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MIDDLE EAST INITIATIVE | FEBRUARY 2021

Contagious Protests

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Abstract

This paper explores the spillover of protests across countries using data on nonviolent and spontaneous demonstrations for 200 countries from 2000 to 2020. Using an autoregressive spatial model, the analysis finds strong evidence of "contagious protests," with a catalyzing role of social media. In particular, social media penetration in the source and destination of protests leads to protest spillovers between countries. There is evidence of parallel learning between streets of nations alongside the already documented learning between governments.

Keywords: street protest; contagion; social media.

JEL Codes: C21, D74, D8, E71.

1. Introduction

History provides examples of media incentivizing street protests, which spread across borders. The popular discontent that ended communism in Eastern Europe began in Poland in the early 1980s, and swept through Hungary, East Germany, Bulgaria, Czechoslovakia, and Romania. Radio Free Europe played a critical role as a vehicle for the spread of the information about protests and catalyzed its spillovers across borders (Puddington 2000), as did a network of radio stations of the Catholic Church (Stehle 1982). Fast forward 30 years to the wave of street protests that sparked the Arab Spring in 2011 following the death of a Tunisian street vendor who set himself ablaze—after having been harassed and humiliated by municipal officials. These protests established social media as the new conduit for the spread of protests. In 2019, a second wave of protests that started in Sudan and Algeria spread to other Arab countries, including the Arab Republic of Egypt, Lebanon and Iraq, eventually resulting in a global contagion of protests spanning from Chile to the Russian Federation to Hong Kong SAR, China. Just as the global pandemic put a damper on street protests, the death of George Floyd in US police custody powered a global protest movement against police brutality and racial injustice. Again, social media was the main channel of protest engagement.

In this paper we systematically explore spillovers of spontaneous street protests across countries, with social media acting as the catalyst. We use data on nonviolent and unorganized demonstrations for 200 countries for the period 2000 to 2020. Using an autoregressive spatial model, we find strong evidence for contagious protests with a catalyzing role of social media. Social media penetration in the source and destination of protests leads to protest spillovers between countries. There is evidence for parallel learning between streets of nations alongside the previously documented learning between governments.

Our research is related to three strands of previous work. First, our paper is related to the emerging literature on social media and protests. Battaglini (2017) argues that protests are a way to signal private information to policy makers, in which social media is a good medium for policy makers to aggregate information. A field experiment in Hong Kong SAR shows that one's turnout decision depends on others' turnout decisions (Cantoni et al, 2019). Broadband internet is shown to be positively associated with local online grassroots protest movements in Italy (Campante et al, 2018). The diffusion of VK, Russia's dominant online social network, increased protest turnout in Russia (Enikolopov et al, forthcoming). Where internet coverage is low, such as in Africa, mobile phones' diffusion increased protest turnout (Manacorda and Tesei, 2020).

Our paper is also related to the literature on learning and networks. Buera et al. (2011) study how countries learn from the successes of neighbors' past economic policies. Chen and Suen (2016) theorize that a successful revolution could dramatically lead to revisions in beliefs of both protesters and governments and hence may lead to a series of revolutions in other countries. König et al. (2017) examine how networks (of military alliances and enmities) affect the intensity of the conflict in the Democratic Republic of Congo. Harari and Ferrara (2018) examine how local conflicts in one gridded cell in Africa spill over to neighboring cells.

A strand of the literature studies spillovers from protests. Several papers have documented that protests in Tunisia and Egypt have inspired protesters elsewhere (Bamert et al, 2015; Hale, 2013; Lynch, 2013; Saideman, 2012). Similar spillovers were observed from other revolutionary periods, such as the Eastern European democratization in the 1990s and the revolutionary wave of 1848 in Europe (Hale, 2013; Weyland, 2010, 2012).

The remainder of the paper is organized as follows. Section II presents the data and the empirical strategy. Section III shows the results. Section IV presents robustness checks. Section V concludes.

2. **Data and Empirical Strategy**

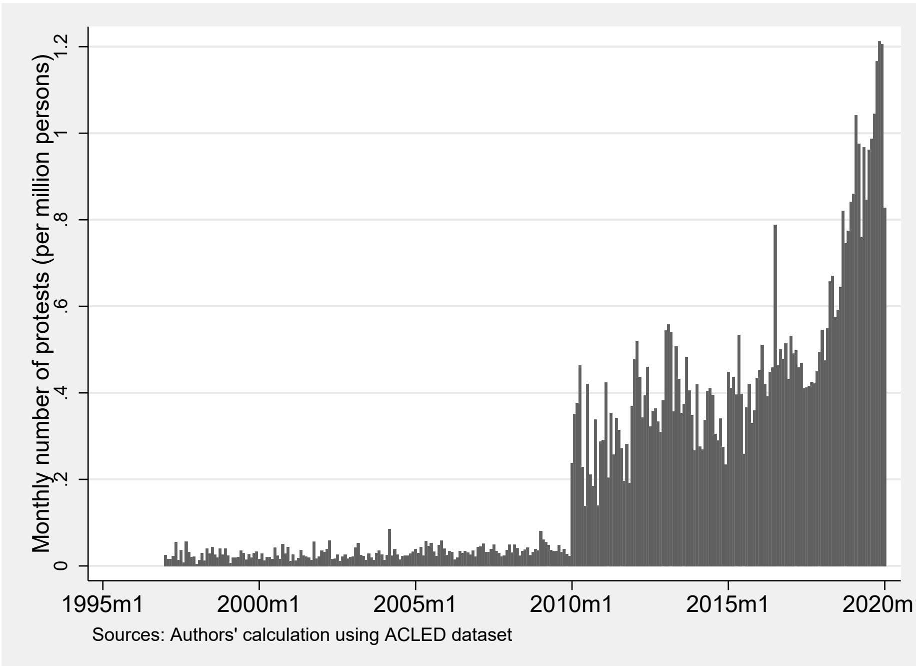
Data on protests are from the Armed Conflict Location & Event Data (ACLED) Project. Protests are defined in the data set as *"non-violent demonstrations, involving typically unorganized action by members of society."* This category covers peaceful protests, protests with interventions (e.g. arrests), and protests in which excessive force was used against protesters (e.g. causing injuries and deaths). Note that this definition does not include violent demonstrations and mob violence. The data coverage starts in 1997 but is severely imbalanced, rendering difficult the use of earlier years to conduct the spatial analysis. We aggregate the number of protests at the monthly (and quarterly) level.

Figure 1 shows the evolution of the number of protests at a monthly frequency as recorded by ACLED—in absolute number (Panel A) and in per million capita (Panel B). Note that starting in 2010 and subsequent years more countries were added to the data set—see Panel A of Appendix Table A1 for the list of countries included in the data set. That explains the big jump in the series in the year 2010. We hence restrict our sample to start in January 2010 when using the ACLED data set.[1]

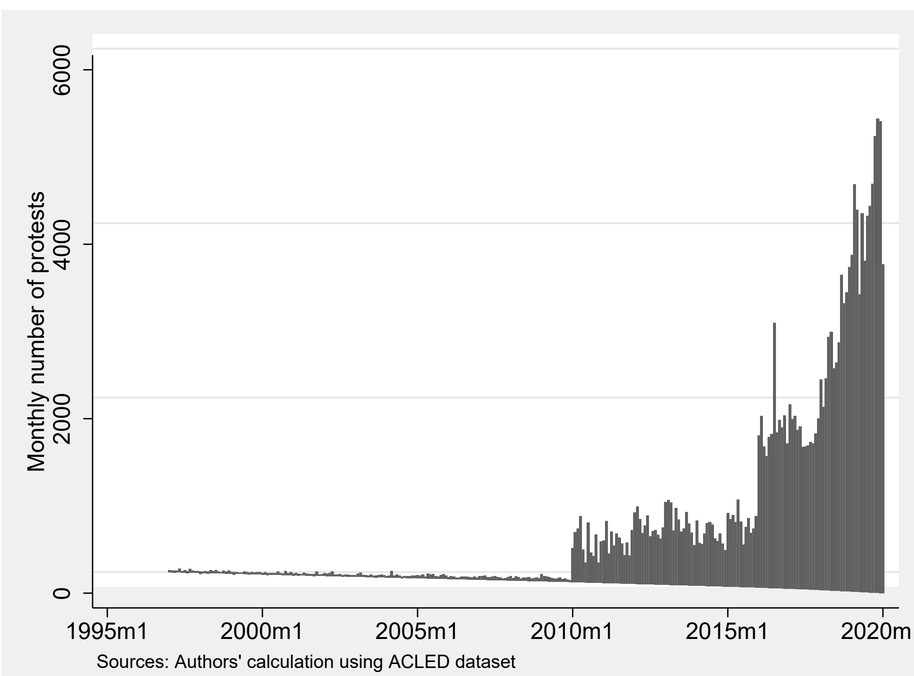
1 Note that for countries added to the data set after 2010, we consider these country-year pairs as missing observations (and not zeros) before they are added to the data set. However, our results remain robust when using data from ACLED starting in January 1997.

Figure 1: Evolution of the Total Number of Protests

Panel A: Protests in levels



Panel B: Protests in per capita



For the sample starting in January 2010 to January 2020, the average number of protests per month per country is 21. In 34 percent of country-month pairs (2,910 of 8,549), there is no occurrence of protest. Panel A of Appendix Figure A1 presents the histogram of the entire distribution of available occurrence of protests from ACLED (Appendix Table A2 for summary statistics of actual protests). The distribution supports the use of the Zero-Inflated Poisson estimator, which we discuss in the next section.

We construct an alternative measure of protests capturing the intensity of media chatter around protests. The rationale for the news-based measure of protests is first and foremost that it allows to significantly expand the scope of the data on protests over space and time. This measure accounts for the saliency of specific protests. For instance, a protest sparked by a popular figure is likely reported and discussed more extensively in the news media. The news data are from Dow Jones FACTIVA, which is a global repository of over one billion articles published across the world and reported in 28 different languages. For each language, the following words are translated: (i) "street" and (ii) "protests" or "protest". The search for each language is constructed such that the word "street" and at least one relating to "protest" appear. For example, in English, the precise search query is: *[("street") AND ("protest" OR "protests")]*.

This search is performed for all countries and all languages in the Dow Jones database, over the period from January 1, 2000 to December 31, 2019. In addition, we gather the number of total articles in the Dow Jones FACTIVA for each country and each month. A measure of normalized article counts is then constructed by taking the ratio between the number of articles mentioning "street protests" and the total number of articles for each country-month pair multiplied by 100. Formally, for country i in month t the intensity of media chatter around protests is as follows:

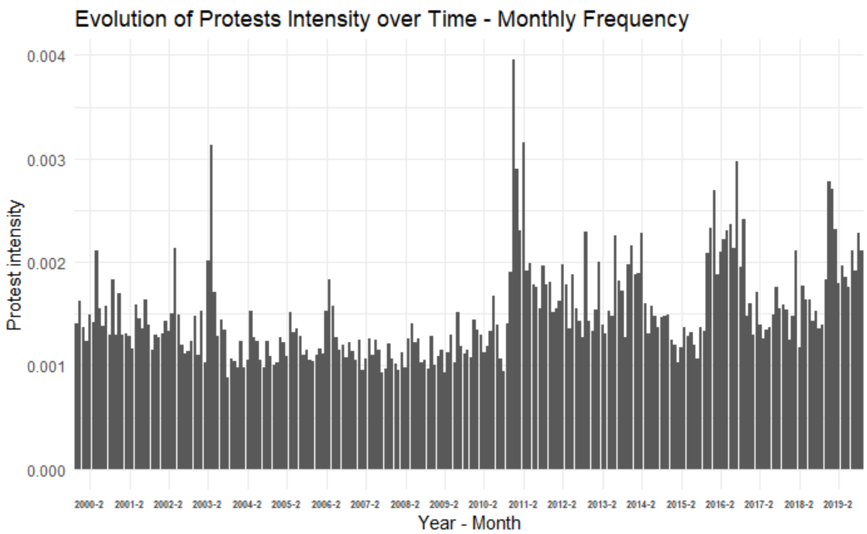
$$News\_Protest_{i,t} = \frac{street\ protest\ article\ count_{i,t}}{total\ article\ count_{i,t}} \times 100$$

The news-based protest data provide us with a balanced panel for 207 countries from January 1, 2000 to December 19, 2019 (see Panel B of Appendix Table A1 for the list of countries). The coverage is more comprehensive than for ACLED and allows us to exploit time and space variation. Panel B of Appendix Figure A1 presents the histogram of the entire distribution of news-based protests. In 33.4 percent of country-month pairs (16,568 of 49,678), there is zero news about protest (Appendix Table A2 for summary statistics). The distribution is also skewed toward zero, which supports the use of the Zero-Inflated Poisson estimator.

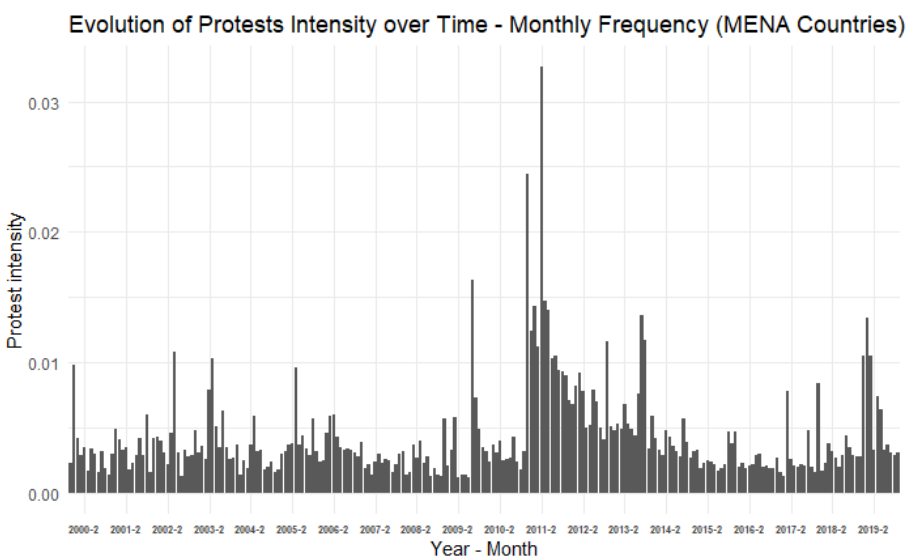
The evolution of the measure is presented in Figure 2 in monthly frequency (Panel A). We also illustrate the evolution of the measure for countries in the Middle East and North Africa (Panel B). Both panels show a clear uptick in the chatter about protests around the Arab Spring in 2011 and the second wave of protests that started in 2019. The uptick in Panel A around 2003 reflects global protests against the war in Iraq.

Figure 2: News-Based Measure of Street Protests

Panel A. Global Perspective



Panel B: Middle East and North Africa countries



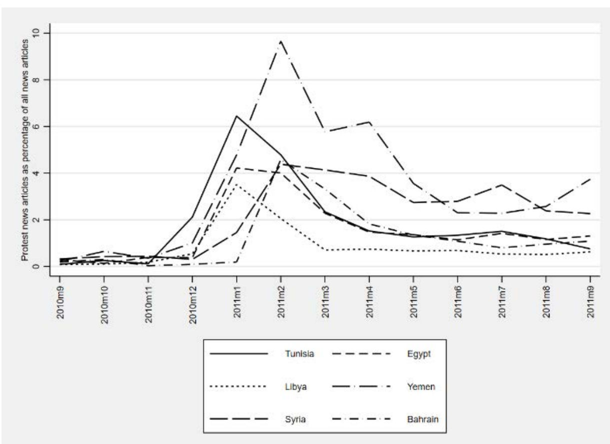
Sources: Dow Jones FACTIVA and authors' own calculations.

Note: Middle East and North Africa region includes Algeria, Bahrain, Djibouti, the Arab Republic of Egypt, the Islamic Republic of Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, the Syrian Arab Republic, Tunisia, United Arab Emirates, West Bank and Gaza, and the Republic of Yemen.

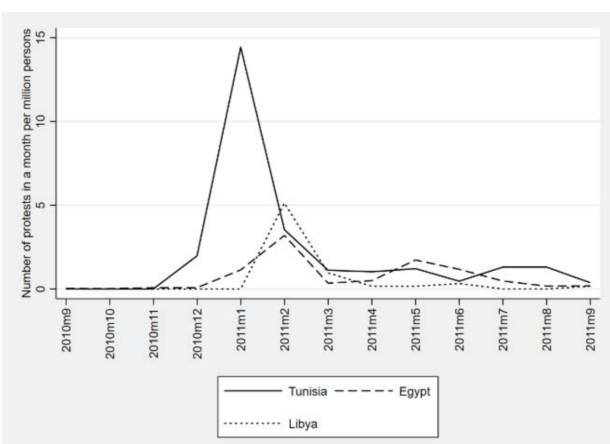
We next compare the ACLED account of actual protests (Panel A in Figure 3) with our alternative source of protests based on news (Panel B in Figure 3) around the time of the Arab Spring. Panel A in Figure 3 shows a spike in the number of protests—plotted as the number of protests in per capita terms—in Tunisia, which occurred after the death of Mohamed Bouazizi on December 17, 2010. Panel B in Figure 3 confirms the spike in the news about protests in Tunisia around that period. The protest quickly spread from Tunisia to Bahrain, Egypt, Libya, the Syrian Arab Republic, and the Republic of Yemen. The availability of data from ACLED limits us to Egypt and Libya only. Panel A in Figure 3 confirms that both Egypt and Libya experienced spikes in actual protests following Tunisia's unrest. The news-based measure appears to be a good proxy to the actual protest data, which suffer from limitations in terms of coverage.

Figure 3. Protests during the Arab Spring

Panel A: Actual Protests from ACLED



Panel B. Protests based on News



Source: ACLED, FACTIVA and authors' own calculations.

We use data on social media penetration to explore the role of social media as a catalyst for the spread of protests across country borders. Specifically, we use the number of Facebook subscribers as a fraction of the population to capture social media penetration in a country. Among different platforms of social media, Facebook accounts for the lion's share in pretty much all world regions (see Appendix Figure A2).[2] In previous anecdotal studies, Facebook use was found in different studies to be linked with protest activity (see Valenzuela et al, 2012 for the case of Chile and for Egypt see New York Times, 2011). A preliminary look at the data suggests a correlation between protests and Facebook penetration (see Appendix Figure A3). In particular, the cross-country correlation between Facebook penetration and the average number of monthly protests (per million persons) is 0.41.

To capture the role of other potential catalysts for protests, we use a variety of other measures. Polity data are from the Polity IV project, which gathers information about authority characteristics of states for 195 countries. Polity IV provides a democracy index ranging from -10 to 10. We use the average value of the democracy index over the period 1997 to 2018 to create a dummy variable on *Common Polity*. The dummy takes the value of 1 if the average democracy index is above 0, and the dummy takes the value of 0 otherwise. Two countries are considered "close" in terms of polity if the dummy for each country takes the same value. Corruption data are from Transparency international's Corruption Perception Index (CPI). The data cover 189 countries. The *Common Corruption* dummy takes the value of 1 if both countries under consideration are relatively corrupt, i.e., the corruption indices of both countries for the last two years are less than the median value. Appendix Table A2 presents summary statistics of actual protests, news-based protests, polity IV, corruption perception index, and social media penetration in 2018.

We next present the test as to whether protests in period, *t-1,* in the rest of world (i.e., for all other countries *j* in the rest of the world) lead to protests in the current period, *t,* in country *i*. The number of protests per capita is skewed to the left, with a majority of countries having no protest (see Table 1).

The framework is an autoregressive spatial model following Lesage and Pace (2009). The Zero-Inflated Poisson (ZIP) model mixes two zero generating processes. The first process generates zeros. The second process is governed by a Poisson distribution with an estimation as follows:

$$y_t = exp\ (\rho W y_{t-1} + \delta I y_{t-\tau} + FE_i + FE_t + u_t) \qquad (1)$$

where y_t is an N-by-1 vector that contains the number of protests *per capita* in N countries at current month t. y_{t-1} is an N-by-1 vector that contains the number of protests *per capita* in N countries in the past month. In subsequent robustness checks, we use quarterly frequency instead of monthly.

2 China is an important exception where Facebook and other global platforms have been blocked. Facebook was banned after June 2009 riots in Western China when the platform was used among protesters.

In addition to the Zero-Inflated Poisson estimator, we use the standard Poisson as an alternative estimator. We also use an alternative measure of protests based on the intensity of media chatter around protests.

W is an N-by-N spatial weight matrix that captures geographic proximity between countries. In the baseline specification, we measure the spatial spillovers using geographical distance. The diagonal elements are zero. The off-diagonal elements are the inverse of the distance between country capitals (i.e., $\frac{1}{distance_{i,j}}$). Next, the weight matrix is standardized so that the sum of row is unity. ρ captures the importance of spatial dependence in protest spillover from foreign countries. I is an N-by-N identity matrix. δ^{τ} captures the autoregressive effects of domestic protests *per capita* in previous months. FE_i and FE_t are vectors of country and month fixed effects. Data on distance and language are obtained from CEPII.

To account for the role that social media could play as a catalyst for protests, we use information about social media penetration in both source and destination of protests. Specifically, we test whether source countries with higher social media penetration are more likely to send stronger protest spillover to other countries. The econometric specification is as follows:

$$y_t = exp\ (\rho Z y_{t-1} + \delta I y_{t-1} + FE_i + FE_t + u_t) \qquad (2)$$

The only difference between (2) and (1) is the spatial weight matrix. Z now is also an N-by-N spatial weight matrix but is different from W. The diagonal elements are zero. The off-diagonal elements are the inverse of the distance multiplied by common social media penetration (i.e., $\frac{1}{distance_{i,j}} \times common\ social\ media_{i,j}$). The weight matrix is then also standardized so that the sum of row is unity. The idea is to account for protests in countries with a common level of social media penetration. $common\ social\ media_{i,j}$ is a dummy which takes the value of 1 if both countries *i* and *j* have relatively large penetration of social media and 0 if at least one country's social media penetration is below that threshold. The hypothesis we test is that the set of countries subject to potential protest spillover is limited to countries with social media penetration beyond a certain threshold.

To account for similarities between political systems and other factors that could play an important role in driving spillovers, we use the following dummies in the estimation:

- $Common\ Polity_{i,j}$ is a dummy which takes the value of 1 if country *i* and country j are either both democracies or both autocracies. The hypothesis we want to test is whether protest spillovers take place between countries with "close" polity.

- $Common\ Corruption_{i,j}$ is a dummy which takes the value of 1 if both countries i and j have a high level of corruption. The hypothesis we want to test is whether protest spillovers take place between countries with “close” levels of perceived corruption.

- $Common\ Language_{i,j}$ is a dummy which takes the value of 1 if both countries i and j have the same language. The hypothesis we want to test is whether protest spillovers take place between countries with similar languages.

3. **Results**

The results for geographic proximity point to statistically insignificant protest spillovers from neighboring countries for both measurement of geographic proximity (see columns [1] and [2] of Table 1). Column [1] captures the spillovers of protests from neighboring countries (i.e., sharing borders) where protests are measured as the simple average of the number of protests per million capita. After controlling for domestic protests in the previous months, protests in neighboring countries are found to have a statistically insignificant effect on protests in the country under consideration. Similarly, column [2] indicates that the spillovers from inverse distance-weighted global protests in the previous months are statistically insignificant.

Table 1: Contagion, Distance and Social Media—Actual Protests

Zero-Inflated Poisson	Protests per million persons (t)				
	Distance Only		Distance*Common Social Media		
			Social Media Penetration Threshold		
			> 10%	**> 20%**	**> 30%**
	[1]	[2]	[3]	[4]	[5]
Protests pc (t-1)	0.033***	0.031***	0.031***	0.032***	0.032***
	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)
Neighbor's simple average protests pc*(t-1)	0.012				
	(0.015)				
Inverse-distance weighted protests pc*(t-1)		0.022			
		(0.022)			
Inverse-Distance-Common Social Media weighted Protest pc*(t-1)			0.030	0.044*	0.047**
			(0.026)	(0.023)	(0.022)
Constant	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7,728	8,256	5,340	3,324	2,652
Number of countries	92	97	67	47	40
N_zero	2776	2822	1584	781	626
Chi-square	18514	22090	16763	11038	9742
Log likelihood	-5150	-5865	-4595	-3466	-2836

Note: Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). *Protests pc* captures the number of protests per million persons. * denotes foreign protests. In columns [3],[4],[5], the threshold for a country to be defined to have large Facebook penetration is 10%, 20% and 30% respectively. Data are from January 2010 to January 2020.

The effects of protest spillovers become significant when the commonality in social media penetration between countries is considered as well. Columns [3],[4],[5] of Table 1 differ in the threshold of the definition for large social media penetration. In column [3], a country is defined to have large social media penetration if it has more than 10% of its population subscribed to Facebook in 2018. In columns [4] and [5], the threshold is 20% and 30% respectively. The dummy $common\ social\ media_{i,j}$ takes the value of 1 if both countries have large social media penetrations and 0 otherwise.

The larger the threshold, the smaller the number of countries included in the sample—which by construction only includes countries with social media above the threshold. We can interpret the results as protest spillovers within a selected number of "connected" countries with high social media penetration. The three columns show that commonality in social media penetration between source and destination country of protests plays an important role in protest spillovers. The coefficients for (inverse distance-social media) weighted average global protests in the previous month now are statistically significant. The coefficient is more significant with larger magnitude for larger common social media thresholds, and largest at the 30% threshold (see column [5]). [3]

The coefficient of 0.047 implies that a one standard deviation increase in foreign protests, which is 3.1 more protests per million persons, leads to 1.15 more domestic protests per million persons. This is 37% of the standard deviation of a country's monthly protests. To put this in perspective, at the onset of the Arab Spring, protests in Tunisia jumped from zero in November 2010 to close to 15 protests per million persons in January 2011, which is 5 times the standard deviation of protests in our sample.

Social media is found to play a significant role in driving spillover of protests using the news-based measure. News-based protest about neighboring countries in the previous month has statistically significant effect on current month domestic news-based protest (see Column [1] of Table 2), but global protest using inverse distance-weighted in previous month has statistically insignificant effect (Column [2]). We observe large and consistent news-based protest spillovers for countries with strong media penetrations. This is true for all three thresholds of social media (columns [3] to [5]). The coefficient of 0.912 in column [5] implies that one standard deviation increase in previous month's foreign news-based protests, which is 0.632 percentage point increase, leads to a 1.78 percentage points increase in the contemporaneous month of its own news-based protests. This is

3 When we run the regressions with distance alone on the samples in columns [3],[4],[5], the coefficients of foreign protests (per million persons) are not significant (Appendix Table A3, Panel A). Appendix Table A4 shows that our main results are robust to using an earlier cross-section of data for Facebook penetration for the year 2010 for 61 countries for both actual protests (Panel A) and news-based protests (Panel B).

equivalent to about 3 times the standard deviation of news-based protests.[4,5] Our results are consistent with the social media being a catalyst for both push and pull factors behind protests, i.e. social media makes it much easier for protesters in one country to raise their voice, and for sympathizers in other countries to read, learn and emulate.

Table 2: Contagion, Distance and Social Media—News based Protests

Zero-Inflated Poisson	News-based protests				
	Distance Only		Distance*Common Social Media		
			Social Media Penetration Threshold		
			> 10%	**> 20%**	**> 30%**
	[1]	[2]	[3]	[4]	[5]
News-based protests(t-1)	0.238***	0.160***	0.234***	0.374***	0.372***
	(0.014)	(0.012)	(0.014)	(0.021)	(0.022)
Neighbor's simple news-based protests*(t-1)	0.098***				
	(0.034)				
Inverse distance weighted news-based protests*(t-1)		0.128			
		(0.152)			
Inverse-Distance-Common Social Media weighted News-based protests*(t-1)			0.889***	0.872***	0.912***
			(0.137)	(0.155)	(0.156)
Constant	-1.461***	-1.80***	-2.079***	-2.152***	-2.14***
	(0.177)	(0.321)	(0.277)	(0.255)	(0.258)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	36,806	49,469	31,348	26,218	24,318
Number of countries	154	207	165	138	128
N_zero	8045	16469	9050	7273	6495
Chi-square	26983	23141	29855	17864	17386
Log likelihood	-16695	-22067	-12989	-10529	-9772

Note: Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). *News-based protests* captures the number of articles mentioning street protests in a country as percentage of total number of articles covering the country. * denotes foreign *news-based protests.* In columns [3],[4],[5], the threshold for a country to be defined to have large. Facebook penetration is 10%, 20% and 30% respectively. Since Facebook was launched in 2004, data in these 3 columns are restricted from January 2004 to December 2019.

4 Note that changes in sample size are not driving the significance of the role of social media. Indeed, Appendix Table A3 Panel B shows that coefficients associated with distance-weighted foreign protests remain insignificant and are smaller when using the samples presented in Columns [3] to [5] in Table 1.

5 The samples used in Columns [3] to [5] in Table 1 only include countries above the social media thresholds—weights are not defined otherwise. Results remain robust when we impose undefined weights as zeros when countries having relatively low social media penetration are included in the samples (Appendix Table A5).

We examine the role of *Polity* characteristics, *Corruption* level and *Language* in protest spillovers. They are found to play an insignificant role in the spillover of actual protests (Columns [1] to [3] of Table 3), except for the spillover of news-based protests where they have some importance (columns [4] to [6]).

Table 3: Contagion, Polity, Corruption, and Language

Zero-Inflated Poisson	Protests per million persons			News-based protests		
	[1]	[2]	[3]	[4]	[5]	[6]
Protest pc (t-1)	0.031***	0.031***	0.032***			
	(0.005)	(0.005)	(0.004)			
News-based protests (t-1)				0.236***	0.234***	0.164***
				(0.013)	(0.014)	(0.012)
Inverse-distance-Common Polity weighted Protest pc*(t-1)	0.009					
	(0.018)					
Inverse-distance-Corruption weighted Protest pc*(t-1)		0.002				
		(0.015)				
Inverse-distance-Common Language weighted Protest pc*(t-1)			0.018*			
			(0.010)			
Inverse-distance-CommonPolity weighted news-based protests*(t-1)				0.467***		
				(0.078)		
Inverse-distance-Corruption weighted news-based protests*(t-1))					0.224***	
					(0.074)	
Inverse-distance-Common Language weighted news-based protests*(t-1)						0.174***
						(0.051)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,184	6,048	6,936	38,718	18,499	41,582
Number of countries	95	72	76	162	124	174
N_zero	2822	2117	2602	8241	4023	14946
Chi-square	21384	13219	18698	31139	19957	19197
Log likelihood	-5697	-3658	-4730	-509.1	-289.6	-527.0

Note: Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). *Protests pc* capture the number of protests per million persons. *News-based protests* captures the number of articles mentioning street protests in a country as percentage of total number of articles covering the country. * denotes foreign.

Regarding the news discussions of street protests, polity, corruption, and common language are found to have significant effects on the spillover of global protest discussions (Panel B). Between them, *Common Polity* seems to have the largest effects (columns [4] to [6] of Table 3). The coefficient of 0.467 implies that one standard deviation increase in previous month's foreign news-based protests, which is 0.632 percentage point increase, leads to 1.34 percentage points increase in the contemporaneous month of its own news-based protests.

4. **Robustness Checks**

We conduct several robustness checks. First, we examine protest spillover at the quarterly frequency. Second, we employ the Standard Poisson estimator. Our results are robust to these checks.

We find that the spillovers are weaker when using quarterly frequency. This is true for both measures of protests. Table 4 shows that past foreign protests, even with large social media penetration, are no longer having spillover effects on domestic protests (columns [1] to [3] of Table 4). The coefficients remain positive but are not statistically significant.

In terms of news-based protests, foreign protests are found to have statistically significant spillover effects on domestic protests at all three thresholds of social media penetration (see columns [4] to [6]). This finding could reflect the stronger tendency for news-based protests to spread than actual protests do. However, the coefficients associated with the effects for the last quarter's discussions about foreign protests are smaller than those of the last month's (see Table 2 for a comparison). The effect using quarterly frequency tends to "dilute" the effect captured at the monthly frequency.

Table 4: Contagion, Distance, and Social Media—Quarterly Frequency

Zero-Inflated Poisson	Protests per million persons			News-based protests		
	[1]	[2]	[3]	[4]	[5]	[6]
Social Media Penetration Threshold	**> 10%**	**> 20%**	**> 30%**	**> 10%**	**> 20%**	**> 30%**
Protest pc (t-1)	0.010***	0.010***	0.010***			
	(0.002)	(0.002)	(0.002)			
News-based protests (t-1)				0.193***	0.413***	0.412***
				(0.032)	(0.033)	(0.035)
Inverse-distance-Common Social Media weighted Protest pc*(t-1)	0.039	0.040	0.038			
	(0.029)	(0.025)	(0.024)			
Inverse-distance-Common Social Media weighted news-based protests*(t-1)				0.440**	0.536**	0.662***
				(0.208)	(0.237)	(0.233)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,780	1,108	884	10,395	8,694	8,064
Number of countries	67	47	40	165	138	128
N_zero	310	174	145	1813	1477	1291
Chi-square	11224	7293	6535	14666	8477	8142
Log likelihood	-2805	-2117	-1751	-4286	-3466	-3224

Note: Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). *Protests pc* capture the number of protests per million persons. Data are from January 2010 to January 2020. *News-based protests* captures the number of articles mentioning street protests in a country as percentage of total number of articles covering the country. Since Facebook was launched in 2004, data in columns [4] to [6] are restricted from January 2004 to December 2019. *denotes foreign.

We also test the presence for spillover of last month's foreign protests in both actual protests and news-based protests, using the Standard Poisson estimator. A standard Poisson estimator is less suitable to the Zero-Inflated Poisson Estimator because the former does not address the issue of excessive zeros in the dependent variable. Nevertheless, the standard Poisson estimator yields a similar magnitude for the actual protest spillovers to that by the Zero-Inflated Poisson Estimator (see columns [2] and [3] of Table 5). The Standard Poisson Estimator also yields similar magnitude for the spillover of news-based protests (columns [4] to [6] of Table 5). At all thresholds of common social media, the coefficients are significant.

Table 5: Contagion, Distance, and Social Media—Poisson Estimator

Zero-Inflated Poisson	Protests per million persons			News-based protests		
	[1]	[2]	[3]	[4]	[5]	[6]
Social Media Penetration Threshold	**> 10%**	**> 20%**	**> 30%**	**> 10%**	**> 20%**	**> 30%**
Protest pc (t-1)	0.031***	0.032***	0.032***			
	(0.001)	(0.002)	(0.002)			
News-based protests (t-1)				0.234***	0.374***	0.372***
				(0.020)	(0.027)	(0.028)
Inverse-distance-Common Social Media weighted Protest pc*(t-1)	0.029	0.031***	0.046*			
	(0.032)	(0.028)	(0.026)			
Inverse-distance-Common Social Media weighted news-based protests*(t-1)				0.889***	0.872***	0.912***
				(0.175)	(0.214)	(0.219)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,340	3,324	2,652	31,348	26,218	24,318
Number of countries	67	47	40	165	138	128
Chi-square	221625	397000	164076	117912	33160	53553
Log likelihood	-4418	-3339	-2729	-12563	-10174	-9443

Note: Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). *Protests pc* capture the number of protests per million persons. *News-based protests* captures the number of articles mentioning street protests in a country as percentage of total number of articles covering the country. Since Facebook was found in 2004, data in columns [4] to [6] are restricted from January 2004 to December 2019. *denotes foreign.

5. **Conclusions**

The frequent shutdown of internet by governments in times of protests illuminates the catalyzing role of social media. Governments often argue that limited social media access is necessary for public safety or curbing the spread of misinformation. It seems, however, that a bigger concern is the organizing role of social media in anti-government protests.

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Appendix Table A1

Panel A: Countries included in the ACLED dataset with at least 1 protest

Country	First month in the dataset	Country	First month in the dataset
Afghanistan	1/2017	Libya	1/1997
Albania	1/2018	Madagascar	1/1997
Algeria	1/1997	Malawi	1/1997
Angola	1/1997	Malaysia	1/2018
Armenia	1/2018	Mali	1/1997
Azerbaijan	1/2018	Mauritania	1/1997
Bahrain	1/2016	Moldova	1/2018
Bangladesh	1/2010	Montenegro	1/2018
Belarus	1/2018	Morocco	1/1997
Benin	1/1997	Mozambique	1/1997
Bosnia and Herzegovina	1/2018	Myanmar	1/2010
Botswana	1/1997	Namibia	1/1997
Bulgaria	1/2018	Nepal	1/2010
Burkina Faso	1/1997	Niger	1/1997
Burundi	1/1997	Nigeria	1/1997
Cambodia	1/2010	North Macedonia	1/2018
Cameroon	1/1997	Oman	1/2016
Central African Republic	1/1997	Pakistan	1/2010
Chad	1/1997	West Bank and Gaza	1/2016
Croatia	1/2018	Philippines	1/2016
Cyprus	1/2018	Qatar	1/2016
Congo, Dem. Rep.	1/1997	Congo, Rep.	1/1997
Djibouti	1/1997	Romania	1/2018
Egypt, Arab Rep.	1/1997	Russian Federation	1/2018
Equatorial Guinea	1/1997	Rwanda	1/1997
Eritrea	1/1997	Saudi Arabia	1/2015
Eswatini	1/1997	Senegal	1/1997
Ethiopia	1/1997	Serbia	1/2018
Gabon	1/1997	Sierra Leone	1/1997
Gambia, The	1/1997	Somalia	1/1997
Georgia	1/2018	South Africa	1/1997
Ghana	1/1997	South Sudan	1/1997
Greece	1/2018	Sri Lanka	1/2010
Guinea	1/1997	Sudan	1/1997
Guinea-Bissau	1/1997	Syrian Arab Republic	1/2017
India	1/2016	Tajikistan	1/2018
Indonesia	1/2015	Tanzania	1/1997
Iran, Islamic Rep.	1/2016	Thailand	1/2010
Iraq	1/2016	Togo	1/1997
Israel	1/2016	Tunisia	1/1997
Côte d'Ivoire	1/1997	Turkey	1/2016
Jordan	1/2016	Turkmenistan	1/2018
Kazakhstan	1/2018	Uganda	1/1997
Kenya	1/1997	Ukraine	1/2018
Kosovo	1/2018	United Arab Emirates	1/2016
Kuwait	1/2016	Uzbekistan	1/2018
Kyrgyzstan	1/2018	Vietnam	1/2010
Lao PDR	1/2010	Yemen, Rep.	1/2015
Lebanon	1/2016	Zambia	1/1997
Lesotho	1/1997	Zimbabwe	1/1997
Liberia	1/1997		

Panel B: Countries included in the news-based protest dataset

Afghanistan, Albania, Algeria, Andorra, Angola, Anguilla,Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, British Virgin Islands, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia ,Cameroon, Canada, Cape Verde, Cayman Islands, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo Republic, Costa Rica, Cote d'Ivoire, Croatia, Cuba, Cyprus, Czech Republic, Democratic Republic of the Congo, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Eswatini, Ethiopia, Faroe Islands, Fiji, Finland, France, French Polynesia, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Greece, Greenland, Grenada, Guatemala, Guinea-Bissau, Guinea, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Macau, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Moldova, Mongolia, Montserrat, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, Netherlands, New Caledonia, New Zealand, Nicaragua, Niger, Nigeria, North Korea, North Macedonia, Northern Mariana Islands, Norway, Oman, Pakistan, Palau, Palestine, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Puerto Rico, Qatar, Romania, Russia, Rwanda, Saint Lucia, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, St. Helena, St. Kitts and Nevis, St. Vincent and the Grenadines, Sudan, Suriname, Sweden, Switzerland, Syria, Taiwan, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Turks and Caicos Islands, Tuvalu, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe

Appendix Table A2: Summary Statistics

	Protests (per million persons)	Protests news (%)	Corruption Perception Index	Polity IV	Facebook Penetration in 2018 (%)
Number of Obs	8524	49678	3150	162	192
Mean	0.791	0.197	42.388	3.530	41.738
Std. Dev.	3.118	0.632	20.948	6.105	23.446
Min	0.000	0.000	4	-10	0.211
p10	0.000	0.000	21	-6.909	8.169
p25	0.000	0.000	26	-1.364	18.528
Median	0.116	0.075	36	5.818	47.199
p75	0.554	0.202	55	8.909	60.937
p90	1.643	0.438	76	10	72.615
Max	124.192	57.143	100	10	95.906
Number of Countries	101	207	184	162	192
Unit	Country-Month	Country-Month	Country average	Country average	Country

Appendix Table A3: Contagion and Distance

Panel A: Actual Protests using Reduced Sample

	[1]	[2]	[3]
Zero-Inflated Poisson	Protests per million persons (t)		
Social Media Penetration Threshold	**> 10%**	**> 20%**	**> 30%**
Protest pc (t-1)	0.030***	0.031***	0.031***
	(0.005)	(0.004)	(0.004)
Inverse-Distance-weighted Protest pc*(t-1)	-0.002	0.042	0.044
	(0.037)	(0.033)	(0.033)
Country fixed effects	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes
Observations	5,340	3,324	2,652
Number of countries	67	47	40
N_zero	1584	781	626
Chi-square	14778	11188	9926
Log likelihood	-4673	-3470	-2840

Note: This panel reports the regressions on the samples of columns [3] to [5] of Table 1. The results point to insignificant effect of the inverse-distance weighted average protests (per million persons). Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). *Protests pc* captures the number of protests per million persons. * denotes foreign protests.

Panel B: News Coverage using Reduced Sample

	[1]	[2]	[3]
Zero-Inflated Poisson	News-based protests (t)		
Social Media Penetration Threshold	> 10%	> 20%	> 30%
News-based protests(t-1)	0.231***	0.371***	0.370***
	(0.014)	(0.021)	(0.021)
Inverse-distance-weighted news-based protests*(t-1)	0.432***	0.229	0.217
	(0.112)	(0.141)	(0.145)
Constant	-2.016***	-2.072***	-2.053***
	(0.276)	(0.255)	(0.257)
Country fixed effects	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes
Observations	31,348	26,218	24,318
Number of countries	165	138	128
N_zero	9050	7273	6495
Chi-square	29724	18124	17650
Log likelihood	-12994	-10537	-9782

Note: This panel reports the regressions on the samples of columns [3] to [5] of Table 2. The results point to largely insignificant effect of the inverse-distance weighted average news-based protests. Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). *News-based protests* captures the number of articles mentioning street protests in a country as percentage of total number of articles covering the country. * denotes foreign *news-based protests*.

Appendix Table A4: Contagion, Distance and Social Media—2010 Facebook Penetration

Panel A: Contagion, Distance, and Social Media—Actual Protests

	[1]	[2]
Zero-Inflated Poisson		
Social Media Penetration Threshold in July 2010	> 5%	> 10%
Protest pc (t-1)	0.037***	0.038***
	(0.003)	(0.003)
Inverse-Distance-Common Social Media weighted Protest pc*(t-1)	0.054*	0.052*
	(0.029)	(0.028)
Constant	Yes	Yes
Month fixed effects	Yes	Yes
Observations	1,056	552
Number of countries	18	13
N_zero	160	88
Chi-square	7017	3817
Log likelihood	-1244	-860.5

Note: This panel includes countries having social media penetration in July 2010 larger than 5% and 10% thresholds. The results point to still positive and marginally significant effect of the inverse-distance-social media weighted average global protests (per million persons). Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). *Protests pc* captures the number of protests per million persons. * denotes foreign protests. 10% threshold (13 countries) includes Israel, Turkey, Bahrain, Qatar, Croatia, Malaysia, Greece, Lebanon, Kuwait, Philippines, Tunisia, Jordan, and Indonesia. 5% threshold (18 countries) includes Israel, Turkey, Bahrain, Qatar, Croatia, Malaysia, Greece, Lebanon, Kuwait, Philippines, Tunisia, Jordan, Indonesia, Romania, Thailand, South Africa, Morocco, and Oman.

Panel B: Contagion, Distance and Social Media—News based Protests

Zero-Inflated Poisson	[1]	[2]
Social Media Penetration Threshold	> 5%	> 10%
Protest news(t-1)	0.467***	0.452***
	(0.029)	(0.029)
Inverse-Distance-Common Social Media protest news*(t-1)	0.456***	0.373***
	(0.109)	(0.099)
Constant	Yes	Yes
Country fixed effects	Yes	Yes
Month fixed effects	Yes	Yes
Observations	10,038	8,604
Number of countries	42	36
N_zero	545	392
Chi-square	11179	10963
Log likelihood	-4099	-3527

Note: This panel includes countries having social media penetration in July 2010 larger than 5% and 10% thresholds. The results point to positive and highly significant effect of the inverse-distance-social media weighted average global protests news. Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). *Protest news* captures the number of articles mentioning street protests in a country as percentage of total number of articles covering the country. * denotes foreign *protest news*. 10% threshold includes Hong Kong, Canada, United Kingdom, United States, Chile, Sweden, Australia, Israel, Ireland, Belgium, Turkey, Taiwan, France, Bahrain, Slovenia, Qatar, Italy, Slovakia, Croatia, Argentina, Malaysia, Greece, Austria, Venezuela, Spain, Lebanon, Colombia, Kuwait, Estonia, Philippines, Tunisia, Jordan, Hungary, Germany, Mexico, and Indonesia. 5% threshold includes the latter countries plus Poland, Romania, Thailand, South Africa, Morocco, and Oman.

Appendix Table A5: Contagion, Distance, and Social Media

Panel A: Actual Protests—including Countries with Social Media Penetration below Thresholds

	[1]	[2]	[3]
Zero-Inflated Poisson	Protests per million persons (t)		
Social Media Penetration Threshold	> 10%	> 20%	> 30%
Protest pc (t-1)	0.031***	0.031***	0.031***
	(0.004)	(0.004)	(0.004)
Inverse-Distance-Common Social Media weighted Protest pc*(t-1)	0.030	0.022	0.023
	(0.024)	(0.020)	(0.019)
Constant	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes
Observations	7,812	7,812	7,812
Number of countries	92	92	92
N_zero	2603	2603	2603
Chi-square	21691	21761	21712
Log likelihood	-5573	-5573	-5573

Note: This panel reports the regressions in columns [3] to [5] of Table 1 but including countries having social media penetration below the thresholds (by assigning undefined weights to zero). The results point to still positive but insignificant effect of the inverse-distance-social media weighted average global protests (per million persons). Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). *Protests pc* captures the number of protests per million persons. * denotes foreign protests.

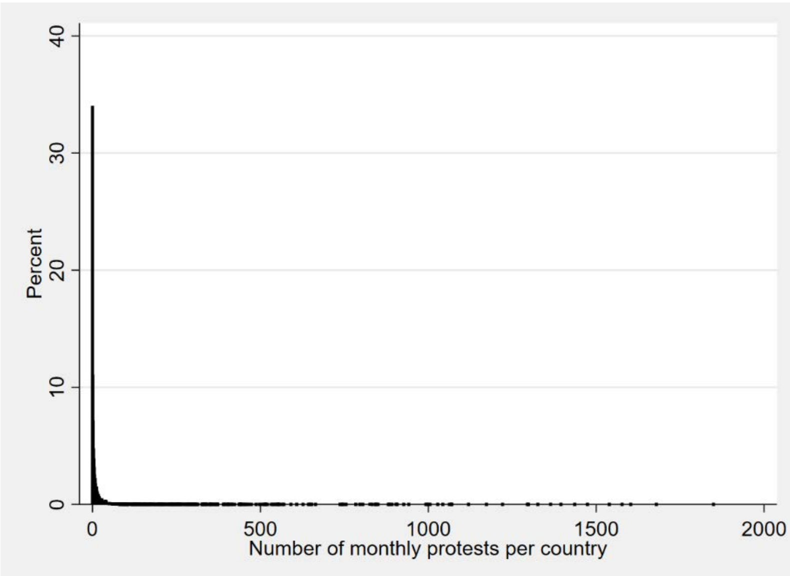
Panel B: News based Protests – Including Countries with Social Media Penetration below Thresholds

	[1]	[2]	[3]
Zero-Inflated Poisson	News-based protests (t)		
Social Media Penetration Threshold	> 10%	> 20%	> 30%
News-based protests(t-1)	0.236***	0.234***	0.234***
	(0.013)	(0.013)	(0.013)
Inverse-Distance-Common Social Media news-based protests*(t-1)	0.510***	0.540***	0.495***
	(0.132)	(0.120)	(0.118)
Constant	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes
Observations	45,886	45,886	45,886
Number of countries	192	192	192
N_zero	14686	14686	14686
Chi-square	30003	29919	29898
Log likelihood	-19695	-19693	-19694

Note: This panel reports the regressions in columns [3] to [5] of Table 2 but including countries having social media penetration below the thresholds (by assigning undefined weights to zeros). The results point to positive and highly significant effect of the inverse-distance-social media weighted average global protests news. Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). *News-based protests* captures the number of articles mentioning street protests in a country as percentage of total number of articles covering the country. * denotes foreign *news-based protests*.

Appendix Figure A1: Distribution of Protests

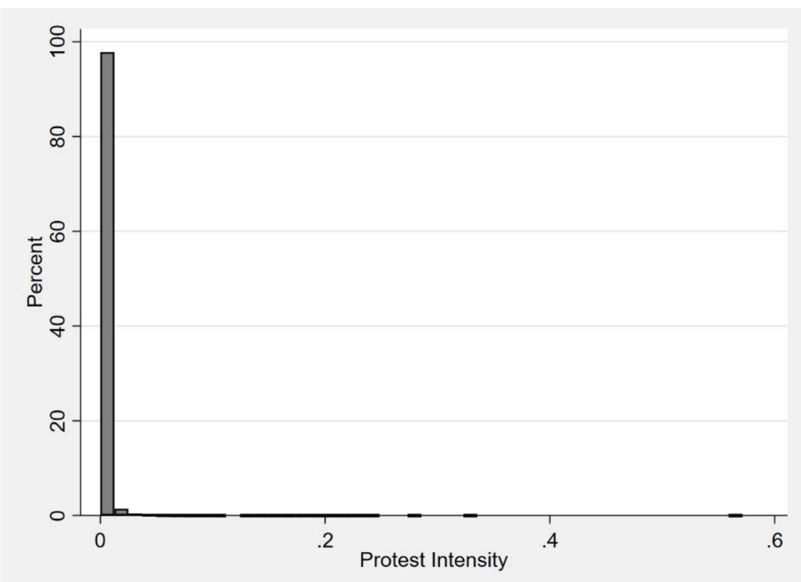
Panel A: Distribution of Number of Protests per Country per Month



Source: ACLED and authors' own calculation.

Note: In 34 percent of country-month pairs (2910 out of 8549), there is no occurrence of protest.

Panel B: Distribution of Protests News Intensity

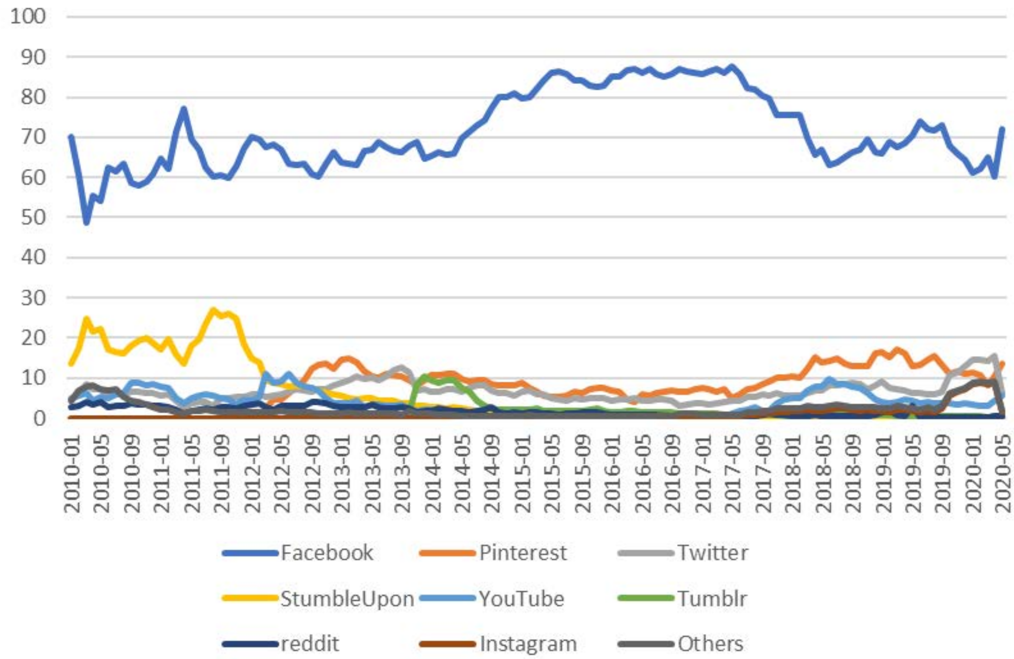


Source: Dow Jones' FACTIVA and authors' own calculation.

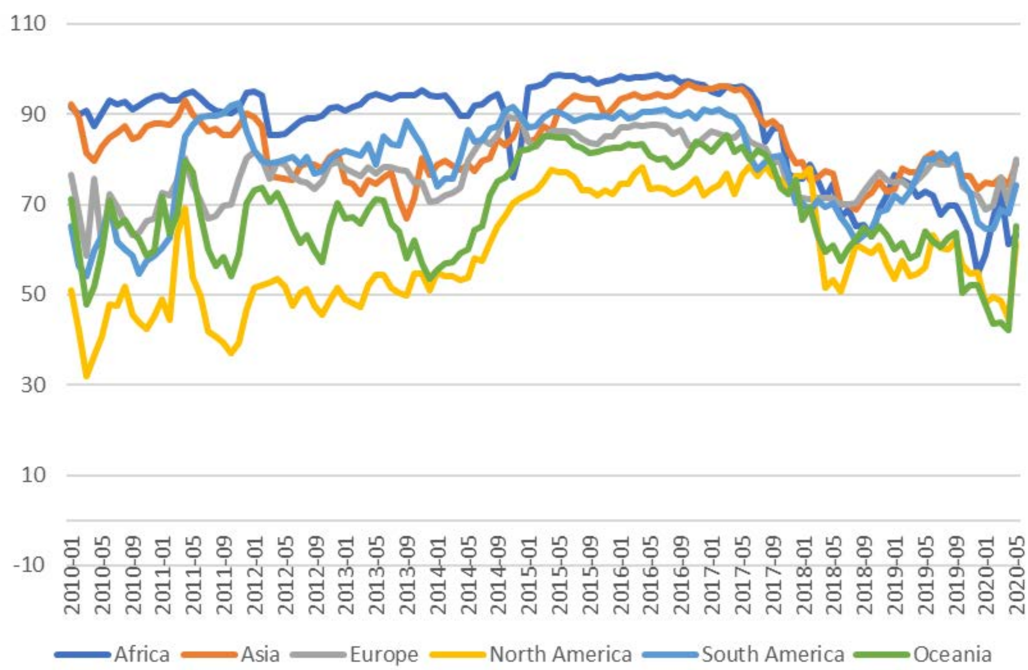
Note: Protest intensity is measured as the number of street news-based protests articles divided by the number of total news articles in that country and month. In 33.4 percent of country-month pairs (16568 out of 49678), there is zero news-based protests.

Appendix Figure A2: Market Shares of Facebook

Panel A: Facebook versus other Social Media Platforms



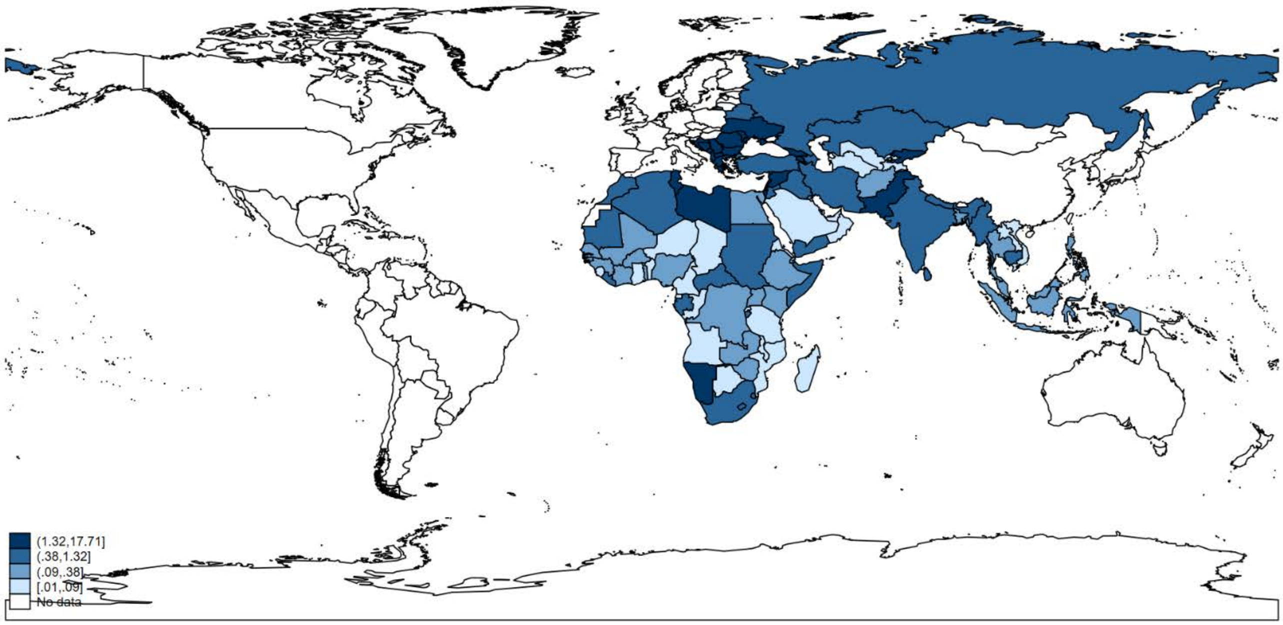
Panel B: Facebook's Market Share in Different Regions



Source: statcounter.com [https://gs.statcounter.com/social-media-stats#monthly-200903-202005]

Appendix Figure A3: Facebook Penetrations and Protests

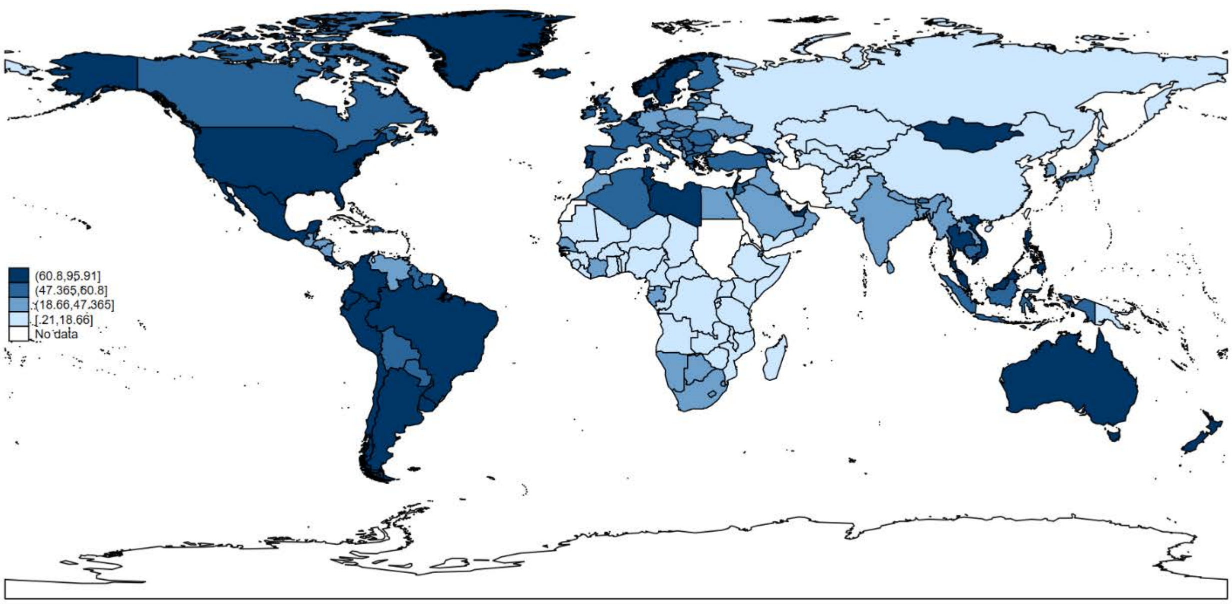
Panel A: Average Number of Protests per Million Persons Per Month



Source: ACLED.

Note: Include countries with at least 1 protest. Data coverage starts from January 2010.

Panel B: Facebook Penetration (% of Population, December 2018)



Source: www.napoleoncat.com.