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The study of political participation: how experiments and panel data can help analyse the effect of Internet use.

Rosa Borge Bravo

Department of Law and Political Science
Doctoral Programme in Information and Knowledge Society
Internet Interdisciplinary Institute (IN3)
Universitat Oberta de Catalunya (UOC)

rborge@uoc.edu

Abstract:

One of the main problems in studies of political participation based on cross-sectional survey data is the question of causality. It is difficult to discern with certainty the impact on participation of key explanatory factors such as political mobilization, information, knowledge and political interest, political efficacy or, lately, the use of Internet. Several methodological problems have hindered sound causal inferences: confounding factors affecting both Internet use and participation, omitted variables, the impossibility of establishing a before-and-after sequence, self-selection of politically active citizens into Internet use, and reverse causality.

Two currently popular methods for properly examining the causal direction and effect of Internet usages are to use panel surveys or carry out experiments. By following these two methods it is possible to verify the effect of the explanatory variables before and after they take place, while the rest of the variables and self-selection processes are being controlled. We will review some of the most important studies that have analysed the effect of the Internet on participation using panel data and experiments. Their findings complement and nuance those of cross-sectional studies, and sometimes serve to arbitrate between conflicting results from cross-sectional data. However, in order to contribute to the accumulation of knowledge in the study of the role of the Internet in participation, they should pay attention to the problems found in cross-sectional studies and aim to form part of a body of related studies. Although most of the studies examined here clearly did, the extraordinary rise in experimental studies is bringing about very specific results difficult to extrapolate and compare with cross-sectional results.

Keywords:

Causal effects, Internet use, political participation, experiments, panel data studies

Problems ascertaining causality with cross-sectional data

One of the main problems in the studies of political participation based on survey data is the question of causality[1]. Cross-sectional surveys do not allow the impact on participation of key explanatory antecedents such as political mobilization, information, knowledge and political interest, political efficacy or, lately, the use of Internet to be discerned with certainty. When studying the causal effect of Internet access and use on political engagement, most empirical studies are based on cross-sectional survey data. The literature shows that the difficulty in establishing causality is due to several reasons[2]:

1) There are confounding factors affecting both Internet usage and political participation: that is, individual socio-demographic characteristics associated with using Internet, such as high income, education, and occupation, are also correlated with political participation (Boulainne 2009: 194; Kroh and Neiss 2009: 5; Norris 2001, 2005). Also gender, age or ethnicity have been detected as predictors of engagement and Internet use. All these characteristics therefore have an impact on both Internet use and participation in a way that may mean that the link between Internet and participation is spurious. The typical importance of SES for civic engagement (Verba, Scholzman and Brady 1995) also affects Internet use and access, leading to more inequalities in participation (Norris 2001).

2) Omitted or unmeasured variables that affect political participation and are not always taken into account, such as for example political interest, political knowledge or other media uses (Boulianne, 2009: 202). In addition, factors that can affect specifically online participation are not always included, such as for example Internet experience and skills, ICTs use at home and at work, recreational uses, time spent on the Internet, online socializing or broadband availability. In the case of online participation, several studies have shown that, once access to Internet is achieved, Internet skills facilitate online participation, whereas traditional resources (income, education, civic skills) do not (Anduiza, Gallego and Cantijoch, 2010) or may even decrease the likelihood of

[1] The classical and most important studies on political participation take into account the difficulty in attributing causal affects which, among other problems, are due to questions of self-selection of politically mobilized citizens and recursivity among independent and dependent variables (Rosenstone and Hansen, 1993: 16, 20, Chapter 6; Verba, Scholzman and Brady, 1995: Appendix D).

[2] These reasons also generally apply, albeit with different nuances, to all research using cross-sectional survey data.

participating online (Krueger, 2002: 488). The omission of relevant variables leads to model misspecification with biased estimators of the effect of Internet use on participation, which frequently turn out to be positive and statistically significant. When the variables in question are introduced these effects are reduced or disappear.

3) The difficulty in establishing a before-and-after sequence in a cross-sectional study. In this kind of study data are collected at a particular point in time when it is not possible to check behavior before and after the explanatory factors have taken place. Although researchers dealing with cross-sectional data try to make causal inferences by statistically controlling variables and modeling the links between variables, there is always uncertainty about possible confounding variables (Freedman, 2009: 2-3). To a certain extent, the subjects of the study assign themselves to the different groups formed by the variables and the researcher cannot manipulate the timing of the variables of interest (Idem). However, with regard to the effect of the Internet on participation, the causal effect could be better estimated if we measured the level of political engagement of citizens prior to using Internet and compare it to the level after using it, but controlling at the same time for previous level of political engagement.

4) A self-selection effect cannot be ruled out in these surveys. That is, the most politically interested, mobilized, informed and efficacious people and the frequent Internet users end up responding to a much greater degree and are also those who participate more in politics. In addition, as we already said, these respondents share certain socio-demographic characteristics that favor not only participation but also use of Internet. As a result, politically attentive citizens self-selected themselves into Internet use (Kroh and Neiss, 2009). The only way to minimize, but not completely solve this problem is to try to carefully establish a causal system of relationships between variables which includes all possible relevant variables, even those that may be considered causal mechanisms between the explanatory factors and the dependent variable (Davis, 1985; Freedman, 2009). With regard to the impact of Internet use on participation, several authors have tried to examine possible mechanisms or mediators that explain this effect, such as voluntary searching for political information online, proclivity to involuntary exposure to political information online (Cantijoch, 2009) or being contacted online and surfing the net without a specific purpose (Borge and Cardenal, 2011).

5) The shortcomings of recursivity or reverse causality typical of the studies of political participation are difficult to avoid and detect, as with cross-sectional studies the researcher cannot completely ensure that the values of the independent variable (Internet use) do not come from the values of the dependent variable (participation). One of the consequences of this lack of control is known as “endogeneity” where the causes are in fact consequences (King, Keohane and Verba, 1994). Political participation and voting are transformative acts that can change attitudes and behaviors which may alternatively alter or reinforce previous participation. In the case of Internet use, some authors have detected that those intending to participate or vote use the Internet to obtain political information, but Internet use per se does not increase -without motivation- political knowledge or participation (Prior, 2005; Johnson and Kaye, 2003). Other authors have found that citizens being contacted online are the ones most prone to participation (Krueger, 2006; Gibson, Lusoli and Ward, 2005). The causal flow therefore also goes from engagement to Internet use, because more politically engaged citizens extend their repertory of political activities to the online world (Cantijoch, 2009). Norris has called this “a virtuous circle”: there is a process of mutually reinforcing interaction where the most motivated citizens prove most likely to use the political opportunities on the Internet. However, in the longer term this process will reinforce civic activism, with the side-effect of increasing the inequalities in activism (2002: 230). Nevertheless, in general, studies which have tested the hypothesis that those who are more politically engaged use the Internet more have produced contradictory results, even when controlling for possible intervening variables, although the majority of studies show that engagement does not have a significant effect on Internet use (Boulainne, 2009: 203).

These five problems are all ultimately linked to each other and could lead to bias in the estimators and a higher number of errors in the models of explanation. These shortcomings mean that the assumptions for regression analysis to really make causal inferences are not fully fulfilled. The regression assumptions, such as no specification error, no measurement error, zero mean of errors, homoscedasticity (the variance of the error term is constant), no autocorrelation of error terms, exogeneity (independent variables should be uncorrelated with the error term) and normality in the distribution of errors (Berry, 1993) are difficult to accomplish with cross-sectional data because of the five shortcomings explained above. The most common used technique for ascertaining the impact of the Internet on participation with cross-sectional data, that is regression analysis, therefore provides sometimes meager and contradictory results, illustrating the important difficulties in ascertaining causality.

A higher number of studies has found a positive effect of the Internet on political participation (Delli Carpini, 2000; Krueger, 2002; Lusoli, Ward and Gibson, 2002; Ward, Gibson and Lusoli, 2003; Tolbert and McNeal, 2003; di Gennaro & Dutton, 2006), but some important researchers have also discovered that the Internet does not have a significant impact on the size and types of political participation or the socio-demographic and attitudinal profile of participants (Bimber, 2001, 2003; Norris, 2001, 2005). Some scholars have even found evidence of negative effects of Internet use on participation in the sense that it decreases the time available for civic engagement (Putnam, 2000), accentuates intolerance and distrust (Putnam, 2000; Wojcieszak, 2009) and diminishes the general level of political knowledge and information (Prior, 2005).

These contradictory results have forced researchers to improve measurements, collect more extensive data and refine statistical models. However, new methodological designs can also be used, following the general trend in political science towards new methods such as panel surveys and experiments. In this regard, over the last few decades some political scientists have begun to worry that observational data has prevented researchers from asking causal questions and have turned their interests to experimental methods (Morton and Williams, 2010: 10)[3].

[3] Morton and Williams (2009: 10) cited two important examples of how experimental research has been used to answer causal questions that survey data has not. The first referred to the problem of determining the influence of television on public opinion (Kinder and Palfrey, 1992) and the second focused on the causes of the decline in the turnout at U.S. presidential elections (Rosenstone and Hansen, 1993). In both cases, there were problems of unobserved variables affecting the dependent variable, self-selection of respondents and endogenity bias. In the first case the experiments carried out by Iyengar and Kinder (1987) were able to determine the magnitude effect of television newscasts on citizen's political views, and in the second Gerber and Green (2000) showed the impact of mobilization strategies on turnout (Morton and Williams, 2010: 10).

Methods for improving causal inference

Two solutions for properly examining the causal direction and effect between the explanatory antecedents and participation are to use panel surveys or carry out experiments. By following these two methods it is possibly to verify the effect of one explanatory variable of interest before and after they take place, while the rest of the variables and self-selection processes are being controlled. Through panel surveys, we can obtain data for different points in time and compare, for example, the level of political participation for citizens after they have Internet access with their previous level of political participation when they did not have access to Internet. Through experiments, we are able to test the impact at one point in time of the variable of interest (the treatment: Internet use) on the dependent variable (the outcome: political participation) later on, by controlling for the rest of explanatory variables. That is possible because the individuals under study are randomly assigned to the treatment and there is a control group equal on average in terms of all (observed and unobserved) characteristics to the group under treatment (Horiuchi, Imai and Taniguchi, 2007: 669).

Technological advances have made it possibly to carry out panel surveys and experiments more easily. Thanks to new technologies such as Computer Assisted Telephone Interview (CATI), Computer Assisted Personal Interview (CAPI) or Computer Assisted Web Interview (CAWI), it is not necessary to print and distribute the surveys, the numbers of interviewers can be reduced and it is possible to monitor survey activity and count data in real time. The number of panel surveys and survey experiments has thus increased due to their reduced costs and practical advantages (Morton and Williams, 2010: 9; Stoker, 2010: 301). Moreover, a wide variety of laboratory experiments are now possible as new software programs and Web platforms have been developed to program complex games, build up virtual laboratories and design a wide arrange of experiments[4]. In this regard, the Internet itself has become a field for experiments that can involve a great number of subjects and are able to test multiple effects on behavior and attitudes (Margetts, 2009: 16). Experiments embedded into the Internet, for example the one developed by Salganik, Dodds and Watts (2006), are well suited to testing the relationship between individual (micro) and collective

[4] For a good sample of Web-based instruments, Web-based platforms and software programs currently used by political scientists and economists to carry out surveys and laboratory experiments, see Morton and Williams (2010: 9). Another important Web-based tool for laboratory and survey experiments is Wextor, which is widely used by psychologists.

(macro) behavior as they can be extended to thousands of subjects and can include multiple treatments and a range of different outcomes[5].

Nevertheless, for testing the causal chain between Internet use and political engagement, few studies have used panel data or designed experimental strategies. It is one thing is to use ICT technologies to support experimentation and panel surveys in general and quite another to specifically analyse the relationship between individual Internet use and political participation. Despite the cost reduction achieved through new methods of conducting interviews and collecting data, panel studies are still costly and questions about Internet use and online participation are seldom included in panel questionnaires. With regard to experiments, some authors see them as the best hope for untangling the effect of Internet use on participation and they are becoming increasingly prominent (Boulainne, 2009: 203). However, political scientists are reluctant to use them because of doubts about their external validity[6], usability and capacity to address relevant and broad questions (Stoker, 2010; Morton and Williams, 2010).

In the next sections we will review the studies that have analyzed the effect of Internet on participation using experiments and panel data. We will finally conclude with a reflection on the improvements and findings brought about by experiments and panel data but also on the objections to these methods.

[5] Salganik, Dodds and Watts (2006) wanted to test the influence of the behavior of others on the popularity of songs. They created an artificial "music market", comprising 14,341 participants who were shown a list of unknown songs. The participants were randomly assigned to either a group without information on the choices of others or to a group which did have this information, that is, under "social influence". The latter group was also randomly assigned to eight "worlds" characterized by a different bunch of songs. In addition, different ways of visually presenting the ranking of the songs were applied to the social influence group. The results showed that social influence contributes to the inequality and unpredictability of success in cultural markets.

[6] External validity refers to the generalization of the findings of the experiment, that is, the possibility of capturing what the population of interest would do in a real situation.

Studies based on experiments

There are basically three types of experiments depending on the context where they are conducted: laboratories, surveys, and in the field (Druckman et al, 2011: 6)[7]. They differ in terms of where the stimuli or treatment takes place: in the controlled setting of a laboratory, in the course of a phone, in-person, or Web-based survey, or in a natural setting such as at home, at work or in an educational environment, during everyday life. However, sometimes the distinction between laboratory, survey and field experiments is difficult to make because the three of them are combined. Nowadays, for example, some researchers use the Internet as a virtual laboratory and many others use online surveys to apply the treatment in a field experiment (Stoker, 2010: 301).

Political scientists have deployed experiments in a wide range of areas and widely different issues (Druckman et al, 2011: 5). However, there is basically one line of experiments which have been very influential in the recent development of experiments which seek to test the causal effect of the Internet on participation. We are referring to the survey and field experiments focused on the effects of varied political factors on turnout, voter's preferences and attitudes and political participation (Stoker, 2010: 305; Morton and Williams, 2009: 26-30). Influenced by the success of this line of experiments, several researchers have analysed the impact of Internet uses on political behavior and attitudes. Without being exhaustive, we can point to some studies with relevant findings:

First, the studies carried out by Sara Vissers and her partners on the impact of Internet on participation, primarily in Belgium, which started with cross-sectional data (Quintelier and Vissers, 2008; Vissers, 2009) and the analysis of panel data (Vissers and Quintelier, 2009), and are currently adding several experimental works (Hooghe et al , 2010; Vissers et al, 2011). As part of this general interest in assessing the impact of the Internet on participation, the issues tackled by these scholars are very varied. They started by firstly studying the party websites (Hooghe and Vissers, 2007) and secondly the profile of the visitors to party websites through a survey hosted on the websites (Vissers, 2009). They then analysed the effect of time spent on the Internet and online activities on offline political participation by means of a representative sample of 15 and 16-years-olds (Quintelier and Vissers, 2008), who were interviewed later on when aged

[7] Some authors consider that survey experiments belong to the category of field experiments (Stoker, 2010: 300-301).

18 in order to test the effect of following the news online and watching television news on offline political participation (Vissers and Quintelier, 2009). These two surveys of the same sample produced a panel study which enabled the effect of media use at time 1 on participation at time 2 to be measured, controlling for participation at time 1 and other control variables (Vissers and Quintelier, 2009: 8). Finally, the last studies consisted of two laboratory experiments with the aim of comparing the effect of face-to-face and Web-based mobilization on participation with regard to environmental concerns (Hooghe et al, 2010; Vissers et al, 2011). Both are very similar in terms of design:

a) They were conducted in Belgium.
b) Participants are randomly assigned to one of the treatments or the control group.
c) There is a pre and post-test measurement of the dependent variables, by means of different questionnaires. Levels of knowledge, attitudes and participation with regard to climate change and environmental issues were measured through a battery of questions a few weeks before the experiments took place. A few months after the experiments the participants were again asked about their environmental knowledge, attitudes and participation.
d) The content of the information provided was kept constant (information on the consequences of human behavior for climate change was the content of the treatments) but the means used to deliver the information in question varied (a face-to-face condition or a website condition).
e) The control group was not exposed to any content related to climate change. The control group members had to fill in exactly the same questionnaire, but without being exposed to the environmental information contained on the website or given face-to-face.
f) Participants were young people.

Nevertheless, they varied in several important ways:

a) With regard to the dependent variable: in the first experiment the dependent variables were knowledge, salience and intention to participate and participation (up to 14 activities) with regard to environmental issues; in the second they were online (6 activities) and offline (the same 13 activities within the first experiment that were offline) environmental participation,

b) In relation to the socio-demographic profile of the participants: in the first experiment they were recruited from among undergraduate students at a University and in the second they were sampled using a network of professional training services. The participants in the second experiment were 18 to 25 years old, came from a lower socio-economic background and were less interested and engaged in politics, in comparison to their better educated peers.
c) In the first case the experiment was also conducted in Canada.
d) The post-experiment measurements came in two waves in the case of the first experiment (one following the experiment, the other 4 months later), but in only one wave in the second experiment, which took place 3 months after the experimental manipulation.

The results of the first experiment showed significant effects of the website information on knowledge, salience and intention to participate but not on participation after 4 months. The first experiment also revealed significant effects of the face-to-face condition on knowledge and salience. As a conclusion, Web-based mobilization is at least as effective as face-to-face mobilization.

In the second experiment, the authors considered that it was necessary to distinguish between different forms of participation -online at offline- as an outcome of the experiment. The authors argued that the lack of strong conclusions on the effect of Internet-based mobilization might be due to the failure to differentiate between the behavioral outcomes of mobilization (Vissers et al, 2011: 1). They therefore decided to compare the two means of mobilization in the two types of participation. The findings showed that only Web mobilization was effective in stimulating online participation in the three months following the experimental condition, and that Web mobilization in turn had no significant effect on offline participation in the medium term. Quite the contrary, face-to-face mobilization has a significant impact on offline participation. The conclusion is that mobilization effects are medium-specific.

The idea of keeping the main features of the experimental design but changing some features in order to refine the design and specify the research question is a good strategy which could achieve better external validity (Druckman et al, 2011: 28). In the case of the experiments examined, there have been several changes in the second experiment which may have improved its validity:

1.-) The subjects targeted for participation came from far more disadvantaged educational and socio-economic backgrounds than the average Belgian youth and the sample of undergraduate students in the first experiment. Through this change, the authors attempted to address the critique usually made against experiments based on students who, moreover, in the case of analysing the effects of the Internet, are participants with much higher scores on Internet skills and socio-economic status (Vissers at al, 2011: 6).

2.-) The timing of the post-experiment measurement in the second experiment was reduced to 3 months instead of 4 months, changing the effect of the mobilization which seemed to last as long as 3 months. In the first experiment, after applying the face-to-face and website conditions, the participants filled in a questionnaire to test their intention to participate in environmental issues and 4 months later they were asked to fill in another questionnaire on environmental participation. The results in the case of medium-term participation were not significant for any of the experimental conditions; that is, neither face-to-face nor website mobilization had any effect on the level of self-reported participation in the last 4 months. However, in the second experiment where the survey was administered 3 months later, the face-to-face information effectively mobilized the participants to take offline action and the website did the same for the online participation. This change in the timing of the post-experiment measurement allowed the duration of effects to be tested more precisely, improving the external validity of the experiment (Gaines, Kuklinski and Quirk, 2007: 5).

3.-) The improved specification of the outcome variable, which -as we explained earlier- in the case of the second experiment was divided between online and offline environmental participation, enabled the effects of the online and offline treatments to be better assessed. It is therefore possible to confirm other studies, such as that carried out by Best and Krueger (2005), based on cross-sectional survey data, which had already found medium-specific mobilization effects. Consequently, this experiment complements the observational research carried out previously. In Best and Krueger's work it is possible that participation acts might affect the propensity to remember the mobilization experience, but those who did not participate might not remember the very short experience of receiving a mobilizing e-mail (Vissers et al, 2011: 4-5). The problem of differential memory of mobilization efforts that could produce problems of endogeneity is solved through the experimental design.

In spite of the possible improved achievements in this second experiment, in their 2011 article -where the second experiment is reported- the authors made virtually no mention of the previous experiment and did not compare or evaluate the different results or designs. Nevertheless, the authors have continuously justified the deployment of experiments, and also of panel surveys such as the one they conducted before, as better methods of assessing the causality between the Internet and participation. It is therefore a pity that they did not overtly explain the second experiment as an extension of the first one or that they did not link their different works based on observational and experimental data. The lack of a certain reflections or conclusions by the authors themselves on their whole body of research makes it difficult to assess the effective contributions of the experiments.

There are also important scholars who have carried out experiments with the aim of analysing the effect of different Internet tools on turnout. Nickerson (2007) has analysed the effectiveness of email to get out the vote, and Horiuchi, Imai and Taniguchi (2007) have examined the impact of visiting party websites on turnout. The first study took place in the U. S.A. and conducted seven field experiments with a total of 161,633 participants registered on a citizen action group's website, who volunteered to receive different emails encouraging them to register and vote. Voter registration and turnout was measured by matching the randomized volunteer file to official voter databases (p. 499). The findings showed that sending emails is not effective in increasing voter registration and turnout. The authors acknowledged that the volunteers studied had a very high average turnout so that was perhaps impossible to mobilize them further (p. 502). Observational studies have also yielded surprising findings on mobilization via email. For example, Krueger (2006) showed that those who typically vote, have civic skills and come from high-SES backgrounds do not, everything else being equal, receive a disproportionate amount of online political messages, but are in fact pretty much mobilized by phone, postal mail or face-to-face.

Horiuchi, Imai and Taniguchi (2007) tested the impact of viewing certain political information (manifestos about pension reform) from one-party or two party websites on turnout, by means of a survey experiment which took place during Japan's 2004 Upper House election. The experiment consisted of three separated surveys: screening, pre-election, and post-election surveys. First, two weeks before the election day they sent an e-mail with the screening survey to 6,000 randomly sampled respondents in order to ask them about background characteristics, party preferences and voting intention. Of these 6,000 individuals, 2,748 completed the survey, and from this group 2,000 eligible

voters were randomly selected to form the final sample. The findings were that the effect of one-party treatment is small but the effect of the two-party treatment is larger and increases the turnout probability by three percentage points on average (p. 601). They also tested whether additional information increases turnout, particularly for people uncertain about which candidate or party to vote for. They argued that, according to Downs (1957), uncertain voters are more susceptible to new information. The results showed that additional information raised turnout by six percentage points on average among those who did not know which party to vote for (p. 683). However, besides these important findings, the aim of the article was to apply different methods to a survey experiment in order to improve the validity and efficiency of causal inference.

First, they obtain information on the background characteristics of the subjects that could be used to predict their non-compliance, non-response, and the outcome (p. 672). This information was collected through a screening survey administered prior to the pre-election and post-election surveys. Second, the randomization of treatments was done by forming six randomized blocks on the basis of the two pre-treatment covariates which are good predictors of the outcome (gender and the answer to the question on voting intention in the upcoming election). An advantage of the randomized-block design is that reduces random and systematic differences between the treatment and control groups along these covariates (p. 673), but also helps to estimate the missing values of compliance status and non-responses to the outcome variable, instead of directly deleting the observations with non-response or the missing values (p.677). The randomized-block design is not used in experiments carried out by political scientists that usually use the simple randomization of treatment, which according to the authors is far less efficient (p. 670). Third, they recommended trying to record the precise treatment received by each experimental subject in order to achieve greater accuracy in the interpretation of causal effects, the modelling of assumptions and the understanding of causal heterogeneity (p. 670). Finally, building on recent statistical literature they showed how to make statistical adjustments for non-compliance and non-response problems at the same time following a Bayesian approach. This framework is also useful for modelling causal heterogeneity in randomized experiments (p. 670). Causal heterogeneity refers to treatment effects that can be heterogeneous because some experimental units experience larger treatment effects than others, in spite of identical treatment being administered (p. 679). These heterogeneous effects depend on the characteristics of respondents (treatment effect heterogeneity) or on the different levels or kinds of the treatment being administered for

each experimental subject (treatment heterogeneity). An example of treatment heterogeneity occurred in this experiment when respondents decided how much time they spent viewing the party websites. This information was recorded by the authors, who also knew the characteristics of respondents via the screening survey; they were therefore able to deal with treatment effect heterogeneity as well (p. 679). The two sources of causal heterogeneity shared common statistical estimation problems which were addressed by the authors (p. 680).

The impact of viewing websites has been also examined by Lupia amd Philpot (2005) but on political interest and in a more substantive way. The authors argued that broad claims based on observational data about the Internet's impact on political phenomena have to be stated precisely on direct evidence of site-user interactions (p. 1129). With this aim, they ran a survey experiment on a randomly selected sample (1,199 individuals) of a representative panel of the US population. The participants were invited to visit one political news website, but were randomly assigned to one of a total of 9 websites. The results showed that websites which are considered to provide interesting information effectively and efficiently increase respondents' political interest, but that young adults evaluate the sites differently from older respondents (p. 1137).

Finally, another relevant branch of experiments which analyses the impact of Internet-based tools or channels of communication on participation is that focused on the impact of online deliberation on civic engagement, participation (Price and Capella, 2002; Price, 2006; Min, 2007) and policy preferences (Price and Capella, 2002; Price, 2006; Smith et al, 2009). These kinds of experiments have normative concerns about the virtues for civic engagement and building of social capital that online deliberative forums may have. But they also aim to contribute to the understanding of the formation and changing of policy preferences so as to help policy makers (Stoker, 2010: 316)[8].

Price and his partners, and the team formed by Smith and others, carried out large-scale field experiments where the participants come from a random sample of the US or Great Britain population, respectively. In the case of the American study, sixty groups of citizens engaged in a series on real-time electronic discussions about issues facing the country and the presidential campaign (Price, 2006: 8). With regard to the British project, six groups took part in either an online forum about youth and

[8] The work by Smith et al (2009) is part of a programme developed by the University of Manchester and the University of Southampton with the aim of encouraging active citizenship and design policy experiments that can help policy makers achieve better outcomes. See the website www.civicbehaviour.org.uk.

community cohesion or an information-only group about the same issues (Smith et al, 2009: 7-8). Both projects concluded that online deliberation had a significant impact; in the American case, on increasing the likelihood of voting, political knowledge and social trust (Price and Capella, 2002), but also on the levels of opinion held and shifts in policy preferences (Price, 2006: 15-16). In the British case, the authors found that online deliberation leads to shifting opinions and changing policy preferences about the issues at stake (Smith et al, 2009: 26). Contrary to some findings from observational studies (Putnam, 2000; Wojcieszak, 2009), these scholars did not find evidence of negative effects of taking part in online forums such as intolerance, ambivalence or distrust. Nevertheless, we should take into account that these forums are structured and controlled by a moderator, and it is therefore difficult to compare them with "real" Internet forums and social networks.

Studies based on panel data

As we have already said, another method used for properly examining the causal effect between the explanatory variables and participation is the panel survey. Panel data sets have major advantages over cross-sectional data. Panel data allow the researcher to have a larger number of data points and multiple observations for a given individual or at given time, increasing the degrees of freedom, controlling self-selection processes better, reducing collinearity among explanatory variables, identifying otherwise omitted variables in the model and estimating the effects of missing values better (Hsiao, 2003; Wooldridge, 2002). They also offer the possibility of generating more accurate predictions on individual outcomes, as if individual behaviours are similar on certain variables, panel data allow us to learn about an individual's behaviour by observing and comparing the behaviour of others through time (Hsiao, 2003). In addition by using panel data it is possibly to verify the effect of an explanatory variable before and after it takes place; we can therefore compare the level of political participation after access to the Internet is gained with their previous level of political participation when there was no access to the Internet. The previous level of political participation is treated as a variable which should be controlled in order to test the later level of participation. That is what some scholars have analysed with the few panel sets available with data on Internet use and participation.

The first study of this kind is the work of Jennings and Zeitner (2003) based on the panel data set from the University of Michigan's long-term political socialization project. This data set have a large number of pre- and post-Internet measurements of civic engagement and consist of a 1965 national sample of high school seniors who were resurveyed in 1973, 1982, and 1997 (p. 314). The 1997 data also included a self-administered survey to the adolescents or older offspring of these panel respondents in order to make cross-generational comparisons. Specifically, the authors examined the 1982 and 1997 waves as these dates bracket the period before and after widespread availability of the Internet. They treated the relationship between the two variables in two directions: from Internet access and Internet use (in order to follow public affairs and politics) to participation and from participation to Internet use and access. They found statistically insignificant effects of Internet use on offline participation in 1997 after taking into account 1982's levels of engagement, socioeconomic status, political knowledge and political interest (p. 325). Most specifically, previous levels of civic engagement were found to be generating this relationship. In addition, offline participation in 1982 was weakly correlated with Internet use in order to follow public affairs and politics in 1997, and political interest was not correlated at all (p.321). On the other hand, the authors did pin out that access to and using the Internet to follow public affairs and politics did not foster greater levels of political distrust in general as political and social trust is not affected by the dynamics of the Internet (p.331).

Finally, the effects of Internet differ between the upcoming (mean age is 22) and contemporary (mean age is 29) young adult generations. With respect to access, the findings for the offspring of the 1965 generation resemble those of their parents, but sharper differences emerged with regard to political use of the Internet (p.331). Among the contemporary young adult generation, the correlates of Internet use in order to follow public affairs and politics were not significant in the case of political activity, volunteer activities and political trust. Even the correlation with social trust was negative and significant. However, for the younger generation, Internet use was correlated with political activity and there was no significant correlation for the other variables mentioned. It seems that use of Internet in order to follow public affairs and politics had a salutary impact on the civic engagement of the younger generation but a very weak impact on baby boomers (p. 329).

Jennings and Zeitner's work has been celebrated as the first panel study offering causal insights into the links between Internet use and participation (Boulainne, 2009). However it has also been criticized by other scholars such as Kroh and Neiss

(2009) because of two problems: first, the analysis was restricted to a single cohort who were born around 1947, and, second, the time gap between the pre-Internet survey (conducted in 1982) and the post-Internet survey (conducted in 1997) is likely to underestimate self-selection processes. Kroh and Neiss argued that the ideal situation is to have information on political engagement one year before individuals obtain access to the Internet, in the same year, and one year after (2009: 2). Vissers and Quintelier (2009: 8) also pointed out that one of the flaws of Jennings and Zeitner's work is that they could not yet control for Internet use in 1982, so that what they were ultimately analysing were contemporaneous measurements of Internet use and participation in 1997.

However, there are other problems in this study which are more related to the measurement of the variables and the design of the causal flows. The explanatory variable of interest –Internet use in order to follow public affairs and politics- is too closely related to other indicators of political involvement (political interest, political knowledge, political efficacy, media attentiveness, etc..) which explain participation. This is why when Internet use was introduced in the model controlling for the rest of variables, no significant effect was found. The relationship between Internet use to follow politics and offline participation is in fact spurious as it is basically produced by attitudinal and behavioural indicators of political involvement which affect both political use of the Internet and offline political participation. We have good reasons to believe that if Internet use is measured as a group of non-political activities carried out online, the inclusion of political interest or political knowledge (or any of the classical indicators of political involvement) will not eliminate the impact of Internet use on participation. There are some studies which show that general Internet use affects participation independently, when controlling for political interest and knowledge (Mossberger et al, 2008; Borge and Cardenal, 2011).

The other two panel studies which have examined the relationship between use of ICT and participation are, precisely, the works of Kroh and Neiss (2009) and Vissers and Quintelier (2009). Specifically, the main objective of Kroh and Neiss' study is to advance the ongoing debate about the causal effect of the Internet on participation, using panel data and a natural experiment with an instrumental variable. They studied the data on Internet access and political engagement from the German Socio-Economic Panel Study, which covered the period of increasing Internet use since the mid-1990s and was made up of 20,000 interviewees. They compared the level of political engagement in respondents before and after they obtained access to the

Internet. In order to corroborate the robustness of the panel estimates, they also analysed a natural experiment generated by regional variation in the advancement of broadband technologies on the municipal level in Germany between 2005 and 2008. This is an exogenous source of variation in individual internet access as citizens are randomly assigned to Internet access based on broadband availability (p. 2).

First, they investigated the self-selection hypothesis (see page 4 of this paper) by analysing the extent to which characteristics of respondents in 1995 affected the elapsed time until Internet access was obtained in the period up to 2008 (p. 7). The dependent variable was therefore Internet access. The results yielded are in line with research on the digital divide; that is, access to the Internet is highly stratified by socio-economic characteristics. What's more, when controlling for all these background variables, indicators of political engagement in 1995 had significant effects on Internet access being obtained in the period up to 2008. This finding suggests that the causal relationship between Internet access and participation works in both directions, and that cross-sectional estimates of the Internet effect which do not control for prior levels of participation could be upward-biased (p. 10).

Second, they estimated the Internet effect in a "before and after" perspective of fixed-effects panel models between 1995 and 2008. As opposed to cross-sectional models, the Internet effect in longitudinal fixed effects models is only identified by individual changes in political engagement as a function of a change in access to the Internet whilst also controlling for previous level of political engagement (p. 7). The results pointed out the weak effects of Internet access on levels of political interest and active work in politics (p. 10). With regard to the attachment to parties, the effect of Internet access is insignificant (p.11).

Third, the authors wanted to test the hypothesis that the causal effect of Internet use varies systematically in size among different groups of the population. That is, individuals such as the poor, the young, the women or political minorities, who are less integrated into non-Internet-based political communities, are expected to benefit in terms of political participation from access to the Internet, while those who are more integrated in these communities are expected to benefit less from access to the Internet (p. 11). They calculated the Internet effect in odd ratios estimated in fixed-effect panel models for different groups: age, income, technical affinity (PC use prior to 1995), perceived valence of politics in 1995 (because around this time the Internet was barely used for politics). The findings show that Internet has an effect in terms of the

engagement individuals with technical affinity who fall within the upper third of income distribution. In addition, those who did not consider politics important in 1995 did not benefit from Internet access, but those who were already politically active prior to the advent of the Internet did. That is, politically attentive citizens select themselves into Internet access, making them more likely to exploit the political benefits of the Internet and become more politically active than they used to be. There is also an increase in political interest as a reaction to Internet access which depends on personal characteristics such as being young, having a PC prior to 1995 and enjoying more income, but does not depend on political action. The authors therefore concluded that both selection and selective causal effect are at work and that the spread of the Internet, when controlling for other variables, is associated with an increasing level of political inequality in societies (p. 12). These results are in line with Norris' "virtuous circle" thesis (2001).

Finally, the authors analysed a natural experiment given by the random distribution of broadband accessibility in Germany, in order to corroborate the results obtained from panel estimates. They argued that panel estimates of the Internet effect provide a better basis for causal inferences than cross-sectional estimates, although there are still problems of simultaneity because the cause and the effect could occur at the same time (p. 12)[9]. For the authors, the experimental method would be the ideal: randomly assigning individuals to a treatment group (with access to the Internet) and a control group (with no access to the Internet) and comparing pre and post-treatment levels of participation in both groups. Unlike laboratory and field experiments, the so called "natural" experiments provide a way to ex-post randomize the assignment to the treatment and control group. It is "natural" in the sense that an instrumental variable or factor exists or is available in the real world without any researcher intervention. This variable should be an exogenous instrument of the treatment and fairly well correlated with the treatment, but also unrelated to the outcome variable and to the rest of the independent variables. In Kroh and Neiss' study the instrumental variable of Internet access was broadband availability and political engagement was the outcome (p. 13). However, the results in the fixed-effects panel model when the instrumental variable was included were somewhat different to what has been found previously: there was a positive and significant effect of Internet access on political interest and no effect on attachment to parties and active work in politics (p. 14). In this regard, the authors

[9] For example, individuals can obtain access to the Internet at the same time they begin to worry about political affairs or could possibly have the intention to participate in the future and decide to get an Internet connection for this purpose.

considered that the availability of broadband technologies in the cross-section of 2005 as an instrument may be considered problematic, as it may not be fully exogenous of political engagement. We should take into account that municipalities with and without DSL access are not randomly distributed in Germany as it depends on the number of habitants, and even although municipality size is controlled, as well as others contextual variables, this may not capture all the joint correlates of the outcome and instrumental variable (p. 14).

In conclusion, Kroh and Neiss found out that only a small fraction of the correlation between Internet access and political participation is attributable to a causal Internet effect. Moreover, the size of this effect depends on the political engagement indicator (political interest, attachment to a party or active political work) and the personal characteristics of the respondents in a way which reinforces extant political inequalities. The only exception is people below 30 who have Internet access above the population average and increase their level of political interest as a reaction to the Internet more than other people (p. 15).

In parallel to this work, and as we have already explained, Vissers and Quintelier (2009) examined a panel from 2006 to 2008 in Belgium, which was made up of youngsters aged 16 and 18[10]. Their objective was to test the effect of following the news online and watching television news in 2006 on offline political participation (both institutionalized and new forms) in 2008, controlling for participation in 2006 and other control variables (p. 8). However, they also wanted to check the direction of the relationship, as Jennings and Zeitner (2003) or Kroh and Neiss (2009) had done: to see whether political participation also affects media use (p. 15). The findings were that only watching television news in 2006 had a positive and significant impact on new forms of participation in 2008. And the size of the effect of television and Internet news in 2006 on conventional participation in 2008 is equally large (p. 17). The Internet is therefore by no means more effective than television. In addition, participation in 2006 influenced the likelihood of following the news in 2008 more than following the news in 2006 affected participation in 2008 (p. 20). Consequently, there is more evidence of a self-selection hypothesis where politically interested individuals follow the news than a net impact of following the news on future participation. These results are in line with what Jennings and Zeitner (2003) and Kroh and Neiss (2009) found in their analyses.

[10] First, in 2006, a representative survey among 6,330 youngsters aged 16 was conducted in Belgian schools, and in 2008 these youngsters were contacted again to be re-interviewed at the age of 18. Finally, 2,988 students were re-interviewed.

Finally, Vissers and Quintelier (2009), in a similar way to literature asserting that the new media environment -as a high choice setting- would disadvantage citizens from lower socio-economic backgrounds (Prior 2005, 2007), hypothesized that the higher educated are more likely to benefit from the Internet and lower educated people will benefit more from television use (p. 9). However, the results did not confirm the hypothesis. 16 years-old people with higher educational tendencies followed the television news more and were more likely to participate in 2008, whereas following online news does not have any effect on the participation of young people with lower or higher educational goals (p. 13). These results could contradict what Kroh and Neiss (2009) found in their panel of German adult population, where Internet access has more impact on participation among citizens with higher income. Nevertheless, Vissers and Quintelier themselves point out that their data and analysis have some shortcomings: 1) only two waves of data collection; 2) the participants in the panel are in the middle of the process of political socialization; 3) there are substantial covariates at each point in time; 4) each type of news consumption (watching television news or following the news online) is measured by only one indicator (p. 18). All these things could affect the results.

Conclusions

The experiments and panel data studies reviewed here show how it is possible to design better studies which deliberately seek to control for confounding factors, omitted variables, self-selection and endogeneity, and attempt to establish a before-and-after sequence between the explanatory and the dependent variable. The findings of the experiments and panel studies explained therefore complement and help to understand the contradictory results found in cross-sectional studies. The three panel studies overviewed (Jennings and Zeitner 2003; Kroh and Neiss 2009; Vissers and Quintelier 2009) all found that Internet use and access have weak effects or insignificant effects on political participation. That is, when controlling for previous levels of participation, socio-economic status and political attitudes, use of the Internet does not have a significant impact on the level of political participation. In addition, these studies analysed the opposite causal flow: from previous participation to later use of the Internet, controlling for socio-economic and attitudinal variables. The results point towards significant effects of participation in a previous point in time on Internet

use and access later on. Consequently, the causal relationship between Internet use or access and participation has not been proved and cross-sectional studies that cannot control for prior levels of participation would be biased.

Another related question addressed by these panel studies is the socio-economic stratification of Internet use and its consequences on participation. The findings show that Internet use and access specifically increases the political engagement of individuals with higher income or higher educational motivations. Consequently, these findings are in line with research on the digital divide and the "virtuous circle" theory (Norris, 2001), as the spread of the Internet could be reinforcing the inequalities in participation already present in society. However, with regard to differences among generations, the authors also point out that in comparison to older generations young people are more likely to have Internet access and use the Internet more frequently in a way that will lead them to increasing their level of political interest and political activities in the near future. This would be a change in the typical profiles of participants which have already been detected by several cross-sectional studies (Tolbert and McNeal, 2003; Mossberger, Tolbert and McNeal, 2008; di Gennaro and Dutton, 2006; Gibson, Lusoli and Ward, 2005).

The experiments examined here have been designed with the purpose of obtaining direct evidence of specific Internet-based tools and channels on participation. In that sense these pieces of research also complement and clarify cross-sectional studies (and panel survey data) which commonly use broad and aggregate indicators of Internet use and participation. The experiments reviewed prove that the Internet can have an impact on participation but in very specific settings and conditions and that its effects are heterogeneous in different groups of individuals. For example, Quintelier and Vissers (2011) found that mobilization through a website has a significant effect on online participation but not on offline participation and only if the effect is measured no more than three months after the viewing of the website. Horiuchi et al (2007) discovered that viewing party websites increased the turnout among undecided voters but had a slightly negative effect on voters who knew which party they were going to vote for. Lupia and Philpot (2005) showed that only political news websites which provide interesting, useful and well-presented information can increase political interest, but taking into account that this evaluation is different for young people in comparison with older respondents. Taking part in online forums also seems to have a positive impact on voting, participation and social trust, and helps to create opinion on policy issues, while also leading to higher participation among less participatory groups

such as women and old people (Smith at al, 2009, Price and Capella, 2002, Price, 2006). However for this type of forum to be deliberative and have an impact on political behavior and attitudes, careful design of the dynamic of the discussions must be implemented. For example, they must be conducted by a moderator, there should be a random selection of participants and elites should sometimes take part in order to contrast their knowledge or opinion with the rest of the participants.

As this latter example shows, some experiments do not reproduce the "real" world of the Internet and their external validity could be questioned. In addition, the researchers usually only measured the treatment effect immediately after exposure and we do not really know how long this effect will last. The experiments by Quintelier and Vissers (2010, 2011) thus offer a better measurement of the treatment effects, as they take participation measurements not only immediately after exposure but a few months later as well.

Another problem which experiments on the impact of Internet use on political behavior should address is the need to somehow ensure that the participants in the experiment are not receiving the same stimuli outside than in the experiment. This is very problematic, as for instance it is impossible to avoid or control individuals going through the websites or social networks to get political information apart from that in the treatment. Horiuchi at al (2007: 672) argued that the problem of endogenous information acquisition can be addressed by giving additional or different information to randomly selected participants, which is what they did in their experiment. They asked participants additional questions in order to find out whether respondents actually obtained policy information from party websites and if they have already had knowledge on the issues explained on the websites.

For their part, panel studies also suffer from some shortcomings. Some of the studies reviewed here have only two waves of data collection (Vissers and Quintelier 2009), when for clear causal statements at least three waves are required. It is also impossible to fully solve the problem of endogeneity and self-selection, although panel studies are better equipped than cross-sectional studies to deal with this (Jennings and Zeitner, 2003: 322). The availability of previous measurements of the variables in time helps to mitigate these problems and controls which reflect life events are usually introduced. For instance, critical and coinciding life events can happen at the same time and affect both Internet use and political behavior. In order to take into account these confounding factors the analyses carried out by Jennings and Zeitner (2003) and

Kroh and Neiss (2009) control for events such as ageing, geographical and occupational mobility, changes in households and partnerships, time distance to national elections, additional education and the presence of school-age children for the panel period.

Experiments and panel data studies are not a panacea but they can help to complement cross-sectional studies and shed some light on their sometimes contradictory findings. In terms of causal inference these two methods have clear comparative advantages. However, in order to contribute to the accumulation of knowledge, for example in the study of the role of the Internet in participation, they should pay attention to the problems found in cross-sectional studies and aim to form part of a body of related studies. Most of the studies examined here clearly did this.

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