The New Public Address System:
Why Do World Leaders Adopt Social Media?

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Abstract

The emergence of social media has led scholars to focus on its effects on mass behavior and protest. A key understudied question is what explains the variation in the adoption and use of social media by world leaders? Social media, and in particular Twitter and Facebook, have emerged as important, new channels for political communication. By the end of 2014, over 76% of world leaders had an active presence on social media platforms, which are being used to communicate with domestic and international audiences. We look at several different potential hypotheses that explain adoption of social media by world leaders including: modernization, social pressure, level of democratization, and diffusion. We find strong support for two explanations–increased political pressure from social unrest and higher levels of democratization both increase the likelihood of leaders adopting social media. Taken together, these findings show how institutional and political pressures shape political communication and leader behavior.

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1 Motivation

Leaders have long recognized the importance of communicating and cultivating an image to help maintain power and order. For example, emperors in Rome manufactured coins that were emblazoned with their own image and their important victories (Jowett and O'Donnell, 2014, p. 63). The use of coins was particularly effective since they were circulated throughout the empire via trade, creating a "low-cost" form of propaganda. In more recent times, autocratic leaders have sought to further ensure their hold on power by asserting control over the mass media, and intimidating independent journalists who criticize the regime (Bueno de Mesquita and Downs, 2005; Levitsky and Way, 2002; Gehlbach and Sonin, 2013).[1] For instance, many have argued that Russian President Vladimir Putin uses his influence over state media to silence dissent, and support a "pro-Kremlin" message both internally and abroad.[2]

The advent of social media[3] has led some scholars and commentators to call it a "liberation technology" (Diamond, 2010). Proponents of this view argue that social media and its associated technologies have disrupted the top-down (from elites to masses) political communication of traditional media (Shirky, 2011). Social media thus provides an advantage to protestors and challengers of the regime. However, many have questioned the assumption that social media gives "power to the people," pointing out that it can also be a tool of incumbents to monitor activists and dissidents (Morozov, 2012). What is not debated is the increasing role that social media has played in prominent political events (Weidmann, 2015). From extensive use of social media by Hamas and Israel (particularly Twitter)[4] in the 2012 Gaza Conflict (Zeitzoff, 2014), to internet censorship during Egyptian protests in 2011 (Hassanpour, 2013) and the Syrian Civil War (Gohdes, 2015), social media is increasingly becoming an important arena not just for political communi-

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[1] For instance, in Uzbekistan, a noted government critic, and independent journalist (Jamshid Karimov), was reported missing. He was eventually found having been forcibly committed a psychiatric clinic, where he remained captive until November 2011. He then disappeared in January 2012. http://en.wikipedia.org/wiki/Jamshid_Karimov.

[2] See http://www.theatlantic.com/international/archive/2015/04/how-the-media-became-putins-most-powe 391062/

[3] We follow the Oxford Dictionary and define social media as "websites and applications that enable users to create and share content or to participate in social networking."

[4] The conflict was dubbed the first "Twitter War" (Cohen, 2012).

cation, but also for political conflict. Much of the previous research has focused on the effect of social media and information communication technology (ICT) on mass behavior. Does access to social media and ICT increase insurgency (Shapiro and Weidmann, 2012; Pierskalla and Hollenbach, 2013), or protests (Lynch, 2011; Howard and Parks, 2012; Rød and Weidmann, 2015), and how can it mobilize constituents (Howard and Hussain, 2011; Bond et al., 2012)? Moreover, how do governments react strategically to popular challenges and protests via social media (King, Pan, and Roberts, 2012)?

Yet, the focus on mass mobilization has obscured the growth in a parallel phenomenon. Leaders themselves have signed up, and created their own social media accounts (e.g. Twitter, YouTube, Facebook) as political tools. By the end of 2014, over 76% of world leaders had an active Twitter or Facebook account. Many of these online networks of both leaders (and their followers) reflect offline, salient political cleavages (Zeitzoff et al., 2015; Barberá, 2015). These accounts have even been used to by leaders to document important diplomatic events, such as a phone conversation between Iranian President Hassan Rouhani and US President Barack Obama.[5] Some argue that Twitter and Facebook are simply tools for propaganda, and do not provide meaningful insights into leader behavior.[6] Yet, little work has been done on understanding the political determinants of when and why leaders adopt social media. Given that a large amount of evidence suggest incumbent political leaders seek to maintain political power, and strategically manipulate coordination goods (such as social media) in order to do so (Magaloni, 2008; Bueno de Mesquita and Downs, 2005), these remain important and unanswered questions.

What explains the adoption of social media by world leaders? To answer this question, we construct a new dataset that tracks when world leaders in UN-member countries became active on Twitter and Facebook (two of the largest social media platforms). We then match this data with key political, geographic, and socio-demographic variables. We test several potential hypotheses that may explain adoption of social media by world leaders, including modernization, political pressure, level of democratization, and diffusion. We have three key findings. 1) We find little to

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[5]See http://thelede.blogs.nytimes.com/2013/09/27/details-of-conversation-with-obama-deleted-from-tw

[6]See http://foreignpolicy.com/2015/04/28/these-are-the-most-influential-world-leaders-on-twitter-an

no support for the hypotheses that social media adoption by leaders is higher in richer countries or those with more internet users (modernization hypothesis), or that this process is driven by electoral pressure. 2) However, there is strong evidence that leaders respond to social unrest – increasing number of civil society protest events against the government has a positive effect on social media adoption. 3) Finally, leaders in more democratic countries are more likely to adopt social media. Taken together, these results contribute to a growing body of literature that illustrates the political dimensions of social media (Tufekci and Wilson, 2012; Bennett, 2012), and how political institutions, particularly the electoral incentives of leaders, shape strategic media behavior (Baum and Potter, 2008; Dahlgren, 2009; Howard, 2010; Williams and Carpini, 2011).

2 World Leaders on Social Media

2.1 How are world leaders using social media?

The use of social media as a tool for political communication by world leaders has increasingly become widespread. As we show in Figure 1, by January 1st, 2014 the governments of 76% of U.N. member countries had an active presence on Twitter or Facebook. By early 2015, this figure had increased to over 81%.[7] The list includes the presidents or prime ministers of the most powerful nations in the world, such as Barack Obama, David Cameron, Dmitry Medvedev, and Dilma Rousseff, and also of many other countries (e.g. Argentina, France, Ukraine, Tunisia, South Africa, Philippines, Japan, etc). Leaders from countries with limited press freedom, such as Iran, Kyrgyzstan, or Cuba, also have social media accounts. As we show in Figure 2, at least one of these two social media websites are used by world leaders essentially all around the world, with the exception of China and several African countries.

The presence of world leaders takes mostly two forms: either a *personal* account for the head of government, with messages that at least appear to be written by the world leader herself, or an *institutional* account for the presidency or prime ministry. We distinguish personal accounts

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[7]See section 3.1 for additional details on how this dataset was collected.

Figure 1: Proportion of countries whose government has an active social media account
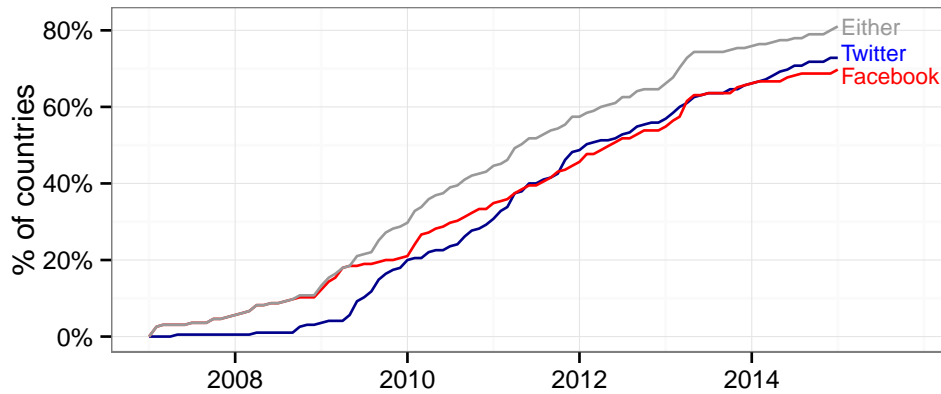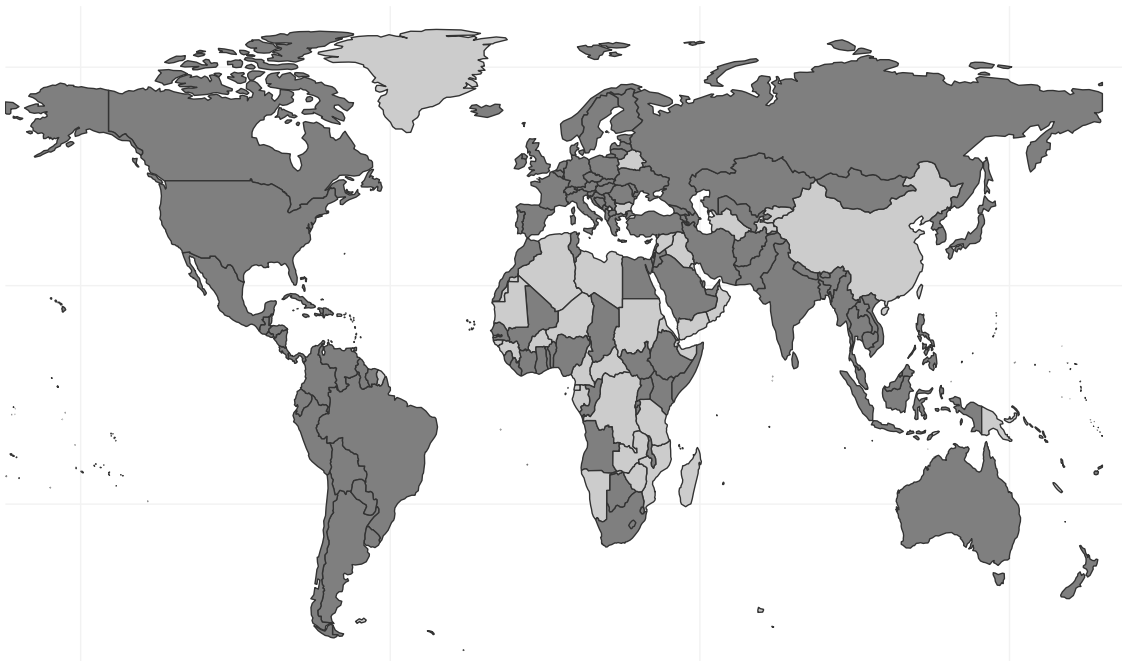

Figure 2: Countries with at least one leader on Twitter

Note: countries colored in dark grey correspond to countries where the head of government has an active Twitter or Facebook account, either personal or institutional.

from institutional accounts by whether the name of the social media profile corresponds to the world leader and the account uses his or her image as a profile picture.[8] On Twitter, institutional

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[8]We assume that in most cases social media messages are posted by the leader's communication office. Many accounts indicate when the messages are posted by the leaders themselves by signing the tweet with their initials (e.g. tweets written by Barack Obama on `@BarackObama` are signed -bo). Note that whether the leader is the person updating the account or not is irrelevant for our analysis, since we're interested in the general communication strategy

accounts are slightly more common: leaders in 48% of countries have an institutional Twitter account, whereas 45% of them have a personal Twitter account. The opposite pattern can be observed on Facebook: 49% of leaders have a personal Facebook account, but only 37% of them have an institutional Facebook account. Note that these percentages do not add up to 100 because many countries have multiple Twitter and Facebook accounts. In fact, it is also fairly common to have multiple accounts for the same institution, each in a different language. For example, Dmitry Medvedev has an account in English (`@MedvedevRussiaE`) and another in Russian (`@MedvedevRussia`).

Most world leaders on Twitter are active users of this platform and also have large audiences. As of August 2015, the median Twitter account for a world leader has sent 2,110 tweets since it was created, and has 42,569 followers. Institutional accounts tend to be more active than personal accounts, with a median of 3,939 tweets sent vs 1,769 tweets sent, but they are also slightly less popular, with a median of 27,504 followers vs 70,143 followers. We find the same pattern when we analyze the levels of activity and popularity on world leaders' Facebook profiles. Institutional accounts on Facebook had posted a median of 1,085 messages vs 1,645 posts on leaders' personal Facebook pages. The median leader account was "liked" by 62,748 Facebook users, but this figure increases to 88,398 likes when we consider only personal accounts, and decreases to 40,918 likes for institutional accounts.

However, as we show in Figure 3, there is wide variation in the degree of popularity of world leaders on social media. 20 accounts have more than 1,000,000 followers and 18 accounts have more than 1,000,000 likes. A clear outlier is `@BarackObama`, with over 63 million followers and 44 million likes as of August, 2015. As one would expect, audience size is correlated with population (for example, the accounts with over a million followers or likes include the prime ministers or presidents of Argentina, Brazil, Germany, India, Mexico, Philippines, Russia, and Turkey), but we also observe a few cases where leaders from medium-sized countries – such as Chile, Israel, and Ecuador – are able to attract international attention and increase their audience size.

World leaders use social media for a wide variety of purposes. We claim that these different

taken by the leader–*institutional* or *personal*–rather than the leader's individual decisions.

Figure 3: Distribution of Number of Followers of World Leaders on Twitter, by Continent
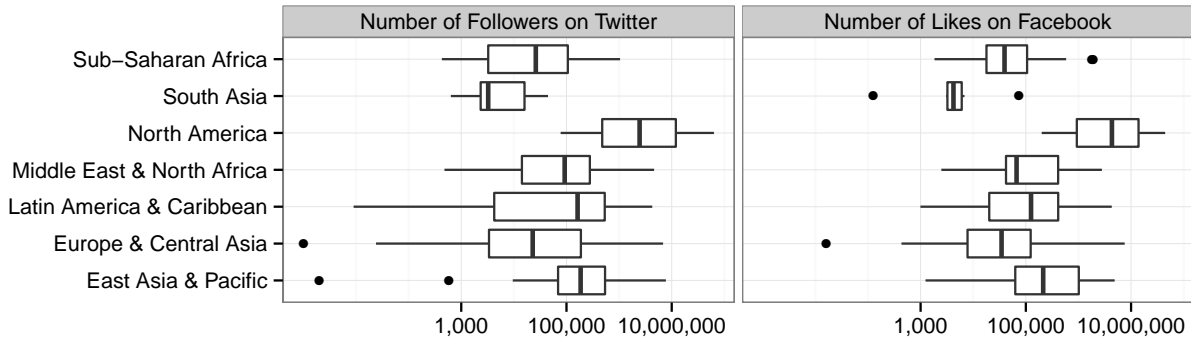
purposes can be collapsed into two broad categories: social media posts oriented towards an international audience; and social media posts that are related to the internal politics of the country.

Figure 4: Examples of Social Media Posts by World Leaders (International)

(a) Post promoting the country
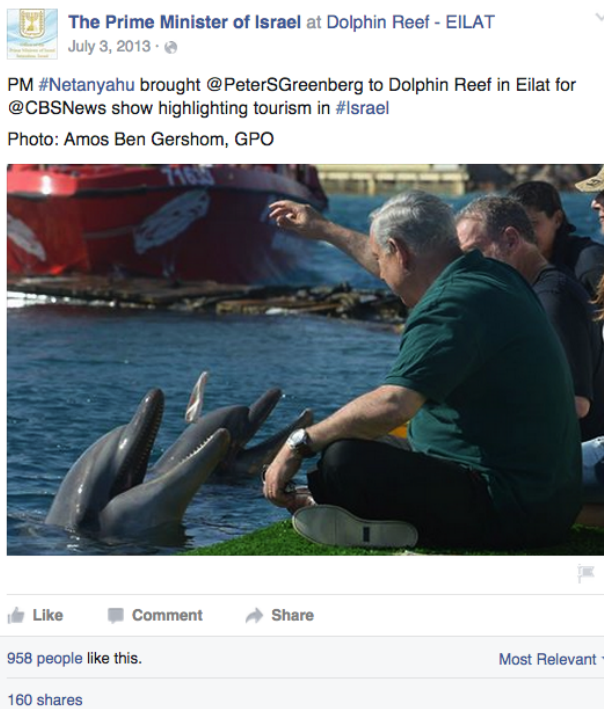
(b) Post advertising policy positions

(c) Post about diplomatic relations

Starting with the first category, world leaders send messages to their international audiences

for different objectives. They often share messages that promote specific aspects of their country such as trying to attract tourists, or improving their country's international image. Post (a) on Figure 4 provides an example: here, the Prime Minister of Israel is using Facebook to advertise the touristic appeal of its country. A second category of posts would refer to those that advertise policy positions about international relations. As an example, post (b) shows a tweet by Russia's Prime Minister in which he informs of his position on the Crimea crisis. Finally, there are also cases of what the media has coined "Twitter diplomacy". Post (c) is the most visible example of this pattern: here, Iranian president Hassan Rouhani used Twitter to inform his followers of the state of the negotiations about Iran's nuclear plan. It is obvious that social media is not a substitute for traditional diplomacy, but it has become an outlet by which world leaders can communicate directly with citizens all around the world, without the need of traditional news media as an intermediary agent.

The second category encompasses all uses of social media that have the internal audience of each country as the target audience. Figure 5 shows examples of the four types of posts we consider within this category. Post (a) is an instance of what appears to be the most common use of social media: to provide information about the government's daily agenda. Here, Mexico's president announces that he participated in the inauguration of a new dam. Other activities that are frequently reported are meetings with other political actors, international visits, participation in political rallies, etc. Post (b) provides an example of another frequent use: to influence offline and online political agenda. US President Barack Obama and the White House appear to be particularly successful at this, often creating hashtags that become trending topics in the United States. A more specific subtype of post is that illustrated with post (c). Here, Spain's prime minister advertises the proposal of a new policy to reform the public administration. Finally, social media platforms are also often used to provide information about the personal life of the world leaders, often with pictures about how they spend their leisure time with family. Post (d) is an example of that.

Interestingly, it is extremely rare that world leaders use social media to interact directly with their citizens, which suggests that they use these platforms as a top-down channel to broadcast

Figure 5: Examples of Social Media Posts by World Leaders (National)

(a) Post about government's agenda

Enrique Peña Nieto @EPN

En Comondú, Baja California Sur, inauguré la presa Alberto Andrés Alvarado Arámburo: pic.twitter.com/sE131F5VmY

View translation

Reply Retweet Favorite ••• More

RETWEETS 195 FAVORITES 135

(b) Post influencing political agenda

The White House
November 21, 2014 ·

"What makes us American is a shared commitment to an ideal that all of us are created equal." —President Obama: wh.gov/immigration-action #ImmigrationAction

284k Views

Like Comment Share

21,573 people like this. Most Relevant

4,906 shares

(c) Post about country policies

Mariano Rajoy Brey
La #ReformaAAPP cumple un año y logra un ahorro de 10.417 millones de euros con el 45% de las 222 medidas completadas y el resto en ejecución. En 2015 alcanzaremos los 37.620 millones ahorrados.

Es una apuesta decidida por la modernización, la competitividad y el bienestar de los españoles. Haremos más con menos porque creemos en una Administración más cercana, ágil, eficiente y útil para todos q... See More

Like · Comment · Share · September 18, 2014

858 people like this.

147 shares

(d) Personal post

Cristina Kirchner @CFKArgentina

Hacía tiempo que quería mostrarles como estaba Simón de grande. Esta foto es en El Calafate... pic.twitter.com/SzgMxYcn1r

View translation

Reply Retweet Favorite ••• More

RETWEETS 2,194 FAVORITES 2,262

7:01 PM - 1 Mar 2014 Flag media

information. As an example, less than 6% of tweets sent by leaders are replies to other users' tweets. Leaders are also rarely exposed to tweets by ordinary citizens, since the median number of users they follow is only 96.

2.2 Theories of social media adoption

A key debate that many scholars have focused on is whether social media plays an important role in political behavior (Tufekci and Wilson, 2012), or whether it is simply epiphenomenal (Gladwell, 2010). Yet, little has been done to theorize the role of social media usage by world leaders. Theories of leader behavior tend to center around leaders seeking to maintain power (de Mesquita, Smith, Siverson, and Morrow, 2005; Acemoglu and Robinson, 2012). Leaders use the tools at their disposal within their current political system to maximize their chances their chances of survival. Thus decisions about how to distribute goods – both public and private – and the use of media are made with an aim towards benefitting the leader politically. Yet, these decisions are shaped by the political institutions in which the leader operates. The amount of resources world leaders spend curating their social media accounts, as well as their large audiences online, highlight the potential importance of this platform as a mechanism for political communication (Howard, 2010).

What factors explain leaders' adoption and use of social media? We seek to understand differential rates of adoption, and the factors associated with the active use of this tool by leaders. If leaders view social media as an important tool, and not simply as an outlet for propaganda, then institutional constraints, social and electoral pressure, as well as country-specific demographic factors should help explain when world leaders adopt Twitter. We argue that there are four potential channels or hypotheses that could influence social media adoption. We delineate these hypotheses below.

1. **Modernization Hypothesis**. Social media adoption by world leaders depends on the sociodemographic characteristics of the country. World leaders will be more likely to adopt social media at higher rates countries with higher income per capita, and higher rates of internet penetration and social media usage, in order to adapt to general communication

practices by members of their society. This is related to the modernization hypothesis – democracy consolidation occurring at higher levels of income– that Lipset (1959) proposed. Thus, social media adoption by world leaders is a function of underlying advances in a given country. Critics of this argument would argue that the large-scale adoption of mobile phones and internet across the developing world make this channel less likely (Howard and Hussain, 2011).

2. **Political Pressure Hypothesis**. The second channel hypothesizes that leaders (incumbents) create social media accounts in order to promote their political activities, with the purpose of staying in power. Elections place pressure on incumbents to campaign and reach out to supporters (Carey and Shugart, 1995), as well as engage in negative campaigning to challenge opponents (Ansolabehere and Iyengar, 1996). If this is true, leaders facing election will be more likely to try to adopt social media in election years.

A second type of pressure placed on leaders is the threat of social unrest and protests. There is ample evidence that leaders are keenly aware of the how social media technologies may be used to coordinate protests and foment unrest that may challenge their hold on power (Howard and Hussain, 2011; Morozov, 2012; King, Pan, and Roberts, 2012). Under threat from protests or armed actors, leaders may seek to disrupt social media and other coordination goods by blocking activist accounts, and in extreme cases "pulling the plug," to dissipate the unrest (Hassanpour, 2013; Gohdes, 2015). Not only will leaders seek to manage and block activists, but they will also use social media to craft their own narrative.[9] In the face of heightened social unrest, leaders will be more likely to adopt social media.

3. **Transparency/Democracy Hypothesis**. Democratic leaders are held to higher standards of accountability to the general public than autocratic leaders (Przeworski, Stokes, and Manin, 1999). Previous research has argued that this is why democratic leaders provide higher amounts of public goods compared to autocratic leaders (de Mesquita, Smith, Siverson, and Morrow, 2005). Voters' ability to retain good incumbents and punish bad incumbents (Ferejohn, 1986) puts pressure on democratic leaders to both 1) engage in credit claiming about

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[9]See Chen (2015) and Cohen (2012).

their successes while in office, and 2) be more transparent about their policies (Stiglitz, 2002). Social media provides a unique (and relatively low-cost) solution to reach voters, particularly those of younger ages, who may not be as exposed to traditional media outlets. Given these pressures, democratic leaders are more likely to create social media accounts in order to be more transparent and to credit-claim their own policy successes.

4. **Diffusion hypothesis**. International relations scholars have long argued that policy diffusion is an important mechanism for explaining state and leader behavior. From pension reforms (Weyland, 2005) to liberal economic ideas (Simmons and Elkins, 2004), research has shown that policy changes tend to cluster in time and space, and that leaders take their cues from states that share similar characteristics. For instance, during the Arab Spring many have argued that the spread of the protests across the Middle East and North Africa closely tracked the diffusion and uptake of social media in the region (Lotan, Graeff, Ananny, Gaffney, Pearce et al., 2011; Howard and Hussain, 2013). Thus, leaders are more likely to adopt social media following adoption by neighboring leaders.

Conversely if none of these four hypotheses are borne out, then this would suggest that the null hypothesis is true—i.e. that social media is epiphenomenal, and tangential to world leaders' principal concerns of staying in office and maximizing power.

3   Research design

3.1   Data

Our dataset includes the social media accounts of the heads of government in all 193 United Nations member states as of January 1st, 2014.[10] The list of heads of government and names of the corresponding institution in each country was collected from the United Nations Protocol and Liaison Service website (www.un.it/protocol). For each of these names and institutions, we identified manually the corresponding Twitter and Facebook account, if it exists. Our list of Twitter

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[10]We have data on world leaders through mid-2014. However, many of our control variables end in November 2013.

accounts was in part based on the "Twiplomacy" dataset (Burson-Marsteller, 2012), which we revised and updated. When multiple Twitter or Facebook accounts with the same name existed, we chose the one that was verified.[11] In the absence of verification, we selected the account with the largest number of followers.[12] We only considered active accounts – those that had sent 10 or more posts in 2013.

The second step in our data collection process was to compile a dataset with information about each of these social media accounts from Twitter's REST API and Facebook's Graph API. These additional variables include the number of followers/likes and tweets/posts sent, and when each account was created. We also downloaded the entire history of tweets and posts in order to identify the date in which the first tweet or post was published. Our dependent variable – social media adoption– was constructed using this information. Following the distinction we introduced in the previous section, we distinguished between personal and institutional accounts, and also consider either Twitter or Facebook, although our main independent variable of interest is whether the world leaders was active on *any* platform, regardless of the type of account.

Table 1 provides summary statistics for this variable, as well as our independent variables, which include GDP per capita, internet users, and social media users (Modernization Hypothesis); a dummy variable indicating whether an election was going to be held in the coming 12 months and an index of social unrest computed using event data from the ICEWS dataset (Political Pressure Hypothesis); the Polity IV democracy score (Democracy/Transparency Hypothesis); and the count of neighboring countries (among the K=4 nearest neighbors, based on distance between capital cities) that had adopted social media at each time point (Diffusion Hypothesis). All of our models include region fixed effects.[13] For more information about the operationalization and sources for these variables, see Table 6 in the Appendix.

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[11]Verification is granted by Twitter and Facebook to public figures, including politicians, journalists and media outlets, in order to certify that their profile corresponds to their real identity. It is denoted by a blue "check" sign on the social media profile.

[12]We were also careful to exclude parody or fake accounts, as well as "community" Facebook pages, created by supporters of a politician and not the leader herself.

[13]We use the same classification of countries into regions as the World Bank: East Asia and Pacific (15%), Europe and Central Asia (27%), Latin America and Caribbean (17%), Middle East and North Africa (11%), North America (1%), South Asia (1%), and Sub-Saharan Africa (24%).

Table 1: Summary Statistics: Monthly Data from Jan 2007 to Nov 2013

Variable	Mean	Std. Dev.	Min.	Max.	N
Leader Has Active Social Media Account	0.362	0.481	0	1	16185
Leader Has Active Personal Account	0.254	0.435	0	1	16185
Leader Has Active Institutional Account	0.214	0.41	0	1	16185
Leader Has Active Twitter Account	0.267	0.442	0	1	16185
Leader Has Active Facebook Account	0.297	0.457	0	1	16185
Monthly Count of Tweets (All)	19.76	64.912	0	1473	16185
Monthly Count of Posts (All)	13.24	50.668	0	601	16185
% of Tweets in English, by Month	0.339	0.428	0	1	3869
Log GDP Per Capita	9.064	1.251	6.039	12.777	15177
Internet Users	32.506	27.691	0	96.547	15770
Social Media Users	0.421	0.994	0	10.594	16185
Election Within 12 Months	0.202	0.401	0	1	16185
Index of Social Unrest (ICEWS)	1.132	1.233	0	5.984	13695
Polity IV Score	3.863	6.287	-10	10	13351
Adoption by K=4 Nearest Neighbors (1 lag)	1.408	1.366	0	4	15335
Population, in 1000s (log)	8.523	2.287	-0.693	14.102	16185

One of our key independent variables is the proportion of social media users in each country by month. Unfortunately, neither Twitter nor Facebook provide public statistics of how many users are active on these platforms, and the existing public surveys (e.g. the Eurobarometer studies, or the surveys conducted by the Pew Research Center) only include a limited subset of countries, without the granularity required for our analysis (at the month level). In order to overcome this limitation, we applied an alternative strategy that provided us with a good proxy that we captures change over time in citizens' adoption of social media platform.

In particular, we estimate the number of Twitter users by country and month. This measure of social media adoption exploits the possibility of collecting random samples of tweets with geographic coordinates attached with the fact that the date in which each Twitter account was created is public information for all users. Our first step was to collect a dataset of 130 million geolocated tweets sent by 7 million unique users between November 6th, 2013 at 00:00:00 GMT and December 5th, 2013 at 23:59:59 GMT. Tweets were captured using the Streaming API and the streamR package for R (Barberá, 2013) and a geographic bounding box that spans the entire globe.[14] Then,

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[14]Given the limitations of the API (only up to 1% of all tweets sent at any given time can be accessed), these 130 million tweets represent a random sample of the approximately 300 million geolocated tweets that were sent during

we classified each of these tweets according to the country from which they were sent, building upon the technique developed by Mocanu et al. (2013). Finally, we extracted the user information for each tweet, which contains the date when they created their account. Under the assumption that users are tweeting from the country they live in, we thus consider the distribution of creation dates as equivalent to the rate of adoption in each country.

The use of this variable to measure social media adoption presents three limitations. First, it does not measure the number of Facebook users, although in our analysis we assume that changes over time in Facebook and Twitter adoption by citizens are highly correlated. Second, geolocated tweets are a small sample of the entire universe of tweets (Ajao et al., 2015), and since it is composed mostly of users posting messages from smartphones, it is likely to underestimate Twitter adoption, particularly in countries with lower income levels. This is an additional reason why we control for GDP per capita in our analysis. Finally, the fact that users often tweet when they travel can induce measurement error.[15] Despite these limitations, as we now demonstrate, this measure provides a reasonable approximation to the rates of social media adoption by citizens in the different countries we consider.

Table 2 displays our estimates of the number of users per million inhabitants in a sample of countries, as of December 2013. Our results match the main results in Mocanu et al. (2013). We find that countries in the Arabian peninsula, as well as Turkey, Spain, United Kingdom, and the United States have the highest Twitter penetration. The countries with lowest proportion of Twitter users are mostly in central Africa, and they also include small nation states such as San Marino, Nauru, and the Vatican.

Figure 6 demonstrates that the speed at which Twitter became an important tool for communication varies across countries. Here, we display our estimates of Twitter adoption over time for a set of eight different countries with high Twitter penetration. English-speaking countries like United States and United Kingdom were early adopters, with high rates of Twitter use since 2009.

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the same period. This number was estimated based on the "track limit errors" returned by the Twitter API, which indicate the number of tweets that were missed due to the 1% rate limit.

[15]For example, the fact that citizens tweet more during their holidays probably explains why Bahamas is one of the countries with the highest number of users per capita, as we report in Table 2.

Table 2: Estimated number of Twitter users, by country

	Top 15 countries		Bottom 15 countries	
	Country	Users	Country	Users
1	Kuwait	10594	Central African Republic	6
2	Qatar	8235	Democratic Republic of Congo	5
3	Bahrain	7781	Niger	5
4	United Kingdom	7609	Burundi	3
5	Saudi Arabia	7308	Togo	2
6	Spain	6982	Chad	2
7	Malaysia	6695	Andorra	0
8	Ireland	6660	Liechtenstein	0
9	United Arab Emirates	6134	Lesotho	0
10	Turkey	6003	Monaco	0
11	Bahams	5961	Nauru	0
12	United States	5363	San Marino	0
13	Oman	4677	South Sudan	0
14	Cyprus	4563	Tuvalu	0
15	Panama	4352	Vatican	0

Note: quantities measure the estimated number of Twitter users per million inhabitants in each country.

Figure 6: Twitter adoption, by country
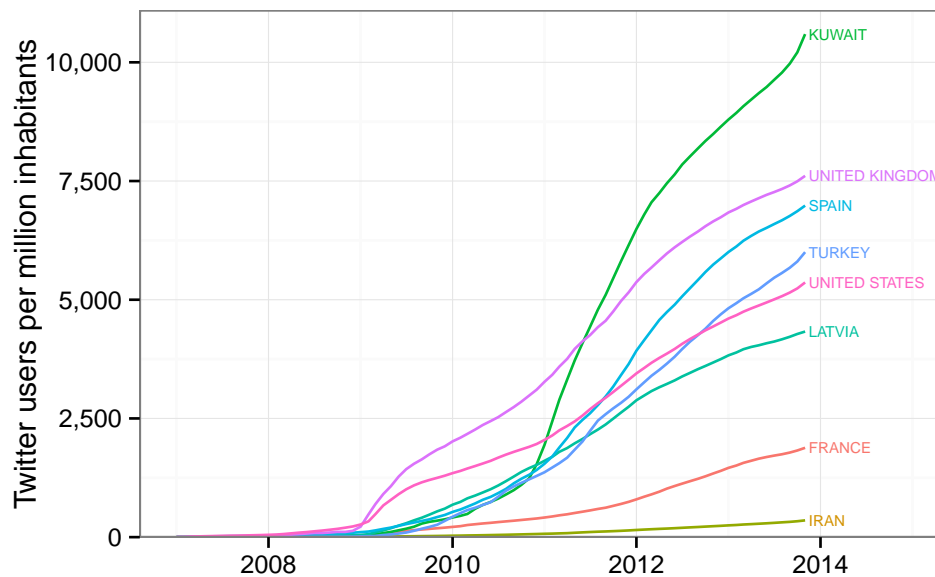
Kuwait represents the opposite case: here the number of users per capita has been increasing exponentially since late 2012.

4   Results

To better understand the factors that influence social media adoption by world leaders, we use event history analysis (Box-Steffensmeier and Jones, 2004). We model the probability (hazard rate) that a country's leadership will adopt at least one of the two social media platforms we consider, and examine how political and demographic variables influence the probability of adoption using monthly data from January, 2007 to November, 2013.

One component of our Political Pressure Hypothesis is that world leaders are more likely to adopt social media in the months leading to an election. In the Kaplan-Meier plot in Figure 7 we examine the probability of social media adoption by world leaders as a function of time comparing countries that have an election within the year compared to those that do not.[16] The results show that leaders not facing elections in the next 12 months are actually slightly more likely to adopt social media compared to those who are not facing elections. Although this difference is not statistically significant, it does suggests that electoral pressure is not a major determinant of social media adoption.

Another one of our hypotheses (Transparency/Democracy) is that democratic leaders are more likely to adopt social media due to pressures to be more transparent and communicate with voters. The Kaplan-Meier plot in Figure 8 shows the probability of social media adoption as a function of time comparing democracies and non-democracies. The results show that democratic leaders were much more likely to adopt Twitter compared to non-democracies.

Of course, the differences that we observe in these two Kaplan-Meier graphs could be due to the effect of key omitted variables, such as GDP per capita or the number of social media users in each country. To account for this possibility, we now show the results of multivariate Cox proportional hazard models that estimate the determinants of social media adoption (Table 3), and distinguish across account types – institutional versus personal – and across platforms – Facebook versus Twitter – (see Table 4).

First, in Table 3 we look at the correlates of social media adoption (having an active Twitter or

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[16]We test a smaller time window–election within six months–and we find no difference.

Figure 7: Kaplan-Meier Graph of Social Media Adoption by Election vs. No Election in the Next Year
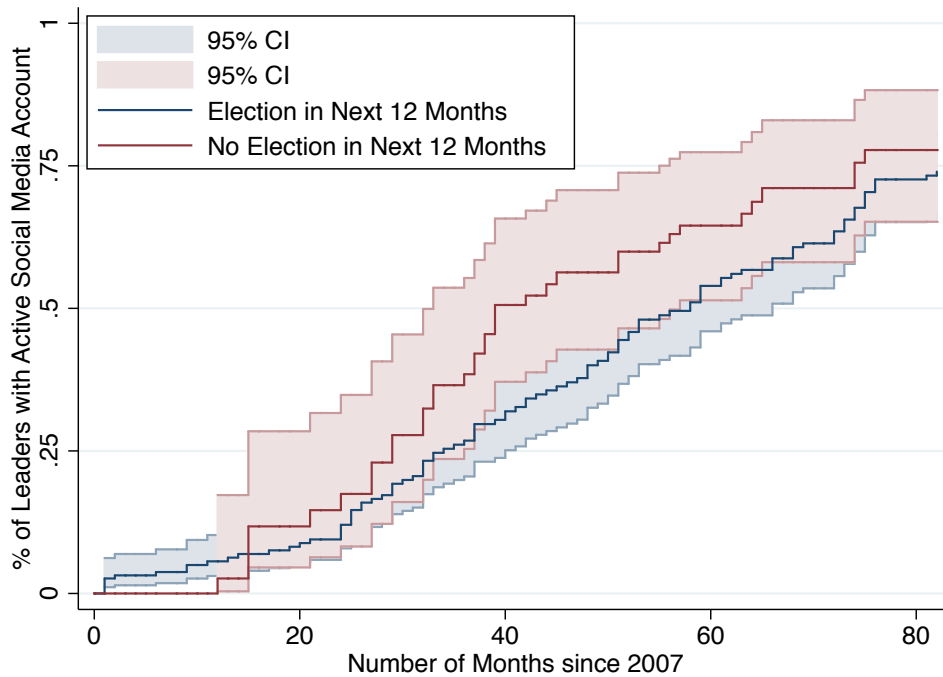
Note: The plot displays "failure," or active social media adoption (i.e. whether a country has an active Twitter or Facebook account associated with a leader).

Facebook account) by world leaders. To account for regional effects that may explain differential speeds of adoption, each regression controls for regional fixed effects. Each column tests one of our proposed hypotheses for social media adoption. Column H1 looks at the effect of wealth, internet penetration, and social media adoption (Modernization Hypothesis), Column H2 looks at the effect of elections and social unrest (Political Pressure Hypothesis), Column H3 looks at the effect of democracy (Transparency/Democracy Hypothesis), Column H4 examines the effect of neighboring countries' adoption of social media (Diffusion Hypothesis), and the Column labeled "All" compares H1-H4 against each other.

Four clear findings emerge. First, the Modernization Hypothesis finds lukewarm support. The positive effects of wealth and internet on social media adoption disappear once we control for other factors (Column H1 compared to Column All). Second, we find partial support for the Political Pressure Hypothesis. Having an election within the year does not significantly increase

Figure 8: Kaplan-Meier Graph of Social Media Adoption by Democracies vs. Non-Democracies
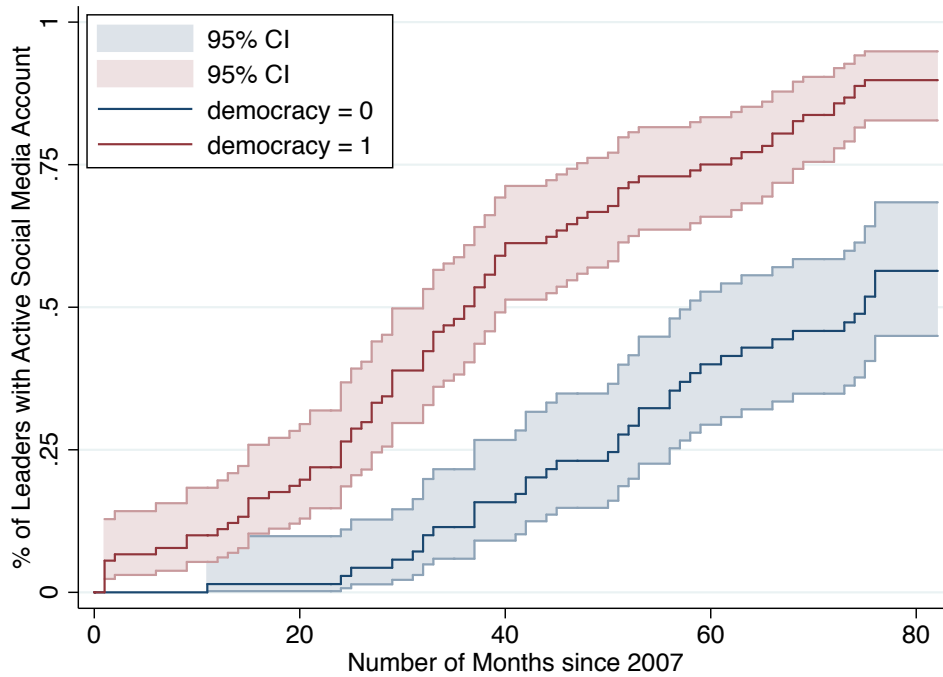
Note: The plot displays "failure," or active social media adoption (i.e. whether a country has an active Twitter or Facebook account associated with a leader). Following standard practice (Jaggers and Gurr, 1995), code countries with a Polity IV score of +6 or higher as democracies.

the probability that world leaders adopt social media, confirming the pattern in the Kaplan-Meier Graph in Figure 7.[17] However, social unrest does have a positive and statistically significant effect on social media adoption, even after controlling for other covariates. This suggests that leaders may be adopting social media in response to protests and threats to their regime. Third, also confirming the results from Figure 8, leaders in more democratic countries are more likely to adopt social media accounts. Finally, although geographic diffusion appears to explain social media adoption in the bivariate model (Column H4), it appears other variables are explaining the spread of social media across countries, as it is not statistically significant in the full model.

In Tables 4 we redo the analysis from Table 3, but now we focus on the determinants of leaders adopting a personal ("Pers" column) versus institutional account ("Inst" column), and a Twitter

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[17]It may be argued that elections only matter in the case of democracy. To test this proposition, we interact the Polity IV score with the variable indicating an upcoming election in the following 12 months. We find no significant interaction effect (results not shown).

Table 3: Cox Proportional Hazard Model

	H1	H2	H3	H4	All
Log GDP Per Capita	0.25*				0.21
	(0.13)				(0.16)
Internet Users	0.01*				0.01
	(0.01)				(0.01)
Social Media Users	0.01				0.08
	(0.11)				(0.12)
Election Within 12 Months		0.10			0.01
		(0.20)			(0.21)
Index of Social Unrest		0.21***			0.21**
(ICEWS), Lagged		(0.07)			(0.08)
Polity IV Score			0.07***		0.05**
			(0.02)		(0.02)
Adoption by K=4 Nearest				0.17**	-0.03
Neighbors (1 lag)				(0.08)	(0.10)
Population, in 1000s (log)					-0.00*
					(0.00)
Region fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	9337	8428	8059	9822	7647
Number of Countries	180	165	160	186	151
Number Get Account	134	126	120	138	114

Dependent variable: Does the Leader Have an Active Social Media Account? Robust standard errors in parentheses. Signif.: *10% **5% ***1%.

("Tw" column) vs Facebook ("Fb" column account). The results largely confirms those from Table 3, and provide a bit more nuance. As in Table 3, social unrest increases the probability that a leader will become active on social media platforms, which is consistent with the idea that protest may trigger leaders' incentives to improve their communication practices in order to remain in power. Interestingly, leaders in more democratic regimes are more likely to adopt a personal account, but not an institutional account. This suggests that Transparency/Democracy Hypothesis effect is most strongly operating at the leader level as well. Leaders in democratic countries have an incentive to cultivate a personal, rather than institutional account–to increase their own stature. We find a similar pattern in the comparison of Twitter vs Facebook, with democracy more likely to drive adoption on the latter social media platform. This result echoes recent research on how Facebook may be a better platform for politicians to "market" themselves to constituents (Enli and

Table 4: Cox Proportional Hazard Model

	Pers	Inst	Tw	Fb
Log GDP Per Capita	0.40**	0.06	0.09	0.16
	(0.18)	(0.20)	(0.17)	(0.16)
Internet Users	-0.01	0.01	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Social Media Users	0.08	-0.06	0.17	0.18
	(0.11)	(0.15)	(0.12)	(0.12)
Election Within 12 Months	0.15	0.01	0.04	-0.00
	(0.24)	(0.27)	(0.24)	(0.24)
Index of Social Unrest	0.14	0.15*	0.22**	0.29***
(ICEWS), Lagged	(0.10)	(0.09)	(0.09)	(0.09)
Polity IV Score	0.08***	0.02	0.03	0.06***
	(0.03)	(0.03)	(0.02)	(0.02)
Adoption by K=4 Nearest	-0.08	0.10	0.02	-0.01
Neighbors (1 lag)	(0.14)	(0.12)	(0.10)	(0.11)
Population, in 1000s (log)	-0.00*	-0.00	-0.00	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
Region fixed effects	Yes	Yes	Yes	Yes
Observations	8998	9553	8828	8396
Number of Countries	151	151	151	151
Number Get Account	87	79	101	102

Dependent variable: Does the Leader Have an Active Social Media Account (Personal or Institutional; on Twitter or on Facebook)? Robust standard errors in parentheses. Signif.: *10% **5% ***1%.

Skogerbø, 2013).[18]

A more nuanced aspect of how world leaders use social media is not only whether they are active or not on these platforms, but also *how active* they are. What explains how many tweets or posts do they publish each month? When do they tweet in English or in the country's language? To answer these questions, we estimate multivariate linear regressions of the monthly count of social media posts on each of the two platforms (logged) and the proportion of monthly tweets in English on a similar set of independent variables as in the previous regression.[19]

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[18] As we show in Figure 7 in the Appendix, all these results are robust to the inclusion of time-varying covariates.

[19] See Table 8 for additional analyses of how leaders who adopt social media use it. We compare both leader usage (total number of Tweets and Facebook posts) and audience response (number of followers and Facebook likes) controlling for population size, wealth, internet, and social media users. Not surprisingly, those who were early adopters of social media, post and tweet more and have more likes and followers. However, conditional on adoption, we do not find differences in audience engagement or leader behavior by level of democracy.

The results of this analysis are presented in Table 5. Note that here we only consider variables that vary at the month level. We find that world leaders appear to increase their levels of activity on social media as the number of users in their country rises, when the next election approaches (although this coefficient is not statistically significant), and when the neighboring countries are active on social media as well. One interesting difference with respect to the previous analysis is that social unrest does appear to drive adoption, but not the levels of activity. Finally, as the third column indicates, we find that none of these variables is a significant predictor of whether leaders tweet in English or other languages.[20]

Table 5: OLS Regression

	Tw	Fb	Eng
Social Media Users, Lagged	0.21**	0.16**	-0.01
	(0.09)	(0.07)	(0.01)
Election Within 12 Months	0.08	0.09	-0.00
	(0.09)	(0.08)	(0.01)
Index of Social Unrest	0.03	0.01	-0.01
(ICEWS), Lagged	(0.04)	(0.04)	(0.01)
Adoption by K=4 Nearest	0.38***	0.50***	0.00
Neighbors, Lagged	(0.06)	(0.07)	(0.01)
Constant	2.40***	1.56***	0.33***
	(0.16)	(0.17)	(0.03)
Country fixed effects	Yes	Yes	Yes
Observations	3472	3362	3472
Number of Countries	112	108	112

Dependent variable: Monthly count of posts on Twitter and Facebook (logged); and proportion of Twitter posts in English. Robust standard errors in parentheses. Signif.: *10% **5% ***1%.

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[20]One potential explanation for this lack of findings is that here we do not distinguish between English-speaking countries and other countries, which could induce measurement error.

5 Discussion and Conclusion

Our paper used a unique dataset to understand the determinants of social media adoption by world leaders. We find support for two channels of adoption. First, democratic leaders are more likely to adopt social media. We further show that this effect is strongest for personal Twitter accounts and Facebook (a more personal medium compared to Twitter). This suggests that democratic leaders use social media to engage in credit-claiming to cultivate a personalistic appeal. It also further reinforces the important role of institutions in shaping leader behavior (Bueno de Mesquita and Downs, 2005). The relatively cheap and easy nature of social media to broadcast targeted messages to audiences is likely to be extremely attractive for democratic leaders who must be responsive to electorates.

Second, we find electoral pressure has no effect on the adoption of social media by world leaders. Conversely, social unrest increases the likelihood of leader adoption of social media. This suggests an intriguing, and little-studied effect of social media related to contentious politics. Most previous research has focused on the effects of social media usage by protestors (Weidmann, 2015; King, Pan, and Roberts, 2012). Yet, our findings suggest that world leaders also adopt social media strategically in response to unrest. World leaders are becoming equally sophisticated as protestors in their use of social media, and see it as an as an important platform for shaping their own narrative about unrest.[21] Leaders are challenging the "protestor" social media advantage, and using social media to discredit and disrupt protests (Gunitsky, 2015; Sanovich, Stukal, Penfold-Brown, and Tucker, 2015; Pearce, 2015).

Taken together these findings show that world leaders are strategic in their adoption of social media, and that these platforms play an important and growing role as a tool for political communication. While we show that adoption is influenced by social unrest and the level of democracy, we find little to no support for such factors influencing the usage of social media (number of posts or Tweets). Thus factors which explain social media adoption are distinct from actual social media usage. Future work should unpack how Twitter and Facebook are used strategically by *both*

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[21]See http://www.latimes.com/business/la-fi-social-media-politics-20150808-story.html

incumbent leaders and challengers in the context of contentious politics. How do leader's use Twitter strategically to counter domestic protests? What role does social media play in swaing domestic versus international opinion amid diplomatic or foreign policy crises? Furthermore, how do protests change the nature of political leader's messages on Twitter? Are they more likely to engage the opposition, or with their own supporters? Tracing out the effects of Twitter usage by leaders on contentious politics (protests, civil war, etc.) and foreign policy is an important next step.

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A Additional results

Table 6: **Operationalization and source of variables used in analysis**

Variable	*Description*
Leader Has Active Social Media Account	Is there an active (tweeted at least once) social media account associated with the head of government. Source: own elaboration (see Section 3.1).
Leader Has Active Personal Account	Is there an active social account associated with the head of government (with their name and picture). Source: own elaboration (see Section 3.1).
Leader Has Active Institutional Account	Is there an active social account associated with the government (with the name of the institution). Source: own elaboration (see Section 3.1).
Leader Has Active Twitter Account	Is there an active Twitter associated with the head of government (personal or institutional). Source: own elaboration (see Section 3.1).
Leader Has Active Facebook Account	Is there an active Facebook associated with the head of government (personal or institutional). Source: own elaboration (see Section 3.1).
Monthly Count of Tweets (All)	Total count of tweets (including retweets and replies) posted on both the personal and institutional Twitter associated with the head of government. Source: Twitter API.
Monthly Count of Posts (All)	Total count of posts posted on both the personal and institutional Facebook associated with the head of government. Source: Facebook Graph API.
% of Tweets in English, by Month	Proportion of tweets posted each month in both the personal and institutional Twitter accounts associated with the head of government. Source: Twitter API.
Log GDP Per Capita	Source: World Bank Development Indicators.
Internet Users	Internet users per 100 inhabitants. Source: World Bank Development Indicators.
Social Media Users	Proportion of Twitter users per one thousand inhabitants. Source: own elaboration from data collected with the Twitter API (see Section 3.1).
Election Within 12 Months	Is the country holding an election within the next twelve months? Source of election dates: IFES Election Guide.
Index of Social Unrest (ICEWS)	Logged count of events of civil society towards government that have a negative intensity value (hostile events). Source: ICEWS (Lautenschlager, Shellman, and Ward, 2015).
Polity IV Score	Democracy score (Polity2 score), from -10 to 10. Source: Polity Project (Jaggers and Gurr, 1995).
Adoption by K=4 Nearest Neighbors (1 lag)	Count of neighbors with active social media account, among 4 countries whose capitals are closest to the country. Source: own elaboration from social media users variable and GeoDist Database (Mayer and Zignago, 2011)
Population, in 1000s (log)	Source: New Maddison Project Database (Bolt and Zanden, 2014)

Table 7: Cox Proportional Hazard Model

	TVC All	TVC Pers.	TVC Inst.	TVC Tw.	TVC Fb.
Main covariates					
Log GDP Per Capita	0.69*	0.86*	0.44	-0.16	1.06**
	(0.39)	(0.47)	(0.61)	(0.54)	(0.49)
Internet Users	-0.02	-0.03*	0.00	0.02	-0.03*
	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
Social Media Users	0.68	0.47	1.98*	0.23	1.32**
	(0.59)	(0.69)	(1.14)	(0.49)	(0.56)
Election Within 12 Months	0.32	0.12	-0.24	0.59	-0.25
	(0.53)	(0.66)	(0.77)	(0.79)	(0.62)
Index of Social Unrest	0.61***	0.41*	0.40	0.16	0.48**
(ICEWS), Lagged	(0.19)	(0.24)	(0.27)	(0.32)	(0.20)
Polity IV Score	0.15**	0.21***	0.04	0.06	0.23***
	(0.06)	(0.06)	(0.09)	(0.07)	(0.08)
Adoption by K=4 Nearest	-0.06	-0.14	-0.02	0.11	-0.40
Neighbors (1 lag)	(0.32)	(0.35)	(0.36)	(0.33)	(0.36)
Population, in 1000s (log)	-0.00*	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Time-varying covariates					
Log GDP Per Capita	-0.01	-0.01	-0.01	0.00	-0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Internet Users	0.00**	0.00	0.00	-0.00	0.00**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Social Media Users	-0.01	-0.01	-0.03	-0.00	-0.02*
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Election Within 12 Months	-0.01	0.00	0.00	-0.01	0.01
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)
Index of Social Unrest	-0.01**	-0.01	-0.01	0.00	-0.01
(ICEWS), Lagged	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)
Polity IV Score	-0.00*	-0.00**	-0.00	-0.00	-0.00**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Adoption by K=4 Nearest	-0.00	0.00	0.00	-0.00	0.01
Neighbors (1 lag)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Population, in 1000s (log)	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Region fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7647	8998	9553	8828	8396
Number of Countries	151	151	151	151	151
Number Get Facebook	114	87	79	101	102

Dependent variable: Does the Leader Have an Active Account (Time-Varying Covariates)? (Type varies across columns). Robust standard errors in parentheses. Signif.: *10% **5% ***1%.

Table 8: OLS regressions of social media variables on country-level characteristics.

	TW (Foll.)	TW (Tweets)	FB (Likes)	FB (Posts)
Months Since Adoption	0.02*	0.05***	0.02***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)
Polity IV Score	0.04	-0.04	0.06	-0.01
	(0.03)	(0.03)	(0.04)	(0.04)
Population, in 1000s (log)	0.91***	0.05	0.65***	0.01
	(0.13)	(0.11)	(0.14)	(0.09)
Internet Users	-0.01	-0.02	0.00	-0.01
	(0.02)	(0.01)	(0.01)	(0.01)
Social Media Users	0.31***	0.10	0.05	-0.01
	(0.09)	(0.08)	(0.13)	(0.08)
Log GDP Per Capita	0.35	0.35	0.01	0.25
	(0.35)	(0.28)	(0.36)	(0.30)
Constant	-0.94	1.32	4.37	3.13
	(3.26)	(2.73)	(3.59)	(2.65)
Region fixed effects	Yes	Yes	Yes	Yes
N (countries)	105	104	102	102
R^2	0.61	0.34	0.51	0.36

Robust standard errors in parentheses. Signif.: *10% **5% ***1%. Dependent variables: number of followers (logged), number of tweets (logged), number of likes (logged), number of Facebook posts (logged). For leaders with two different accounts, we choose the one with the highest number of followers or likes.