

Does Campaigning on Social Media Make a Difference? Evidence from candidate use of Twitter during the 2015 and 2017 UK Elections¹

Jonathan Bright, Scott A. Hale, Bharath Ganesh, Andrew Bulovsky, Helen Margetts, Phil Howard

Correspondence: jonathan.bright@oii.ox.ac.uk

Abstract

Politicians all over the world are investing considerable time and effort in both creating and curating social media profiles, with many sending hundreds or even thousands of messages over social platforms during election time, often with the help of trained and professional staff. However, there have been only a handful of papers that have sought to test whether active campaigning on social media actually makes a positive difference to vote share outcomes. All of these studies are based on cross-sectional datasets from one election period that make separating true relationships from unobserved variables problematic. Hence empirical evidence on the actual impact of social media campaigning is thin.

We analyse data from the first panel study of candidate social media use during elections, based on Twitter use in the 2015 and 2017 elections in the United Kingdom. We find support for the idea that Twitter based campaigning is associated with voting outcomes, a finding which is robust to a variety of different model specifications and a strong empirical test using a two wave panel design.

Furthermore, we show that while the impact of Twitter use is small in absolute terms, it is nevertheless comparable with that of increased campaign spending, and could conceivably make a difference in a close electoral race. We use our results to advance theory around the impact of social media use on voter behaviour.

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1 Introduction

In less than a decade, use of social media has gone from being a niche pursuit to a central feature of a professional political campaign (Stromer-Galley, 2014). Politicians all over the world now invest considerable effort in creating social media profiles and distributing content across them. Indeed, content distribution is itself often in the hands of paid, professional staff. Despite this enthusiasm, systematic empirical evidence of the actual impact of social media campaigning is thin. Only a handful of studies have sought to empirically test the relationship between use of social media and campaign outcomes. All of these have been based on a single set of observations of politician behaviour around one election period in one country. Such cross sectional approaches naturally struggle to control for other aspects of campaign behaviour (such as the professionalization of the candidate's campaign) which may correlate with both social media use and voting outcomes. Hence strong causal claims are difficult.

This study seeks to improve on this initial research. It takes advantage of the fact that the United Kingdom (UK) has recently held two electoral competitions in relatively quick succession (in 2015 and 2017) to create a novel panel dataset of Twitter use of 6,000 politicians during two separate electoral periods. We observe the extent to which the level of social media activity in both periods correlates with vote outcomes (in both linear and pooled time-series regressions), and test whether this effect is robust to controls for potential confounding variables and the inclusion of theoretically relevant interaction effects. We also estimate a hybrid fixed effects model on a limited subset of more than 800 politicians who competed in both elections, a design which allows us to eliminate a wide range of unobserved variables such as the candidate's campaigning skill or whether they are located in a safe seat. The results suggest that use of Twitter does make a positive difference to voting outcomes. The size of effect is small in absolute terms but nevertheless comparable with campaign spending and could conceivably make a difference in a close race.

The rest of the article is structured in the following way. In Section 2 we address theory about political use of social media in general, outlining why campaigning on social media might make a difference, and reviewing existing empirical work on the subject. We also specify interaction effects that ought to moderate the extent to which social media campaigning is useful. In Section 3 we describe our methods, data collection and variable operationalisation. Finally, Section 4 presents our analysis and findings from the study.

2 Theorising Campaigning on Social Media

Use of social media is becoming increasingly widespread in contemporary politics (see Lilleker, Tenscher, & Štětka, 2015), and as such has attracted a large volume of literature (a comprehensive summary is offered by Jungherr, 2016), which itself has built on literature on the adoption and use of digital technologies in general (Gibson, Römmele & Williamson, 2014; Vaccari, 2017; Howard, 2005). As political actors progressively adopted these technologies, an early focus of this literature was on explaining reasons for variation in this adoption. Some authors suggested that minor parties would be more likely to make use of social media, because the low cost of communication on the platform enabled them to level the playing field when compared with more established actors who would dominate traditional media channels, leading to the so called 'equalisation' thesis (Enli & Skogerbø, 2013, 759; Koc-Michalska, Lilleker, Smith, & Weissmann, 2016; Larsson & Moe 2014). Others suggested that challenger parties (whether large or small) were more likely to use the technology than incumbents, as periods out of power provided greater stimulation for innovation (Jackson 2003; Ward & Lusoli 2005; Chen 2010; Jackson & Lilleker 2009; Vaccari & Nielsen, 2013, p. 210).

However, regardless of the reasons explaining variation, recent empirical research demonstrates that social media campaigning has become widespread, with both well-established and minor parties making heavy use of these tools to promote their messages and candidates (for examples see Grusell & Nord, 2016; Quinlan, Gummer, Roßmann, & Wolf, 2017; Samuel-Azran,

Yarchi, & Wolsfeld, 2015; Lilleker et al., 2011; Ramos-Serrano, Gomez & Pineda 2016). Indeed, this use of social media is now likely to be incorporated as one political communication tool among many others in professionally-run campaigns (Stromer-Galley, 2014, Štětka, Lilleker, Tenscher, & Jalali, 2014; Quinlan et al., 2017), which often include a variety of other interactive web technologies (see Koc-Michalska et al., 2016, p. 344-5; Kruikmeier, 2014, p. 135; Van Noort, Vliegenhart, & Kruikemeier 2016, p. 360). The widespread uptake of social media amongst all types of politicians has driven what has been described as the “normalisation” thesis, that social media (and indeed digital technologies in general) do little to change electoral dynamics. Indeed, older and better established parties may be better positioned to take advantage of them.

As use of social media platforms has become more widespread, the research agenda has started to shift towards the key focus of this article, which is whether use of these platforms makes a difference to the outcome of political campaigns. Some work has looked at major individual campaigns (Gilmore & Howard 2012), such as Barack Obama’s campaigns for the 2008 and 2012 elections in the United States (Carpenter 2010; Bimber 2014), as a demonstration of the value of social media for digital outreach strategies alongside an effective online campaign (e.g. Macnamara, 2010; Rainie & Smith 2008; Gibson and McAllister 2006, p. 254). The use of Twitter by Donald Trump’s campaign is prompting similar research (see Ahmadian, Azarshahi, & Palhus et al., 2017; Enli, 2017; Karpf, 2017).

Several researchers have also adopted the approach used in this paper, and examined the impact of social media use on large numbers of political candidates competing in the same electoral competition. Kruikemeier (2014) looked at Twitter use in the Dutch national elections of 2010, finding a statistically significant link between use of the platform and vote outcomes. Bode and Epstein (2015) look at aggregate measures of online influence (“Klout” scores) in the context of the US 2012 elections, also finding a statistically significant correlation between vote outcomes and their measures. Finally, Vaccari and Nielsen (2013) produced a study seeking to explain the online

popularity of candidates on a variety of platforms, showing a correlation with predicted vote share, albeit only in the case of Facebook.

While these quantitative studies are valuable, they also suffer from important limitations. Observational studies of the impact of social media (or indeed any campaigning technique) on vote share outcomes are difficult because political campaigns will adopt multiple strategies in order to generate votes. As argued above, social media use is now seen as only one element of a professional political campaign. Any measure of social media use may hence also act as a proxy measure for the overall professionalization of the campaign, the campaign skill of the candidate or some other lurking variable. Linear regression models of the relationship between social media use and vote outcomes will therefore be vulnerable to potential unobserved variable bias: social media use may be heavier amongst campaigns which are also more successful in other respects. Theoretically relevant control variables such as level of campaign spending can ameliorate the situation but not remove the problem entirely. For example, ephemeral characteristics such as the skill of the candidate or the dedication of campaign staff will be very hard to capture in this fashion. This study hence seeks to build on and extend this previous work, by offering a stronger test of the impact of social media use on vote share outcomes based on a two wave panel dataset. The research question posed is simple: *Does use of social media have an impact on the number of votes gained by political candidates?*

Before describing in more detail our methods for answering the question, it is worth reflecting on the mechanisms by which social media might have a positive effect on the outcomes of political campaigns. As a variety of authors have noted, social media have altered the 'media ecology' and the way in which the public interacts with political campaigns (Bimber, 2014; Gurevtich, Coleman, & Blumler, 2009), and these changes have opened up a variety of mechanisms through which a political candidate might influence voting outcomes. Firstly, and most obviously, use of social media might open a channel of communication between political candidates and citizens:

individuals using social media might see messages posted by candidates, either through direct connection with the candidate or through messages that are shared by the social circle with whom they are connected. When voters see such messages, they are informed about both the existence of an upcoming election and also that the candidate sending the message is someone whom they could vote for (and social media use has been shown to positively correlate with knowledge of political campaigns – see Gottfried, Hardy, Holber, Winneg, & Jamieson, 2017). Voters may also receive a signal about a characteristic of the candidate that might help sway their vote, for example, a stance on a policy issue; or they may receive a direct appeal to participate, something which Vaccari (2017) has shown to be impactful.

The connection from candidate to voters may also take a number of more indirect routes. As Murthy notes (2015), social media campaigning can be used to generate traditional press coverage, as the press themselves are covering social media, through a process often described as inter-media agenda setting (see also Conway, Kenski, & Wang, 2015; Anstead and O’Loughlin 2015). This press coverage may then stimulate further interest on the part of voters (Yasseri & Bright, 2016), whilst news articles may be shared via social media by either the candidate themselves or their supporters (Bright, 2016). Social media messages could also be used to influence “opinion leaders”: small groups of highly politically aware people who then in turn go on to influence others within their own social circle (Dubois & Gaffney, 2014). In all of these respects, social media might have similar effects to communication through other media (such as advertising). Indeed, the “equalisation” thesis referred to above was founded on the idea that the effects of communicating through social media were similar to other media, just much cheaper and easier to obtain.

There are also certain characteristics of social media that cannot be found in other means of candidate to voter communication. One example of this concerns the ability of social media to send signals about candidate viability, which is known to have an impact on voter behaviour, by giving “social information” about the number of friends or followers a given candidate has (Margetts, John,

Hale, & Yasseri, 2015), and indeed perhaps indicating whether your own friends and social connections have an interest in the politician. Research on Facebook has shown this to be politically powerful (Bond et al., 2012). Another example of this is social media's ability to provide an apparent "personal" connection between a candidate and a voter, by allowing a kind of direct engagement that is not mediated through the mainstream news media. There is evidence that campaigning through social media leads to voters feeling more direct connections with politicians (Lee & Shin, 2012), something which is likely to boost their willingness to vote for him/her. In these respects, campaigning through social media might actually be *more* effective than other forms of campaigning, rather than simply offering an equivalent effect.

Despite the above, there is also a considerable literature that questions the ability of social media campaigning to have an effect on vote outcomes. Social media platforms are used by only a portion of the population (Blank, 2016). Heavier social media users in particular are more likely to be drawn from younger demographics who are of course the least likely to vote (Dempsey, 2017). Recent studies that have shown that social media applications have a positive impact on voter turnout particularly for young people seem to support this idea (Vaccari, 2017; Garzia, Trechsel, & De Angelis 2017; Aldrich et al., 2015). This factor would limit the impact of campaigning on social media, though of course not eliminate it entirely. A second and arguably more important critique is the echo chamber thesis (Conover et al., 2012; Bright, 2016): on social media, it appears easier to connect with those who already agree with you rather than those who do not. Hence there is a risk that campaign effort on social media is wasted by 'preaching to the choir'. These diverging expectations about the actual impact of social media campaigning lead us to propose our first hypothesis:

H1: Increasing use of social media will have a positive impact on votes gained by political candidates.

The theory outlined above suggests that, in essence, *any* use of social media might have some impact on campaign outcomes. However, it also seems reasonable to suggest that this impact

will be moderated by certain other factors, the impact of which we also seek to test. In addition to being theoretically interesting, observing whether these factors do genuinely have a moderating impact is also a way of strengthening our test of whether social media itself makes a difference. One obvious potential moderator is the fact that, although anyone can create an account on social media, such creation does not automatically lead to a large audience for messages which are posted. Rather, there is a need to progressively build up this audience of “followers”. It seems intuitive that, as the size of a politician’s audience grows on social media, the potential impact of their messages ought to increase as well. Furthermore, when local electoral competitions are considered, the extent to which this audience is locally based also seems important. A politician who has a large follower base inside their own constituency is likely to be better placed to exploit social media than one who has many followers who are not actually eligible to vote for them. Hence, we develop our second hypothesis:

H2: The size of a candidate’s audience on social media will have a positive interaction effect on the impact of Twitter on vote share.

Further potential moderators relate to structural factors that could have an impact on the ability of candidates to use social media for beneficial purposes. Many elections are fought in geographically constrained areas (constituencies) that might have demographic profiles that vary considerably from the country at large. Some of these areas might have relatively higher or lower levels of Internet use, which should also correlate with higher or lower proportions of social media users in the area. Some areas are also likely to have demographic profiles that are more likely to generate social media users, for example higher levels of wealth and education are linked to social media use (Blank, 2016). Areas with higher proportions of social media users are, clearly, more likely to be fertile ground for social media campaigning. Hence, we develop our final hypothesis:

H3: Using Twitter to campaign in areas with higher proportions of social media users will have a positive interaction effect on the impact of Twitter on vote share.

3 Methods

In this section, we will outline the major methodological design choices in the study, before going on to present the detail of how each variable is operationalised. The main method employed in this paper, consistent with a variety of other studies of the campaign effects of digital technologies (Kruikemeier, 2014; Koc-Michalska et al., 2016; Van Noort et al., 2016), is to observe the extent to which effort put into social media by candidates in a political campaign correlates with vote outcomes. We opt for an observational study (rather than an experimental one) in order to have high external, real-world validity. However, a weakness of existing observational studies of the electoral effects of social media is that they lack the capacity to easily disentangle the effect of using social media from other potentially confounding variables. We address this issue in three ways in our study. First, we seek as far as possible to control for confounding variables explicitly in our model. Second, we test interaction effects that address the specific mechanism through which social media is theorized to influence voters: these interaction effects should be less vulnerable to confounding variables. Finally, we take advantage of the fact that the UK has recently held two electoral competitions in quick succession to construct a two-wave panel dataset of electoral outcomes and political social media use. This allows us to estimate a hybrid fixed effects model that allows us to control for unobserved variables. None of these methods are perfect, and we revisit their weaknesses below. However together we believe they offer the strongest possible test of the impact of social media use on vote outcomes.

Our study is based on data from the 2015 and 2017 UK national elections. In these elections, political parties competed by fielding candidates in 631² individual electoral districts, known as “constituencies”. In our dataset, we chose to include all candidates who stood for one of the UK

² There are actually 650 constituencies in total, but we did not include the 18 Northern Irish constituencies, where parties from the rest of the UK do not typically campaign and electoral politics has a local focus that is mostly independent from national political dynamics. We also excluded one constituency which is dedicated to the ceremonial position of the “speaker of the House”, a politician who organises the business of parliament and who traditionally runs unopposed.

parties that managed to win at least one seat in at least one of the two elections we observed³. In total, our dataset contains 6,000 candidates. The dependent variable for our study is the percentage of overall votes gained by each candidate in the constituency in which they were competing. A total of 822 politicians campaigned in both of these elections, and are hence represented twice in the dataset. The fact that this subset of politicians campaigned in both elections also allows us to treat the data as a panel dataset (albeit an unbalanced one).

The key independent variables for our study relate to patterns of candidate use of the social media platform Twitter, which had approximately 14.8 million UK based users in 2015, a number which rose to 16.4 million in 2017 (Statista, 2017). This is relatively large considering the UK had a population of around 65 million in this time period, of which around 45 million were eligible to vote (The Electoral Commission 2016). Our focus on only one social media platform generates a limitation, of course, in that we cannot know how activity on Twitter correlates with activity on other social media platforms. Hence we cannot disentangle what might be called the “Twitter effect” from the effect of using Facebook, or Snapchat, or anything else. It may be that usage of these platforms is highly correlated: campaigners who perceive Twitter as a useful tool might be more likely to use another platform. However, they may also be negatively correlated, with politicians only choosing to put effort in on one platform. Future research looking at how candidates spread their social media activity over different platforms at election time would be useful.

In order to collect data on candidate Twitter activity, we made use of data from the civic technology organisation DemocracyClub who released lists of Twitter usernames of political candidates for both elections under study. We conducted an independent verification of the data, which overall was found to be 93% accurate (i.e. 7% of the observations in the dataset were either missing a Twitter username that did actually exist, or were recorded as having a username

³ These parties were: the Conservative Party, the Labour Party, the Scottish National Party, the Liberal Democrats, Plaid Cymru, the Green Party and the UK Independence Party.

incorrectly).⁴ This inaccuracy was higher for the 2017 election (the data was 95% accurate in 2015 but only 90% accurate in 2017). Using this list of Twitter usernames, we recorded the number of Tweets sent by candidates from the day after official candidate registration closed up to and including the day before the election: a period of 24 days in total⁵.

We also recorded a variety of other variables, of three types. First, we collected variables which we thought could be potential confounds of the Twitter effect. We labelled candidates as to whether they were currently an incumbent Member of Parliament (MP) or not in either the 2015 or 2017 elections. This labelling is based on the theoretical likelihood that Twitter use will differ between challengers and incumbents, but incumbents typically do better than challengers at elections. We also included the amount of money spent during the election campaign, on the basis that Twitter use may correlate with professional, well financed campaigns, which are also likely to achieve better vote shares (Gulati & Williams 2011). Campaign spending data was made available by the UK Electoral Commission (2015) a public body that monitors the conduct of elections. However, at the time of writing it was only available for the 2015 election. Our spending data covers all money spent during the campaign period immediately before the 2015 election (from the 30th of March 2015 to election day on the 6th of May 2015). Finally, we included the party of the candidates themselves: levels of Twitter use may differ between parties, and vote outcomes certainly do. Including these variables in our models allows us to measure the Twitter effect independent of these potential confounds.

⁴ The validation was based on a random sample of the data (116 observations). For each observation in the sample, one of the authors made use of both the Twitter search function and Google to determine if the candidate in question had a Twitter username, and if so to look at if it had been correctly recorded in the dataset. More details on DemocracyClub can be found here: <https://democracyclub.org.uk/>

⁵ Our data collection period ran from April 13th to May 6th in 2015 and from May 16th to June 8th in 2017. In 2015, we collected the data using a commercial partner, Data Sift, which ensured that we did not encounter any rate limit issues. In 2017, we had elevated access to the Twitter Streaming API (Application Programming Interface) and again were able to collect the data without any rate limit issues. For both elections, we looked up the numeric ids corresponding to candidates' screennames using the Twitter RESTful API and used these to track their activity as incumbent MPs often change their Twitter usernames during the campaign period (during which they are not allowed to refer to themselves as MPs).

Second, we measured variables that would indicate the size of a candidate's audience on Twitter. One of these was simply the average number of Twitter followers the politician had during the observation window. Another variable was the amount of times politicians were "mentioned" by individuals located within the politician's constituency, relative to the overall amount of times the politician was mentioned. This measure was based on tweets that were "geolocated" (i.e. that contained a certain amount of geographical information) and provides an impression of the extent to which a given politician's Twitter following is locally oriented. We should note of course that only a small, non-representative subset of Twitter users use the geolocation feature of the platform (Graham, Hale & Gaffney 2014), hence our estimates must be treated with caution. Nevertheless, it is the best available data we have for addressing this part of the question.

Finally, we measured variables that we thought might indicate higher or lower levels of Twitter use in individual constituencies. In particular, we gathered the demographic characteristics of each constituency, in terms of their average level of wealth and education (data that comes from the 2011 census – a full description of these variables is provided in the appendix), on the basis that Twitter users are typically wealthier and more educated than average (at least in the UK – see Blank 2016; Blank & Lutz 2017). We also estimated the proportion of internet users in each constituency, making use of estimations generated by Blank, Graham and Calvino (2017). The appendix again contains more details on how this variable is calculated.

4 Results

We will now move on to describe the results of our study, beginning with some descriptive statistics of interest (full descriptive statistics for all variables can be found in the appendix). Twitter use is widespread amongst politicians in our dataset, though it drops from 76% in 2015 to 63% in 2017. This may be partly explained by the rushed nature of the 2017 election, which was called at short notice by Prime Minister Theresa May: many candidates were picked at the last minute, and hence had less time to organise social media profiles. However, we would highlight again that the

accuracy of our Twitter username data is lower in 2017 than it is in 2015. Those candidates who did have a Twitter account made quite frequent use of the network in the campaign period, sending a median of 86 tweets in 2015 (or around 3.6 a day), a number which rose to 123.5 tweets in 2017 (just over 5.1 a day). The distribution of Twitter use was quite right-skewed, with some politicians sending several thousand tweets during the observation window. This provides a counter-point to the idea that social media use is “normalised”: although many politicians have accounts, the extent to which they use them actually varies considerably.

It is also worth looking at how the level of Twitter activity correlates with some of our independent variables. In our 2015 data, those candidates with Twitter accounts spent, on average, more than twice as much money than those who did not. However, amongst those who did have an account, there was only a weak positive correlation between the number of tweets sent and the amount of money spent. Overall this supports the idea that having a Twitter account is indeed considered part of a professional, well-funded campaign, though the level of actual use of seems less strongly linked to funding than presence of the account itself.

There was also evidence to support the idea of differential adoption levels between incumbents and challengers, however it was incumbents that typically made much more use of the platform. In 2015, 87% of incumbent candidates had a Twitter account, compared to only 73% of challengers. In 2017, 84% of sitting MPs had an account compared with only 58% of challengers. Amongst those who had adopted, usage levels were roughly comparable. However, there were stark differences in terms of audience sizes (followers). The median challenger politician had roughly half of the followers of the median incumbent politician in 2015, and just over a third of the median number of followers for incumbents in 2017. This is probably because existing MPs have had years to cultivate a social media presence, whereas challengers have to do so in a relatively short period of time (especially for a snap general election as in 2017). This offers strong support to the

“normalisation” thesis: established political forces are better placed to take advantage of this new technology.

A final descriptive question concerns the geographic distribution of the activity of those engaging with politicians on social media. In both years an average of just over 30% of mentions of candidates came from their own constituency (median 22%). This indicates that, while the majority of activity concerning candidates takes place outside their constituencies, a considerable proportion nevertheless takes place amongst people who could actually be eligible to vote for the candidate in question.

We will now move to evaluating the evidence for the idea that active use of Twitter has a positive effect on voting outcomes. We will begin with a set of linear models of the relationship between Twitter use and vote outcomes, which can be found in table one. Each of the first two models is tested on both waves of our data, and hence in the table estimates are reported for both 2015 and 2017. We also estimate a pooled model (model 1.3), which is useful as a way of addressing whether the strength of the Twitter effect changes in the two waves of observation.

Regression models were estimated in R. All fitted models were analysed with standard goodness of fit diagnostic tests for OLS models⁶. These tests highlighted two main potential concerns with the fit: evidence of heteroscedasticity and a group of around 150 high influence observations (the exact amount varying depending on the model being fitted). These problems were not resolved by log transformation of variables, so two further steps were taken in response. First, coefficient estimates, measures of statistical significance and estimates of R^2 were all computed by bootstrapping ($R=5,000$). Second, robust linear regressions were also estimated for all models. The results of the robust regressions were the same as the original OLS estimates. Hence we have

⁶ In particular, variance inflation factors were inspected for evidence of multicollinearity, Cook’s distance was calculated for all observations in order to identify high influence data points, plots of variables versus fitted values were inspected to check the general assumption of a linear relationship between dependent and independent variables, and a Breusch-Pagan test for heteroscedasticity was conducted.

reported the original OLS estimates to facilitate interpretation. Full results of the robust regressions can be found in the appendix.

<i>Dependent variable: vote share (log₁₀)</i>					
Wave	Model 1.1		Model 1.2		Model 1.3
	2015	2017	2015	2017	Pooled
Uses Twitter	0.09***	0.07***			
#Tweets (log ₁₀)			0.03***	0.04**	0.03**
Spending (log ₁₀)	0.04***		0.04***		
Incumbent MP	0.38***	0.31***	0.37***	0.30***	0.35***
2017 Wave					-0.17***
2017 Interaction					0.05*
Observations	3172	2826	2398	1771	4169
Adjusted R ²	0.76	0.86	0.77	0.85	0.76

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 1: OLS regressions of the relationship between Twitter use and vote share outcomes. Coefficients, significance levels and R² were calculated using bootstrapping (percentile method). A term for the candidate's party is included but not reported. Note that spending data was not available for the 2017 election at the time of writing.

We will now describe the results of the models in table one. Model 1.1 addresses the relationship between having a Twitter account and final vote share outcome. In both years Twitter use is positively associated with vote outcomes. Though the overall R² of the models is quite high, stepwise inclusion of variables indicated that the Twitter account variable made only a small difference to this (0.05 in 2015 and 0.09 in 2017). Model 1.2 is restricted to the subset of observations for candidates who did have a Twitter account. The main independent variable becomes the amount of times they sent messages from this account during the observation window. The term is again positive and statistically significant, and (in the 2015 model) is roughly comparable with spending: increasing money spent by 10% has approximately the same effect as increasing tweets sent by 13%. Finally, model 1.3 pools all observations, and includes a dummy variable for whether the wave was 2017 or 2015 as well as an interaction term between the wave and the number of tweets sent. This interaction term is positive, statistically significant and larger than the main term for number of tweets sent, indicating a considerable divergence in effect sizes between the two waves: for example, a 10% increase in tweets sent correlates with, approximately, a 0.3%

increase in votes in 2015 and a 0.8% increase in 2017. This may indicate that the impact of social media use was greater in 2017 than it was in 2015.

We will now move on to the second part of our analysis, which looks at the extent to which the relationships highlighted in table one are moderated by theoretically relevant interaction effects. These interaction effects are addressed in table two, which contains a set of models that duplicate model 1.2 from table one with the addition of an interaction effect. Note that control variables for incumbency and party are included but not reported to save space. Note as well that N is reduced in models 2.1 and 2.2 as follower and mention data was not observed for some politicians in the observation window⁷. Diagnostic tests on these models produced similar results to those above, hence the same strategy of bootstrapping and adoption of alternative robust regressions was used. There were some deviations between the results of the robust regressions and the standard OLS regressions: these are noted in the text below.

Wave	<i>Dependent variable: vote share (log10)</i>									
	Model 2.1		Model 2.2		Model 2.3		Model 2.4		Model 2.5	
	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017
#Tweets (log ₁₀)	-0.09**	0.04	0.00	0.00	0.04***	0.04**	0.04***	0.04**	0.03***	0.04**
Followers (log ₁₀)	0.02	0.06								
Foll. (log ₁₀) * Tweets	0.03**	0.00								
% Cons. Mentions			-0.45*	0.20						
% C. Mentions * Tweets			0.39***	-0.01						
Cons. Wealth					0.00	-0.04				
C. Wealth * Tweets					0.01	0.04*				
Cons. Education							-0.03	-0.02		
C. Education * Tweets							0.02*	0.03 ⁺		
Cons. Internet Use									-0.01	-0.03
C. Int. Use * Tweets									0.02*	0.03*
Observations	2383	1764	2290	1318	2398	1771	2398	1771	2398	1771
Adjusted R ²	0.77	0.85	0.76	0.84	0.76	0.85	0.76	0.85	0.76	0.85

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 2: OLS Models with interaction terms. Terms for party and incumbency are included in all models but not reported. Grey shading indicates results that were not significant in the robust regression models.

⁷ Our measure of the amount of followers a candidate has is calculated whenever they send a tweet. As some candidates did not send a tweet during the observation window, the number of followers they had could not be calculated. Some candidates were also not mentioned during the observation window, hence the percentage of mentions they had could not be calculated.

The interaction models in general provide supportive evidence for H2 and H3, though not in a way that is consistent across all model specifications. The interaction terms between tweets and followers (model 2.1) and tweets and percentage of constituency mentions (model 2.2) were both significant in 2015 but not 2017. The interaction term for the wealth of a constituency (model 2.3) was significant in 2017 but not 2015. The interaction terms for education and Internet use (models 2.4 and 2.5) were significant in both waves of observation; however, these results diminished to borderline levels in 2015 and outright insignificance in 2017 when the models were estimated through robust regressions. Overall, therefore, we find tentative but not complete support for H2 (regarding audience size) and H3 (regarding likely volume of Twitter users within a constituency).

We will now move on to our final analytical section where we estimate two “hybrid” fixed effects models (Allison, 2009, p. 23-25). These models are estimated on the subset of observations in our dataset who competed in both the 2015 and 2017 elections. A fixed effects model is useful in our circumstances because it allows us to eliminate bias caused by unobserved (time invariant) variables. The “hybrid” model is particularly appropriate because it allows us to both estimate the impact of time varying factors in explaining voting outcomes (in this case, the number of tweets sent and also whether the candidate was an incumbent when the election was called) but also allows us to preserve observed time *invariant* variables which are nevertheless of interest (in this case the political party of the candidate). The approach is not flawless, however. First, the need to look at politicians who campaigned in both elections means we are forced to select on the dependent variable as those who achieved higher vote shares in one election are much more likely to return in the next one (indeed, 55% of the individuals who competed in both elections won their constituencies in 2015). These individuals already made relatively high use of social media, which also lowers the amount of variation we observe in this independent variable. Second, this type of regression only eliminates *time-invariant* unobserved variables. This is a weakness with regard to potential changes in party effects between waves of the election: the strength of national campaigns

likely differed between elections, hence the impact of party membership is not time invariant. We will return to these points in the conclusion.

The hybrid models are reported in table three. For readers who are not familiar with the structure of these models, their setup is similar to a pooled time series regression, in the sense that there is one observation per person per year, and the outcome variable is the result achieved by that person in that year. However the main explanatory variables in the model are expressed as deviations from person-specific means for a given year of observation. These person-means are themselves also included in the model, though are not typically interpreted (see Allison 2009, p. 23-24). Hybrid models are estimated as multilevel ones, with each individual as a group modelled as a random effect (hence the “hybrid” designation of the model as it combines both fixed and random effects). In this paper, models were fitted with the “lme4” package in R, with coefficients, confidence and values for R^2 again obtained by bootstrapping ($R=5,000$). We make use in particular of the marginal R^2 value proposed by Tjur (2009). Standard diagnostic tests were applied which showed that the models developed fitted the data well.

	<i>Dependent variable: vote share (log₁₀)</i>	
	Model 3.1	Model 3.2
Tweets (log ₁₀) (Deviation)	0.01***	0.01***
Tweets (log ₁₀) (Person Mean)	0.03***	0.01*
Incumbent (Deviation)		0.01***
Incumbent (Person Mean Centred)		0.08***
Observations	1,644	1,644
Marginal R ²	0.03	0.84

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 3: Hybrid fixed-effects models for individuals who competed in both 2015 and 2017 elections.
A party term is included for model 3.2 but not reported.

In model 3.1, we look solely at the relationship between difference in the level of Twitter use and difference in vote share outcomes. The term for change in Twitter use is positive and statistically significant. Those who used Twitter more also improved their vote share outcome. In model 3.2, we add in two theoretically relevant control variables (incumbency status and party of origin). The coefficient is about a third of the size of the one estimated in models 1.2 and 1.3 (these coefficients can be directly compared), however it remains positive and statistically significant. This model,

which is based solely on how individuals change their behaviour over time, is a strong test and hence provides considerable evidence for the idea that social media use does genuinely make a difference to electoral campaigns.

5 Conclusions

This study has provided an extensive empirical test of the link between political campaigning on social media and vote share outcomes. A positive correlation was found that was robust to a range of control variables and the specification of a hybrid fixed effects model. Interaction effects also largely functioned in the expected way further enhancing support for the existence of an effect, though the interactions themselves were not all significant. Overall the empirical evidence that Twitter media use does have a positive effect on votes is strong.

The results were also unanimous in suggesting that the overall impact of Twitter use is small in absolute terms. The hybrid fixed effects regression which made use only of Twitter related variables (model 3.1) had an R^2 of just 0.03, indicating that a great deal of the variance is unexplained by social media use. MPs that had a Twitter account typically had vote shares around 20% higher than those who did not have one (see model 1.1). When the volume of tweets sent is considered, our most conservative model (3.2) suggests that tweets would need to be increased by 175% to generate a 1% increase in vote share. However, it is worth emphasising that these figures are nevertheless important in relative terms. They are first and foremost comparable with the effect of campaign spending (see the 2015 wave of model 1.2). Furthermore, the modest increases they generate may nevertheless be significant in a close race, of which there were many in our data: around 14% of the electoral competitions which form the basis of our study were won by a margin of less than 5 percentage points, and 4% of them were won by a margin of less than 1 percentage point. Hence overall the evidence suggests that social media use could make a genuinely important difference to electoral campaigns. Of course, as our results are measured in percentage terms, this

also means returns from the using the platform diminish. This suggests that a small amount of engagement with the platform is the most efficient strategy.

How do these results affect theory about the impact of social media on politics? We would highlight two main contributions. First, in showing that making use of social media matters for political campaigns, we discredit the idea that it only offers a communication channel with those who are already converted to the cause (the “echo chamber” effect). Although we cannot distinguish between mechanisms, candidates who communicate in this way do appear to reach voters who otherwise would not have voted for them (or might not have voted at all). One useful avenue for further research would be to investigate the precise pathway by which this influence takes place: whether it be through direct communication with voters or a more indirect avenue through opinion leaders or inter-media agenda setting. Of course, we should note that the finding does not completely contradict the echo chamber thesis: this may be one reason why we only observe a weak effect. Furthermore, the mechanism at work could be one of increasing voter turnout within the group that already agrees with the candidate.

Second, it is worth revisiting the normalisation vs equalisation debate. We have shown that while some sort of engagement with social media (measured through account creation on Twitter) is quite widespread, actual levels of usage vary considerably. We cannot say yet that sustained social media use is a typical feature of campaigns. However, we also showed that politicians who were victorious at a previous election typically had better developed social media profiles than those who did not. They were likely to tweet more, and typically boasted follower bases that were significantly larger than those of challengers, something which our 2015 data suggested was an important enabler in terms of translating tweets into votes. This provides strong support for the normalisation thesis: social media offers an advantage to those who have won previously. It is also interesting to note, however, that this advantage is at the level of the individual politician rather than the party as a whole. Hence, for example, even though the Labour Party lost the 2015 election in terms of gaining

fewer seats than its traditional rival the Conservative Party, it nevertheless gained a considerable portion of the overall seats on offer. In many respects, on social media the politicians in those seats then had the same incumbency advantage as members of the winning Conservative party when the 2017 election came around.

It is worth concluding, however, by highlighting weaknesses in the study, and thus pointing the way for future research. We address only one social media platform in this paper (Twitter). We do not know the extent to which the use of Twitter correlates with use of other types of social media (such as Facebook and Snapchat), hence we are unable to say to what extent it is Twitter itself which makes the difference, as compared to other platforms. We also look solely at patterns of usage of social media, and do not engage with the type of contributions being made by politicians, nor the type of response received. Finally, we treat observations in our dataset as if they are the result of separate, independent electoral campaigns, but this is not the case: there are also co-ordinated national campaigns that take place containing social media elements. Only a field experiment could truly address this deficiency. Absent this, however, we believe that this study is the strongest treatment yet of the effect of active political campaigning on social media.

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Appendix

This appendix contains details on how we calculated the constituency level demographic indicators, descriptive statistics for both waves of data, and a number of robust regression models which are referenced in the main text but not reported for space reasons.

Constituency Level Demographic Characteristics

We calculate three constituency level demographic indicators that are designed to provide an indication of the likely quantity of social media users located in that constituency: the average level of wealth, education, and the estimated number of internet users.

Our wealth and education variables are calculated from the 2011 UK census. For wealth, we make use of census counts of the number of people in each constituency in each one of the “National Statistics Socio-economic Classes”: an ordinal scale that groups people according to their profession, where professions broadly correlate to individuals’ average earnings (see Savage et al. 2013). This data source was combined into an average socio-economic class level for each area, which we take to represent the area’s average wealth level. For education, we make use of census counts of the number of people in each area who achieved a certain level of education. This is again an ordinal scale which was combined into an average education level for each area.

Our internet use indicator is based on the data released by Blank, Graham and Calvino (2017). These authors used small area estimation to provide a measure of internet use at the “output area” level, which is a small geographical area designed specifically for use with the census that typically contains around 120 households. There are 227,759 of these output areas in England, Scotland and Wales. The census provides lookup tables which map these output areas to parliamentary constituencies. We use these lookup tables to provide a population weighted average of internet usage by constituency on the basis of the output area measures. In cases where output areas overlapped with two or more constituencies, we assigned these areas to the constituency with which they had the largest overlap.

Descriptive Statistics

Numeric variables					
Variable	Mean	Median	SD	Min	Max
Tweets Sent	155.1	86	220	0	3,077
Spending (£)	3,878	1,537	4,587	0	18,981
Followers	3,893.3	699	24,783	2	965,173
% Cons. Mentions	30	25	28	0	100
Cons. Wealth	15.3	14.8	6.02	0	31.8
Cons. Education	162	161	24.2	104	233
Cons. Internet Use	0.78	0.78	0.06	0.57	0.92
Categorical Variables					
Variable	Category	Frequency	Percentage		
Uses Twitter	Yes	2,398	76%		
	No	774	24%		
Incumbency	Incumbent MP	540	17%		
	Not Incumbent	2,632	83%		
Party	Conservative	631	20%		
	Labour	631	20%		
	SNP	59	2%		
	Liberal	631	20%		
	Plaid	40	1%		
	Green	567	18%		
	UKIP	613	19%		
Total Observations	3,172				

Table A1: Descriptive Statistics (2015 Wave)

Numeric variables					
Variable	Mean	Median	SD	Min	Max
Tweets Sent	173.7	124	185.1	0	2,086
Followers	7,090	1,607	29,297	17	905,093
% Cons. Mentions	32	22	33	0	100
Cons. Wealth	15.3	14.8	6.09	0	31.8
Cons. Education	162	161	24.5	104	233
Cons. Internet Use	0.78	0.78	0.06	0.57	0.92
Categorical Variables					
Variable	Category	Frequency	Percentage		
Uses Twitter	Yes	1,786	63%		
	No	1,040	37%		
Incumbency	Incumbent MP	597	21%		
	Not Incumbent	2,229	79%		
Party	Conservative	631	22%		
	Labour	631	22%		
	SNP	59	2%		
	Liberal	629	22%		
	Plaid	40	1%		
	Green	459	16%		
	UKIP	377	13%		
Total Observations	2,826				

Table A2: Descriptive Statistics (2017 Wave)

Further Models

<i>Dependent variable: vote share (log₁₀)</i>					
Wave	Model 1.1R		Model 1.2R		Model 1.3R
	2015	2017	2015	2017	Pooled
Uses Twitter	0.08***	0.06***			
#Tweets (log ₁₀)			0.03***	0.03**	0.03**
Spending (log ₁₀)	0.04***		0.04***		
Incumbent MP	0.36***	0.28***	0.34***	0.27***	0.32***
Green Party	-0.74***	-1.20***	-0.75***	-1.20***	-0.95***
Labour Party	-0.04***	0.03***	-0.04***	0.03***	-0.01
Liberal Dem.	-0.62***	-0.85***	-0.59***	-0.79***	-0.69***
Plaid Cymru	-0.38***	-0.62***	-0.38***	-0.55***	-0.45***
SNP	0.27***	-0.15***	0.26***	-0.15***	0.07***
UKIP	-0.19***	-0.97***	-0.22***	-0.99***	-0.43***
2017 Wave					-0.18***
2017 Interaction					0.06**
Observations	3172	2826	2398	1771	4169

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table A3: Robust Regression versions of Models 1.1-1.3. The Conservative Party is the reference level for the categorical party variable.

<i>Dependent variable: vote share (log₁₀)</i>										
Wave	Model 2.1R		Model 2.2R		Model 2.3R		Model 2.4R		Model 2.5R	
	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017
#Tweets (log ₁₀)	-0.10**	0.06	0.00	0.01	0.03***	0.03*	0.03***	0.03*	0.03***	0.03*
Incumbent MP	0.27***	0.25***	0.36***	0.25***	0.36***	0.27***	0.36***	0.27***	0.36***	0.27***
Green Party	-0.77***	-1.20***	-0.80***	-1.18***	-0.80***	-1.20***	-0.80***	-1.20***	-0.80***	-1.20***
Labour Party	-0.06***	0.03***	-0.05***	0.04***	-0.05***	0.04***	-0.04***	0.04***	-0.04***	0.04***
Liberal Dem.	-0.60***	-0.79***	-0.59***	-0.68***	-0.62***	-0.79***	-0.62***	-0.79***	-0.62***	-0.79***
Plaid Cymru	-0.40***	-0.56***	-0.39***	-0.54***	-0.38***	-0.53***	-0.38***	-0.54***	-0.36***	-0.53***
SNP	0.25***	-0.16***	0.27***	-0.16***	0.28***	-0.15***	0.28***	-0.16***	0.29***	-0.14***
UKIP	-0.24***	-0.99***	-0.24***	-0.97***	-0.24***	-0.98***	-0.24***	-0.98***	-0.24***	-0.99***
Followers (log ₁₀)	0.03	0.07 ⁺								
Foll. (log ₁₀) * Tweets	0.03**	-0.01								
% Cons. Mentions			-0.42*	0.18						
% C. Mentions * Tweets			0.35***	-0.03						
Cons. Wealth					0.01	-0.02				
C. Wealth * Tweets					0.01	0.02				
Cons. Education							-0.02	-0.01		
C. Education * Tweets							0.02 ⁺	0.01		
Cons. Internet Use									0.00	0.01
C. Int. Use * Tweets									0.01	0.01
Observations	2383	1764	2290	1318	2398	1771	2398	1771	2398	1771

⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table A4: Robust Regression versions of Models 2.1-2.5. The Conservative Party is the reference level for the categorical party variable.

Appendix References

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