Natural disasters and electoral outcomes*

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Abstract

Natural disasters are good examples of catastrophic events that may affect vote decisions. In this study, we analyze how the occurrence of earthquakes changes voters' behavior at municipal elections and which channels drive this change, focusing in particular on the role of media exposure. We exploit data from 13,338 municipal electoral cycles where incumbents seek reelection between 1993 and 2015 in Italy. We apply a difference-in-difference strategy with time and cities fixed effect to the probability of reelection and vote share using three different control groups: the universe of municipalities, a sub-sample of neighboring municipalities, and a sub-sample of municipalities identified by a one-to-one nearest-neighbour propensity score matching procedure. We find that the occurrence of destructive earthquakes significantly increases the incumbent mayors' chance of being reelected and their vote share. We argue that this result is driven by the incumbent mayor advantage in offering recovery from disaster damages combined with a higher visibility on the media in the aftermath of the disaster. Thus, the mediatic relevance of earthquake occurrence may bias voters towards the incumbent.

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JEL codes: D72, Q54

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1 Introduction

Natural disasters are good examples of shocks that may affect election results since voters can update preferences and expectations on policies and politician performance following the catastrophe (Ashworth, Bueno de Mesquita, & Friedenberg, 2018). Indeed, 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 assess incumbent politicians' competences and evaluate whether they deserve maintaining their position and punish or reward them at the following elections. Several studies address the question of voter behavior at elections when disasters occur (e.g. Gallego, 2018; Klomp, 2019). However, findings are mixed and evidence on the alignment between variations in electoral support in local-level elections and incumbent mayor performance is lacking. In particular, the potential role played by media exposure is generally neglected.

In this study, we investigate how the occurrence of natural disasters (earthquakes) affects electoral outcomes. To this aim, we use data from 13,338 municipal elections in Italy where incumbent mayors run for reelection between 1993 and 2015, and exploit a rich dataset of all earthquake events occurred within the same period. We analyze how the reelection probability and vote share of incumbent mayors differ between struck and unaffected municipalities in local elections, and then we focus on channels explaining the results by devoting special attention to the scarcely explored pipeline of political visibility.

We apply a difference-in-difference strategy with time and cities fixed effect to the probability of reelection and vote share using three different control groups: the universe of municipalities, a sub-sample of neighboring municipalities (within 30 km from treated units), and a sub-sample of municipalities identified by a one-to-one nearest-neighbor propensity score matching procedure. We find that the occurrence of destructive earthquakes raises the support for the incumbent mayor by increasing both the reelection probability and the share of votes gained. The results are robust to the use of alternative matching procedures and placebo tests. Then we analyze possible channels through which earthquake occurrence changes vote decisions. In particular, we focus on politician performance and visibility on the main Italian press agency (*ANSA*). While data for the measurement of performance (local government financial indicators) are available from institutional sources, we collected data on political visibility using a search strategy on the Factiva database to obtain the frequency of news mentioning incumbent mayors and competing candidates. We find that both incumbent mayor performance and visibility on the media increase after the occurrence of an earthquake, which explains improved electoral outcomes for incumbent mayors. Although voters tend to reward the good performance of the incumbent, the mediatic exposure of incumbent mayors relative to their competitors biases voters' choice towards the incumbent.

Previous studies tend to suggest that the occurrence of natural disasters reduces the support for the incumbent politician if his/her response is perceived as inadequate (Eriksson, 2016; Lay, 2009) or if he/she takes actions which go to the detriment of voters welfare (Akarca & Tansel, 2016). Conversely, an appropriate response, generally measured by the size of financial transfers from the central government, raises the support for the incumbent government (e.g. Healy & Malhotra, 2009), although incumbents may use these tools to attract votes in an opportunistic manner (Bechtel & Hainmueller, 2011). Belloc, Drago, and Galbiati (2016) show that between 1000 and 1300, political and religious leaders (bishops) in autocratic Italian cities exploited the occurrence of earthquakes to maintain their power leveraging on fear and the religious sphere of individuals. However, whether voters are able to identify the politicians who are responsible for a positive (negative) response to disasters and reward (punish) them at elections is an under-investigated question and provides mixed evidence. Gasper and Reeves (2011) analyze the impact of extreme rainfalls in the US on electoral outcomes at county and federal level and find that voters are able to identify politicians who are responsible for a good (or bad) response to disaster occurrence, and reward (or punish) them accordingly. Conversely, Achen and Bartels (2017) argue that voters express their frustration at elections when disasters strike, and blame incumbents as long as there is some reason to believe that they are accountable for disaster occurrence.

The investigation of other channels driving vote decisions when natural disasters occur is still lacking. Studies investigating the incumbent government response generally focus on spending levels but neglect the performance in recovery from damages and the role of media exposure (e.g. Bechtel & Hainmueller, 2011; Healy & Malhotra, 2009). A large strand of the literature analyzes the role of media in biasing vote decisions, showing that the influence of media can shift votes towards a specific party or shape the evaluation of politicians' competences (e.g. DellaVigna & Kaplan, 2007; Hetherington, 1996). To our knowledge, there are no studies that relate variations in political visibility following a disaster and electoral outcomes. Our contribution to this literature is twofold. First, we use a unique and very detailed data set on earthquake occurrences to capture the impact of these shocks on municipal electoral outcomes, an institutional level that has been neglected in previous studies.[1] Therefore, we believe that our empirical exercise allows to assess the impact of natural disasters on election results more precisely as compared to previous studies. Second, we improve the understanding of channels driving vote decisions and take into account factors that have been neglected in past studies. Part of the response of individuals to natural disasters cannot be explained by politician's reaction, and may be due to some psychological mechanisms related to fear, risk perception and need for reassurance. Although it is hard to measure the impact of these aspects by looking at political visibility, our analysis on the role of news casts doubts on explanations of electoral outcomes through politician's performance. In particular, when local politicians appear to have little power in responding to large catastrophic events, voter's decisions are likely to be induced by apparent or misleading politician's performance masked with communication.

The remainder of this paper is structured as follows. Section 2 provides an overview of electoral rules in local elections in Italy. Section 3 describes the data and discusses how we measure the occurrence of natural disasters. Section 4 presents our identification strategy, while Section 5 shows some preliminary evidence on the relationship between votes and earthquake occurrences. Section 6 discusses the main results of the analysis. In Section 7 we provide evidence on possible channels driving our results. Finally, Section 8 concludes and the online Appendix presents a simple framework of voters' response to earthquake occurrence and some robustness checks.

2 Institutional setting

2.1 Municipal elections in Italy

Italy is a parliamentary republic with a multiparty system organized in 20 regions, 110 provinces and almost 8000 municipalities.[2] Substantial power is delegated by the central government to sub-national governments and each institutional level has a government with executive power and a council with legislative power. Local (municipal) governments have the task to provide a number of services to the resident population. The main services are primary education, waste disposal, urban road maintenance, public residential buildings and social protection.[3] The mayor is the head of the Executive Committee

[1] Exceptions are Nikolova and Marinov (2017) who focus on corruption determined by flood-driven relief funds and incumbent reelection, and Bodet, Thomas, and Tessier (2016) who analyze the effect of a flood on electoral outcomes in one town and for one electoral period.

[2] These numbers refer to 2015. Since 1993, provinces increased from 103 to 110 and municipalities have followed a consolidation process from 8100 to 7997 jurisdictions.

[3] See Decree Law 267/2000 (*Testo unico delle leggi sull'ordinamento degli enti locali*).

(*Giunta Comunale*), which holds executive power, and the Municipal Council (*Consiglio Comunale*) exercises legislative power.

In this study, we focus on municipal elections. At local level, the mayor and the Council members are elected directly by the electorate, while the Executive Committee is proposed by the mayor and approved by the Council. Local government elections are ruled by two electoral systems (majoritarian and proportional) which are assigned based on the population size of the most recent population census. Municipalities with less than 15,000 inhabitants adopt a single-ballot majoritarian system and each mayor candidate can be supported by a single party/list. Municipalities with more than 15,000 inhabitants adopt a two-ballot proportional electoral system and each mayor candidate is supported by a coalition of parties. The second ballot takes place if no candidate wins the absolute majority in the first ballot. Therefore, voters express their preference for one of the two candidates who obtained the largest shares of votes in the first ballot.[4]

Until 2000, each term lasted 4 years. Afterwards, the term was extended to 5 years and a term limit was introduced for mayors.[5] In municipalities with less than 3,000 inhabitants a mayor is allowed to rule for not more than three consecutive mandates, while in municipalities with more than 3,000 inhabitants only two consecutive mandates are allowed. Elections do not take place at the same time in each municipality. Anticipation is possible if a mayor loses the support of the Council or resigns, or the central government replaces the elected officials because of connections with the mafia. Between 1993 and 2015, the *regular* election years are 1995, 1999 and every 5 years afterwards. Less than 50% of municipalities have governments that reach the end of their mandates in every electoral cycle.

2.2 Response to earthquake shocks

Between 1993 and 2015, 397 municipalities were struck at least once by a destructive earthquake (i.e. an earthquake with Mercalli scale intensity greater than 5). In addition, 1524 municipalities registered an intensity equal to 5 and many other jurisdictions below that threshold. Following the shocks, the central government intervenes through the Civil Protection, a department administered by the Presidency of the Council of Ministers with the task to manage prevention, response and forecast of natural and man-made disasters, and through delegates who can act notwithstanding the regulation in order to face the

[4] See Law 81/1993 for further details on municipal elections in Italy.
[5] Law 120/1999, Art. 7.

state of emergency. A "special status" is also acknowledged for groups of municipalities included in the state of emergency declaration according to the Italian law. This status allows to put priority on rapid recovery and fast application of safety measures, and increases flexibility in the awarding of contracts by public authorities (Marcolongo, 2020).

Large amounts of financial resources are then transferred to local governments from both central and regional governments.[6] As a consequence, the response of local governments to the occurrence of an earthquake is generally immediate. Evidence suggests that local governments of municipalities struck by disasters of intensity greater than or equal to 5 increase expenditure by about 100 Euro per capita for 11 years after a shock (Masiero & Santarossa, 2020). This expenditure variation is allowed by a higher availability of transfers from the central and regional governments. Moreover, local governments adjust the spending composition to face the consequences of the disaster. Local governments increase the share of resources for housing, Civil Protection, waste disposal, water services and services for environmental protection, and reduce the expenditure share of minor services such as justice, culture and sports.

3 Data and descriptive evidence

3.1 Sample and variables

To analyze the impact of earthquake occurrence on electoral outcomes, we merge a number of data sources with information aggregated at municipality level. Data on municipal electoral outcomes are provided by the Italian Ministry of Interior and are available on the online historical election archive (*Archivio storico delle elezioni*). These data include information on election dates, candidates, lists/coalitions, vote participation and preferences for elections taking place between 1993 and 2015.[7] Since these data lack some information on municipal elections, we supplement the information with a second data set (*Anagrafe degli amministratori locali*) which includes yearly information on gender, age and education for all elected officials. Between 1993 and 2015, 41,361 municipal elections (about 5 per municipality) took place.

The municipal election data set includes 16,266 observations relative to incumbent mayors running for reelection. Using these data, we define two electoral outcome measures.

[6] See for example Barone and Mocetti (2014), Di Giacomo (2014) and Masiero and Santarossa (2020) for a discussion on public transfers and expenditure in the aftermath of earthquake shocks in Italy.

[7] Data on more recent electoral outcomes are available, but we cannot use them because we lack data on earthquake occurrences.

The first is a dummy variable equal to one if an incumbent mayor is reelected. The second is the share of votes received by the incumbent computed as the proportion of preferences relative to the total number of valid votes. The reelection dummy is a dichotomous measure that allows to assess the success of the incumbent in the electoral run, but it does not suggest if and how much the incumbent gains or loses support during his mandate. Instead, the vote share, especially if related to the votes received in the previous election, measures how much support an incumbent gains or loses, but looking at the vote share variation does not allow to make inference on electoral success.

Using the sources above, we also compute the number of candidates participating in the electoral run and the political orientation of the incumbent government (center-left, center-right, independent or *Movimento 5 Stelle*).[8] In municipalities with more than 15,000 inhabitants, we classify governments according to the political orientation of the parties forming the winning coalition.

We use several other data sources to complete our data set. Data on earthquake occurrence are provided by the Italian Institute for Geophysics and Volcanology (INGV) and these data are discussed in detail in the next section. We use population data for the period 1993-2015 provided by the Italian Institute for Statistics (ISTAT) to define sociodemographic indicators (percentage variation of population and variation in the share of elderly people), and population census data for the years 1991, 2001 and 2011 to classify municipalities by electoral system (proportional or majoritarian).[9] Local government balance sheet data are provided by the Italian Ministry of Interior. Total expenditure and revenue data are available for the period 1993-2015, and detailed data (spending categories and revenue sources) for the period 1998-2015. All monetary values are deflated using the regional consumer price index to obtain real values at 2010 prices. Because we drop some municipalities with incomplete data, our final sample is composed of 13,338 observations for the analysis on incumbent mayor reelection, and 12,893 observations for the analysis of vote share.

[8] About 60% of the lists supporting mayors are reported as *civic lists*, i.e. lists which do not have an explicit political orientation and generally are independent from national parties.

[9] For each election, population at most recent censuses was used to discriminate the electoral system, as in accordance with the law prescription (Art. 2 of the Presidential Decree no. 570/1960 and Art. 37, Par. 4, of the Legislative Decree no. 267/2000).

3.2 Measurement of earthquake occurrence

We use data on earthquake occurrences from the Italian Macroseismic Database DBMI15 (Locati et al., 2016) provided by INGV aggregated by municipality and electoral period. The INGV institute is managed by the Civil Protection and has the purpose to increase the knowledge of natural phenomena in terms of occurrence and relevance, with a particular focus on seismic and volcanic events. The DBMI15 database includes detailed information on earthquakes occurred in Italy between 1000 AD and 2014.[10] We are interested in the Mercalli scale intensity (I), which measures observable effects caused by an earthquake on humans, animals, buildings and objects. This is plausibly the best measure of exposure to earthquake risk.[11]

Following Belloc et al. (2016), we classify earthquakes into destructive earthquakes ($I > 5$) and weak earthquakes ($2 < I \leqslant 5$). Belloc et al. (2016) exploit both types of shocks since religious authorities in medieval times leveraged on the intense sentiment of fear to keep their power. However, voters in modern economies are unlikely to reward or punish incumbent governments without any visible consequence. Therefore, in our baseline analysis we use destructive earthquakes to distinguish between struck and unaffected municipalities. We define a dummy variable (EQ_i) equal to one if at least one destructive earthquake occurred in the municipality area (i) between two consecutive electoral periods ($t-1$ and t), and zero otherwise.

Between 1993 and 2015, there are 397 struck municipalities with 406 occurrences of destructive earthquakes between two electoral cycles (see Figure 1 for an illustration of earthquake occurrence across Italian municipalities). Our final sample includes 183 municipalities struck once by a destructive earthquake.[12] 57% of these municipalities are located in 4 regions: Emilia Romagna, Umbria, Marche and Abruzzo.

[10]Data for 2015 are not available. Note, however, that in 2015 only a few earthquakes occurred and none of them was destructive.

[11]The alternative Richter scale measures the energy released by an earthquake. Although this is probably a more objective measure of earthquake strength, it is also less suitable to capture damages, and, therefore, observable effects, in the area.

[12]In the full sample, we observe 216 earthquake occurrences after which an incumbent mayor seeks for reelection. We drop 33 shocks because of missing data.

4 Methodology

4.1 Identification strategy

In order to identify the causal impact of natural disasters on electoral outcomes, we propose a strategy using earthquake occurrence as an instrument and looking at the effects on vote shares and mayor reelection probability within a framework akin to a difference-in-differences model (DD), though not completely standard as we will explain below, with time and municipality fixed effects. We apply the DD strategy to three control groups: the full sample of municipalities where an earthquake did not occur, a restricted sample of municipalities defined according to distance (30 km) from struck municipalities conditional on having no earthquake events, and a group of municipalities without earthquake shocks and defined by a one-to-one nearest-neighbor propensity score matching (PSM) approach.

Our empirical approach differs from the standard difference-in-differences model in some respects. First of all, the outcome variable reelection is only defined for elections when the incumbent runs for the second time. Therefore, we cannot compare electoral outcomes of any consecutive pair of elections before and after a disaster. We can only compare outcomes of second-runs before and after a disaster. Second, treatment (earthquakes) may happen at different points in time for the group of treated municipalities. Third, there is no pre and post for the control group of municipalities. Differences between treated and control municipalities are identified by municipality fixed effects. In this sense, our approach is closer to an event study rather than a standard difference-in-differences, even though we exploit time-invariant differences between treated and control municipalities.

The average treatment effect of earthquake occurrence on electoral outcomes on the treated municipalities (ATT) can be defined as:

$$\tau_{ATT} = E[Y_1 - Y_0 \mid EQ = 1] = E[Y_1 \mid EQ = 1] - E[Y_0 \mid EQ = 1], \tag{1}$$

where Y_1 and Y_0 are measures of electoral outcomes (incumbent reelection or vote share) when an earthquake strikes and if it doesn't occur, respectively, and EQ is the earthquake occurrence measure that assigns municipalities to the treatment group. However, we do not observe $E[Y_0 \mid EQ = 1]$ and if we assume $E[Y_0 \mid EQ = 1] = E[Y_0 \mid EQ = 0]$, then:

$$\tau_{ATT} = E[Y_1 \mid EQ = 1] - E[Y_0 \mid EQ = 0]. \tag{2}$$

Therefore, if the assignment to treatment is random, Equation 2 provides a consistent estimate of τ_{ATT}. Otherwise, as in our case, the consistent estimation of τ_{ATT} builds on the assumptions of unconfoundedness and common support. The first assumption requires that outcomes in control municipalities are independent of assignment to treatment conditional on observable characteristics of municipalities ($Y_0 \perp EQ \mid X$). The second assumption requires that, conditional on observable characteristics, earthquake occurrence is not perfectly predictable ($P(EQ = 1 \mid X) < 1$).[13]

Since we observe the outcome of an incumbent mayor both before and after the occurrence of an earthquake, we can apply a strategy that relaxes the assumption of unconfoundedness because it is possible to account for unobserved factors. Our estimator can then be written as:

$$\tau_{ATT}^{DD} = E[Y_{1,t} - Y_{0,t-1} \mid EQ = 1,\ X] - E[Y_{0,t} - Y_{0,t-1} \mid EQ = 0,\ X]. \tag{3}$$

Then, we evaluate the τ_{ATT}^{DD} estimator using the following equation:

$$Y_{it} = \tau_{ATT}^{DD} EQ_i \times Post_t + \boldsymbol{X'_{it}}\boldsymbol{\beta} + \gamma_t + \alpha_i + \varepsilon_{it} \tag{4}$$

where $Post_t$ is a dummy variable equal to 1 in the period after earthquake occurrence and ε_{it} is an *iid* error term. Time-invariant differences between the treatment and control groups are absorbed by municipality fixed effects (α_i) and time-specific shocks common to both groups are absorbed by time-specific (year) effects (γ_t).

Municipality fixed effects take into account persistent unobserved differences among municipalities which are likely correlated with both electoral outcomes and seismic risk. For instance, voters living in municipalities that are systematically exposed to corruption of politicians may take persistently different vote decisions as compared to voters living in non-corrupt towns. Also, people living in municipalities characterized by a higher seismic risk may have persistently different risk preferences. Finally, year fixed effects are supposed to absorb the effect of changes in the electoral law, the political orientation of the central government and other macroeconomic shocks (e.g. the 2009 economic crisis).

$\boldsymbol{X'_{it}}$ is a vector of time-variant controls and $\boldsymbol{\beta}$ is a vector of parameters. We control for the variation in local political controls (electoral system, political orientation of the

[13] Note that the assumptions of unconfoundedness and common support presented here are valid only for the estimation of the ATT and are weaker than the assumptions that allow to consistently estimate the average treatment effect (ATE) (Caliendo & Kopeinig, 2008).

incumbent, number of competing candidates and per capita local government public expenditure), characteristics of the incumbent mayor (years of education, gender, age, share of votes at previous elections) and sociodemographic characteristics (population and share of elderly population). We also control for the occurrence of concurrent shocks such as floods, using a dummy variable equal to one for municipalities affected by heavy rainfalls (more than 70 mm for 3 consecutive days or more) before the electoral spell.

To identify the effect of an earthquake on incumbent mayor reelection probability, we estimate Equation 4 using a linear probability model (LPM). This choice is determined by the inclusion of a large set of municipality fixed effects, which would lead to the incidental parameter problem when using non-linear choice models (logit or probit) and yield inconsistent estimates. Moreover, if the fixed effect of a municipality is collinear to electoral outcomes (i.e. any mayor running for reelection is always/never reelected), then a fixed-effects logit or probit regression would drop information of that municipality because the success or failure would be perfectly predicted by time-invariant unobserved heterogeneity.[14] However, municipalities struck by an earthquake where incumbent mayors are systematically (not) reelected contribute to the identification of the impact of earthquakes, and so do unaffected municipalities because they contribute to estimate the effect of the other regressors on electoral outcomes.

Differently from the reelection probability, vote shares of incumbent mayors can be observed both in current and previous elections. Therefore, when using vote share as a dependent variable we further control for the lag of vote shares. In this way, the earthquake occurrence variable measures the differential between the variation in votes received by incumbent mayors of struck and unaffected municipalities.

For both the reelection probability model (LPM) and the vote share model, we estimate our parameters using OLS with robust standard errors clustered by municipality to correct for possible heteroskedasticity and serial correlation. We estimate Equation 4 using the full sample of municipalities not affected by earthquake events as control group. However, we will refine our estimates using two alternative control groups discussed in the following section.

[14] This is a relevant issue in our sample because we would lose information from 5,549 municipalities (10,073 observations).

4.2 Difference-in-differences with neighboring cities and PSM

The strength of our DD approach lies in the fact that earthquake occurrence, conditional on time and municipality fixed effects, are random exogenous shocks. Note, however, that earthquake occurrence is random over time but the assignment of a municipality to the group of struck municipalities may not be random because of the heterogeneous exposure to earthquake risk due to the characteristics of the ground. This issue is amplified if we believe that risk preferences shape vote decisions and voters living in areas with high seismic risk have different risk preferences as compared to voters in low-risk areas. Moreover, we observe earthquake occurrence only in 183 of the 13,338 and 12,893 observations, respectively for the analysis on incumbent mayor reelection and vote shares (about 1.4%).

Therefore, comparing struck municipalities with the universe of unaffected municipalities may still confound the analysis due to unobserved heterogeneity that varies over time among municipalities and among electoral cycles. To address these concerns, we refine our identification strategy using two additional matching procedures to identify the control group. The first one is based on the selection of a smaller sample of neighboring municipalities within 30 km from struck municipalities conditional on having no earthquake events.[15] The approach is inspired by (Cipollone & Rosolia, 2007) and (Marcolongo, 2020) who use similar empirical methods to study earthquakes in the context of Italy. In our case, the method allows us to reduce the number of observation by almost 80%, from about 13,000 to 2,700 observations.

The construction of the second group of controls grounds on a one-to-one nearest-neighbor propensity score matching (PSM) approach. This method allows to reduce further the unobserved heterogeneity between struck (*treatment group*) and unaffected municipalities (*control group*), and to improve the identification of the causal impact of earthquake occurrence on electoral outcomes (e.g. Caliendo & Kopeinig, 2008; Heckman, Ichimura, & Todd, 1997; Imbens, 2004; Rosenbaum & Rubin, 1983). In particular, the PSM approach addresses the sample selection bias to obtain a comparable counterfactual group of unaffected municipalities since the matching procedure identifies a sub-sample of unaffected municipalities that is identical to the treatment group, on average, and therefore achieves pseudo-randomization. On the other hand, because of the small number of struck municipalities the PSM approach has reduced power as compared to the distance

[15]The choice of 30 km is based on evidence that the intensity of earthquakes within this distance decreases only slightly as compared to the epicenter, and almost 50% of municipalities within this distance show an intensity equal to 5. However, some robustness checks are later performed on bandwidths of 20, 25, 35 and 40 km.

approach and much less than the full-sample approach. Although this is an appealing approach to reduce unobserved heterogeneity, the cost in terms of loss of information is very high (about 1300 observations remain). Therefore, each control group exhibits specific strenghts that help to better identify our effect of interest.

We match treated with control municipalities conditioning on a set of variables (Z) observed in the electoral cycle before earthquake occurrence and obtain two homogeneous samples of municipalities. Various matching algorithms can be adopted to identify a comparison group for treated municipalities. We use the nearest neighbor approach to match each treated municipality with one control municipality.[16] We first exclude observations of treated municipalities in electoral periods when no earthquake occurs to avoid that treated municipalities are matched with themselves. Moreover, we exclude municipalities struck by destructive earthquakes in periods without observations on electoral outcomes (i.e. when an incumbent mayor does not run for reelection) and municipalities struck by weak earthquakes (intensity equal to 5) because their inclusion may confound or dim our results due to temporal and spatial spillover effects, respectively. The vector of variables used to identify nearest neighbors (Z_i') includes some local political factors (election year, incumbent vote share in previous elections, political orientation, electoral system, vote participation, variation in the number of candidates), characteristics of incumbent mayor (gender, age, education), number of inhabitants and aging index measured by the share of elderly people (both in terms of variation on previous elections), and the geographical location. After the matching, we check the balancing properties of the sample (see Table 7 in the Appendix for the balancing properties of the matching procedure).

Our two matched samples (30 km distance and PSM) are then used within a difference-in-difference strategy. We adjust Equation 4 to evaluate the difference-in-difference matching estimator τ_{ATT}^{DD-M} identified by the following model:

$$Y_{it} = \tau_{ATT}^{DD-M} EQ_i \times Post_t + \boldsymbol{X'_{it}}\boldsymbol{\gamma} + \gamma_t + \alpha_i + \varepsilon_{it} \tag{5}$$

where for the PSM sample the vector of variables $\boldsymbol{X'_{it}}$ includes the vector $\boldsymbol{Z'_i}$ used to identify nearest neighbors, which allows us to adjust the estimates of the ATT for outstanding bias if the matching is inexact and to correlate political characteristics with electoral out-

[16]The occurrence of earthquakes in different periods and municipalities hardly allows to use other matching procedures because the pre- and post-earthquake period varies with the earthquake. Single nearest-neighbor matching has the advantage that it is possible to identify pre- and post-earthquake periods for matched control municipalities.

comes since PSM does not account for that. We estimate Equation 5 using robust standard errors to account for possible heteroskedasticity.

5 Preliminary evidence on the probability of running for reelection

Before analyzing electoral outcomes, it is important to explore mayors' decision to run for reelection to rule out a possible sample selection. Indeed, earthquake occurrence might weaken electoral competition and increase the probability of rerunning. Some preliminary evidence is provided on the first line of each of the three panels considered in Table 1. Each panel represents a different sample of municipalities. Panel A is our original sample with the universe of municipalities; Panel B restricts the sample to municipalities non affected by an earthquake and within 30 km distance from affected municipalities (about 2700 observations); and Panel C is limited to municipalities identified by a one-to-one nearest-neighbor propensity score matching procedure (PSM) (about 1300 observations). Details on the use of these three different control samples are provided in the next Section 4. Notice that the average probability of observing a mayor who decides to run for reelection is slightly lower in the group of municipalities struck by an earthquake. However, this difference is relatively low in terms of size. While the probability of re-run is between 0.56 and 0.57 in municipalities not affected by an earthquake, the same probability is between 0.50 and 0.51 in unaffected municipalities.

Note also that the number of candidates is not significantly different between treated and untreated municipalities using the full sample and the 30 km sample (Panel A and B). If ever, the number of candidates slightly increases in the nearest-neighbor PSM sample (Panel C).[17] Finally, vote turnout is not significantly lower in treated municipalities when we restrict our sample (panel B and C). This may suggest that, in principle, the electoral competition is not distorted by the occurrence of natural disasters, at least in terms of number of candidates and vote participation. However, the slightly higher likelihood of re-running in treated municipalities could suggest that the incumbent is more confident of gaining the competition thanks to the increasing exposure obtained by the occurrence of natural disasters and, therefore, suggests a possible channel to discuss in the following analysis.

[17] The number of electoral lists corresponds to the number of candidates in municipalities with less than 15000 inhabitants. Above 15000 inhabitants, the number of candidates may differ from the number of lists but corresponds to the number of competing coalitions.

The remainder of Table 1 reports mean characteristics of municipalities struck between two electoral cycles (column 2) and unaffected municipalities (column 1). The reelection probability when an earthquake occurs is on average 2% higher in the two restricted samples, while it is not significantly different in the PSM sample. Instead, variation in the vote share between two electoral cycles is apparently the same for treated and untreated municipalities.

Also characteristics of incumbent mayors are not significantly different between the two groups of municipalities, except for incumbent years of education, which are lower in struck municipalities when we restrict the sample to neighboring municipalities (Panel B). Finally, the two groups in the restricted samples (Panels B and C) are composed of a non-significantly different share of municipalities with a proportional electoral system.

We complement this preliminary evidence with a regression analysis on the probability of running for reelection as a function of earthquake occurrence and controls. We control for municipality and year fixed effects, local political aspects (electoral system, political orientation of the incumbent, number of competing candidates and per capita local government public expenditure), characteristics of the incumbent mayor (years of education, gender, age, share of votes at previous elections) and sociodemographic characteristics (population and share of the elderly population). The results of this analysis are reported in Panel A of Table 2. The coefficient *Earthquake* $\times$ *Post* represents the standard interaction term in a difference-in-differences model capturing the effect of earthquakes in electoral cycles following the catastrophic event. Note that we cannot find any evidence that the probability of running for reelection is influenced by the natural disaster. As robustness checks we also extend the analysis to the restricted samples of neighboring municipalities and nearest-neighbor PSM (columns 2 and 3). The lack of significance in the estimated parameter is confirmed.

We also run similar regressions for voter turnout (Panel B) and the number of candidates (Panel C), but do not find any evidence of difference between municipalities exposed to earthquake events and municipalities not affected. This allows us to conclude that, in principle, the electoral competition is unaffected by natural disasters in terms of induced propensity to rerun, voter turnout and number of competitors.

6 Results

6.1 Matching

Our analysis of the impact of earthquakes on electoral outcomes is performed using three control samples of municipalities. As described in Section 4, the initial number of observations considered in the full sample of municipalities (about 13,000 observations) is restricted by means of two matching procedures. The first procedure matches each treated municipality with all municipalities (controls) within 30 km conditional on not being struck by an earthquake. This allow us to obtain a sample of 2764 and 2690 observations, respectively for the analysis of reelection probability and vote share, where earthquake occurrence is observed in 183 municipalities. The second procedure matches each treated municipality with only one municipality (control) based on the nearest-neighbor propensity score matching (PSM) approach. As a results we obtain 1366 and 1326 observations, respectively for the analysis of reelection probability and vote share, where earthquake occurrence is observed in 183 municipalities.

The balancing properties of covariates used to predict propensity scores in the PSM procedure before (U) and after matching (M) are reported in Table 7 in the Appendix. Looking at these properties, we observe that the treatment and matched control samples are balanced on all covariates conditional on propensity scores, which ensures the independence between assignment to treatment and observed covariates. Indeed, variables showing significant mean differences between treated and unaffected municipalities before the matching do not show significant differences after the matching. This implies that municipalities in the treated group are similar to municipalities in the control group in terms of local political factors such as election year, incumbent vote share in previous elections, political orientation, electoral system, vote participation, and number of candidates. The two groups are also similar in terms of characteristics of incumbent mayor (gender, age, education), population, aging index (share of elderly people), and geographical location (North, Center or South). If any, there is a slightly smaller proportion (by 6%) of control municipalities as compared to treated municipalities in the South, which is not different from the donor pool, i.e. the original unmatched sample of the universe of Italian municipalities. Therefore, the matching procedure is effective in reducing bias between the treatment and the control group.

6.2 Impact of earthquakes on electoral outcomes

Using the three samples of treated and control observations, we estimate the ATT of earthquake occurrence on electoral outcomes within a difference-in-differences model, as from Equations 4 and 5. The results are summarized in Table 3. Columns 1-3 report regression results from linear probability models (LPM) of incumbent mayor reelection, while columns 4-6 report the results from fixed effects regressions of incumbent mayor vote share. For each outcome, the first column (1 and 4) reports the estimates for the full sample of municipalities. The estimates for the restricted sample of municipalities located less than 30 km from affected municipalities are reported in columns 2 and 5. Finally, the last two columns of each outcome show the results using the smallest sample of municipalities identified by the one-to-one nearest-neighbor matching strategy.

All models control for time-varying aspects categorized into local political covariates (electoral system, political orientation of the incumbent, number of competing candidates and per capita local government public expenditure), characteristics of the incumbent mayor (years of education, gender, age, share of votes at previous elections) and sociodemographic characteristics (population and share of the elderly population). Each model also controls for concurrent shocks (floods), year fixed effects and unobserved time-invariant effects through municipality fixed effects.

Our main coefficient of interest is represented by the interaction term $Earthquake \times Post$, which measures the impact on electoral outcomes following the occurrence of a natural disaster. All of the coefficients are positive and significant at 10% level at least, with higher significance levels (between 5% and 1%) showing for incumbent vote share in columns 4-6. Models exploiting matching procedures (columns 2, 3, 5 and 6) to reduce heterogeneity between treated and control municipalities provide coefficients similar in magnitude to those observed in the full sample. The incumbent mayor probability of reelection is slightly higher when we use the full sample of municipalities (about 2% higher), while the incumbent vote share is slightly lower (between 0.5-0.7 lower). Standard errors (in parenthesis) and the explained variance are also quite similar across the models. The use of municipality fixed effects in all models may actually attenuate the potential bias and improve the accuracy of our estimates.

The results show that the occurrence of a destructive earthquake raises a mayor's probability of being reelected by 8.2%-10.6%. Moreover, the mayor's vote share increases by 5.0-5.5 percentage points. Thus, earthquake occurrence raises both the incumbent mayor's chance of being reelected and his/her strength in the municipal council, *ceteris paribus*. This result is in contrast with Achen and Bartels (2017) who argue that incumbent politicians are punished at elections when disasters occur, but is in line with other studies showing that incumbent politicians gain support if the response to disasters meets voters expectations and needs (e.g. Gasper & Reeves, 2011; Healy & Malhotra, 2009). However, the results presented here do not allow to draw conclusions on the effectiveness of the response provided by incumbent mayors, an aspect that will be further investigated later in Section 7. Moreover, note that our results are somehow in line with Belloc et al. (2016) who find that earthquake occurrence in the Middle Ages provided support to religious authorities in place and delayed political transition. Clearly, fear of God is not a credible channel that could explain our results in modern societies where voters are generally aware that earthquakes are natural phenomena.

To complement the above evidence, we run some robustness checks using different bandwidths of distance to select control municipalities. Starting from our baseline of 30 km, we consider municipalities included into two smaller areas defined by 20 and 25 km from the epicenter, and two bigger areas of 35 and 40 km. The results of this robustness are summarized in Table 8 in the Appendix. As expected, the number of observations increases with the size of the bandwidth and the effects on the impact of shocks are confirmed but decrease in magnitude with the size of the bandwidth.

7 Channels driving vote decision

7.1 Post-disaster relief and incumbent mayor performance

A channel that may explain the change in electoral outcomes following the occurrence of an earthquake is politicians' ability to recover from earthquake damages through the use of additional public resources. Previous studies argue that public financial windfalls from the central government increase the support for the incumbent party in national elections (Bechtel & Hainmueller, 2011; Healy & Malhotra, 2009), and voters are able to identify how incumbent politicians perform in recovering from disasters (Gasper & Reeves, 2011). This suggests that incumbent mayors may benefit from an effective response to disaster occurrence.

Since performance indicators for local politicians are not available, to investigate this channel we follow Gagliarducci and Nannicini (2013) and exploit balance sheet data to build performance measures. Indeed, pre-electoral expenditure could signal incumbent politicians' ability to expand the availability of public goods (Rogoff, 1990; Rogoff & Sibert, 1988). Since we focus on earthquakes with intensity higher than 5, and the intensity scale is based on damages, the costs of our disasters are implicit and roughly the same across municipalities. Therefore, looking at expenditure variations is also a way to look at differences in net benefits. However, a cost and benefit analysis may not represent the approach of voters in this case. The perception of damages after a natural disaster is quite subjective and the availability of funds may become the main driver of public opinion. Voters' belief that the alternative candidate cannot do any better in attracting new resources may be sufficient to grant reelection.

We investigate how per capita expenditure, transfers from regional and central governments, deficit (the difference between per capita expenditure and revenues), tax revenues, and the ratio between budget allocation to investments (capital expenditure) and goods and services (current expenditure) observed in the year before elections vary following earthquake occurrence.[18] Moreover, we investigate variations in personal income as a proxy for local economic growth. Finally, we deepen the analysis on spending to better understand how local public finance changes after an earthquake and how this may affect incumbent's performance. Since the visibility of public spending may vary greatly depending on the category, we conduct the analysis on different macro categories of spending: local services, general administration, social protection, transport services, and education. Actually, some spending categories, such as local services which are tightly related to infrastructures, may be more visible than others. Therefore, these categories may better suggest whether and how voters react to variation in spending.

We apply a DD strategy on expenditure categories and other variables mentioned above using our three different control groups (all unaffected municipalities, municipalities within 30 km with no earthquake, and municipalities defined with nearest-neighbor PSM). Hence, we substitute the dependent variables in Equations 4 and 5 with expenditure categories, and estimate our models with municipality and year fixed effects but excluding other controls X'_{it}. All monetary values are expressed in real values at 2010 prices and are deflated using the regional consumer price index. The results are summarized in Tables 4 and 5.

[18]Since data for expenditure components, transfers and tax revenues are available only for the period 1998-2015 (see Section 3), we exclude observations for 1585 elections, including 14 treated observations, to improve comparability across the results presented here. Note, however, that the baseline estimates of the impact of earthquake occurrence on electoral outcomes presented in Table 3 hold also using this sub-sample of observations.

Looking at Table 4, we observe that mayors seem to provide a remarkable response to earthquake occurrence since expenditure before elections significantly increases by between 1224 and 1398 Euro per capita (column 1). This is not unexpected since governments in developed countries generally provide aid to disaster areas (Noy & Nualsri, 2011). The additional resources spent by local governments are allocated to investments, which grow significantly by around 50% more than expenditure on other services and goods (column 2). The sharp increase in spending levels is driven by the intervention of upper-tier governments that significantly increase transfers to municipalities struck by earthquakes by 1379-1448 Euro per capita (column 3). The other three figures of Table 4 (deficit, tax revenues and personal income) are apparently not affected by the shock if we exclude the significant reduction of personal income in Panel A (column 6). There is some weak evidence that deficit and tax revenues tend to decrease, respectively in Panels A and B of column 4 and Panels B and C of column 5.

Clearly, the focus on public finance indicators in the last year before elections may not convey a full picture of the response in the post-disaster period. Therefore, we repeat the analysis using the average value of public finance indicators in all the years between the disaster and the new election. The results are presented in a new table in the Appendix (Table 9). Over the whole post-disaster period, we observe a significant drop in income, which tends to disappear in the year before elections (Table 4). Also, the increase in expenditure comes with some inertia since it is lower than in the last year before elections. The slow initial response in expenditure and the increase of transfers seem to affect the deficit, which reduces substantially. However, by the end of the electoral period, mayors tend to spend more also by increasing the deficit, and income appears to be back at pre-earthquake levels.

Overall, these results suggest that, on average, incumbent mayor performance in recovering from earthquake damages is positively welcomed by the population. Incumbent mayors expand spending levels and foster investments to reconstruct damaged infrastructures (e.g. streets and public buildings), to allow local economic activities to start operating again without laying the burden of reconstruction on voters' fiscal contributions. As shown by Gasper and Reeves (2011), voters appear to be able to assess the performance of incumbent mayors who respond to earthquake occurrence limiting voters' wealth losses (small variation in personal income just before elections and no increase of taxes). The electorate rewards fiscal performance also in terms of deficit improvement despite the disaster (Brender & Drazen, 2008). It seems that voters do not express their frustration at elections as suggested by Achen and Bartels (2017), but rather their gratitude to well-performing politicians.

Clearly, incumbents are not accountable for the increase in resources available for recovery, since these resources are decided by upper-tier governments, while local governments are subject to substantial budget constraints. Nevertheless, mayors are accountable for the use of these additional resources and our results suggest that incumbent mayors are rewarded for appropriate responses to natural disasters. A concern that may arise is that voters act under bounded rationality since they do not have access to complete information on the fiscal performance of local governments. If this is the case, then voters may reward incumbents just for providing a response which is actually driven by upper-tier government transfers. However, due to the mediatic exposure of earthquake occurrence (see Section 7.3), voters are aware that upper-tier governments intervene by means of earthquake-specific transfers and are informed on the response provided by incumbent mayors.

7.2 Type of spending and time to election

Voters are also likely to observe the response of incumbent mayors who favor expenditure on investments at the expense of other goods and services, and the former spending component is characterized by a higher visibility as compared to the latter (Drazen & Eslava, 2010; Kneebone & McKenzie, 2001). Mayors are actually required to offer a number of services, among which the most relevant are local transports, urban road maintenance, waste disposal, housing, social protection, and primary education. Not surprisingly, after the shock the expenditure for local services, which includes public infrastructures, water supply and waste disposal, shows the largest increase among spending categories (Table 5). Indeed, the expenditure for local services significantly increases by 1038-1291 Euro per capita. Since this expenditure category is by large the most visible part of public expenditure, voters may be more responsive to changes. Therefore, mayors who are better in exploiting transfers from upper-level governments to expand expenditure on new infrastructures are possibly rewarded by voters. Note, however, that these resources may not be used efficiently and could favor corruption in the longer period. As suggested by Galletta (2017), spending categories that attracts the largest part of additional grants may foster exposure to corruption scandals within the construction industry. Indeed, Marcolongo (2020) shows that corrupted firms increase their participation in public procurement auctions in municipalities under the emergency status, in particular when there is little discretion, but this result does not seem to be related to collusion with local administrators.

Another expenditure category that responds significantly to earthquake shocks is the general administration (between 60 and 69 Euro per capita). In this case, the increase in expenditure is likely due to more flexibility in hiring people. Conversely, other spending categories do not change significantly, although there is some evidence of increase in social protection and education. In particular, the expenditure for social protection increases at 5% significance level in Panel C.

When we repeat the analysis using the average value of public finance indicators in all the years between the disaster and the new election, as we did in the previous section, the results are confirmed. There are some differences in the magnitude of the coefficients. In particular, the expenditure for local services increases by 672-920 Euro per capita, slightly less that in the last year before elections. The increase in the general administration is slightly more volatile (between 48 and 73 Euro per capita). Other spending categories do not change significantly. The results are reported in Table 10 in the Appendix.

An interesting aspect strictly related to mayor's performance is the opportunity to exploit time to elections to improve reelection chances. Indeed, one would expect that in cities where earthquakes occur at the beginning of the electoral term, mayors have more time to show their ability in dealing with disasters. To test for this heterogeneity and investigate the effect of earthquake proximity on electoral outcomes, we consider a new model where we interact the treatment variable *Earthquake* with two measures of time to election. We classify earthquakes into "near" and "far" shocks, i.e. earthquakes occurred less or more than 2.5 years (half electoral cycle) before elections, respectively. We implement this extension by replacing the treatment variable, *Earthquake* (omitted because of municipality FE) with *Earthquake*×*Near* and *Earthquake*×*Far*. Hence, we split the electoral cycle (5 years) based on the proximity of the disaster to capture whether the catastrophic event happened relatively near the current election (within 2.5 years) or far from (more than 2.5 years before) the current election. The results are presented in Table 11 in the Appendix.

The effect of natural disasters on reelection is confirmed since, in general, both interactions are significant and positive. Clearly, part of the effect measured by the interaction *Earthquake*×*Post* is now captured by the new time interactions. More interesting, we find some evidence that the incumbent benefits more in terms of reelection chances if he/she had more time to deal with the catastrophic event. In particular, earthquakes more far away from elections have a slightly larger impact on reelection probability than shocks occurring more recently. This evidence is quite the same across the three samples (Full, 30 Km and PSM). Generally, the incumbent mayor has 2% to 3% more chances of being reelected and 1 to 2 additional share of votes if a disaster occurs at the beginning of the electoral term. This suggests that the benefits for the incumbent mayor tend to increase with time passed since the shock because incumbent politicians have more time to respond, for instance in terms of recovery actions or allocation of funds, or possibly to take advantage from longer media exposure following the disaster to distract the public opinion.

7.3 Political visibility

Natural disasters receive extensive media coverage immediately after the events. Detailed information is provided on their impact in terms of damages, consequences for individuals, the reaction of local administrators and the response of upper-tier governments. Both local politicians and representatives in upper-tier governments are frequently cited and interviewed by the media. Therefore, catastrophic events increase the visibility of local politicians allowing them, either opportunistically or not, to send signals to the electorate, mostly in terms of reassurance and promises of fast recovery. The higher visibility on the media of incumbent politicians as with respect to the potential competitors may provide another possible explanation for the observed relationship between earthquake events and reelections. Therefore, to what extent the higher visibility of incumbent politicians in earthquake areas affects electoral outcomes is worth to be explored.

To this aim, we adapt the search strategy used by Giommoni (2017) and measure political visibility using frequencies of news reporting the name of incumbent mayors geolocalized in the ruling municipality and released while they were in charge. Our search strategy is applied on the *Factiva* database, a research tool that provides access to news from all over the world. We limit the collection of information from the main Italian press agency (*ANSA*), though, along with *ANSA*, several other Italian local and national news providers are accessible. This is because *ANSA* covers information over the entire country and for the longest period (since 2001). Indeed, data from the second most frequent newspaper sources, *Corriere della Sera* and *Il Sole 24 Ore*, are available since 2005 for about 2,500 observations and only 25 of them belong to the treatment group. Since our access is limited to news released after 2001, we exclude electoral cycles before that year or overlapping with it. To control for media exposure of political competitors, we apply a similar search strategy and build a competitor visibility measure using frequencies of news relative to the main challenger (most mentioned competitor).[19] We collected news frequencies for 5,218 elections. The search was conducted on the entire electoral term to use comparable time windows for treated and control municipalities. For 1,965 elections we did not find any news mentioning the incumbent or the competing politicians. Hence, the first sub-sample (full) and the second sub-sample (within 30km distance) of electoral runs that we use to analyze the relationship between electoral outcomes, earthquakes and politician visibility on media are composed of 222 (220) observations on treated municipalities for the reelection probability (vote share) outcome. Observations on control municipalities are 3031 (2957) and 603 (595), respectively for the first and the second sub-samples. Finally, in the nearest-neighbour PSM sub-sample we have 215 (213) observations on treated municipalities and 169 (163) observations on control municipalities.[20]

Since our selection of municipalities with news leads to an important reduction in the number of treated cities in all the three samples, concerns may arise over the comparability of outcomes with the main results. Therefore, we compare the original samples with the news sub-samples in terms of intensity of earthquakes, number of candidates, vote participation, and other variables. Table 12 in the Appendix provides some descriptive statistics for the three sub-samples with news. From the perspective of earthquake intensity, we observe that the average intensity of earthquakes in affected municipalities in the original samples is 6.2 (see Table 1), while the average intensity of earthquakes in the samples with news increases slightly to 6.4. It is unclear whether electoral competition differ between original samples and smaller samples with news. Actually, the number of candidates is generally higher in municipalities with news but vote participation is lower. Also, differences between treated and control municipalities in terms of number of candidates, variation in the number of candidates, and vote participation point to the same direction.

As a result of our search, we find 18.19 and 14.22 press-agency news on average per municipality on incumbent mayors and main challengers, respectively. The proportion of

[19] Other measures of competitor's visibility, such as the average news frequencies of all competitors, can be used. However, the share of news issued on the incumbent and the main challenger is on average 96.85% of the total news issued on candidates, suggesting that the remaining candidates have a marginal role in the electoral run.

[20] The number of observations on treated and unaffected municipalities is not the same because the PSM is performed on the original sample, while news are obtained only for part of it.

news on incumbents on total news exceeds the proportion of news on the main challenger by about 67% in municipalities treated by an earthquake, whereas the same difference in control municipalities, weighted by the reciprocal of normalized propensity scores, is significantly lower and equal to 47% (see Figure 2b). The different distribution of news in treated municipalities is determined by a sharp and significant increase of news on the incumbent relative to the main challenger (19.07 news on average), while the gap between incumbent and challenging politician visibility in control municipalities is much lower and not significant (3.73 news on average; see Figure 2a). These figures suggest that, after the occurrence of an earthquake, the incumbent mayor may benefit not only from a higher visibility on the media, but also from a higher visibility relative to his main challenger, in accordance with the many studies showing that media coverage can influence citizens' opinion about politicians and parties (e.g. Arceneaux, Johnson, & Murphy, 2012; Druckman & Parkin, 2005; Ladd & Lenz, 2009).

To add further evidence, we exploit monthly data and look at the evolution of news on running candidates in periods when an earthquake took place. The timeline of news on the incumbent and the main challenger in treated municipalities is illustrated in Figure 3. Panel 3a shows news for 25 months before and after the disaster, while Panel 3b shows news for 12 months before elections. We notice a clear jump in news after a disaster and, even before the election, there is a gap between the incumbent and the main challenger, except for the last two months (when rules on *par condicio* are enforced). In terms of spatial distribution, Figure 4 shows that news on the incumbent (map 4a) and the main challenger (map 4b) stem from some major events that affected seven Italian regions in our period of study: Abruzzo (2009), Emilia Romagna (2012), Lombardy (2012), Molise (2002), Puglia (2002), Tuscany (2013), and Umbria (2009).

To further investigate the channel of political visibility, we include the measure of media exposure and its interaction with earthquake occurrence in our regression models of electoral outcomes. In particular, we first estimate OLS models of incumbent mayor reelection probability and vote share, controlling for the natural logarithm of the frequency of news on the incumbent mayor and for the natural logarithm of the frequency of news on the main competing candidate. We include region and year fixed effects and control for local political factors, characteristics of the incumbent mayor and sociodemographic aspects as in the main analysis above.[21] Then, we improve our model by including an

[21]We do not estimate DD models because observations are quite limited and the measure of media exposure is time-invariant for the sub-sample for which we were able to collect data and, therefore, is collinear with municipality fixed effects.

interaction term between earthquake occurrence and news. Finally, we run another model where the interaction term includes the net visibility of the incumbent mayor, i.e. the difference between news on the incumbent and news on the main challenger. This should allow to distinguish between cities where there is high media coverage, in general, and cities where there is particularly high attention toward the incumbent mayor.

The regression results are reported in Table 6. As usual we focus on the full sample of municipalities (Panel A), the sample with municipalities located within 30 km from municipalities hit by a natural disaster (Panel B), and the sample with unaffected municipalities identified using a nearest-neighbor matching strategy. Clearly, the one-to-one PSM strategy is very demanding in this case given the small number of observations. As shown in columns 1 and 4, the limited number of observations with news affects the size and the significance of the impact of earthquakes on vote share and reelection probability in some cases, as compared to our main regression analysis above. Beyond this and focusing on our purpose, we find that higher incumbent news frequency raises both the probability of being reelected (column 1) and the vote share (column 4). Symmetrically, the higher the media coverage of the main challenger, the lower is the incumbent mayor reelection probability and the vote share. These results are generally significant for Panel A (Full sample) and Panel B (sample of neighbour cities).

In columns 2 and 5 of Table 6 we include the interaction term between earthquake occurrence and news frequency of the incumbent. The results show that the estimated coefficient of the interaction term is always positive and significant at 10% statistical level in one case. Moreover, the interaction term tends to wash out at least partially the coefficient of earthquake occurrence. Indeed, the latter coefficient loses some magnitude and significance as compared to columns 1 and 4, which suggests that media visibility captures part of the earthquake effect on reelection. Although the estimated coefficient of the interaction term with news is not always significant, the result may suggest that incumbent mayors in struck municipalities gain electoral support through higher media visibility as compared to municipalities not hit by natural disasters. Actually, this result finds also support in columns 3 and 6 of Table 6 where we use interactions between *Earthquake* and *Net visibility*, i.e. the difference between news on the incumbent and news on the main challenger, to better capture the effect of privileged visibility of the incumbent candidate as compared to the main competitor. The estimated coefficient is small but always positive, except in one case, and is statistically significant at least in Panel A and partially in Panel B. Therefore, voters are probably responsive to signals of reassurance and quick recovery, which drives preferences towards a rewarding vote for the incumbent. The result points at the prediction of the theoretical model in the Appendix that a positive signal sent by the incumbent (visibility) when an earthquake occurs increases incumbent chances of winning the electoral competition (see the theoretical model in the online Appendix).

While DellaVigna and Kaplan (2007) and Clinton and Enamorado (2014) find that media can bias voters towards a specific party coalition, our evidence generally suggests that media bias voters towards politicians under the spotlight because of natural disasters, namely incumbent mayors. Although visibility on the media is also a channel through which voters get informed on politician performance, i.e. the response to earthquake occurrence, and some performance indicators (e.g. expenditure following disasters) seem to improve as shown in Section 7.1, we cannot exclude that other factors, such as the opportunistic behavior of incumbent mayors who seek media exposure for reelection, also play a relevant role in shaping vote choices after the occurrence of an earthquake.

Our results on media exposure should, however, be interpreted very carefully. A concern arises as to the possible endogeneity of media coverage with respect to natural disasters. Indeed, media coverage likely depends on earthquake occurrence. Therefore, stronger earthquakes imply higher media coverage and more transfer of resources from central governments. Consequently, the higher reelection probability observed where media coverage is higher may actually be interpreted as mayor's performance, recalling the channel discussed above. Although we showed that stronger earthquakes do not seem to blunt electoral competition and to induce parties to support the incumbent mayor (see Section 5), the observed correlation between political visibility and the probability of incumbent reelection may be the result of voters' reward for effective mayor's response to natural disasters. Unfortunately, our data do not allow to build any plausible instrument for media coverage of the disaster to further address this issue.

8 Conclusions

The occurrence of shocks such as natural disasters requires politicians to provide effective responses to recover from damages, which may disclose information on their competence. It has been suggested that the occurrence of natural disasters and the response provided by national-level governments affect vote decisions (e.g. Eriksson, 2016; Gasper & Reeves, 2011). However, the implications of natural disasters on vote decisions at local level and the investigation of possible channels driving these votes have received little attention in the literature so far.

We exploit a rich and unique dataset of all seismic events occurred between 1993 and 2015 in Italy and data on municipal electoral outcomes from 11,966 municipal electoral cycles where incumbent mayors seek reelection. We compare electoral outcomes in municipalities struck by an earthquake before the election with unaffected municipalities using propensity score matching combined with regression adjustment and a difference-in-difference strategy. We find that the occurrence of an earthquake increases incumbent mayor reelection probability by about 8-11% and vote share by more than 5%.

Two possible channels may help to explain our result. First, we find that reelection is associated with a better performance of incumbent politicians who increase spending levels and investments to recover from damages, and are able to reduce deficit without apparently affecting the wealth of local population. This may suggests that voters rationally update their expectations on incumbent mayor performance and competence based on signals sent by politicians to the electorate (Ashworth et al., 2018). Second, incumbent politicians appear to benefit from a higher visibility on the media, both in terms of news frequency and relative to their competitors. Although this may allow incumbent mayors to inform the electorate about the implemented measures to foster recovery from earthquake damages, the post-disaster disproportion between news covering incumbent mayors as compared to their competing challengers suggests that voters' decisions may be biased in favor of incumbent politicians (Clinton & Enamorado, 2014; DellaVigna & Kaplan, 2007). Indeed, higher political visibility may just naturally arise from the mediatic relevance of earthquake occurrence. Future research on the role of media in shaping vote decisions in the aftermath of natural disasters would help to better understand the drivers of vote decisions.

References

Achen, C. H., & Bartels, L. M. (2017). Blind retrospection: Electoral responses to droughts, floods, and shark attacks. In *Democracy for realists: Why elections do not produce responsive government* (pp. 116–145). Princeton University Press.

Akarca, A. T., & Tansel, A. (2016). Voter reaction to government incompetence and corruption related to the 1999 earthquakes in Turkey. *Journal of Economic Studies*, *43*(2), 309–335.

Arceneaux, K., Johnson, M., & Murphy, C. (2012). Polarized Political Communication, Oppositional Media Hostility, and Selective Exposure. *Journal of Politics*, *74*(1), 174–186.

Ashworth, S., Bueno de Mesquita, E., & Friedenberg, A. (2018). Learning about Voter Rationality. *American Journal of Political Science*, *62*(1), 37–54.

Barone, G., & Mocetti, S. (2014). Natural disasters, growth and institutions: A tale of two earthquakes. *Journal of Urban Economics*, *84*, 52–66.

Bechtel, M. M., & Hainmueller, J. (2011). How Lasting Is Voter Gratitude? An Analysis of the Short- and Long-Term Electoral Returns to Beneficial Policy. *American Journal of Political Science*, *55*(4), 852–868.

Belloc, M., Drago, F., & Galbiati, R. (2016). Earthquakes, Religion, and Transition to Self-Government in Italian Cities. *The Quarterly Journal of Economics*, *131*(4), 1875–1926.

Bodet, M. A., Thomas, M., & Tessier, C. (2016). Come hell or high water: An investigation of the effects of a natural disaster on a local election. *Electoral Studies*, *43*, 85–94.

Brender, A., & Drazen, A. (2008). How Do Budget Deficits and Economic Growth Affect Reelection Prospects? Evidence from a Large Panel of Countries. *American Economic Review*, *98*(5), 2203–2220.

Caliendo, M., & Kopeinig, S. (2008). Some Practical Guidance For The Implementation of Propenisty Score Matching. *Journal of Economic Surveys*, *22*(1), 31–72.

Cipollone, P., & Rosolia, A. (2007). Social interactions in high school: Lessons from an earthquake. *American Economic Review*, *97*(3), 948–965.

Clinton, J. D., & Enamorado, T. (2014). The national news media's effect on congress: How Fox News affected elites in congress. *Journal of Politics*, *76*(4), 928–943.

DellaVigna, S., & Kaplan, E. (2007). The Fox News effect: Media bias and voting. *Quarterly Journal of Economics*, *122*(3), 1187–1234.

Di Giacomo, M. (2014). *I costi dei terremoti in Italia* (Report 340). Rome, Italy: Centro Studi Consiglio Nazionale Ingegneri.

Drazen, A., & Eslava, M. (2010). Electoral manipulation via voter-friendly spending: Theory and evidence. *Journal of Development Economics*, *92*(1), 39–52.

Druckman, J. N., & Parkin, M. (2005). The impact of media bias: How editorial slant affect voters. *Journal of Politics*, *67*(4), 1030–1049.

Eriksson, L. M. (2016). Winds of Change: Voter Blame and Storm Gudrun in the 2006 Swedish Parliamentary Election. *Electoral Studies*, *41*, 129-142.

Gagliarducci, S., & Nannicini, T. (2013). Do better paid politicians perform better? Disentangling incentives from selection. *Journal of the European Economic Association*, *11*(2), 369–398.

Gallego, J. (2018). Natural disasters and clientelism: The case of floods and landslides in Colombia. *Electoral Studies*, *55*, 73–88.

Galletta, S. (2017). Law enforcement, municipal budgets and spillover effects: Evidence from a quasi-experiment in Italy. *Journal of Urban Economics*, *101*, 90–105.

Gasper, J. T., & Reeves, A. (2011). Make It Rain? Retrospection and the Attentive Electorate in the Context of Natural Disasters. *American Journal of Political Science*, *55*(2), 340–355.

Giommoni, T. (2017). *Exposure to Corruption and Political Participation: Evidence from Italian Municipalities* (CESifo Working Paper 6645). Munich, Germany: CESifo Group.

Healy, A., & Malhotra, N. (2009). Myopic Voters and Natural Disaster Policy. *American Political Science Review*, *103*(03), 387–406.

Heckman, J. J., Ichimura, H., & Todd, P. E. (1997). Matching As An Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Programme. *The Review of Economic Studies*, *64*(4), 605–654.

Hetherington, M. J. (1996). The Media's Role in Forming Voters' National Economic Evaluations in 1992. *American Journal of Political Science*, *40*(2), 372–395.

Imbens, G. W. (2004). Nonparametric Estimation of Average Treatment Effects Under Exogeneity: A Review. *Review of Economics and Statistics*, *86*(1), 4–29.

Klomp, J. (2019). Election or Disaster Support? *The Journal of Development Studies*, *forthcoming*.

Kneebone, R. D., & McKenzie, K. J. (2001). Electoral and partisan cycles in fiscal policy: An examination of Canadian provinces. *International Tax and Public Finance*, *8*(5), 753–774.

Ladd, J. M., & Lenz, G. S. (2009). Exploiting a Rare Communication Shift to Document the Persuasive Power of the News Media. *American Journal of Political Science*, *53*(2), 394–410.

Lay, J. C. (2009). Race, Retrospective Voting, and Disasters. *Urban Affairs Review*, *44*(5), 645–662.

Locati, M., Camassi, R., Rovida, A., Ercolani, E., Bernardini, F., Castelli, V., ... Rocchetti, E. (2016). *DBMI15, the 2015 version of the italian macroseismic database* (Data source). Rome, Italy: Istituto Nazionale di Geofisica e Vulcanologia.

Marcolongo, G. (2020). *Organized Crime, Earthquakes and Local Public Procurement: Evidence from Italy* (Working Paper).

Masiero, G., & Santarossa, M. (2020). Earthquakes, grants and public expenditure: how municipalities respond to natural disasters. *Journal of Regional Science*, *60*(3), 481–516.

Nikolova, E., & Marinov, N. (2017). Do Public Fund Windfalls Increase Corruption? Evidence From a Natural Disaster. *Comparative Political Studies*, *50*(11), 1455–1488.

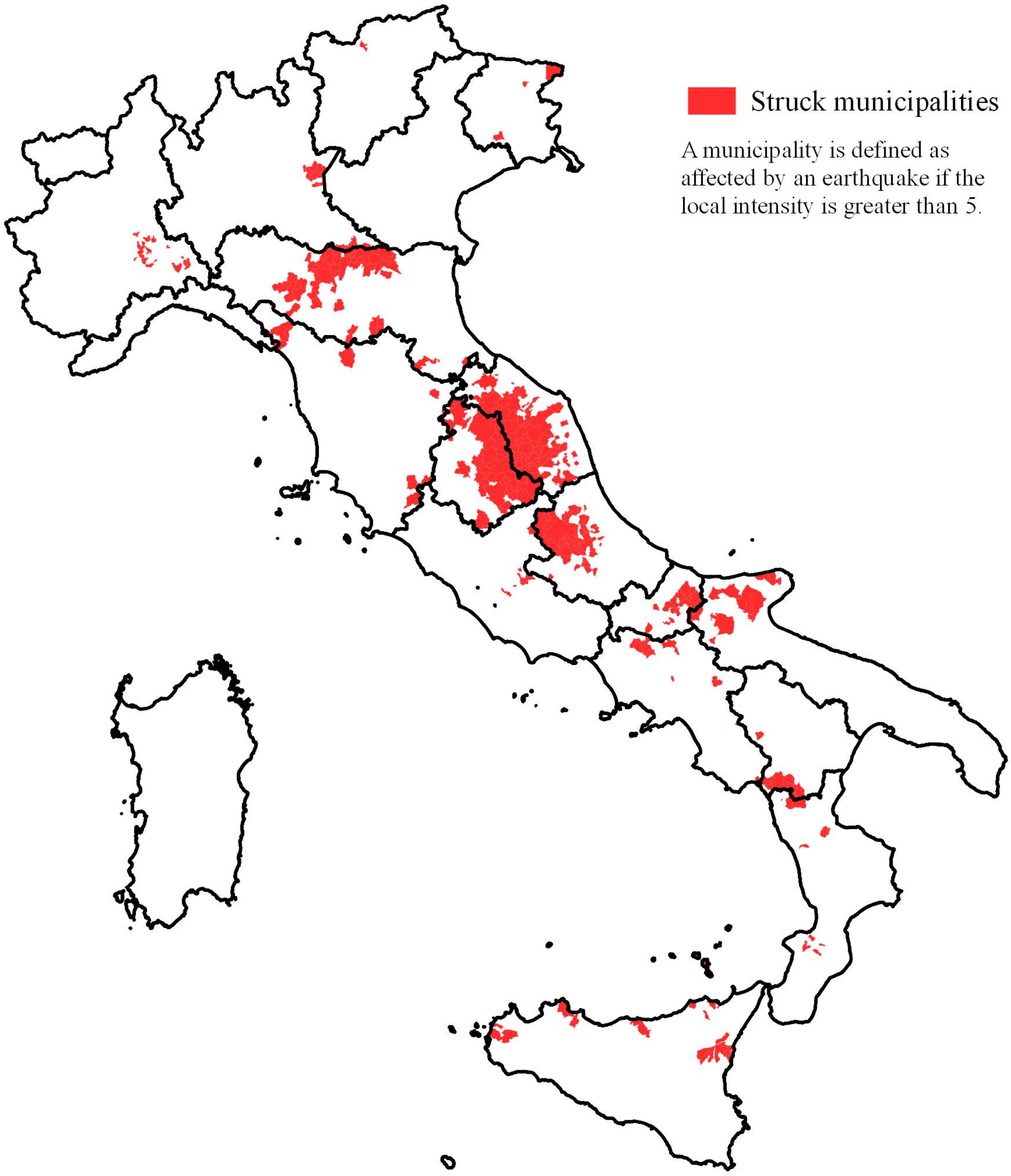
Noy, I., & Nualsri, A. (2011). Fiscal storms: Public spending and revenues in the aftermath of natural disasters. *Environment and Development Economics*, *16*(1), 113–128.

Rogoff, K. (1990). Equilibrium Political Budget Cycles. *The American Economic Review*, *80*(1), 21–36.

Rogoff, K., & Sibert, A. (1988). Elections and Macroeconomic Policy Cycles. *The Review of Economic Studies*, *55*(1), 1-16.

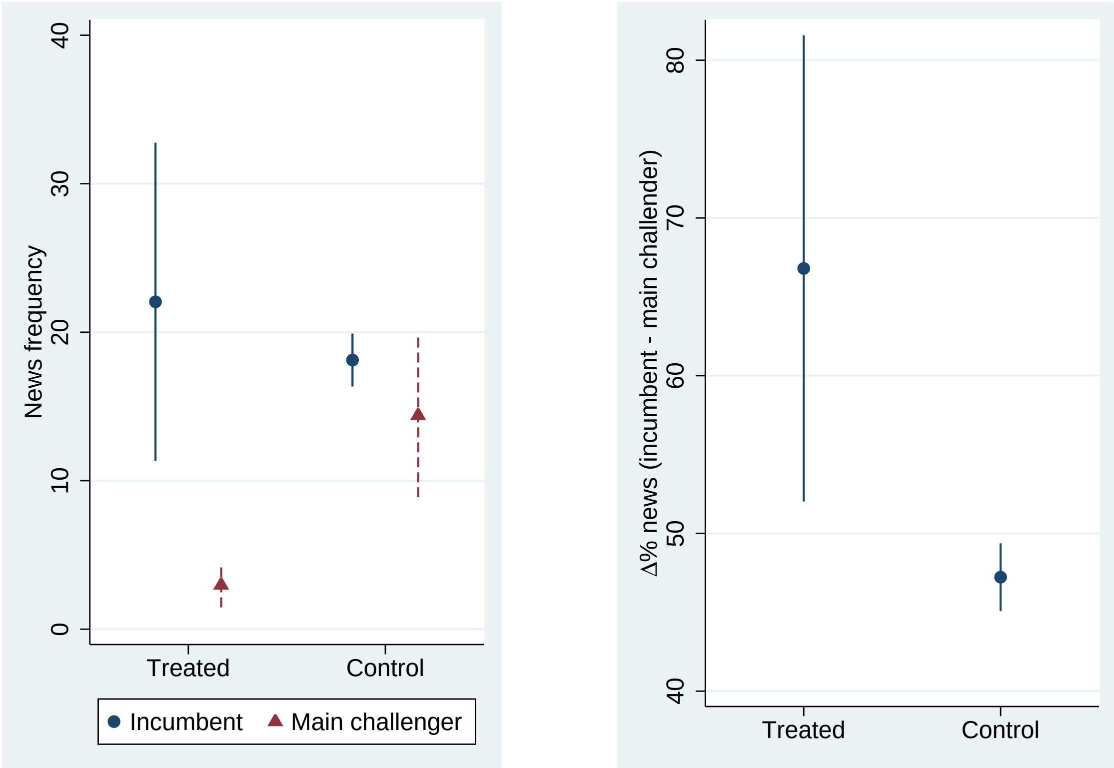
Rosenbaum, P. R., & Rubin, D. B. (1983). The Central Role of the Propensity Score in Observational Studies for Causal Effects. *Biometrika*, *70*(1), 41–55.

Figure 1: A map of earthquake occurrence in Italy (1993-2015).



Notes - The map represents municipalities struck by a destructive earthquake (with intensity >5) between 1993 and 2015. Red areas represent struck municipalities.
Source: Our elaboration on data from the DBMI15 database of INGV (Locati et al., 2016). The shape map of the administrative borders is provided by ISTAT.

Figure 2: Political visibility.

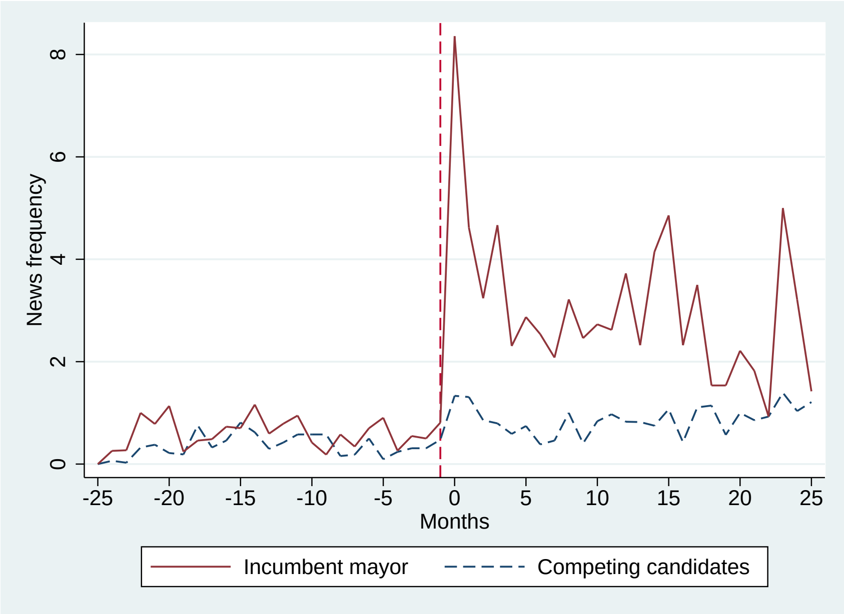


(a) News frequency

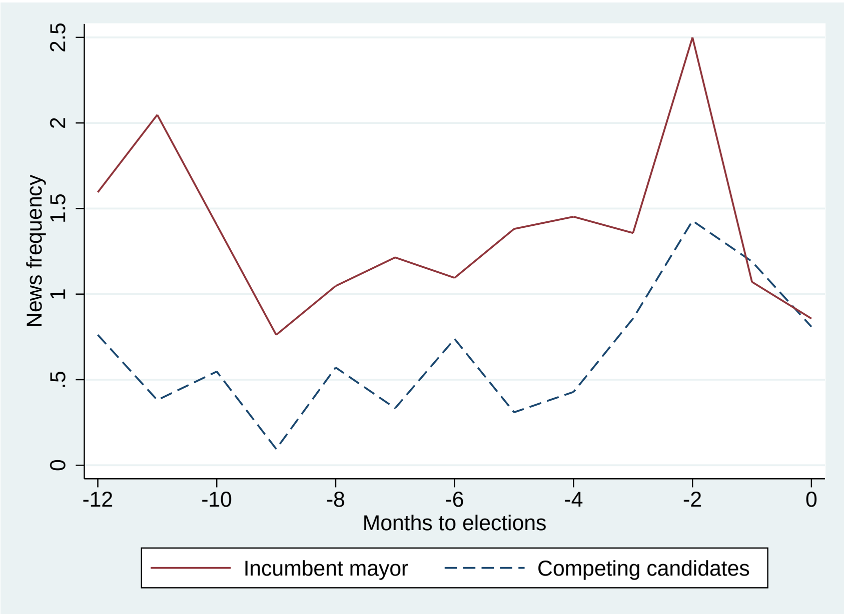
(b) Share of news

Notes - Figure 2a shows mean frequencies of news for the incumbent and the main challenger, while Figure 2b illustrates differences in the share of news between the incumbent and the main challenger. Markers denoted by *Treated* represent municipalities struck by a destructive earthquake (with intensity >5) between two elections and markers denoted by *Control* refer to unaffected municipalities using the universe of Italian cities. In Figure 2a, blue circles represent news on incumbent mayors and red triangles news on main competing candidates. Reported data include 90% confidence intervals.
Source: Our elaboration on data collected from the *Factiva* database.

Figure 3: News frequency around earthquakes and before elections.



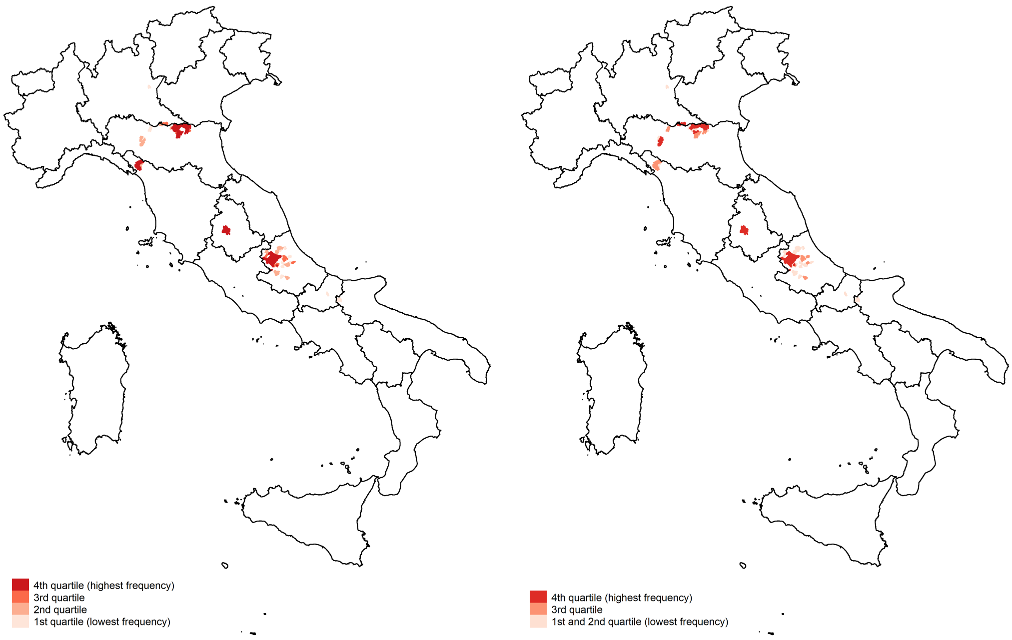
(a) News frequency before and after an earthquake



(b) News frequency in the year before elections

Notes - Figure 3a shows trends in the (average) monthly frequency of news for incumbents and main challengers in treated municipalities before and after the occurrence of an earthquake shock, while Figure 3b illustrates trends in the (average) monthly frequency of news in the year before elections. The red solid lines represent news frequency of incumbent mayors, and the blue dashed lines represent news frequency of challenging candidates. The vertical dashed line in Figure 3a indicates the month before earthquake occurrence.
Source: Our elaboration on data collected from the *Factiva* database.

Figure 4: Location of municipalities affected by natural disasters with news on incumbent mayors and challengers.



(a) News frequencies on incumbent mayors (b) News frequencies on competing candidates

Notes - Maps 4a and 4b show news frequency across the Italian territory and aggregated by municipality, respectively for incumbent mayors and challengers. The darker the color, the higher the news frequency. In the legend of map 4b, the first two quartiles are aggregated because more than 50% of observations are zeros. Between 2001 and 2015, main earthquakes hit seven regions: Abruzzo, Emilia Romagna, Lombardy, Molise, Puglia, Tuscany, and Umbria.
Source: Our elaboration on data collected from the *Factiva* database. The shape map of the administrative borders is provided by ISTAT.

Table 1: Descriptive statistics.

	(1) No earthquake	(2) Earthquake
Panel A: Full sample		
Earthquake intensity		6.216
Runs for reelection (=1)	0.569	0.515***
Reelected (= 1)	0.778	0.804*
Δ Vote share of the incumbent	1.772	1.988
Vote participation (%)	76.49	75.24***
Number of candidates	2.671	2.669
Δ candidates	-0.116	-0.0776
Inumbent education years	14.41	14.55
Incumbent is man (=1)	0.926	0.934
Incumbent age	46.50	46.07
Proportional electoral system (=1)	0.0824	0.0672*
Obs.	12201	692
Panel B: Unaffected municipalities within 30km		
Earthquake intensity		6.216
Runs for reelection (=1)	0.557	0.515***
Reelected (= 1)	0.781	0.804*
Δ Vote share of the incumbent	1.706	1.988
Vote participation (%)	73.56	75.24***
Number of candidates	2.658	2.669
Δ candidates	-0.100	-0.0776
Inumbent education years	15.25	14.55***
Incumbent is man (=1)	0.943	0.934
Incumbent age	45.57	46.07
Proportional electoral system (=1)	0.0718	0.0672
Obs.	1998	692
Panel C: Nearest-neighbor PSM		
Earthquake intensity		6.216
Runs for reelection (=1)	0.575	0.505***
Reelected (= 1)	0.807	0.805
Δ Vote share of the incumbent	2.875	1.850
Vote participation (%)	75.84	75.25
Number of candidates	2.578	2.679*
Δ candidates	-0.149	-0.0665
Inumbent education years	14.38	14.57
Incumbent is man (=1)	0.932	0.935
Incumbent age	45.60	46.14
Proportional electoral system (=1)	0.0666	0.0696
Obs.	659	667

Notes - The table reports mean characteristics of unaffected municipalities (column 1) and municipalities struck by a destructive earthquake (with intensity >5) between two electoral cycles (column 2). 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: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 2: Preliminary analysis of rerun, voter turnout and electoral competition.

	(1)	(2)	(3)
Sample	Full	30km	PSM
Panel A: Recandidation			
Earthquake × Post	-0.0518	-0.0555	-0.0528
	(0.0367)	(0.0400)	(0.0433)
Obs.	26556	5464	2708
Overall R-sq.	0.0899	0.0744	0.0836
Panel B: Vote participation			
Earthquake × Post	0.0975	-0.134	-0.236
	(0.512)	(0.533)	(0.647)
Obs.	13338	2764	1366
Overall R-sq.	0.154	0.124	0.104
Panel C: Number of candidates			
Earthquake × Post	-0.0208	-0.0875	-0.0179
	(0.101)	(0.109)	(0.119)
Obs.	13339	2765	1366
Overall R-sq.	0.303	0.194	0.200
Municipality fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Local political controls	Yes	Yes	Yes
Characteristics of the incumbent	Yes	Yes	Yes
Sociodemographic controls	Yes	Yes	Yes
Concurrent shocks (floods)	Yes	Yes	Yes

Notes - The table reports regression results of the probability of running for reelection (Panel A), voter turnout (Panel B) and number of candidates (Panel C). In column 1 we use the full sample of municipalities. In column 2, the sample of municipalities not affected by an earthquake is limited to municipalities located within 30 km from a municipality struck by an earthquake. In column 3, unaffected municipalities are identified using a nearest-neighbor matching strategy. All models control for municipality and year fixed effects, local political controls (electoral system, political orientation of the incumbent, number of competing candidates - except for Panel C - and per capita local government public expenditure), characteristics of the incumbent mayor (years of education, gender, age, share of votes at previous elections) and sociodemographic controls (population and share of the elderly population). Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 3: Regression results of electoral outcomes.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Incumbent reelection			Incumbent vote share		
Sample	Full	30KM	PSM	Full	30KM	PSM
Earthquake × Post	0.108**	0.0830*	0.0920*	5.024***	5.537***	5.157**
	(0.0455)	(0.0495)	(0.0516)	(1.909)	(2.131)	(2.289)
Concurrent shocks (floods)	0.0400	0.000213	-0.0132	1.764	0.910	1.807
	(0.0300)	(0.0613)	(0.0699)	(1.164)	(2.243)	(3.194)
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Local political controls	Yes	Yes	Yes	Yes	Yes	Yes
Characteristics of the incumbent	Yes	Yes	Yes	Yes	Yes	Yes
Sociodemographic controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	13338	2764	1366	12893	2690	1326
Overall R-sq.	0.0247	0.0105	0.00912	0.302	0.217	0.259
Within R-sq.	0.0792	0.0848	0.0993	0.228	0.187	0.221
Between R.sq	0.00388	0.000309	0.00153	0.329	0.232	0.275

Notes - The table reports regression results of electoral outcomes. Columns 1-3 show the results from linear probability models of incumbent mayor reelection, and columns 4-6 present the results from fixed effects regressions of incumbent mayor vote share. In columns 1 and 4, the full sample of municipalities is used. In columns 2 and 5, the sample of unaffected control municipalities is composed of municipalities located less than 30 km from a municipality affected by an earthquake shock with intensity>5. In columns 3 and 6, unaffected control municipalities are identified using a one-to-one nearest-neighbor matching strategy. $Earthquake \times Post$ is a dummy variable equal to one for treated municipalities in electoral periods taking place after the occurrence of an earthquake. *Concurrent shocks (floods)* is a dummy variable equal to one for municipalities affected by heavy rainfalls (more than 70 mm for 3 consecutive days or more) before an electoral spell. All models control for municipality and year fixed effects, local political controls (electoral system, political orientation of the incumbent, number of competing candidates and per capita local government public expenditure), characteristics of the incumbent mayor (years of education, gender, age, share of votes at previous elections) and sociodemographic controls (population and share of the elderly population). Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors are in parentheses.

Table 4: Incumbent mayor fiscal performance after an earthquake.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Expenditure	Inv./Cur.	Transfers	Deficit	Tax revenues	Personal income
Panel A: Full sample						
Earthquake × Post	1397.8***	0.565***	1412.1***	-116.2	27.22	-242.0
	(292.5)	(0.141)	(358.6)	(204.4)	(24.19)	(160.0)
Obs.	11803	11802	11803	11803	11803	8664
Overall R-sq.	0.0308	0.0904	0.0571	0.00478	0.154	0.0866
Panel B: Municipalities within 30 km						
Earthquake × Post	1239.9***	0.521***	1447.8***	-186.8	-24.80	-286.8*
	(236.6)	(0.119)	(280.2)	(169.1)	(23.36)	(161.9)
Obs.	2431	2431	2431	2431	2431	1797
Overall R-sq.	0.0868	0.0935	0.0738	0.00908	0.276	0.0304
Panel C: Nearest-neighbor matching						
Earthquake × Post	1224.0***	0.487***	1378.9***	-235.0	-13.86	-282.0*
	(232.9)	(0.124)	(247.3)	(147.1)	(25.70)	(166.4)
Obs.	1193	1193	1193	1193	1193	873
Overall R-sq.	0.103	0.112	0.0763	0.0160	0.237	0.0477
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes - The table reports regression results from a DD strategy applied on a set of incumbent mayor performance indicators. Performance indicators are per capita local government expenditure, the ratio between investments and current expenditure, per capita transfers and deficit (expenditure - revenues), tax revenues and personal income. *Earthquake* × *Post* is a dummy variable equal to 1 for struck municipalities in electoral periods after earthquake occurrence. All models control for municipality and time fixed effects. Monetary values are expressed in 2010 prices. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors are in parentheses.

Table 5: Budget allocation after an earthquake.

Type of expenditure	(1) Local	(2) Administration	(3) Social	(4) Transport	(5) Education
Panel A: Full sample					
Earthquake × Post	1291.5***	60.18**	22.38	-15.65	1.134
	(282.6)	(26.79)	(18.41)	(33.84)	(13.72)
Obs.	11741	11738	11670	11721	11678
Overall R-sq.	0.0455	0.0120	0.00734	0.00410	0.0147
Panel B: Municipalities within 30 km					
Earthquake × Post	1146.6***	68.68**	14.13	-8.637	12.22
	(221.6)	(33.45)	(18.65)	(36.73)	(14.20)
Obs.	2421	2415	2406	2415	2403
Overall R-sq.	0.0876	0.0144	0.00741	0.00349	0.0440
Panel C: Nearest-neighbor matching					
Earthquake × Post	1038.3***	63.46	35.12*	5.462	6.139
	(204.4)	(48.30)	(20.59)	(39.53)	(15.39)
Obs.	1188	1186	1180	1185	1177
Overall R-sq.	0.132	0.00438	0.0159	0.0118	0.0239
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes

Notes - The table reports regression results from a DD strategy applied to local public expenditure categories. Spending categories are local services, general administration, social services, local transport services and education. *Earthquake* × *Post* is a dummy variable equal to 1 for struck municipalities in electoral periods after earthquake occurrence. All models control for municipality and time fixed effects. Monetary values are expressed in 2010 prices. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors are in parentheses.

Table 6: Regression results of political visibility on electoral outcomes.

	(1)	(2)	(3)	(4)	(5)	(6)
		Reelection			Vote share	
	News	Interaction	Net visibility	News	Interaction	Net visibility
Panel A: Full sample						
Earthquake	0.086	0.012	0.074	4.146**	0.370	3.996**
	(0.054)	(0.103)	(0.055)	(1.829)	(3.238)	(1.876)
Earthquake × News on incumbent		0.032			1.642*	
		(0.028)			(0.899)	
Earthquake × Net visibility			0.0002***			0.0021*
			(0.00004)			(0.00124)
News on incumbent	0.025***	0.024***	0.024***	0.705***	0.678***	0.702***
	(0.007)	(0.007)	(0.007)	(0.241)	(0.243)	(0.242)
News on main challenger	-0.026***	-0.026***	-0.026***	-1.325***	-1.328***	-1.328***
	(0.008)	(0.008)	(0.008)	(0.250)	(0.250)	(0.250)
Obs.	3253	3253	3253	3177	3177	3177
R-sq.	0.080	0.080	0.080	0.298	0.298	0.298
Panel B: Municipalities within 30 km						
Earthquake	0.055	-0.016	0.049	3.836	-0.039	3.868
	(0.057)	(0.104)	(0.058)	(2.340)	(3.926)	(2.358)
Earthquake × News on incumbent		0.030			1.657	
		(0.027)			(1.145)	
Earthquake × Net visibility			0.0001*			-0.0005
			(0.00005)			(0.00184)
News on incumbent	0.027*	0.025*	0.026*	0.416	0.299	0.419
	(0.014)	(0.015)	(0.014)	(0.514)	(0.527)	(0.518)
News on main challenger	-0.042***	-0.042***	-0.042***	-1.650***	-1.669***	-1.647***
	(0.016)	(0.016)	(0.016)	(0.472)	(0.473)	(0.475)
Obs.	825	825	825	815	815	815
R-sq.	0.088	0.088	0.088	0.265	0.266	0.265
Panel C: Nearest-neighbor matching						
Earthquake	0.044	-0.014	0.039	4.704*	1.070	4.691*
	(0.070)	(0.114)	(0.071)	(2.426)	(3.653)	(2.433)
Earthquake × News on incumbent		0.026			1.650	
		(0.032)			(1.140)	
Earthquake × Net visibility			0.0001			0.0003
			(0.00007)			(0.00247)
News on incumbent	0.007	0.003	0.005	0.272	-0.028	0.266
	(0.022)	(0.024)	(0.023)	(0.702)	(0.760)	(0.722)
News on main challenger	-0.013	-0.015	-0.016	-0.472	-0.545	-0.479
	(0.025)	(0.025)	(0.026)	(0.693)	(0.704)	(0.714)
Obs.	384	384	384	376	376	376
R-sq.	0.128	0.128	0.128	0.311	0.314	0.311
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Local political controls	Yes	Yes	Yes	Yes	Yes	Yes
Characteristics of the incumbent	Yes	Yes	Yes	Yes	Yes	Yes
Sociodemographic controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes - The table reports OLS regression results of political visibility on incumbent reelection probability (columns 1-3) and vote share (columns 4-6). *Earthquake* is a dummy variable equal to 1 if a municipality is struck by an earthquake since the last election. In columns 1 and 4 we include the natural logarithm of the frequency of news on the incumbent mayor (*News on incumbent*) and the main competing politician (*News on main challenger*). Columns 2 and 5 add interactions between *Earthquake* and *News on incumbent*. Columns 3 and 6 use interactions between *Earthquake* and *Net visibility*, i.e. the difference between news on the incumbent and news on the main challenger. All models control for region and year fixed effects, sociodemographic and local political aspects, and characteristics of the incumbent mayor. Results are reported for the full sample of municipalities (Panel A), the sample with municipalities located within 30 km from municipalities hit by a natural disaster (Panel B), and the sample with unaffected municipalities identified using a nearest-neighbor matching strategy. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors are in parentheses.

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9 Theoretical framework

We consider a voter with the following expected utility function depending on wealth (w):

$$EU_I[w] = log(w) \qquad w > 0. \tag{6}$$

The voter observes policies by incumbent politicians while he/she is uncertain about the effect of policies by alternative candidates (challengers). Therefore, the voter's expected utility from choosing the challenger is:

$$EU_C[w, \varepsilon, \pi] = \pi \; log(w - \varepsilon) + (1 - \pi) \; log(w + \varepsilon) \qquad \pi \in [0, 1], \; 0 < \varepsilon < w \tag{7}$$

where π is the probability attached to outcomes lower than the current level of wealth, and ε is the loss/gain from policies in terms of wealth. Using (6) and (7), we can write a critical value of π that makes the individual indifferent between choosing the incumbent or the competitor:

$$\hat{\pi} = \frac{log(w + \varepsilon) - log(w)}{log(w + \varepsilon) - log(w - \varepsilon)} \tag{8}$$

For $\pi \geqslant \hat{\pi}$, the individual will vote for the incumbent.

Now, assume that an earthquake occurs and the voter faces a loss of wealth L (with $0 < L < w - \varepsilon$). The incumbent and the competitor's ability to recover from the loss is assumed to be the same: $\rho \in [0, 1]$. However, the incumbent can send a signal δ ($\delta \in [-\rho, 1 - \rho]$) at no cost regarding his/her commitment in restoring initial wealth, which affects voter's expectations. Using (6) and (7), we can write the voter's expected utility from the incumbent and the competitor as:

$$EU_I[w|L, \rho] = (\rho + \delta) \; log(w) + (1 - \rho - \delta) \; log(w - L) \tag{9}$$

and

$$\begin{aligned} EU_C[w, \varepsilon, \pi|L, \rho] = \rho[\pi \; log(w - \varepsilon) + (1 - \pi) \; log(w + \varepsilon)] \\ + (1 - \rho)[\pi \; log(w - \varepsilon - L) + (1 - \pi) \; log(w + \varepsilon - L)]. \end{aligned} \tag{10}$$

Hence, 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:

$$\hat{\pi}_s = \frac{\rho[log(w + \varepsilon) - log(w)] + (1 - \rho)[log(w + \varepsilon - L) - log(w - L)] - \Delta}{\rho[log(w + \varepsilon) - log(w - \varepsilon)] + (1 - \rho)[log(w + \varepsilon - L) - log(w - \varepsilon - L)]} \tag{11}$$

which is a decreasing function of L and δ. From Equation 11 we see that the individual will vote for the incumbent if the probability of negative outcomes is $\pi \geqslant \hat{\pi}_s$. A positive threshold $\bar{\delta}$ exists for which $\hat{\pi}_s$ does not vary with ρ:

$$\bar{\delta} = \frac{\beta(\gamma - \eta) + \alpha(\eta - \phi) + \lambda(\phi - \gamma)}{(\alpha - \gamma)(\lambda - \beta + \phi - \eta)} \tag{12}$$

where $\alpha = log(w)$, $\beta = log(w + \varepsilon)$, $\lambda = log(w - \varepsilon)$, $\gamma = log(w - L)$, $\eta = log(w - \varepsilon - L)$ and $\phi = log(w + \varepsilon - L)$. For $\delta < \bar{\delta}$, we have that $\hat{\pi}_s$ is an increasing function of ρ. Conversely, $\hat{\pi}_s$ decreases with p if $\delta > \bar{\delta}$.

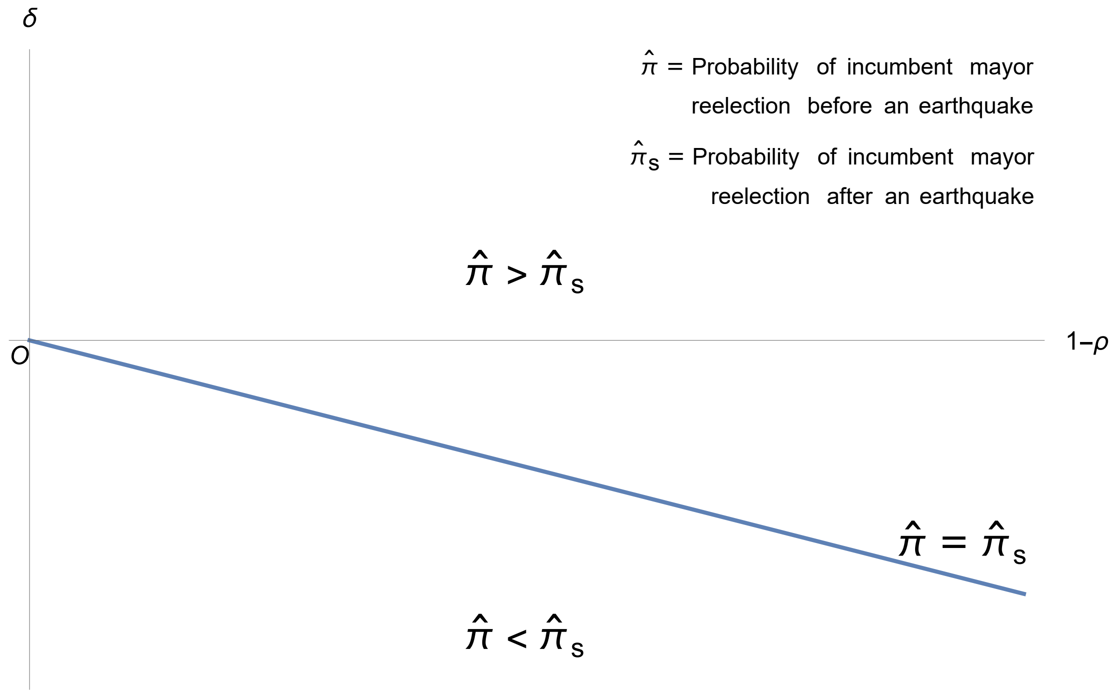
To compare vote choices before and after the shock, consider first the extreme case of full recovery with $\rho = 1$ and no signal by the incumbent ($\delta = 0$). In this case we obtain $\hat{\pi}_s = \hat{\pi}$ meaning that the chances of reelection of the incumbent do not change. However, if the incumbent sends a negative signal, he/she could reduce the likelihood of reelection since Δ is an increasing function of δ and $\hat{\pi}_s$ would increase.

Consider now the most realistic case in which full recovery is not expected (at least within a relatively short period of time or within one electoral cycle). For $\rho < 1$ and no signal by the incumbent ($\delta = 0$), we have $\hat{\pi}_s < \hat{\pi}$. Moreover, if a positive signal is sent ($\delta > 0$), the likelihood of supporting the incumbent increases since Δ has a negative effect on $\hat{\pi}_s$. Finally, if the incumbent sends a negative signal ($\delta < 0$), then a threshold $\hat{\delta}$ exists for which $\hat{\pi}_s \lesseqgtr \hat{\pi}$. Using (8) and (11), we solve $\hat{\pi} = \hat{\pi}_s$ for δ ($\delta = \Delta/[log(w) - log(w - L)]$) and get the critical value:

$$\hat{\delta} = -(1 - \rho)\frac{\beta(\gamma - \eta) + \lambda(\phi - \gamma) + \alpha(\phi - \eta)}{(\beta - \lambda)(\alpha - \gamma)} \tag{13}$$

For $\delta \geqslant \hat{\delta}$, we have $\hat{\pi}_s \leqslant \hat{\pi}$ and the incumbent mayor benefits from the shock even though a negative signal is sent, provided this is not too negative.

Figure 5: Gain in voter support after the occurrence of an earthquake.



Notes - The figure illustrates the gain in voter support by an incumbent mayor after an earthquake depending on expectations about political candidates' inability to recover from earthquake losses $(1-\rho)$ and the signal sent by the incumbent mayor (δ). The blue thick line represents the set of combinations $(1-\rho,\, \delta)$ for which the incumbent mayor has the same reelection probability $(\hat{\pi} = \hat{\pi}_s)$, before and after an earthquake. Above the line, the incumbent has a higher chance of being reelected, while below the line he loses voters support.

Table 7: Balancing properties: Nearest-neighbor matching.

Variable	Unmatched Matched	Mean Treated	Mean Control	% bias	% reduction bias	t-test t	t-test p> |t|
Previous election year	U	2003.4	2005.6	-39.2		-7.22	0.000
	M	2003.4	2003.6	-2.1	94.7	-0.28	0.777
Proportional electoral system (=1)	U	.07479	.08734	-4.6		-0.84	0.401
	M	.07479	.06094	5.1	-10.4	0.74	0.460
Incumbent vote share$_{t-1}$	U	57.35	58.423	-7.1		-1.22	0.221
	M	57.35	58.253	-6.0	15.9	-0.81	0.417
Vote participation (%)	U	76.907	76.433	4.8		0.94	0.346
	M	76.907	77.027	-1.2	74.6	-0.15	0.878
Center-right government	U	.06371	.11903	-19.3		-3.23	0.001
	M	.06371	.06094	1.0	95.0	0.15	0.878
Civic government	U	.00277	.00366	-1.6		-0.28	0.781
	M	.00277	.00277	0.0	100.0	0.00	1.000
Δ candidates	U	-.00277	.01515	-1.6		-0.28	0.779
	M	-.00277	.03601	-3.5	-116.5	-0.44	0.658
Incumbent is man (=1)	U	.91136	.91344	-0.7		-0.14	0.889
	M	.91136	.90028	3.9	-431.7	0.51	0.611
Incumbent age	U	46.958	47.97	-10.5		-1.96	0.050
	M	46.958	46.756	2.1	80.0	0.29	0.774
Inumbent education years	U	14.626	14.397	6.5		1.20	0.228
	M	14.626	14.291	9.5	-46.2	1.26	0.207
Δ Population (%)	U	-.5805	.34479	-14.1		-2.58	0.010
	M	-.5805	.03323	-9.4	33.7	-1.35	0.176
Δ elderly (%)	U	.58888	1.2449	-28.7		-6.17	0.000
	M	.58888	.35415	10.3	64.2	1.16	0.248
Center	U	.40443	.17538	52.1		11.31	0.000
	M	.40443	.42659	-5.0	90.3	-0.60	0.546
South	U	.31579	.25901	12.6		2.44	0.015
	M	.31579	.25208	14.1	-12.2	1.90	0.058

Notes - The table reports balancing properties of a one-to-one nearest-neighbor matching. *U* represents the full (unmatched) sample and *M* the matched sample of municipalities.

Table 8: Regression results of electoral outcomes and other distance-based control samples.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Incumbent reelection				Incumbent vote share			
Sample	20KM	25KM	35KM	40KM	20KM	25KM	35KM	40KM
Earthquake × Post	0.105**	0.0906*	0.0801	0.0845*	6.376***	5.944***	5.462***	5.404***
	(0.0507)	(0.0501)	(0.0491)	(0.0487)	(2.210)	(2.163)	(2.107)	(2.073)
Concurrent shocks (floods)	-0.00644	0.0103	-0.00143	0.000258	0.755	1.468	0.629	0.482
	(0.0698)	(0.0637)	(0.0581)	(0.0567)	(2.585)	(2.263)	(2.151)	(2.108)
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local political controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Characteristics of the incumbent	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sociodemographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1938	2365	3162	3548	1887	2302	3076	3455
Overall R-sq.	0.0222	0.0124	0.0114	0.0131	0.228	0.213	0.218	0.238
Within R-sq.	0.0958	0.0862	0.0775	0.0751	0.214	0.194	0.179	0.195
Between R.sq	0.00182	0.00000278	0.0000177	0.000429	0.225	0.217	0.239	0.257

Notes - The table reports regression results of electoral outcomes for four distance-based control samples, i.e. municipalities without earthquake events located less than 20, 25, 35 and 40 km from treated municipalities. *Earthquake×Post* is a dummy variable equal to one for treated municipalities in electoral periods taking place after the occurrence of an earthquake. *Concurrent shocks (floods)* is a dummy variable equal to one for municipalities affected by heavy rainfalls (more than 70 mm for 3 consecutive days or more) before an electoral spell. All models control for municipality and year fixed effects, sociodemographic and local political aspects, characteristics of the incumbent mayor, and concurrent shocks (floods). Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors are in parentheses.

Table 9: Incumbent mayor fiscal performance based on post-disaster averages.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Expenditure	Inv./Cur.	Transfers	Deficit	Tax revenues	Personal income
Panel A: Full sample						
Earthquake × Post	953.2***	0.199**	1114.0***	-1158.6***	-11.45	-419.0***
	(212.2)	(0.0799)	(229.8)	(285.7)	(16.29)	(140.1)
Obs.	11803	11438	11424	11787	11444	8463
Overall R-sq.	0.0180	0.0167	0.0554	0.0132	0.0973	0.0824
Panel B: Municipalities within 30 km						
Earthquake × Post	768.6***	0.117	1054.9***	-1856.2***	-29.08*	-538.3***
	(202.3)	(0.0765)	(215.5)	(459.1)	(16.50)	(149.6)
Obs.	2431	2348	2352	2426	2352	1767
Overall R-sq.	0.0730	0.0286	0.0800	0.0396	0.154	0.0297
Panel C: Nearest-neighbor matching						
Earthquake × Post	605.6***	0.0300	835.5***	-1083.4**	-45.17**	-513.7***
	(204.9)	(0.0777)	(216.5)	(433.9)	(18.84)	(173.3)
Obs.	1193	1163	1164	1192	1164	858
Overall R-sq.	0.0750	0.0207	0.0887	0.0476	0.114	0.0223
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes - The table reports regression results from a DD strategy applied on a set of incumbent mayor performance indicators measured as averages for the post-earthquake period before elections. Performance indicators are per capita local government expenditure, the ratio between investments and current expenditure, per capita transfers and deficit (expenditure - revenues), tax revenues and personal income. *Earthquake × Post* is a dummy variable equal to 1 for struck municipalities in electoral periods after earthquake occurrence. All models control for municipality and time fixed effects. Monetary values are expressed in 2010 prices. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors are in parentheses.

Table 10: Budget allocation after an earthquake based on post-disaster averages.

	(1)	(2)	(3)	(4)	(5)
Type of expenditure	Local	Administration	Social	Transport	Education
Panel A: Full sample					
Earthquake × Post	919.6***	47.89*	34.08	-22.93	8.566
	(219.7)	(28.86)	(22.70)	(22.36)	(16.55)
Obs.	10856	10824	10367	10725	10236
Overall R-sq.	0.0458	0.0197	0.0105	0.00422	0.00579
Panel B: Municipalities within 30 km					
Earthquake × Post	820.3***	73.38**	24.75	-31.60	9.569
	(206.6)	(28.75)	(23.28)	(23.71)	(9.699)
Obs.	2247	2216	2155	2223	2142
Overall R-sq.	0.0630	0.0140	0.0132	0.00155	0.0202
Panel C: Nearest-neighbor matching					
Earthquake × Post	672.4***	55.84**	29.65	-11.32	-0.975
	(207.3)	(27.73)	(21.25)	(26.21)	(9.758)
Obs.	1102	1088	1058	1082	1048
Overall R-sq.	0.0637	0.00539	0.0313	0.00606	0.00520
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes

Notes - The table reports regression results from a DD strategy applied to local public expenditure categories measured as averages for the post-earthquake period before elections. Spending categories are local services, general administration, social services, local transport services and education. *Earthquake* × *Post* is a dummy variable equal to 1 for struck municipalities in electoral periods after earthquake occurrence. All models control for municipality and time fixed effects. Monetary values are expressed in 2010 prices. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors are in parentheses.

Table 11: Regression results of electoral outcomes and temporal distance from the shock.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Incumbent reelection			Incumbent vote share		
Sample	Full	30KM	PSM	Full	30KM	PSM
Earthquake × Near	0.109*	0.107*	0.0931	6.241***	6.858***	5.402**
	(0.0581)	(0.0599)	(0.0600)	(2.221)	(2.435)	(2.499)
Earthquake × Far	0.128*	0.131*	0.125*	8.084**	8.019**	7.870**
	(0.0656)	(0.0678)	(0.0711)	(3.182)	(3.293)	(3.473)
Earthquake × Post	0.115**	0.118**	0.0980	3.627*	5.544**	3.324
	(0.0491)	(0.0594)	(0.0629)	(2.015)	(2.506)	(2.690)
Concurrent shocks (floods)	0.0402	-0.00550	-0.0104	1.812	0.962	2.179
	(0.0300)	(0.0700)	(0.0703)	(1.164)	(2.583)	(3.194)
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Local political controls	Yes	Yes	Yes	Yes	Yes	Yes
Characteristics of the incumbent	Yes	Yes	Yes	Yes	Yes	Yes
Sociodemographic controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	13338	1938	1366	12893	1887	1326
Overall R-sq.	0.0247	0.0224	0.00937	0.303	0.230	0.264
Within R-sq.	0.0793	0.0967	0.100	0.228	0.216	0.225
Between R.sq	0.00389	0.00185	0.00149	0.329	0.225	0.279

Notes - The table reports regression results of electoral outcomes for the three control samples: full sample of municipalities without earthquake events (Full column), municipalities without earthquake events located less than 30 km from treated municipalities (30KM column), and unaffected municipalities identified using a one-to-one nearest-neighbor matching strategy (PSM column). *Earthquake×Post* is a dummy variable equal to one for treated municipalities in electoral periods taking place after the occurrence of an earthquake. *Earthquake×Near* is an interaction variable where *Near*=1 if the time distance between the election and the earthquake event is less than 2.5 years. *Earthquake×Far* is an interaction variable where *Far*=1 if the time distance between the election and the earthquake event is more than 2.5 years. *Concurrent shocks (floods)* is a dummy variable equal to one for municipalities affected by heavy rainfalls (more than 70 mm for 3 consecutive days or more) before an electoral spell. All models control for municipality and year fixed effects, sociodemographic and local political aspects, characteristics of the incumbent mayor, and concurrent shocks (floods). Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Robust standard errors are in parentheses.

Table 12: Descriptive statistics for the samples with news.

	(1) No earthquake	(2) Earthquake
Panel A: Full sample		
Earthquake Intensity		6.435
Reelected (= 1)	0.717	0.822***
Δ Vote share of the incumbent	-2.008	-0.209*
Vote participation (%)	72.62	72.16
Number of candidates	3.129	2.959*
Δ candidates	0.0757	0.0776
Inumbent education years	15.02	14.93
Incumbent is man (=1)	0.908	0.927
Incumbent age	47.67	46.94
Proportional electoral system (=1)	0.140	0.0868**
Obs.	2957	220
Panel B: Unaffected municipalities within 30km		
Earthquake Intensity		6.435
Reelected (= 1)	0.739	0.822***
Δ Vote share of the incumbent	-1.773	-0.209
Vote participation (%)	70.07	72.16***
Number of candidates	2.960	2.959
Δ candidates	0.106	0.0776
Inumbent education years	15.36	14.93**
Incumbent is man (=1)	0.921	0.927
Incumbent age	47.83	46.94
Proportional electoral system (=1)	0.101	0.0868
Obs.	595	220
Panel C: Nearest-neighbor PSM		
Earthquake Intensity		6.429
Reelected (= 1)	0.794	0.816
Δ Vote share of the incumbent	-0.334	-0.436
Vote participation (%)	72.46	72.07
Number of candidates	2.969	2.976
Δ candidates	-0.0187	0.0802
Inumbent education years	14.99	14.94
Incumbent is man (=1)	0.931	0.925
Incumbent age	46.61	47.08
Proportional electoral system (=1)	0.119	0.0896
Obs.	162	213

Notes - The table reports mean characteristics of unaffected municipalities (column 1) and municipalities struck by a destructive earthquake (with intensity >5) between two electoral cycles (column 2) for the sample of municipalities×elections where at least one news is available either for the incumbent or the competing candidate. 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: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.