Social Media and Vote Outcomes:
Evidence from the United States

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Bocconi

CBS ● NEWS

PROJECTION

DONALD **TRUMP**

ELECTED 45TH PRESIDENT

OF THE UNITED STATES

	PRESIDENT MISSISSIPPI 87% IN			
● CBS NEWS CAMPAIGN 2016		R DONALD TRUMP ✓ CBS ● NEWS PROJECTION	58%	659,579
		D HILLARY CLINTON	39%	453,105

"Facebook and Twitter were the reason we won this thing," he says. "Twitter for Mr. Trump. And Facebook for fundraising."

Here's How Facebook Actually Won Trump the Presidency

The Fake Americans Russia Created to Influence the Election

Twitter unveils more data on foreign manipulation

Donald Trump's 'celebrity-style' tweets helped him win US presidential election, says data scientist

This paper

1. **We estimate the effect of social media on elections using quasi-experimental variation**

   - Shock to adoption: South by Southwest (SXSW) festival in 2007

2. **Twitter exposure decreases the Republican vote share in 2016/2020 presidential elections**

   - Similar results in county-level and individual-level data

   - No effect in earlier elections and no effect on House/Senate elections

3. **Consistent with Bayesian persuasion models, effect decreases with voter priors**

   - Driven by undecided voters and "swing counties"

4. **Potential Mechanism**

   - Unlikely to be driven by a general left-shift of Twitter or a user number effect

   - Pro-democratic backlash against Donald Trump on Twitter

Related literature

1) Social media and political outcomes

- **Protests:** e.g., Howard et al. (2011), Enikolopov et al. (2019), Acemoglu et al. (2017)

- **Xenophobia:** e.g., Müller & Schwarz (2018), Müller & Schwarz (2019), Bursztyn et al. (2019)

- **Polarization & fake news:** e.g., Boxell et al. (2017), Allcott & Gentzkow (2017), Levy (2021)

2) Internet and political outcomes

- **Broadband internet:** e.g., Falck et al. (2014), Gavazza et al. (2019), Campante et al. (2017), Lelkes et al. (2017), Boxell et al. (2018)

- **Mobile internet:** e.g., Manacorda & Tesei (2020), Guriev et al. (2020)

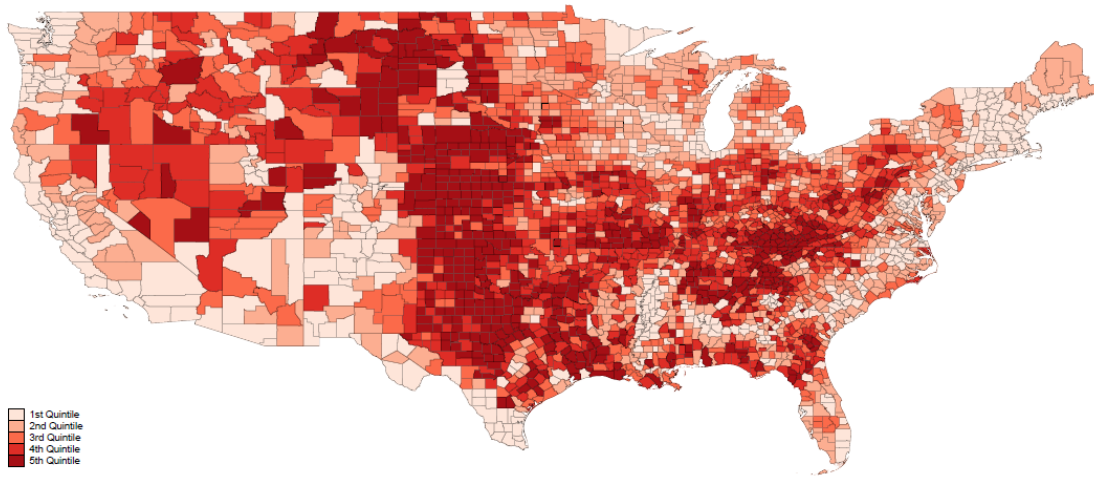**3) Persuasion through television, newspapers, and radio**

- e.g., Gentzkow (2006), Huber & Arceneaux (2007), DellaVigna & Kaplan (2007), Gentzkow et al. (2011), Enikolopov et al. (2011), DellaVigna et al. (2014), Larcinese & Miner (2017), Martin & Yurukoglu (2017), Spenkuch & Toniatti (2018)
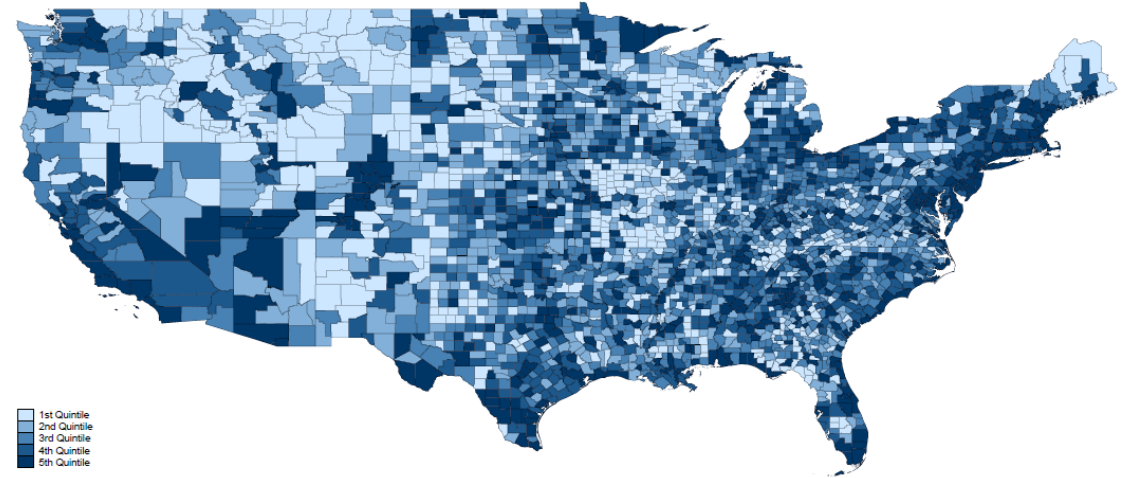
Data and Identification

Data

Republican vote share, 2016

Twitter users per capita

Exogenous shock to Twitter usage: SXSW festival 2007

Spike in Twitter activity around SXSW 2007
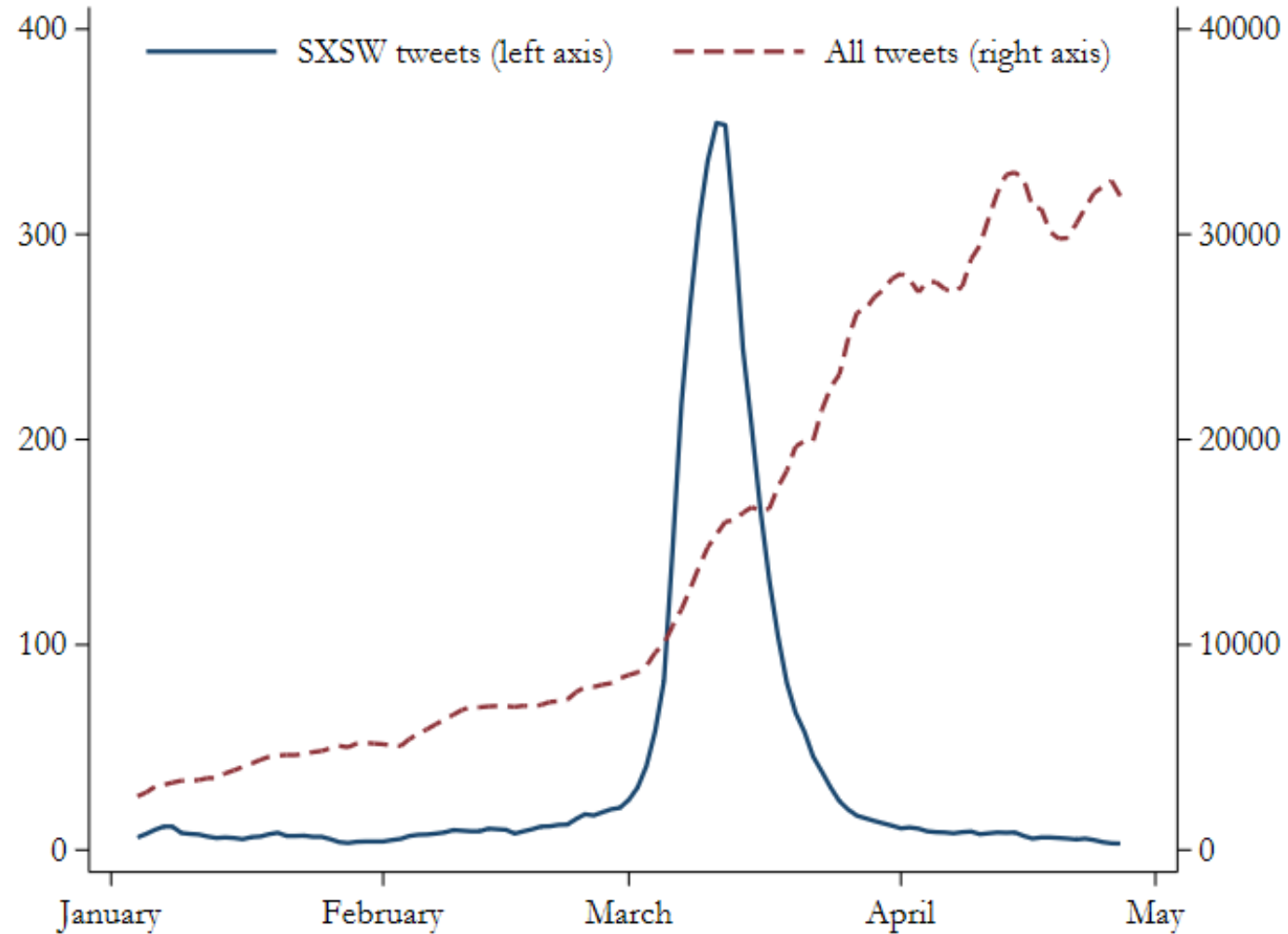
Two-stage least squares

Second stage:

$$y_c = \alpha + \boldsymbol{\beta} \cdot \widehat{\boldsymbol{Twitter\ users}}_c + \gamma \cdot SXSW\ followers_c^{pre} + \boldsymbol{X'}_c + \epsilon_c$$

First stage:

$$Twitter\ users_c = \psi + \boldsymbol{\delta} \cdot \boldsymbol{SXSW\ followers}_c^{March\ 2007}$$

$$+ \theta \cdot SXSW\ followers_c^{pre} + \boldsymbol{X'}_c + \xi_c$$

Variable definitions:

- $\boldsymbol{y_c}$: county-level vote outcomes in levels and differences (e.g., 2016 Republican presidential two-party vote share)
- $\boldsymbol{Twitter\ users_c}$: log number of Twitter users
- $\boldsymbol{SXSW\ followers_c^{March\ 2007}}$ and $\boldsymbol{SXSW\ followers_c^{pre}}$: log number of SXSW followers plus 1
- $\boldsymbol{X'_c}$: control variables (e.g., census region fixed effects and population deciles)

Assumption underlying the identification strategy

Relevance:

1. Increase in Twitter usage starts with the SXSW festival

2. Increase is geographically concentrated in home counties of SXSW attendees

3. Effect persists until today

Exclusion restriction:

1. Number of 2007 SXSW attendees in a county affects vote outcomes through the impact of SXSW on Twitter usage

2. Vote outcomes in these counties do not differ for other reasons

Relevance: Local adoption shock

$$Tweets_{ct} = \sum_{\tau} \beta_{\tau} \cdot SXSW_c^{March\ 2007} \times 1[t = \tau] + \sum_{\tau} \delta_{\tau} \cdot SXSW_c^{pre} \times 1[t = \tau] \cdot + \theta_c + \gamma_t + \xi_{ct}$$
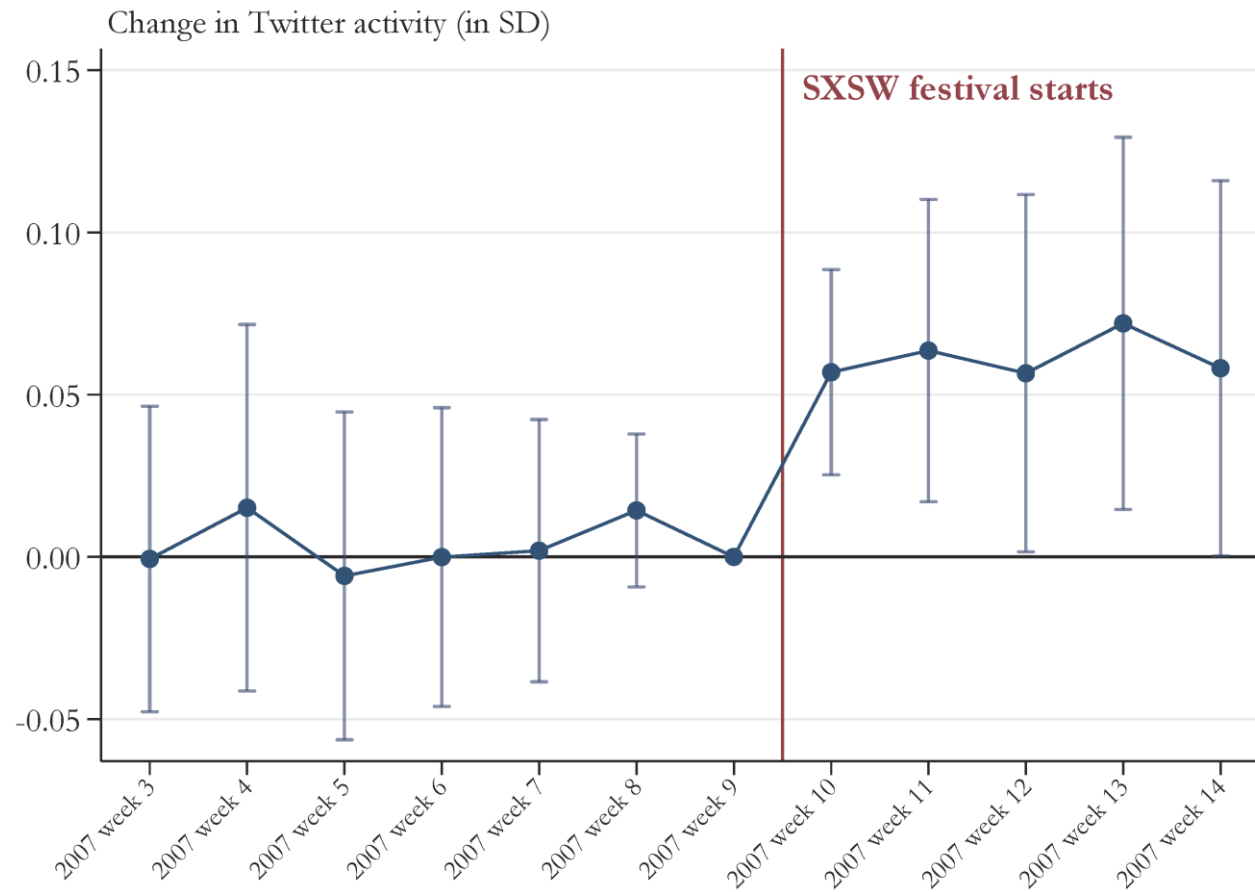
Relevance: Persistence of the adoption shock

$$Twitter\ users/Pop_{ct} = \sum_{\tau} \beta_{\tau} \cdot SXSW_c^{March\ 2007} \times 1[t = \tau] + \sum_{\tau} \delta_{\tau} \cdot SXSW_c^{pre} \times 1[t = \tau] \cdot + \theta_c + \gamma_t + \xi_{ct}$$

Diff-in-diff estimate of SXSW on Twitter usage

Exclusion restriction

Concern:

Omitted variable drives electoral effects in home counties of SXSW followers

Evidence:

Omitted variable would need to be correlated with $SXSW_c^{March\ 2007}$ and y_c but uncorrelated with:

1. number of SXSW followers that joined in earlier months

2. observable variables

3. number of followers of other festivals

4. levels and trends in election results before Twitter's launch and rise to popularity

5. election results in congressional elections in 2016 and 2020.

Identification

Exclusion restriction

SXSW followers
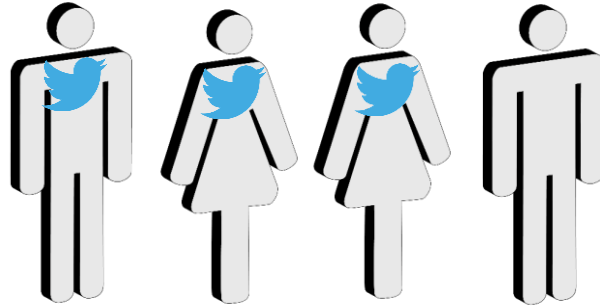
Twitter
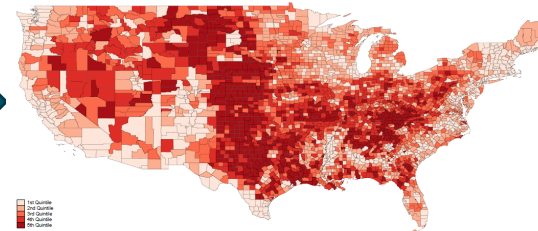
Home counties of SXSW followers March 2007

Omitted variable
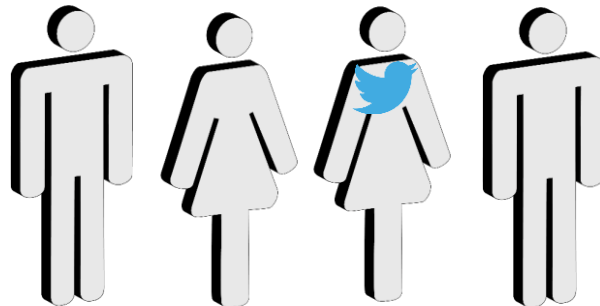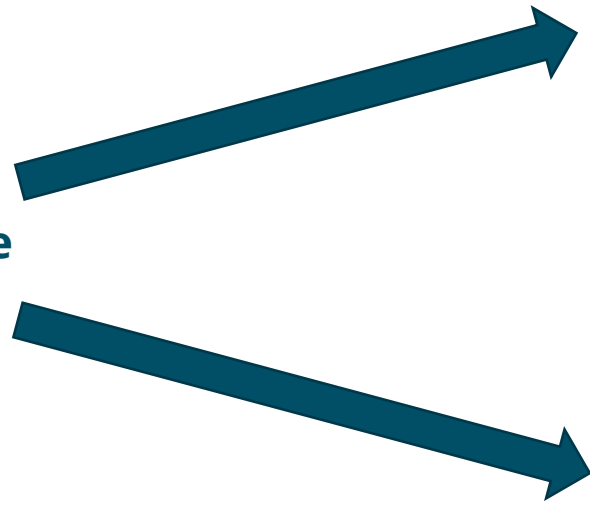
Home counties of SXSW followers before 2007

Are SXSW followers who joined in March 2007 different?

Firstnames (Corr. = 0.69)		Bios (Corr. = 0.92)	
Pre-Period	Treatment Period	Pre-Period	Treatment Period
michael	michael	http	http
mike	john	founder	com
paul	chris	com	digital
chris	jeff	co	founder
ryan	matt	tech	medium
eric	brian	design	director
david	david	director	tech
matthew	alex	product	music
john	jason	digital	social
jeff	kevin	designer	marketing
robert	paul	medium	design
mark	mike	music	co
andrew	dan	social	writer
daniel	andrew	love	love
james	peter	marketing	lover
kevin	jim	web	dad
jay	tom	geek	creative
jonathan	jennifer	writer	tweet
rob	steve	technology	author
rachel	todd	dad	designer

Are their home counties different?

	March 2007 and Pre	March 2007 only	Pre only	Difference in means		Šidàk
	(1)	(2)	(3)	(2) - (3)	p-value	p-value
Population density	5192.27	1021.39	1998.35	-976.96	0.07*	0.95
Log(County area)	6.30	6.63	6.54	0.09	0.73	1.00
Distance from Austin, TX (in miles)	1775.99	1749.38	1626.64	122.74	0.48	1.00
Distance from Chicago (in miles)	1439.45	1329.47	1214.42	115.05	0.53	1.00
Distance from NYC (in miles)	1685.31	1594.99	1510.05	84.94	0.78	1.00
Distance from San Francisco (in miles)	2751.83	2900.11	2833.01	67.10	0.83	1.00
Distance from Washington, DC (in miles)	1558.55	1450.23	1397.05	53.18	0.85	1.00
% aged 20-24	0.07	0.08	0.08	0.00	0.92	1.00
% aged 25-29	0.09	0.07	0.07	-0.00	0.51	1.00
% aged 30-34	0.08	0.07	0.07	-0.00	0.58	1.00
% aged 35-39	0.07	0.06	0.06	-0.00	0.82	1.00
% aged 40-44	0.06	0.06	0.06	0.00	0.82	1.00
% aged 45-49	0.07	0.06	0.06	0.00	0.89	1.00
% aged 50+	0.32	0.35	0.35	-0.00	0.97	1.00
Population growth, 2000-2016	0.18	0.18	0.15	0.03	0.56	1.00
% white	0.50	0.65	0.67	-0.02	0.62	1.00
% black	0.18	0.12	0.08	0.04	0.20	1.00
% native American	0.01	0.01	0.02	-0.02	0.02**	0.53
% Asian	0.10	0.05	0.05	-0.01	0.55	1.00
% Hispanic	0.20	0.16	0.15	0.01	0.80	1.00
% below poverty level	15.71	15.82	13.69	2.14	0.17	1.00
% unemployed	4.86	5.05	4.51	0.54	0.07*	0.95
Gini index	0.48	0.46	0.45	0.01	0.24	1.00
% uninsured	12.87	12.40	11.21	1.19	0.35	1.00
Log(Median household income)	11.00	10.91	10.99	-0.09	0.18	1.00
% employed in agriculture	0.00	0.00	0.00	0.00	0.27	1.00
% employed in IT	0.04	0.02	0.02	-0.00	0.98	1.00
% employed in manufacturing	0.07	0.09	0.09	0.01	0.63	1.00
% employed in nontradable sector	0.23	0.26	0.27	-0.01	0.52	1.00
% employed in construction/real estate	0.06	0.07	0.07	0.01	0.39	1.00
% employed in utilities	0.04	0.04	0.03	0.00	0.56	1.00
% employed in business services	0.29	0.25	0.24	0.01	0.70	1.00
% employed in other services	0.27	0.26	0.28	-0.02	0.27	1.00
% adults with high school degree	21.76	25.99	25.77	0.22	0.88	1.00
% adults with graduate degree	16.15	13.08	14.34	-1.26	0.40	1.00
% watching Fox News	0.25	0.26	0.26	-0.00	0.91	1.00
% watching prime time TV	0.42	0.43	0.43	0.00	0.91	1.00
Exposure to Chinese import competition	2.55	2.46	2.79	-0.32	0.54	1.00
Share of routine occupations	32.47	31.38	31.25	0.13	0.82	1.00
Average offshorability index	0.37	-0.07	-0.05	-0.02	0.84	1.00
Republican two-party vote share (1996)	0.36	0.42	0.42	-0.00	0.90	1.00

First Stage Evidence
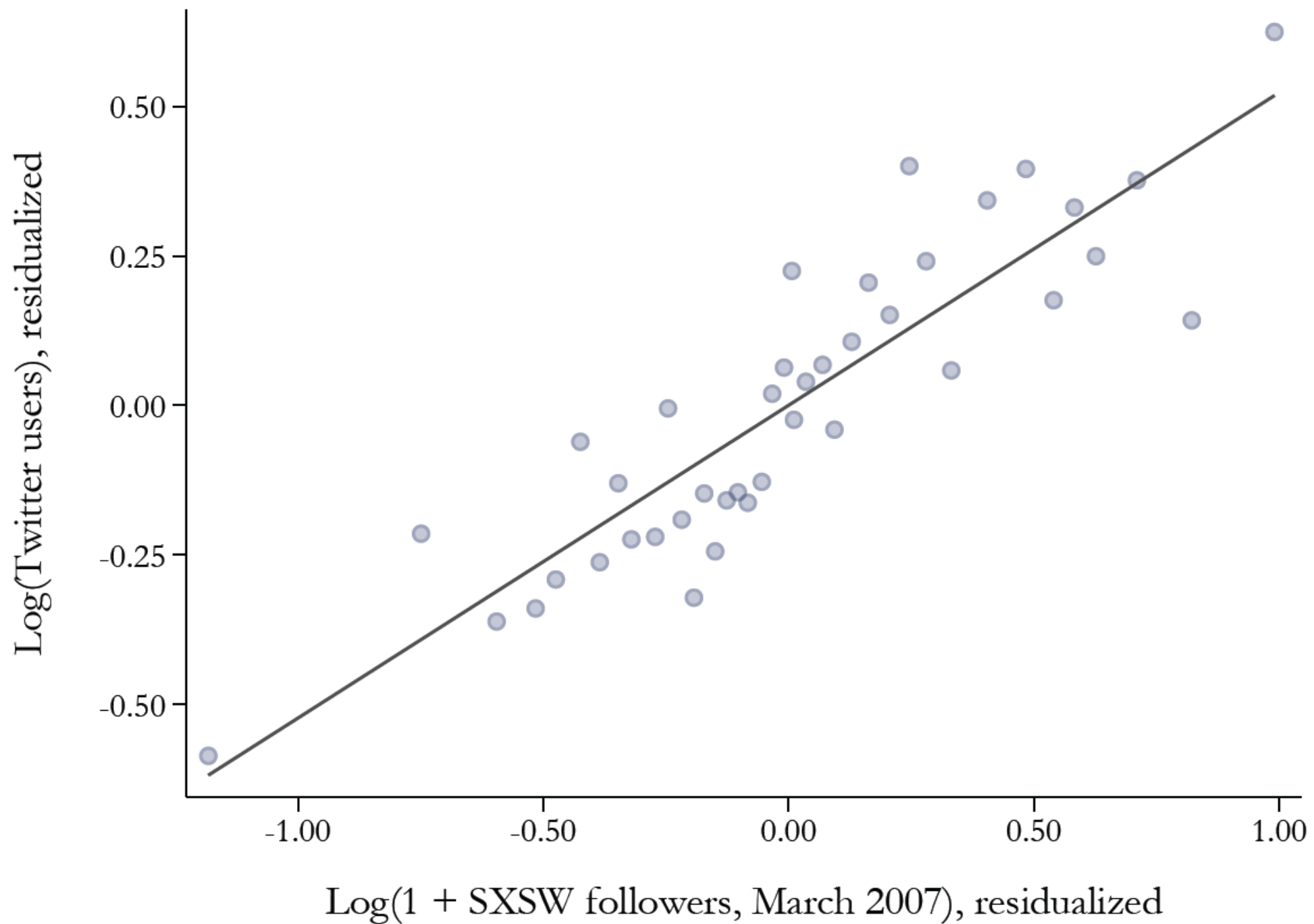
First stage

$$Twitter\ users_c = \psi + \boldsymbol{\delta \cdot SXSW\ followers_c^{March\,2007}} + \theta \cdot SXSW\ followers_c^{pre} + \boldsymbol{X'_c} + \xi_c$$

	Dep. var.: Log(Twitter users)				
	(1)	(2)	(3)	(4)	(5)
Log(SXSW followers, March 2007)	0.726***	0.683***	0.563***	0.524***	0.523***
	(0.087)	(0.079)	(0.055)	(0.048)	(0.048)
Log(SXSW followers, Pre)	0.104	0.110	0.059	0.059	0.058
	(0.101)	(0.076)	(0.098)	(0.082)	(0.082)
Population deciles	Yes	Yes	Yes	Yes	Yes
Census region FE	Yes	Yes	Yes	Yes	Yes
Geographical controls		Yes	Yes	Yes	Yes
Demographic controls			Yes	Yes	Yes
Socioeconomic controls			Yes	Yes	Yes
China shock controls				Yes	Yes
1996 election control					Yes
Observations	3,065	3,065	3,064	3,064	3,064
R^2	0.92	0.93	0.95	0.95	0.95
Mean of DV	8.22	8.22	8.22	8.22	8.22
p-value: March 2007 = Pre	0.00	0.00	0.00	0.00	0.00

Second Stage Evidence
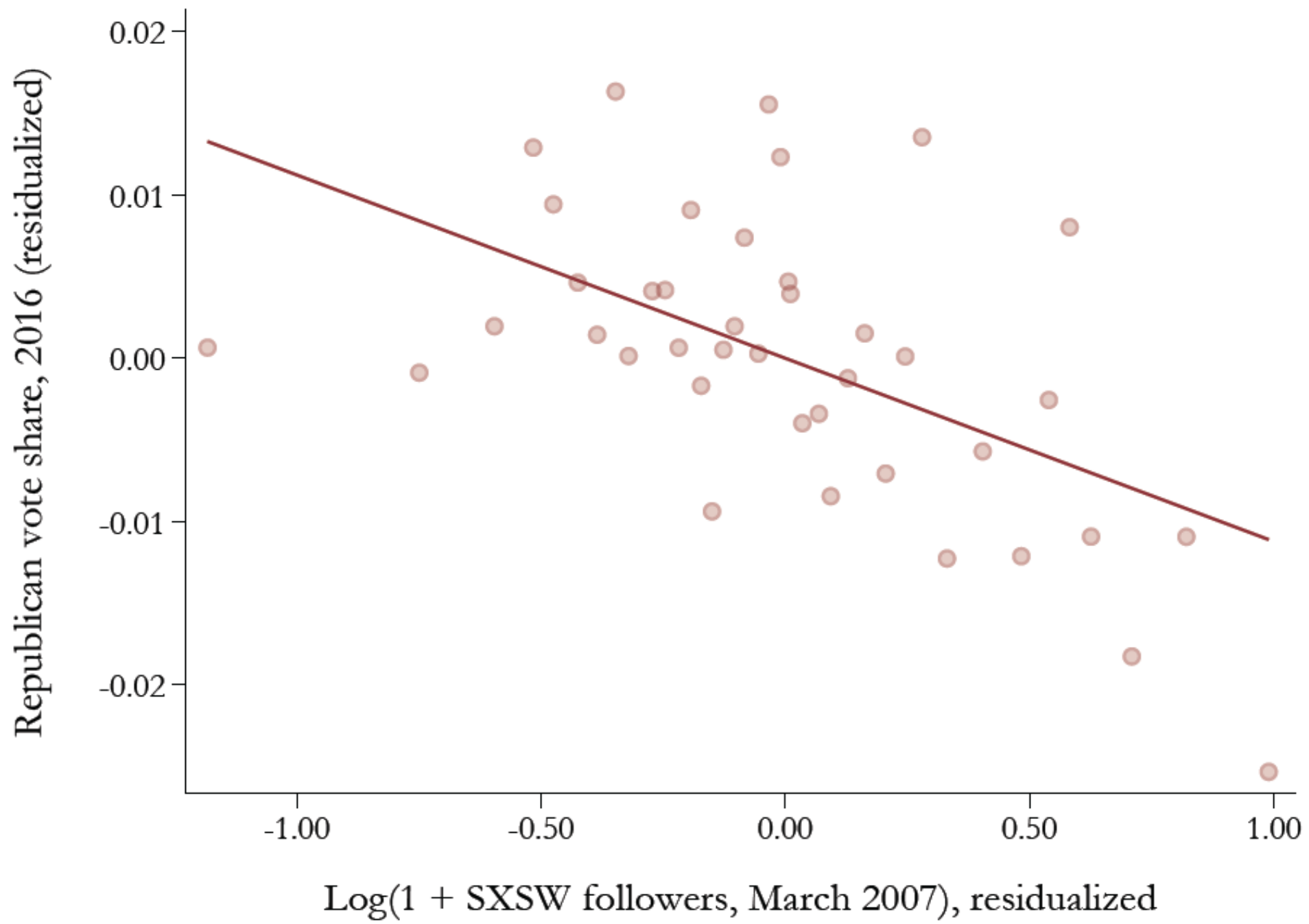
Effect on Republican two-party vote share

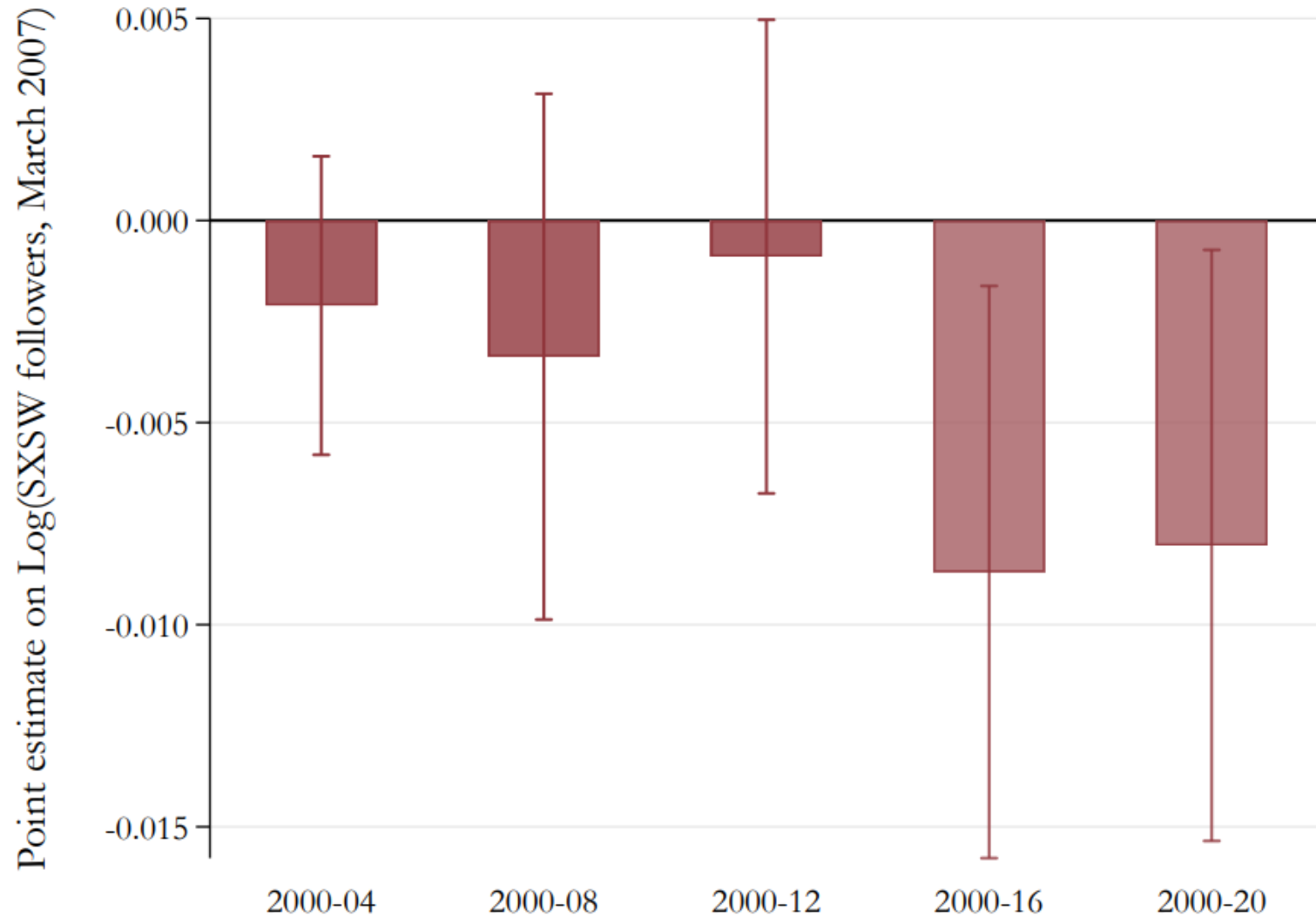|	Dep. var.: Republican vote share in 2016					Dep. var.: Republican vote share in 2020				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: OLS										
Log(Twitter users)	-0.065***	-0.067***	-0.013***	-0.011***	-0.007**	-0.058***	-0.064***	-0.012***	-0.011***	-0.008***
	(0.009)	(0.008)	(0.004)	(0.003)	(0.003)	(0.009)	(0.009)	(0.004)	(0.003)	(0.003)
Panel B: Reduced form										
Log(SXSW followers, March 2007)	-0.053***	-0.058***	-0.019***	-0.014***	-0.011***	-0.046***	-0.055***	-0.017***	-0.013***	-0.011**
	(0.011)	(0.012)	(0.005)	(0.004)	(0.004)	(0.009)	(0.010)	(0.006)	(0.005)	(0.005)
Log(SXSW followers, Pre)	-0.021	-0.003	-0.000	-0.002	0.001	-0.022	-0.005	-0.002	-0.004	-0.001
	(0.016)	(0.013)	(0.006)	(0.006)	(0.004)	(0.016)	(0.013)	(0.007)	(0.007)	(0.005)
Panel C: 2SLS										
Log(Twitter users)	-0.072***	-0.085***	-0.034***	-0.027***	-0.021***	-0.064***	-0.080***	-0.031**	-0.025***	-0.020**
	(0.016)	(0.018)	(0.010)	(0.008)	(0.008)	(0.015)	(0.017)	(0.011)	(0.009)	(0.009)
Log(SXSW followers, Pre)	-0.014	0.007	0.002	-0.001	0.002	-0.015	0.004	-0.000	-0.002	0.000
	(0.020)	(0.016)	(0.007)	(0.006)	(0.005)	(0.020)	(0.015)	(0.008)	(0.007)	(0.006)
Population deciles	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical controls		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Demographic controls			Yes	Yes	Yes			Yes	Yes	Yes
Socioeconomic controls			Yes	Yes	Yes			Yes	Yes	Yes
China shock controls				Yes	Yes				Yes	Yes
1996 election control					Yes					Yes
Observations	3,065	3,065	3,064	3,064	3,064	3,065	3,065	3,064	3,064	3,064
Mean of DV	0.46	0.46	0.46	0.46	0.46	0.47	0.47	0.47	0.47	0.47

Placebo Test: Other Festivals

Table C.2: Placebo Tests for Other Festivals

	Twitter Followers of Festival joining in Festival Month					
	SXSW (1)	Burning Man (2)	Coachella (3)	Pitchfork (4)	EDC (5)	ACL (6)
Panel A: First Stage (Dep. Var.: Twitter Usage)						
Followers Festival Month	0.167***	-0.005	0.011	-0.006	0.010	-0.009
	(0.015)	(0.012)	(0.012)	(0.006)	(0.008)	(0.018)
Panel B: Reduced form (Dep. Var.: Rep. Vote Share 2016)						
Followers Festival Month	-0.004***	0.001	-0.000	-0.000	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Panel C: Reduced form (Dep. Var.: Rep. Vote Share 2020)						
Followers Festival Month	-0.003**	0.000	-0.001	-0.000	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Census region FE	Yes	Yes	Yes	Yes	Yes	Yes
Population controls	Yes	Yes	Yes	Yes	Yes	Yes
Geographical controls	Yes	Yes	Yes	Yes	Yes	Yes
Demographic controls	Yes	Yes	Yes	Yes	Yes	Yes
Socioeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes
China shock controls	Yes	Yes	Yes	Yes	Yes	Yes
1996 election control	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,064	3,064	3,064	3,064	3,064	3,064

Limited evidence of effect in earlier elections

Populist Support

	Dep. var.: Vote share Ross Perot in...			
	1992		1996	
	(1)	(2)	(3)	(4)
Panel A: Reduced form				
Log(SXSW followers, March 2007)	0.000	-0.000	0.003	0.003
	(0.002)	(0.002)	(0.003)	(0.003)
Panel B: 2SLS				
Log(Twitter users)	0.000	-0.001	0.006	0.007
	(0.003)	(0.003)	(0.006)	(0.006)
Population deciles	Yes	Yes	Yes	Yes
Census region FE	Yes	Yes	Yes	Yes
Geographical controls	Yes	Yes	Yes	Yes
Demographic controls	Yes	Yes	Yes	Yes
Socioeconomic controls	Yes	Yes	Yes	Yes
China shock controls	Yes	Yes	Yes	Yes
1996 election control		Yes		Yes
Observations	3,064	3,064	3,064	3,064
Mean of DV	0.10	0.10	0.20	0.20
Robust F-stat.	118.21	121.18	118.21	121.18

Additional results

1. Robustness

- Definition of SXSW instrument

- Results hold within counties with SXSW variation

- Alternative regression specifications

- Alternative standard errors

2. Additional outcomes

- Switching from Obama to Trump

- Trump's presidential approval

- Party donations

Mechanism and Channels

Individual-level evidence: by party affiliation (CCES)

Persuasion models would suggest stronger effects for moderate voters.

	Full Sample	Strong Dem.	Mod. Dem.	Indep.	Mod. Rep.	Strong Rep.
			Dep. var.: Voted for Trump			
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Twitter users)	-0.129***	0.034	-0.062	-0.186***	-0.073*	0.029
	(0.048)	(0.061)	(0.081)	(0.069)	(0.044)	(0.065)
Marginal effect	[-0.047]	[0.002]	[-0.011]	[-0.064]	[-0.010]	[0.001]
Observations	94,523	27,572	20,447	9,142	18,863	17,304
Mean of DV	0.491	0.027	0.114	0.627	0.918	0.981

Who is persuaded by social media?

1. Existing work

- Bayesian models predict that beliefs are more affected when a receiver's priors are weak

- Some empirical evidence for persuasive effect of media on vote outcomes (e.g. DellaVigna & Kaplan, 2007; Enikolopov et al., 2011)

2. What we test in the data

- Effect depending on individuals' political orientation in CCES

- Differentiate counties by their voting history

Individual-level evidence: by party affiliation (CCES)

Dependent variable: Voted for Donald Trump in 2016 (1), Hillary Clinton (0)

	Dep. var.: Voted for Trump					
	Full Sample	Strong Dem.	Mod. Dem.	Indep.	Mod. Rep.	Strong Rep.
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Twitter users)	-0.129***	0.034	-0.062	-0.186***	-0.073*	0.029
	(0.048)	(0.061)	(0.081)	(0.069)	(0.044)	(0.065)
Marginal effect	[-0.047]	[0.002]	[-0.011]	[-0.064]	[-0.010]	[0.001]
Observations	94,523	27,572	20,447	9,142	18,863	17,304
Mean of DV	0.491	0.027	0.114	0.627	0.918	0.981

Potential explanation

1. User number effect

Usage of social media, and thus effect on elections, has increased over time

2. Content effect

Twitter has become more left-leaning

3. Trump effect

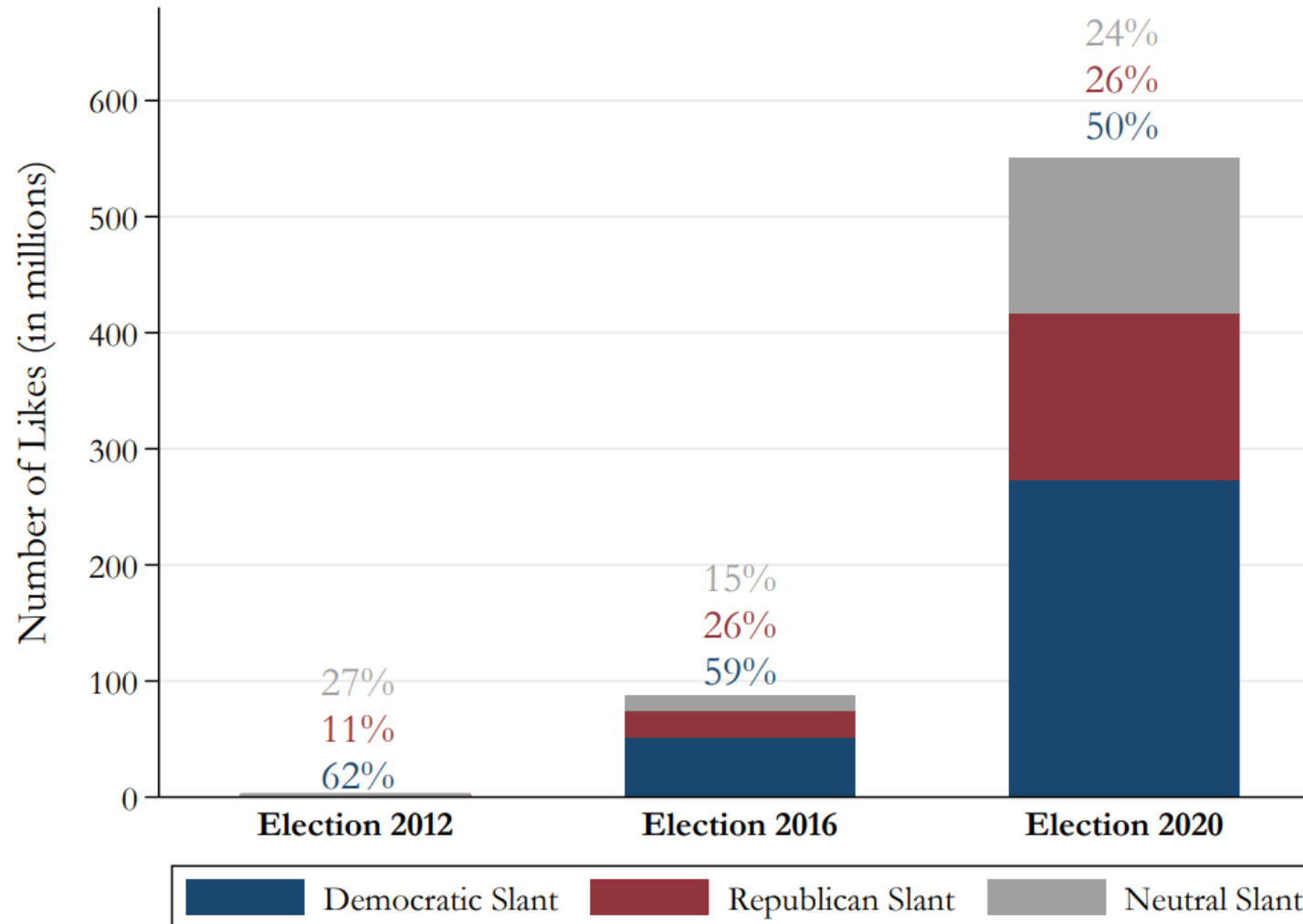Trump's rhetoric led to a backlash on Twitter

Trump effect: Republicans' approval of presidential candidates

	Trump	Cruz	Rubio	Kasich	Sanders	Clinton
	*Dep. var.: Approved of candidate during primaries*					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Republicans						
Log(Twitter users)	-0.108***	-0.086**	-0.051	0.018	0.031	0.148***
	(0.030)	(0.035)	(0.060)	(0.050)	(0.039)	(0.041)
Marginal effect	[-0.038]	[-0.029]	[-0.014]	[0.006]	[0.009]	[0.022]
Observations	19,974	11,959	8,344	8,995	16,099	20,983
Mean of DV	0.647	0.698	0.779	0.665	0.238	0.092
Panel B: Independents and Leaners						
Log(Twitter users)	-0.065**	-0.006	-0.015	0.050	0.059	0.154***
	(0.028)	(0.035)	(0.043)	(0.042)|	(0.043)	(0.036)
Marginal effect	[-0.021]	[-0.002]	[-0.006]	[0.019]	[0.021]	[0.054]
Observations	22,852	12,135	8,080	8,280	17,356	23,813
Mean of DV	0.329	0.392	0.516	0.581	0.595	0.380
Panel C: Democrats						
Log(Twitter users)	-0.052	-0.116**	-0.036	0.076	0.004	0.081**
	(0.051)	(0.054)	(0.056)	(0.051)	(0.050)	(0.038)
Marginal effect	[-0.009]	[-0.030]	[-0.012]	[0.029]	[0.001]	[0.021]
Observations	20,866	11,098	7,460	7,547	16,059	21,454
Mean of DV	0.107	0.195	0.271	0.502	0.808	0.807

Conclusion

Conclusion

1. Social media likely decreased Republican vote shares in 2016 and 2020

- Works through persuading undecided voters, likely less through turnout

- Results consistent with Bayesian persuasion models

2. No effect on earlier elections and House/Senate elections on the same day

- Evidence of a "Never Trump" effect on moderate Republicans

- Pro-democratic slant of Twitter content in the 2016 and 2020 elections