A Spatial Analysis of the Impact of West German Television on Protest Mobilization During the East German Revolution

Charles Crabtee (PSU)
Holger L. Kern (FSU)
David Darmofal (USC)

March 9, 2014

Revolutionary Collective Action

- How are citizens able to coordinate revolutionary collective action under authoritarian rule (preference falsification, high-risk, lack of independent media)?

- Democratization literature suggests that **foreign** media can serve as a coordination device by providing information not available in domestic media.

Revolutionary Collective Action

- How are citizens able to coordinate revolutionary collective action under authoritarian rule (preference falsification, high-risk, lack of independent media)?
- Democratization literature suggests that **foreign** media can serve as a coordination device by providing information not available in domestic media.
- Plenty of anecdotes about the role of West German television (WGTV) during East German revolution.

Revolutionary Collective Action

- How are citizens able to coordinate revolutionary collective action under authoritarian rule (preference falsification, high-risk, lack of independent media)?
- Democratization literature suggests that **foreign** media can serve as a coordination device by providing information not available in domestic media.
- Plenty of anecdotes about the role of West German television (WGTV) during East German revolution.
- We test this claim by exploiting a natural experiment: WGTV was only available in parts of East Germany.

Revolutionary Collective Action

- How are citizens able to coordinate revolutionary collective action under authoritarian rule (preference falsification, high-risk, lack of independent media)?
- Democratization literature suggests that **foreign** media can serve as a coordination device by providing information not available in domestic media.
- Plenty of anecdotes about the role of West German television (WGTV) during East German revolution.
- We test this claim by exploiting a natural experiment: WGTV was only available in parts of East Germany.

Gap in the Literature

- Mass media as a coordination device for collective action have received some attention in the social movements literature.
- Focused on domestic media in democratic societies.

Gap in the Literature

- Mass media as a coordination device for collective action have received some attention in the social movements literature.
- Focused on domestic media in democratic societies.
- Little known about the effects of domestic or foreign mass media in authoritarian regimes.

Gap in the Literature

- Mass media as a coordination device for collective action have received some attention in the social movements literature.
- Focused on domestic media in democratic societies.
- Little known about the effects of domestic or foreign mass media in authoritarian regimes.

Identification

- Our main identifying assumption is that access to WGTV was idiosyncratic, at least conditional on covariates. That is, we assume that access to WGTV was strongly ignorable given covariates, **X**:

$$(\mathbf{Y}^{(\text{no WGTV})}, \mathbf{Y}^{(\text{WGTV})}) \perp \mathbf{WGTV} \mid \mathbf{X}.$$

Outcome of Interest

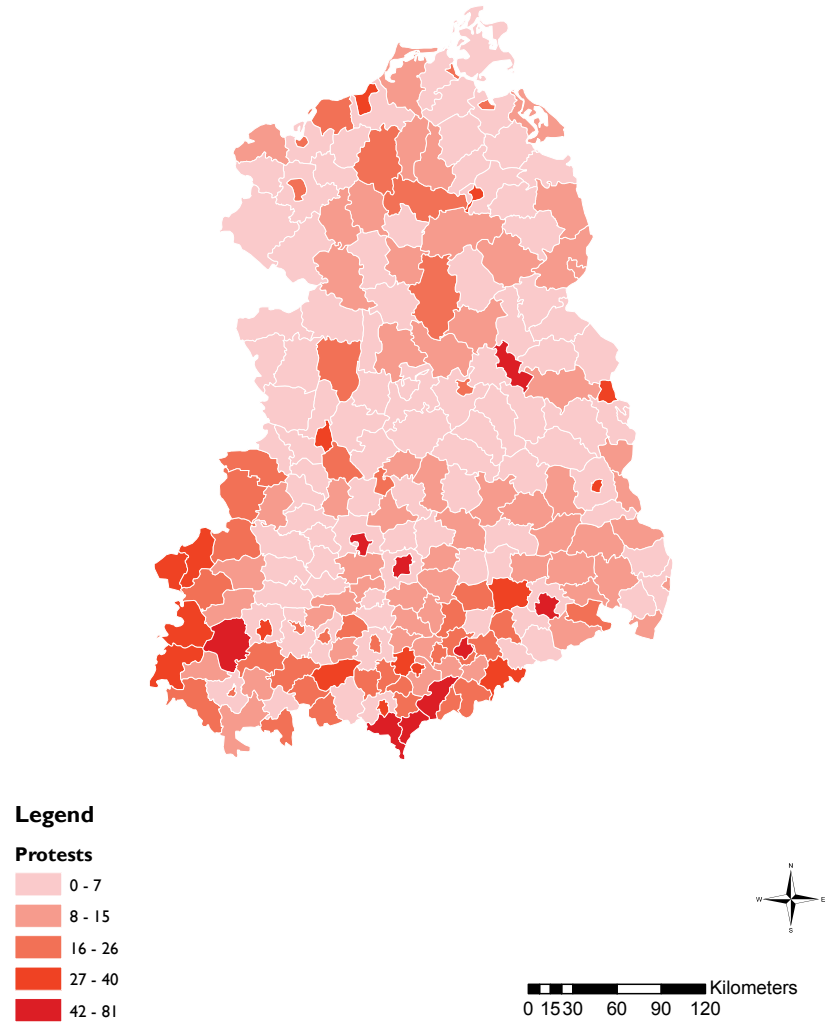
- Detailed country-wide compilation of county-level protest events between September 4, 1989 and March 18, 1990 from Schwabe (1999). 2,734 protests in total, with the number of protest events ranging from 0 to 81 per county.
- Rich set of county-level covariates possibly related to propensity to protest, capturing mainly socioeconomic differences and differences in living standards.

Outcome of Interest

- Detailed country-wide compilation of county-level protest events between September 4, 1989 and March 18, 1990 from Schwabe (1999). 2,734 protests in total, with the number of protest events ranging from 0 to 81 per county.

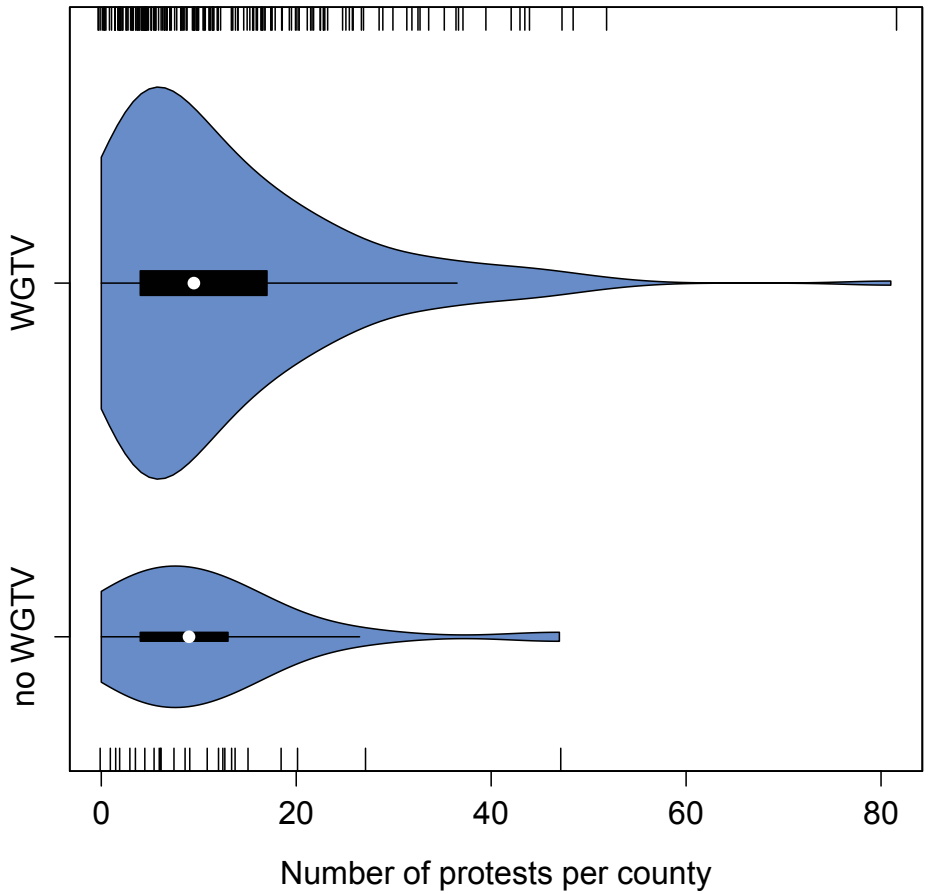
- Rich set of county-level covariates possibly related to propensity to protest, capturing mainly socioeconomic differences and differences in living standards.

Protest Heatmap



Number of protests per county, East Germany, September 4, 1989 - March 18, 1990

Protest Distribution



Distribution of the number of protests per county, East Germany, September 4, 1989 - March 18, 1990, for counties with and without access to WGTV

Treatment

- We use historical maps as well as the Longley-Rice electromagnetic signal propagation model to distinguish between WGTV and non-WGTV counties.

- Historical maps have the disadvantage of low resolution - not detailed enough to allow us to reliably determine the availability of WGTV at the county level.

Treatment

- We use historical maps as well as the Longley-Rice electromagnetic signal propagation model to distinguish between WGTV and non-WGTV counties.

- Historical maps have the disadvantage of low resolution - not detailed enough to allow us to reliably determine the availability of WGTV at the county level.

- Longley-Rice model predicts average WGTV signal strength based on the location of 120 West German main broadcast transmission towers, their technical characteristics, the technical characteristics of radio receivers, and the topography of East Germany.

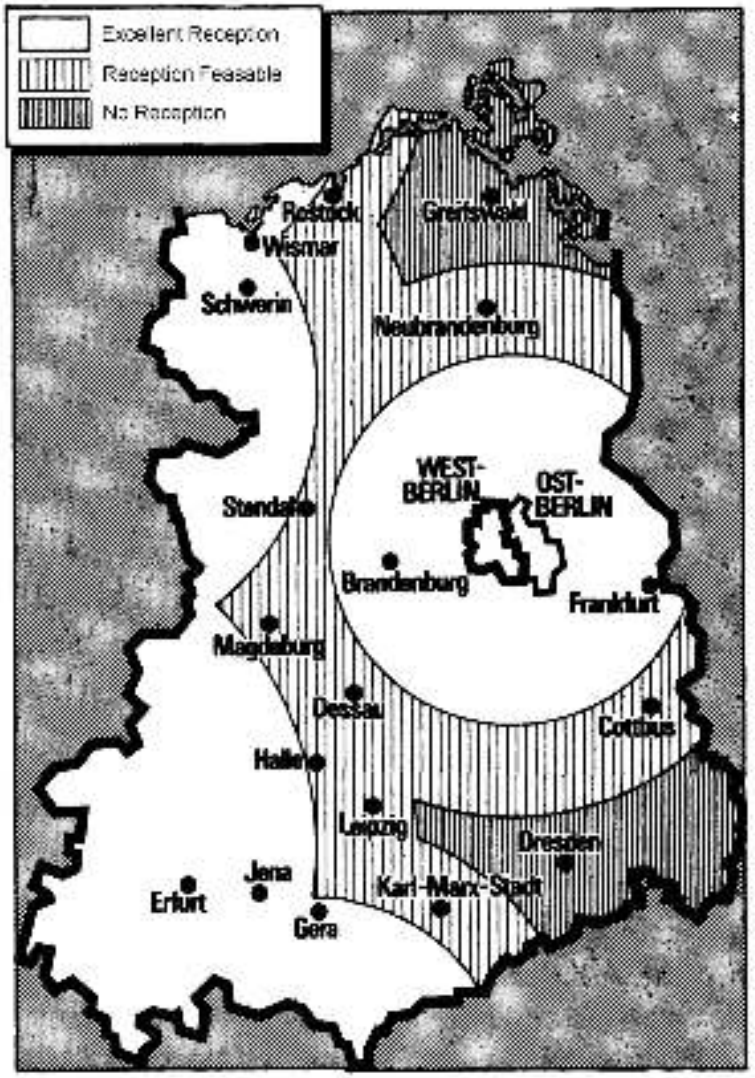
Treatment

- We use historical maps as well as the Longley-Rice electromagnetic signal propagation model to distinguish between WGTV and non-WGTV counties.
- Historical maps have the disadvantage of low resolution - not detailed enough to allow us to reliably determine the availability of WGTV at the county level.
- Longley-Rice model predicts average WGTV signal strength based on the location of 120 West German main broadcast transmission towers, their technical characteristics, the technical characteristics of radio receivers, and the topography of East Germany.
- Counties with an average signal strength below the average signal strength in Dresden (which we know didn't have WGTV) are categorized as non-WGTV. Results are quite robust to various other cutoff values.

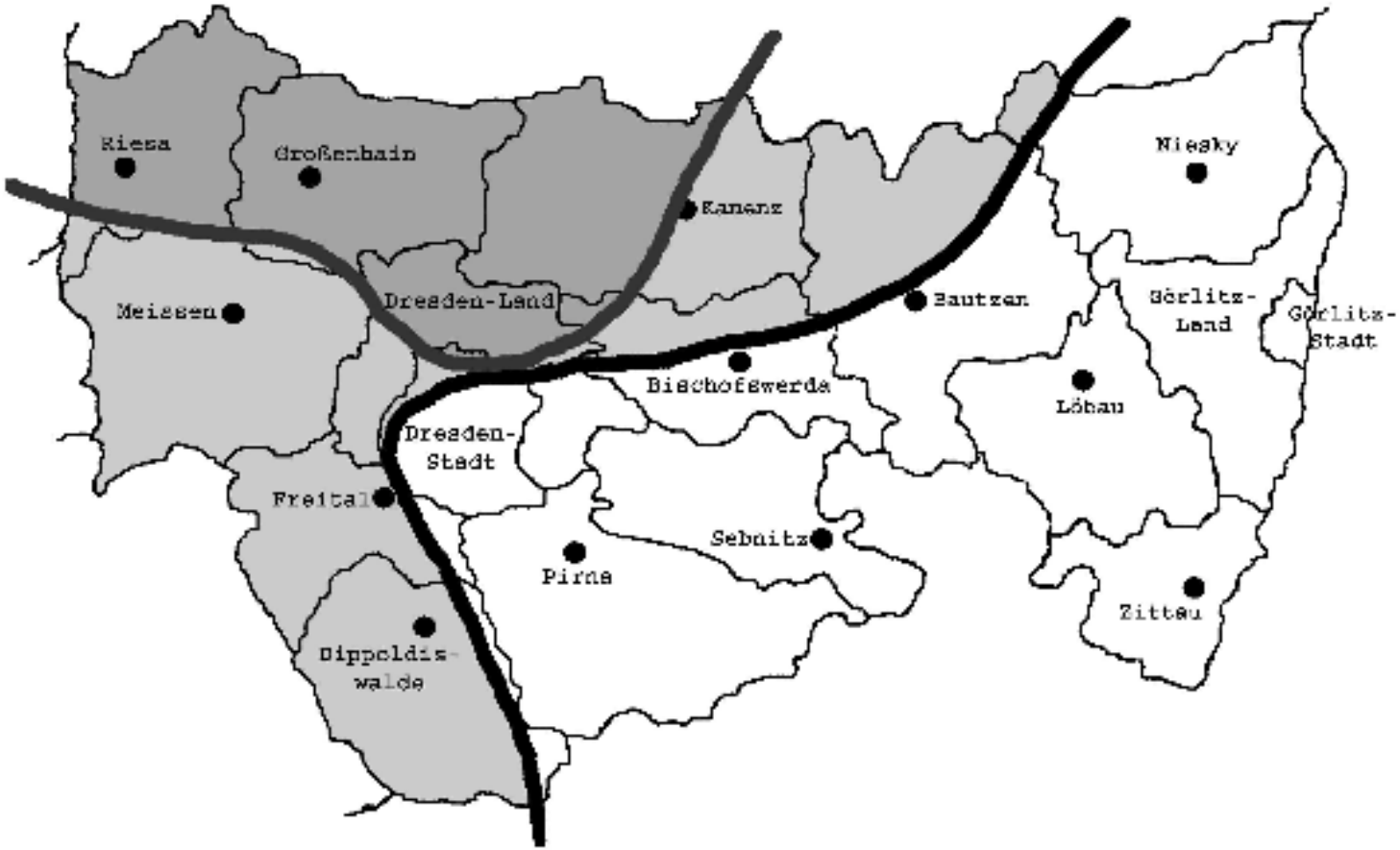
Treatment

- We use historical maps as well as the Longley-Rice electromagnetic signal propagation model to distinguish between WGTV and non-WGTV counties.
- Historical maps have the disadvantage of low resolution - not detailed enough to allow us to reliably determine the availability of WGTV at the county level.
- Longley-Rice model predicts average WGTV signal strength based on the location of 120 West German main broadcast transmission towers, their technical characteristics, the technical characteristics of radio receivers, and the topography of East Germany.
- Counties with an average signal strength below the average signal strength in Dresden (which we know didn't have WGTV) are categorized as non-WGTV. Results are quite robust to various other cutoff values.

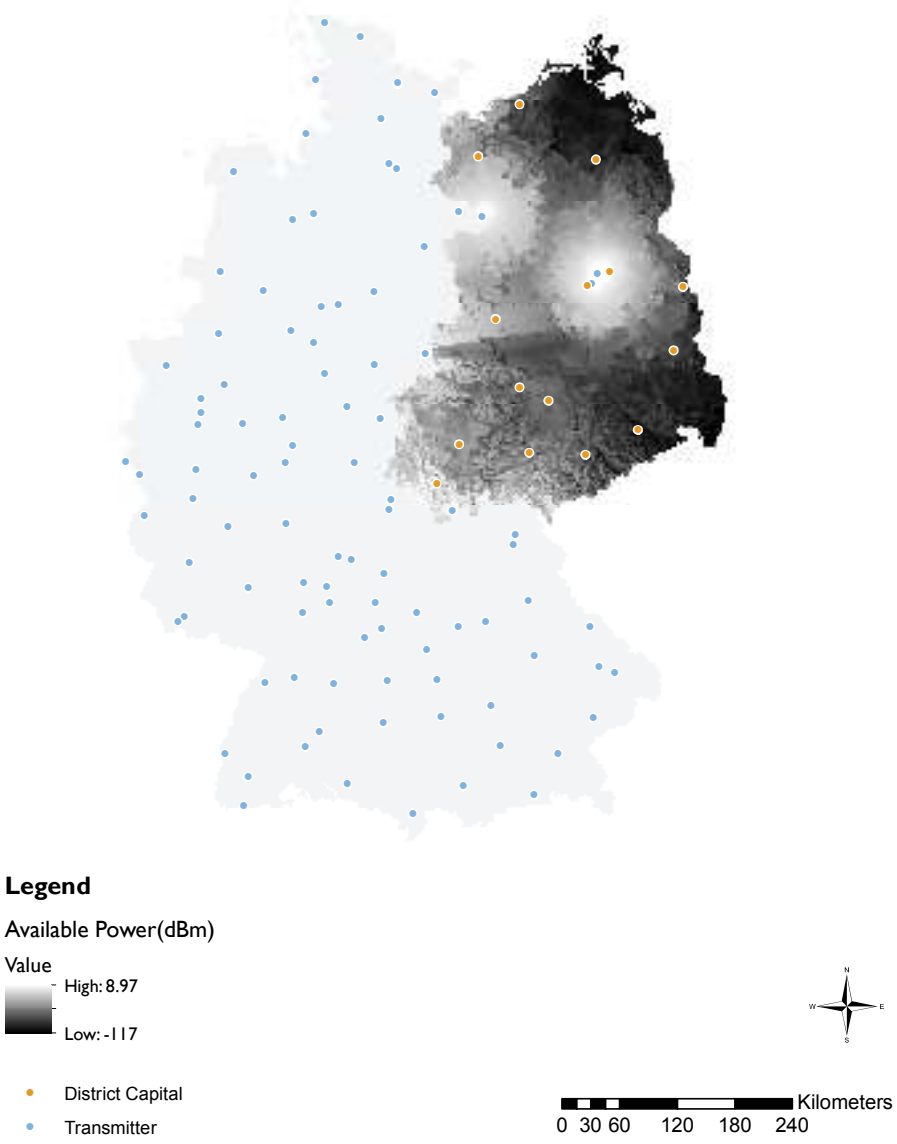
Historic Signal Coverage Map



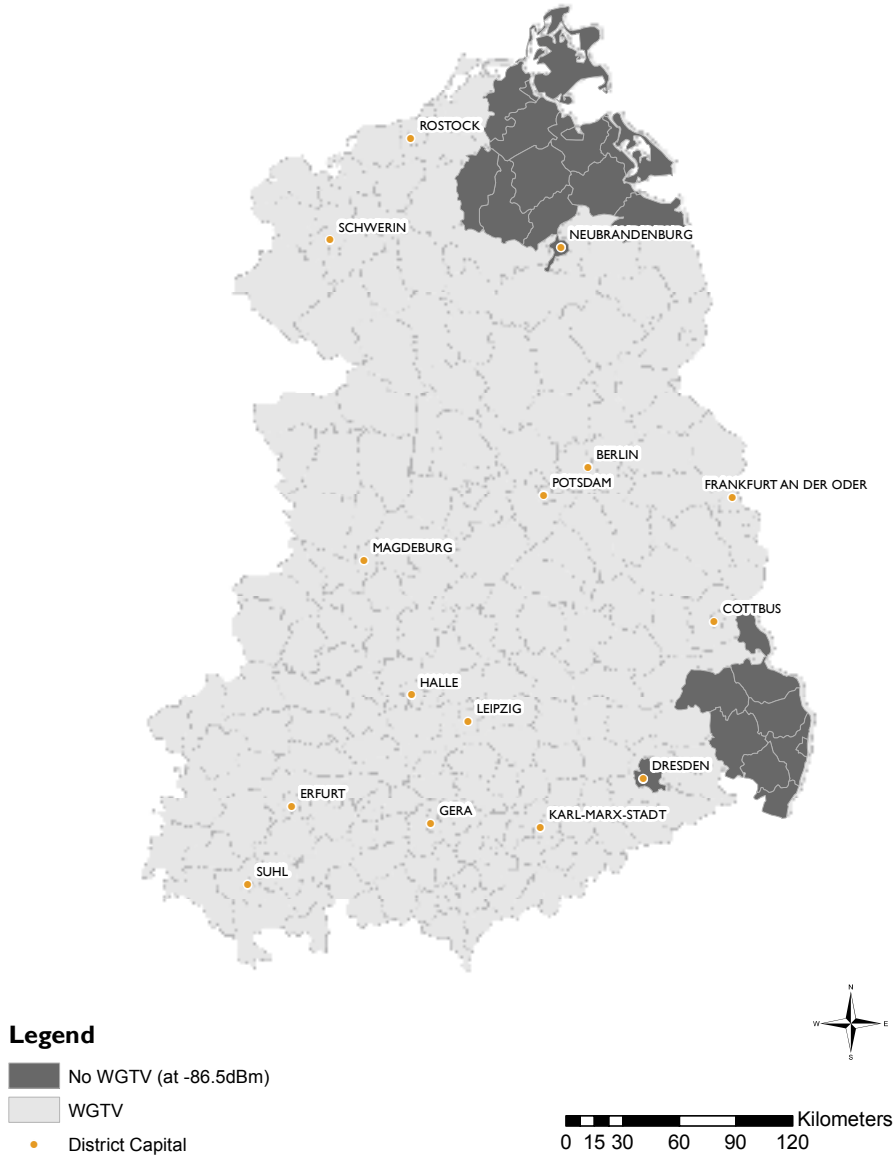
Signal Coverage Map for Dresden Region



Continuous Signal Coverage Map



Binary Signal Coverage Map (-86.5dBm)



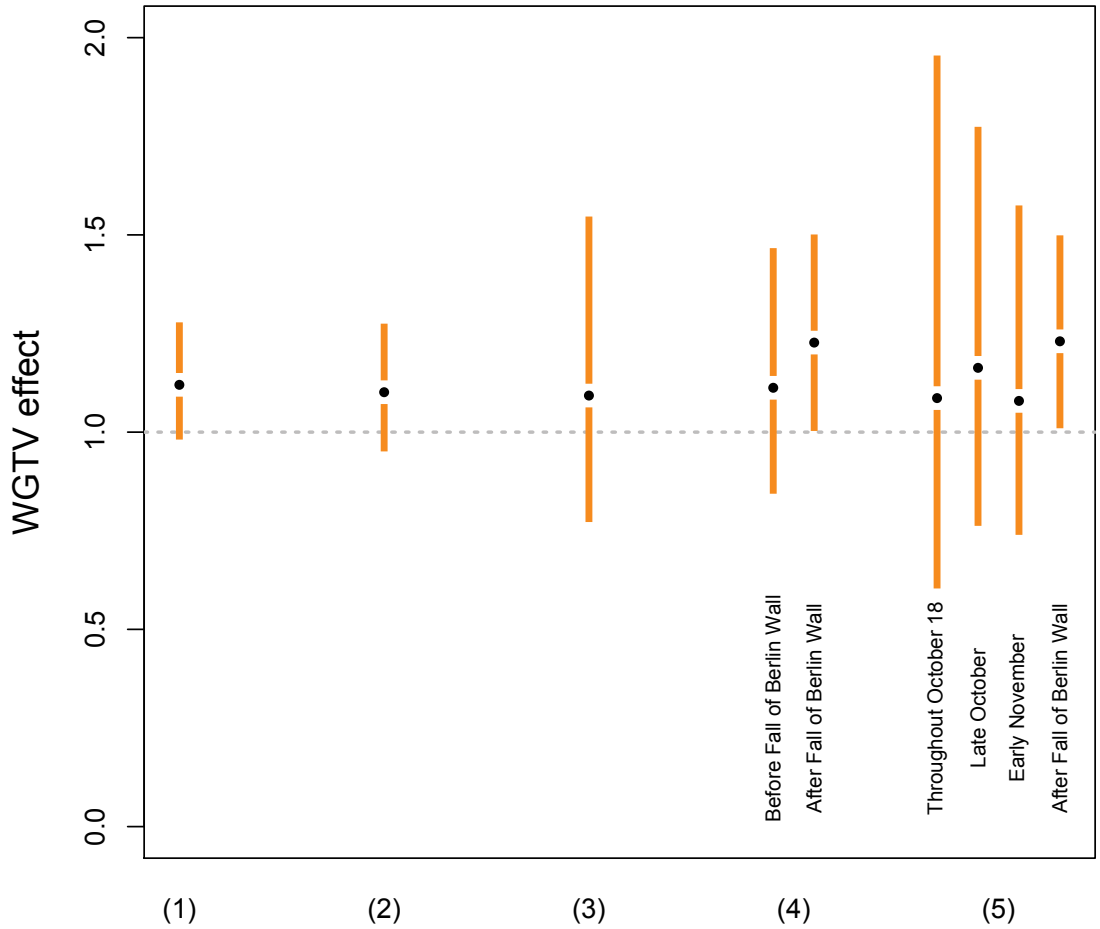
Estimator

- Cox semi-parametric conditional frailty gap time survival model.
- Risk of a protest event as a function of WGTV access, time, covariates, and (in some specifications) a temporally lagged spatial lag variable.

Estimator

- Cox semi-parametric conditional frailty gap time survival model.
- Risk of a protest event as a function of WGTV access, time, covariates, and (in some specifications) a temporally lagged spatial lag variable.

WGTV Effect



Causal effect estimates for WGTV from models (1) - (5) and 95% confidence intervals.

Robustness Checks

- Additional models:
  - Account for the possible spatial diffusion of protest.
  - Different coverage cutoffs.

Robustness Checks

- Additional models:
  - Account for the possible spatial diffusion of protest.
  - Different coverage cutoffs.
  - Continuous coverage cutoffs.

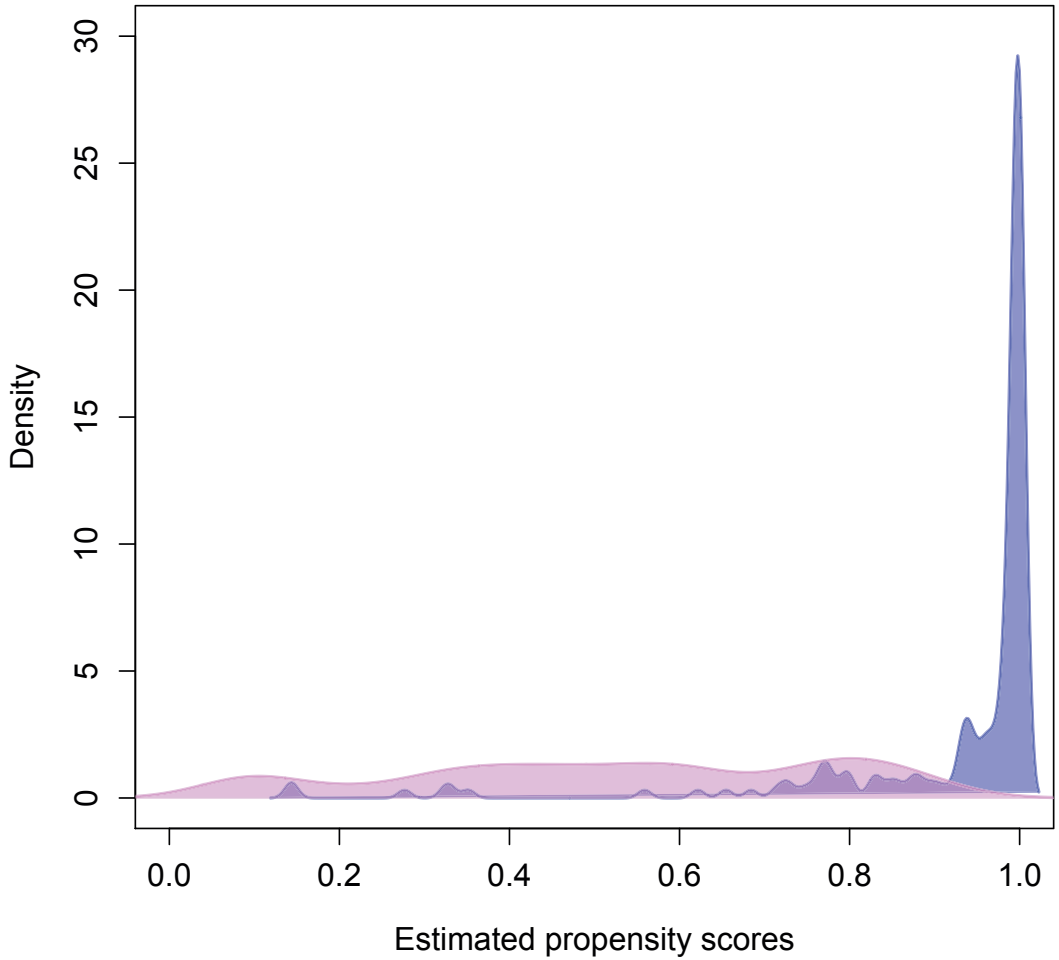
Robustness Checks

- Additional models:
  - Account for the possible spatial diffusion of protest.
  - Different coverage cutoffs.
  - Continuous coverage cutoffs.
  - Different subsamples.

Robustness Checks

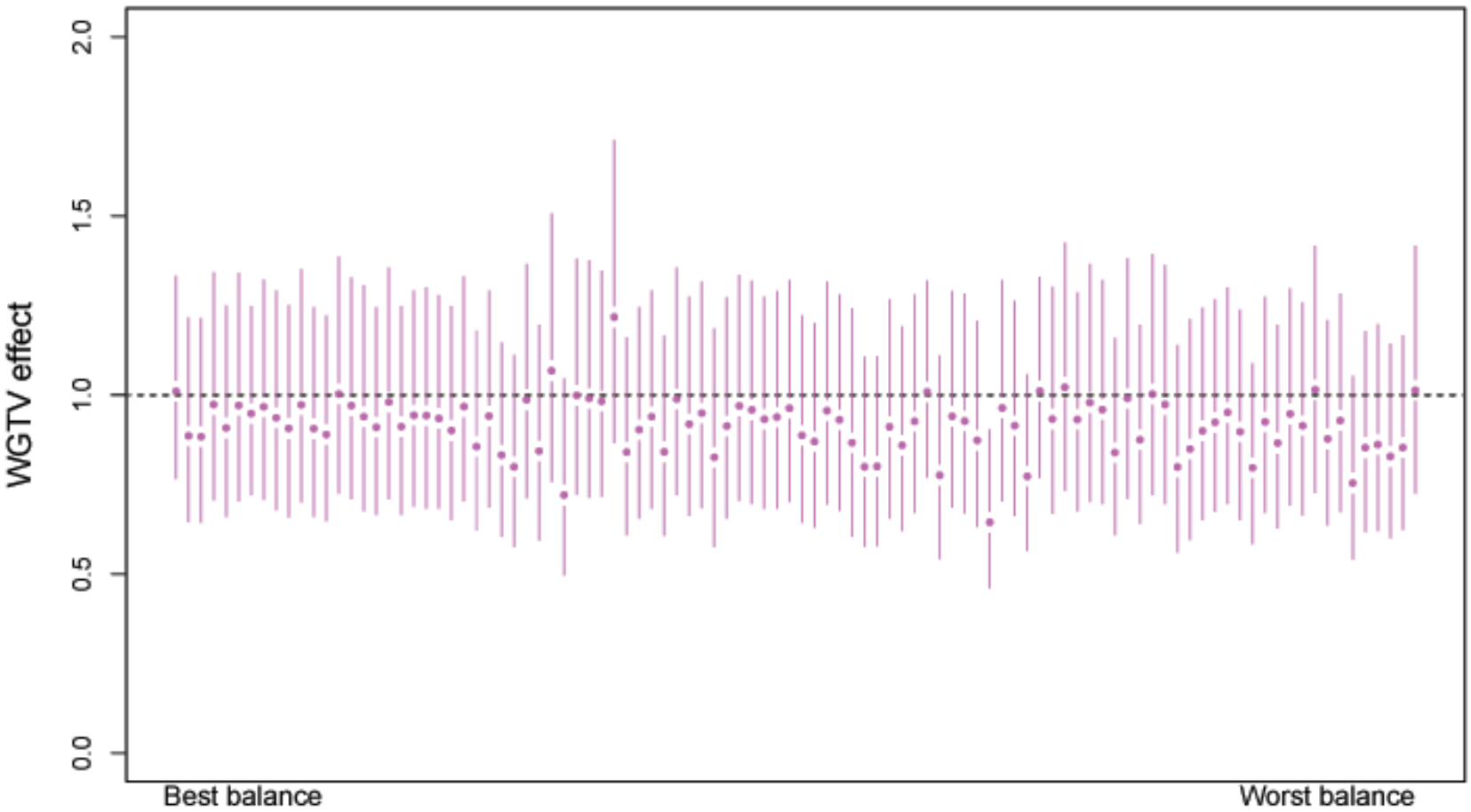
- Additional models:
  - Account for the possible spatial diffusion of protest.
  - Different coverage cutoffs.
  - Continuous coverage cutoffs.
  - Different subsamples.

Kernel Density Plots



Kernel density plots of estimated propensity scores for WGTV (blue) and non-WGTV (pink) counties with areas of overlap shown in violet

Causal Effect Estimates



Causal effect estimates for WGTV from baseline Cox model for 100 best subsets and 95% confidence intervals. Estimates are sorted in decreasing balance as measured by the maximum absolute standardized difference in means across all 22 covariates.

Discussion

- Empirical analysis did not detect any effect of WGTV on the probability of a protest event occurring.
- This finding is robust to variation in the time periods we looked at, spatial diffusion, the measurement of WGTV access, and the specific samples of counties used in the estimations.

Discussion

- Empirical analysis did not detect any effect of WGTV on the probability of a protest event occurring.
- This finding is robust to variation in the time periods we looked at, spatial diffusion, the measurement of WGTV access, and the specific samples of counties used in the estimations.

Discussion

- Our case study cannot rule out the possibility that foreign mass media, or communication technologies more generally, facilitate collective action in other cases.
- Our paper presents a cautionary tale.

Discussion

- Our case study cannot rule out the possibility that foreign mass media, or communication technologies more generally, facilitate collective action in other cases.
- Our paper presents a cautionary tale.
- More research needed.

Discussion

- Our case study cannot rule out the possibility that foreign mass media, or communication technologies more generally, facilitate collective action in other cases.
- Our paper presents a cautionary tale.
- More research needed.

Future Research

- Investigate the effect of Western radio broadcasts on the Uprising of 1953 in East Germany.

The End

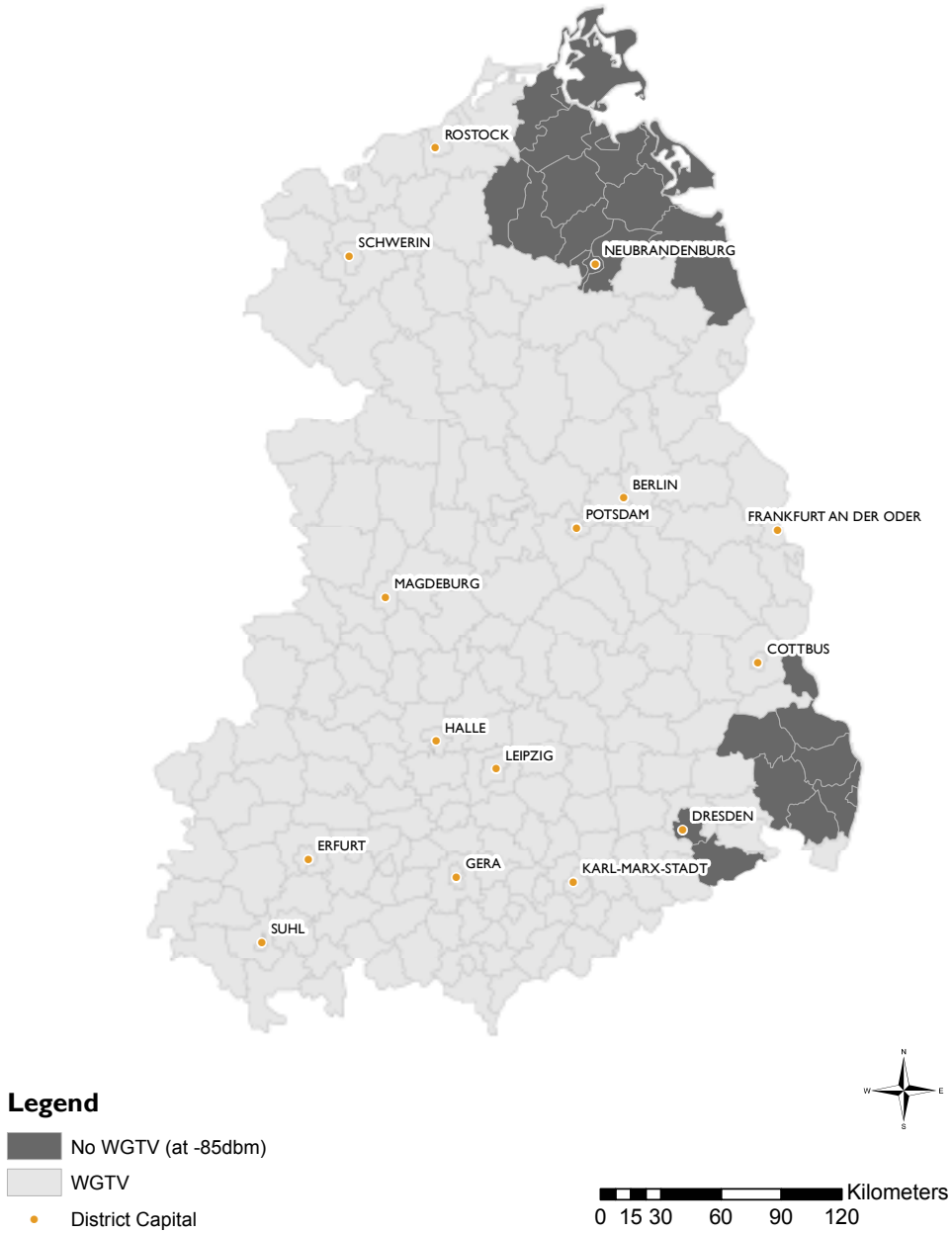
Thank you.

Balance Table

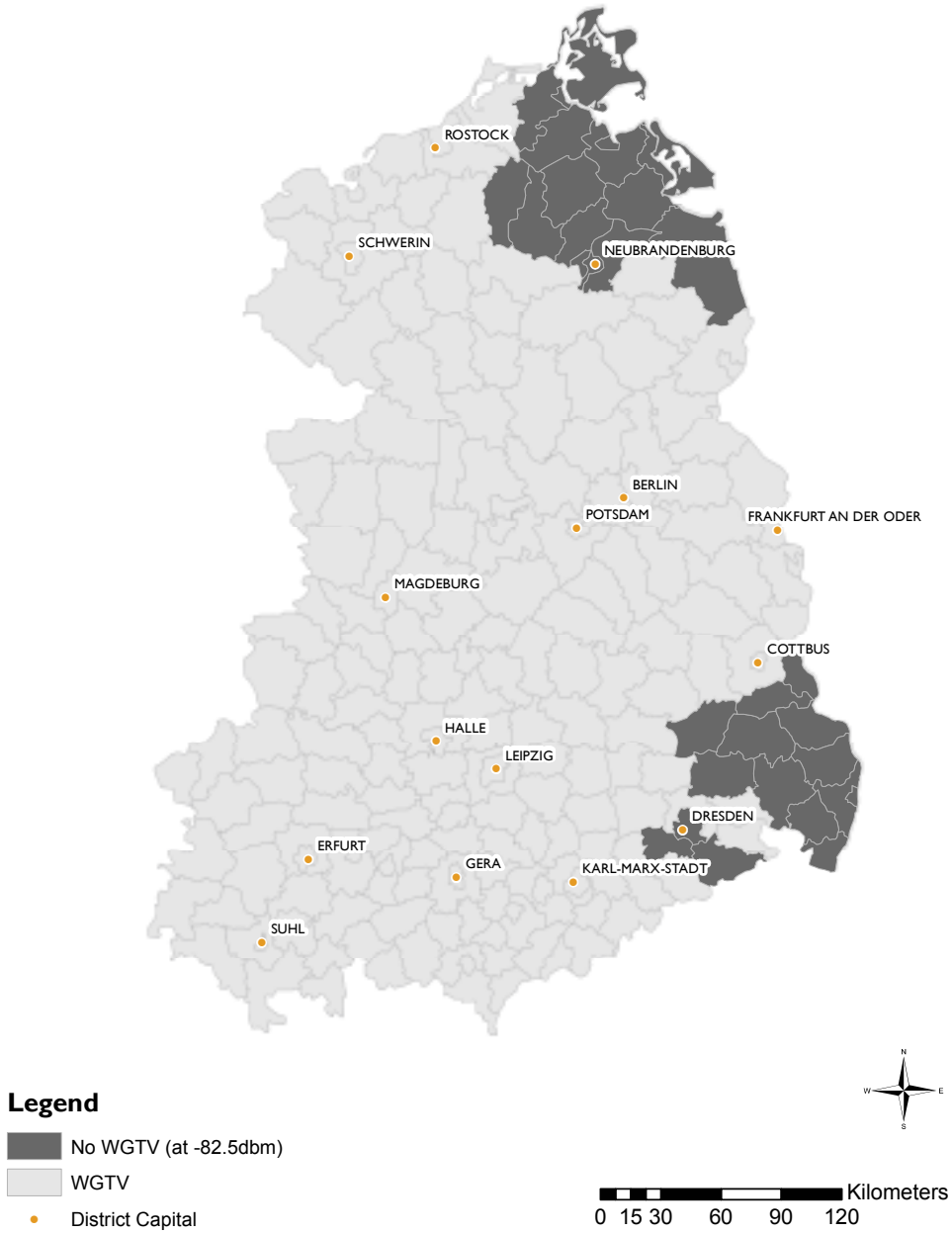
Covariate	WGTV mean	non-WGTV mean	std. diff	*t*-test *p*-value	KS-test *p*-value
log(population size)	11.01	10.99	4.53	0.90	0.67
population density (pop/km^2)	350.24	474.47	−20.65	0.48	0.51
% population change 1980--1988	−0.02	−0.01	−12.01	0.76	0.68
district capital	0.07	0.08	−6.84	0.83	0.84
% industry	0.36	0.31	41.58	0.15	0.13
% agriculture	0.17	0.19	−18.01	0.64	0.65
% crafts and construction	0.09	0.10	−16.64	0.58	0.58
% services and transportation	0.36	0.38	−40.84	0.23	0.28
% skilled	0.62	0.61	60.16	0.07	0.31
% unskilled	0.13	0.14	−33.23	0.22	0.26
% college	0.20	0.21	−25.31	0.47	0.60
% female	0.52	0.51	80.10	0.03	0.00
% working age	0.64	0.64	8.09	0.81	0.07
housing space (m^2)	27.34	26.15	95.45	0.03	0.00
% bathroom	0.82	0.79	51.12	0.18	0.03
% interior toilet	0.74	0.73	8.33	0.80	0.82
% modern heating	0.43	0.42	5.13	0.90	0.08
residents per medical doctor	596.34	616.24	−14.08	0.64	0.08
residents per dentist	1549.49	1573.60	−12.83	0.75	0.54
nitrogen oxides (tons/km^2)	6.24	7.63	−12.81	0.68	0.57
sulfur doxide (tons/km^2)	81.55	86.25	−3.26	0.90	0.33
particulate matter (tons/km^2)	33.10	34.12	−2.00	0.93	0.54
distance to Berlin	159.63	164.90	−11.65	0.46	0.04
distance to German-German border	82.33	161.86	−181.58	0.00	0.00
distance to nearest transmitter	77.90	156.20	−266.79	0.00	0.00

Note: Covariate balance for 217 East German counties. First and second columns show means. Third column shows differences between means standardized by the pooled variances. Fourth column shows *p*-values from two-sample *t*-tests. Fifth last column shows *p*-values from bootstrapped Kolmogorov-Smirnoff tests of equality of distributions.

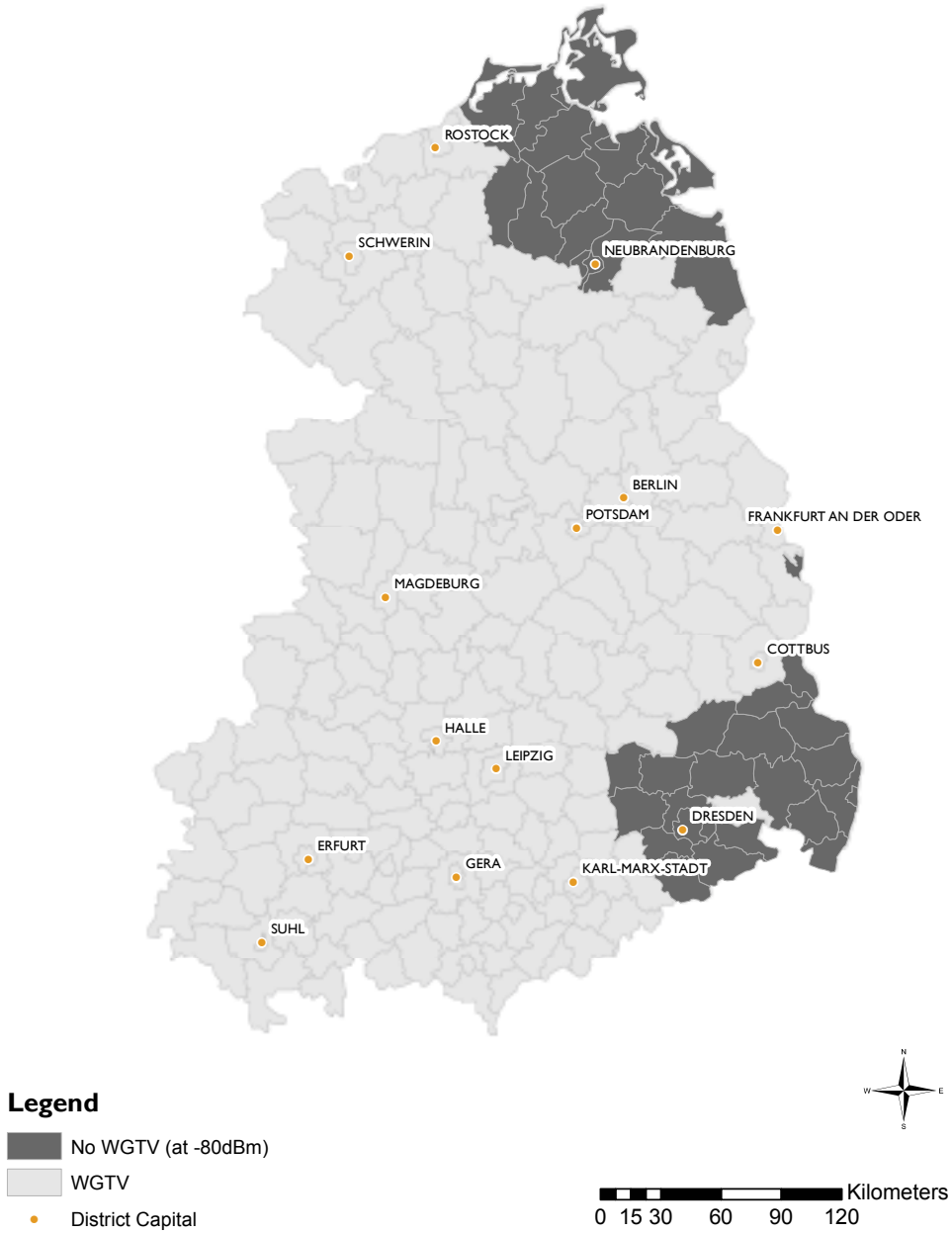
Binary Map of WGTV Signal Reception (-85bDm)



Binary Map of WGTV Signal Reception (-82.5bDm)



Binary Map of WGTV Signal Reception (-80bDm)



Effect of WGTV on Probability of Protest Event

	(1)	(2)	(3)	(4)	(5)
WGTV	0.113*	0.096	0.089	0.205**	0.207**
	[0.067]	[0.075]	[0.177]	[0.103]	[0.101]
Before Wall				1.744***	
				[0.152]	
WGTV × Before Wall				−0.098	
				[0.151]	
Through October 18					1.734***
					[0.283]
Late October					1.832***
					[0.218]
Early November					1.702***
					[0.197]
WGTV × Through October 18					−0.124
					[0.305]
WGTV × Late October					−0.056
					[0.222]
WGTV × Early November					−0.131
					[0.202]
Covariates	no	yes	yes	yes	yes
Frailties	no	no	yes	yes	yes
Number of events	2,598	2,598	2,598	2,598	2,598
Number of observations	40,365	40,365	40,365	40,365	40,365
Log/l-likelihood	−9,077	−8,858	−8,746	−8,586	−8,589

Note: The table shows coefficient estimates from 5 Cox model specifications, with standard errors in brackets.
* significant at 10 percent level.
** significant at 5 percent level.
*** significant at 1 percent level.

Effect of WGTV on Probability of Protest Event: Accounting for Spatial Dependence

	(1)	(2)	(3)	(4)	(5)
WGTV	0.083	0.062	0.068	0.070	0.085
	[0.175]	[0.173]	[0.177]	[0.170]	[0.176]
Spatial lag 1 day	yes	no	no	yes	no
Spatial lag 1 week	no	yes	no	yes	no
Spatial lag 2 weeks	no	no	yes	yes	no
Day of week dummies	no	no	no	no	yes
Covariates	yes	yes	yes	yes	yes
Frailties	yes	yes	yes	yes	yes
Number of events	2,597	2,596	2,595	2,595	2,598
Number of observations	40,158	38,916	37,474	37,474	40,365
l-likelihood	−8,731	−8,686	−8,719	−8,676	−8,649

Note: The table shows coefficient estimates from 5 Cox model specifications, with standard errors in brackets.
* significant at 10 percent level.
** significant at 5 percent level.
*** significant at 1 percent level.

Effect of WGTV on Probability of Protest Event: Alternative Measures of WGTV Access

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WGTV (−85.0dBm)	0.034							
	[0.174]							
WGTV (−82.5dBm)		−0.018						
		[0.174]						
WGTV (−80.0dBm)			−0.089					
			[0.161]					
% WGTV (Dresden)				0.062				
				[0.229]				
% WGTV (−85.0dBm)					0.039			
					[0.215]			
% WGTV (−82.5dBm)						−0.013		
						[0.202]		
% WGTV (−80.0dBm)							−0.043	
							[0.191]	
Kern (2011) WGTV								−0.078
								[0.195]
Covariates	yes	yes	yes	yes	yes	yes	yes	yes
Frailties	yes	yes	yes	yes	yes	yes	yes	yes
Number of events	2,598	2,598	2,598	2,598	2,598	2,598	2,598	2,598
Number of observations	40,365	40,365	40,365	40,365	40,365	40,365	40,365	40,365
l-likelihood	−8,746	−8,746	−8,746	−8,746	−8,746	−8,746	−8,746	−8,746

Note: The table shows coefficient estimates from 8 Cox model specifications, with standard errors in brackets.
* significant at 10 percent level.
** significant at 5 percent level.
*** significant at 1 percent level.

Effect of WGTV on Probability of Protest Event from Cox Models: Subsets of Counties or Events

	(1)	(2)	(3)	(4)	(5)	(6)
WGTV	0.074	0.027	0.159	0.020	0.0102	−0.502
	[0.180]	[0.258]	[0.241]	[0.191]	[0.141]	[0.335]
Omit East Berlin	yes	no	no	no	no	no
Omit Southeast	no	yes	no	no	no	no
Omit Northeast	no	no	yes	no	no	no
Omit neighbors	no	no	no	yes	yes	no
Best subset	no	no	no	no	yes	no
First events only	no	no	no	no	no	yes
Covariates	yes	yes	yes	yes	yes	yes
Frailties	yes	yes	yes	yes	yes	yes
Number of events	2,521	2,458	2,476	2,340	480	207
Number of observations	40,170	38,220	37,830	36,465	8,385	11,700
l-likelihood	−8,605	−8,168	−8,184	−7,596	−908	−847

Note: The table shows coefficient estimates from 6 Cox model specifications, with standard errors in brackets.
* significant at 10 percent level.
** significant at 5 percent level.
*** significant at 1 percent level.