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Do Campaign Web Sites Really Matter in Electoral Civic Engagement?

Empirical Evidence From the 2004 Post-Election Internet Tracking Survey

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This study explores the impact of campaign web sites on electoral civic engagement by examining 2004 Internet Tracking Survey data. Propensity score matching and the recursive bivariate probit model are employed to deal with endogeneity and the missing data problem, which are often ignored in existing literature. Findings show that effects of campaign web sites vary across individual engagements and generally support reinforcement theory rather than mobilization theory.

Keywords: *electoral civic engagement; campaign web sites; deliberative engagement; endogeneity; missing data problem; propensity score matching*

Since the mid-1990s, the Internet and World Wide Web have been changing society remarkably. Government has provided electronic information and services through government websites. Political parties have used campaign web sites for election campaigns. Almost all senators and representatives have their own web sites to disseminate information and communicate with their constituents. Political use of the Internet, in particular campaign web sites, has become a common phenomenon. The interactive nature and massive information transfer capability of the Internet are implicitly assumed to produce a positive effect on politics and democracy. Do campaign web sites really matter in electoral politics and civic engagement?

As the Internet permeates everyday life, scholars from many disciplines have investigated its impact on various aspects of society, such as public service delivery, social capital, digital inequality (digital divide), and the like (Bimber, 2001, 2003; DiMaggio, Hargittai, Neuman, & Robinson, 2001; Katz & Rice, 2002; Norris, 2001; Rheingold, 1993; Robbin, Courtright, & Davis, 2004; Selnow, 1998). Relatively little is known, however, about the relationship between Internet use (campaign web site use) and electoral civic engagement. Enthusiasts argue that the Internet will facilitate deliberative and participatory democracy (Browning, 2002; Grossman, 1995; Morris, 1999; Rheingold, 1993). Studies of the political use of the Internet suggest that the Internet is less likely to mobilize citizens and more likely to reinforce their power status (Davis, 1999; Norris, 2001). Bimber (2001,

2003), Bimber and Davis (2003), and Delli Carpini and Keeter (2003) reported little evidence to support a significant relationship between the two. How do we reconcile the conflicting evidence about the impact of the Internet on electoral civic engagement?

This article attempts to solve the puzzle. It begins by discussing diversity of civic engagement. The existing research on Internet use and civic engagement is then reviewed from three different perspectives. We next describe the 2004 Internet Tracking Survey of the Pew Internet and American Life Project and explain the propensity score matching (PSM) method and the recursive bivariate probit model (RBPM). The analysis presents the average effect and the discrete change of campaign web site use on individual electoral civic engagement activities. Finally, we discuss the findings and their implications for theories and methods in this field.

Diversity of Civic Engagement

Civic engagement refers to citizens' individual and collective involvement in public affairs. Civic engagement encompasses a variety of forms of political and nonpolitical activities. Common forms of civic engagement are voting; working in election campaigns for political parties; contributing to political causes and candidates; contacting public officials; attendance at public meetings, political rallies, protests, and speeches; signing petitions; serving local organizations; and writing articles for mass media (Putnam, 2000; Ramakrishnan & Baldassare, 2004; Verba, Scholzman, & Brady, 1995; Weissberg, 2005). Some engagements are partisan oriented and electoral, whereas others are nonelectoral. Some activities are based on individual choices, whereas others involve collective actions. Some are deliberative and others are action oriented.

There are many theoretical and practical problems in defining and measuring civic engagement and political participation (Robbin et al., 2004; Weissberg, 2005). Weissberg (2005) argues that conventional inquiries on political participation are conceptually vague and thus fail to capture the variety of engagement in the real world. He claims that existing literature tends to focus on political activities that are easy to measure and treats all activities equally. Jennings and Zeitner (2003, p. 313) criticize survey methodology because it focuses on limited numbers of civic engagement indicators and provides insufficient evidence for generalization. Weissberg (2005, pp. 22-26, 32-34) also points out that most research takes the election-centered approach and analyzes a collection of individual "acts" rather than "activities" that they want to study ultimately.

Verba et al. (1995, 43-78) differentiate political activities according to the capacity to convey information (or messages), strength of pressures, and required resources. Financial contributions to a political party and candidate can send many strong messages to politicians but in turn require more resources, particularly money. Serving local organizations and participating in protests may also convey strong messages to politicians and public officials; however, the required resources for these activities are not material resources such as money but time and skills that enthusiasts are willing to spare. Voting conveys a few weak messages. A person is given only one ballot regardless of wealth, occupation, and education, and the likelihood that his or her ballot makes a difference in outcomes is very low. Voting cost is relatively low. Voting is, in the view of Verba et al., *sui genesis*.

Relationship Between the Internet and Society

DiMaggio et al. (2001) review five research domains for the Internet and society: digital inequality, community and social capital, political participation, organizational impact, and cultural impact. More recently, Robbin et al. (2004) provide a summary of research on the impact of information and communication technology (e.g., e-government and e-democracy) on political life. Arguments in the research literature reflect three perspectives about the relationship between Internet use and society: optimism, pessimism, and skepticism (Arterton, 1987; Bimber, 2003; DiMaggio et al., 2001; Katz & Rice, 2002; Norris, 2001).

Internet enthusiasts have a utopian view that the Internet will get people more involved in public life, facilitate formation of social networks (social capital), and contribute to participatory and deliberative democracy (Browning, 2002; Corrado, 1996; Foot & Schneider, 2006; Grossman, 1995; Morris, 1999; Rheingold, 1993; Ward, Gibson, & Nixon, 2003). Cyber-optimists emphasize that information technology reduces the costs of information and communication and thus allows citizens to obtain and disseminate political information in an efficient and timely manner. This cost reduction, in particular, provides minority or marginalized groups of people with opportunities to have their voices heard in the public sphere (Rheingold, 1993). Foot and Schneider (2006, p. 194) analyze practices of informing, involving, connecting, and mobilizing of “web spheres” and conclude that web campaigns have profound effects on electoral and political processes. The Internet and related technologies are viewed as vehicles for mobilizing constituents, transforming and reinventing government, and revitalizing deliberative democracy.

The pessimists argue, however, that the Internet reinforces rather than transforms existing power relationships and patterns of political participation (Davis, 1999, 2005; Kavanaugh, 2002; Norris, 2001). Davis (1999, 2005) argues that the Internet tends to be dominated by those who are young, well educated, affluent, and powerful. The Internet facilitates the civic engagement of people who are already informed and motivated, but it does not change the involvement level of people who are disenfranchised (Kavanaugh, 2002; Norris, 2001). The Internet is less likely to mobilize the disengaged and more likely to reinforce established political actors who can take greater advantage of using political information on the network, deepening the digital divide between the information haves and have-nots (Norris, 2001).

Finally, the skeptics hold the cautious view that the Internet, despite its potential, does not necessarily facilitate or destroy civic engagement but reflects “politics as usual” (Bimber, 2003; Davis, Elin, & Reeher, 2002; Kamarck, 2002; Margolis & Resnick, 2000; Uslaner, 2004). Bimber (2001) argues that the Internet may reduce the costs of obtaining information and thus improve availability of information; however, the cost reduction and availability are not substantially related to voting and political engagement. He reported a marginally significant relationship only between the Internet and financial contributions to parties and candidates. Based on analysis of the 2000 Missouri Race, Bimber and Davis (2003) conclude that campaign web sites have a weak effect on electoral politics such as voting. Delli Carpini and Keeter (2003) also find little evidence to support a significant relationship between the use of the Internet and civic engagement. More recently, Uslaner (2004, p. 239) concludes that the Internet is not transforming but looks much like the world and that the Internet does not make up for the decline in civic engagement nor facilitate social capital. This normalization thesis suggests that cyberspace is taking on the characteristics

Table 1
Perspectives on the Relationship Between the Internet and Society

	Key Arguments	Role of the Internet
Optimism	Mobilization, transformation, and participatory and deliberative democracy	Determinant (positive)
Pessimism	Reinforcement, digital inequality (digital divide), "engaging the engaged"	Determinant (negative)
Skepticism	Normalization, reflection (mirroring), displacement, complement, "politics as usual"	Reflected and socially shaped

of ordinary life (Margolis & Resnick, 2000). Table 1 summarizes the three perspectives on the relationship between the Internet and society.

Methods Review

Existing research employs various methods to examine the relationship between Internet use and civic engagement. Many studies envisage a unidirectional relationship between Internet use and society. This relationship is often criticized as a misspecification because of the nebulous causal relationship between the two variables (Arterton, 1987; Bimber, 2001; DiMaggio et al., 2001). Internet use and engagement may be iterative and interactive in the virtuous circle that exerts a positive impact on democracy (Norris, 2000, pp. 316-319). Most quantitative research relies on univariate and descriptive methods and seldom carefully considers the key issues, such as endogeneity and the missing data problem, when modeling Internet use and civic engagement.

Norris (2001) largely depends on descriptive methods to examine three types of digital divide. Bimber (2001, 2003) employs the binary logit model to analyze American National Election Studies data in 1998 and 2000. Bimber and Davis (2003) combine telephone surveys, content analysis, and interviews, but their approach is descriptive and narrative. Jennings and Zeitner (2003) conduct linear regression analyses using longitudinal survey data and find an insignificant association between the political use of the Internet and civic engagement. Uslander (2004) employs two-stage least squares to fit the model of social capital (trust in people). More recently, Scott (2006) performs a content analysis to measure the extent that municipal government web sites provide information and services to improve public involvement. He develops public involvement indices and then applies ANOVA to compare group means of the indices.

Descriptive methods and content analysis tend to be biased toward supply of Internet services without considering how citizens use the Internet. Univariate methods implicitly assume a unidirectional causal relationship between Internet use and engagement; that is, the former influences the latter in some way. But the causal structure is not always clear and varies across specific engagement activities.¹ The relationship between Internet use and civic engagement may be reciprocal and simultaneously jointly determined.² This causal structure should be carefully examined regardless of whether research is quantitative or

qualitative. Despite a direct causality often posited by enthusiasts, existing research has produced inconsistent results that raise many theoretical and methodological questions.

Internet use is endogenous in some civic engagements but not in others.³ The missing data problem is common in nationwide surveys because randomized experiments tend to be costly, infeasible, and/or undesirable. If an individual receives the treatment, we cannot observe what the outcome would have been had he or she been assigned to the control group. These problems make it difficult to estimate the net impact of treatment. However, little effort was made in past research to address endogeneity and missing data problems.

Data: 2004 Post-Election Internet Tracking Survey

The Pew Internet and American Life Project has provided data sets of nationwide surveys that examine the impact of the Internet on American society. In each survey, a nationally representative sample is drawn from adults living in continental U.S. households using the standard list-assisted random-digit dialing method. This study employs the 2004 Post-Election Internet Tracking Survey that was conducted from November 4 to November 22 of that year (Pew Internet and American Life Project, 2004).⁴ The final response rate was 30.6%. The data set used includes a total of 2,146 observations, excluding those ($n = 54$) with missing values in age.

Six types of electoral civic engagement are considered (Table 2). The first type is to send e-mails urging people to vote without reference to a particular candidate. This engagement appears less partisan oriented and more deliberative than attendance at a campaign rally, which is an action-oriented partisan engagement. Sending e-mails urging voting for a particular candidate is solicitation for votes. The fourth engagement is another solicitation by making telephone calls or visiting at homes. Financial contributions are to give money to a political candidate. Despite its uniqueness, voting is also considered to compare with other electoral engagements. (See the appendix for details about questions selected.)

Political knowledge and motivation are computed by averaging several binary variables of related questions. Family income is drawn by taking the midpoint of each income range. Online use intensity is computed from the two variables that measure frequencies of online use from home and work. A variable for weighting is provided in the November 2004 Internet Tracking Survey data set. Those who identify themselves as either Republican or Democrat are set to 1 for partisanship. College graduates are those who earned bachelor's, master's, and/or PhD degrees. Broadband users have Internet connections of a DSL-enabled phone line, a cable TV modem, wireless (including satellite), T-1, fiber optic, or access to the Internet at work. Use of campaign web sites is whether citizens have visited campaign web sites to get news or information about the election. Tables 3 and 4 provide descriptive statistics of independent variables.

Methods

The diversity of civic engagements suggests that Internet use may not influence each type of engagement in the same way. Therefore, civic engagements need to be differentiated

Table 2
Summary of Dependent Variables

	Engaged		Not Engaged		Missing	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
E-mails urging voting	155	7.22	1,062	49.49	929	43.29
Attendance at a rally	158	7.36	1,984	92.45	4	0.19
Solicitation (e-mails)	147	6.85	1,071	49.91	928	43.24
Solicitation (call or visit)	184	8.57	1,961	91.38	1	0.05
Financial contributions	314	14.63	1,826	85.09	6	0.28
Voting	1,708	79.59	435	20.27	3	0.14

Note: *N* = 2,146.

Table 3
Summary of Interval Independent Variables

	<i>n</i>	<i>M</i>	<i>SD</i>	Min	<i>Mdn</i>	Max
Political knowledge	2,145	0.249	0.337	0	0	1
Political motivation	2,145	0.346	0.294	0	0.333	1
Family income (\$1,000)	1,733	52.360	34.076	5	45	115
Age	2,146	49.405	17.874	18	49	94
Internet experience (Year)	2,121	4.008	3.928	0	4	10
Online use intensity	1,303	12.090	9.074	0	11.5	30

Note: *N* = 2,146.

Table 4
Summary of Categorical Independent Variables

	Yes (1)		No (0)		Missing	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Partisanship (partisan = 1)	1,389	64.73	652	30.38	105	4.89
Education (college = 1)	714	33.27	1,420	66.17	12	0.56
Gender (male = 1)	1,010	47.06	1,136	52.94	—	—
Race (White = 1)	1,741	81.13	367	17.10	38	1.77
Broadband user	717	33.41	459	21.39	970	45.20
Use of campaign web sites	299	13.93	1,003	46.74	844	39.33

Note: *N* = 2,146.

from one another in analysis. Internet use and some civic engagement may be reciprocal or jointly determined at one time.⁵ Internet use may be an endogenous variable for some civic engagements and exogenous for other types of engagement. If endogeneity comes from regressors that are correlated with omitted variables (disturbances), an instrumental variable approach (i.e., two-stage least squares) may work. But other sources of endogeneity require

different approaches. The “missing data problem” is pervasive in observational studies but is seldom taken into account in existing research, leading to reporting biased and unreliable estimates of effects. This study employs the propensity-score matching method (PSM) and recursive bivariate probit model (RBPM) to deal with the missing data problem and endogeneity.

PSM

Since the seminal work of Rosenbaum and Rubin (1983), PSM has been used in policy analysis and evaluations such as job training programs (Angrist, 1998; Dehejia & Wahba, 1999; Heckman, Ichimura, & Todd, 1997; LaLonde, 1986). PSM is a nonexperimental method of sampling to produce a control group whose distribution of covariates is similar to that of the treated group. Conditioning many covariates produces a so-called “curse of dimensionality” that calls for a method of “dimension reduction” (Hahn, 1998, p. 317). PSM employs one-dimensional propensity scores, predicted probabilities of falling into a treated group, to summarize multidimensional covariates (D’Agostino & Rubin, 2000, p. 749).

PSM is based on the “strongly ignorable treatment assignment” assumption that the treatment assignment d and outcomes of y_0 and y_1 are conditionally independent given covariates w (Rosenbaum & Rubin, 1983).⁶ Theorem 3 says that “if the treatment assignment is strongly ignorable given w , then it is also strongly ignorable given any balancing score $b(w)$ ” (Rosenbaum & Rubin, 1983, p. 45). This theorem implies that “if treatment assignment is strongly ignorable, then adjustment for a balancing score $b(w)$ is sufficient to produce unbiased estimates of the average treatment effect” (Rosenbaum & Rubin, 1983, pp. 44-45). Under these assumptions, the unobservable $E\{y_0 | b(w), d = 1\}$ is drawn from the observable $E\{y_0 | b(w), d = 0\}$ given balancing scores $b(w)$, propensity scores in particular.

$$\begin{aligned} E\{y_1 | b(w), d = 1\} &= E\{y_1 | b(w), d = 0\} = E\{y_1 | b(w)\} \\ E\{y_0 | b(w), d = 1\} &= E\{y_0 | b(w), d = 0\} = E\{y_0 | b(w)\} \end{aligned}$$

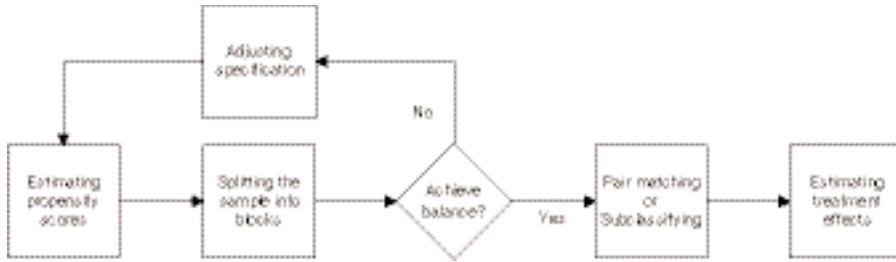
The “expected difference in observed responses to the two treatments at $b(w)$ is equal to the average treatment effect at $b(w)$,” if treatment assignment is strongly ignorable (Theorem 4). Thus, PSM makes it possible to estimate the average treatment effect on the treated as follows.

$$\begin{aligned} E\{y_1 - y_0 | b(w)\} &= E\{y_1 | b(w), d = 1\} - E\{y_0 | b(w), d = 1\} \\ &= E\{y_1 | b(w), d = 1\} - E\{y_0 | b(w), d = 0\} \end{aligned}$$

The PSM method consists of four steps (see Figure 1): (a) estimating propensity scores, (b) checking the balance of covariates, (c) matching (pair matching or subclassification), and (d) calculating average treatment effects (Becker & Ichino, 2002; Dehejia & Wahba, 1999; Rosenbaum & Rubin, 1984). This study employs the binary probit model to estimate propensity scores and applies one-to-one pair matching without replacement to match control and treated observations.

PSM can produce robust estimators of effects without assuming any functional form or probability distribution. This method relies on the quality of covariates and usually requires a large sample size. PSM cannot control all biases that come from the unobserved because this method considers observed covariates only (Shadish, Cook, & Campbell, 2002).

Figure 1
Flow Chart of the Propensity Score Matching



Source: Figure based on narrative descriptions in Rosenbaum and Rubin (1984) and Dehejia and Wahba (1999).

RBPM

RBPM was proposed by Maddala and Lee (1976) and Maddala (1983) and later developed by Greene (1998, 2003). RBPM is a bivariate probit model in which one equation includes the binary dependent variable of the other equation as an endogenous independent variable. Its functional form is,

$$\begin{aligned}
 y_1^* &= x_1\beta_1 + \gamma y_2 + \varepsilon_1, & y_1 &= 1 \text{ if } y_1^* > 0, 0 \text{ otherwise,} \\
 y_2^* &= x_2\beta_2 + \varepsilon_2, & y_2 &= 1 \text{ if } y_2^* > 0, 0 \text{ otherwise,}
 \end{aligned}$$

where y_1 is a binary dependent variable of interest in Equation 1, y_2 is a binary dependent variable of the second equation that is included in the first equation as an endogenous variable, and x_1 and x_2 are the regressor vectors of two regression equations.

This equation system is identified if disturbances are independent or there is at least one exogenous variable in x_2 that is not included in x_1 (Maddala, 1983). The bivariate standard normal probability distribution is defined as,

$$\begin{aligned}
 \phi_2(y_1, y_2; \rho) &= \frac{1}{2\pi\sqrt{1-\rho^2}} \\
 &\int_{-\infty}^y \int_{-\infty}^{y_1} \exp\left[\frac{-1}{2(1-\rho^2)}(y_1^2 + y_2^2 - 2\rho y_1 y_2)\right] \phi_1 \phi_2
 \end{aligned}$$

where ρ is the correlation coefficient of disturbances of two equations.

The correlation coefficient between the disturbances measures the effect of y_2 on y_1 after the influence of the endogenous variable y_2 is accounted for in the first equation (Greene, 2003, p. 717). The key null hypothesis is that the disturbances ε_1 and ε_2 are not correlated: $\rho = 0$. If the null hypothesis is not rejected, the two equations may be estimated separately by either the binary logit or probit model with an exogenous variable y_2 .

Like the simultaneous equation model (SEM), RBPM assumes that the disturbances are correlated. Unlike SEM, RBPM is estimated by the full information maximum likelihood method, not by ordinary least squares. Interestingly, the endogenous nature of y_2 in the first equation can be ignored in formulating the likelihood function (Greene, 2003, p. 715); y_2 can be used as an endogenous variable in the first equation as if there is no simultaneity problem because two dependent variables are jointly determined (Greene, 1998, p. 295; Greene, 2003).

Because RBPM is nonlinear, effects of individual parameter estimates should be interpreted with special caution. The impact of an independent variable on predicted probabilities is not constant but depends on the values of the variable and other independent variables. Therefore, simply reporting parameter estimates and their significance is not helpful for understanding the effects of independent variables in nonlinear models. Marginal effects and discrete changes are often used to evaluate the effects of independent variables in logit and probit models (Greene, 2003; Long, 1997; Long & Freese, 2003). In RBPM, conditional predicted probabilities, predicted probabilities given $y_2 = 1$ are used to evaluate the impact of the endogenous independent variable (i.e., campaign web site use).⁷ The reference points used are medians for interval independent variables, the intermediate point 0.5 for political knowledge and mobilization and 1 for all binary variables.

Findings

Use of campaign web sites positively influences electoral civic engagement, but its effect varies across individual engagements. Campaign web site experience has a negligible impact on voting.

Sending E-mails to Vote

PSM suggests that campaign web site users are on average 17.4% (.294 – .121) more likely than nonusers to send e-mails urging people to vote without reference to a particular candidate (Table 5).⁸ The left plot of Figure 2 illustrates the average effect of campaign web site use on this type of electoral civic engagement. The percentage of users engaged is higher than that for nonusers in most strata.

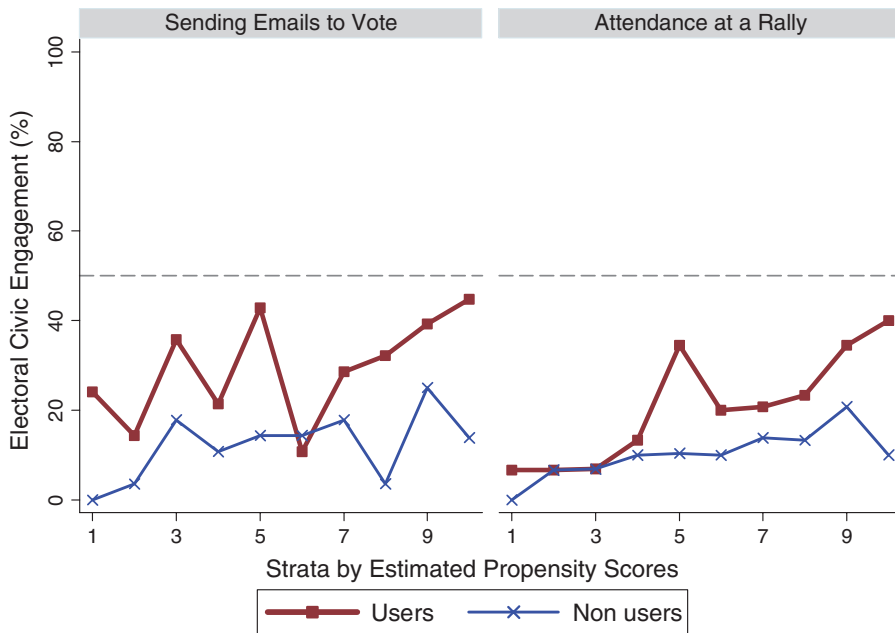
RBPM of sending e-mails to vote without reference to a candidate fits the data well and has a significant correlation between disturbances (first column in Table 6). Campaign website use and sending e-mails to vote without reference to a candidate appear to be jointly determined and positively related. The left plot of Figure 3 depicts conditional predicted probabilities that campaign web site users and nonusers will send e-mails urging people to vote without reference to a particular candidate. The discrete change, that is, the gap between two curves, is the impact of campaign web site use on this engagement. For example, users who are moderately mobilized at 0.5 are 10.1% more likely than nonusers to send e-mails urging to vote, holding all other variables at their reference points. As citizens are more mobilized, the effect of campaign web site use on this engagement increases (Figure 3).

Political knowledge and mobilization are important predictors of sending e-mails to vote, whereas partisanship does not make a substantial difference. Political knowledge has

Table 5
Average Effect: Sending E-mails to Vote and Attendance at a Rally

Civic Engagement	Pairs	Treated	Control	Effect	SE	T	p Value
E-mails to vote	282	0.2943	0.1206	0.1738	0.0334	5.2006	< .0000
Campaign Rally	296	0.2061	0.1014	0.1047	0.0294	3.5643	< .0004

Figure 2
Average Effect: E-mails to Vote and Attendance at a Rally



an overall effect of 15.7%; for a 0.1 increase from the intermediate level of political knowledge, the conditional predicted probability of users' engagement will increase by 1.6%, holding other variables at their reference points. The indirect effect of 11.8% indicates that political knowledge influences sending e-mails largely by facilitating use of campaign web sites. Political mobilization has significant direct and indirect effects.

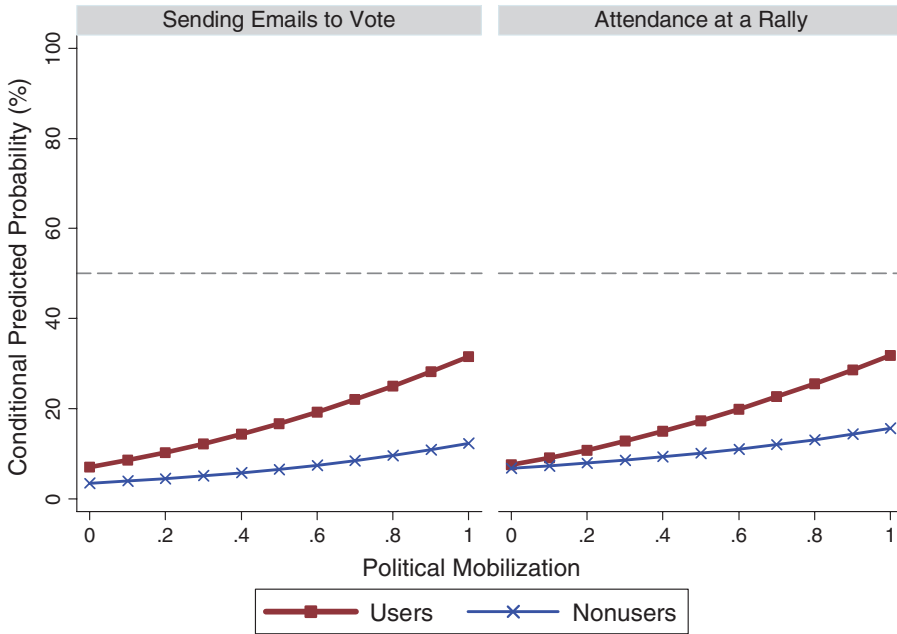
Gender and race have marginally significant direct effects. Age has positive direct and negative indirect effects that cancel each other out to make its overall effect negligible. Generation gap does matter in Internet use but does not make a big difference in this engagement. Internet experience and online use intensity facilitate use of campaign web sites and thus indirectly influence sending e-mails urging voting without reference to a particular candidate. Family income, education, and broadband use do not significantly affect this engagement.

Table 6
Sending E-mails to Vote and Attendance at a Rally
(Recursive Bivariate Probit Model)

	Sending E-mails to Vote			Attendance at a Rally				
	Engagement		SE	Web Site Use		SE		
	Coeff.	SE		Coeff.	SE			
Political knowledge	0.1381	0.1909	1.0104***	0.1461	0.2975	0.1844	1.0384***	0.1401
Mobilization	0.5161**	0.2636	0.8813***	0.1903	0.3282	0.2034	0.7050***	0.1795
Partisanship	-0.0353	0.1241	0.0132	0.1162	0.0738	0.1343	0.0929	0.1119
Family income	-0.0013	0.0018	-0.0001	0.0018	-0.0012	0.0018	0.0003	0.0017
Education (college)	-0.0407	0.1259	-0.0956	0.1128	0.0757	0.1208	-0.0782	0.1088
Gender (male)	-0.2262*	0.1186	-0.1514	0.1031	0.1566	0.1184	-0.1928*	0.1005
Race (White)	-0.2619*	0.1497	-0.1271	0.1451	-0.1324	0.1508	-0.0321	0.1387
Age	0.0044	0.0040	-0.0173***	0.0037	0.0127***	0.0040	-0.0178***	0.0036
Campaign web site	1.4731***	0.2893			1.6364***	0.2499		
Internet experience			0.0691***	0.0231			0.0449**	0.0197
Online use intensity			0.0216***	0.0060			0.0227***	0.0057
Broadband use			0.0529	0.1123			0.0438	0.1147
Intercept	-1.5157***	0.2310	-1.2097***	0.2438	-2.4550***	0.2717	-1.1276***	0.2381
Rho (correlation)			-0.5049	0.1569			-0.6993	0.1232
Wald test (Rho)			6.9689***				12.8987***	
Log likelihood	-1571.9885							
Wald test (model)	318.60***							
N	933							

* $p < .10$. ** $p < .05$. *** $p < .01$.

Figure 3
Conditional Predicted Probability: E-mails to Vote and Attendance at a Rally



Attendance at a Campaign Rally

PSM suggests that campaign web site users are 10.5% more likely than nonusers to attend a campaign rally (Table 5). The right plot of Figure 2 illustrates that campaign web site users attend a rally more than nonusers in most strata.

RBPM of attending a campaign rally fits the data well and has a large correlation coefficient of disturbances (second column in Table 6). Use of campaign web sites has a positive and significant effect on attendance at a rally. The right plot of Figure 3 illustrates that conditional predicted probability of campaign web site users is about 7.2% higher than that of nonusers, holding all other variables at their reference points.

Political knowledge and mobilization have significant indirect effects on attendance at a rally without significant direct effects. Age has positive direct and negative indirect effects on attendance at a rally; young generations are more likely to use campaign web sites but less likely to attend a rally than older. However, the overall effect is negligible because direct and indirect effects cancel each other out.⁹ Internet experience and online use intensity indirectly influence attendance at a rally, whereas gender has a marginally significant indirect effect. Other variables do not affect this engagement significantly.

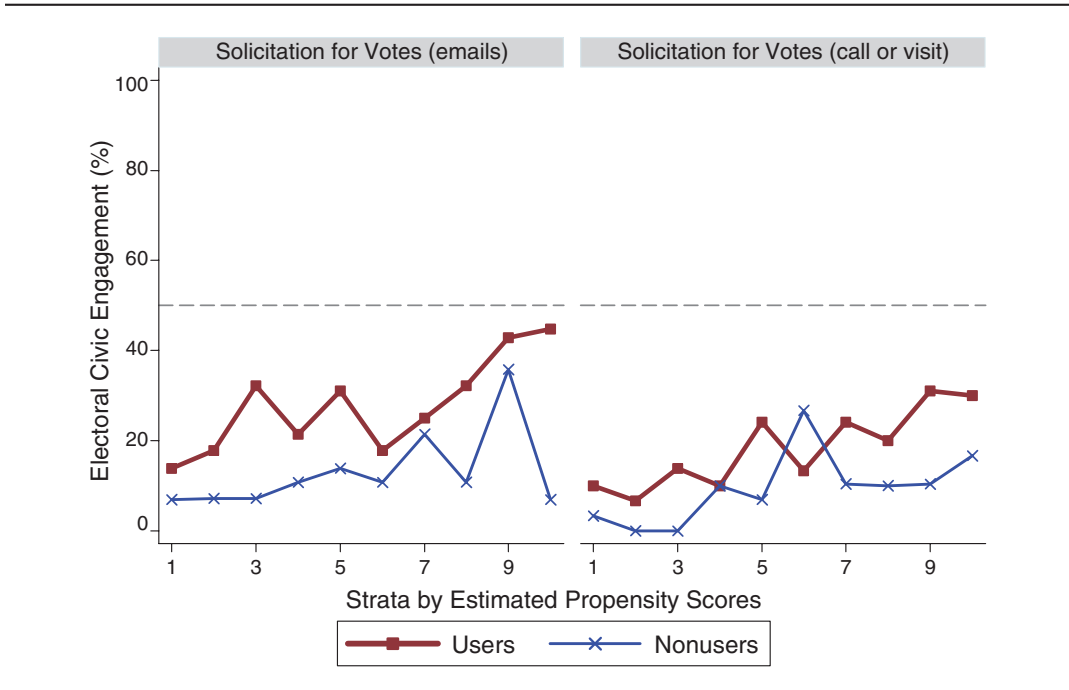
Solicitations for Votes

Use of campaign web sites has a positive average effect on solicitations for votes. Users send e-mails urging people to vote for a particular candidate 14.8% more than do nonusers

Table 7
Average Effect: Solicitations for Votes

Civic Engagement	Pairs	Treated	Control	Effect	SE	T	p Value
E-mails with reference	283	0.2792	0.1307	0.1484	0.0334	4.4431	< .0000
Phone call or visit	296	0.1824	0.0946	0.0878	0.0282	3.1135	< .0020

Figure 4
Average Effect: Solicitations for Votes



(Table 7). The average effect on solicitation for votes by making telephone calls or visiting at home is 8.9%. Figure 4 illustrates these average effects.

Both RBPMs of solicitations for votes fit data but do not have significant correlations between disturbances (Table 8). As a result, the binary probit model is estimated to consider direct effects. Both binary probit models fit the data well and report statistically significant effects of campaign web site use on solicitations for votes (Table 9).

The left plot in Figure 5 depicts discrete changes of campaign web site use at different levels of political mobilization. Campaign web site users are 17.4% more likely than nonusers to send e-mails urging people to vote for a particular candidate, holding other variables at their reference points. Political knowledge and mobilizations significantly influence sending e-mails for a particular candidate, whereas partisanship and education have marginally significant effects (first column in Table 9). Other variables do not make a substantial difference.

Table 8
Summary of Empirical Analysis

Civic Engagement	Likelihood Ratio Test	Rho	Web Site Use Coefficient	Discrete Change ^b	Average Effect
E-mails urging to vote	319***	-.5049***	1.4731***	0.1013	0.1738**
Attendance at a rally	417***	-.6993***	1.6364***	0.0717	0.1047***
Solicitations (e-mail)	135*** ^a	-.3455	0.6415*** ^a	0.1736 ^a	0.1484***
Solicitations (call or visit)	90*** ^a	.2807	0.3070*** ^a	0.0785 ^a	0.0878***
Financial contributions	153*** ^a	-.2383	0.3589*** ^a	0.1363 ^a	0.1122***
Voting	98*** ^a	.3940	0.0734 ^a	0.0063 ^a	0.0169

a. Result of the binary probit model.

b. The significance level is not applied.

* $p < .10$. ** $p < .05$. *** $p < .01$.

For urging people to vote for a particular candidate by making telephone calls or visiting at homes, campaign web site use has a discrete change of 7.9% at the reference points (right plot of Figure 5). Two curves have a similar slope as if they were parallel lines. Political knowledge and mobilization have positive effects, whereas partisanship and race marginally affect solicitations by phone calls or visits (second column in Table 9). The more family income users have, the less likely they are to urge people to vote for a particular candidate. Education, gender, and age do not have a significant effect.

Financial Contributions

PSM suggests that campaign web site users are 11.2% more likely to give money to a political candidate than are nonusers (Table 10). This average effect is depicted in the left plot of Figure 6. Users show a higher level of contributions than do nonusers in most strata.

RBPM of financial contributions fits the data well but has a small correlation coefficient of disturbances (Table 8). Accordingly, the binary probit model is used instead (third column in Table 9). Discrete changes of campaign web sites use are illustrated in the left plot of Figure 7. Campaign web site users are 13.6% more likely than nonusers to donate money, holding all other variables at their reference points. The engagement curves appear to be parallel lines. All independent variables turn out statistically significant. In particular, family income, college education, and age positively influence financial contributions.

Voting

Voting has unique properties that cannot be simply modeled. PSM returns a negligible average effect of 1.7%, indicating that use of campaign web sites does not matter much in voting. The right plot of Figure 6 does not show a consistent difference in voting between campaign web site users and nonusers.

The RBPM of voting has a small and insignificant correlation coefficient that calls for the binary probit model (Table 8). The model fits the data well but does not report a significant coefficient of campaign web site use (fourth column in Table 9). The discrete change remains less than 1%, holding other variables at the reference points. This negligible

Table 9
Solicitations for Votes, Contributions, and Voting (Binary Probit Model)

	Solicitation (E-mails)		Solicitation (Call or Visit)		Financial Contribution		Voting	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Political knowledge	0.9427***	0.1564	1.0491***	0.1511	0.8535***	0.1452	0.4543***	0.1662
Mobilization	1.0189***	0.2229	0.5193**	0.2258	0.6912***	0.1923	0.7878***	0.2168
Partisanship	0.2565*	0.1355	0.2592*	0.1377	0.4263***	0.1276	0.4472***	0.1110
Family income	-0.0010	0.0019	-0.0059***	0.0020	0.0046**	0.0019	0.0026	0.0019
Education (college)	-0.2232*	0.1261	0.1694	0.1258	0.3186***	0.1188	0.2464**	0.1202
Gender (male)	-0.0033	0.1177	0.0432	0.1212	0.2726**	0.1079	-0.0713	0.1108
Race (White)	-0.2485	0.1730	-0.2770*	0.1520	0.3049*	0.1723	0.2972**	0.1378
Age	0.0048	0.0040	0.0014	0.0045	0.0276***	0.0041	0.0189***	0.0042
Campaign web site	0.6415***	0.1282	0.3070**	0.1354	0.3589***	0.1196	0.0734	0.1365
Intercept	-2.1519***	0.2647	-1.8997***	0.2910	-4.1322***	0.3275	-0.8661***	0.2242
Log likelihood	-327.3350		-295.6216		-344.9291		-440.1983	
Wald test	135.25***		90.06***		153.41***		97.50***	
Pseudo R ²	.1842		.1370		.2314		.1366	
N	1,027		1,090		1,088		1,093	

* $p < .10$. ** $p < .05$. *** $p < .01$.

Figure 5
Predicted Probability of Solicitations for Votes

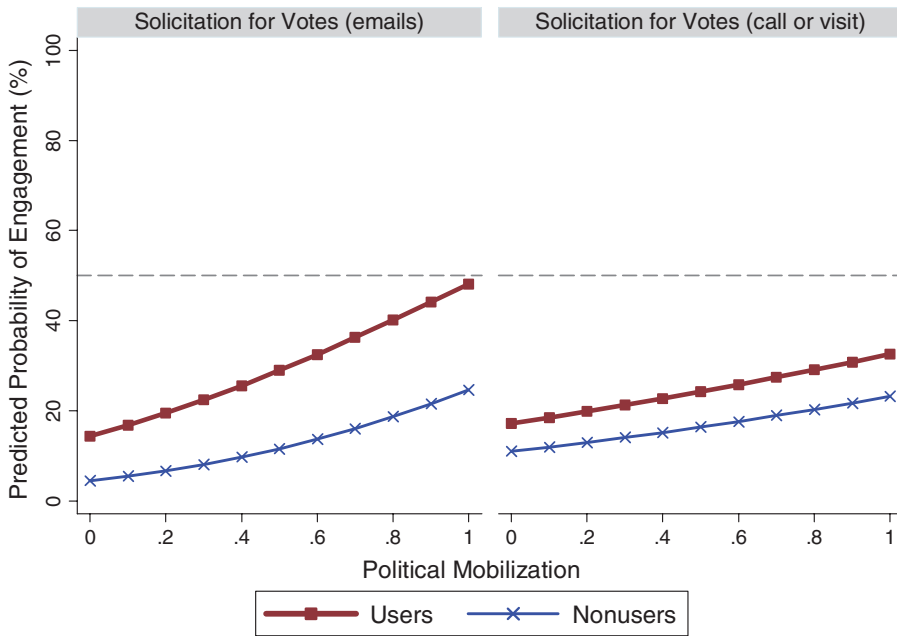


Table 10
Average Effect: Financial Contributions and Voting

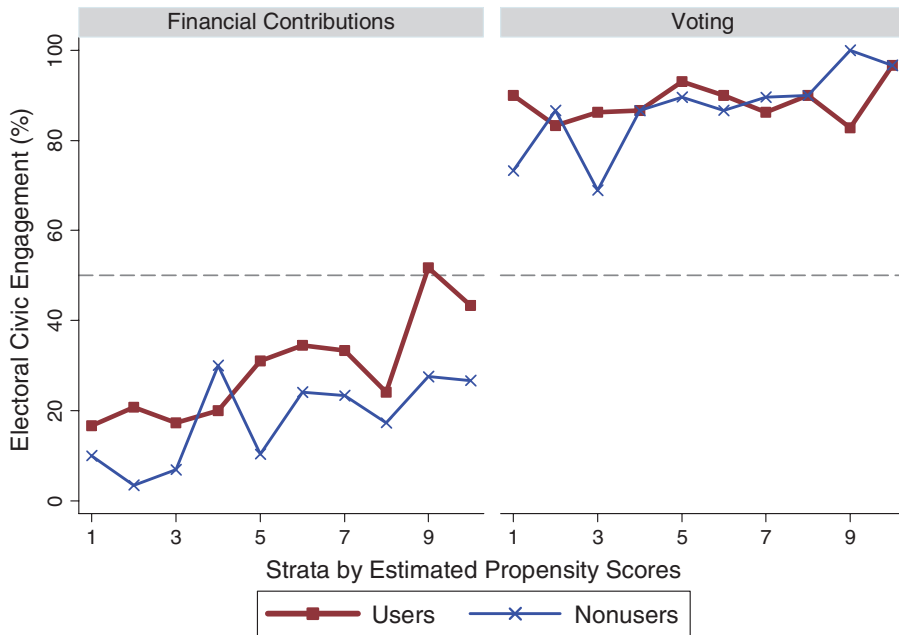
Civic Engagement	Pairs	Treated	Control	Effect	SE	T	p Value
Contributions	294	0.2925	0.1803	0.1122	0.0348	3.2259	< .0014
Voting	296	0.8851	0.8682	0.0169	0.0271	0.6236	< .5334

effect is illustrated in the right plot of Figure 7.¹⁰ Political knowledge, mobilization, partisanship, age, education, and race significantly influence voting.

Summary

RBPMs of sending e-mails urging voting without to a candidate and attending a campaign rally have significant correlations between disturbances of two equations. Even after use of campaign web sites is accounted for in the first equation, there still remains a part of variation in engagement that the endogenous variable can indirectly explain in the second equation. To evaluate overall impact of an independent variable, both direct and indirect effects should be considered. Political knowledge and mobilization indirectly influence these two

Figure 6
Average Effect: Financial Contributions and Voting



electoral engagements by facilitating use of campaign web sites. The RBPMs of other engagements do not show a significant correlation between disturbances. Hence, the binary probit model is estimated.

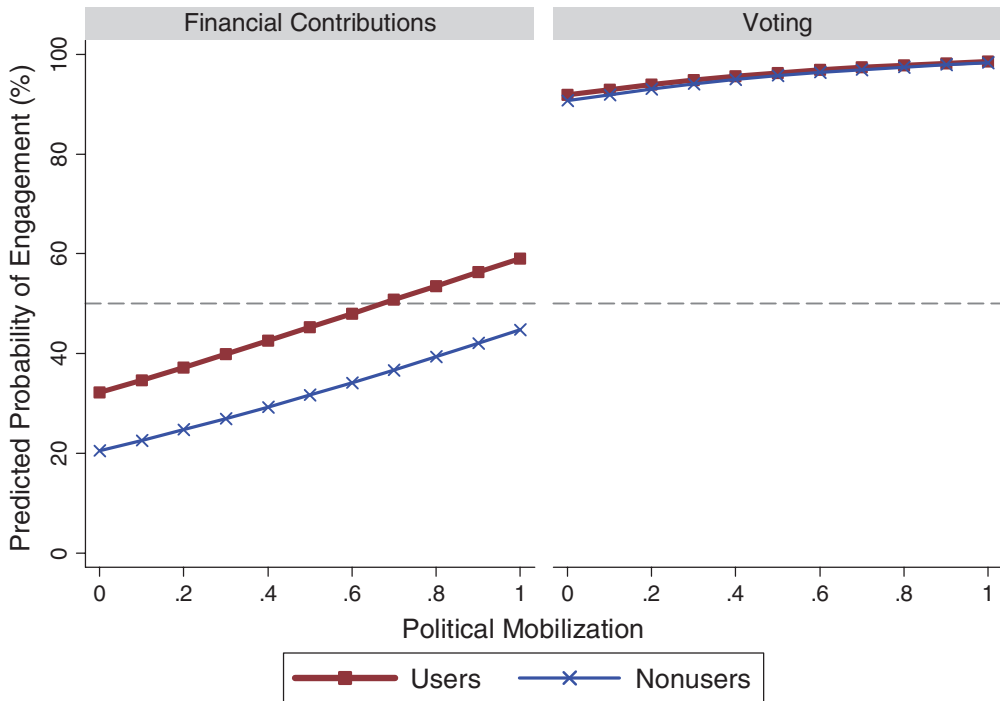
Use of campaign web sites is influential for giving money to political candidate and sending e-mails urging people to vote with and without reference to a particular candidate. Campaign web site use has moderate effects on attendance at a rally and solicitations for votes through phone calls or visits at homes. However, the impact on voting is negligible.

Discussion

Individual civic engagements require different resources, convey different messages, and exert pressures to different degrees on politicians (Verba et al., 1995). Thus, civic engagements need to be distinguished from one another. The empirical analysis suggests that use of campaign web sites influences individual electoral engagements differently depending on the type of civic engagements.

Use of campaign web sites is endogenous in the models of sending e-mails urging voting and attending a rally. These engagements and campaign web site use appear to be jointly determined with significant correlation. The relationship may be reciprocal and form a virtuous circle (DiMaggio et al., 2001; Norris, 2000, 2001). Campaign web site use accounts for some variation of these engagements, but there must be other portions that are

Figure 7
Predicted Probability of Financial Contributions and Voting



left over and can be indirectly accounted for through the endogenous variable. A single-equation model such as the binary probit or logit model could not take this indirect effect into account and would thus report an incorrect, if not misleading, result. For example, age has significant direct and indirect effects on attendance at a rally, but its overall impact is negligible. Use of campaign web sites is exogenous in models of other electoral engagements such as financial contributions and solicitations for votes.

Why is use of campaign web sites endogenous in some electoral engagements and exogenous in other engagements? Sending e-mails urging people to vote without reference to a particular candidate appears less partisan oriented than sending e-mails urging people to vote for a candidate. The former is more likely to involve private and/or public deliberation than the latter. A campaign web site may be used to organize campaign rallies and other events. As a "technology of cooperation," a campaign web site may be able to minimize the collective action problem by facilitating information exchange among attendants (Rheingold, 2002). This speculation is consistent with Uslaner's (2000, 2004) notion that the Internet may positively influence public deliberation and information exchange within personal networks. In contrast, other engagements such as financial contributions and voting are based on individual choices (as opposed to collective actions) without deliberation and information exchange involved.

It is surprising that use of campaign web sites has a large effect on sending e-mails urging people to vote with and without reference to a particular candidate. In particular, the discrete change and the average effect of campaign web site use are 17.4% and 14.8%, respectively, in solicitations for votes by means of e-mails. These online electoral engagements appear to be correlated to whether citizens use the Internet and e-mail. Hence, the impact may be overestimated by the self-selection or incidental truncation problem. It is not, however, surprising that campaign web sites are influential for financial contributions because they provide easy ways to donate money through credit cards, cellular phones, and other methods.¹¹ Bimber (2003) and this study consistently suggest that Internet and campaign web site use, as an exogenous variable, has a significant positive effect on financial contributions.

Target clients of campaign web sites tend to be those who are politically acknowledged and mobilized, in particular party members and supporters rather than the general public (Bimber & Davis, 2003). Political knowledge and mobilization are important indicators of civic engagement and use of campaign web sites. Political parties often use campaign web sites largely for disseminating information, raising funds, and mobilizing volunteers. Candidates are likely to provide only information (e.g., profiles and election pledges) that they want constituents to see, in the format that they prefer. Politicians have no strong incentives to get involved in online two-way communications with constituents and supporters (Stromer-Galley, 2000). Politicians often want to avoid furious debates on online forums and the overflow of e-mails and messages from constituents (Stromer-Galley, 2000). Politicians tend to “narrowcast” favored information for the target audience who resort to the sources of favored information (Bimber & Davis, 2003). Internet fund-raising through campaign web sites is an example that satisfies the need of both politicians and supporters. Targeting clients and narrowcasting of campaign web sites generally support the reinforcement theory that information technology reinforces rather than transforms the existing patterns of political participation.¹²

Campaign web sites cannot replace but supplement traditional electoral activities (Bimber & Davis, 2003). Therefore, there may be limitations to the use of campaign web sites that influence electoral civic engagement, although information technology continues to progress over time. The limitations do not come from information technology itself but rather from the ways that people (both politicians and constituents) use information technology.

Conclusion

This study explores the 2004 Post-Election Internet Tracking Survey data of the Pew Internet and American Life Project. Use of campaign web sites has a positive effect on electoral civic engagement, but the effect differs by the type of civic engagement. Campaign web site use is endogenous in the model of electoral engagements that involve deliberation and collective actions among citizens. Otherwise, use of campaign web sites is exogenous, and its impact is direct. However, campaign web sites tend to focus more on mobilizing party members and supporters who are already engaged rather than on engaging the general public. This finding is consistent with the reinforcement perspective of Internet pessimists and the normalization perspective of Internet skeptics.

PSM and RBPM were employed to handle the missing data problem and endogeneity of campaign web site use. These methods improve methodological rigor in this field of study but do not deal with the incidental truncation problem that may occur when modeling online civic engagements such as posting messages to online forums. In future research, it will also be necessary to consider interactions among use of campaign web sites, government portals, Internet broadcasting, and other information technology applications that are associated with exchange of political information.

Appendix Survey Questions

Variable	Questions and Description
E-mails without reference	Have you sent emails urging people to get out and vote without reference to a particular candidate? (q27c)
Attendance at a rally	During this year's election campaigns, have you attended a campaign rally? (q27a)
Solicitation (e-mails)	Have you sent emails urging people to vote for a particular candidate? (q27d)
Solicitation (call or visit)	Have you made telephone calls urging people to vote for a particular candidate? (q27e) Have you visited people at their homes to urge them to vote for a particular candidate? (q27f)
Contributions	Have you given money to a political candidate? (q27b)
Voting	Did you happen to vote? (vot02)
Use of campaign web sites	Do you go onto campaign websites to get news or information about the 2004 elections? (q34a, q34b, q34c)
Political knowledge	In the past year, have you read a book about current politics or national affairs? (q52a) In the past year, have you seen any documentary films related to the campaign or the candidates? (q52b)
Political mobilization	In the past two months, have you received mail urging you to vote for a particular presidential candidate? (q23a) Have you received email urging you to vote for a particular presidential candidate? (q23b) Have you received telephone calls urging you to vote for a particular presidential candidate? (q23c) Have you been visited at home by someone urging you to vote for a particular presidential candidate? (q23d)
Partisanship	Do you consider yourself a Republican, Democrat, or Independent? (polid) (1 for Republican and Democrat, 0 otherwise)
Family income	Last year, what was your total family income from all sources, before taxes? (inc)
Education	What is the last grade or class you completed in school? (educ) (1 for college graduates, 0 otherwise)
Gender	Gender (sex) (1 for male, 0 for female)
Race	What is your race? Are you White, Black, Asian, or some other? (race) (1 for White, 0 otherwise)
Age	What is your age? (age)
Internet experience	About how many years have you had access to the Internet? (q12)

(continued)

Appendix (continued)

Variable	Questions and Description
Online use intensity	How often do you go online from home? (q14) How often do you go online from work? (q16)
Broadband use	Does the computer you use at home connect to the Internet through a dial-up telephone line, or do you have some other type of connection? (1 for a DSL-enabled phone line, a cable TV modem, a wireless connection, or a T-1 or fiber optic connection, 0 for dial-up telephone line and others) (modem, q15). Internet users at work are assumed to have a broadband connection.

Note: Original variable name is in parenthesis.

Notes

1. Bimber's (2001) binary logit model of voting fits the data well. Given the uniqueness of voting, this simple causal structure appears doubtful.

2. This formulation is likely especially when Internet use itself is a part of civic engagement. For example, citizens may e-mail civil servants to make policy suggestions, post messages to online forums, and run political blogs.

3. Endogeneity technically refers to the correlation of regressors and the disturbances, which may be caused by omission of relevant regressors, measurement error, sample selectivity, self-selection, and other reasons (Baltagi, 2001).

4. Because individual questions included vary across surveys, it was not possible to get meaningful longitudinal data for this study by combining the November 2000, 2002, and 2004 data sets.

5. Reciprocity or iterative process is difficult to examine without well-organized longitudinal data and sophisticated methods such as a dynamic model.

6. Let y_1 denote civic engagement of an individual who has used the Internet for political information ($d = 1$) and y_0 be engagement without Internet use ($d = 0$).

7. The recursive bivariate probit model was estimated using the `.biprobit` command in Stata, but its marginal effects and discrete changes in conditional predicted probabilities were manually computed. Long and Freese's (2003) `SPost` module was used to compute marginal effects and discrete changes of binary probit models.

8. The one-to-one matching without replacement matched 282 pairs of campaign web site users and nonusers who have similar propensity scores.

9. A binary probit model would mistakenly report a positive effect of age on attendance at a rally.

10. Bimber and Davis (2003) stated, "But the reality is not only that campaign sites fail to change the minds of citizens, but they also fail even to assist many undecided citizens in making up their minds" (p. 144)

11. Online fund-raising becomes one of the successful information technology applications adopted for political campaigns. According to Rainie, Cornfield, and Horrigan (2005), Howard Dean collected more than \$20 million through the Internet, accounting for 40% of his total receipts. John Kerry earned \$82 million (33%) from Internet fund-raising, whereas George Bush received \$14 million (3%) during the 2004 election.

12. Bimber and Davis (2003) stated, "The more people like a candidate, the more likely they are to learn about him, and as they learn, their feelings toward the candidate are likely to strengthen" (p. 137).

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