Appendix

Figure 1: Examples of Social Media Posts by World Leaders

(a) Post promoting the country

(b) Post advertising policy positions

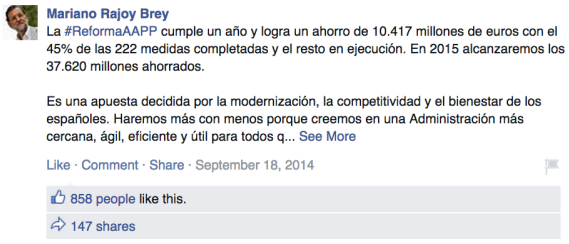
(c) Post about diplomatic relations

Figure 2: Examples of Social Media Posts by World Leaders

(a) Post about government's agenda

(b) Post influencing political agenda

(c) Post about country policies



(d) Personal post

Table 1: 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.
Unfavorable polls (NELDA)	Were there reliable polls that indicated popularity of ruling political party or of the candidates for office before elections AND were they unfavorable to for the incumbent? Source: NELDA25 and NELD26 (Hyde and Marinov, 2011)
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 1: Operationalization and source of variables used in analysis

Variable	*Description*
Electoral Competition (NELDA)	Index computed as the sum of NELDA3 (opposition allowed), NELDA4 (more than one party legal), NELDA5 (a choice of candidates in the ballot), NELDA11 (no concerns about elections being free and fair), and NELDA12 (incumbent or ruling party not confident of victory before elections). Source: (Hyde and Marinov, 2011).
Riots and Protests After Election	Were there riots and protests after the election?. Source: NELDA29 (Hyde and Marinov, 2011).
Freedom of Expression (FH)	Freedom and independence of the media and other cultural expressions, ability of the people to engage in private (political) discussions without fear of harassment or arrest by the authorities, etc. Source: Freedom House.

Validation of variable measuring social media users

We measure social media adoption by the public by estimating 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.[1] Then, 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

[1]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 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.

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. We may also underestimate user adoption in autocratic countries where freedom of expression is restricted, and thus users may have an additional incentive to hide the location of their tweets. Despite these concerns, in our analysis we show that our results (or lack thereof) are robust to controlling for GDP per capita and a measure of freedom of expression and belief elaborated by Freedom House. Finally, the fact that users often tweet when they travel can induce measurement error.[2] 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. These results are consistent with Eurobarometer survey data, which places Cyprus, Spain, Ireland, and the United Kingdom among the top 10 European countries with highest self-reported usage of social networking sites.[3] 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 3 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. Kuwait represents the opposite case: here the number of users per capita has been increasing exponentially since late 2012.

[2] 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.

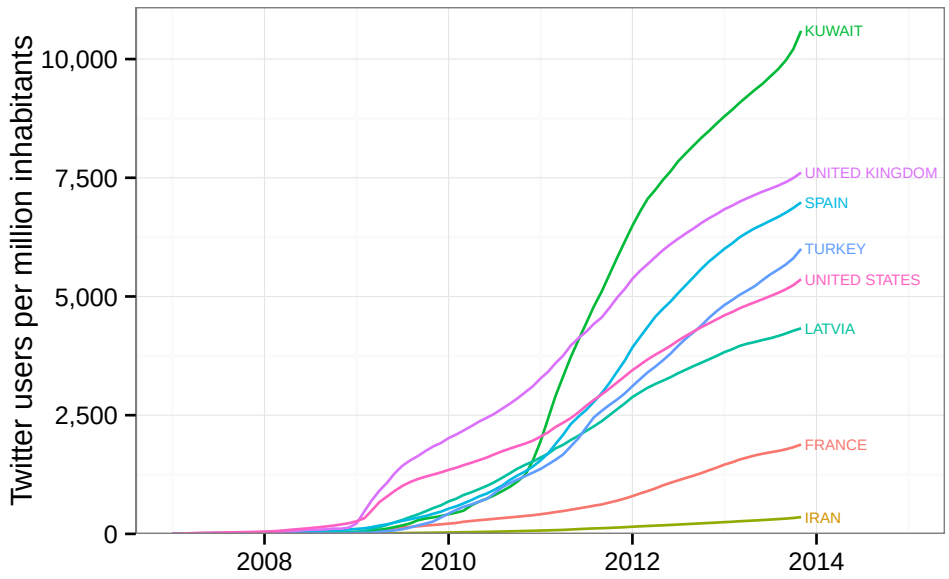
[3] As an additional validation exercise, we compared our estimates of Twitter usage by capita in the 28 EU countries as of November 2012 with survey data from the Eurobarometer conducted that same month, which included a question regarding social media use. The correlation between our measure and the proportion of citizens who "use online social networks at least once a week" (QE3.6) is $r = 0.63$.

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 3: Twitter adoption, by country



Robustness checks

Here, we explore the robustness of our main findings. First, in Table 3, we show that a more complex measure of electoral competition that aggregates different variables in the NELDA dataset (Hyde and Marinov, 2011) yields similar result: positive and significant in the models containing only variables related to electoral pressure, but losing its statistical significance once we control for variables measuring democratic levels. We find that an alternative variable measuring social unrest (the presence of riots and protest after the election, according to the NELDA dataset) is not a significant predictor of social media adoption, although this could be due to its lower degree of granularity (only a dummy variable, and not at the month level as ICEWS), and measuring unrest *after* the election. Finally, our result regarding the importance of democratic institutions also holds: freedom of expression and belief (from Freedom House) is a positive and significant predictor of social media adoption.

One concern with our analysis up to this point may be that we do not capture the interactive effect of electoral pressure and transparency/democracy. For instance, maybe only politicians in democracies are sensitive to electoral pressure. To test this argument, we split our sample into two groups, democratic and non-democratic countries, depending on whether their Polity IV Score is 6 or more, or less than 6. We then replicate our main analysis for these two groups of countries, with our two main measures of electoral pressure as shown in Table 4. We do not find that this effect is moderated by the level of democracy, as in all cases we find the coefficient of our electoral competition variables is not significantly different from zero. In contrast, the effect of social unrest remains positive and statistically significant in three of the four models.

In Table 5 we redo the analysis from Table 3 in the manuscript, but now we focus on the determinants of leaders adopting a personal ("Pers" column) versus institutional account ("Inst" column), and Twitter ("Tw" column) vs Facebook ("Fb" column account). The results largely confirm our main findings, and provide a bit more nuance. As in Table 3 in the manuscript, 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

Table 3: Cox Proportional Hazard Model

	H2	H2	H2	H2	H3	H3
Election Within 12 Months	0.03	0.03	0.13	0.02		-0.05
	(0.27)	(0.28)	(0.27)	(0.27)		(0.27)
Electoral Competition (NELDA)	0.33**	-0.09				
	(0.15)	(0.20)				
Index of Social Unrest	0.36***	0.27**				0.38***
(ICEWS), Lagged	(0.08)	(0.12)				(0.11)
Log GDP Per Capita		0.54**		0.61***		0.46**
		(0.22)		(0.21)		(0.22)
Internet Users		-0.01		-0.01		-0.01
		(0.01)		(0.01)		(0.01)
Social Media Users		0.11		0.09		0.04
		(0.17)		(0.17)		(0.17)
Polity IV Score		0.12***		0.12***		
		(0.04)		(0.04)		
Adoption by K=4 Nearest		-0.13		-0.10		-0.12
Neighbors (1 lag)		(0.14)		(0.14)		(0.14)
Population, in 1000s (log)		0.00		0.00***		-0.00
		(0.00)		(0.00)		(0.00)
Unfavorable polls (NELDA)			0.72**	0.19		0.12
			(0.28)	(0.32)		(0.30)
Riots and Protests After			-0.07	0.30		
Election (NELDA)			(0.33)	(0.34)		
Freedom of Expression (FH)					0.06**	0.14**
					(0.03)	(0.06)
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5577	5238	5669	5306	8963	5161
Number of Countries	149	143	152	145	185	141
Number Get Account	73	70	75	71	117	70

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

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. 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

Table 4: Cox Proportional Hazard Model

	Dem1	Dem2	NonDem1	NonDem2
Election Within 12 Months	0.24		-0.21	
	(0.25)		(0.38)	
Index of Social Unrest	0.26**	0.26*	0.18	0.41**
(ICEWS), Lagged	(0.12)	(0.13)	(0.17)	(0.21)
Population, in 1000s (log)	-0.00	0.00	-0.00*	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Unfavorable polls (NELDA)		0.33		0.71
		(0.30)		(0.91)
Region fixed effects	Yes	Yes	Yes	Yes
Observations	3570	2778	4346	2687
Number of Countries	92	88	73	65
Number Get Account	80	56	38	16

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%.

result echoes recent research on how Facebook may be a better platform for politicians to "market" themselves to constituents (Enli and Skogerbø, 2013).

Finally, as we show in Table 6, all our main results are robust to the inclusion of time-varying covariates.

Table 5: Cox Proportional Hazard Model

	Pers	Inst	Tw	Fb
Log GDP Per Capita	0.41**	0.05	0.09	0.18
	(0.17)	(0.20)	(0.17)	(0.15)
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	0.17
	(0.12)	(0.15)	(0.12)	(0.12)
Election Within 12 Months	0.14	0.00	0.03	-0.01
	(0.24)	(0.27)	(0.24)	(0.23)
Index of Social Unrest	0.14	0.15*	0.22**	0.28***
(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	-0.09	0.09	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	8905	9483	8758	8303
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%.

Table 6: 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%.

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