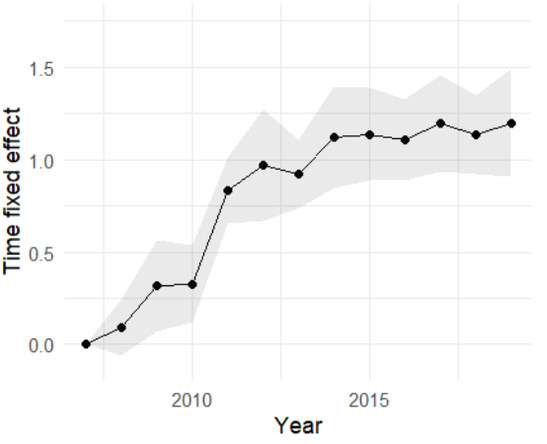


Figure 6: Time fixed effects for Use



Note: 2007 is the reference year. Each time fixed effect is to be compared to this year. A positive fixed effect significantly different from 0 means that the year has an advantage in digital access and use over 2007. The grey area represents the 95% confidence interval of the time-fixed effects of the models (2) and (2') in Table C.1.

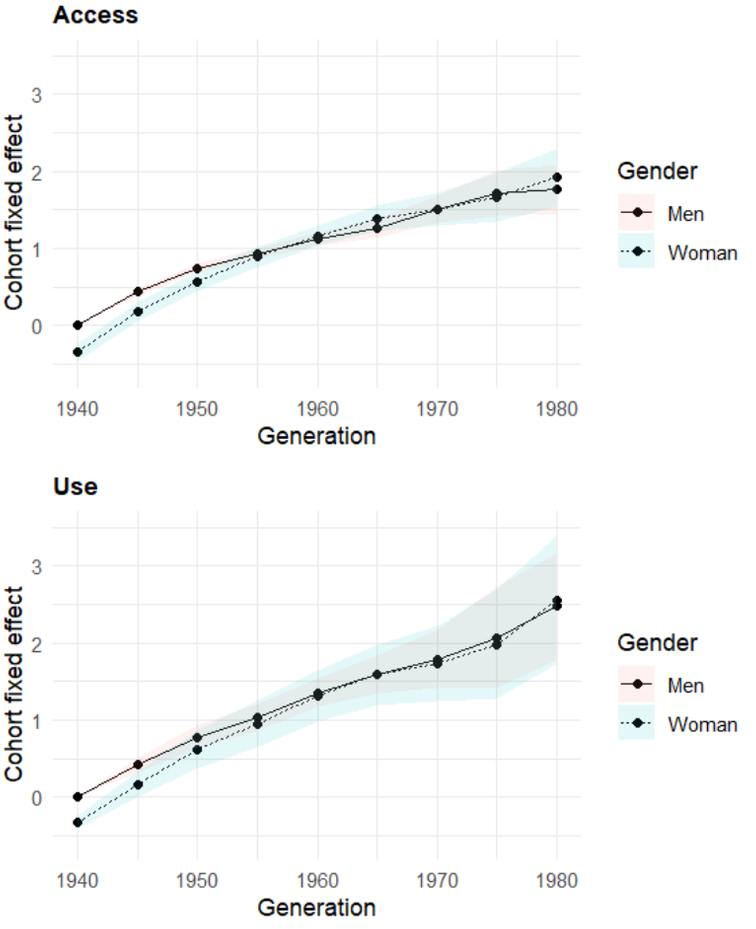
lower incomes than in urban areas. This is consistent with the fact that among households that do not have an internet connection at home, only 6% explain it by the absence of broadband infrastructure in their locality. Therefore, the place of residence, often considered an infrastructure proxy, does not appear to be a barrier to digital access and use. This has not always been the case, especially in the early days of internet diffusion when infrastructures were located in the most profitable areas, i.e., in the most densely populated areas. Meanwhile, the internet coverage of France's territory has improved through various laws. For instance, the law on the digital divide in 2009 created a fund for the digital development of territories, whose objective was to assist in implementing the infrastructure required for broadband access in areas where electronic communications operators considered that the necessary efforts were beyond their funding capacities.[9] The perception that place of residence is a key determinant of the digital divide is also based on the fact that the quality of internet service varies depending on location. In 2019, the mobile coverage rate was 92,1% in metropolitan France, but only 81,5% of housing and offices enjoyed broadband and 52,9% from very high-speed broadband (Antoine and Simon, 2020). Moreover, Croutte and Muller (2021) point out that, among internet users, people living in rural areas are less satisfied with their internet connection than their urban counterparts. They also highlight that 11% of French internet users consider that an insufficient quality of internet service is a barrier to internet use. Among the internet non-users, only 4% consider the quality of internet service as a barrier. Therefore, there is a digital divide between cities and the countryside, not because of a lack of infrastructure but because of its poor quality.

Gender appears to be a determinant of internet use and not of access (Table C.1). Women seem to use the internet more than men. However, results for constant variables such as gender in pseudo-panel models should be treated cautiously. Indeed, the propor-

[9]French law n°2009-1572 of December 17, 2009, on the fight against the digital divide.

tion of men and women should be similar between generations; variations over time and within cohorts may be due to measurement errors. Therefore, we perform other regressions where cohorts are separated by generation and gender. This enables us to compare the cohort effect between women and men of the same generation. Results are presented in Table C.2 in the appendix. We find that fixed effects of the same generation are statistically different according to the gender of the individuals born between 1938 and 1952, both for access and use (Figure 7). The younger cohort's fixed effects value is the same for each generation of a different gender. Consequently, there is a digital gender gap favoring men for the older generations, but this gap does not appear for younger generations.

Figure 7: Generation and gender effects



Notes: The 1936-1938 men generation is the reference cohort. Each fixed effect is to be compared to this cohort. A positive fixed effect significantly different from 0 means that the cohort has an advantage in digital access and use over men from the 1936-1938 generation. The red (blue) area represents the 95% confidence interval of the men (women) fixed effects for each generation of models (2) and (4) in Table C.2.

As a robustness check, we re-estimate the models by considering one and three-year generation cohorts for access (Table C.3) and use (Table C.4) and three-year generation separated by gender (Table C.5). Results remain similar.

We also re-estimated the models with a pooled logit. Results are presented in Table C.6, and we compare them with the pseudo-panel results in Table C.1. Both methodologies

give similar results for generation and time effects and the education and income level variables. These variables' coefficients are generally slightly higher in the pooled logit (Table C.6) than in the pseudo-panel (Table C.1). Others variables estimates differ between the pooled logit and the pseudo-panel models. The population density and the size of the urban unit are significantly positive in the pooled logit but not in the pseudo-panel model. Regarding household size and gender, coefficients depend on the model. When studying internet access (Table C.6), household size coefficients are always positively significant but are larger in the model with the education level variable (models (2) and (4)) than the income level variable (models (1) and (3)). In the study of internet use (Table C.6), the household size is only significant for models (2') and (4'). The sign of the women variable varies according to the model: positive in models (1') and (3') and negative in models (2') and (4'). These results suggest that the pooled logit coefficients are biased. Since they depend on the inclusion of explanatory variables, we suspect an endogeneity issue due to an omission bias. This endogeneity bias does not appear in the pseudo-panel models as it is reduced by the inclusion of the fixed cohort effects and the aggregation of the variables (Gardes, Duncan, Gaubert, Gurgand, and Starzec, 2005). It reinforces our choice to use pseudo-panel methods for our paper. With pseudo-panel methodology, only the heterogeneity within cohorts is studied rather than between individuals. This is not a problem as the generation used to form the cohorts is a main determinant of the digital divide, both in the pooled logit and pseudo-panel estimates. Panel methodology also enables us to consider the temporal evolution in the model, which is important to consider since the digital transition is still ongoing. Therefore, in the rest of the paper, we only consider the estimation results arising from the pseudo-panel models.

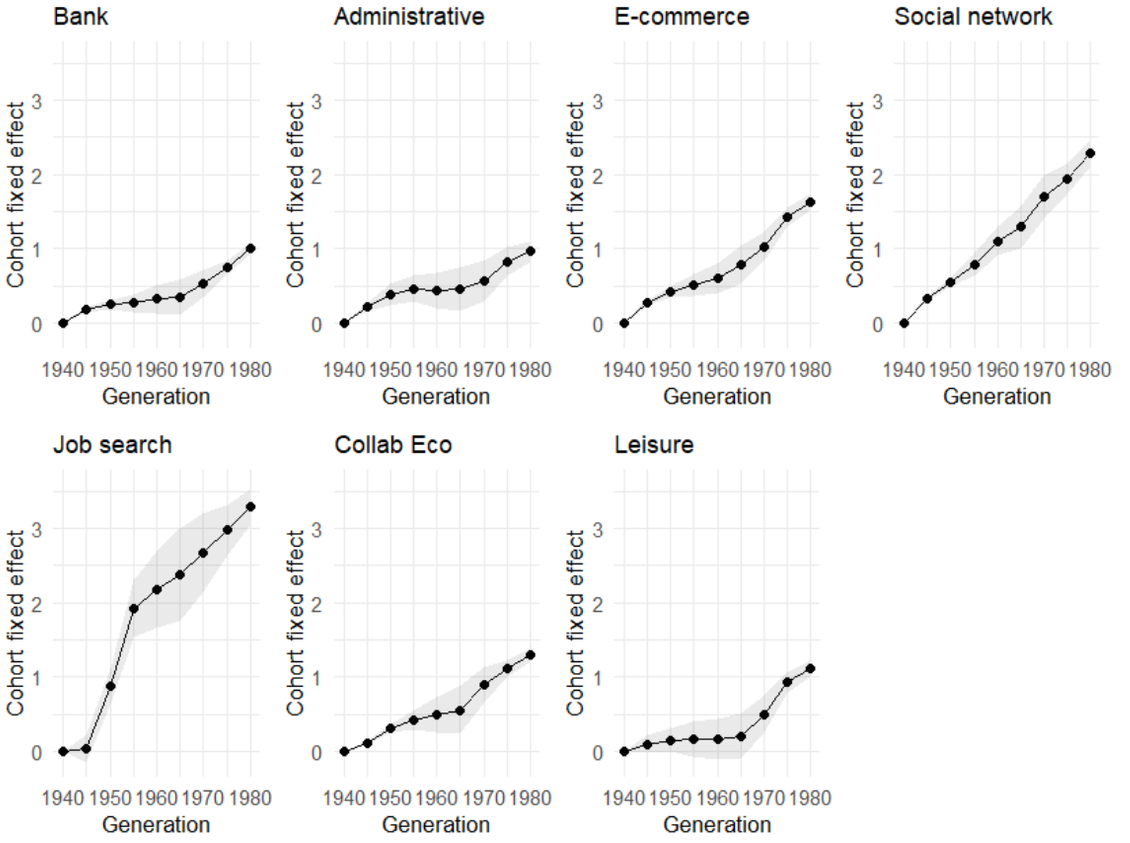
4.2. *Disparities in the diversity of internet use*

In this section, we focus on whether these intra and inter-generational inequalities exist in usage once an individual has access to the internet and uses it. In other words, do an individual's socioeconomic characteristics influence the diversity and the type of internet use? Although other variables influence the probability of doing an online activity, we restrict the analysis to the explanatory variables used in the previous section. Results are presented in Table C.7 in the appendix. We perform a robustness check by changing the definition cohort from five-year to two-year generations (Table C.8).

Inter-generational inequalities still exist for all selected activities, but the scale depends on the activity (Figure 8). The probability of shopping online, being on social media, and selling goods online (collaborative economy) increases with the generation's youth. Individuals born after 1968 also have a higher probability of listening to the radio or music, watching television, and playing games (leisure). The generational effect is less pronounced for organizational activities. Young people are more likely to do administrative procedures online, but generational differences are less marked than in other activities. For instance, the 1953-1957 generation does not have a lower probability of doing an administrative procedure over the internet than the 1968-1972 generation. The probability of using online banking is high for younger generations, but there is no significant difference between the 1938-1942 and 1963-1967 generations. Inter-generational differences appear in the probability of doing online job searching, but they primarily represent the generations of age to seek work.

Once an individual uses the internet, the disparities within a generation observed in the previous section are no longer necessarily present. The effects of level of education,

Figure 8: Cohort effects on the probability of doing an activity online

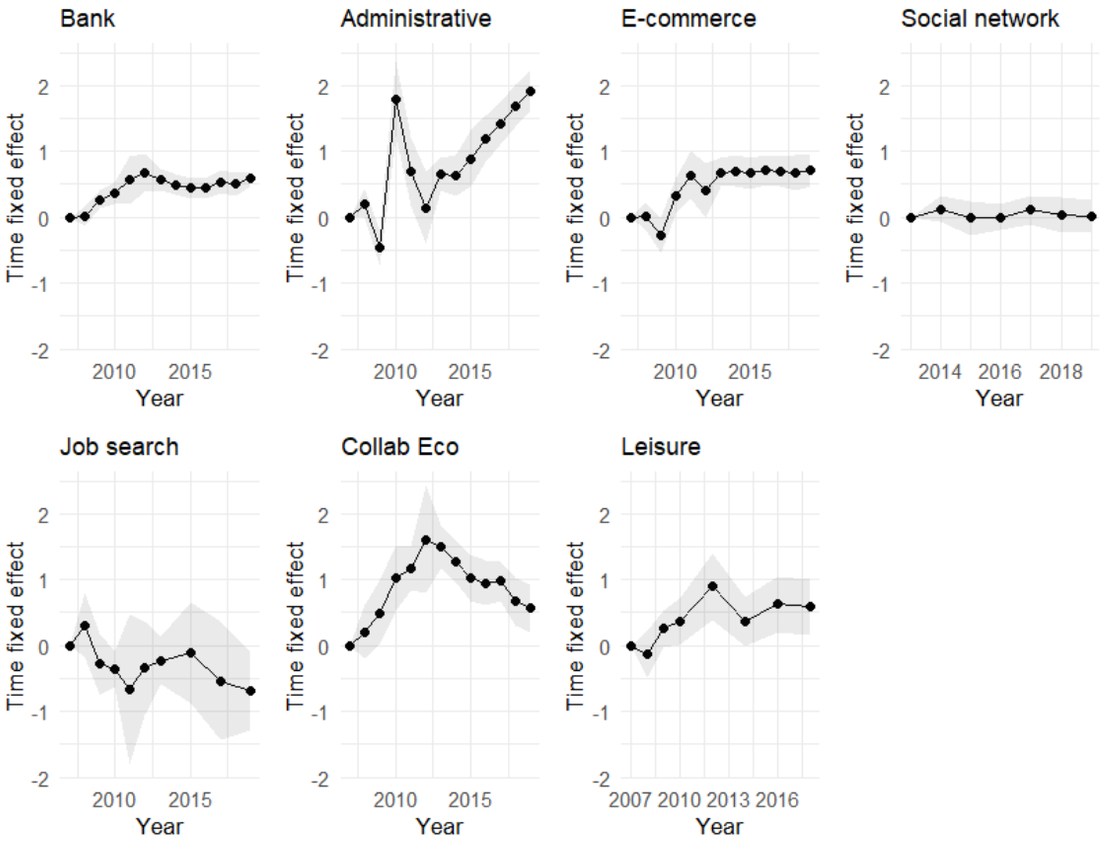


Notes: the 1938-1942 generation is the reference cohort. Each fixed effect is to be compared to this cohort. A positive fixed effect significantly different from 0 means that the generation has an advantage in digital access and use over the 1938-1942 generation. The grey area represents the 95% confidence interval of fixed effects for each generation of the models (1), (3), (5), (7), (9), (11), and (13) in Table C.7.

gender, and the number of people in the household depend on the activity and are not always significant. The level of qualification is only a determinant of buying goods online (model (6) in Table C.7). Individuals purchasing goods online generally have a degree above the bachelor's level. Low-income individuals are more likely to participate in the collaborative economy due to the potential for additional income by selling second-hand goods (model (13) in Table C.7). Women tend to use more internet to search for a job online (model (11) and (12) in Table C.7), while men tend to buy or sell goods (model (6), (13), and (14) in Table C.7). Nevertheless, we remain cautious about these results as they are not significant anymore when we consider two-year generations instead of five as a robustness check (Table C.8). In addition, as mentioned earlier, the specificity of gender can be difficult to capture in a pseudo-panel model.

Time effects depend on the activities studied (Figure 9). The probability of being on social media and doing online job searches has not changed over time. Online leisure experienced a limited increase since 2007. The likelihood of completing administrative procedures online has increased significantly over time. Two changes can be observed. First, 2010 was marked by an increased in individuals doing administrative procedures online. This can be due to the creation of the site *mon.service-public.fr* by the French

Figure 9: Time effects on the probability of doing an activity online



Notes: 2007 is the reference year. Each time fixed effect is to be compared to this year. A positive fixed effect significantly different from 0 means that the year has an advantage in digital access and use over 2007. The grey area represents the 95% confidence interval of the time-fixed effects of the models (1), (3), (5), (7), (9), (11), and (13) in Table C.7.

government in December 2008, enabling citizens to register to vote, to declare a change of address, a death, a loss of identity papers, and to create a company or an association online. In 2010, this site was improved and simplified, mainly by extending access to its services to the entire territory.[10] Previously, only a few pilot municipalities had access to its online services. In 2014, the French government pursued its project of modernizing the public service by merging its various sites to simplify all administrative procedures. Other laws also increased online administrative procedures, particularly the obligation for households with internet access to declare revenues online in 2016. The French government's investment in digitalizing public services appears to produce results. Online banking and purchasing goods also experienced increased usage over time, but only until 2011. Finally, the online sale of goods increased until 2014 and has since declined. Goudin (2016) explains that the collaborative economy experienced growth following the economic and financial crisis of 2008 because it was perceived as a way to save money or earn additional income.

To conclude, once an individual has access to and uses the internet, intra-generational

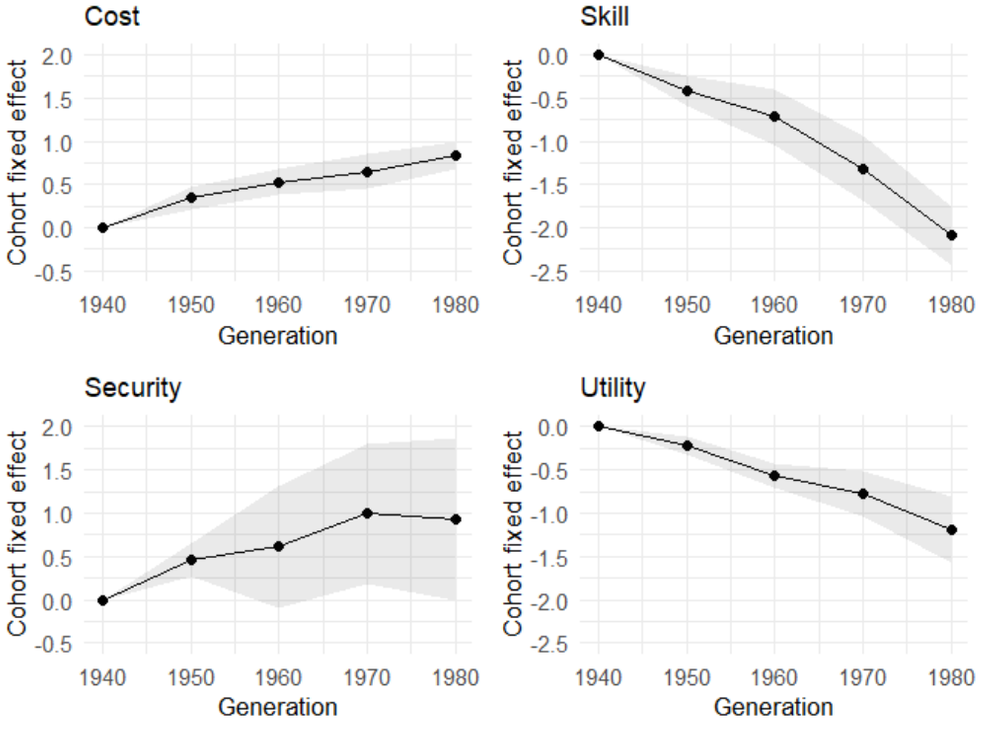
[10] https://www.senat.fr/rap/a09-106-6/a09-106-64.html.

inequalities in usage are no longer present, but intergenerational inequalities remain prevalent. The inequalities in the usage of online banking and administrative procedures are more concerning due to the dematerialization of these services. The priority is to focus on digital access, marked by more significant inequalities, to overcome the digital divide. To this end, identifying barriers to digital access in France is essential.

4.3. *Reasons for non-access to internet*

Internet access in France increased significantly between 2007 and 2019, but some French people still do not have internet. Our previous results indicate a slowdown in the increase in the number of new households with an internet connection. This section restricts the sample to households who do not have internet access at home to investigate the reasons behind this. Sub-sections 4.1 and 4.2 provide a profile of the individuals most affected by the digital divide to help determine where public policies should be focused. Understanding and knowing the different barriers to digital access will allow these public policies to be adapted to different populations. Estimation results are presented in Table C.9 in the appendix. We also present in Table C.10 robustness results where we change the definition cohort from ten-year to five-year generations.

Figure 10: Cohort effect on the probability of not having internet for a reason



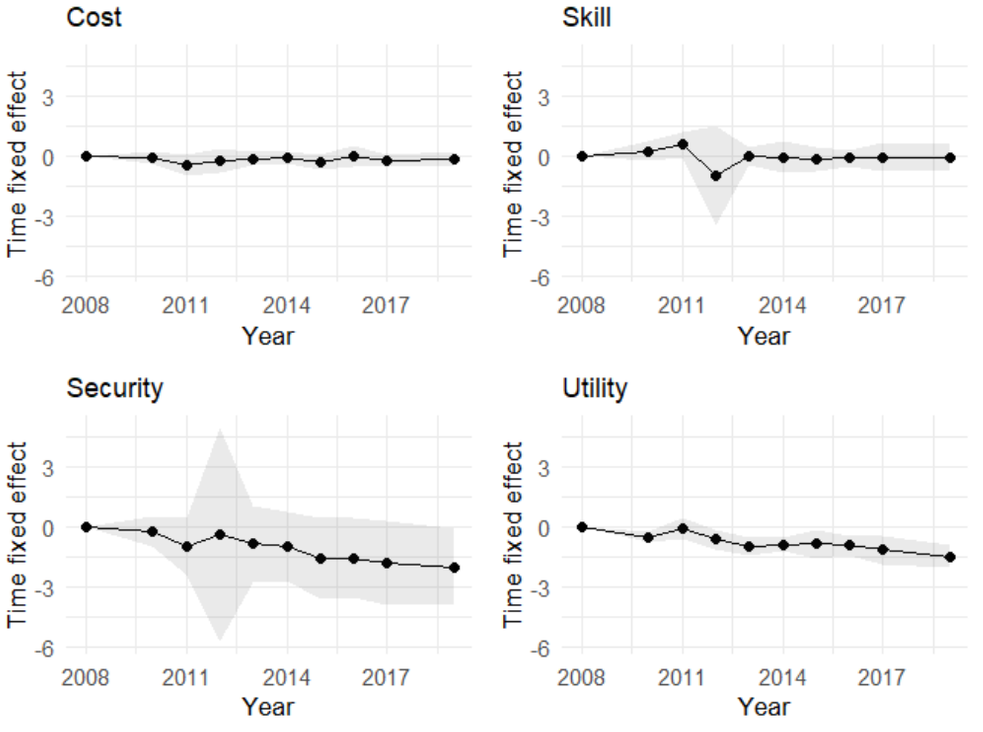
Notes: the 1935-1944 generation is the reference cohort. Each fixed effect is to be compared to this cohort. A positive fixed effect significantly different from 0 means that the generation has an advantage in digital access and use over the 1935-1944 generation. The grey area represents the 95% confidence interval of fixed effects for each generation of the models (1), (3), (5), and (7) in Table C.9.

Income and education are essential determinants of internet access and use in France. However, they do not explain the differences in the reasons for not accessing the internet.

Those who are more skilled tend to consider security and privacy issues less of a barrier to internet access than those less skilled. They are also more likely not to have an internet connection because they are not interested in it. Education and standard of living do not impact the likelihood of not having the internet for financial reasons or lack of skills. Women are more affected by financial barriers than men. Household size decreases the likelihood of not having access to the internet for security or privacy reasons. This may be because one member of the household may acquire an internet connection regardless of the fears of other members.

The generation mainly drives the reasons behind the non-access to the internet. The younger generations are more likely to lack internet access due to the cost of equipment or connection (see Figure 11). In contrast, older generations are more likely to cite a lack of skill or interest as the reason for not having internet access. Privacy and security concerns are prevalent among all generations. The reasons for not having internet access have remained relatively stable since 2007 (Figure 11), except for a decreasing number of individuals who report not finding the internet useful. The cost of access, lack of skills, and eventual security or privacy issues are always important reasons for non-access.

Figure 11: Time effect on the probability of not having internet for a reason



Notes: 2008 is the reference year. Each time fixed effect is to be compared to this year. A positive fixed effect significantly different from 0 means that the year has an advantage in digital access and use over 2008. The grey area represents the 95% confidence interval of the time-fixed effects of the models (1), (3), (5), and (7) in Table C.9.

5. DISCUSSION

Digital tools are one of the pillars of the French government's recovery plan after the COVID-19 crisis. To reduce the digital divide, 250 million euros are dedicated to digi-

tal inclusion. This section compares our results with the public policies implemented in France.

One of the groups most affected by the digital divide is the elderly population. Their main barriers are the lack of skill and interest (Figure 11). Providing digital education is, therefore, crucial. This training must be concentrated on the oldest populations but can be offered to the poorest and the less educated ones. It must also explain the advantages of using the internet and, in particular, introduce the administrative procedures that can be carried out online, such as income tax returns. Indeed, even if the digital exclusion is voluntary, not being online can exclude a person, especially in France, where administrative procedures for public services are done digitally. The lack of interest may be due to a lack of knowledge and skills. Security and privacy issues remain barriers to internet access (Figure 11). Digital education is also a way to avoid misuse of the internet, which can result in security or privacy problems. To address this issue, the French government offers "digital passes" that allow individuals with digital difficulties to follow dedicated training. Education that takes the issues mentioned above into account would reduce digital inequalities. Moreover, legislation strengthening online security and requiring digital platforms to protect users' privacy, such as the General Data Protection Regulation, should be pursued.

The cost of equipment and connection is also an important reason for not accessing the internet in France. As skill barriers, financial constraints remain important barriers to internet access (Figure 11). Our results highlight that financial barriers mainly concern the younger groups. These populations are less likely to be affected by the digital divide, but when they are, it is rarely because of a lack of interest. These excluded individuals should therefore be the target of public policies. However, there is no financial support specific to digital access, as pointed out by Vall (2020), who proposes implementing "equipment checks" for the rental or purchase of digital equipment. Finally, in line with the Défenseur des droits (2019), we recommend that non-digital and accessible solutions be offered for essential services (e.g., tax returns, requests for help) for fear that part of the population be excluded, and inequalities increased.

6. CONCLUSION

Bridging the digital divide is one of the objectives of the United Nations Development Program. The OECD (2018) emphasizes that digital technologies provide various opportunities, such as *"additional income, additional employment opportunities, and improved access to knowledge and general information."* In addition, inequalities in digital access and skills can drag on productivity and economic growth (Eichengreen, 2015). Therefore, it is essential to reduce digital inequalities.

This paper studies the determinants of the digital divide in France at different levels. Firstly, we focus on inequalities in internet access and use. Our results demonstrate intra and inter-generational inequalities in internet access and use, which decrease over time. Income and level of education are significant determinants of internet access and use. Household size has a positive impact on access but not on usage. There is a gender digital gap in favor of men among the older generations. Finally, we find no urban/rural digital divide in internet access and use in France. When we examine the variety and types of online uses, we find that inter-generational inequalities in favor of younger people remain strong for several online activities. However, intra-generational inequalities among internet users are low. The French digital divide is mainly a problem of access and use.

Finally, we highlight that barriers to internet access differ between individuals. Older people are more affected by a lack of skills and interest, while younger people are affected by financial barriers. Lack of interest, security, and privacy barriers are decreasing over time. The two main barriers to internet access remain the lack of digital skills and financial cost. Therefore, we recommend continuing to invest in digital education and creating a financial aid system to access digital equipment. We also advise continuing to offer a non-digital, accessible option in addition to the dematerialization of public services to avoid reinforcing the digital divide.

One of the limitations of this paper is that some aspects of the digital divide could not be considered due to the lack of available information in the survey. For instance, the Covid-19 crisis and the resulting lockdowns have shown that access to the internet and a computer is insufficient for large families. Nevertheless, we do not have information on the number of devices in the household. Another limitation of our study is that it considers that digital technology has only positive effects. However, inadequate use of digital technology can cause many security and privacy problems (OECD, 2019). The internet has also allowed the proliferation of *"fake news"* on a large scale and the polarization of opinions. The digital divide must be reduced while learning to use these tools correctly. We also chose to study the differences in basic access and use of the internet. Inter- and intra-generational disparities can appear if we examine the intensity of use, as some individuals use the internet more intensively than others. It will also be helpful to study the inequalities in access to high-quality internet, as broadband does not cover the entire territory for now, and the overseas territories. Finally, this paper takes a dichotomous view of the digital divide and considers only the first two levels of the digital divide. However, as Bléhaut, Clerget, Serreau, and Plantard (2023) point out, the digital divide can also be measured in terms of capabilities, i.e., considering inequalities in the ability to turn the opportunities offered by digital technologies into benefits. They also recommend moving away from the binary vision of the digital divide and representing digital inequalities as a halo.

APPENDIX A: VARIABLES DESCRIPTION

Table A.1: Description of the dependent variables

Variable	Description	Available years
Inequalities in internet access and use		
Access	The individual has an access to the Internet at home	2007-2019
Use	The individual uses the Internet	2007-2019
Inequalities in the variety of usage		
Administrative	The individual has used the internet to fill out or send administrative forms	2007-2019
Bank	The individual used the internet to access his bank account	2007-2019
E-commerce	The individual has used the internet to buy a good online	2007-2019
Leisure	The individual has listened to the radio or music, watched television, played or downloaded games, pictures, video, music	2007-2012, 2014, 2016, 2018
Social media	The individual has used the internet to create a profile or post messages on social media	2013-2019
Job search	The individual used the internet to search for a job	2007-2013, 2015, 2017, and 2019
Collaborative Economy	The individual has used the internet to sell products and services on online sites	2007-2019
Reasons for non-access of the internet		
Cost	Household does not have internet at home because equipment or access is too expensive	2007-2017 and 2019
Utility	Household does not have internet at home because internet is not needed	2007-2017 and 2019
Skills	Household does not have internet at home because of insufficient household skills	2008-2017 and 2019
Security	Household does not have internet at home for security or privacy reasons	2008, 2010-2017, and 2019

Source: Households ICT surveys, INSEE

Table A.2: Description of the explanatory variables

Variable	Description	Source
Generation	Year of birth	ICT Household survey, INSEE
Woman	Be a woman	ICT Household survey, INSEE
Household size	Number of persons over 15 years old in the household	ICT Household survey, INSEE
Density	Population density of the region where the individual lives	INSEE & Eurostat
Urban unit size		
- rural area	Live in a rural area	ICT Household survey, INSEE
- 2,000 to 4,999 residents	Live in an urban unit of 2,000 to 4,999 residents	ICT Household survey, INSEE
- 5,000 to 9,999 residents	Live in an urban unit of 5,000 to 9,999 residents	ICT Household survey, INSEE
- 10,000 to 19,999 residents	Live in an urban unit of 10,000 to 19,999 residents	ICT Household survey, INSEE
- 20,000 to 49,999 residents	Live in an urban unit of 20,000 to 49,999 residents	ICT Household survey, INSEE
- 50,000 to 99,999 residents	Live in an urban unit of 50,000 to 99,999 residents	ICT Household survey, INSEE
- 100,000 to 199,999 residents	Live in an urban unit of 100,000 to 199,999 residents	ICT Household survey, INSEE
- 200,000 to 1,999,999 residents	Live in an urban unit of 200,000 to 1,999,999 residents	ICT Household survey, INSEE
- Paris	Live in Paris	ICT Household survey, INSEE
Monthly income		
- less than 1000€	Earn a monthly income of less than 1000€	ICT Household survey, INSEE
- between 1000 and 1500€	Earn a monthly income between 1000 and 1500€	ICT Household survey, INSEE
- between 1500 and 3000€	Earn a monthly income between 1500 and 3000€	ICT Household survey, INSEE
- more than 3000€	Earn a monthly income of more than 3000€	ICT Household survey, INSEE
Education level		
- Low	Below baccalauréat (high school diploma)	ICT Household survey, INSEE
- Middle	Between the baccalauréat and the second-year university degree	ICT Household survey, INSEE
- High	Higher than two years of higher education	ICT Household survey, INSEE

APPENDIX B: COHORT'S SIZE

Table B.1: Cohort's size: two-year generation

Generation	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
1937-1938	114	180	152	104	106	147	345	147	218	285	243	260	281
1939-1940	140	162	131	121	101	152	314	197	223	261	256	285	323
1941-1942	96	149	102	104	93	179	269	142	237	300	301	278	293
1943-1944	112	149	128	140	127	234	405	225	314	318	298	324	345
1945-1946	111	168	139	133	138	232	466	252	390	395	370	343	379
1947-1948	147	243	171	160	172	351	576	380	468	530	482	533	478
1949-1950	164	227	176	157	184	345	571	402	514	532	488	515	508
1951-1952	155	219	148	138	168	306	540	359	443	543	507	451	528
1953-1954	146	209	154	145	150	320	561	315	449	516	423	517	501
1955-1956	142	189	145	121	158	288	474	322	453	514	496	499	466
1957-1958	127	191	151	103	174	275	463	303	446	518	443	480	479
1959-1960	139	175	123	111	149	287	503	308	477	527	468	475	527
1961-1962	144	188	104	111	145	294	445	299	450	519	461	425	484
1963-1964	119	198	126	86	138	268	492	261	394	494	444	457	476
1965-1966	137	218	120	106	149	282	447	279	454	490	413	426	455
1967-1968	138	194	119	88	122	291	496	243	440	459	443	393	468
1969-1970	146	202	125	110	145	281	415	283	476	471	366	420	442
1971-1972	153	182	114	78	153	341	461	281	424	461	407	426	422
1973-1974	164	192	97	73	144	318	486	303	430	437	390	428	426
1975-1976	112	164	89	66	109	266	440	235	431	415	316	404	376
1977-1978	97	148	67	64	112	270	413	218	394	391	362	376	385
1979-1980	99	146	61	37	94	275	366	273	391	417	313	319	368
1981-1982	76	146	44	37	76	221	362	268	395	433	344	361	375
Total	2978	4239	2786	2393	3107	6223	10310	6295	9311	10226	9034	9395	9785

Table B.2: Cohort's size: five-year generation by gender

Generation	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Woman													
1938-1942	157	207	204	159	138	226	364	201	258	363	382	388	400
1943-1947	159	256	201	199	188	338	472	323	419	480	451	487	494
1948-1952	240	347	231	207	222	395	657	420	513	700	596	648	606
1953-1957	187	273	208	183	210	364	601	374	508	649	616	643	631
1958-1962	170	248	155	146	221	352	558	342	479	652	565	579	603
1963-1967	168	265	159	141	165	377	543	329	462	600	539	534	580
1968-1972	120	131	93	81	120	222	315	205	311	355	284	331	334
1973-1977	172	246	115	89	164	394	565	322	495	546	448	479	509
1978-1982	123	205	75	45	126	372	484	347	480	531	455	463	455
Total	1496	2178	1441	1250	1554	3040	4559	2863	3925	4876	4336	4552	4612
Men													
1938-1942	132	188	113	117	108	185	395	211	310	343	287	325	347
1943-1947	129	168	141	152	170	319	667	352	526	494	467	420	484
1948-1952	161	235	189	170	209	416	762	523	671	644	631	611	654
1953-1957	166	213	174	128	182	401	660	419	622	646	546	611	601
1958-1962	175	218	140	134	163	347	627	412	666	647	564	563	622
1963-1967	153	260	144	101	174	313	634	322	612	615	544	526	606
1968-1972	99	156	94	67	95	210	358	210	379	344	299	305	321
1973-1977	150	188	103	84	137	314	558	324	553	501	442	505	486
1978-1982	103	157	65	59	108	270	460	304	513	515	380	441	480
Total	1268	1783	1163	1012	1346	2775	5121	3077	4852	4749	4160	4307	4601

Table B.3: Cohort's size: five-year generation (internet users)

Generation	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
1938-1942	57	97	84	38	115	153	272	217	293	344	349	367	382
1943-1947	101	171	155	59	188	392	650	460	619	628	630	640	652
1948-1952	203	316	240	97	297	596	965	723	908	1036	971	941	1004
1953-1957	222	302	254	92	305	628	937	652	912	1074	940	1048	1048
1958-1962	239	333	223	94	324	601	964	661	1012	1135	1017	104	1079
1963-1967	246	405	251	88	303	626	1006	602	978	1133	993	980	1102
1968-1972	171	230	160	70	194	411	583	400	663	658	560	602	636
1973-1977	278	379	203	82	289	686	1035	627	1021	1019	876	946	980
1978-1982	207	333	125	52	231	631	878	648	998	1042	834	900	917
Total	1724	2566	1695	672	2246	4724	7290	4990	7404	8069	7170	6528	7800

Table B.4: Cohort's size: ten-year generation (Individuals without internet access)

Generation	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2019**
1935-1944	422	548	442	392	282	464	859	393	586	649	608	522
1945-1954	373	508	340	313	227	413	687	362	524	533	502	471
1955-1964	224	294	190	140	100	234	341	218	330	354	298	270
1965-1974	183	222	99	74	42	112	186	99	184	158	170	119
1975-1984	78	146	39	29	23	76	95	49	98	84	61	51
Total	1280	1718	1110	948	674	1299	2168	1121	1722	1778	1639	1433

APPENDIX C: ESTIMATION RESULTS

Table C.1: Pseudo-panel estimation results for Internet Access and Use (cohorts: two-year generations)

	Access				**Use**			
	(1)	(2)	(3)	(4)	(1')	(2')	(3')	(4')
Woman	0.501	0.252	1.330	0.590	0.615	0.534	1.930**	1.434
	(0.445)	(0.457)	(1.071)	(1.082)	(0.458)	(0.424)	(0.740)	(0.843)
Household size	0.374**	0.274	0.146	0.271	0.055	0.019	0.029	0.084
	(0.149)	(0.170)	(0.296)	(0.262)	(0.171)	(0.221)	(0.415)	(0.359)
Density	0.001	0.002	-	-	0.000	0.000	-	-
	(0.001)	(0.001)	-	-	(0.001)	(0.001)	-	-
Monthly income								
- less than 1000€	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-
- between 1000 and 1500€	0.681	-	0.288	-	0.713	-	0.314	-
	(0.781)	-	(1.112)	-	(0.781)	-	(2.331)	-
- between 1500 and 3000€	1.485***	-	2.755***	-	1.717***	-	2.615**	-
	(0.463)	-	(0.931)	-	(0.385)	-	(1.115)	-
- more than 3000€	2.183***	-	3.880***	-	1.825**	-	3.202**	-
	(0.668)	-	(1.021)	-	(0.710)	-	(1.411)	-
Education level								
- Low	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*
- Middle	-	1.692***	-	1.816***	-	2.680***	-	1.493
	-	(0.471)	-	(0.607)	-	(0.665)	-	(1.015)
- High	-	1.102*	-	4.098***	-	2.661***	-	4.446***
	-	(0.585)	-	(1.020)	-	(0.687)	-	(1.403)
Urban unit size								
- rural	-	-	*ref.*	*ref.*	-	-	*ref.*	*ref.*
- 2,000 to 4,999 residents	-	-	-0.136	-0.639	-	-	0.428	0.068
	-	-	(1.430)	(1.541)	-	-	(1.157)	(1.279)
- 5,000 to 9,999 residents	-	-	-0.761	0.036	-	-	1.173	1.855
	-	-	(1.151)	(1.417)	-	-	(1.555)	(1.658)
- 10,000 to 19,999 residents	-	-	1.157	-0.847	-	-	3.198*	1.457
	-	-	(1.705)	(1.708)	-	-	(1.565)	(1.138)
- 20,000 to 49,999 residents	-	-	-1.298	-1.755*	-	-	0.179	-0.075
	-	-	(0.998)	(1.003)	-	-	(1.523)	(1.513)
- 50,000 to 99,999 residents	-	-	-1.069	-0.921	-	-	-0.625	-0.513
	-	-	(0.922)	(1.184)	-	-	(1.299)	(1.253)
- 100,000 to 199,999 residents	-	-	0.712	-0.707	-	-	1.229	-0.396
	-	-	(1.075)	(0.961)	-	-	(1.228)	(1.140)
- 200,000 to 1,999,999 residents	-	-	-0.111	-0.478	-	-	1.256	0.701
	-	-	(0.759)	(0.599)	-	-	(1.086)	(1.129)
- Paris	-	-	0.683	0.279	-	-	2.042	1.386
	-	-	(0.953)	(0.829)	-	-	(1.217)	(1.061)
Generation								
- 1937- 1938	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*
- 1939 - 1940	0.233***	0.232***	0.177***	0.231***	0.318***	0.232***	0.201***	0.221***
	(0.021)	(0.030)	(0.039)	(0.036)	(0.019)	(0.034)	(0.055)	(0.052)
- 1941 - 1942	0.503***	0.527***	0.467***	0.497***	0.569***	0.476***	0.463***	0.462***
	(0.042)	(0.049)	(0.062)	(0.067)	(0.032)	(0.053)	(0.053)	(0.084)
- 1943 - 1944	0.682***	0.691***	0.578***	0.531***	0.756***	0.591***	0.600***	0.503***
	(0.051)	(0.067)	(0.073)	(0.083)	(0.035)	(0.076)	(0.084)	(0.122)
- 1945 - 1946	0.773***	0.800***	0.752***	0.747***	0.976***	0.819***	0.921***	0.870***
	(0.066)	(0.069)	(0.075)	(0.088)	(0.044)	(0.078)	(0.080)	(0.125)
- 1947 - 1948	1.007***	1.025***	0.991***	0.934***	1.220***	0.989***	1.122***	1.013***

	(0.074)	(0.092)	(0.083)	(0.106)	(0.053)	(0.104)	(0.099)	(0.160)
- 1949 - 1950	1.116***	1.121***	1.105***	1.000***	1.402***	1.129***	1.275***	1.124***
	(0.083)	(0.107)	(0.085)	(0.121)	(0.058)	(0.121)	(0.102)	(0.192)
- 1951 - 1952	1.211***	1.227***	1.247***	1.115***	1.534***	1.265***	1.455***	1.284***
	(0.082)	(0.110)	(0.077)	(0.113)	(0.066)	(0.123)	(0.102)	(0.182)
- 1953 - 1954	1.393***	1.413***	1.352***	1.238***	1.730***	1.440***	1.538***	1.377***
	(0.098)	(0.123)	(0.090)	(0.126)	(0.075)	(0.137)	(0.124)	(0.204)
- 1955 - 1956	1.367***	1.393***	1.404***	1.340***	1.770***	1.487***	1.640***	1.548***
	(0.104)	(0.130)	(0.094)	(0.124)	(0.086)	(0.143)	(0.139)	(0.194)
- 1957 - 1958	1.508***	1.536***	1.484***	1.371***	2.027***	1.697***	1.864***	1.712***
	(0.122)	(0.156)	(0.115)	(0.150)	(0.102)	(0.171)	(0.177)	(0.239)
- 1959 - 1960	1.552***	1.577***	1.568***	1.374***	2.190***	1.829***	1.986***	1.760***
	(0.132)	(0.169)	(0.128)	(0.178)	(0.111)	(0.185)	(0.201)	(0.268)
- 1961 - 1962	1.725***	1.737***	1.715***	1.552***	2.270***	1.857***	2.130***	1.928***
	(0.138)	(0.195)	(0.161)	(0.209)	(0.129)	(0.215)	(0.250)	(0.316)
- 1963 - 1964	1.725***	1.732***	1.674***	1.439***	2.438***	1.986***	2.166***	1.906***
	(0.159)	(0.215)	(0.188)	(0.244)	(0.138)	(0.234)	(0.293)	(0.360)
- 1965 - 1966	1.879***	1.886***	1.787***	1.470***	2.699***	2.223***	2.514***	2.181***
	(0.159)	(0.229)	(0.207)	(0.274)	(0.144)	(0.252)	(0.324)	(0.398)
- 1967 - 1968	1.888***	1.850***	1.846***	1.420***	2.693***	2.127***	2.592***	2.161***
	(0.155)	(0.237)	(0.208)	(0.291)	(0.138)	(0.263)	(0.336)	(0.433)
- 1969 - 1970	2.124***	2.034***	2.115***	1.637***	2.980***	2.279***	2.798***	2.271***
	(0.162)	(0.254)	(0.219)	(0.327)	(0.130)	(0.284)	(0.328)	(0.470)
- 1971 - 1972	2.362***	2.197***	2.388***	1.702***	3.468***	2.606***	3.167***	2.420***
	(0.156)	(0.273)	(0.195)	(0.334)	(0.120)	(0.310)	(0.311)	(0.486)
- 1973 - 1974	2.439***	2.199***	2.291***	1.531***	3.489***	2.510***	3.194***	2.374***
	(0.156)	(0.281)	(0.175)	(0.342)	(0.107)	(0.325)	(0.272)	(0.507)
- 1975 - 1976	2.519***	2.217***	2.512***	1.653***	3.635***	2.562***	3.274***	2.344***
	(0.148)	(0.292)	(0.171)	(0.347)	(0.095)	(0.341)	(0.246)	(0.525)
- 1977 - 1978	2.614***	2.270***	2.651***	1.807***	3.660***	2.525***	3.334***	2.409***
	(0.142)	(0.293)	(0.176)	(0.345)	(0.091)	(0.346)	(0.233)	(0.529)
- 1979 - 1980	2.815***	2.461***	2.635***	1.784***	4.355***	3.202***	3.911***	2.975***
	(0.138)	(0.299)	(0.171)	(0.345)	(0.084)	(0.356)	(0.224)	(0.531)
- 1981 - 1982	2.693***	2.276***	2.566***	1.740***	4.022***	2.853***	3.755***	2.871***
	(0.123)	(0.288)	(0.165)	(0.338)	(0.073)	(0.345)	(0.193)	(0.522)
Year								
- 2007	*ref.*	*ref.*	-	-	*ref.*	*ref.*	-	-
- 2008	0.062	0.111*	-	-	0.024	0.093	-	-
	(0.072)	(0.057)	-	-	(0.093)	(0.073)	-	-
- 2009	0.307***	0.374***	-	-	0.313**	0.317**	-	-
	(0.082)	(0.075)	-	-	(0.117)	(0.119)	-	-
- 2010	0.382***	0.430***	-	-	0.377***	0.328***	-	-
	(0.062)	(0.060)	-	-	(0.098)	(0.102)	-	-
- 2011	1.632***	1.314***	-	-	1.146***	0.832***	-	-
	(0.159)	(0.095)	-	-	(0.113)	(0.085)	-	-
- 2012	0.765***	1.009***	-	-	0.870***	0.970***	-	-
	(0.189)	(0.078)	-	-	(0.217)	(0.146)	-	-
- 2013	1.302***	1.188***	*ref.*	*ref.*	1.029***	0.924***	*ref.*	*ref.*
	(0.090)	(0.093)			(0.069)	(0.090)		
- 2014	1.360***	1.244***	0.105	0.083	1.222***	1.121***	0.100	0.093
	(0.086)	(0.090)	(0.085)	(0.087)	(0.096)	(0.133)	(0.124)	(0.133)
- 2015	1.343***	1.197***	0.179*	0.108	1.212***	1.136***	0.183	0.151
	(0.097)	(0.106)	(0.101)	(0.114)	(0.087)	(0.121)	(0.143)	(0.154)
- 2016	1.449***	1.316***	0.243***	0.209**	1.173***	1.104***	0.082	0.078
	(0.078)	(0.079)	(0.086)	(0.095)	(0.068)	(0.105)	(0.110)	(0.143)
- 2017	1.438***	1.295***	0.249**	0.204*	1.275***	1.195***	0.159	0.147

	(0.080)	(0.085)	(0.099)	(0.104)	(0.088)	(0.127)	(0.136)	(0.152)
- 2018	1.549***	1.418***	0.358***	0.312***	1.201***	1.132***	0.111	0.088
	(0.061)	(0.065)	(0.088)	(0.107)	(0.067)	(0.102)	(0.107)	(0.137)
- 2019	1.684***	1.547***	0.494***	0.451***	1.267***	1.198***	0.182*	0.166
	(0.090)	(0.090)	(0.078)	(0.096)	(0.102)	(0.141)	(0.100)	(0.125)
Constant	-3.834***	-2.671***	-3.176**	-1.273	-3.296***	-2.473***	-4.187***	-2.423***
	(0.660)	(0.480)	(1.299)	(1.054)	(0.563)	(0.472)	(1.412)	(0.742)
Observations	299	299	161	161	298	298	161	161
Adjusted R-squared	0.962	0.960	0.975	0.974	0.967	0.969	0.976	0.977

Notes: The dependent variable Access specifies whether or not the individual has access to the internet and Use if he uses it in the last three months.
$^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$
Standard errors clustered at the level of each cohort are reported in parentheses.

Table C.2: Pseudo-panel estimation results for Internet Access and Use (cohorts: five-year generations separated by gender).

	Access				**Use**			
	(1)		**(2)**		**(3)**		**(4)**	
Household size	0.352*	(0.177)	0.259*	(0.146)	0.126	(0.215)	0.063	(0.182)
Density	0.000	(0.001)	0.000	(0.001)	0.000	(0.001)	0.000	(0.001)
Monthly income								
- less than 1000€	*ref.*		-	-	*ref.*		-	-
- between 1000 and 1500€	1.296*	(0.720)	-	-	0.723	(0.587)	-	-
- between 1500 and 3000€	1.141**	(0.527)	-	-	1.025*	(0.540)	-	-
- more than 3000€	1.605**	(0.615)	-	-	1.348	(0.832)	-	-
Education level								
- Low	-	-	*ref.*		-	-	*ref.*	
- Middle	-	-	1.896***	(0.437)	-	-	2.874**	(1.025)
- High	-	-	1.215***	(0.416)	-	-	2.459***	(0.622)
Generation								
Women								
1938-1942	-0.199*	(0.100)	-0.346***	(0.053)	-0.246**	(0.086)	-0.324***	(0.038)
1943-1947	0.382***	(0.062)	0.177***	(0.056)	0.386***	(0.054)	0.171**	(0.077)
1948-1952	0.834***	(0.045)	0.563***	(0.061)	0.981***	(0.036)	0.614***	(0.117)
1953-1957	1.205***	(0.024)	0.890***	(0.061)	1.403***	(0.025)	0.951***	(0.143)
1958-1962	1.496***	(0.036)	1.162***	(0.060)	1.851***	(0.050)	1.320***	(0.157)
1963-1967	1.764***	(0.072)	1.388***	(0.078)	2.238***	(0.088)	1.584***	(0.184)
1968-1972	1.998***	(0.055)	1.507***	(0.101)	2.596***	(0.071)	1.731***	(0.234)
1973-1977	2.320***	(0.045)	1.662***	(0.150)	3.145***	(0.053)	1.981***	(0.335)
1978-1982	2.697***	(0.039)	1.921***	(0.178)	3.899***	(0.042)	2.558***	(0.393)
Men								
1938-1942	*ref.*		*ref.*		*ref.*		*ref.*	
1943-1947	0.516***	(0.023)	0.439***	(0.022)	0.564***	(0.029)	0.422***	(0.046)
1948-1952	0.864***	(0.040)	0.745***	(0.030)	0.989***	(0.048)	0.777***	(0.071)
1953-1957	1.061***	(0.049)	0.926***	(0.031)	1.265***	(0.060)	1.035***	(0.079)
1958-1962	1.262***	(0.064)	1.123***	(0.043)	1.624***	(0.075)	1.355***	(0.086)
1963-1967	1.454***	(0.071)	1.267***	(0.059)	1.958***	(0.081)	1.592***	(0.114)
1968-1972	1.820***	(0.071)	1.497***	(0.082)	2.409***	(0.078)	1.792***	(0.180)
1973-1977	2.284***	(0.067)	1.715***	(0.139)	3.080***	(0.074)	2.071***	(0.306)
1978-1982	2.389***	(0.061)	1.766***	(0.147)	3.549***	(0.060)	2.475***	(0.327)
Observations	234		234		234		234	
Adjusted R^2	0.965		0.967		0.966		0.969	
Constant	Yes		Yes		Yes		Yes	
Time Fixed-Effect	Yes		Yes		Yes		Yes	

Notes: The dependent variable Access specifies whether or not the individual has access to the internet and Use if he uses it in the last three months.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered at the level of each cohort are reported in parentheses.

Table C.3: Pseudo-panel estimation results for Internet Access (cohorts: one and three-year generations)

Dep var: internet access	**One-year generation**				**Three-year generation**			
	(1)	(2)	(3)	(4)	(1')	(2')	(3')	(4')
Woman	0.312	0.163	0.960*	0.394	0.856	0.310	1.416	0.758
	(0.257)	(0.260)	(0.544)	(0.556)	(0.620)	(0.534)	(1.014)	(1.257)
Household size	0.363**	0.331**	0.275	0.382	0.346*	0.147	0.169	0.323
	(0.135)	(0.150)	(0.244)	(0.235)	(0.166)	(0.152)	(0.287)	(0.300)
Density	0.001*	0.001*	-	-	0.001	0.002	-	-
	(0.000)	(0.000)	-	-	(0.001)	(0.002)	-	-
Monthly income								
- less than 1000 €	ref.	-	ref.	-	ref.	-	ref.	-
- between 1000 and 1500€	0.883	-	0.970	-	1.744**	-	0.137	-
	(0.560)	-	(0.873)	-	(0.631)	-	(1.560)	-
- between 1500 and 3000€	1.413***	-	2.448***	-	1.621***	-	2.650**	-
	(0.401)	-	(0.683)	-	(0.367)	-	(1.007)	-
- more than 3000€	2.437***	-	3.681***	-	2.195***	-	3.577***	-
	(0.485)	-	(0.845)	-	(0.701)	-	(1.214)	-
Education level								
- Low	-	ref.	-	ref.	-	ref.	-	ref.
- Middle	-	1.667***	-	1.542**	-	1.858**	-	1.416*
	-	(0.366)	-	(0.657)	-	(0.656)	-	(0.806)
- High	-	1.208***	-	2.850***	-	0.802	-	2.743***
	-	(0.352)	-	(0.738)	-	(0.606)	-	(0.937)
Urban unit size								
- rural	-	-	ref.	ref.	-	-	ref.	ref.
- 2,000 to 4,999 residents	-	-	-1.750**	-1.567*	-	-	-0.542	-0.606
	-	-	(0.801)	(0.882)	-	-	(1.535)	(1.853)
- 5,000 to 9,999 residents	-	-	-0.257	-0.127	-	-	-0.013	0.982
	-	-	(0.974)	(0.960)	-	-	(1.731)	(1.915)
- 10,000 to 19,999 residents	-	-	0.288	-0.258	-	-	-0.016	-1.212
	-	-	(1.383)	(1.411)	-	-	(2.157)	(2.346)
- 20,000 to 49,999 residents	-	-	-1.451	-1.324	-	-	-1.314	-2.645
	-	-	(0.956)	(1.015)	-	-	(1.738)	(1.664)
- 50,000 to 99,999 residents	-	-	-0.785	-0.826	-	-	-1.916	-1.823
	-	-	(0.906)	(1.037)	-	-	(1.844)	(2.046)
- 100,000 to 199,999 residents	-	-	0.254	0.158	-	-	-0.345	-1.729
	-	-	(0.861)	(0.857)	-	-	(0.934)	(1.099)
- 200,000 to 1,999,999 residents	-	-	-0.533	-0.695	-	-	-0.675	0.170
	-	-	(0.760)	(0.759)	-	-	(1.276)	(1.377)
- Paris	-	-	0.118	0.171	-	-	-0.080	0.036
	-	-	(0.550)	(0.521)	-	-	(1.046)	(1.079)
Observations	609	609	329	329	231	231	118	118
Adjusted R-squared	0.935	0.933	0.945	0.943	0.979	0.978	0.985	0.983
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort Fixed-Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed-Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable specifies whether or not individuals have access to the internet.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered at the level of each cohort are reported in parentheses.

Table C.4: Pseudo-panel estimation results for Internet Use (cohorts: one and three year generations)

Dep var: internet access	**One-year generation**				**Three-year generation**			
	(1)	(2)	(3)	(4)	(1')	(2')	(3')	(4')
Woman	0.396	0.223	1.951***	1.463**	0.838	0.667	3.017**	3.007**
	(0.392)	(0.375)	(0.647)	(0.632)	(0.718)	(0.674)	(1.140)	(1.203)
Household size	-0.004	-0.092	0.256	0.269	0.227	0.170	0.243	0.253
	(0.128)	(0.140)	(0.286)	(0.291)	(0.140)	(0.177)	(0.259)	(0.245)
Density	0.000	-0.000	-	-	0.001	0.000	-	-
	(0.001)	(0.001)	-	-	(0.001)	(0.001)	-	-
Monthly income								
- less than 1000 €	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-
- between 1000 and 1500€	1.117*	-	1.410	-	1.795***	-	-1.303	-
	(0.647)	-	(1.139)	-	(0.351)	-	(2.033)	-
- between 1500 and 3000€	1.483***	-	2.437***	-	1.607***	-	1.286	-
	(0.435)	-	(0.798)	-	(0.420)	-	(1.442)	-
- more than 3000€	2.247***	-	3.134***	-	2.148***	-	1.164	-
	(0.471)	-	(1.087)	-	(0.455)	-	(1.121)	-
Education level								
- Low	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*
- Middle	-	2.361***	-	1.641**	-	2.795**	-	0.843
	-	(0.570)	-	(0.640)	-	(0.978)	-	(0.905)
- High	-	1.531***	-	2.673***	-	2.614***	-	5.077***
	-	(0.394)	-	(0.925)	-	(0.840)	-	(1.457)
Urban unit size								
- rural	-	-	*ref.*	*ref.*	-	-	*ref.*	*ref.*
- 2,000 to 4,999 residents	-	-	-1.129	-0.867	-	-	-0.809	-0.576
	-	-	(0.844)	(0.860)	-	-	(2.080)	(2.180)
- 5,000 to 9,999 residents	-	-	0.635	0.664	-	-	3.138	3.003*
	-	-	(1.005)	(0.928)	-	-	(2.033)	(1.452)
- 10,000 to 19,999 residents	-	-	0.910	0.419	-	-	2.355	0.661
	-	-	(1.271)	(1.206)	-	-	(2.313)	(1.972)
- 20,000 to 49,999 residents	-	-	-1.205	-1.128	-	-	-2.252	-3.062*
	-	-	(0.988)	(1.031)	-	-	(1.959)	(1.454)
- 50,000 to 99,999 residents	-	-	-0.424	-0.379	-	-	-3.121	-3.617*
	-	-	(0.966)	(1.054)	-	-	(2.451)	(1.767)
- 100,000 to 199,999 residents	-	-	0.594	0.437	-	-	-0.388	-1.627
	-	-	(1.051)	(0.930)	-	-	(2.058)	(1.671)
- 200,000 to 1,999,999 residents	-	-	-0.021	-0.319	-	-	-0.192	-0.831
	-	-	(0.698)	(0.638)	-	-	(1.808)	(1.725)
- Paris	-	-	-0.105	-0.109	-	-	0.333	-0.131
	-	-	(0.735)	(0.736)	-	-	(1.749)	(1.546)
Observations	598	598	326	326	231	231	118	118
Adjusted R-squared	0.938	0.939	0.950	0.950	0.978	0.979	0.984	0.986
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort Fixed-Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed-Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable specifies whether or not individuals have used the internet.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered at the level of each cohort are reported in parentheses.

Table C.5: Pseudo-panel estimation results for Internet Access and Use (cohorts: three-year generations separated by gender)

	Access				**Use**			
	(1)		**(2)**		**(3)**		**(4)**	
Household size	0.246	(0.151)	0.195	(0.130)	0.015	(0.117)	0.052	(0.135)
Density	0.000	(0.001)	0.001	(0.001)	-0.000	(0.001)	-0.000	(0.001)
Monthly income								
- less than 1000€	*ref.*		-	-	*ref.*		-	-
- between 1000 and 1500€	1.069**	(0.488)	-	-	1.366*	(0.728)	-	-
- between 1500 and 3000€	1.250**	(0.512)	-	-	1.442*	(0.723)	-	-
- more than 3000€	1.949***	(0.448)	-	-	2.130***	(0.635)	-	-
Education level								
- Low	-	-	*ref.*		-	-	*ref.*	
- Middle	-	-	1.299***	(0.468)	-	-	2.271***	(0.666)
- High	-	-	0.460	(0.365)	-	-	2.162***	(0.592)
Generation								
Women								
- 1936-1938	-0.246**	(0.096)	-0.523***	(0.057)	-0.390***	(0.123)	-0.540***	(0.067)
- 1939-1941	0.222***	(0.073)	-0.013	(0.044)	0.182*	(0.095)	-0.010	(0.051)
- 1942-1944	0.566***	(0.047)	0.356***	(0.045)	0.488***	(0.056)	0.227***	(0.064)
- 1945-1947	0.818***	(0.043)	0.628***	(0.045)	0.861***	(0.046)	0.593***	(0.066)
- 1948-1950	1.114***	(0.043)	0.912***	(0.060)	1.249***	(0.043)	0.869***	(0.096)
- 1951-1953	1.359***	(0.030)	1.156***	(0.068)	1.519***	(0.032)	1.105***	(0.110)
- 1954-1956	1.512***	(0.031)	1.324***	(0.073)	1.718***	(0.038)	1.315***	(0.111)
- 1957-1959	1.722***	(0.041)	1.537***	(0.095)	2.129***	(0.044)	1.659***	(0.137)
- 1960-1962	1.970***	(0.052)	1.778***	(0.113)	2.274***	(0.060)	1.721***	(0.159)
- 1963-1965	2.139***	(0.078)	1.954***	(0.138)	2.537***	(0.082)	1.930***	(0.186)
- 1966-1968	2.164***	(0.075)	1.978***	(0.142)	2.787***	(0.079)	2.139***	(0.197)
- 1969-1971	2.467***	(0.069)	2.221***	(0.163)	3.142***	(0.075)	2.313***	(0.243)
- 1972-1974	2.614***	(0.062)	2.346***	(0.178)	3.479***	(0.069)	2.544***	(0.276)
- 1975-1977	2.596***	(0.066)	2.273***	(0.193)	3.464***	(0.064)	2.416***	(0.307)
- 1978-1980	3.053***	(0.063)	2.688***	(0.201)	4.273***	(0.060)	3.141***	(0.322)
- 1981-1983	3.043***	(0.059)	2.634***	(0.200)	4.085***	(0.045)	2.951***	(0.319)
Men								
- 1936-1938	*ref.*		*ref.*		*ref.*		*ref.*	
- 1939-1941	0.281***	(0.016)	0.303***	(0.020)	0.263***	(0.021)	0.206***	(0.029)
- 1942-1944	0.729***	(0.032)	0.741***	(0.038)	0.714***	(0.039)	0.578***	(0.058)
- 1945-1947	0.899***	(0.041)	0.906***	(0.045)	0.982***	(0.046)	0.802***	(0.071)
- 1948-1950	1.191***	(0.049)	1.189***	(0.058)	1.292***	(0.061)	1.073***	(0.087)
- 1951-1953	1.243***	(0.054)	1.251***	(0.056)	1.411***	(0.064)	1.216***	(0.083)
- 1954-1956	1.391***	(0.061)	1.385***	(0.067)	1.626***	(0.074)	1.390***	(0.094)
- 1957-1959	1.450***	(0.069)	1.448***	(0.076)	1.776***	(0.086)	1.527***	(0.102)
- 1960-1962	1.661***	(0.078)	1.645***	(0.091)	2.073***	(0.093)	1.774***	(0.118)
- 1963-1965	1.750***	(0.085)	1.724***	(0.106)	2.226***	(0.094)	1.884***	(0.135)
- 1966-1968	1.873***	(0.082)	1.833***	(0.112)	2.514***	(0.091)	2.109***	(0.149)
- 1969-1971	2.257***	(0.091)	2.201***	(0.131)	2.862***	(0.100)	2.337***	(0.190)
- 1972-1974	2.432***	(0.090)	2.259***	(0.158)	3.295***	(0.088)	2.528***	(0.246)
- 1975-1977	2.700***	(0.081)	2.461***	(0.172)	3.582***	(0.075)	2.698***	(0.275)
- 1978-1980	2.755***	(0.079)	2.502***	(0.176)	3.928***	(0.071)	3.029***	(0.279)
- 1981-1983	2.713***	(0.063)	2.382***	(0.168)	3.882***	(0.047)	2.943***	(0.268)
Observations	416		416		414		414	
Adjusted R^2	0.952		0.951		0.958		0.960	
Constant	Yes		Yes		Yes		Yes	
Time Fixed-Effect	Yes		Yes		Yes		Yes	

Notes: The dependent variable Access specifies whether or not the individual has access to the internet and Use if he uses it in the last three months.

$^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Standard errors clustered at the level of each cohort are reported in parentheses.

Table C.6: Pooled logit estimation results for Internet Access and Use

	Access				**Use**			
	(1)	(2)	(3)	(4)	(1')	(2')	(3')	(4')
Woman	0.213***	0.013	0.277***	0.053	0.133**	-0.086**	0.148**	-0.078
	(0.042)	(0.036)	(0.050)	(0.041)	(0.054)	(0.044)	(0.060)	(0.047)
Household size	0.468***	0.907***	0.466***	0.928***	-0.043	0.314***	0.020	0.370***
	(0.047)	(0.040)	(0.053)	(0.048)	(0.031)	(0.024)	(0.038)	(0.035)
Density	0.000***	0.000***	-	-	0.000***	0.000***	-	-
	(0.000)	(0.000)	-	-	(0.000)	(0.000)	-	-
Monthly income								
- less than 1000euro	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-
- between 1000 and 1500euro	0.561***	-	0.606***	-	0.495***	-	0.506***	-
	(0.033)	-	(0.044)	-	(0.042)	-	(0.051)	-
- between 1500 and 3000euro	1.492***	-	1.537***	-	1.481***	-	1.466***	-
	(0.037)	-	(0.042)	-	(0.045)	-	(0.047)	-
- more than 3000euro	2.661***	-	3.043***	-	2.744***	-	2.779***	-
	(0.063)	-	(0.074)	-	(0.050)	-	(0.056)	-
Education level								
- Low	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*
- Middle	-	1.242***	-	1.266***	-	1.664***	-	1.634***
	-	(0.058)	-	(0.056)	-	(0.032)	-	(0.039)
- High	-	1.843***	-	1.955***	-	2.519***	-	2.431***
	-	(0.071)	-	(0.071)	-	(0.068)	-	(0.079)
Urban unit size								
- rural	-	-	*ref.*	*ref.*	-	-	*ref.*	*ref.*
- 2,000 to 4,999 residents	-	-	0.064	0.099*	-	-	0.039	0.076
	-	-	(0.062)	(0.060)	-	-	(0.059)	(0.061)
- 5,000 to 9,999 residents	-	-	0.089	0.098**	-	-	0.082	0.086
	-	-	(0.055)	(0.047)	-	-	(0.069)	(0.067)
- 10,000 to 19,999 residents	-	-	0.065	0.072	-	-	0.029	0.028
	-	-	(0.052)	(0.046)	-	-	(0.054)	(0.048)
- 20,000 to 49,999 residents	-	-	0.120***	0.118***	-	-	0.098**	0.089*
	-	-	(0.034)	(0.042)	-	-	(0.047)	(0.050)
- 50,000 to 99,999 residents	-	-	0.137***	0.084	-	-	0.087*	0.024
	-	-	(0.045)	(0.057)	-	-	(0.047)	(0.057)
- 100,000 to 199,999 residents	-	-	0.184***	0.144***	-	-	0.190***	0.118**
	-	-	(0.061)	(0.052)	-	-	(0.051)	(0.050)
- 200,000 to 1,999,999 residents	-	-	0.280***	0.196***	-	-	0.259***	0.143***
	-	-	(0.038)	(0.038)	-	-	(0.038)	(0.039)
- Paris	-	-	0.350***	0.313***	-	-	0.335***	0.218***
	-	-	(0.037)	(0.045)	-	-	(0.038)	(0.045)
Generation								
- 1937- 1938	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*
- 1939 - 1940	0.271***	0.260***	0.290***	0.322***	0.295***	0.284***	0.290***	0.335***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
- 1941 - 1942	0.591***	0.575***	0.634***	0.641***	0.551***	0.539***	0.545***	0.572***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
- 1943 - 1944	0.806***	0.761***	0.846***	0.812***	0.793***	0.745***	0.812***	0.781***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
- 1945 - 1946	0.948***	0.923***	1.062***	1.020***	1.052***	1.034***	1.103***	1.082***
	(0.002)	(0.003)	(0.004)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)
- 1947 - 1948	1.227***	1.156***	1.337***	1.256***	1.300***	1.235***	1.317***	1.260***
	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)	(0.002)	(0.004)	(0.003)
- 1949 - 1950	1.373***	1.281***	1.512***	1.381***	1.514***	1.423***	1.539***	1.428***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)

- 1951 - 1952	1.487***	1.376***	1.641***	1.485***	1.670***	1.572***	1.692***	1.565***
	(0.003)	(0.003)	(0.006)	(0.004)	(0.004)	(0.003)	(0.005)	(0.003)
- 1953 - 1954	1.682***	1.571***	1.803***	1.637***	1.846***	1.746***	1.829***	1.695***
	(0.004)	(0.003)	(0.006)	(0.003)	(0.006)	(0.003)	(0.006)	(0.003)
- 1955 - 1956	1.706***	1.571***	1.900***	1.700***	1.952***	1.829***	2.004***	1.834***
	(0.005)	(0.002)	(0.008)	(0.004)	(0.008)	(0.004)	(0.008)	(0.004)
- 1957 - 1958	1.834***	1.669***	1.966***	1.751***	2.197***	2.038***	2.210***	2.018***
	(0.006)	(0.003)	(0.008)	(0.004)	(0.009)	(0.005)	(0.008)	(0.004)
- 1959 - 1960	1.895***	1.712***	2.035***	1.784***	2.343***	2.151***	2.338***	2.096***
	(0.006)	(0.003)	(0.008)	(0.003)	(0.011)	(0.005)	(0.011)	(0.005)
- 1961 - 1962	2.136***	1.889***	2.273***	1.983***	2.508***	2.262***	2.558***	2.292***
	(0.008)	(0.004)	(0.009)	(0.003)	(0.013)	(0.007)	(0.012)	(0.007)
- 1963 - 1964	2.122***	1.851***	2.225***	1.896***	2.604***	2.319***	2.590***	2.271***
	(0.009)	(0.004)	(0.010)	(0.002)	(0.015)	(0.008)	(0.015)	(0.009)
- 1965 - 1966	2.272***	1.966***	2.312***	1.920***	2.950***	2.624***	2.950***	2.553***
	(0.011)	(0.006)	(0.012)	(0.004)	(0.017)	(0.010)	(0.018)	(0.010)
- 1967 - 1968	2.294***	1.953***	2.396***	1.953***	2.951***	2.578***	3.009***	2.556***
	(0.009)	(0.007)	(0.012)	(0.005)	(0.016)	(0.009)	(0.018)	(0.010)
- 1969 - 1970	2.534***	2.155***	2.720***	2.249***	3.191***	2.773***	3.279***	2.792***
	(0.009)	(0.010)	(0.011)	(0.005)	(0.016)	(0.009)	(0.020)	(0.011)
- 1971 - 1972	2.776***	2.290***	2.977***	2.407***	3.647***	3.114***	3.629***	3.034***
	(0.008)	(0.013)	(0.011)	(0.011)	(0.013)	(0.009)	(0.016)	(0.009)
- 1973 - 1974	2.807***	2.305***	2.945***	2.339***	3.722***	3.156***	3.725***	3.083***
	(0.008)	(0.015)	(0.010)	(0.013)	(0.012)	(0.008)	(0.013)	(0.009)
- 1975 - 1976	2.922***	2.344***	3.154***	2.509***	3.779***	3.132***	3.793***	3.102***
	(0.008)	(0.018)	(0.010)	(0.016)	(0.010)	(0.007)	(0.011)	(0.009)
- 1977 - 1978	3.056***	2.454***	3.360***	2.720***	3.852***	3.167***	3.854***	3.162***
	(0.007)	(0.019)	(0.009)	(0.016)	(0.009)	(0.007)	(0.010)	(0.009)
- 1979 - 1980	3.159***	2.559***	3.313***	2.699***	4.488***	3.808***	4.377***	3.708***
	(0.007)	(0.018)	(0.009)	(0.016)	(0.009)	(0.007)	(0.009)	(0.007)
- 1981 - 1982	3.131***	2.492***	3.298***	2.660***	4.341***	3.625***	4.361***	3.678***
	(0.007)	(0.019)	(0.011)	(0.017)	(0.009)	(0.004)	(0.010)	(0.005)
Year								
- 2007	*ref.*	*ref.*	-	-	*ref.*	*ref.*	-	-
- 2008	0.118**	0.160***	-	-	0.057	0.092	-	-
	(0.054)	(0.050)	-	-	(0.065)	(0.070)	-	-
- 2009	0.367***	0.430***	-	-	0.253***	0.326***	-	-
	(0.085)	(0.078)	-	-	(0.087)	(0.088)	-	-
- 2010	0.448***	0.492***	-	-	0.304***	0.340***	-	-
	(0.054)	(0.046)	-	-	(0.075)	(0.078)	-	-
- 2011	1.823***	1.372***	-	-	1.278***	0.848***	-	-
	(0.063)	(0.063)	-	-	(0.076)	(0.083)	-	-
- 2012	0.718***	1.315***	-	-	0.420***	1.052***	-	-
	(0.077)	(0.052)	-	-	(0.077)	(0.060)	-	-
- 2013	1.445***	1.407***	*ref.*	*ref.*	1.068***	1.055***	*ref.*	*ref.*
	(0.062)	(0.053)			(0.061)	(0.059)		
- 2014	1.603***	1.569***	0.149***	0.157***	1.220***	1.214***	0.147***	0.157***
	(0.062)	(0.052)	(0.045)	(0.040)	(0.064)	(0.069)	(0.043)	(0.042)
- 2015	1.596***	1.553***	0.139***	0.141***	1.245***	1.236***	0.168***	0.180***
	(0.064)	(0.055)	(0.038)	(0.039)	(0.062)	(0.069)	(0.042)	(0.043)
- 2016	1.721***	1.674***	0.270***	0.263***	1.263***	1.253***	0.187***	0.196***
	(0.061)	(0.045)	(0.042)	(0.045)	(0.052)	(0.051)	(0.032)	(0.032)
- 2017	1.752***	1.683***	0.304***	0.272***	1.386***	1.342***	0.309***	0.285***
	(0.047)	(0.043)	(0.039)	(0.039)	(0.069)	(0.074)	(0.030)	(0.037)
- 2018	1.893***	1.834***	0.448***	0.425***	1.362***	1.337***	0.287***	0.281***
	(0.050)	(0.045)	(0.050)	(0.047)	(0.059)	(0.073)	(0.053)	(0.052)

- 2019	1.925***	1.871***	0.487***	0.467***	1.382***	1.364***	0.312***	0.309***
	(0.069)	(0.054)	(0.047)	(0.036)	(0.068)	(0.070)	(0.044)	(0.041)
Constant	-3.975***	-3.590***	-2.822***	-2.381***	-3.024***	-2.612***	-2.149***	-1.681***
	(0.099)	(0.072)	(0.111)	(0.079)	(0.091)	(0.071)	(0.107)	(0.072)
Observations	86645	86645	64908	64908	86645	86645	64908	64908
Adjusted R-squared	0.260	0.243	0.253	0.219	0.274	0.281	0.256	0.251

Notes: The dependent variable Access specifies whether or not the individual has access to the internet and Use if he uses it in the last three months.

$^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Standard errors clustered at the level of each cohort are reported in parentheses.

Table C.7: Pseudo-panel estimation results for the online population (cohorts: five-year generations)

	Bank		**Administrative**		**E-commerce**		**Leisure**		**Social media**		**Job search**		**Collab eco**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Woman	-0.162	-0.033	-0.415	-0.360	-0.679	-0.843**	0.059	-0.001	0.304	0.552	3.945**	3.678*	-1.524***	-1.573**
	(0.361)	(0.433)	(1.091)	(1.208)	(0.545)	(0.326)	(0.965)	(1.074)	(0.670)	(0.800)	(1.540)	(1.765)	(0.370)	(0.473)
Household size	0.092	0.008	0.411*	-0.008	0.223	0.063	0.537**	0.399	-0.198	-0.276*	0.726	0.791	0.156	0.204
	(0.178)	(0.209)	(0.207)	(0.201)	(0.173)	(0.128)	(0.196)	(0.290)	(0.155)	(0.143)	(0.525)	(0.513)	(0.251)	(0.213)
Density	0.000	0.000	0.002*	0.002*	0.001	0.001	-0.001	-0.001	-0.002	-0.002	-0.000	-0.000	-0.002*	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Monthly income														
- less than 1000€	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*		*ref.*	-	*ref.*	-
- between 1000 and 1500€	-2.322	-	2.292	-	-4.562	-	0.345	-	-1.163	-	-0.748	-	-4.899**	-
	(2.223)	-	(2.979)	-	(2.849)	-	(2.785)	-	(2.110)	-	(6.169)	-	(2.041)	-
- between 1500 and 3000€	-0.325	-	3.478	-	-2.254	-	0.431	-	-2.272	-	-4.502	-	-2.748*	-
	(1.494)	-	(2.218)	-	(1.908)	-	(1.151)	-	(1.575)	-	(3.828)	-	(1.456)	-
- more than 3000€	-1.318	-	2.707	-	-2.146	-	-0.995	-	-2.653	-	-2.771	-	-3.677*	-
	(1.305)	-	(2.670)	-	(2.243)	-	(1.652)	-	(2.085)	-	(3.862)	-	(1.816)	-
Education level														
- Low	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*
- Middle	-	1.038	-	1.928**	-	2.589***	-	0.354	-	0.588	-	1.041	-	0.799
	-	(0.577)	-	(0.783)	-	(0.543)	-	(0.279)	-	(0.645)	-	(1.418)	-	(0.556)
- High	-	1.078*	-	0.127	-	1.508***	-	-0.442	-	0.362	-	0.955	-	0.736
	-	(0.559)	-	(1.997)	-	(0.403)	-	(0.987)	-	(1.693)	-	(0.883)	-	(1.021)
Observations	117	117	117	117	117	117	72	72	63	63	86	86	117	117
Adjusted R^2	0.868	0.869	0.928	0.935	0.945	0.960	0.870	0.862	0.978	0.975	0.933	0.930	0.920	0.914
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort Fixed-Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed-Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Definition of the dependent variables: Bank: the individual uses the internet to access his bank account. Administrative: the individual uses the internet to fill out or send administrative forms. E-commerce: the individual uses the internet to buy a good online. Leisure: the individual has listened to the radio or music, watched television, played or downloaded games, pictures, video, music. Social media: the individual uses the internet to create a profile or post messages on social media.

Job search: the individual uses the internet to search for a job. Collab Eco: the individual uses the internet to sell products and services on online sites.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered at the level of each cohort are reported in parentheses.

Table C.8: Pseudo-panel estimation results for the online population (cohorts: two-year generations)

	Bank		**Administrative**		**E-commerce**		**Leisure**		**Social media**		**Job search**		**Collab eco**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Woman	-0.009	-0.000	-0.190	-0.170	-0.711	-0.889	-0.056	-0.049	0.044	0.193	1.298	0.977	-0.733	-0.728
	(0.314)	(0.306)	(0.707)	(0.636)	(0.406)	(0.440)	(0.350)	(0.381)	(0.371)	(0.306)	(1.086)	(0.959)	(0.454)	(0.500)
Household size	-0.069	-0.069	0.114	-0.102	0.129	0.105	0.224	0.097	-0.056	-0.226	0.639*	0.409	0.072	0.092
	(0.114)	(0.093)	(0.183)	(0.206)	(0.120)	(0.128)	(0.173)	(0.156)	(0.190)	(0.183)	(0.255)	(0.247)	(0.252)	(0.243)
Density	-0.000	-0.000	0.001	0.001	0.001	0.001	0.000	0.001	-0.001	-0.001	-0.000	-0.001	0.000	0.001
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Monthly income														
- less than 1000€	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-
- between 1000 and 1500€	-0.022	-	-0.252	-	-2.352*	-	-0.547	-	1.505	-	-1.895	-	-3.518*	-
	(0.645)	-	(1.664)	-	(0.975)	-	(2.299)-	-	(1.129)	-	(2.555)	-	(1.555)	-
- between 1500 and 3000€	0.400	-	0.603	-	-0.583	-	0.136	-	-0.218	-	-4.481*	-	-3.241*	-
	(0.661)	-	(1.705)	-	(0.747)	-	(1.080)	-	(0.717)	-	(1.926)	-	(1.387)	-
- more than 3000€	0.643	-	0.279	-	0.233	-	-0.650	-	-0.483	-	-3.591	-	-3.144*	-
	(0.649)	-	(1.668)	-	(0.548)	-	(1.200)	-	(0.705)	-	(1.807)	-	(1.273)	-
Education level														
- Low	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*
- Middle	-	0.596*	-	1.683**	-	1.679**	-	0.417	-	-0.203	-	2.230*	-	0.582
	-	(0.239)	-	(0.374)	-	(0.458)	-	(0.527)	-	(0.609)	-	(1.028)	-	(0.547)
- High	-	0.632	-	0.391	-	1.021**	-	-0.162	-	-0.343	-	0.462	-	0.501
	-	(0.402)	-	(0.814)	-	(0.356)	-	(0.550)	-	(0.751)	-	(1.175)	-	(0.584)
Observations	299	299	299	299	299	299	184	184	161	161	201	201	299	299
Adjusted R^2	0.751	0.754	0.880	0.891	0.889	0.888	0.826	0.825	0.953	0.950	0.874	0.874	0.844	0.837
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort Fixed-Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed-Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Definition of the dependent variables: Bank: the individual uses the internet to access his bank account. Administrative: the individual uses the internet to fill out or send administrative forms. E-commerce: the individual uses the internet to buy a good online. Leisure: the individual has listened to the radio or music, watched television, played or downloaded games, pictures, video, music. Social media: the individual uses the internet to create a profile or post messages on social media.

Job search: the individual uses the internet to search for a job. Collab Eco: the individual uses the internet to sell products and services on online sites.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered at the level of each cohort are reported in parentheses.

Table C.9: Pseudo panel estimation results for reasons of non-access of Internet (cohorts: ten-year generations)

	Too expensive		**Lack of skills**		**Security**		**Not useful**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Woman	-1.247	-1.250*	0.489	1.226	-1.945	-1.949	-0.622	-0.711
	(0.768)	(0.546)	(1.152)	(1.322)	(2.423)	(1.588)	(0.773)	(0.826)
Household size	0.152	0.197	0.106	0.681*	-1.791	-2.223*	-0.876	-1.008
	(0.147)	(0.261)	(0.133)	(0.297)	(1.249)	(0.802)	(0.528)	(0.496)
Density	0.000	0.000	0.001	0.001	0.000	0.005	0.000	-0.002**
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.004)	(0.001)	(0.001)
Monthly income								
- less than 1000€	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-
- between 1000 and 1500€	0.471	-	2.912**	-	-4.445	-	1.211	-
	(0.833)	-	(0.908)	-	(2.670)	-	(0.847)	-
- between 1500 and 3000€	0.168	-	0.882	-	-5.472*	-	1.532**	-
	(0.905)	-	(0.643)	-	(1.975)	-	(0.518)	-
- more than 3000€	0.375	-	3.056	-	-4.340*	-	0.209	-
	(0.520)	-	(1.669)	-	(1.766)	-	(0.405)	-
Education level								
- Low	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*
- Middle	-	-0.330	-	-0.000	-	4.191*	-	0.230
	-	(0.632)	-	(1.170)	-	(1.816)	-	(1.246)
- High	-	0.248	-	-0.663	-	-5.928**	-	2.325*
	-	(0.566)	-	(0.821)	-	(1.895)	-	(1.042)
Observations	50	50	50	50	50	50	50	50
Adjusted R^2	0.931	0.931	0.956	0.940	0.792	0.829	0.948	0.951
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Dependent variables definition:

- Too expensive: the individual does not have internet at home because of equipment or access is too expensive
- Lack of skills: the individual does not have internet at home because internet is not needed
- Security: the individual does not have internet at home because of insufficient household skills
- Not useful: the individual does not have internet at home for security or privacy reasons

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered at the level of each cohort are reported in parentheses.

Table C.10: Pseudo panel estimation results for reasons of non-access of Internet (cohorts: five-year generations)

	Too expensive		**Lack of skills**		**Security**		**Not useful**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Woman	0.319	0.430	-0.654	-0.457	0.242	0.230	-0.421	-0.607
	(0.480)	(0.585)	(0.692)	(0.754)	(1.543)	(1.439)	(0.574)	(0.787)
Household size	-0.029	-0.066	-0.275	-0.476	-1.017	-1.363*	-0.133	-0.037
	(0.201)	(0.265)	(0.386)	(0.285)	(0.449)	(0.434)	(0.430)	(0.440)
Density	-0.000	-0.000	-0.000	0.000	-0.001	0.001	0.001	0.001
	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Monthly income								
- less than 1000€	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*	-
- between 1000 and 1500€	-0.146	-	0.014	-	-2.381	-	0.014	-
	(0.318)	-	(0.561)	-	(1.374)	-	(0.754)	-
- between 1500 and 3000€	-0.552	-	-0.661	-	-2.370	-	-0.715	-
	(0.443)	-	(0.674)	-	(1.523)	-	(0.864)	-
- more than 3000€	0.620	-	-0.237	-	-2.766*	-	-0.002	-
	(0.437)	-	(0.756)	-	(0.828)	-	(0.638)	-
Education level								
- Low	-	*ref.*	-	*ref.*	-	*ref.*	-	*ref.*
- Middle	-	-0.028	-	-2.639*	-	2.257	-	-0.049
	-	(0.287)	-	(0.976)	-	(1.915)	-	(1.136)
- High	-	-0.594	-	-3.099**	-	-4.430**	-	1.310
	-	(0.601)	-	(0.686)	-	(0.932)	-	(0.708)
Observations	90	90	89	89	90	90	90	90
Adjusted R^2	0.793	0.783	0.869	0.901	0.620	0.666	0.831	0.832
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Dependent variables definition:

- Too expensive: the individual does not have internet at home because of equipment or access is too expensive
- Lack of skills: the individual does not have internet at home because internet is not needed
- Security: the individual does not have internet at home because of insufficient household skills
- Not useful: the individual does not have internet at home for security or privacy reasons

$p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Standard errors clustered at the level of each cohort are reported in parentheses.

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