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Internet Use and Social Capital: The Strength of Virtual Ties

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Internet Use and Social Capital: The Strength of Virtual Ties

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Summary

This paper aims to understand how Internet users may improve their social capital by investing in social online activities. We argue that Internet can be a convenient and efficient means of maintaining existing social ties and/or of creating new ties. We seek to identify the drivers of online investments in social capital and the nature of the interaction with traditional forms of investments in social capital. Using a Luxembourg household survey, the econometric results reveal a significant positive impact of volunteer activities and trust (two measures of social capital) on online investments to maintain social capital, but more ambiguous relations are found between online investments and face-to-face contacts with friends. By contrast, online investments to create new ties are poorly related to the Internet users' existing social capital. Our results also show that geographic mobility tends to increase social capital built online.

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I. INTRODUCTION

Sending and receiving e-mails is the most frequent Internet usage. Internet users via e-mail, Instant Messaging or social network platforms communicate not only with their family, friends or colleagues, but also with anonymous people (Parks and Floyd, 1996). Internet is actually a new means of communication and socialization that can supplement face-to-face or telephone contacts. But the Internet may isolate individuals and reduce the time spent participating in social activities, especially if Internet users are mainly engaged in solitary usage (web-surfing, news reading, etc.). For example, Attewell *et al.* (2003) showed that adolescents with a home computer spend less time practicing sports or playing outside. Moreover, virtual sociability is not really equivalent to traditional sociability: face-to-face interactions are typically richer than virtual interactions by e-mail, chat or instant messaging.

Whether Internet use increases or decreases sociability has important consequences on the building and maintenance of social capital. Social capital refers to the individual's collection of social ties that provides access to assistance, information or services. Individuals can derive market and non-market benefits from their social capital (better job, more happiness, better deals...). This paper aims to understand how Internet users may improve their social capital by investing in social online activities. In particular, we want to understand whether investing online in social capital is a substitute or a complement to traditional investments in social capital (face-to-face contacts and participation in political and organizational activities).

This issue is critical because if online and traditional investments are complementary, then the Internet users could accumulate more social capital than non-users. As Internet users tend to have higher social capital than non-users, the digital divide may increase the inequalities in social capital (Quan-Haase and Wellman, 2004, Di Maggio *et al.*, 2004, Katz and Rice, 2003; Hargittai, 2002).

Moreover, Internet use may also modify the nature of an individual's social capital and introduce new forms of social capital. Following Granovetter (1973), it is possible distinguish two forms of online social activities. Firstly, Internet may serve to maintain or intensify existing social ties with close friends and family (strong-tie investments). Secondly, Internet can be useful to maintain weak ties and to encounter new acquaintances (weak-tie investments). In other terms, Internet enables to strengthen strong ties, but also to expand weak ties (Resnick, 2001). Actually, the Internet may modify the composition of social capital if the Internet is more favorable to either weak-tie investments or strong-tie investments. By changing the proportion of strong and weak ties in Internet users' social capital, it may affect their ability to obtain support and

emotional aid (provided by strong ties) and to access new ideas, resources or job opportunities (provided by weak ties) (Granovetter, 1973, 1983, 2005; Friedkin, 1982).

Several studies have examined the influence of social capital and social support on Internet usage (Agarwal *et al.*, 2005; Goldfarb, 2006; DiMaggio *et al.*, 2004). Goolsbee and Zittrain (1999) for example find that people are more likely to shop online if much of their social network (friends and family) does likewise. Our article is not intended to measure the impact of social capital on Internet usage, but rather how Internet use can affect the building and maintenance of social capital.

Much of the debate over social capital is about whether the Internet enhances or reduces social capital (DiMaggio *et al.*, 2001). This question has been partially addressed by Franzen (2003), who examines the effect of Internet use on peoples' social network, measured by the number of close friends and the amount of time spent with them. Based on a Swiss panel of 700 individuals surveyed in 1998 and 2001, he shows that Internet use does not increase or decrease the number of friends and the time spent with them, but reduces the time spent watching television. Shklovski *et al.* (2006) review 16 surveys between 1995 and 2003 that examine how Internet use can affect social interaction. They show that Internet use has a slight positive impact on sociability in longitudinal studies. But the impact tends to be negative in cross-sectional studies such as in Nie *et al.* (2002) that give evidence of substitution effects between the time spent online and the time spent in face-to-face interactions. Following Putnam (2000), Wellman *et al.* (2001) distinguish three forms of social capital: *network capital* (informal relations among friends, neighbors and colleagues), *participatory capital* (involvement in politics and voluntary organizations), and *community commitment* (trust and engagement toward the community). Using U.S. data, they find that Internet use supplements network capital² and increases participatory capital, yet undermines community commitment. Kraut *et al.* (2002) show that Internet use increases social interactions with friends and kin, but only for people rich in social capital³. Similarly, Katz *et al.* (2001) conclude that Internet users are more heavily involved in voluntary organizations; moreover, longstanding Internet users have larger social networks than either non-Internet users or more recent users. Riphaegen and Kanger (1997) state that e-mail users do not necessarily communicate more extensively with others than e-mail non-users, yet Internet users are able to communicate more easily with strangers or people outside their social circle (weak ties). Zooten *et al.* (2003) report contrasting effects between Internet use and individual social capital: no correlation with participatory capital (involvement in voluntary organizations), but a limited negative correlation with community commitment (volunteer work, religious activities, charities). Zhao (2006) also emphasizes differences in Internet use between

² i.e. Internet use does not increase or decrease the frequency of face-to-face and telephone contacts.

³ For people poor in social capital, Internet use tends to reduce their sociability.

social (e-mail, chat) and asocial activities (web surfing, reading the news). He shows that social users have a larger social network than non-users.

Most of the aforementioned studies indicate the existence of interaction between Internet use and social capital, although causation is often ambiguous. In the remainder of this article, we focus on online investments in social capital and attempt to empirically understand the determinants for such social activities. For this purpose, we use data from a Luxembourg household survey and estimate several probit models (discrete choice models) to find the drivers of online investments in social capital. The dataset has several advantages. First, the survey is part of the European Social survey and has similarities with the US Generalized Social Survey. It thus provides detailed and accurate measures of sociability and social capital (Reeskens and Hooghe, 2008). Second, Luxembourg is a small, highly-developed European country that is well-representative of Northern Europe's population. Third, the survey has been conducted face-to-face and funded by the European Commission. Finally, data enable us to distinguish between the two main motivations when investing in social capital: maintaining existing ties and creating new ties.

The econometric results reveal a significant positive impact of *participatory capital* (volunteer activities) and *community commitment* (trust) on online investments to maintain social capital, but more ambiguous relations are found between online investments and *network capital* (face-to-face contacts with friends). By contrast, online investments to create new ties are poorly related to the Internet users' existing social capital. Our results also show that geographic mobility tends to increase social capital built online. In other terms, the Internet is a convenient and efficient means of creating and upholding social capital for those who experienced mobility in the past.

In the next section, we clarify the concept of social capital and then propose a theoretical framework for analyzing the potential effects of Internet use on individual social capital. Section 3 will present the database and the econometric models used to test our hypotheses. Section 4 will display and comment the estimations. Section 5 concludes.

II. THE CONCEPTUAL FRAMEWORK

1 Social capital as an individual attribute

The concept of social capital was initially developed by sociologists (Bourdieu, 1980; Coleman, 1988) and has since been extended to other social sciences, especially economics⁴. Actually, social capital is a multiform concept that does not create consensus among social scientists (Durlauf, 2002; Manski, 2000). First, social capital can be defined as a community-

level feature. Each group or community is characterized by a level of social capital that tends to be correlated with the degree of trust among community members (Bowles and Gintis, 2002). According to Fukuyama (1999) therefore, "*social capital can be defined simply as an instantiated set of informal values or norms shared among members of a group that permits them to co-operate with one another. If members of the group come to expect that others will behave reliably and honestly, then they will come to trust one another. Trust acts like a lubricant that makes any group or organization run more efficiently.*"⁵

By contrast, an individual level approach of social capital considers that each individual is characterized by the amount of trusting relationships and social ties "in which he is involved and where he has access" (Laumann and Sandefur, 1998). Social capital is an individual attribute that enables people to draw on resources from other members of the networks to which they belong and to obtain greater benefits from social interactions with others, such as useful information, better working and living conditions, happiness or self-esteem (Glaeser *et al.*, 2002). The individual will accumulate social capital thanks to his intrinsic aptitudes (charisma, leadership abilities...) and by investing to maintain and expand his social network. Such investments are costly in terms of time, effort and monetary resources; they can consist of joining an association, a club, a political party, or simply meeting friends, organizing a dinner party⁶. These investments contribute to create social ties with helpful or influential persons.

We focus here on this individual level approach of social capital and develop an economic framework to analyze online investments in social capital and build our research hypotheses.

2. Research hypotheses

From a micro-economic perspective, the decision to invest in social capital is a trade-off between the expected benefits and costs, as in physical capital (Becker, 1964). The individual will continue to allocate resources to such social activities as long as the marginal benefits exceed the marginal cost.

Two types of online investments are considered: investments to maintain social capital and investments to create new social capital. The maintenance of existing social capital consists in avoiding the depreciation of social capital. Indeed, as with physical capital, social capital tends to depreciate over time if the individual does not manage his social capital, even if the depreciation rate is certainly much lower than for physical capital (Sobel, 2002).

⁴ See Sobel (2002) for a more in-depth discussion on the economic concept of social capital.

⁵ Similarly, for Putnam (2000): "Social capital refers to connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them."

⁶ Note that these individual investments in social capital can generate positive externalities (such as when an individual joins a club), but can also have negative externalities (e.g. when a person looks for a position envied by others).

The expected cost of building and maintaining social capital largely depends on the individual's skills and intrinsic abilities. For online investments in social capital, the cost should decrease with the level of education and the experience of information technology usage (computer and Internet skills). Indeed, highly educated and IT-skilled people have lower cost barriers in adopting Internet applications to communicate and manage relationships (Hargittai, 2002).

Hypothesis 1: Highly-educated and IT-skilled people are more likely to use the Internet to improve their social capital

An important parameter that may affect the cost of online investment in social capital is the opportunity cost of time. This cost is generally measured by the wage or income that the individual can expect from working instead of using the Internet. This depends on the occupational status. The opportunity cost of time should particularly increase the probability to invest online because the Internet is a time saving means to communicate and interact with one's social network. E-mails can efficiently replace time-consuming meetings. Moreover, Internet enables to send the same message to many friends or to all the members of an organization and provides greater ability to manage his social network through social platforms such as Facebook (Boyd and Ellison, 2007). In other terms, the Internet increases the productivity of many social activities: with the same amount of resources and time, people can be involved in more organizations and maintain more social ties, even if the quality and the expected return of such investments is probably lower than with face-to-face investments.

Hypothesis 2: The incentives to use the Internet to maintain his social capital should be higher for people who have a high opportunity cost of time.

The opportunity cost of time may have negative effects on the creation of new ties. Indeed Goldfarb and Prince (2008) have found that time-consuming Internet usages (like chat or online game) are less frequent as the opportunity cost of leisure time increases. And several studies have showed how meeting new persons online is a time-consuming activity (Smoreda and Thomas, 2001; Lenhart *et al.*, 2001; Parks and Floyd, 1996).

Hypothesis 3: The incentives to use the Internet to create new social capital should be higher for individuals that have a low opportunity cost of time.

The second dimension playing a role in social capital investments is the expected benefits. These benefits are positively linked to the amount of social capital owned by the individual. If an

individual has a lot of friends and acquaintances or belongs to many organizations, he will have to spend a lot of time and resources to preserve his existing social ties (Glaeser *et al.* 2002). Then the expected benefits or returns to use the Internet are larger for this individual than for an individual who has poorer social network. The latter can use traditional means of communication (face-to-face or phone) to maintain his network and will gain little from using the Internet. But an individual that has dense social capital can save a lot of time and resources if he uses Internet technologies to partly manage his social network.

Hypothesis 4: The incentives to use the Internet to improve his social capital should be higher for individuals that enjoy large social capital.

This hypothesis underlines that the Internet may be a convenient and efficient means of maintaining or expanding individual social capital that supplements face-to-face investments for those who are rich in social capital (Kraut *et al.*, 2002).

Internet use can also become essential in case of geographical mobility. Indeed, the main source of depreciation for social capital is when people move to another city or quit an organization. In particular, geographic mobility tends to loosen or weaken many social ties with friends, neighbors or colleagues. The Internet can lower this depreciation process by facilitating contacts with geographically dispersed friends or acquaintances. Thanks to the Internet, it is possible to maintain strong ties despite the distance (Cummings, Lee and Kraut, 2006; Wellman *et al.*, 2001). But the Internet can also be a convenient means of meeting new acquaintances and recreating (virtual) sociability for people who have moved to a place where they have no friends or family. From this point of view, Internet should modify the nature of social capital for those who experienced mobility in the past. Their social capital should be more virtual, with a lot of computer-based social interactions with their relatives and with new “virtual” friends. For such people, online investments tend to be a substitute to offline investments, because the time spent on the Internet can reduce face-to-face sociability and involvement in local voluntary organizations.

Hypothesis 5: People who experienced geographical mobility in the past are more likely to use the Internet to improve their social capital.

In the next sections, we will test the hypotheses that an Internet user has a higher propensity to improve his social capital by means of the Internet if he is well educated, has a high opportunity cost of time and a rich collection of social ties or has experienced geographical mobility in the past. We will estimate the determinants of online investments for a representative sample of Internet users living in Luxembourg. We start by presenting data, the methodology and the variables used in the econometric models.

III. METHOD AND DATA

1. Data collection

The data come from a survey conducted in Luxembourg between April and August 2002 and contain 1,554 individuals aged between 16 and 74 (see Box 1 for details). The survey provides the demographic characteristics of respondents, their IT usage, in particular Internet usage, their leisure occupations, but also their values and social activities. Tables 3 and 4 (in the Appendix) present the list of the variables used in the econometric models and provide some statistics for all the respondents and the sample of Internet users. 51% of respondents declared to have used the Internet within the three previous months. 46% of the Internet users were connected online daily.

Box 1. Description of “ICT Usage by Household” survey and “European Social Survey”

The “ICT Usage by Household” survey is part of the “e-Europe 2005” program and is intended to collect data relating to IT usage by households across the European Union. Consequently, each Member State of the European Union implemented this survey in accordance with a common methodology and a set of common questions. The questionnaire is made up of two parts: the first focuses on IT use by individual Luxembourg residents, and the second part, entitled “European Social Survey”, deals with the opinions of individuals on various topics, such as politics, values, etc.

Technical details of these surveys

The sample was extracted from the registration file of the Inspector General of Social Security (IGSS) that covers 91% of the population living in Luxembourg. The sample selection method was implemented in two phases. First, a random stratified sample of fiscal households was selected based on three criteria: the number of household members, (1, 2, 3 or more), the professional status of the head of household and the health insurance agency where the head of household is registered. Our sample comprised of 5,033 fiscal households. The unit of observation is the fiscal household, yet individual-level data were also collected. In the second phase, the Kish method was employed to select an individual between 16 and 74 years old within the surveyed household to be the household respondent (the individual whose birthday was closest to the first of January). 1,554 respondents (representative of the Luxembourg population) were selected and surveyed face-to-face between mid-April 2002 and mid-August 2002.

Balancing the sample

The sample-balancing step was performed to reduce the bias arising from a lack of homogeneity between the population and the responses, in addition to improving the representativeness of the 1,554 respondents. The weights of each individual were determined according to the CALMAR procedure (“calibration” method at the margins). This method consists in balancing the sample using additional information or “calibration” variables (gender, age or professional status).

2. The econometric model

The econometric model is a probit model that perfectly fits binary decisions such as investing in social capital or not. This model considers that for each individual $i=1, \dots, n$, the binary dependent variable y_i {either 0 or 1} is the result of a decision-making process influenced by

some independent variables x_i . Here, $y_i = 1$ when the individual decides to improve his social capital by the means of the Internet and $y_i = 0$ otherwise. Formally, $y_i = 1$ if $y_i^* > 0$ and $y_i = 0$ if $y_i^* \leq 0$, with $y_i^* = x_i\beta + \varepsilon_i$ where y_i^* is the net utility to invest online in social capital, ε_i is the random error term (normally distributed), x_i the set of independent variables that explain the decisions of investments (demographics, skills, existing social capital...) and β the vector of coefficients associated to each independent variable. Thus the probability or likelihood that an Internet user i invests online is given by $P(y_i = 1) = P(x_i\beta + \varepsilon_i > 0) = F(x_i\beta)$ where F is the cumulative function of the normal law. And the likelihood function is given by $L = \prod_{i=1}^n [F(x_i\beta)]^{y_i} [1 - F(x_i\beta)]^{1-y_i}$. The β coefficients are estimated by maximizing the log of the

likelihood function $LogL = \sum_{i=1}^n [y_i F(x_i\beta)] [(1 - y_i)(1 - F(x_i\beta))]$ (Greene, 1997).

We will now describe the dependent and independent variables introduced in the probit model.

3. Variables used

The objective of our study is to understand what the drivers of online investments in social capital are. What do these investments consist of? Are they substitute or complement to more traditional forms of investment?

Dependent variables

Our survey provides detailed information on Internet usage. In particular, Internet users were asked whether Internet has enabled them to increase or intensify contacts with relatives (INTENSIFY), to renew contact with persons (RE-TIE), to get to know new persons (KNOW) and/or to meet physically persons known by means of the Internet (MEET)⁷.

Among the 1,554 respondents, 31% acknowledged that they experienced at least one of these 4 situations. If we restrict the sample to Internet users, 61% declared to have their social capital improved thanks to the Internet. Each situation can be analyzed as a form of online investment in social capital. The first motive of online investment is to maintain his social capital (INTENSIFY). It can be interpreted as a strong-tie investment since this strengthens ties with friends or family. The online investment RE-TIE is also a form of social capital maintenance, because the Internet is used to renew ties with relatives who have been out of touch. The outcome of online investments KNOW and MEET is the creation of new social capital. A large

⁷ The latter is a sub sample of the respondents who declared to have made new acquaintances thanks to the Internet, and have decided to meet physically their virtual friends. Parks and Floyd (1996) found that many relationships initiated online resulted in face-to-face meetings.

part of this social capital corresponds to weak ties, but some virtual ties can become strong ties, especially when they lead to face-to-face meetings. Maintaining social capital was mentioned by 51% of Internet users (i.e. 41.1% for INTENSIFY and 31.3% for RE-TIE), while creating new social capital was only performed by 34% of Internet users (32.6% for KNOW and 19.8% for MEET).

To analyze the determinants of online investments, we estimate a probit model for each of these four online investment patterns. The dependent variables (INTENSIFY, RE-TIE, KNOW, MEET) are binary. For example, INTENSIFY is equal to 1 if the Internet user declares to have intensified his ties with his relatives by means of the Internet (and 0 otherwise). We also estimate a probit model where the dependent variable (SOCIALUSE) equals 1 if the individual has already used the Internet to invest in social capital (whatever the form of investment). SOCIALUSE is equal to 0 for those who have only solitary usage on the Internet (39% of the Internet users in our survey considered that did not improve their social capital).

We will now describe the independent variables and their expected effects on the decision to invest online in social capital.

Independent variables

In the empirical literature on social capital, there are several methods to measure social capital. First, social capital can be measured by the number or density of social ties with close friends (Granovetter, 1973; Kraut *et al.*, 2002; Franzen, 2002). It can also be measured by the number of associations or organizations with which the individual is involved (Putnam, 2000; Glaeser *et al.*, 2002). Another measurement instrument is the trust in others or in institutions (Putnam, 2000; Fukuyama, 1999). These different measurements correspond to the three dimensions of social capital identified by Wellman *et al.*, (2001): social network, participatory capital and community commitment.

Our data provide information on these three dimensions. First, the *size or density of social network* is measured by the frequency with which individuals spontaneously encounter friends. Three binary variables have been built: the individual spontaneously meets friends several times a day (DAY), several times a week (WEEK) and less than once a week (MONTH). We would expect that those who interact more frequently with friends will have a higher amount of social capital and have a higher probability to invest online to maintain their existing social ties (INTENSIFY).

Concerning *participatory capital*, we know the number of associations, but also the type of associations with which the individual is involved⁸. We make a distinction between "leisure" associations (where membership usually implies face-to-face relationships and active participation) and civic associations (where membership often takes the form of a financial support without any physical contacts or meetings). Leisure type associations include sporting clubs, organizations for promoting cultural and leisure activities, social and youth clubs, retirees' associations, religious and fellowship organizations. Civic associations comprise trade unions, professional societies, consumer rights groups, human rights associations and NGOs, environmental protection organizations, peace activist groups, animal rights groups, political parties and school associations. Amongst the 796 Internet users surveyed, 71% belong to a leisure association, 57% to a civic association and 15% do not belong to any type of association. Membership however does not indicate the degree of involvement, i.e., the intensity of investment in social capital (Glaeser *et al.*, 2002). For this purpose, we distinguish the number of association membership and the number of associations in which the individual is actively engaged (i.e. volunteer work for the association). 14% of Internet users declared to be volunteer in a leisure association and 6% in a civic association.

Being involved in political or organizational activities is most of the time a traditional form of investment in social capital (implying face-to-face contacts). An intense participation in many associations can reduce the time available to invest online in social capital. But the Internet becomes increasingly diffused in the associations and plays a key role in their functioning. It enables members to communicate together, to coordinate remote actions, to share information, etc. Active membership should positively affect the decision to invest online to intensify social ties, especially to strengthen ties with active members of associations in which one is involved. By contrast, it should reduce the probability to use the Internet to get to know and meet new persons (less time available for meeting new acquaintances).⁹

The last measurement of social capital is trust in others. Trust is a continuous variable with values ranging from 0 to 10 (with 0 when respondents declare that they cannot trust others and 10 if they think that a majority of people behave honestly)¹⁰. A high level of trust towards others is presumed to be a prerequisite for investing online, especially for meeting new persons. Indeed, compared to face-to-face interactions that facilitate the transmission of feelings and intention, a

⁸ However, we are unable to calculate the exact number of association memberships. Because the individual only declares whether he belongs at least to one association (for each type of associations). So we cannot discriminate between an individual who is engaged in one sport club and the one who attends several clubs.

⁹ Except if the individual is engaged in online associations, through which he can meet new acquaintances. Unfortunately our data does not make distinction between online and offline associations.

¹⁰ However, Glaeser *et al.* (2000) questioned the reliability of trust inferred from such declarative answers. Glaeser *et al.* (2000) found that responses were often imperfectly correlated with trust derived from an experimental trust game.

computer-mediated interaction can be source of misunderstanding and mistrust (Bohnet and Frey, 1999).

Table 1 compares Internet and non-Internet users with respect to the three measurements of social capital. We observe that Internet users are, on average, involved in more (civic and leisure) organizations (2.08) than non-users (1.71)¹¹ and declare a greater level of trust. They also demonstrate higher sociability¹²: 25% of Internet users spontaneously meet friends every day, whereas only 16% of non-users have this intensity of sociability. However, the difference of social capital between social Internet users (i.e., who declared to have improved their social capital) and solitary Internet users is not significant.

Table 1

Social capital of Internet users and nonusers

| | Non-Internet users | Internet users | Social Internet users |
|--|--------------------|----------------|-----------------------|
| Membership | 1.71 | 2.08 | 2.06 |
| Trust | 5.06 | 5.35 | 5.52 |
| Spontaneous contacts with friends everyday | 16% | 25% | 26 % |

The three above measures of social capital provide an incomplete description of the individual's social network. It is also important to characterize the degree of dispersion and stability of his social network. Hence, we introduce a binary variable that equals 1 when the individual's mother and father were both born in Luxembourg (PARENTS) and 0 otherwise. Having at least a parent born abroad implies a more geographically dispersed social network and increases the incentives to use the Internet to maintain contact with distant family. We also introduce a binary variable that indicates whether the individual has experienced a period of unemployment of three months or longer over the past five years (UNEMPLOYMENT). Many studies have found that unemployment periods can be detrimental to maintaining social capital (DiPasquale and Glaeser, 1999). People who loose a job can experience a strong depreciation of their existing social capital. But the impact of this variable on online investments is unclear because unemployment tends to reduce the opportunity cost of time (positive impact on the online creation of new social capital) and the stock of social capital (negative impact on the online improvement of social capital).

To test Hypothesis 5, we measure geographical mobility with a binary variable that equals 1 when the individual has resided in the Grand Duchy of Luxembourg for less than five years (MOBILITY). Internet users that have recently moved to Luxembourg (in the last five years) are

¹¹ The two means are statistically different from zero at 1%.

more likely to invest online to maintain ties with their original community and/or to renew social ties.

Online improvement of social capital will also depend on the time spent on the Internet. Light users are less likely to know and meet new acquaintances or to intensify their link with their friends and kin than heavy users (Zhao, 2006). The intensity of Internet use (ONLINE) is measured by the average weekly time spent on the Internet (whatever the place – at home, at the office ...).

We also introduce demographic variables as controls: gender, age, age squared (to take into account non-linear age effects), marital status (living with a partner), household size and location (living in an urban area or not). We presume that age could exert a negative impact on online social investments. Young generations are more familiar with Internet higher skill in IT (digital natives) and have massively adopted this technology to communicate and interact with their friends (network effect). By contrast, older generations are less at ease with the Internet and can find a limited interest to maintain social ties by means of the Internet if most of their relatives are not connected.

Being single can increase the incentives for using the Internet to make new acquaintances and meet potential partners. The Internet can be considered as a worldwide dating club and the success of websites like Match.com proves the increased role of the Internet to seek partners.

The respondents' level of education is also taken into account through three dummy variables (LOW EDUCATED, MEDIUM EDUCATED, HIGH EDUCATED)¹³ in order to measure their human capital. Higher education should reduce the cost of investing online in social capital and increase the likelihood of improving his social capital by means of the Internet.

Income is indirectly measured by the opinion the individual holds on his/her standard of living. A question in the ESS survey indicates whether individuals consider that their current household income allows them to live comfortably (HIGH INCOME), to make ends meet (MEDIUM INCOME) or to struggle financially (LOW INCOME)¹⁴.

3. Correction for selection bias

The probit models on the different forms of online social investments are estimated on the population of Internet users. But if this population is different from the general population,

¹² The means are also statistically different at 5%.

¹³ Low education corresponds to a pre-high school level, medium education to a high school level and high education to the university level.

¹⁴ Table 5 (in the Appendix) presents the correlation matrix of the independent variables introduced in our econometric models. Except for Age and Partner (negatively correlated), we do not find any significant correlation. Moreover, the test of Variance Inflation Factors (VIF) has not revealed a serious problem of collinearities in our econometric estimations. VIF measures the inflation in the variances of the parameter estimates due to collinearities that could exist among the independent variables. Even if there is no formal criteria for deciding if a VIF is large enough to affect the predicted values, the VIF of the independent variables in our probit models can be considered as reasonably low (lower than 2).

estimations can be biased (selection bias). Indeed, the decision to maintain social ties and/or to meet new persons by means of the Internet is conditional to the choice of using the Internet. And this decision of adopting the Internet is largely influenced by the amount of individual social capital that also plays a key role in online investment choices.

This bias can be corrected by applying the Heckman method (1979), which consists in first estimating the probability of Internet use and then calculating for each Internet user the inverse Mills ratio (this corresponds to the normal density function divided by the normal cumulative function). In the second step, this ratio is introduced into the probit models of social capital investment as an explanatory variable. The estimated coefficient *RHO*, associated with the inverse Mills ratio, thus measures the correlation in the errors of the Internet use model and the model of online social capital investment (Maddala, 1983; Breen, 1996). When this coefficient is significantly different from zero, the presence of selection bias is proven.

For the first step probit model, the dependent variable is the decision to use the Internet over the previous three months.¹⁵ The independent variables are partly the same as in the second step. We control for demographic characteristics: gender, age, age squared, household size, marital status, location, education and income levels. We also take into consideration the amount of social capital (frequency of spontaneous meetings, membership in leisure or civic associations, and trust). Specifically for this first step probit, we also control for the use of media other than the Internet, such as newspapers and television, since these leisure activities reduce the time available for the Internet (Attewell *et al.*, 2003; Gershuny, 2003). Watching TV is measured by a continuous variable from 0 (no TV) to 7 (more than three hours per day).¹⁶ Similarly, a continuous variable measures the time spent reading newspapers from 0 (no reading) to 7 (more than 3 hours per day). Finally, we have introduced several additional variables about high-tech equipments (smart phone, DVD player, video games console, GPS) to control for individuals who are technology-savvy.

IV. RESULTS

Table 3 presents the parameter estimates for the five specifications of online investments in social capital.¹⁷ Each column presents the second step probit estimates and the selection probit estimates. Concerning the second step probit, we indicate the log-likelihood, the error

¹⁵ We have chosen Internet use during the last three months (whatever the place) rather than an Internet access at home, since individuals can also use the Internet elsewhere (at work, at school, in public places). Among survey respondents, 80% were connected to the Internet at home, 37% at work, 25% at their school/university, and 15% elsewhere (public library, post office, association/club).

¹⁶ This variable is equal to 1 for watching TV less than half an hour, 2 for watching TV between half an hour and one hour, 3 for watching TV between one hour and one hour and half, etc.

¹⁷ Estimations were run in STATA 8.

correlations (RHO) and the percentage of concordance¹⁸. We first comment the results for the selection probit (the decision to use the Internet).

1. Social capital and Internet use

The probability of using the Internet decreases with age and increases with education and income. Internet use is rather complementary with other IT equipments like smart phone, GPS or DVD player. TV and the Internet seem to be substitutes, in as the probability of using the Internet decreases with the time spent watching TV. We do not find a similar relation between the Internet and newspapers.

Social capital has a positive but limited impact on Internet use. Participation in leisure or civic associations increases the probability of adopting the Internet. We can interpret it as indirect evidence that the Internet plays a central role in the functioning of associations, providing members with an efficient means of communication and coordination. Being involved in many associations creates a need to access the Internet. However, sociability and trust have no impact on the decision to adopt the Internet.

We now analyze the determinants to invest online in social capital (the second step). Results (column 1) show that the online improvement of social capital depends on both the amount of social capital and mobility. Those who invest in social capital tend to be more involved in leisure associations and have a higher degree of trust. They also are heavy Internet users and have at least one parent born abroad. When parents are originated from another country, it means that family is geographically dispersed and the Internet appears as a convenient tool to maintain such distant ties or take up with distant relatives again.

We now consider separately the four patterns of online investments (columns 2-5).

¹⁸ The % of concordance is obtained by calculating the predicted values of online investments (the dependent variable) for each individual. When the predicted value is lower than 0.5, the predicted probability is equal 0, when it is higher than 0.51, the predicted probability equals 1. Then, we compare the observed and predicted probabilities to obtain the % of good prediction, called percentage of concordance.

Table 3

The determinants of different online investments

| Second step Probit - Dependant variables: Online investments in social capital | | | | | |
|---|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | Coefficient (standard error) | | | | |
| | SOCIALUSE | INTENSIFY | RE-TIE | KNOW | MEET |
| GENDER | 0.087 (0.102) | -0.025 (0.100) | -0.131 (0.100) | 0.166 (0.109) | 0.05 (0.115) |
| AGE | -0.032 (0.021) | -0.017 (0.020) | -0.001 (0.021) | -0.054** (0.025) | -0.062*** (0.025) |
| AGE2 | 0.001* (0.001) | 0.001 (0.001) | 0.001 (0.001) | 0.001*** (0.001) | 0.001*** (0.001) |
| PARTNER | -0.175 (0.136) | -0.118 (0.133) | -0.169 (0.135) | -0.372*** (0.144) | -0.143 (0.155) |
| SIZE | -0.058 (0.039) | -0.035 (0.0394) | 0.0126 (0.039) | -0.059 (0.042) | -0.050 (0.046) |
| URBAN | -0.005 (0.099) | -0.071 (0.100) | 0.192** (0.100) | -0.070 (0.105) | 0.071 (0.115) |
| MEDIUM EDUCATED | -0.067 (0.146) | 0.062 (0.150) | 0.059 (0.163) | -0.256* (0.149) | -0.400*** (0.151) |
| HIGH EDUCATED | 0.099 (0.226) | 0.296 (0.218) | 0.121 (0.250) | -0.570*** (0.229) | -0.375* (0.230) |
| MEDIUM INCOME | 0.265 (0.265) | 0.3898 (0.282) | 0.005 (0.274) | 0.452 (0.297) | 0.122 (0.306) |
| HIGH INCOME | 0.145 (0.289) | 0.408 (0.305) | -0.115 (0.298) | 0.212 (0.321) | -0.078 (0.327) |
| MOBILITY | -0.092 (0.216) | -0.271 (0.207) | -0.342* (0.208) | -0.017 (0.219) | 0.171 (0.242) |
| UNEMPLOYMENT | 0.264 (0.213) | 0.380** (0.209) | 0.080 (0.210) | 0.746*** (0.215) | 0.261 (0.231) |
| PARENTS | -0.280*** (0.102) | -0.383*** (0.105) | -0.180* (0.105) | -0.121 (0.108) | -0.250** (0.118) |
| ONLINE | 0.001*** (0.001) | 0.001 (0.001) | 0.0001 (0.001) | 0.001*** (0.001) | 0.001*** (0.001) |
| TRUST | 0.073*** (0.024) | 0.052*** (0.023) | 0.060*** (0.024) | 0.040* (0.026) | 0.039* (0.027) |
| VOLUNTEER | 0.028 (0.077) | 0.175*** (0.078) | -0.038 (0.080) | -0.069 (0.094) | -0.001 (0.092) |
| LEISURE MEMBERSHIP | 0.111** (0.059) | 0.109** (0.059) | 0.137** (0.061) | 0.035 (0.065) | -0.011 (0.067) |
| CIVIC MEMBERSHIP | -0.052 (0.057) | -0.097* (0.057) | -0.043 (0.060) | -0.029 (0.065) | -0.010 (0.070) |
| DAY | 0.011 (0.139) | 0.118 (0.140) | -0.041 (0.140) | 0.029 (0.149) | 0.064 (0.156) |
| WEEK | 0.112 (0.114) | 0.272*** (0.116) | -0.141 (0.120) | -0.011 (0.126) | -0.072 (0.138) |
| CONSTANT | 0.731 (0.515) | -0.269 (0.512) | -0.222 (0.534) | 0.610 (0.532) | 0.538 (0.556) |
| SELECTION PROBIT Dependent variable: having used the Internet over the past three months | | | | | |
| GENDER | 0.087 (0.083) | 0.088 (0.083) | 0.089 (0.083) | 0.092 (0.084) | 0.087 (0.083) |
| AGE | -0.065*** (0.019) | -0.065*** (0.019) | -0.067*** (0.019) | -0.063*** (0.020) | -0.064*** (0.019) |
| AGE2 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |

| Second step Probit - Dependant variables: Online investments in social capital | | | | | |
|---|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| | Coefficient (standard error) | | | | |
| | SOCIALUSE | INTENSIFY | RE-TIE | KNOW | MEET |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| PARTNER | -0.172* (0.114) | -0.179* (0.114) | -0.164 (0.116) | -0.189* (0.115) | -0.173* (0.114) |
| SIZE | -0.012 (0.035) | -0.013 (0.035) | -0.008 (0.036) | -0.011 (0.035) | -0.014 (0.034) |
| URBAN | -0.047 (0.087) | -0.045 (0.087) | -0.038 (0.088) | -0.047 (0.087) | -0.040 (0.087) |
| MEDIUM EDUCATED | 0.611*** (0.097) | 0.599*** (0.097) | 0.605*** (0.097) | 0.610*** (0.097) | 0.606*** (0.097) |
| HIGH EDUCATED | 1.146*** (0.129) | 1.131*** (0.128) | 1.130*** (0.127) | 1.170*** (0.137) | 1.148** (0.131) |
| MEDIUM INCOME | 0.414*** (0.162) | 0.406*** (0.161) | 0.408*** (0.162) | 0.419*** (0.161) | 0.411*** (0.160) |
| HIGH INCOME | 0.769*** (0.160) | 0.770*** (0.160) | 0.767*** (0.160) | 0.791*** (0.162) | 0.778*** (0.160) |
| SMARTPHONE | 0.269*** (0.093) | 0.277*** (0.093) | 0.271*** (0.092) | 0.273*** (0.092) | 0.276*** (0.092) |
| DVD | 0.458*** (0.089) | 0.444*** (0.090) | 0.460*** (0.090) | 0.424*** (0.090) | 0.429*** (0.089) |
| CONSOLE | 0.067 (0.107) | 0.103 (0.099) | 0.066 (0.112) | 0.104 (0.097) | 0.132 (0.095) |
| GPS | 0.577*** (0.204) | 0.609*** (0.197) | 0.593*** (0.201) | 0.581*** (0.210) | 0.596*** (0.202) |
| TV | -0.035* (0.020) | -0.037** (0.020) | -0.037** (0.020) | -0.028 (0.024) | -0.033* (0.001) |
| NEWSPAPER | 0.017 (0.029) | 0.018 (0.029) | 0.026 (0.031) | 0.014 (0.029) | 0.021 (0.029) |
| DAY | -0.011 (0.121) | -0.008 (0.121) | -0.025 (0.123) | 0.009 (0.123) | 0.009 (0.122) |
| WEEK | -0.032 (0.094) | -0.038 (0.094) | -0.0396632 (0.0940588) | -0.045 (0.094) | -0.046 (0.094) |
| LEISURE MEMBERSHIP | 0.101** (0.052) | 0.102** (0.052) | 0.101** (0.052) | 0.099** (0.052) | 0.097** (0.052) |
| CIVIC MEMBERSHIP | 0.098** (0.055) | 0.097* (0.056) | 0.099* (0.056) | 0.100** (0.056) | 0.100** (0.056) |
| LEISURE VOLUNTEER | 0.032 (0.144) | 0.044 (0.148) | 0.025 (0.140) | 0.035 (0.146) | 0.048 (0.146) |
| CIVIC VOLUNTEER | 0.175* (0.102) | 0.163* (0.104) | 0.164* (0.101) | 0.183* (0.104) | 0.165* (0.104) |
| TRUST | 0.023 (0.018) | 0.023 (0.018) | 0.023 (0.018) | 0.023 (0.018) | 0.023 (0.018) |
| CONSTANT | 0.950** (0.449) | 0.955** (0.453) | 0.970** (0.451) | 0.868** (0.475) | 0.900** (0.463) |
| Sample size | 713 | 720 | 720 | 720 | 720 |
| Log-likelihood | -1019.225 | -1035.807 | -1002.908 | -950.8828 | -892.5412 |
| Rho | -0.460 | -0.244 | -0.435 | -0.445 | -0.392 |
| % of concordance | 63.75 | 62.91 | 60.00 | 75.41 | 80.00 |

Remarks : * coef. significant at a threshold of 10%, ** coef. significant at a threshold of 5%, *** coef. at a threshold of 1%.

2. The Internet as a means of maintaining one's social capital

Column 2, Table 3 (INTENSIFY) displays the determinants of *online* investments aimed at intensifying social ties with friends and kin. Socio-demographic characteristics have no influence, except the nationality of parents. When at least one parent was born in another country, the Internet is certainly a means to keep in touch with friends and family still living in that country.

A high level of trust in others increases the probability of maintaining social capital through the Internet. We also find interesting relations between participatory capital and online investments. Being actively involved in many associations or just a member of several leisure associations encourages individuals to use the Internet to intensify their interactions with their existing social network. Hence, complementarities exist between online and offline investments in social capital when the offline investments correspond mainly to volunteer activity or leisure organization membership. However, people tend to invest less online when they are members of civic associations.

Finally, people who meet friends frequently (every day) or rarely (less than once a week) are less likely to interact online with their friends than those who meet friends only several days a week. This can be interpreted as weak evidence that certain Internet users tend to substitute face-to-face contacts by computer-mediated contacts in their interpersonal relationships. Using the Internet to communicate with friends reduces the time or the necessity to meet them physically. But this substitution effect can also arise from the difficulty of meeting friends frequently (job constraints, transports, etc.) and in such case, the Internet is a convenient tool to keep in contact with them everyday (at anytime and anyplace). This substitution effect is only true for those who have a rather intense sociability (those who meet friends daily tend to use the Internet less to communicate with them than those who only meet friends weekly). But Internet users who rarely meet friends spontaneously also tend to make less use of the Internet to communicate with their friends.

Finally, an unemployment experience increases the probability that the Internet will be used to maintain existing ties with friends and family.

Column 3 (RETIE) shows similar effects for trust and leisure membership. Moreover, individuals who have experienced mobility (i.e., who lived in another country five years ago) tend to use the Internet to establish contact with relatives again. Thus, the Internet serves to lower social capital depreciation after individuals have moved. This is consistent with hypothesis 5.

3. The Internet as a means of creating new social capital

Investments via the Internet to diversify social capital (columns 4 et 5) are strongly correlated with age, education and marital status. Meeting new acquaintances through the Internet is more frequent for younger, lower-educated people and those living alone¹⁹. Other socio-demographic characteristics have no influence.

The amount of social capital (degree of trust, sociability and membership) has no impact on the possibility to meet new persons online. Trust seems to matter only for maintaining ties with friends and kin. It is certainly more difficult to place trust in anonymous persons met on the Internet (Markey and Wells, 2002).

Heavy Internet users meet new acquaintances more frequently. The Internet is a powerful means of creating weak ties and accumulating virtual social capital. But such investments require spending a lot of time connected to the Internet and can explain why people with low opportunity cost of time have a higher probability of creating new social ties online (i.e., the unemployment variable has a significant positive effect).

Finally, the fact of having his or her parents born abroad increases the probability of using the Internet to diversify one's social network. This finding is consistent with hypothesis 5.

V. DISCUSSION AND CONCLUSION

Our article has examined how Internet use can affect the formation and maintenance of social capital. Our conceptual framework has underlined the importance of costs and benefits when deciding to invest in social capital. From this perspective, the Internet can decrease the cost of investing in social capital and reduce the depreciation of social capital, especially for people leaving their community. Internet enables to abolish distance and facilitate many-to-many interactions. People who have a large social capital or experienced mobility in the past should have higher incentives to invest in social capital online, mostly to maintain it.

To test these predictions, we have used the European Social Survey on Luxembourg households conducted in 2002. We have found complementarities between online investments to maintain one's social networks and active participation in associations (especially leisure associations in which face-to-face contacts are important). However, income and education do not foster online investments. Another finding is the difference between young and old generations. Meeting new persons thanks to the Internet is quite specific of young

generations. Consequently, young people should have a social capital composed of more weak ties (a more sparsely-knit social network). This may attenuate social support and aid that they could obtain from strong ties, but they may gain access to more information and ideas according to the *strength of weak ties* theory (Granovetter, 1973).

Moreover, the massive diffusion of the Internet could stimulate individual mobility by reducing one of the main obstacles – the fear to depreciate one’s individual social capital. Thanks to the Internet, people can preserve most of their existing social ties when leaving a place or a firm.

These results underline the vital role played by the Internet in the formation of social capital, even though the links between strong-tie and weak-tie investments or between online and face-to-face investments are extremely complex and require further studies.

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¹⁹ It is fairly consistent with the conclusions of Parks and Roberts (1997), according to whom the majority of personal relationships on the Internet, in particular via chat-rooms (Multi-User Dimension, Object Oriented: MOO) are established with members of the opposite sex.

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APPENDIX

Table 3

List of variables

| Variable | Description |
|--------------------|--|
| INTERNET USE | Has used the Internet along the past 3 months (binary) |
| SOCIALUSE | Internet use to invest in social capital whatever the form (binary) |
| INTENSIFY | Internet use to intensify ties with friends and kin (binary) |
| RE-TIE | Internet use to renew contacts with persons (binary) |
| KNOW | Internet use to get to know new persons (binary) |
| MEET | Internet use to meet new persons physically (binary) |
| GENDER | Male (binary) |
| AGE | Age (continuous) |
| AGE2 | Age squared (continuous) |
| PARTNER | Living with a partner, married or not (binary) |
| SIZE | Number of persons in the household |
| URBAN | Living in urban areas (binary) |
| LOW EDUCATED | Pre-high school level (binary) – reference |
| MEDIUM EDUCATED | High school level (binary) |
| HIGH EDUCATED | University level (binary) |
| LOW INCOME | Income insufficient to support comfortable lifestyle (binary) – reference |
| MEDIUM INCOME | Income just sufficient to support comfortable lifestyle (binary) |
| HIGH INCOME | Income more than sufficient to support comfortable lifestyle (binary) |
| SMARTPHONE | Having a smart phone with advanced functionalities (binary) |
| DVD | Having a DVD player (binary) |
| CONSOLE | Having a game console (binary) |
| GPS | Having GPS in his/her car (binary) |
| ONLINE | Weekly time spent using Internet for personal or professional usage (minutes) |
| TV | Time spent watching TV (continuous) |
| NEWSPAPER | Time spent reading newspaper per day (continuous) |
| DAY | Unplanned meetings with friends several times a day (binary) |
| WEEK | Unplanned meetings with friends several times a week (binary) |
| MONTH | Unplanned meetings with friends less than once a week (binary) - reference |
| LEISURE MEMBERSHIP | Membership in leisure associations (number) |
| CIVIC MEMBERSHIP | Membership in civic associations (number) |
| LEISURE VOLUNTEER | Active participation in leisure associations (number) |
| CIVIC VOLUNTEER | Active participation in civic associations (number) |
| VOLUNTEER | Active participation in associations (number) |
| TRUST | Trust in others (continuous) |
| MOBILITY | Has lived in Luxembourg for at least 5 years (binary) |
| PARENTS | Father and mother born in Luxembourg (binary) |
| UNEMPLOYMENT | Has experienced a period of unemployment of more than 3 months in the last five years (binary) |

Table 4

Statistical description of the variables used in the econometric models

| | All the population | | Internet users | | | |
|--------------------|--------------------|--------------------|----------------|----------------------|-----|------|
| | N | Average | N | Average | Min | Max |
| INTERNET USE | 1554 | 0.512 (0.500) | 796 | | | |
| SOCIALUSE | / | / | 795 | 0.616 (0.486) | 0 | 1 |
| INENSIFY | / | / | 795 | 0.411 (0.492) | 0 | 1 |
| RE-TIE | / | / | 795 | 0.313 (0.464) | 0 | 1 |
| KNOW | / | / | 795 | 0.325 (0.468) | 0 | 1 |
| MEET | / | / | 795 | 0.197 (0.398) | 0 | 1 |
| GENDER | 1554 | 0.473 (0.499) | 796 | 0.518 (0.499) | 0 | 1 |
| AGE | 1554 | 42.169 (18.548) | 796 | 32.185 (14.020) | 13 | 101 |
| PARTNER | 1524 | 0.599 (0.490) | 778 | 0.505 (0.500) | 0 | 1 |
| SIZE | 1554 | 3.2413 (1.487) | 796 | 3.536 (1.407) | 1 | 10 |
| URBAN | 1523 | 0.468 (0.499) | 783 | 0.448 (0.497) | 0 | 1 |
| LOW EDUCATED | 1554 | 0.350 (0.477) | 796 | 0.228 (0.420) | 0 | 1 |
| MEDIUM EDUCATED | 1554 | 0.399 (0.489) | 796 | 0.456 (0.498) | 0 | 1 |
| HIGH EDUCATED | 1554 | 0.190 (0.392) | 796 | 0.285 (0.451) | 0 | 1 |
| LOW INCOME | 1524 | 0.099 (0.299) | 773 | 0.046 (0.210) | 0 | 1 |
| MEDIUM INCOME | 1524 | 0.354 (0.478) | 773 | 0.297 (0.457) | 0 | 1 |
| HIGH INCOME | 1524 | 0.545 (0.498) | 773 | 0.655 (0.475) | 0 | 1 |
| ONLINE | / | / | 781 | 376.371 (573.911) | 3 | 2400 |
| SMARTPHONE | 1554 | 0.313 (0.464) | 796 | 0.417 (0.493) | 0 | 1 |
| DVD | 1554 | 0.413 (0.492) | 796 | 0.570 (0.495) | 0 | 1 |
| CONSOLE | 1554 | 0.381 (0.485) | 796 | 0.502 (0.500) | 0 | 1 |
| GPS | 1554 | 0.060 (0.238) | 796 | 0.092 (0.290) | 0 | 1 |
| TV | 1547 | 4.361 (2.133) | 793 | 3.958 (2.092) | 0 | 7 |
| NEWSPAPER | 1549 | 1.579 (1.525) | 795 | 1.405 (1.343) | 0 | 7 |
| DAY | 1554 | 0.207 (0.405) | 796 | 0.252 (0.434) | 0 | 1 |
| WEEK | 1554 | 0.446 (0.497) | 796 | 0.296 (0.456) | 0 | 1 |
| MONTH | 1554 | 0.339 (0.473) | 796 | 0.160 (0.367) | 0 | 1 |
| VOLUNTEER | 1552 | 0.206 (0.585) | 796 | 0.257 (0.663) | 0 | 5 |
| LEISURE MEMBERSHIP | 1552 | 0.731 (0.903) | 796 | 0.837 (0.933) | 0 | 4 |
| CIVIC MEMBERSHIP | 1552 | 0.655 (0.928) | 796 | 0.722 (1.015) | 0 | 5 |
| LEISURE VOLUNTEER | 1552 | 0.143 (0.437) | 796 | 0.180 (0.491) | 0 | 3 |
| CIVIC VOLUNTEER | 1552 | 0.062 (0.281) | 796 | 0.076 (0.325) | 0 | 3 |
| TRUST | 1533 | 5.213 (2.298) | 787 | 5.355 (2.191) | 0 | 10 |
| MOBILITY | 1545 | 0.946 (0.224) | 790 | 0.939 (0.239) | 0 | 1 |
| PARENTS | 1554 | 0.503 (0.500) | 796 | 0.527 (0.499) | 0 | 1 |
| UNEMPLOYMENT | 1554 | 0.053 (0.224) | 796 | 0.059 (0.235) | 0 | 1 |

Table 5

Correlation table for the variables introduced in the econometric models

| Pearson Correlation Coefficients | | | | | | | | | | | |
|----------------------------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Prob > r under H0: Rho=0 | | | | | | | | | | | |
| | Gender | Age | Partner | Size | Urban | Medium educated | High educated | Medium income | High income | Mobility | Unemployment |
| Gender | 1.000 | | | | | | | | | | |
| Age | 0.087 0.013 | 1.000 | | | | | | | | | |
| Partner | -0.0080 0.819 | 0.577 <.001 | 1.000 | | | | | | | | |
| Size | 0.004 0.901 | -0.242 <.001 | 0.044 0.214 | 1.000 | | | | | | | |
| Urban | 0.061 0.084 | 0.028 0.425 | -0.056 0.120 | -0.171 <.001 | 1.000 | | | | | | |
| Medium educated | 0.023 0.507 | 0.032 0.357 | 0.088 0.013 | 0.027 0.440 | -0.024 0.487 | 1.000 | | | | | |
| High educated | 0.029 0.412 | 0.217 <.001 | 0.146 <.001 | -0.211 <.001 | 0.082 0.020 | -0.578 <.001 | 1.000 | | | | |
| Medium income | 0.030 0.403 | 0.001 0.971 | 0.039 0.275 | -0.047 0.184 | 0.045 0.206 | 0.089 0.013 | -0.110 0.002 | 1.000 | | | |
| High income | -0.0122 0.732 | 0.010 0.761 | -0.017 0.621 | 0.047 0.191 | -0.064 0.075 | -0.072 0.045 | 0.120 0.001 | -0.898 <.001 | 1.000 | | |
| Mobility | 0.030 0.386 | 0.061 0.085 | -0.056 0.113 | 0.064 0.071 | -0.117 0.001 | 0.094 0.007 | -0.169 <.001 | -0.014 0.689 | 0.035 0.321 | 1.000 | |
| Unemployment | -0.004 0.907 | 0.016 0.635 | 0.041 0.253 | -0.099 0.005 | 0.102 0.004 | 0.038 0.282 | 0.018 0.595 | 0.130 0.001 | -0.214 <.001 | -0.072 0.041 | 1.000 |
| Parents | 0.045 0.197 | 0.004 0.907 | -0.049 0.167 | 0.063 0.071 | -0.130 0.001 | 0.002 0.947 | -0.071 0.044 | -0.104 0.001 | 0.165 <.001 | 0.269 <.001 | -0.136 0.001 |
| Online | 0.161 <.001 | -0.001 0.984 | -0.102 0.004 | -0.027 0.444 | 0.072 0.043 | -0.039 0.273 | 0.102 0.004 | -0.024 0.495 | 0.014 0.698 | -0.022 0.536 | 0.061 0.087 |
| Trust | -0.027 0.444 | 0.132 0.001 | 0.097 0.006 | -0.017 0.625 | -0.021 0.547 | -0.068 0.053 | 0.117 0.001 | -0.131 <.001 | 0.151 <.001 | -0.010 0.767 | -0.062 0.078 |
| Volunteer | 0.078 0.027 | 0.096 0.006 | 0.050 0.158 | 0.005 0.878 | 0.026 0.464 | -0.009 0.790 | -0.010 0.771 | 0.032 0.373 | -0.008 0.809 | 0.098 0.005 | -0.024 0.482 |
| Leisure membership | 0.053 0.129 | 0.061 0.081 | 0.001 0.959 | 0.106 0.002 | -0.056 0.114 | -0.073 0.038 | 0.073 0.036 | -0.080 0.024 | 0.113 0.001 | 0.086 0.015 | -0.076 0.030 |
| Civic membership | 0.056 0.113 | 0.363 <.001 | 0.323 <.001 | -0.106 0.002 | -0.016 0.645 | -0.052 0.137 | 0.241 <.001 | -0.047 0.186 | 0.076 0.032 | 0.049 0.166 | -0.083 0.018 |
| Day | 0.021 0.545 | -0.230 <.001 | -0.157 <.001 | 0.037 0.292 | 0.039 0.274 | 0.013 0.702 | -0.136 0.001 | -0.031 0.377 | 0.029 0.407 | 0.012 0.723 | -0.02 0.5185 |
| Week | -0.044 0.207 | 0.055 0.116 | 0.062 0.080 | -0.041 0.239 | 0.029 0.410 | 0.001 0.999 | 0.090 0.010 | -0.056 0.117 | 0.057 0.110 | -0.021 0.549 | -0.015 0.652 |
| Month | 0.034 0.327 | 0.167 <.001 | 0.087 0.014 | -0.065 0.686 | -0.065 0.066 | -0.008 0.811 | 0.026 0.459 | 0.093 0.009 | -0.093 0.009 | 0.009 0.794 | 0.042 0.231 |

| Pearson Correlation Coefficients | | | | | | | | | |
|----------------------------------|------------------|-----------------|-----------------|-----------------|--------------------|------------------|------------------|-----------------|-------|
| Prob > r under H0: Rho=0 | | | | | | | | | |
| | Parents | Online | Trust | Volunteer | Leisure Membership | Civic membership | Day | Week | Month |
| Parents | 1.000 | | | | | | | | |
| Online | -0.008 0.809 | 1.000 | | | | | | | |
| Trust | 0.082 0.021 | -0.023 0.512 | 1.000 | | | | | | |
| Volunteer | 0.033 0.345 | 0.014 0.679 | 0.060 0.090 | 1.000 | | | | | |
| Leisure membership | 0.100 0.004 | 0.053 0.137 | 0.105 0.003 | 0.2482 <.001 | 1.000 | | | | |
| Civic membership | 0.110 0.001 | 0.005 0.887 | 0.092 0.009 | 0.167 <.001 | 0.297 <.001 | 1.000 | | | |
| Day | -0.017 0.618 | -0.012 0.727 | 0.046 0.188 | 0.110 0.001 | 0.091 0.009 | -0.105 0.002 | 1.000 | | |
| Week | 0.024 0.482 | 0.022 0.525 | -0.021 0.541 | -0.063 0.072 | 0.037 0.283 | 0.131 0.001 | -0.533 <.001 | 1.000 | |
| Month | -0.009 0.7806 | -0.013 0.714 | -0.022 0.531 | -0.039 0.263 | -0.134 0.001 | -0.038 0.2807 | -0.367 <.0017 | -0.579 <.001 | 1.000 |