Natural disasters and electoral support: an investigation of channels driving vote decisions

Giuliano Masiero and Michael Santarossa

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University of Pavia University of Bergamo

Introduction

- Vote choice is the result of policy preferences, retrospective evaluation of and future expectations on politician performance.
- The occurrence of natural disasters likely affect voters' evaluations because the shock allows to update preferences and expectations (Ashworth et al., 2018).
- Politicians are pushed into the center of the storm because they need to provide a response to unexpected damages and needs.
- Voters can use information on politicians' response to update preferences and expectations, and reward or punish politicians at the following elections.

Background

Voters react to natural disasters, but evidence is mixed:

- Gasper and Reeves (2011): voters are able to identify politicians who are responsible for a good (or bad) response to disaster occurrence, and reward (or punish) them accordingly.
- Achen and Bartels (2017): voters express their frustration at elections when disasters strike.

Channels driving vote decisions after disaster occurrence are under-investigated:

- Financial transfers from the central government raise consensus for the incumbent (Bechtel and Hainmueller, 2011, Healy and Malhotra, 2009)
  - Politicians' performance is neglected
- No studies relating political visibility following a disaster to electoral outcomes.
  - The influence of media can shift votes towards a specific party or shape the evaluation of politicians' competences (e.g. DellaVigna and Kaplan, 2007, Hetherington, 1996)

What we do

How does the occurrence of earthquakes affect electoral outcomes at municipal elections in Italy?

Which channels drive this change?

Contribution

- Detailed and extensive data set on occurrence of earthquakes.
- Detailed and extensive data set on earthquake occurrences to capture the impact of these shocks on municipal electoral outcomes.
  - This institutional level has been neglected in previous studies.
- Extension of the understanding of channels driving vote decisions after disasters.
  - We take into account factors that have been neglected in previous studies

Institutional setting: Municipal elections

- Executive power hold by the *Executive Committee (Giunta Comunale)*
- Legislative power hold by the *Municipal Council (Consiglio Comunale)*
- Voters elect the Mayor and the Councilors:
  - in a single ballot with majoritarian rule if population$<$15,000;
  - in two ballots (if majority is not obtained in the first run) with proportional rule if population$\geqslant$15,000.
- Until 2000, each mandate lasted 4 years.
- Since 2000, mandates last 5 years and there is a limit on the number of consecutive mandates for mayors.

Data

Local elections

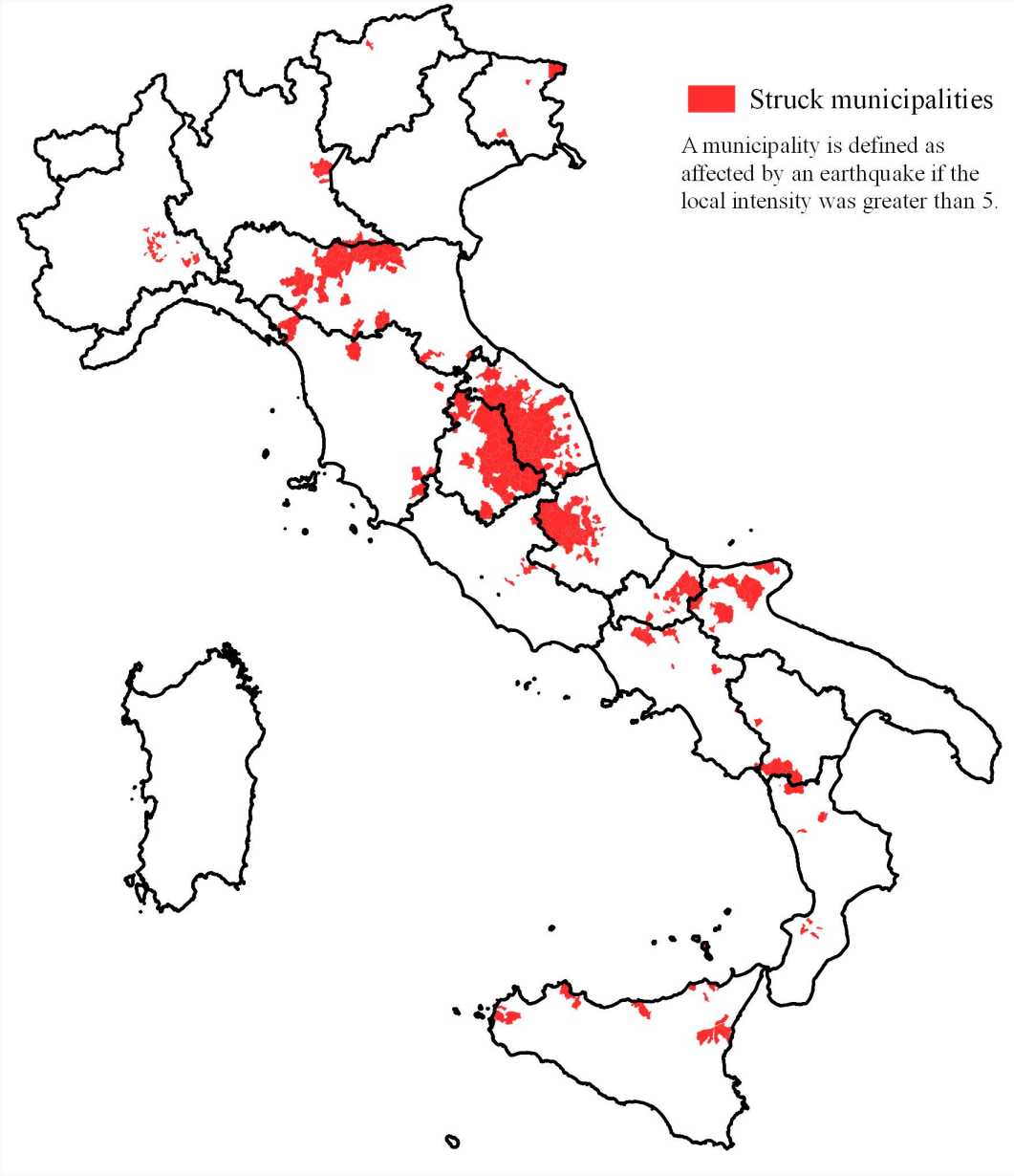
- 11,966 *municipality* $\times$ *election* observations relative to incumbent mayors running for reelection between 1993 and 2015.
  - We excluded 4,300 observations because relative to elections taking place in regions with special statue or because of incomplete data.
- Electoral outcome variables:
  - dummy $= 1$ if the incumbent is reelected;
  - incumbent vote share.

Other data

Earthquake occurrence measures, incumbent mayor characteristics, political orientation of the local government, electoral system, number of candidates, sociodemographic controls, local government balance sheet data.

Data sources: INGV, Ministry of the Interior, ISTAT.

Measurement of risk perception



The Mercalli scale intensity (I) is a good measure of voter exposure to risk because it measures observable damages.

Earthquake occurrence variable: $EQ_{it} = 1$ if a destructive earthquake (with $I > 5$) occurred in municipality i between two electoral cycles ($t-1$ and t).

Between 1993 and 2015, 397 municipalities were struck 406 times.

Our sample includes 170 municipalities struck once by by a destructive earthquake.

Struck versus unaffected municipalities

	(1) No earthquake	(2) Earthquake
Runs for reelection (=1)	0.487	0.486
Reelected (= 1)	0.783	0.853**
Δ Vote share of the incumbent	1.869	5.169**
Vote participation (%)	76.47	76.86
Δ candidates	-0.114	-0.0118
Inumbent education years	14.40	14.25
Incumbent is man (=1)	0.926	0.918
Incumbent age	46.59	45.26**
Proportional electoral system (=1)	0.0827	0.100
Obs.	11796	170

The reported statistics are related to municipal elections where a mayor runs for reelection (except for *Runs for reelection* which exploits the universe of municipal elections). Stars in column 2 indicate significance levels that result from one-side t-tests on mean differences between the two groups of municipalities. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Identification strategy

Identification strategy based on **propensity score matching (PSM)**.

- Municipalities face heterogeneous exposure to earthquake risk
- Assignment to the group of struck municipalities may not be random

We use regressions weighted by the reciprocal of normalized PSs to estimate the **ATT of earthquake occurrence on electoral outcomes**.

PSM approach

Probit model of earthquake occurrence that allows us to estimate PSs:

$$PS_i = Pr[EQ_i = 1 \mid X_i] = \Phi(\alpha + X_i'\gamma) \tag{1}$$

X_i' includes time-varying variables observed in the electoral period before earthquake occurrence and time-invariant variables, including **seismic risk zones**.

- Treated group: 170 observations
- Donor pool: 10,679 observations
  - We excluded observations of treated municipalities in periods not affected by earthquakes,
  - and municipalities struck with intensity = 5 (strong earthquake perception, but no damages).

Our preferred matching algorithm is **radius matching** with radius<0.001.

- Allows for oversampling if good matches are available
- Avoids the risk of including bad matches

Probit regression of earthquake occurrence

Overlapping

Dependent variable	Earthquake
Election year$_{t-1}$	-0.0261***
	(0.00595)
Seismic zone 1	1.270***
	(0.194)
Seismic zone 2	1.287***
	(0.166)
Seismic zone 3	0.882***
	(0.152)
Mountain municipality	0.187**
	(0.0701)
Coastal municipality	-0.951**
	(0.329)
Center (=1)	0.288**
	(0.105)
South (=1)	-0.277*
	(0.117)
Per captia local government expenditure $_{t-1}$	0.0213
	(0.0114)
Obs.	10849
No. of treated	170

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors are in

PSM balancing properties

Variable	U/M	Treated	Control	% bias	t	p> |t|
Election year$_{t-1}$	U	2003.4	2005.6	-38.4	-4.87	0.000
	M	2003.4	2003.1	5.0	0.47	0.642
Seismic zone 1	U	.15294	.08963	19.4	2.85	0.004
	M	.15385	.12553	8.7	0.75	0.454
Seismic zone 2	U	.61765	.2457	80.9	11.15	0.000
	M	.61538	.59298	4.9	0.42	0.675
Seismic zone 3	U	.2	.21828	-4.5	-0.57	0.567
	M	.20118	.24911	-11.8	-1.05	0.293
Mountain municipality	U	.61176	.38716	46.0	5.96	0.000
	M	.60947	.59616	2.7	0.25	0.803
Coastal municipality	U	.00588	.06933	-33.8	-3.25	0.001
	M	.00592	.00828	-1.3	-0.26	0.797
Center (=1)	U	.46471	.11948	81.9	13.62	0.000
	M	.46154	.49534	-8.0	-0.62	0.535
South (=1)	U	.27647	.26609	2.3	0.30	0.761
	M	.27811	.23484	9.7	0.91	0.364
p/c local government expenditure $_{t-1}$	U	1.8244	1.5285	19.6	2.27	0.023
	M	1.7681	1.5905	11.8	1.37	0.172

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

PSM balancing properties: Political variables

Variable	U/M	Treated	Control	% bias	t	p> |t|
Incumbent vote share$_{t-1}$	U	55.438	56.483	-7.5	-0.84	0.400
	M	55.415	55.341	0.5	0.05	0.958
Incumbent is man (=1)	U	.91765	.92496	-2.7	-0.36	0.720
	M	.92308	.94693	-8.8	-0.89	0.375
Incumbent age	U	45.259	46.727	-16.1	-1.99	0.046
	M	45.367	45.656	-3.2	-0.31	0.759
Inumbent education years	U	14.253	14.369	-3.2	-0.42	0.672
	M	14.231	14.603	-10.3	-0.97	0.334
Center-right local government	U	.10588	.12622	-6.3	-0.79	0.428
	M	.10651	.11352	-2.2	-0.21	0.837
Civic-list local government	U	.00588	.00281	4.7	0.75	0.456
	M	.00592	.00141	6.8	0.68	0.494
Proportional electoral system (=1)	U	.1	.08243	6.1	0.83	0.409
	M	.10059	.08364	5.9	0.54	0.591

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Estimation of the ATT

ATT of reelection probability:

$$p_i = Pr[Y_i = 1|EQ_i, X_i] = \Phi(\alpha + \tau_{ATT}^{PSM} EQ_i + X_i'\gamma_1 + Z_i'\gamma_2) \quad (2)$$

ATT of incumbent mayor vote share:

$$Y_i = \alpha + \tau_{ATT}^{PSM} EQ_i + X_i'\gamma_1 + Z_i'\gamma_2 + \varepsilon_i \quad (3)$$

ATT of incumbent mayor vote share using diff-in-diff strategy:

$$Y_{it} = \tau_{ATT}^{DD-PSM} EQ_i \times post_t + \delta\ post_t + \alpha_i + Z_{it}'\gamma_2 + \varepsilon_{it} \quad (4)$$

X_i' is the vector of variables used to predict propensity scores.

Z_i' are political characteristics (Z_{it}' only time-varying).

Controlling for these variables allows to adjust for outstanding bias due to inexact matching.

All models are weighted by the reciprocal of normalized PSs.

Results

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Incumbent reelection		Incumbent vote share			
Model	Probit (marginal effects)		OLS	OLS	DD	DD
Earthquake ($\times$ Post)	0.0705**	0.0689**	3.195**	3.211**	3.121**	3.121**
	(0.0340)	(0.0336)	(1.504)	(1.432)	(1.304)	(1.304)
Municipality fixed effects	No	No	No	No	Yes	Yes
Time fixed effects	No	No	No	No	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes
Obs.	9878	9878	9878	9878	19756	19756
(Pseudo) R-sq.	0.00876	0.0515	0.00873	0.109	0.631	0.633
Log-likelihood	-159.5	-152.7				

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors in parentheses.

Robustness checks

Robustness of results ensured by :

- **Alternative matching algorithms:** Alternative matching
- Provides almost identical results to our baseline estimates
- **Placebo tests:** Placebo
  - Treatment assigned to struck municipalities in periods when no earthquake occurs
  - Treatment assigned to municipalities struck with intensity $= 5$ (strong earthquake perception, no damages)
  - Neither of the tests shows significant variations in electoral outcomes.

Channels driving vote decision

Post-disaster relief and incumbent performance

- Post-disaster relief measured by local gov. per capita expenditure
- Following Gagliarducci and Nannicini (2013), performance measure by investments vs. current expenditure, transfers from upper-tier governments and deficit
- We further investigate variations in tax revenues and income
- We use a PS-weighted DD model that analyzes the impact of an earthquake on financial indicators observed in the year before elections before and after earthquake occurrence.

Political visibility

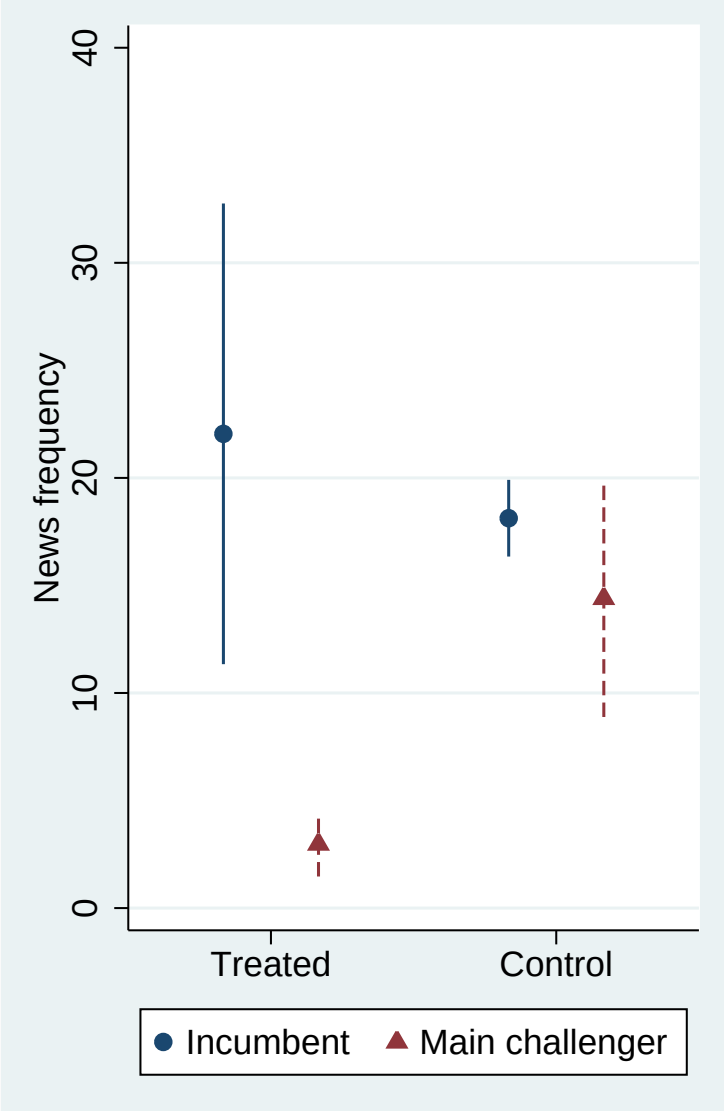
- *Measure*: News frequencies of incumbent mayors and competitors
- *Source*: Search strategy on Factiva Search strategy
- *Sub-sample*: 2,688 elections taking place between 2001 and 2015, and with at least one news collected

Channels: Post-disaster relief and incumbent performance

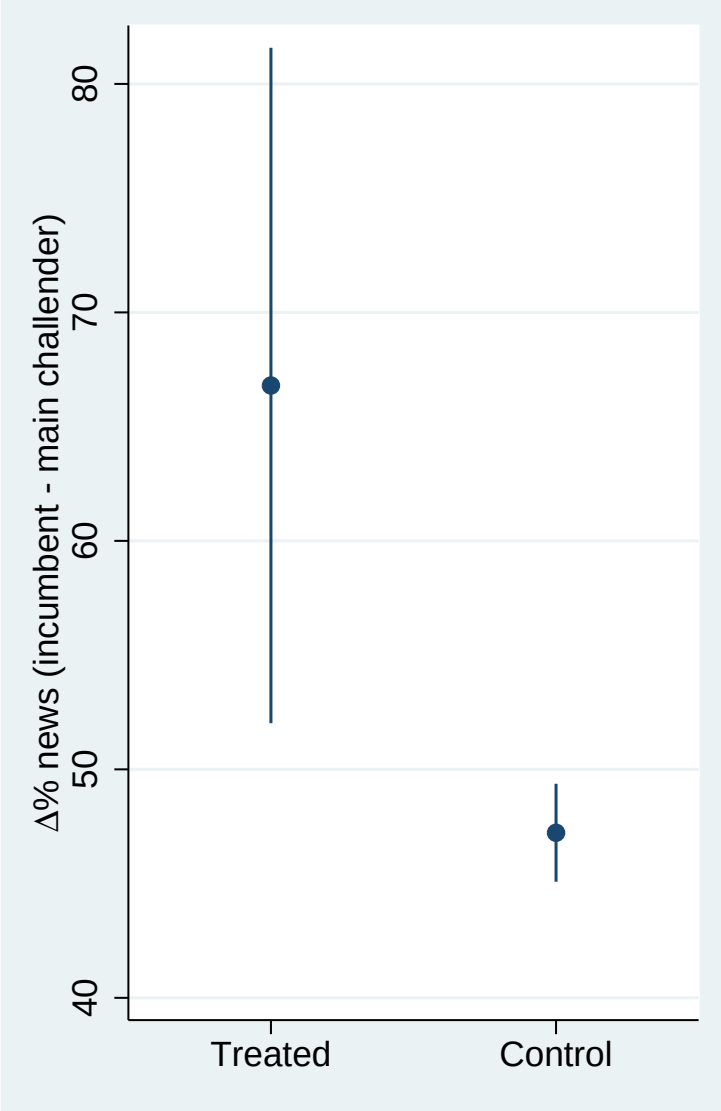
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Expenditure	Invest./ Current	Transfers	Deficit	Tax revenues	Personal income
Earthquake × Post	736.9***	0.218***	1140.3***	-449.2***	-31.48	117.6
	(155.3)	(0.0799)	(223.3)	(151.3)	(26.36)	(131.9)
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12616	12616	12616	12616	12616	11582
R-sq.	0.832	0.637	0.667	0.481	0.860	0.974

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors in parentheses.

Channels: Political visibility I



(a) News frequency



(b) Share of news

Channels: Political visibility II

	(1)	(2)	(3)	(4)
Dependent variable	Incumbent reelection		Incumbent vote share	
Model	Probit (marginal effects)		OLS	OLS
Earthquake (Eq.)	0.122**	0.00300	1.814	-4.144
	(0.0595)	(0.134)	(1.921)	(3.637)
Eq. × News on incumbent		0.0804		2.767**
		(0.0642)		(1.291)
News on incumbent	0.0365***	0.0357***	1.266***	1.220***
	(0.00848)	(0.00851)	(0.296)	(0.298)
News on main challenger	-0.0321***	-0.0320***	-2.153***	-2.152***
	(0.00814)	(0.00813)	(0.295)	(0.295)
Controls	Yes	Yes	Yes	Yes
Obs.	2688	2688	2688	2688
(Pseudo) R-sq.	0.0662	0.0666	0.154	0.155
Log-likelihood	-1482.4	-1481.9		

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors clustered by municipality in parentheses.

Conclusions

- The occurrence of an earthquake **increases incumbent mayor reelection probability by 7% and vote share by more than 3%**.
- Two channels help to explain this result:
  - **Incumbent performance** in recovery from disaster damages without affecting population wealth $\rightarrow$ voters rationally update their expectations (Ashworth et al., 2018)
  - **Higher visibility on the media:**
    - allows to inform the electorate on recovery
    - may bias voters' decisions due to disproportion in news relative to the challengers (Clinton and Enamorado, 2014, DellaVigna and Kaplan, 2007)

Appendix

Theoretical framework: Vote choice under uncertainty

A rational risk-averse voter choosing between the incumbent (I) and a competitor (C).

Strictly concave utility function increasing with the level of wealth (w).

Assume certainty regarding impact of incumbent policies and uncertainty about competitor's policies. Then:

$$EU[w, \varepsilon, \pi] = \pi U(w - \varepsilon) + (1 - \pi)U(w + \varepsilon) \qquad \pi \in [0, 1]$$

($\varepsilon = 0$ for the incumbent)

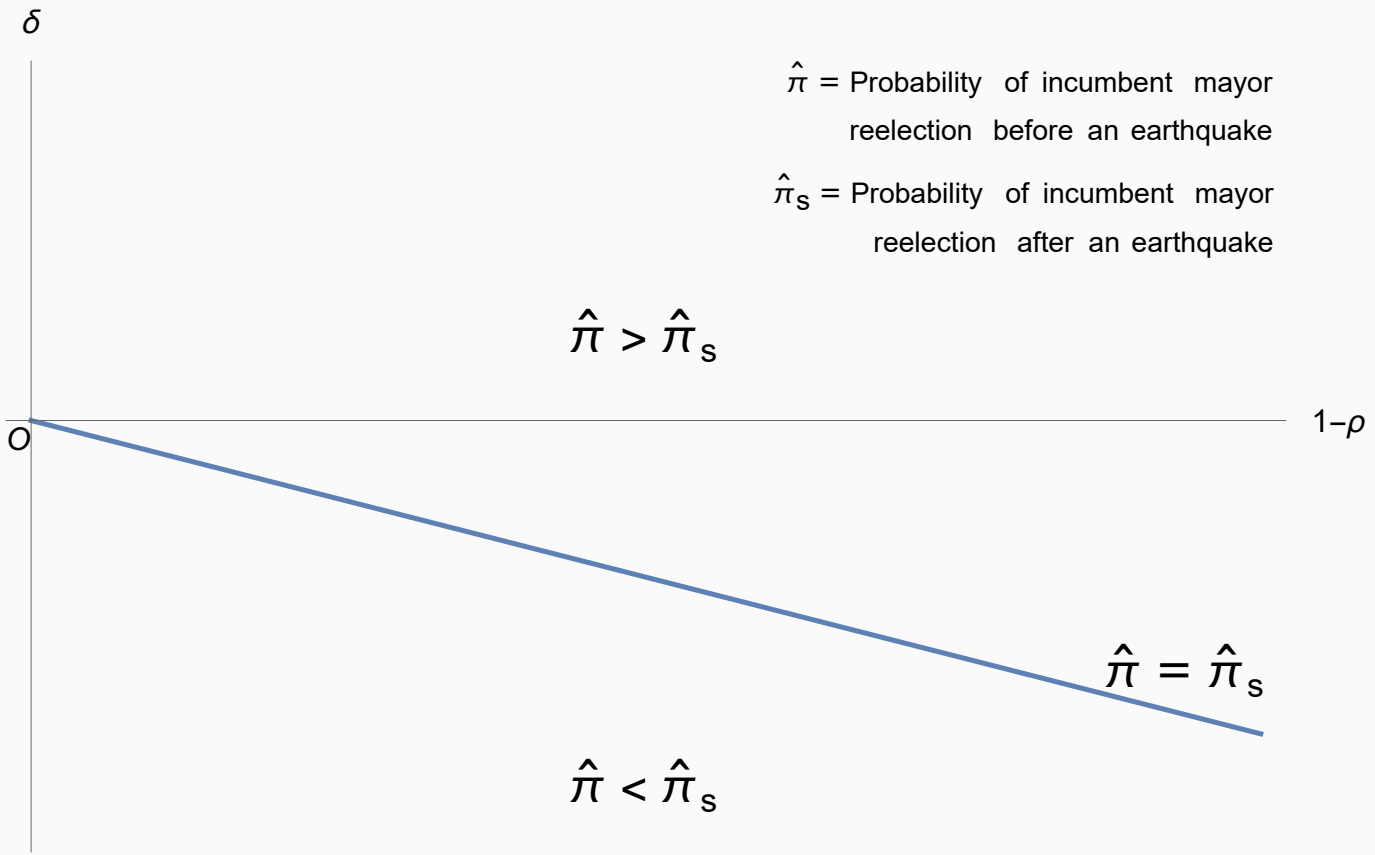
The voter is indifferent between the incumbent and the competitor if:

$$EU_I[w] = EU_C[w, \varepsilon, \hat{\pi}]$$

For $\pi > \hat{\pi}$ vote for the incumbent.

Math

Theoretical framework: Earthquake effect



Math

$L =$ wealth loss

$\rho \in [0, 1] =$ politicians ability to restore initial wealth

$\delta =$ incumbent-specific signal at zero cost affecting (positively or negatively) voter expectations: $\rho_I = \rho + \delta$

New indifference threshold $\hat{\pi}_s$ which decreases with δ. For any $\rho < 1$ and $\hat{\delta} < 0 < \delta$ we have $\hat{\pi}_s < \hat{\pi}$.

Theoretical framework (1/3)

Indifference threshold ($\hat{\pi}$)

$$EU_I[w] = log(w) \tag{5}$$

$$EU_C[w, \varepsilon, \pi] = \pi \; log(w - \varepsilon) + (1 - \pi) \; log(w + \varepsilon) \tag{6}$$

with $\pi \in [0, 1]$, $0 < \varepsilon < w$.

Using (5) and (6), we can write the critical value of π for which the individual is indifferent between choosing the incumbent or the competitor as:

$$\hat{\pi} = \frac{log(w + \varepsilon) - log(w)}{log(w + \varepsilon) - log(w - \varepsilon)} \tag{7}$$

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Theoretical framework (2/3)

Indifference threshold after earthquake ($\hat{\pi}_s$)

The voter expected utility becomes:

$$EU_I[w|L,\rho] = (\rho+\delta)\ log(w) + (1-\rho-\delta)\ log(w-L) \tag{8}$$

$$\begin{aligned} EU_C[w,\varepsilon,\pi|L,\rho] = \rho[\pi\ log(w-\varepsilon) + (1-\pi)\ log(w+\varepsilon)] \\ + (1-\rho)[\pi\ log(w-\varepsilon-L) + (1-\pi)\ log(w+\varepsilon-L)]. \end{aligned} \tag{9}$$

Using (8) and (9) and defining $\Delta = \delta[log(w) - log(w-L)]$, the new value of π for which the individual is indifferent between choosing the incumbent or the competitor is:

$$\hat{\pi}_s = \frac{\rho[log(w+\varepsilon) - log(w)] + (1-\rho)[log(w+\varepsilon-L) - log(w-L)] - \Delta}{\rho[log(w+\varepsilon) - log(w-\varepsilon)] + (1-\rho)[log(w+\varepsilon-L) - log(w-\varepsilon-L)]} \tag{10}$$

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Theoretical framework (3/3)

For $p < 1$ and $\delta < 0$, the threshold for which $\hat{\pi}_s = \hat{\pi}$ is:

$$\hat{\delta} = -\frac{(1-\rho)\{log(w+\varepsilon)[log(w-L) - log(w-\varepsilon-L)]\}}{[log(w+\varepsilon) - log(w-\varepsilon)][log(w) - log(w-L)]}$$

$$-\frac{(1-\rho)\{log(w-\varepsilon)[log(w+\varepsilon-L) - log(w-L)]\}}{[log(w+\varepsilon) - log(w-\varepsilon)][log(w) - log(w-L)]} \quad (11)$$

$$-\frac{(1-\rho)\{log(w)[log(w+\varepsilon-L) - log(w-\varepsilon-L)]\}}{[log(w+\varepsilon) - log(w-\varepsilon)][log(w) - log(w-L)]}$$

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Institutional setting: Response to earthquakes

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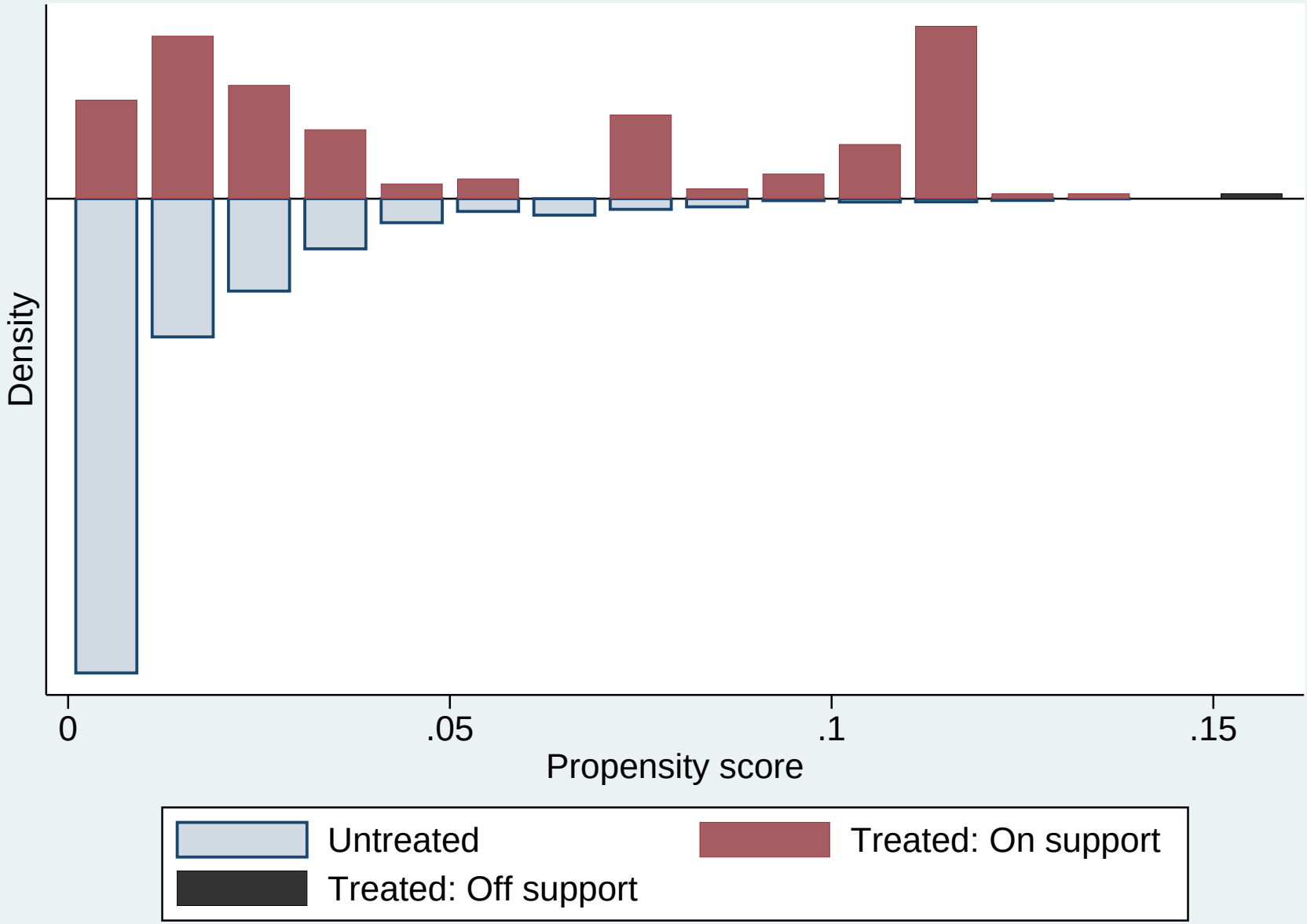
Response to earthquake occurrence

- Governments at all levels contribute to disaster relief.
- The central government transfers financial resources to regional and local governments.
- Local governments increase expenditure for housing, waste disposal, water supply and environmental protection.

PSM: overlapping

Back



Robustness checks: alternative matching algorithms

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	(1)	(2)	(3)	(4)	(5)	(6)
Matching algorithm	Kernel			Nearest-neighbor (n=10)		
Dependent variable	Reel.	Vote sh.	DD	Reel.	Vote sh.	DD
Earthquake ($\times$ Post)	0.0598**	3.198**	3.054***	0.0549*	2.380	2.688*
	(0.0291)	(1.361)	(1.109)	(0.0322)	(1.452)	(1.444)
Municipality fixed effects	No	No	Yes	No	No	Yes
Time fixed effects	No	No	Yes	No	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	10848	10848	21696	1204	1207	2414
(Pseudo) R-sq.	0.0490	0.109	0.618	0.0450	0.109	0.669
Log-likelihood	-150.8			-150.1		

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors in parentheses.

Robustness checks: placebo tests

	(1)	(2)	(3)	(4)	(5)	(6)
	Unaffected election periods			Weak earthquakes		
Dependent variable	Reel.	Vote sh.	DD	Reel.	Vote sh.	DD
Placebo earthquake ($\times$ Post)	0.0115	0.376	-0.346	0.00802	-0.702	-0.793
	(0.0340)	(1.330)	(1.391)	(0.0183)	(0.710)	(0.665)
Municipality fixed effects	No	No	No	No	No	Yes
Time fixed effects	No	No	Yes	No	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	9965	9965	19930	8914	8914	17828
(Pseudo) R-sq.	0.0567	0.0910	0.511	0.0436	0.0956	0.624
Log-likelihood	-205.6			-617.2		

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors in parentheses.

PSM Back

News on politicians: Search strategy

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We use news frequencies to measure political visibility of incumbent mayors and competitors.

Search criteria:

- mentions the name of the candidate
- during the period in which the incumbent is in charge
- geolocalization in the ruling municipality

Sources:

- Press agency (*ANSA*)
- Newspapers (*Corriere della Sera* and *Il Sole 24 Ore*)

Search tool: *Factiva*

Sub-sample: 2688 elections taking place after 2001

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