
EMESE ÉVA ANGYAL AND ZITA FELLNER *
How are Online and Offline Political Activities Connected?
A Comparison of Studies

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* [angyal.emese.eva@gmail.com] (Doctoral School of Sociology, Corvinus University of Budapest); [zitafellner@gmail.com] (Doctoral School of Economics, Corvinus University of Budapest; Central Bank of Hungary)

Abstract

In general, political participation means all the action of citizens that has the aim or the effect of influencing government or politics. Studies argue that media consumption and political participation are correlated: offline and online political participation affect each other. Knowing the relationship between online and offline political activity can improve estimations of offline political events based on social media data.

By comparing these empirical results, in this study we investigate whether social media usage reinforces or weakens the willingness to become involved in a demonstration or other offline political activity. Numerous studies have already attempted to measure this effect, with contradictory findings related to the direction and volume of the latter.

We explore this connection by synthesizing recent empirical political science papers. For this purpose, we compare the results of the former using Bayesian updating – a tool for comparing studies regardless of their methodology or data collection method. This method of data analysis is also insensitive to the operationalization of either the dependent or the explanatory variables.

Based on the aforementioned studies, our results prove that online political activity has a significant positive effect on offline political activity, in spite of the fact that some research has found an insignificant connection.

Keywords: *political participation, Bayesian updating, online political activity, offline political activity, social networking sites.*

1. Introduction

The links between patterns of social media usage and civic engagement have been investigated since the early 2000s. Movements have used social media to organize political demonstrations or other initiatives, and political parties have represented themselves to connect with voters. In 2008, during the elections in the United States, social media became for the first time the main tool used in a political campaign, and since then the impact of the platform has been subject to scientific debate.

Does a ‘like’ count as a form of political activity? Is pressing the ‘share’ button on a social network site as valuable as participating in a demonstration? Can the number of followers predict the number of voters at upcoming elections?

Our aim in this article is to examine a sample of earlier studies related to this scientific debate, and to compare their results in order to answer the question they all raise: Does online political activity reinforce or substitute offline political action?

Our method is an investigation of recent studies about the relationship between online and offline political participation. Researchers are debating what effect online media has on citizens regarding their political activity. Causal relationships have been found, and there are also articles on the positive and negative effects of online media. Noting the currency of the topic, the studies have employed various methods: surveys, experiments, panel methods, etc. To overcome the methodological challenge of their analysis, we use Bayesian updating instead of meta-analyses to compare studies. Meta-analysis can help with summarizing the findings of different articles, but it can only be applied to research with the same research design. Bayesian updating, however, can be used to compare studies regardless of their methodology and sample: it permits the comparison of studies with different research designs and methods.

We collected studies that were designed to answer the same questions regarding specific social media sites, and which compared various forms of participation, both online and offline.

All studies used in the analysis were published in English between 2009 and 2019, as we sought to include the latest results from the relevant literature, but also to employ a relatively narrow time interval in which the results could still be compared. We collected those articles that reported the detailed results of a regression analysis (i.e. that at least estimated regression coefficients and their standard errors), as this is necessary for conducting Bayesian updating.

After comparing the research in terms of the different research designs, we found that online political participation does have a significant effect on offline political action. We note that the method might be biased due to studies with more robust statistical results. In the last section of the paper, we investigate possible criticism of the results we present and discuss further questions.

2. Literature review

2.1 Social media and civic engagement

Since the dawn of internet use, researchers have attempted to explain its effect on people's behavior and the offline world. Patterns of internet usage were associated with socio-economic status and social capital early on, and, based on increased access to information about civic and political topics, scientists predicted greater involvement in politics (Skoric and Zhu, 2015). Internet use widens the scope of interaction with public affairs and thus may improve citizens' knowledge about political issues (Skoric et al., 2016), and have a positive effect on civic engagement through the provision of political news (Boulianne, 2009). Social media has changed the patterns of internet usage and their impact on civic engagement, as it has facilitated political engagement by making the latter personalized and more independent of traditional organizational rules (Bennett and Segerberg, 2012). Engaging in politics on social media does not require individuals to identify themselves with a specific party or movement, thus gives space for individualized political content. In this way – according to Bennett and Segerberg's (2012) theory of connective action – not only has the platform for interaction changed, but the type of activity too: for example, instead of organized, strong-tie-based action, weak ties and personal experiences now predominate in movements.

Using Bennett and Segerberg's framework, Skoric et al. (2016) argue that social media sites represent a new opportunity for debating and discussing political topics, which may lead to changes in behavior. They argue that communicative actions may predict civic engagement, and that social media has become part of the repertoire of communicative action.

2.2 Political participation

Political participation can be any activity that is intended to or has the consequence of affecting, either directly or indirectly, government action. It can happen offline, in traditional forms – participating at demonstrations, contacting members of the government, signing a petition, etc. – or, as has become more common in the last few decades, via online platforms, e.g. on social network sites. Political campaigns and parties have used these platforms for years now, but the causal relationship between online and offline political participation is still subject to scientific debate: the question is whether online activities such as social media usage mobilize or facilitate the spread of information in societies, or rather replace offline action. Knowing the relationship between online and offline political activity can help improve appraisals of offline political events based on social media data, which is available in vast quantities. However, making direct predictions solely based on these types of data is often misleading.

Earlier research has used different methodological approaches to predict political events in relation to social media activities and thus resulted in a variety of findings. One technique commonly used to estimate the offline popularity of a

political party (for example), is examining its online popularity (in the form of number of ‘likes,’ ‘shares,’ or ‘followers’ on the related pages, etc.) by applying weights to balance the dissimilarity between the total population and the set of users. This approach has been successfully used in some cases – weighted social media data analyses led to valid estimations of the 2016 US elections results –, but it can usually only be applied under specific conditions. However, there is no general consensus regarding how to use data from such sites.

Political participation can be defined according to the widely used definition of Verba et al. (1995) as ‘activity that is intended to or has the consequence of affecting, either directly or indirectly, government action.’ This definition is used in studies about online participation as well – for example, in Teocharis and Lowe (2015).

A range of different studies have used various methods to estimate political outcomes from online participation, although these have mostly been empirical studies. Fewer theories have emerged to model the link between social media usage and electoral behavior. Koltai and Stefkovics (2018) introduced two of these: the analytical approach of Strandberg (2006), and a network-based approach based on Bene’s (2018) work.

2.3 Analytical approach

Strandberg’s analytical approach differentiates four possible outcomes from online activities. From the perspective of political actors, online campaigns can replicate offline activities (normalization), or can equalize offline social differences (equalization). Citizens can expect social media to increase publicity and produce more information (mobilization), and may reflect their offline activity (reinforcement). Strandberg analyzed the Finnish election of 2011 and showed that political actors’ social media use has normalization effects, while in the case of voters slight evidence of mobilization was found.

		Citizens	
		Reinforcement	Mobilization
Political actors	Normalization	A	B
	Equalization	C	D

Figure 1: Strandberg’s (2006) typology about the four political environments. Source: Strandberg, 2006.

2.4 Two-step flow theory

Bene (2018) found that the main effect of Facebook posts on political participation is connected to the sharing of content. His results showed that the average number of shares on candidates' Facebook pages was positively associated with electoral outcomes during the Hungarian elections in 2014, while other Facebook performance indicators (numbers of average likes and comments) were not significantly associated with electoral outcomes. 'These findings suggest that a social media campaign can result in extra votes through a two-step flow effect: The extra votes are likely to come from voters who get candidates' messages mediated by their friends and who otherwise would not see the given content' (Bene, 2018: 12).

3. Articles

The effect of online political participation on offline activity is still under debate. Studies that use different samples and methodology have investigated this connection. Here, we separately introduce 14 articles that use the concept of social media and offline political activity, the aim being to determine the connections between them. In these 14 articles, 17 models provide the basis for our analysis.

1. *Vissers and Stolle (2012)*

The analysis utilizes survey data about various forms of offline and online political engagement among undergraduate students.

Data were collected in Canada, 2011 through a survey among university students during a federal election campaign. An online questionnaire was sent to all university students, of whom 1088 completed it. Online political activities involved signing or collecting petitions online, contacting a politician or government official, donating money, and boycotting. The variable that measured offline participation was based on offline activities such as boycotts, signing paper-based petitions, demonstrations, and making personal contact with a politician.

2. *Skoric and Zhu (2015)*

The authors used assisted telephone interviews to investigate the behavior of a sample of eligible Singaporean voters in this post-election survey in 2014. The final response rate was 19 per cent.

The results suggest that social media can be used as an indicator of offline political participation: those who read news about politics via Facebook were more likely to participate in the forms of offline action that were specified than those who did not. Those who were involved in this type of media use were more likely to participate in resident dialogues and help political parties than those who did not. The independent variable in this analysis was 'expressive media use': this incorporated three different offline political activities: attending a rally, participating in resident dialogue, and volunteering for a political party.

3. *Teocharis and Lowe (2015)*

This study describes an experiment undertaken in Greece, 2011. For the experiment, data were collected from 200 people aged 18–35 years (50 per cent

female, 50 per cent male) who did not have a Facebook account. The participants were recruited using random digit dialing and were contacted from September 2011 to March 2012. The treatment group contained 120 participants, while the control group contained 80. Members of the control group were asked not to create a Facebook account during the time of the experiment.

The aim of this study was to examine the causal relationship between Facebook use and political participation, as the authors argue that previous studies – which have found a positive relationship – mainly rely on cross-sectional data. The results suggest that maintaining a Facebook page negatively affects political participation.

4. *Holt et al. (2013)*

This study investigated the impact of social media use for political purposes and attention to political news in traditional media on political interest and offline political participation. The study was based on panel data and designed to reveal causal relationships. Social media usage was measured by principal component analysis and included six activities: reading a blog about current affairs or politics, writing texts on a personal blog about current affairs or politics, commenting/discussing current affairs issues or politics on the internet, and following a politician or political party on either Twitter, Facebook or YouTube. The dependent variable was an index based on offline political activities such as visiting a campaign rally, attending a political meeting, contacting a politician, trying to convince others to vote for a specific party, etc.

The authors' hypothesis was that social media can mobilize younger citizens, while traditional media mobilizes older citizens. Results showed that using social media for political purposes does have a positive influence on political interest and offline political participation in a similar way to paying attention to political news in traditional news media.

5. *Dimitrova et al. (2014)*

This study was also inspired by research that has suggested a positive relationship between digital media use and political participation and knowledge. The research was designed to identify causal correlations using panel data. Two panel studies were conducted during the 2010 Swedish election campaign. Samples for both surveys were drawn using stratified probability sampling from a database of approximately 28,000 citizens from Synovate's pool of web survey participants. The dependent variable (offline political activity) was measured by an index of engagement in different political activities such as attending a demonstration, contacting a politician, and visiting a campaign rally. Social media use was measured by an index that used six survey items that focused on the political use of social media, such as reading or writing blogs with political news.

The authors' findings were that consuming online news had no effect on offline political participation during the campaign, while social media use had the strongest impact.

6. *Feezell et al. (2012)*

The authors used a multi-method survey of 425 undergraduate students to investigate the correlation between political activity and political knowledge and

being a member of a Facebook group. The independent variables included a self-reported answer about how many political groups the respondent was a member of, the intensity of Facebook usage, and an index based on several questions about how often respondents read and post messages. The dependent variable was a composite scale of ten forms of offline political participation. Results showed that participation in online political groups is strongly correlated with offline political participation.

7. *Valenzula et al. (2009)*

In this article, the authors investigate whether the use of social media is correlated with individual social capital. The data used for the research were based on a random web survey of higher education students, and the goal was to test the correlation between Facebook usage and political participation. Civic and political participation were measured using an index based on respondents' involvement in different activities. Respondents were asked whether they had worked in or volunteered for a community project; had worked or volunteered for nonpolitical groups such as a hobby club, environmental group, or minority student association; had raised money for charity or ran/walked/biked for charity; had worked or volunteered for political groups or candidates; voted in a local, state, or national election; tried to persuade others in an election; signed a petition; worn or displayed a badge or sticker related to a political or social cause; or deliberately bought specific products for political, ethical, or environmental reasons.

The analysis showed a positive correlation, but the association was so weak that the authors concluded that social media might not be sufficient to encourage people to participate in politics or in civic life.

8. *Kim et al. (2016)*

The research described in this article was designed to identify online activities that are connected to political participation. The authors used national survey data to examine the effect of social media on political involvement. Social media usage was defined as 'SNS (Social Networking Sites) Activities Regarding Political Issues' and was measured by the frequency of political posting, political posting by friends, and experiences with excluding others from one's own groups on social network sites because of political issues. Offline political activity was defined in this study as 'Offline Political Talk,' measured in terms of the frequency respondents talked about politics or current affairs with friends and family.

Results suggested that social networks used for political purposes predict the level of political participation.

9. *Strömbäck et al. (2017)*

Approaching social media usage as a part of the news repertoire of individuals, this article used two-wave panel data collected during a 2014 Swedish campaign to examine how media use influences political participation. The study analyzed the relationship between different forms of media use and political participation. While more media consumption was found to be positively correlated to civic engagement, the finding was that social media news consumers are more likely to participate in politics offline. Online and offline participation were both measured using the question: 'During the past month, have you done

the following...’ Items included visiting a website of a political party/youth organization; reading a blog about politics and society; writing texts about social and political issues on a personal blog; commenting on or discussing issues related to politics and society online; and following any politician or political party via Twitter, Facebook, Youtube, or Instagram. Nine items were asked about regarding offline political participation: signing a petition; contacting a politician; writing a letter or a debate article for a newspaper or on the internet; arguing for one’s views in a political discussion; contacting mass media; attending a demonstration or a political meeting; and trying to convince others to vote for a particular party.

10. Lane et al. (2017)

Based on two-wave panel survey data collected in the United States in 2012, this study examined the effect of social media political information sharing on offline political participation.

11. Krongard and Groshek (2017)

The authors investigated the effect of streaming on behavior. Alongside this, they tested engagement in politics and participation linked to typical forms of use of social media, finding that the relationship was positive and significant. The data for this cross-sectional analysis were collected through a representative national online panel. The independent variable social media usage was constructed based on the frequency of seven activities: posting personal experiences related to politics or campaigning; friending or following a political actor; receiving messages from parties or politicians; posting or sharing thoughts or media such as photos, videos or audio content about current events or politics; forwarding someone else’s political commentary; and arguing with someone on SNS who has different political views. Offline political participation was measured by the frequency of engaging in activities such as making a campaign contribution; signing up to volunteer for a campaign or issue; subscribing to political lists; attending public hearings, town hall meetings, and political rallies, etc.

12. Tai et al. (2019)

This study defined ‘e-participation’ as a form of information and communication technology usage whereby people engage in public affairs and democratic processes. It was used to construct an index that measures diverse online political activities. The analysis underlined the hypothesis that ‘the more types of political activities individuals engage in online, the greater their political participation offline.’ Data were collected from a random national sample via telephone interviews. Offline participation was measured with an index based on similar items to the other studies: respondents were asked whether they had engaged in different activities such as attending political rallies, speeches or organized protests, etc., in the past 12 months.

13. Towner and Munoz (2016)

Focusing especially on ‘boomers,’ this study tested the effect of online media on participation compared to traditional media consumption. The dependent variable offline participation was constructed using an index based on five items. Respondents were asked whether they had talked to anyone about politics; attended political meetings or rallies; worn a campaign button; worked for a party

or candidate; or given an offline donation. Online participation was defined by eight items: signing an email or web petition; forwarding a political email; talking to anyone about politics; contacting a government official online; following a candidate on a SNS; posting a comment or weblink; participating in online discussion; and giving an online donation. The results showed a positive correlation between Facebook usage and offline political participation.

14. Zuniga et al. (2016)

This study aimed to test the relationship between online social capital and offline political capital. Part of this analysis involved testing the effect of social media on offline participation: results showed that social media social capital has a different effect on offline participation as it may encourage participation in demonstrations, but has a negative relationship with voting.

Six questionnaire items measured online participation: frequency of signing or sharing a petition; participating in question-and-answer sessions with a politician or public official; creating an online petition and signing up online to volunteer to help with a political cause; using a mobile phone to donate money to a campaign or political cause via text message or app; and starting a political or cause-related group on a social media site. Offline participation was defined in this study using items that measured the frequency of involvement with political groups or campaigns; participating in social movement groups; donating money to a campaign or cause; attending a protest; and attending a political rally.

4. Research question and hypothesis

There are multiple competing hypotheses in the literature concerning whether online activities support offline political participation in general. Empirical research has tested this factor over time, but no consensus has been reached regarding the effect of online political participation on offline political participation. The research question behind all the theories is similar, as it is in this study:

RQ: What kind of correlation exists between online political activities and offline political participation?

This article uses the definition of online and offline political activities as introduced above in the general literature. To answer the research question, this study compares articles that examined the correlation between the phenomena defined in the same way. The hypothesis – based on the articles – is that a positive correlation exists between the latter factors:

H: Online political activities – such as social media usage – increase offline political participation.

To test this hypothesis, we analyzed articles that aimed to investigate the causal relationship between online and offline political participation; however, most of the studies used cross-sectional survey data that limited the possibility to examine causality.

5. *Data and method*

To permit the inclusion of articles with different research designs, our analysis applied Bayesian updating in the comparison. The analysis includes 17 models from 14 articles published between 2009 and 2019. The choice of time interval is justified by the fact that we wanted to include the latest results, but also to investigate a period during which the results could still be compared. For this reason, we chose the post-2008 period. We were able to include in our analysis only those articles that displayed the detailed results of their regression analyses; i.e., the estimated regression coefficients and related standard errors, because these are necessary inputs in Bayesian updating. All the articles investigated the relationship between social media usage and offline political activities.¹ During this ten-year period, major changes in the use of social media occurred, but all the studies defined political activity – online and offline – similarly, so comparing them was considered reasonable, despite the variety of methods that were applied.

As mentioned above, much research has been devoted to investigating the relationship between internet use and political participation. In general, results have been positive; meta-analytical research examining the effect of the internet on political participation has found weak or modestly positive relationships between its use and offline political participation (Boulianne, 2009; Skoric et al., 2016). While meta-analyses can compare studies with similar research designs, the results are based on self-reported data. However, different studies have used different methodologies and samples to test this relationship.

6. *Analysis of the articles*

The articles presented above found that there are still parts of the relationship between online and offline political participation that are under debate. An analysis from 2004 by Pew Internet and American Life showed that reading online news and online political discussions is positively related to the probability of voting (Dimitrova et al., 2014). Other studies found that the strongest predictor of offline political participation is expressive online participation among a purposive sample of blog readers. Studies have also found that some online activities are associated with offline political participation. Some previous studies, however, have failed to demonstrate the tangible impact of digital media on participation. For instance, Groshek and Dimitrova (2011) found no significant impact of social media use on voting intentions in the 2008 US presidential election. Zhang et al. (2010) found that reliance on social networking sites had no effect on political participation, although it was significantly related to civic participation.

¹ In our research we could not make a distinction between effects on institutional and non-institutional political participation (Kaase and Marsh, 1979). The main reason behind this is that the empirical research conducted in the field is inconsistent in its treatment of this distinction, probably due to research design obstacles. Thus the underlying assumption in our empirical analysis is that online political activity has the same effect on both types of offline political participation.

The Bayesian updating method can be used to compare studies with different research designs using their regression parameter estimates and related standard errors. Table 1 includes a summary of the articles discussed above.

Table 1: Summary of studies. Source: Authors' compilation.

t	Model t	Parameter estimation	Standard error
01	Visser-Stolle (2012)	0.17	0.049
02	Skoric- Zhu (2015)	0.05	0.21
03	Skoric- Zhu (2015)	0.06	0.28
04	Skoric- Zhu (2015)	-0.04	0.12
05	Teocharis-Lowe (2015)	-0.192	0.198
06	Teocharis-Lowe (2015)	-0.208	0.17
07	Holt et al (2013)	0.20	0.03
08	Dimitrova et al (2014)	0.20	0.02
09	Feezell et al (2016)	2.742	1.334
10	Valenzula et al (2009)	0.01	0.03
11	Kim et al (2016)	0.56	0.14
12	Strömbäck et al (2017)	0.6	0.1
13	Lane et al (2017)	0.03	0.04
14	Krongard - Groshek (2017)	0.331	0.034
15	Tai et al (2019)	0.212	0.027
16	Towner - Munoz (2016)	0.029	0.071
17	Zuniga et al (2016)	-0.03	0.024

As noted earlier, the regression parameter that captures the effect of online participation on offline participation is positive in the majority of the models. However, in some cases these estimated values do not differ. In the next section, we briefly introduce the methodology we used, followed by our findings about the overall effect of online political participation.

7. Method and analysis

In this section, we describe how the Bayesian updating method was applied to the 17 models used in the 14 studies listed above. Each study investigated whether online participation has a significant effect on offline political participation.

To do this, we introduce Bayesian updating according to Kuiper et al. (2012). The purpose of this method is to quantify evidence about multiple studies in

relation to the same theoretical concept. In this case, the analysis aims to summarize research about the effect of online political activity on offline participation.

Since the studies use different research designs, meta-analyses cannot be used. Bayesian updating combines evidence for the positive, negative, and null effect of the predictor of interest – in this case, online participation – on the dependent variable, which is offline participation in this case. The method can be employed to evaluate the hypotheses:

H_0 : null effect

$H_>$: positive effect

$H_<$: negative effect

The method uses Bayes Factors (BF) to test the evidence for each hypothesis. The result is a likelihood ratio (LR) test that shows how likely the hypotheses are to be valid in relation to each other.

In investigating the hypotheses, the parameter estimates of the T studies ($\hat{\beta}_1^t$) and the standard errors ($\hat{\sigma}_{\beta_1^t}, t = 1, \dots, T$) are necessary. This method does not combine the estimates but summarizes the evidence for the hypotheses.

Steps involved in Bayesian updating:

1. Assume that the three hypotheses ($H_0, H_>, H_<$) are equally likely, so prior probabilities (denoted with $\pi_0^0, \pi_>^0, \pi_<^0$ respectively) are 1/3.
2. Calculate the likelihood by using the first study's parameter estimate and standard error.
3. Based on the likelihood, the Bayes Factors can be determined ($BF_{>w}^1, BF_{<w}^1$), which shows how much more support a hypothesis has versus an unconstrained hypothesis concerning the parameter of interest.²
4. Based on prior probabilities and Bayes Factors, posterior model probabilities can be determined (denoted with $\pi_{1,0}^1, \pi_{1,>}^1, \pi_{1,<}^1$ respectively), which show the probability of each hypothesis based on the first regression.
5. These posterior model probabilities are treated as prior probabilities of the hypotheses when we move on to the second study. Based on these, posterior model probabilities can be calculated for the second regression.
6. This process is repeated for each study shown in Figure 2. At the last step, one generates the posterior model probabilities, wherein all the information from the T studies is incorporated (these are $\pi_{T,0}^T, \pi_{T,>}^T, \pi_{T,<}^T$ respectively).

² The hypothesis without constraints on the parameter of interest functions only as a technical device.

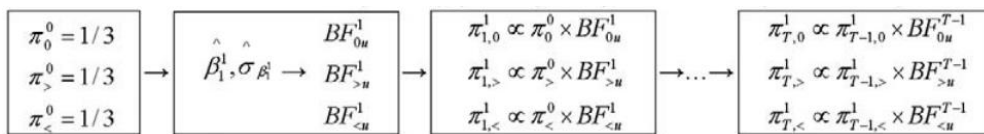


Figure 2: Process of Bayesian Updating. Source: Kuiper et al (2012).

Formally, the method can be read about in Kuiper et al. (2012). The main principles are as follows.

In the case of regression modelling, the dependent variable is a function of the explanatory variables. From all the independent variables used in the models under review, our main concern is with those that denote the marginal effect of the theoretical concept that is to be tested. In our example, the underlined variable is the one that captures the effect of online political participation.

As we mentioned above, it is not necessary to use homogeneous models in terms of design (cross-sectional- and panel-survey-based experiments can be analyzed together), data collection, or regression specification. All that is needed is the estimated effect and its uncertainty – namely, the regression coefficient and its standard error, on which the partial significance tests (t-tests) are based in inferential statistics.

With these two inputs, we can estimate the likelihood functions for the parameter of interest; that is, following a normal distribution with the mean of the parameter estimation and the variance of the square of the standard error of the parameter estimation. For the hypothesis testing of H0, H>, H< we use conjugate priors, thus we ensure that the distribution of parameters is normal.

We determine the prior distributions of the parameters in the case of each of the three hypotheses, which are proportional to the normal distribution mentioned above if the parameter does not contradict the concrete hypothesis.

A priori, we assume that all three hypotheses are equally likely, thus the parameter equals zero. Consequently, the prior confirms H> in 50 per cent of cases, and H< in 50 per cent of cases. The variance of the prior should be determined as it should become a noninformative prior. For this purpose, we produce the 99 per cent confidence intervals for all the studies under review, and based on these we create the 99 per cent credibility interval for the regression parameter.

The posterior probability is proportional to the product of the prior and the likelihood. To define the posterior distribution for each hypothesis, we create the unrestricted posterior distribution function of the parameter.

After that, Bayes Factors are computed. Bayes Factors show the level of support of a hypothesis compared to other hypotheses in the form of the ratio of the marginal likelihood of each hypothesis. In line with the Bayes Factors, posterior model probabilities can be defined that indicate the relative support of a specific hypothesis in relation to a finite set of hypotheses (of which there are three in number).

The main principle of Bayesian updating is that, in the first step, we can use uninformative priors for computing posterior model probabilities. However, after this step, for all other model t we can use the posterior model probabilities of

model t-1 as prior probabilities. It can also be shown that the order of the models does not have any effect on the results that denote the posterior model probabilities for the last model (model T); i.e. the probability of each hypothesis regarding all the information from the models under review.

In this study we test whether online political participation

H₀: does not have an impact on offline political participation;

H₊: affects positively offline political participation;

H₋: affects negatively offline political participation.

For the analysis, we used Kuiper's R code (2012). To test these hypotheses, the 99 per cent confidence intervals of the estimated regression parameters first needed to be determined (Figure 3).

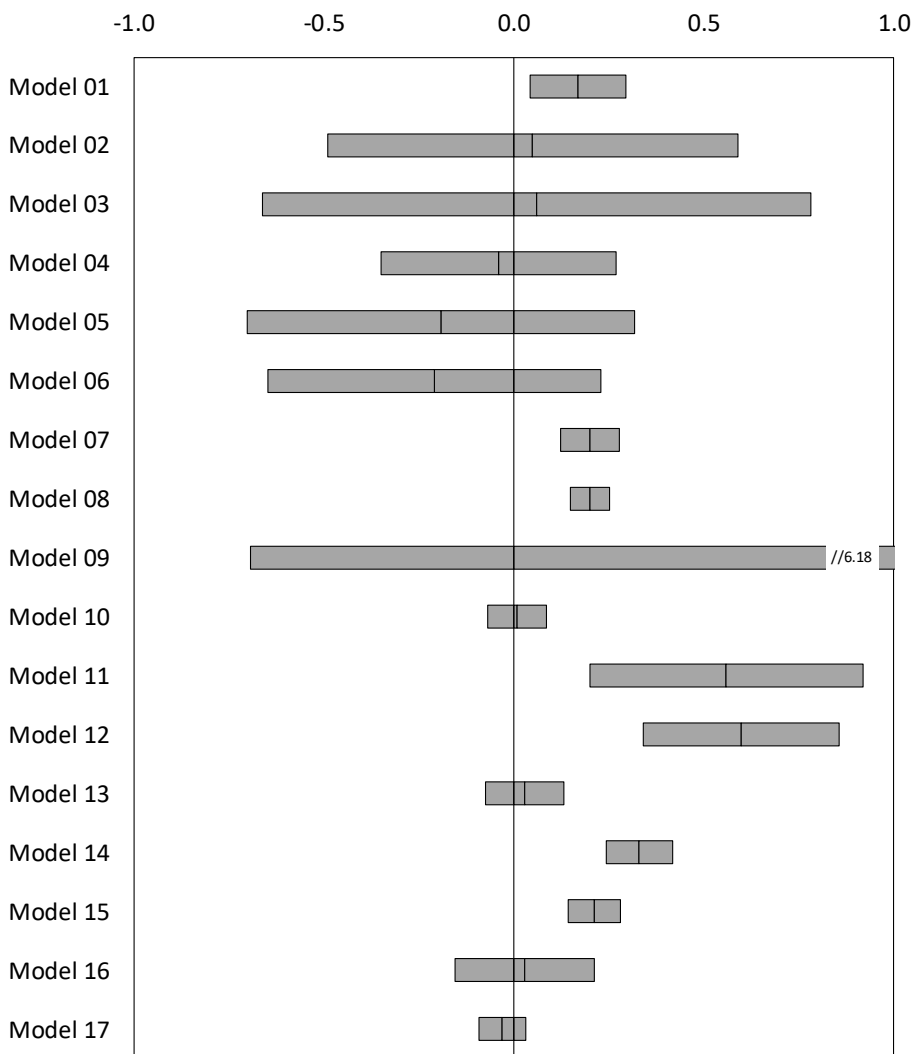


Figure 3: Ninety-nine per cent confidence intervals for β_1 . Source: Authors' calculations.

After updating the uninformative prior probabilities with the 17 model estimations mentioned earlier, the Bayesian updating method provides clear evidence for the positive impact of online political participation on forms of offline participation (Table 2). The posterior model probability of $H_>$ hypothesis is 1, while that of $H_<$ hypothesis is 0, and for H_0 hypothesis it is also practically 0. Thus, the overall effect seems to be positive with respect to the studies and regressions we analyzed. As the study involved performing a sensitivity analysis related to the value of σ_0^{T2} , one can see that the results do not vary significantly: $H_>$ hypothesis is preferred in both cases. The results are stable, otherwise we would be inclined to collect other studies for inclusion in further analyses.

Table 2: Posterior model probabilities for study T (T=17)
Source: Authors' calculations.

	$\frac{1}{2}\sigma_0^{T2}$	σ_0^{T2}	$2\sigma_0^{T2}$
H_0	1.96E-69	6.46E-72	2.97E-72
$H_>$	1.00E+00	1.00E+00	1.00E+00
$H_<$	0.00E+00	0.00E+00	0.00E+00

8. Conclusion

Regarding the correlation of online and offline political participation, most of the related literature shows a positive relationship, with only a few statistically insignificant positive or negative results having been reported. This in itself suggests a positive correlation, but the emphasis on the theoretical importance of the question in the ongoing debates cannot be ignored. For the research for this paper, we identified recent articles that tried to quantify the effect of online political activity on offline political participation. The results of the collected analyses were synthesized using the Bayesian updating method due to its insensitivity to research design, the method of sampling or data collection, and the regression specification of the models under review. Our results suggest that the outcomes of the related articles prove the positive effect hypothesis; that is, online political activity is positively correlated to offline political activity. This conclusion is in line with the theoretical concepts presented in Section 2.

It should also be mentioned that social media data analyses are associated with various methodological challenges. Different social media sites have different structures and different audiences: the demographic distribution of site members does not necessarily represent the distribution of the wider population – youngsters are overrepresented; thus, most information concerns them. Also, the usage of these sites is different according to countries and cultures.

Collecting studies in this field can be also challenging. Most of the studies we identified are based on self-reported data and are from different countries (U.S., Sweden, Singapore, etc.). We were not able to include articles in the research that did not publish the estimated regression parameters and their numerical standard errors, which poses obvious limits to the set of studies available for analysis. As more research is forthcoming in this field, later results may be analytically synthesized – perhaps with respect to different geographical, cultural, or time horizons – to better appraise the relationship between online and offline political participation using a wider dataset.

References

- Bene, M. (2018) Post shared, vote shared: Investigating the link between Facebook performance and electoral success during the Hungarian general election campaign of 2014. *Journalism & Mass Communication Quarterly*, 95(2): 363–380. <https://doi.org/10.1177/1077699018763309>
- Bennett, W. L. and Segerberg, A. (2012) The logic of connective action. *Information, Communication & Society* 15 1–30. <https://doi.org/10.1080/1369118x.2012.670661>
- Boulianne, S. (2009) Does Internet use affect engagement? A meta-analysis of research. *Political Communication*, 26(2): 193–211. <https://doi.org/10.1080/10584600902854363>
- Dimitrova, D. V., Shehata, A., Strömbäck, J. and Nord, L. W. (2014) The effects of digital media on political knowledge and participation in election campaigns: Evidence from panel data. *Communication Research*, 41(1): 94–118. <https://doi.org/10.1177/0093650211426004>
- Feezell, J. T., Conroy, M. and Guerrero, M. (2016) Internet use and political participation: Engaging citizenship norms through online activities. *Journal of Information Technology & Politics*, 13(2): 95–107. <https://doi.org/10.1080/19331681.2016.1166994>
- Groshek, J. and Dimitrova, D. (2013) A cross-section of voter learning, campaign interest and intention to vote in the 2008 American election: Did Web 2.0 matter? *Atlantic Journal of Communication*, 21(2): 108–124. <https://doi.org/10.1080/15456870.2013.773484>
- Holt, K., Shehata, A., Strömbäck, J. and Ljungberg, E. (2013) Age and the effects of news media attention and social media use on political interest and participation: Do social media function as leveller? *European Journal of Communication*, 28(1): 19–34. <https://doi.org/10.1177/0267323112465369>
- Kaase, M. and Marsh, A. (1979) Political action: A theoretical perspective. In Barnes, S. and Kaase, M. (eds.) *Political Action: Mass Participation in Five Western Democracies*. London: Sage. 27–56.

-
- Kim, T., Atkin, D. J. and Lin, C. A. (2016) The influence of social networking sites on political behavior: Modeling political involvement via online and offline activity. *Journal of Broadcasting & Electronic Media*, 60(1): 23–39.
<https://doi.org/10.1080/08838151.2015.1127242>
- Kim, Y., Russo, S. and Amnå, E. (2016) The longitudinal relation between online and offline political participation among youth at two different developmental stages. *New Media & Society*, 19(6): 899–917.
<https://doi.org/10.1177/1461444815624181>
- Koltai, J. and Stefkovics, Á. (2018) A big data lehetséges szerepe a pártpreferencia-becslésekben magyarországi pártok és politikusok Facebook-oldalainak adatai alapján (The possible role of Big Data in predicting party preferences based on the Facebook pages of Hungarian political parties and politicians). *Politikatudományi Szemle*, 27(2): 87–120.
<https://doi.org/10.30718/poltud.hu.2018.2.87.120>
- Krongard, S. and Groshek, J. (2017) Streaming entertainment and talking politics: Social television in the shaping of online and offline political talk during the 2016 campaign. In Schill, D. and Hendricks, J. A. (eds.) *The Presidency and Social Media: Discourse, Disruption, and Digital Democracy in the 2016 Presidential Election*. New York: Routledge. 123–140.
<https://doi.org/10.4324/9781315112824-7>
- Kuiper, R. M., Buskens, V., Raub, W. and Hoijsink, H. (2012) Combining statistical evidence from several studies: A method using bayesian updating and an example from research on trust problems in social and economic exchange. *Sociological Methods & Research*, 42(1): 60–81.
<https://doi.org/10.1177/0049124112464867>
- Lane, D. S., Kim, D. H., Lee, S. S., Weeks, B. E. and Kwak, N. (2017) From online disagreement to offline action: How diverse motivations for using social media can increase political information sharing and catalyze offline political participation. *Social Media + Society*, 3(3): 1–14.
<https://doi.org/10.1177/2056305117716274>
- Skoric, M. and Zhu, Q. (2015) Social media and offline political participation: Uncovering the paths from digital to physical. *International Journal of Public Opinion Research*, 28(3): 415–427.
<https://doi.org/10.1093/ijpor/edv027>
- Skoric, M., Zhu, Q., Goh, D. and Pang, N. (2016) Social media and citizen engagement: A meta-analytic review. *New Media & Society*, 18(9): 1817–1839.
<https://doi.org/10.1177/1461444815616221>
- Strandberg, K. (2006) *Parties, Candidates and Citizens On-line: Studies of Politics on the Internet*. Pargas: Åbo Akademi University Press.

-
- Strömbäck, J., Falasca, K. and Kruikeimer, S. (2017) The mix of media use matters: Investigating the effects of individual news repertoires on offline and online political participation. *Political Communication*, 35(3): 413–432.
<https://doi.org/10.1080/10584609.2017.1385549>
- Tai, K.-T., Porumbescu, G. and Shon, J. (2019) Can e-participation stimulate offline citizen participation: An empirical test with practical implications. *Public Management Review*, 22(2): 278–296.
<https://doi.org/10.1080/14719037.2019.1584233>
- Teocharis, Y. and Lowe, W. (2015) Does Facebook increase political participation? Evidence from a field experiment. *Information, Communication & Society*, 19(10): 1465–1486. <https://doi.org/10.1080/1369118x.2015.1119871>
- Towner, T. and Munoz, C. L. (2016) Boomers versus Millennials: Online media influence on media performance and candidate evaluations. *Social Sciences*, 5(4): 56. <https://doi.org/10.3390/socsci5040056>
- Valenzuela, S., Park, N. and Kee, K. F. (2009) Is there social capital in a social network site? Facebook use and college students' life satisfaction, trust, and participation. *Journal of Computer-Mediated Communication*, 14(4): 875–901.
<https://doi.org/10.1111/j.1083-6101.2009.01474>
- Verba, S., Lehman Schlozman, K. and Brady, H. E. (1995) *Voice and Equality: Civic Voluntarism in American Politics*. Cambridge, MA and London: Harvard University Press.
- Vissers, S. and Stolle, D. (2014) Spill-over effects between Facebook and on/offline political participation? Evidence from a two-wave panel study. *Journal of Information Technology & Politics*, 11(3): 259–275.
<https://doi.org/10.1080/19331681.2014.888383>
- Zhang, W., Johnson, T., Seltzer, T. and Bichard, S. (2010) The revolution will be networked: The influence of social networking sites on political attitudes and behavior. *Social Science Computer Review*, 28(1): 75–92.
<https://doi.org/10.1177/0894439309335162>
- Zuniga, H. G., Barnidge, M. and Scherman, A. (2016) Social media social capital, offline social capital, and citizenship: Exploring asymmetrical social capital effects. *Political Communication*, 34(1): 44–68.
<https://doi.org/10.1080/10584609.2016.1227000>