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Electoral Earthquake: Natural Disasters and the Geography of Discontent

A. Cerqua^{*}, C. Ferrante[†], M. Letta[‡]

Abstract

The recent literature on the determinants of populism has highlighted the role of long-term trends of progressive isolation and prolonged economic stagnation in engendering discontent and, in turn, demand for political change. We investigate, instead, the potential of unanticipated local shocks in shaping the ‘geography of discontent’. Using comprehensive data at a fine spatial scale and a comparative natural experiment approach, we document that the occurrence of two destructive earthquakes in Italy resulted in sharply diverging electoral outcomes: while the 2012 Emilia quake did not alter voting behaviour, the 2009 L’Aquila earthquake paved the way for an impressive and persistent surge in right-wing populism in the most affected areas. Such heterogeneous patterns mainly originate from a stark contrast in post-disaster reconstruction processes and shifts in institutional trust. Our findings are consistent with the idea that not only “places that don’t matter”, but also “places that don’t recover”, can become populist hotbeds.

Keywords: elections; populism; discontent; natural disasters; earthquakes

JEL-Codes: D72; H12; Q54

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“[...] in order for people to support radical alternatives, existing institutions need to have lost their legitimacy or failed to cope with some new challenge”.

from “How do populists win?” by D. Acemoglu and J. Robinson, 31/5/2019

Introduction

Populism is on the rise. In most Western countries, recent rounds of elections have been characterised by increasing support towards right-wing populist parties, shaping what has been termed the “geography of discontent” (McCann, 2020). Such rapid success has spurred a strand of literature devoted to investigating mechanisms and determinants behind this rise including, among others, long-term economic decline, rural depopulation, regional inequalities, economic backlash of the 2008 financial crisis, globalization, immigration, cultural and social processes. These factors have contributed to a growing dissatisfaction with mainstream parties, blamed for having failed in facing these new challenges. Rodriguez-Pose (2018) argues that this phenomenon is particularly pronounced in “left-behind areas” or “places that don’t matter”, i.e. once thriving industrial hubs, suffering from decades of progressive isolation and economic stagnation. Here, local voters began reacting against what they perceived as the self-seeking or corrupt “establishment”, supporting new or more extreme parties eager to promise quick and easy solutions to their long-forgotten problems.

Italy is anything but immune to populism. Indeed, Italian political history has always been characterised by populist tendencies (van Kessel, 2015), ranging from Silvio Berlusconi’s *Come on Italy* (Forza Italia) to the *National Alliance* (Alleanza Nazionale). Even the more traditional *Democratic Party* (Partito Democratico) had evolved towards a populist attitude under Matteo Renzi’s leadership (Revelli, 2017). The populist rise reached its peak in the last few years with the culmination of the rise of the *Five Star Movement* (Movimento 5 Stelle), which obtained the voting majority at the 2018 national elections, and the impressive surge in popularity of Matteo Salvini’s *League* (Lega) and Giorgia Meloni’s *Brothers of Italy* (Fratelli d’Italia), both expressions of right-wing populism.

While acknowledging the role of long-term economic decline and slow-onset regional dynamics in providing fertile ground for populism, our paper complements this narrative by investigating the role of short-term exogenous factors, such as large-scale but localized natural disasters, in engendering citizens’ demand for radical alternatives. The focus is on two major earthquakes that struck Italy in recent times: L’Aquila 2009 and Emilia 2012. These destructive earthquakes had comparable physical

magnitude but hit very different territories in economic and institutional terms, were followed by divergent post-disaster management and reconstruction patterns, and, ultimately, resulted in starkly contrasting electoral outcomes in the affected areas.

We demonstrate that the “geography of discontent” is also shaped by the territorial scars generated by local unexpected shocks that, if institutions fail to cope with them, can translate into sentiments of abandonment and frustration which find their ultimate outlet at the ballot box. While political discontent is often the by-product of local (economic, institutional, demographic) decline, this decline can be sudden and unanticipated rather than gradual and predictable. Hence, we argue, not only “places that don’t matter”, but also “places that don’t recover”, can become populist hotbeds. This makes the evolution of the geography of discontent more uncertain, and places additional burden on the role played by institutions in managing local recovery and ensuring territorial resilience.

2. Related literature

This article lies at the intersection of two strands of literature: the recent body of work on the geography of discontent and the political science literature on natural disasters and retrospective voting. After introducing the concept of populism, we briefly review both strands of research to contextualize our contribution.

2.1 The notion of populism

Even though the dispute on the meaning of *populism* is endless, there are at least two distinctive features of populism that can be identified, namely the contrast between the *pure* people and the *corrupt* elite, and the need to change things, restore people’s sovereignty and preserve their identity (Mudde, 2007; Acemoglu et al., 2013; Van Kessel, 2015; Judis, 2016).

Populist parties can come from the right- as well as the left-wing depending on the societal cleavages upon which a party hinges its political campaigns. Typically, right-wing populist parties combine conservative economic policies with nationalist views on immigration, globalisation, and cooperation (Colantone and Stanig, 2019), whereas left-wing populism focuses more on income and wealth cleavages (Rodrik, 2018). Such diversity makes it hard to define the boundaries of populism and illustrates how blurry the ideology is. While these aspects pertain to what can be considered as the *supply* side of populism, Guiso et al. (2020) and Revelli (2017) define its *demand* side as a lack of representative democracy and a widespread feeling of disappointment: when traditional parties fail in representing people’s needs and in dealing with external challenges, people react through populism.

In a recent comprehensive review, Guriev and Papaioannou (2020) summarise the core features of modern populism: no common ideology, anti-elite and anti-science sentiments, coupled with anti-globalisation and anti-European ones. This mix is completed by anti-pluralist and authoritarian positions and delivered in a simple and aggressive communication style. In Europe, most of these features belong to right-wing parties, whose ideology is rooted in Euroscepticism, nationalism, and traditionalism (Golder, 2016).

2.2 The geography of discontent

The crucial factors behind the geography of discontent hinge on both economic and cultural cleavages. First and foremost, globalization. In many local economies, exposure to global markets spurred unemployment, fuelling political reactions to return to the previous *status quo* (McCann, 2020). This gave populist parties the chance to blame those social classes benefitting from globalisation (Guriev and Papaioannou, 2020; Pastor and Veronesi, 2018). Colantone and Stanig (2019) demonstrate how exposure to the China market brought about increasing consensus towards nationalist and far-right parties in Western Europe. A similar pattern is found by Barone and Kreuter (2020) for Italy. Therefore, globalisation, or ‘hyperglobalization’ (Rodrik, 2020), generated domestic disintegration and exacerbated localized economic distress, sparking the “revenge of the places that don’t matter” (Rodríguez-Pose, 2018).

Economic determinants such as crisis-driven economic insecurity, unemployment and inequality have also been considered key drivers in triggering political dissatisfaction. Many agree that adverse economic shocks like the 2008 financial crisis worsened the cultural cleavages and triggered political polarisation, with a substantial shift towards populist parties. The Great Recession helped anti-establishment parties gain support by blaming incumbent governments, ruled by moderate or traditional parties, and supranational institutions for austerity measures, as well as by embracing people’s discontent thanks to anti-European, anti-globalisation and anti-elite discourses (Mian et al., 2014; Algan et al., 2017; Guiso et al., 2020).

Territorial and interpersonal inequalities are playing a fundamental role in driving support towards populist, nationalist, and authoritarian parties (Putnam, 2000; Lee et al., 2020). However, economic events may often not be enough to explain this support (Margalit, 2019). Inglehart and Norris (2016), while confirming the role of economic insecurity, introduce a ‘cultural backlash’ theory focused on the role of educational, social, and cultural aspects. The “post-materialist” era witnessed a cultural shift towards more progressive values, especially in highly educated and wealthy communities. This transformation triggered a counter-revolution from older generations – representing more traditional

values – who felt threatened by these new values.

Finally, anti-immigration feelings are also among the individual-specific factors contributing to the rise of discontent, involving sentiments of fear for identity and traditional values (Hobolt, 2016; Ford and Goodwin, 2017). On one side, Barone et al. (2016) find that Berlusconi's Party (*Come on Italy*) gained more support in regions with higher migration flows. On the other side, Colantone and Stanig (2018) and Alabrese et al. (2019) reveal an opposite pattern between EU immigration and the Leave Vote for the UK referendum. Results on the role of immigration are therefore still mixed and inconclusive.

In the Italian context, a recent study on the drivers of local discontent (Di Matteo and Mariotti, 2020), reveals the role of employment, long-term cultural change, and immigration as crucial to explain the rise of right-wing populist votes in the 2014 and 2019 European elections.

2.3 Natural disasters and retrospective voting

There is also a considerable body of empirical work which looks at the electoral repercussions of natural disasters or other exogenous events. This strand has focused mainly on the electoral fortunes of *incumbent* governments, without taking into account the potential of such events in engendering drastic political change.

Although the link between natural disasters and voting is influenced by many specific and context-related features, what seems to be confirmed is that citizens tend to question their political opinions on the government in the aftermath of shocks (Carlin et al., 2014). Natural disasters may affect voting behaviour in opposite directions, depending on how much governments and institutions are successful in attenuating their impacts on people's lives. In some cases, the government might be considered responsible for both the lack of prevention as well as bad post-disaster management (Abney and Hill, 1966).

Several studies demonstrate that citizens tend to blame the incumbent authorities when a natural disaster occurs, even if there is no rational basis: they act as 'blind' retrospective voters. Often, after the occurrence of a natural shock, affected people show lesser support for the incumbent government at the following election rounds (Achen and Bartels, 2004; Heersink et al., 2017). However, this is not always the case, as some research also demonstrates the opposite (Healy and Malhotra, 2009; Neugart and Rote, 2021). Looking at the Italian context, Masiero and Santarossa (2020) find that

being hit by the earthquake increases the vote by more than 5% for incumbent mayors.¹

Alternatively, natural disasters might also engender more extreme political repercussions by inducing broader changes in human behavior. For instance, there is evidence that, in the aftermath of a natural disaster, people tend to become persistently more risk-tolerant (Hanaoka et al., 2018). More risky attitudes could, in turn, be associated with rising preferences towards populist parties, which usually propose riskier policy responses (Panunzi et al., 2020). Unpredictable adverse shocks could thus reshape political beliefs and push people to shift their preference to more radical or extremist candidates (Funke et al., 2016; Autor et al., 2020; Russo et al., 2020).

3. The earthquakes

3.1 L'Aquila 2009

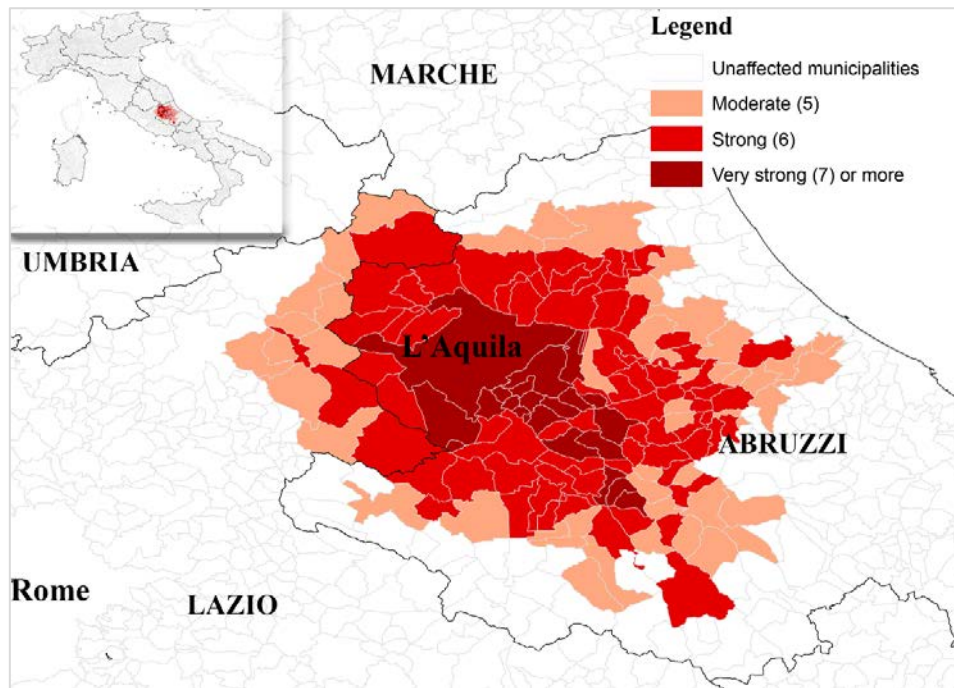
L'Aquila is a historic city and a university hub with a population close to 70,000, traditionally specialized in learning, public administration, and provision of services to the surrounding mountainous region (Alexander, 2019). Right before the 2009 earthquake, L'Aquila was not an economically vibrant territory, as the area was experiencing depopulation from rural areas and economic stagnation, with an unemployment rate above the national average (Pendall et al., 2010; Urso et al., 2019).

L'Aquila earthquake occurred during the night of 6th April 2009 in the Abruzzi region in Central Italy, registering a 6.29 Mw magnitude on the Moment Magnitude Scale (MMS). The epicenter was Poggio di Roio (a district of L'Aquila municipality), 3.4 km southwest of the L'Aquila city center (Contreras et al., 2018). Overall, the quake affected 136 municipalities (89 if we consider only municipalities hit by a 'strong' shaking), caused 308 fatalities, left 67,500 people homeless and damaged at least 30,000 dwellings (Alexander, 2010a). The area struck by the earthquake is a densely populated territory, close to Gran Sasso in the Appennini chain, one of the most seismic zones in Europe (Zullo et al., 2020). Figure 1 below presents a map of the seismic intensity – measured on the Modified Mercalli Intensity (MMI) scale² – experienced in the hit areas.

¹ This paper is related to our work in that the authors perform a municipality-level analysis for Italy covering a similar time span (1993-2015). However, they focus exclusively on *incumbent mayors*, i.e. i) they do not look either at populism or at the geography of discontent, but rather at the incumbent's electoral fortunes in post-disaster voting rounds; ii) they focus on local elections, which we instead explicitly ignore for reasons illustrated in Section 4.

² While the MMS captures the *power* of an earthquake in terms of energy released (measured through its moment magnitude), intensity scales such as the MMI assess the *effects* of an earthquake. Each earthquake has only one magnitude (or a range of magnitudes, in some cases) which is measured using the MMS scale, while intensity scales like the MMI, which is based on observable earthquake damage, measure the amount of shaking at a particular location. An earthquake causes many different intensities of shaking in the area where it occurs, so the intensity of an earthquake will vary

Figure 1: L'Aquila 2009 earthquake – Seismic intensity (MMI scale)



Notes: 47 municipalities were hit by a ‘moderate’ shaking, 69 municipalities were hit by a ‘strong’ shaking, and 20 municipalities were hit by a ‘very strong’ or higher shaking. The highest seismic intensity (9.5) was experienced in the municipalities of San Pio delle Camere and L’Aquila.

This medium power seismic event caused a very large amount of physical and economic damage (Alexander, 2019). The quake caused the loss of not only numerous historical buildings, but also more recent ones, such as the dormitory of the university of L’Aquila, where many students died that night, and brought to light the severe lack of adequate seismic risk prevention in the region (Rossi et al., 2012).³ As for the economy, construction, services, and farming sectors were all severely hit, while employment and livelihoods suffered from substantial distress. In 2009, 16,000 jobs were lost in the province of L’Aquila (Alexander, 2019).

The disaster was followed by a heterogeneous reconstruction that lacked direction and connectedness (Contreras et al., 2018). This reconstruction process was centralized rather than participatory (Özerdem and Rufini, 2013), as local and regional duties were delegated to the national headquarters (Alexander, 2019). Government policy on the highly-publicized transitional shelters and temporary

depending on the specific location (see https://www.usgs.gov/faqs/what-difference-between-magnitude-and-intensity-what-modified-mercalli-intensity-scale?qt-news_science_products=0#qt-news_science_products for more information). Therefore, we will use the MMI scale to measure municipality-level damage generated by the earthquakes, in line with previous literature (Belloc et al., 2016; Masiero and Santarossa, 2020).

³ See also here (in Italian):

https://www.repubblica.it/cronaca/2012/05/20/news/sisma_1_aquila_magnitudo_6_3_emilia_magnitudo_6_ricercatore_cnr_eventi_simili_ma_molto_diversi-35552096/.

accommodation eventually led to isolation, social fragmentation and service deprivation (Alexander, 2013). Besides, the post-disaster management and recovery process were characterized not only by continuous bureaucratic delays, but also by repeated scandals such as corruption and manoeuvrability of mass media (Forino, 2015), as well as infiltration by organized crime.⁴

The earthquake was strongly politicized by the then Italian Prime Minister, Silvio Berlusconi, who visited the area many times, especially in the first months after the disaster, and made numerous promises related to reconstruction, pledging to resolve all problems in a few months (Özerdem and Ruffini, 2013). For some scholars, Berlusconi exploited the centralized emergency management for his electoral tactics, using the reconstruction in L'Aquila to politically survive a decline in popularity (Alexander, 2010b; Forino, 2015). According to Özerdem and Ruffini (2013), one of the main barriers to an effective reconstruction process was Berlusconi's cult of personality, that led him to assume many key decisions without any consultation with the stakeholders.

A few years after the quake, in the wake of forced resettlement and perceived abandonment, affected people were living in a state of limbo and considered state institutions, which had reduced their presence to military personnel, as responsible, so much so that they even called the state relief effort "the second earthquake" (Bock, 2017). Alexander (2013) summarizes the aftermath of the L'Aquila 2009 disaster as a disruptive event that led to further economic stagnation, stalled reconstruction, corruption and, ultimately, alienation of the local population.

3.2 Emilia 2012

On 20th May 2012 and on 29th May 2012, Emilia in Northern Italy was struck by two earthquakes. The two events measured, respectively, 6.09 Mw and 5.90 Mw magnitude on the MMS scale and involved the Emilian Po Valley, a flatland, mostly affecting the areas surrounding Ferrara, Modena, Mantova, Bologna and Rovigo.⁵ Emilia, part of the Emilia-Romagna region, has always been a prosperous and economically dynamic area, one of the most productive of the country, and home to many active businesses and industrial and agri-food hubs, with a pre-earthquake unemployment rate below the national average. The territory hit by the quakes is densely populated, encompassing affluent municipalities, with a productive and industrial fabric open to international markets (Russo

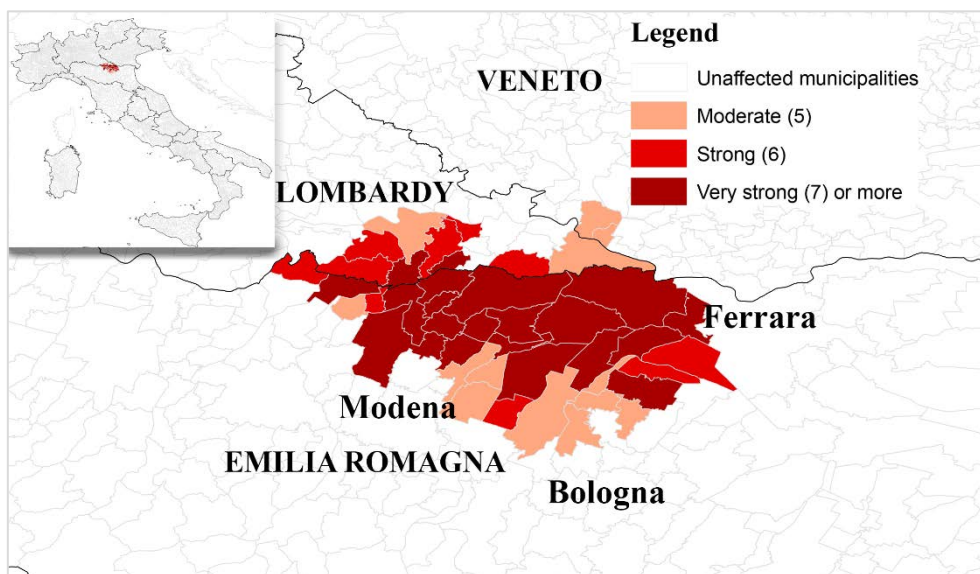
⁴ As reported by Imperiale and Vanclay (2020), many official legal inquiries, including the European Parliament inquiry (Søndergaard, 2013), the National Anti-Mafia Department (*Direzione Nazionale Anti-Mafia*, DNA) (DNA, 2016), and the Parliamentary Commission of Inquiry into the Mafia (Bindi, 2018), confirmed that post-disaster activities were marked by extensive mafia infiltration, as well as by many irregularities and crimes against public administration.

⁵ For simplicity, however, we refer to the Emilian earthquake as a single event.

and Pagliacci, 2019). A crucial feature of this area is also the participatory and inclusive nature of its local governance, rather unusual for its balanced mix between public and private interventions (Pagliacci and Russo, 2016).

The two quakes jointly caused a total of 28 fatalities and displaced about 16,000 people.⁶ Figure 2 illustrates the seismic intensities experienced in the municipalities affected by the Emilian earthquake.

Figure 2: Emilia 2012 earthquake – Seismic intensity (MMI scale)



Notes: The map shows the maximum seismic intensity registered by each municipality. 13 municipalities were hit by a ‘moderate’ shaking, 10 municipalities were hit by a ‘strong’ shaking, and 20 municipalities were hit by a ‘very strong’ or higher shaking. The highest seismic intensity (8) was recorded in the municipality of Cavezzo. For municipalities hit by both the 20th and 29th May earthquakes, the highest intensity is reported.

The harm to the area was significant, as the earthquake caused considerable damage to material infrastructures and intangible components, including major fractures to the local socio-cultural system which was based on the close interaction between businesses, public offices, and households (Russo and Pagliacci, 2019). The productive sector suffered extensive losses for approximately 5 billion Euro, causing substantial economic distress to the many industrial activities in the territory, especially those belonging to the manufacturing sector (Barone et al., 2013).

The Emilian productive system proved to be resilient in the face of the emergency (Barone et al., 2013). The reconstruction process, while not perfect, was rapid and efficient, so much so that, according to Russo and Pagliacci (2019), the Emilian reconstruction experience can be considered as

⁶ See (in Italian) <https://www.regione.emilia-romagna.it/terremoto/speciali>.

a best practice in Italy. Post-earthquake recovery was facilitated by their particular model of local governance, characterized by a balance between public and private action. The reconstruction was able to reconnect people and places and implement extensive, systematic, and immediate measures to rebuild houses and productivity (Bianchi and Labory, 2014; Alexander, 2018).

In sum, the two earthquakes occurred one after the other in a brief time and had comparable physical magnitudes. The similarities, however, end here. Physical damages were substantially higher in the case of L'Aquila. L'Aquila is an economic backwater, Emilia an economic heartland (Alexander, 2018). Post-disaster management was inclusive in Emilia, and the recovery of the cultural and productive system rapid. L'Aquila reconstruction process was centralized, politicized, more infiltrated with corruption. In Emilia, people were actively involved in rebuilding their communities, in L'Aquila they became disengaged and alienated (Bianchi and Labory, 2014; Alexander, 2018).

4. Empirical approach

4.1 Data

We conduct the analysis using municipal-level data, built in a panel structure composed of eight non-consecutive time periods. As shown in Table 1, for each municipality, we collect the number of votes for each party and the voter turnout for the eight national (specifically, for the Chamber of Deputies) and European elections held during the timespan 2004-2019. In our framework, t defines election rounds, not years. This means that t is the first post-earthquake election round. Likewise, $t + 1$ denotes the second post-earthquake election, $t - 1$ denotes the last pre-earthquake election, and so on.

Table 1: Election rounds

Election round – L'Aquila 2009	Election round – Emilia 2012	Date	Type of election
t-3	t-4	Jun 2004	European
t-2	t-3	Apr 2006	National
t-1	t-2	Apr 2008	National
t	t-1	Jun 2009	European
t+1	t	Feb 2013	National
t+2	t+1	May 2014	European
t+3	t+2	Mar 2018	National
t+4	t+3	May 2019	European

The choice of restricting the analysis to national and European elections is rooted in our research

hypothesis. Feelings of abandonment and frustration towards institutions are more likely to materialize at the ballot box of these kinds of elections, whereas local (regional, and especially municipal) elections are characterized by a territorial component made of closer relationships between voters and candidates, and preferences might be driven by personal interests, rather than by voters' genuine sentiments and political beliefs (Barone and Mocetti, 2014). Besides, major natural disasters are almost always addressed by using resources from the central government. Therefore, under such circumstances, it is unlikely that a voter would express his/her support for populism at municipal or regional elections.

Our outcome variable is the share of the authoritarian (right-wing) populist vote, computed following the classification introduced by Norris and Inglehart (2019).⁷ They built continuous standardised 0-100 scores for 268 political parties in Europe (13 in Italy) to identify their authoritarian-libertarian, populist-pluralist, left-wing or right-wing orientation, using the 2014 Chapel Hill expert survey (CHES).⁸ The authoritarian component captures parties in favour of anti-immigrant policies, nationalist foreign policies, law and order, traditional values and against more liberal lifestyles, while the populist component catches the anti-elite rhetoric (Norris and Inglehart, 2019). Table A.1 in Appendix A provides the authoritarian and populist scores for all the parties included in the classification by Norris and Inglehart (2019).

We build our outcome variable by multiplying the voting share of each party by its corresponding authoritarian score, and then we collapse them at the municipal level. We exclusively focus on the authoritarian and right-wing component for a number of reasons. First, when there are potentially societal threatening situations, such as economic crises and terrorism, people tend to react in increasing authoritarianism, i.e. by supporting anti-democratic parties, to ask for external control (Kay et al. 2008). Similarly, previous literature (Funke et al., 2016; Colantone and Staning, 2019; Panunzi et al., 2020) has emphasized that often right-wing parties gain consensus in the aftermath of sudden changes or adverse economic shocks. Russo et al. (2020) provide qualitative evidence that non-authoritarian individuals hit by a natural disaster increase their right-wing authoritarian attitude in the immediate post-disaster period. Lastly, the recent populist backlash seems to have taken a right-wing form (Rodrik, 2020), and populism now seems to be a distinctive element of the right in western Europe and especially in Italy (van Kessel, 2015; Di Matteo and Mariotti, 2020).⁹ Table A.1 in

⁷ From here on, we use the terms 'authoritarian' and 'right-wing' interchangeably.

⁸ The CHES is a project on European politics led by the University of North Carolina at Chapel Hill's Center for European Studies.

⁹ In Appendix B, however, we report the estimates of the analysis on the average authoritarian-populist score as well as only the populist component of such score.

Appendix A provides the authoritarian scores for all the parties included in our authoritarian populist classification.

Earthquake data come from the National Institute of Geophysics and Volcanology (INGV), which gathers the Macroseismic Data Point (MDP) registering the locality and the macroseismic intensity of each earthquake.¹⁰ This database provides us with municipality-level intensity values that capture the physical damages generated by each earthquake as well as the level at which it has been felt by people (Locati et al., 2019). Our treatment variable is a dummy taking value 1 if the municipality has been affected by the earthquake with an intensity greater than 5.¹¹ We adopt this cut-off as it represents the threshold above which quakes generate physical damages, following Belloc et al. (2016) and Masiero and Santarossa (2020). We then diversify the analysis and assess the separate effects of each earthquake at two different intensity cut-offs: i) 5.5 or 6, corresponding, on the MMI scale, to “strong” (I=6); ii) above 6, where the intensity ranges from “very strong” (I=7) to “violent” (I=9).¹²

We also take into account the seismic risk associated with each municipality. We use the official classification introduced in 2003 (O.P.C.M. 3274, 2003), which classifies municipalities in 4 classes of seismic risk, from 1 “high risk” to 4 “low risk”, based on a calculation on the peak ground acceleration. In addition, we include a series of socio-economic variables for the treatment history, mostly collected from the Italian National Statistics Institute (ISTAT). To compare the labour structure among municipalities, we use the total number of employees in logarithmic form and the workplace employment rate. To account for the municipalities’ economic variability and demographic structure, we include the average income per capita, the population size in logarithmic form, the population density, the share of old and young population and the share of net migration. The share of citizens with secondary education captures the educational level; the electoral turnout measures political participation. We also control for heterogeneity in the municipality construction heritage via the average age of the buildings. Table 2 presents summary statistics for all these variables, while Table A.2 in Appendix A provides their detailed description. Our final database is made up of 7,824 Italian municipalities.¹³

¹⁰ The database is publicly available here: <https://emidius.mi.ingv.it/CPTI15-DBMI15/>. Albeit original values for the earthquakes were expressed in either EMS-98 or MCS scales, we interpret them on the MMI scale using the conversion guidelines provided by Musson et al. (2010).

¹¹ As the Emilian earthquakes consisted of two seisms, for the municipalities affected by both we selected the one with the highest intensity.

¹² For a detailed description of the MMI scale, see: <https://www.usgs.gov/media/images/modified-mercalli-intensity-mmi-scale-assigns-intensities>.

¹³ Out of a total of 7,914 municipalities, we only exclude the 74 municipalities belonging to the Aosta Valley region and other 16 municipalities with missing electoral data.

Table 2: Descriptive statistics

Variable	Italian municipalities (7,824)				Municipalities affected by L'Aquila 2009 (89)				Municipalities affected by Emilia 2012 (30)			
	Mean	s.d.	Min	Max	Mean	s.d.	Min	Max	Mean	s.d.	Min	Max
Average building age	1958	12.59	1918	1998	1947	12.74	1920	1985	1962	6.30	1937	1974
Electoral turnout	72.28	13.78	6.80	145.00	66.68	15.93	6.80	94.63	79.55	7.98	54.36	91.85
Income per capita (euro 2010)	16177	3815	5312	52810	13484	2368	7885	21286	18705	1408	14719	21848
Maximum intensity of Emilian seisms	0.033	0.452	0	8	0	0	0	0	6.497	0.68	5.5	8
Intensity of L'Aquila earthquake	0.1	0.761	0	9.5	6.152	0.895	5.5	9.5	0	0	0	0
Number of employees (log)	6.12	1.71	-0.19	13.84	4.99	1.44	-0.19	10.06	7.76	0.92	4.98	10.19
Population (log)	7.87	1.33	3.37	14.87	6.96	1.11	4.41	11.15	8.99	0.77	7.07	11.17
Population density	299.29	639.64	0.75	13055.6 1	55.71	69.72	3.26	536.52	197.09	97.68	81.35	549.59
Seismic risk classification	2.82	0.94	1	4	2.07	0.81	1	4	3.27	0.65	1	4
Share of authoritarian vote	47.75	12.96	0.00	86.00	44.16	13.99	9.02	70.79	43.80	12.84	16.36	65.06
Share of authoritarian-populist vote	47.73	14.67	0.00	82.00	44.51	16.25	8.41	69.73	45.92	15.47	14.69	65.68
Share of net migration	0.08	1.99	-33.71	23.39	-0.21	2.50	-15.97	9.72	0.61	1.38	-3.26	4.84
Share of elderly population (over 65)	22.91	5.98	4.36	66.23	28.61	7.98	15.73	62.50	22.29	2.59	16.12	29.23
Share of populist vote	47.71	18.07	0.00	92.00	44.87	19.86	7.81	76.89	48.04	18.98	13.02	68.12
Share of young population (18-24)	6.86	1.51	0.00	16.36	6.62	1.65	0	10.31	6.01	0.59	4.60	7.58
Share of secondary education	3.59	3.93	0.00	65.11	4.56	4.72	0	21.11	3.63	3.32	0.15	9.27
Workforce rate	33.35	23.47	0.00	435.06	26.18	13.87	0	91.53	47.95	13.98	20.36	83.89

4.2 Methodology

We adopt a comparative natural experiment approach, drawing on the fact that the timing of a large, sudden natural disaster is an exogenous event (Cavallo et al., 2013). The methodology implemented for our analysis is a non-parametric generalisation of the difference-in-differences estimator developed by Imai et al. (2020). By making use of time-series cross-sectional data (TSCS), even in settings with a limited number of pre-treatment periods, Imai et al. (2020) develop a flexible method in which multiple units can receive the treatment at different points in time and which is able to estimate robust short-term and long-term treatment effects.

We set the TSCS dataset with N units (municipalities) and T time periods (election rounds). For each unit $i = 1, 2, \dots, N$ at time $t = 1, 2, \dots, T$, we observe the outcome variable, the share of right-wing populist vote, Y_{it} ; the treatment dummy variable X_{it} and a vector of observed covariates \mathbf{Z}_{it} , for unit i at time t . Recall that, in our framework, t defines election rounds, not years. For the sake of simplicity, we will refer to t as the treatment period.

Our setting requires covariates \mathbf{Z}_{it} to refer to the period before the treatment X_{it} , which in turn must occur before the outcome variable Y_{it} . In addition, we set the number of leads (F) – the number of periods after the treatment – and lags (L), in order to calculate the average treatment effect for the treated (ATT) municipalities (i.e. those hit by the earthquake) as:

$$\delta(F, L) = E \left\{ Y_{i,t+F}(X_{i,t} = 1, X_{i,t-1} = 0, \{X_{i,t-l}\}_{l=2}^L) - Y_{i,t+F}(X_{i,t} = 0, X_{i,t-1} = 0, \{X_{i,t-l}\}_{l=2}^L) \mid X_{i,t} = 1, X_{i,t-1} = 0 \right\}, \quad (1)$$

where the treated units are those municipalities hit by the earthquake. The expression $Y_{i,t+F}(X_{i,t} = 1, X_{i,t-1} = 0, \{X_{i,t-l}\}_{l=2}^L)$ identifies the potential outcome in case of treatment, while $Y_{i,t+F}(X_{i,t} = 0, X_{i,t-1} = 0, \{X_{i,t-l}\}_{l=2}^L)$ is the potential outcome when $X_{i,t-1} = X_{i,t} = 0$, in the absence of treatment. The rest of the treatment history, i.e. $\{X_{i,t-l}\}_{l=2}^L = \{X_{i,t-2}, \dots, X_{i,t-L}\}$, represents the realised history.

The implementation of this methodology requires four steps:

- 1) first, for each treated observation we have a matched set M_{it} , containing the control units sharing the same treatment history. We set $L=3$ to better control for carryover effects. We

restrict M_{it} , by implementing an exact matching identification strategy, based on the seismic territorial classification.

- 2) We refine each M_{it} by using the Mahalanobis distance measure, i.e. given a control unit in M_{it} , we compute the standardised distance using the time-varying covariates and average it across time periods. In light of the parallel trend assumption, refining the matched sets allows us to control for past outcomes and time-varying covariates. We calculate the average Mahalanobis distance between each treated and each control observation over time as follows:

$$S_{it}(i') = \frac{1}{L} \sum_{l=1}^L \sqrt{(V_{i,t-l} - V_{i',t-l})^T \Sigma_{i,t-l}^{-1} (V_{i,t-l} - V_{i',t-l})}, \quad (2)$$

where for a matched control unit $i \in M_{it}$, $V_{it'}$ is the time-varying covariates we are adjusting for, and $\Sigma_{it'}$ is its sample covariance matrix. Each treated unit is matched with the 5 most similar units in terms of Mahalanobis distance.

- 3) After refining the matched sets, we estimate the counterfactual outcome on the control units' weighted average in the refined matched set.
- 4) As a final step, we use the difference-in-difference estimator to calculate the ATT for each treated observation and then average it among all the treated observations. Adjusting for potential time trends, the ATT estimator becomes:

$$\hat{\delta}(F, L) = \frac{1}{\sum_{i=1}^N \sum_{t=L+1}^{T-F} D_{it}} \sum_{i=1}^N \sum_{t=L+1}^{T-F} D_{it} \{ (Y_{i,t+F} - Y_{i,t-1}) - \sum_{i \in M_{it}} w_{i,t}^{i'} (Y_{i',t+F} - Y_{i',t-1}) \}, \quad (3)$$

where $D_{i,t} = X_{i,t}(1 - X_{i,t-1}) \cdot 1\{|M_{i,t}| > 0\}$ and $w_{i,t}^{i'}$ is the non-negative normalised weight such that $w_{i,t}^{i'} \geq 0$ and $\sum_{i \in M_{it}} w_{i,t}^{i'} = 1$.

Standard errors are computed using a block-bootstrap procedure built explicitly for matching analysis in TSCS settings (Otsu and Rai, 2017).

The method relies on three assumptions:

- i) limited carryover effects. This assumption makes the potential outcome i at time $t + F$ not dependent on previous treatment status, up to L periods, i.e. $\{X_{i,t-l}\}_{l=L+1}^L$.

- ii) no interference, i.e. the potential outcome of unit i at time $t + F$ is not dependent on the other units' treatment status, meaning that untreated neighbouring municipalities are not affected by the earthquake occurring in the treated ones.
- iii) the parallel trend assumption, which is implied after conditioning on the set including treatment history, the lagged outcomes (except the immediate lag $Y_{i,t-1}$) and the covariate history $\mathbf{Z}_{i,t}$:

$$E \left[Y_{i,t+F} \left(X_{i,t} = 0, X_{i,t-1} = 0, \{X_{i,t-l}\}_{l=2}^L \right) - Y_{i,t-1} \middle| X_{i,t} = 1, X_{i,t} = 0, \{X_{i,t-l}, Y_{i,t-l}\}_{l=2}^L, \{\mathbf{Z}_{i,t-l}\}_{l=0}^L \right] = E \left[Y_{i,t+F} \left(X_{i,t} = 0, X_{i,t-1} = 0, \{X_{i,t-l}\}_{l=2}^L \right) - Y_{i,t-1} \middle| X_{i,t} = 0, X_{i,t} = 0, \{X_{i,t-l}, Y_{i,t-l}\}_{l=2}^L, \{\mathbf{Z}_{i,t-l}\}_{l=0}^L \right]. \quad (4)$$

These identifying assumptions are milder than those used by most common methodologies such as the linear regression model with fixed effects, dynamic panel models, matching methods, and the difference-in-differences estimator (Imai et al., 2020).

5. Results

For each earthquake, we present the sample selection, the covariate balancing, and the estimated treatment effects, first for the whole sample, then split by intensity levels.

5.1 L'Aquila 2009

For the L'Aquila earthquake, we have 89 municipalities hit by the 2009 earthquake with a “strong” or above seismic intensity, and a control group made up of municipalities from Central and Southern Italy (we consider the following ten regions: Tuscany, Umbria, Marche, Lazio, Abruzzi, Molise, Campania, Puglia, Basilicata and Calabria). We exclude municipalities from the islands and Northern Italy as they might differ in many unobservable ways from the affected municipalities. Besides, we further restrict the control group by removing the 48 municipalities hit by the L'Aquila earthquake but with a smaller intensity (≤ 5) and the 114 municipalities which were hit by the Central Italy earthquakes (occurring between 2016 and 2017), as they might not represent what would have happened to the 89 affected municipalities in the absence of the earthquake. We set $L = 3$ and $F = 4$. Figure 3 shows the balancing of the covariates, which remain stable across the 3 pre-treatment electoral rounds and fully within the $(-1, 1)$ range of the standard deviation. The level of imbalance for the lagged values of our primary dependent variable, that is, the share of authoritarian vote, stays

relatively constant over the entire pre-treatment period, pointing to the plausibility of the parallel trend assumption for the proposed difference-in-difference estimator.

Figure 3: Covariate balancing for L'Aquila 2009

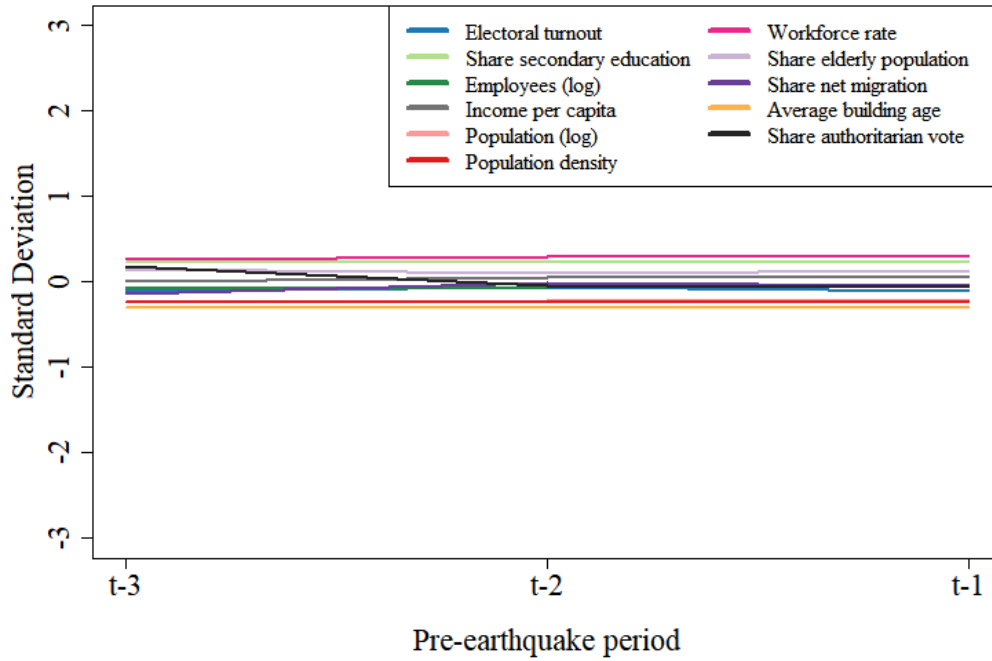


Table 3 shows the impact of the L'Aquila earthquake on the share of the right-wing populist vote. The estimates suggest a positive impact, statistically significant at the 5 or 1 confidence level for all periods considered.

Table 3: Impact of L'Aquila 2009 on the right-wing populist vote share (%)

Intensity > 5 (89 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	4.86***	1.50**	1.46**	3.21***	4.26***
Block-bootstrapped SE	(0.60)	(0.62)	(0.69)	(0.67)	(1.20)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

We then split the analysis by intensity levels. The estimates are reported in Table 4. At the “strong” category, the estimates’ extent gets smaller and we find no statistically significant results at the 5% level for the 2013 national elections ($t + 1$) and the 2014 European elections ($t + 2$). When considering only “very strongly” to “violently” affected municipalities, the impact becomes very large and always statistically significant at the 1 or 5% confidence level. The persistence of such

electoral gains for right-wing populist parties, which are sizable even a decade after the earthquake, is remarkable, and consistent with the recent qualitative evidence suggesting that severe earthquakes can push individuals towards right-wing authoritarian attitudes (Russo et al., 2020).

Table 4: Impact of L'Aquila 2009 on the right-wing populist vote share (%)

– By intensity levels

Intensity > 5 and Intensity ≤ 6 (69 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	3.84***	1.13*	0.72	2.93***	3.77***
Block-bootstrapped SE	(0.64)	(0.67)	(0.74)	(0.73)	(1.32)

Intensity > 6 (20 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	8.35***	2.76**	4.01***	4.20***	5.95**
Block-bootstrapped SE	(1.17)	(1.32)	(1.45)	(1.52)	(2.80)

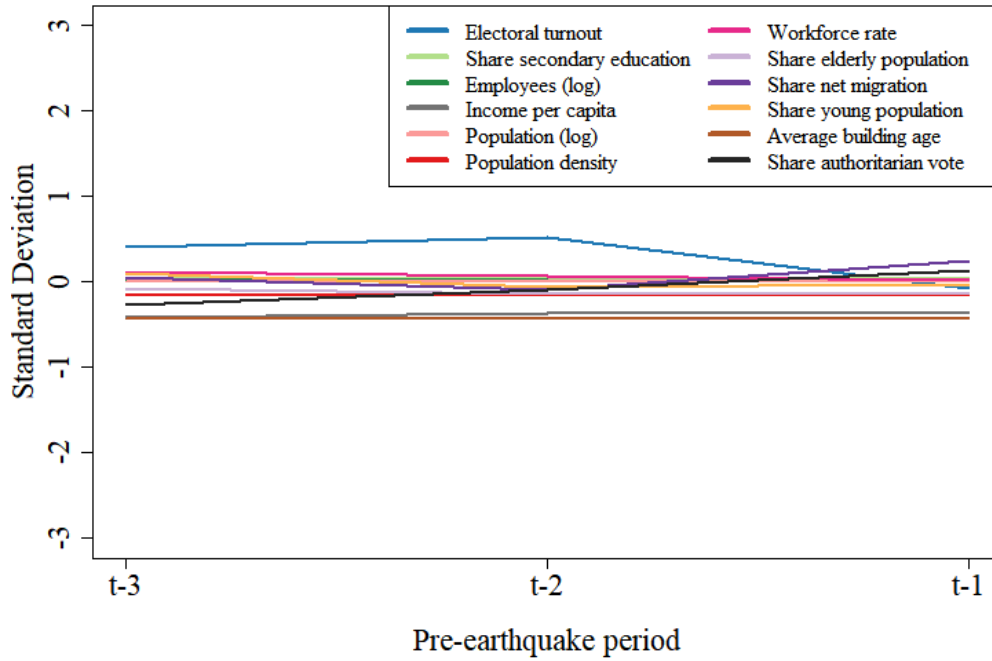
Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

5.2 Emilia 2012

We perform the same analysis for the Emilia earthquake, for which we have 30 municipalities hit by the 2012 earthquakes with an intensity that caused physical damage. The control group is made up of municipalities from the same geographical area, i.e. Northern Italy (we consider the following eight regions: Piedmont, Liguria, Lombardy, Emilia-Romagna, Veneto, Friuli-Venezia Giulia and Trentino-Alto Adige/Südtirol), with the only exception of the 13 municipalities hit by the Emilian seisms with a smaller intensity (≤ 5). Here the first-post treatment period, which we call t , corresponds to the 2013 national elections. In this case, we set $L = 3$ and $F = 3$. The covariate balancing is shown in Figure 4. All covariates display a stable balance across the 3 pre-treatment electoral rounds, remaining fully within the range $(-1, 1)$.¹⁷ As before, the parallel trend assumption appears satisfied as the level of imbalance for the share of authoritarian vote stays relatively constant over the entire pre-treatment period.

¹⁷ Only the control variable ‘electoral turnout’ exhibits a somewhat unstable pre-treatment balancing. In the robustness subsection, we will show that our results do not depend on this.

Figure 4: Covariate balancing for Emilia 2012



As for L'Aquila, we first consider all the municipalities hit by the earthquake. Table 5 reports close to zero and statistically insignificant estimates for all time periods.

Table 5: Impact of Emilia 2012 on the right-wing populist vote share (%)

Intensity > 5 (30 municipalities)				
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)
Point estimates	-0.53	-0.50	-0.12	0.25
Block-bootstrapped SE	(0.79)	(0.69)	(0.30)	(1.31)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

In Table 6, we disaggregate the analysis and look at the different intensities. No new insights emerge: regardless of the intensity experienced, there is no significant impact whatsoever of the Emilian earthquake on right-wing populist voting.

Table 6: Impact of Emilia 2012 on the right-wing populist vote share (%) – By intensity levels

Intensity > 5 and Intensity ≤ 6 (10 municipalities)				
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)
Point estimates	0.30	-0.16	-0.29	0.04
Block-bootstrapped SE	(1.72)	(1.63)	(0.64)	(3.52)
Intensity > 6 (20 municipalities)				
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)
Point estimates	-0.94	-0.66	-0.03	0.36
Block-bootstrapped SE	(1.03)	(0.88)	(0.34)	(1.62)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

One may intuitively question the plausibility of our results by noting that Emilia has a long tradition of being a ‘red stronghold’, and that this explains the lack of post-earthquake rise in populism. But we do not compare the municipalities affected by the two earthquakes *between each other*. We compare each set of affected municipalities with *control* municipalities that are very similar under many aspects, including political preferences and previous electoral outcomes. Yet, in one case we observe very large treatment effects and in the other a total lack of impact.¹⁸

5.3 Additional analyses and robustness tests

We implement a battery of additional analyses and robustness checks to validate our results. Appendix B contains the corresponding tables and figures.

- a) *Central Italy 2016-2017*: we perform the same analysis on the municipalities hit by the 2016-2017 Central Italy earthquakes, for which only two post-earthquakes election rounds are available. The estimates point to a positive impact on the outcome variable, which is also statistically significant at the 1% confidence level for the 2018 elections. The results are thus more consistent with L’Aquila 2009 than with Emilia 2012. Note that, as illustrated in Figure B.1, the affected areas are much closer and more similar to the municipalities hit by L’Aquila 2009 earthquake.

¹⁸ We also note that in the last round of regional elections (2020) the *League* party obtained an unprecedented share of votes (almost 32%) and, despite that, it was still considered a ‘defeat’ for Salvini’s party, who had seriously hoped for an historical win of the right-wing coalition in the region. This is a sign of how there have been profound changes in the Italian political landscape even in politically ‘stable’ territories.

- b) *Removal of municipalities hit by other earthquakes*: 14 municipalities hit by L'Aquila 2009 were also hit by the Central Italy 2016-2017 earthquakes. Table B.3 reports the results of the analysis without these 14 municipalities. The positive impact of the L'Aquila earthquake remains statistically significant at the 1% level for the 2009 (t), 2018 ($t + 3$) and 2019 ($t + 4$) elections.
- c) *Placebo tests*: we run two in-space placebo tests. The first replicates the twofold analysis but takes as treated only municipalities registering an intensity equal to 5, corresponding to “moderate” on the MMI scale. Table B.4 shows that L'Aquila 2009 had a positive but smaller impact, significant at the 5% level, only for the 2009 European elections (t), while Emilia 2012 estimates point again to null effects. The second is inspired by Belloc et al. (2016) and Masiero and Santarossa (2020): within each earthquake sample, we remove the treated municipalities and re-assign the treatment randomly at the same election time and to the same number of municipalities. The point estimates of these falsification tests, shown in Tables B.5-B.6 are close to zero and show no discernible impact whatsoever.
- d) *Alternative neighbour numbers*: we change the number of the neighbours in the refined matched set. In Table B.7 we reduce the number of neighbours from 5 to 3 and in Table B.8 we increase such number to 10. In both cases the results are consistent with the main estimates.
- e) *Alternative matching methods*: we implement an alternative matching method to select the 5 control units, namely the propensity score matching (Rosenbaum and Rubin, 1983). The estimates in Tables B.9 and B.10 suggest that our results are stable and not very sensitive to the choice of the matching method used. Besides, we also report the covariate balancing of the propensity score matching in Figures B.3 and B.4. In particular, the more stable balancing of Emilia 2012 suggests that our main estimates are not sensitive to small pre-treatment imbalances occurring in the Mahalanobis covariate balancing.
- f) *Removal of distant regions from each sample*: we re-run the analysis for L'Aquila 2009 earthquake including only the regions that are closest to the location of the natural disaster, i.e. Abruzzi, Marche, Umbria, Molise, Lazio, and Campania, for a total of 1,532 municipalities. We did the same for Emilia 2012 considering Emilia-Romagna, Lombardy and Veneto, for a total of 2,371 municipalities. The outcomes, reported in Tables B.11 and B.12, confirm that our results are not driven by specific regional factors, which might be stronger in more distant regions.
- g) *Alternative outcome variables*: we test whether L'Aquila 2009 and Emilia 2012 earthquakes had an impact on the average authoritarian-populist score and on the populist component of

such score.¹⁹ The results in Tables B.13-B.14 are in line with the hypothesis that there is a distinct relevance of right-wing populism in our setting.

Having established robustness, we now turn to the interpretation of our findings.

6. Mechanisms

What are the core drivers behind such strikingly heterogeneous results? Why did people affected by L'Aquila earthquake embrace right-wing populism as a reaction, but Emilian people did not?

To frame our results, we explore an array of potential mechanisms by looking at both pre- and post-earthquake dynamics and by taking into account economic, political, material, social and institutional factors. All the tables reporting the estimates of the following tests are in Appendix C.

- a) *Pre-existing territorial disparities*: for L'Aquila 2009, a large impact is already observed at the European elections of 2009, only two months after the earthquake. Such an immediate populist upsurge may hint at the exacerbation by the shock of pre-existing resentment in the population, i.e. that pre-quake discontent generated by territorial disparities was suddenly brought to light by the earthquake's devastation. Indeed, as stated by Placanica (1985), the earthquake does not overturn but consolidates the established order, it does not change but reinforces pre-existing tendencies and gaps. As described above, the two affected areas are characterized by structural differences in institutional contexts and economic characteristics, which in turn might have determined diverging post-disaster political trajectories. We test for this hypothesis by running a test in which, for each earthquake, we introduce a moderating variable which captures pre-existing medium-run economic trends of the affected territories: a dummy splitting the municipalities in those below and above the median of the average income growth over the 2000-2008 period.²⁰ The results reported in Tables C.1 and C.2, however, do not support this hypothesis: for L'Aquila, no clear differential trends are observed in populist voting between areas with more and less favourable pre-earthquake economic dynamics; for Emilia, both subsamples show no effects. Therefore, the earthquake did not simply act as an amplifier of pre-existing discontent.
- b) *Filtering out the 'promise' effect*: an alternative mechanism to explain the immediate reaction, still pointing to the relevance of ex-ante channels, is that citizens immediately blamed institutions for the vast damages caused by the earthquake, because corruption and political

¹⁹ Cf. Table A.1 for the list of parties included in these different scores.

²⁰ The use of average growth as a proxy for economic trends is inspired by the recent work by Dijkstra et al. (2020).

favours led to a lack of prevention and safety standard in building activities. Indeed, there is qualitative evidence from a recent survey conducted in Amatrice (one of the hotspots of the 2016-2017 Central Italy earthquakes) that up to 29 % of the surveyed individuals attributed the cause of the disaster to the central government for the lack of prevention, and especially for the lack of control and monitoring of the building industry and malpractice in constructing buildings (Massazza et al., 2019). Yet, there is also a political explanation for the sudden upsurge in right-wing populism: trust in the electoral promises made by the then-Prime Minister Silvio Berlusconi, leader of the populist party *People of Freedom* (a federation of right-wing political parties launched at the end of 2007 and led by *Come on Italy* and *National Alliance*). As explained in Section 3, the earthquake was fervently politicized by Berlusconi who made many pledges and ensured people would get back to normal lives in a matter of months. We test these two alternative hypotheses by running the same analysis but using a different dependent variable: the share of votes for *far-right* wing populism using the classification by Rooduijn et al. (2019).²¹ This classification does not include *People of Freedom*.²² The idea is that, if the initial outburst is due to blaming the central government for the lack of prevention, the voting pattern should be similar to the main estimates which include votes for *People of Freedom*. If, instead, a ‘promise’ effect in favour of *People of Freedom* is at play, we should not observe this impact for far-right wing parties such as the *League*. Table C.3 suggests that the latter is the case: there is no impact whatsoever on the share of votes for far-right populism until the 2018 national elections.²³ The immediate populist reaction, therefore, was neither blaming the central government for the disaster nor a ‘true’ protest voting, but rather ‘pocketbook’ voting (see Elinder et al., 2015), in response to Berlusconi’s paternalistic populism. Early populist support in the immediate aftermath was the fruit of hope, not of discontent. Discontent only arose when people became disillusioned by the initial pledges. This is also confirmed by the estimates in Table C.4, in which we focus on the positive impacts on the votes for *People of Freedom/Come on Italy*²⁴, which faded quickly and had disappeared by 2013. Having shown that initial effects are not related to ex-ante channels, but rather to a different composition and nature of the right-wing populist voting, we thus shift our attention to ex-post mechanisms.

²¹ Using this classification, we selected parties that identified with both the populist and far-right dimensions. In this classification, the ‘populist’ definition gathers parties fostering the divide between the *pure* people and the *corrupt* elite, while the ‘far-right’ definition includes nativist and authoritarian parties (Mudde, 2007).

²² Cf. Table A.1 for the list of parties included in this alternative variable.

²³ For the sake of completeness, for this and other checks we also report the results for Emilia 2012, even though we are mainly interested in L’Aquila ones.

²⁴ The party in 2013 switched back to the original *Come on Italy* denomination, but it has always been Berlusconi’s party.

- c) *Different seismic intensities*: the first ex-post mechanism is intuitive and easy to test. L'Aquila saw vaster damage compared to Emilia, and 5 municipalities (including L'Aquila city) experienced a seismic intensity on the MMI scale higher than 8, which is the maximum value registered for the Emilian earthquake. It could be, therefore, that the heterogeneous results are merely due to the fact that people in L'Aquila have been more severely affected. We re-ran the analysis for L'Aquila by excluding municipalities hit with intensity higher than 8. The results, reported in Table C.5, rule out this explanation: the populist effects are still large and statistically significant.
- d) *Economic impacts*: inequality in the economic effects of the earthquakes may then be the answer. We test for the ex-post economic channel by looking at the impacts of each quake on two economic variables: employment and income per capita. The estimates are in Tables C.6 and C.7. While no discernible pattern can be detected for employment, the income results are surprising: in L'Aquila (and, to a minor extent, in Emilia) real income per capita *increased* due to the earthquake, and significantly so, although the effect size is not large in absolute terms.²⁵ Even though these findings on the lack of employment effects or positive income impacts may seem counterintuitive, they can be contextualized in light of the following insights from the specialized literature: i) the seminal comparative study by Cavallo et al. (2013) found no effects on the evolution of per capita income even in the case of large disasters; ii) some studies document positive economic effects of natural disasters, due to reconstruction stimulus, industrial growth or other factors favouring a mechanic rebound, triggered by the disaster (Cavallo and Noy, 2011; Loayza et al., 2012); iii) the output dynamics following a quake can be considerably affected by the amount of post-quake financial aid that positively affects the GDP of local economies (Barone and Mocetti, 2014) – and this is especially the case when looking at smaller administrative entities such as municipalities; iv) a recent study (Porcelli and Trezzi, 2019) on the local evolution of output and employment following earthquakes from 1986 to 2011 (including also the L'Aquila event) found that economic impacts are small, transitory, and, in some cases, even positive, because the stimulus from reconstruction activities (financed by public grants) more than compensates for the destruction of physical capital. Given such features, it comes as no surprise that the discrepancies in populist support are not rooted in directly observable detrimental economic effects. To understand post-earthquake recovery, it is better to look directly at reconstruction dynamics.

²⁵ We also tested for spatial spillovers and broader patterns in economic impacts by repeating the analysis at the local labor market level for both outcomes. The results are similarly inconclusive and available upon request.

e) *Reconstruction patterns*: in Section 3, we provided anecdotal and qualitative evidence about how contrasting the reconstruction patterns of the two events have been. We now complement that discussion by offering descriptive and causal evidence that hint at a stark contrast in post-disaster management and in the speed and model of the reconstruction process, as these aspects might be the key drivers behind the heterogeneous impacts. To this end, we scraped public and private fund reconstruction data from the respective *Open data* platforms of each earthquake.²⁶ These online platforms provide, for each municipality, the amount of reconstruction funds allocated by the central government to that municipality and the amount of funds already disbursed by local institutions to implement the reconstruction projects. Thanks to this information, we were able to assemble, for each earthquake, variables capturing the municipality-level share of reconstruction fund disbursement completion. We use these variables as proxies for the status of the reconstruction to depict two snapshots of the recovery processes, one as of 2017 (Figure 5) for public projects only, and the other from 2020 (Figure 6) for both public and private projects, by intensity levels of the affected municipalities. The pictures tell a clear story: despite occurring *more than three years* after L'Aquila, the Emilian earthquake has been followed by a much more rapid and smooth recovery, at comparable levels of damage severity.

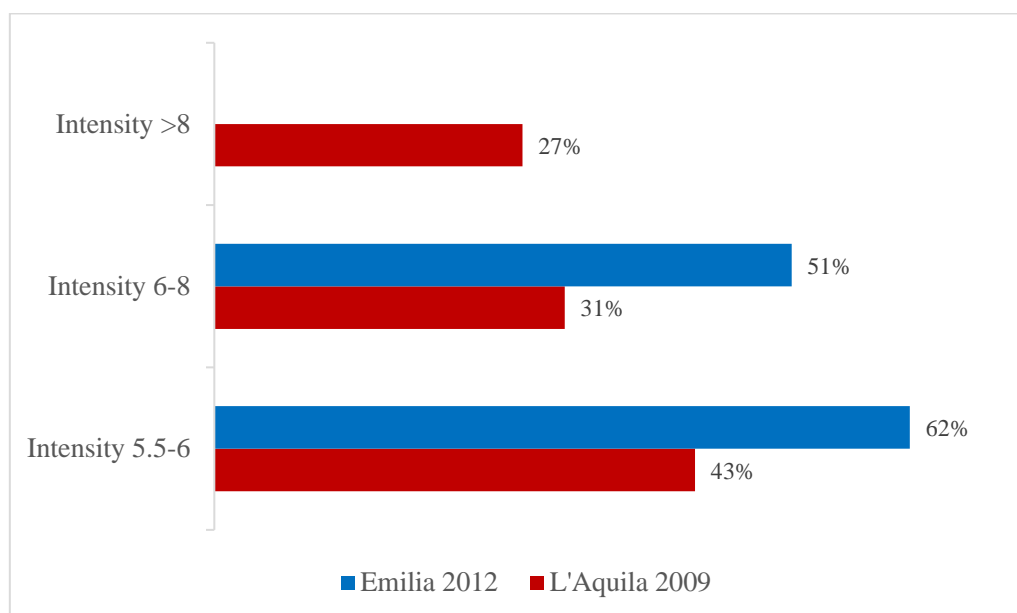
These variables can also be seen as a proxy for the quality of local institutions, under the assumption that better and more efficient local institutions are able to more rapidly employ the money received to carry out the reconstruction efforts.²⁷ Indeed, unequal institutional quality in the two affected areas may be a reason for such discrepancies: there is evidence from a comparative analysis of Italy's previous earthquakes that better pre-quake institutions might be more capable of managing the recovery and better allocating the inflows of public funds, avoiding improper use of financial aid (Barone and Mocetti, 2014). Indeed, considering pre-disaster years, the provinces hit by the Emilia earthquakes rank generally higher than the provinces hit by the L'Aquila seism, according to the institutional quality index put forward by Nifo and Vecchione (2014).

²⁶ Open data for L'Aquila come from *Ufficio Speciale per la Ricostruzione dei comuni del Cratere* (USRC) and are available here <http://www.usrc.it/attivita/ricostruzione-pubblica/monitoraggio-pubblica> and here <https://opendataricostruzione.gssi.it/home>. Open data for Emilia-Romagna can be retrieved from here <https://openricostruzione.regione.emilia-romagna.it/>.

²⁷ Seen in this light, our proxies are similar in spirit to the variable used to capture local institution quality by Albanese et al. (2019) and De Angelis et al. (2020), i.e. the number of days between the central state's deadline for the approval of a local tax and the date of adoption that changes at the municipality level, where the underlying assumption is that the sooner a local administration updates the rules on local taxation, the more efficient it is.

Figure 5: Share of reconstruction fund disbursement completion as of 2017 (%)

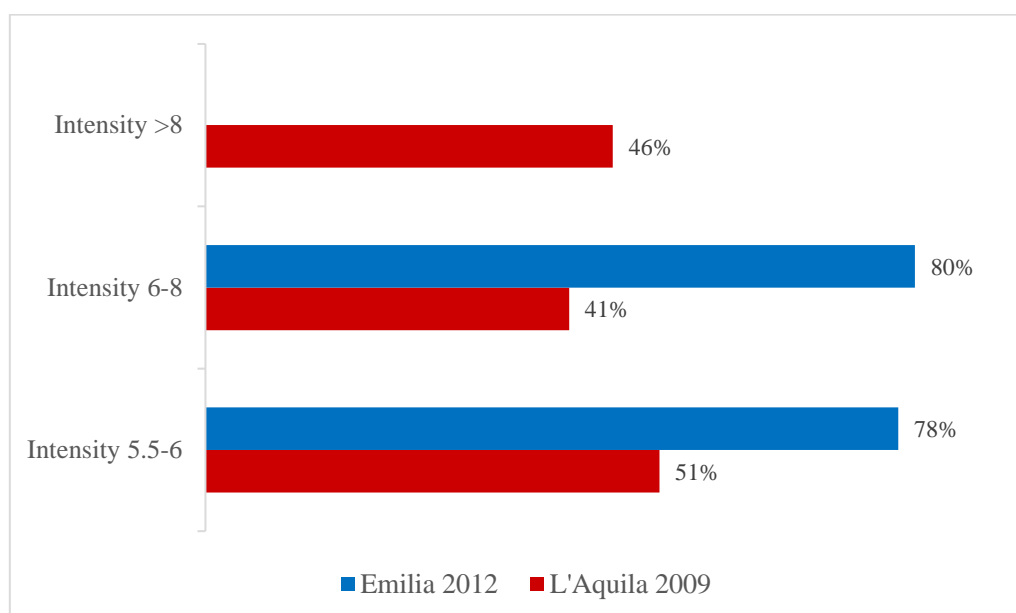
Public projects only



Notes: L'Aquila data are available for 79 municipalities. Data are missing for 4 municipalities from Lazio (Amatrice, Borgorose, Borgo Velino, Fiamignano) and 6 municipalities from Abruzzi (Cerchio, Collepietro, Molina Aterno, Castiglione a Casauria, Civitaquana, Pietranico). Emilia provides data for a total of 25 municipalities, since the other 5 municipalities belong to Lombardy (Gonzaga, Pegognaga, Quingentone, Quistello, San Giacomo delle segnate).

Figure 6: Share of reconstruction fund disbursement completion as of 2020 (%)

Public and private projects



Notes: We lose several treated units when collecting data for both private and public projects. L'Aquila data are available for 57 municipalities: L'Aquila and the 56 municipalities inside the “crater” (the name by which became known the affected area). Data are missing for the 4 municipalities of Lazio region (Amatrice, Borgorose, Borgo Velino,

Fiamignano) and the 28 municipalities considered “outside the crater” (Aielli, Celano, Cerchio, Collepietro, Magliano de’ Marsi, Massa d’Albe, Molina Aterno, Ortona dei Marsi, Pratola Peligna, San Benedetto in Perillis, Scanno, Scurcola Marsicana, Secinaro, Basciano, Castel Castagna, Cermignano, Crognaleto, Isola del Gran Sasso d’Italia, Alanno, Bolognano, Carpineto della Nora, Castiglione a Casauria, Civitavecchia, Pianella, Pietranico, San Valentino in Abruzzo Citeriore, Tocco da Casauria). Emilia data refer to a total of 23 municipalities, since the remaining 7 affected municipalities belong to the Lombardy region (Gonzaga, Moglia, Pegognaga, Poggio Rusco, Quingentone, Quistello, San Giacomo delle Segrate).

In addition to this descriptive between-earthquake evidence, we also offer *within*-earthquake estimates that are consistent with the notion that places where recovery was smoother and reconstruction faster were less prone to right-wing populist voting: Tables C.7 and C.8 present the results of a test in which, for each earthquake, we split the analysis by introducing, as a moderating variable, a dummy capturing whether a municipality lies above or below the median distribution of the 2017 share of public reconstruction fund disbursement completion. As the reader can see, there is evidence that, in the case of L’Aquila, in municipalities where post-disaster reconstruction was more rapid, the impact on voting behaviour is substantially smaller and less significant.²⁸

- f) *Institutional trust*: finally, we complement the above findings with evidence that the mismanagement of the recovery process and the many corruption scandals and bureaucratic delays which, as reported in Section 3, characterized the aftermath of L’Aquila 2009, lowered citizens’ trust in institutions. To capture this mechanism, we focus on the impact of the earthquake on electoral turnout at European elections. Turnout at European electoral rounds has been used in previous literature as a proxy for civic engagement, social capital, and institutional trust and quality (Guiso et al., 2004). While voting in general or local elections can lead to personal patronage benefits, namely an “exchange” rather than a measure of civic involvement, there are no immediate personal benefits in the case of European elections, for which, instead, the primary motivation can be considered a concern for public issues and a belief in institutions and the functioning of the political system (Barone and Mocetti, 2014). The estimates of Tables 7 and 8 are consistent with the idea that the mismanagement of the L’Aquila disaster generated distrust towards institutions: the impact on turnout at European elections in Table 7 is always negative, and, for 2009 and 2019, sizable and strongly significant.²⁹ The contrast with turnout impacts at national elections for L’Aquila and at all

²⁸ On top of this, the Pearson correlation between L’Aquila 2009 intensity and the share of public reconstruction fund disbursement completion is only 0.04, meaning that the stronger authoritarian support in less-reconstructed areas is not mechanically driven by the correlation between reconstruction and intensity levels.

²⁹ The huge negative effects during the 2009 European elections could also be explained by the retrospective mechanism described by Massazza et al. (2020) for Amatrice in the aftermath of the Central Italy earthquakes. Citizens might have

elections in Emilia (Table 8) is remarkable. Importantly, these results are also in line with recent evidence that corruption scandals in Italy tend to lower institutional trust and, in turn, lead to populist support (Aassve et al., 2018).

Table 7: Impact of L'Aquila 2009 on electoral turnout (%)

Intensity > 5 (89 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Election type	European	National	European	National	European
Point estimates	-16.54***	1.07	-2.11	2.51***	-7.79***
Block-bootstrapped SE	(1.79)	(0.79)	(2.19)	(0.94)	(2.67)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

Table 8: Impact of Emilia 2012 on electoral turnout (%)

Intensity > 5 (30 municipalities)				
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)
Election type	National	European	National	European
Point estimates	0.78	0.85	1.21*	1.09
Block-bootstrapped SE	(1.01)	(1.44)	(0.66)	(2.04)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

In sum, the contrasting electoral outcomes between the two earthquakes can be traced back to stark differences in the speed and management of post-disaster reconstruction process, with L'Aquila 2009 affected areas lagging far behind, and faring far worse, the more resilient Emilian territories. The post-Aquila 2009 stalemate, in turn, brought about distrust in the disappointed communities who, after the initial belief in Berlusconi's electoral promises, the repeated political and corruption scandals, the endless bureaucratic delays, saw their hope turn into discontent. The state's initially prompt engagement led to widespread hopes for a swift recovery, but soon, local expectations were shattered (Bock, 2017). Such narrative that emerges from our analysis is thus consistent overall with the historical background on the earthquakes and their aftermaths provided in Section 3: one area did

blamed the central government and the institutions for the lack of timely prevention in an area exposed to high seismic risk and for the lack of monitoring of malpractice and corruption in the construction sector, while, at the same time, believing in Berlusconi's paternalistic slogans.

not recover, the other did; the former reacted by embracing right-wing populism, the latter did not.

7. Conclusion

Not all shocks leave the same scars. Our comparative analysis showed that places and people can turn to authoritarianism and populism not just if ‘left behind’ by long-run economic trajectories related to global transformations, but also in reaction to the lack of territorial resilience in the aftermath of local shocks. Populist upsurges can thus be unanticipated, not necessarily gradual and predictable.

The geography of discontent emerging after L’Aquila 2009 was shaped by the inability of institutions, despite initial pledges, to cope with the new, unexpected challenge, ensure a prompt recovery and set in motion a smooth reconstruction process. The impasse, coupled with the scandals and organized crime infiltrations, engendered distrust towards public institutions, alienation, feelings of abandonment and resentment and, ultimately, revenge through the ballot box. The failure to rebuild places translated into a failure to rebuild local communities, so those communities looked for someone else to address their unfulfilled claims and reinvigorate their hopes.

The policy lesson is clear: in a world in which right-wing populism is on the rise, mismanaging shocks can have a high political cost, and lead to social fragmentation, extremism, and authoritarianism. In this respect, the finding that even “places that don’t recover” can become populist hotbeds resounds as a dire and current warning of the potential electoral and political repercussions of the ongoing pandemic crisis.

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Appendix A – Variable details

Table A.1: Party scores and classifications

Authoritarian and populist scores by party – Classification by Norris and Inglehart (2019)			
Party name (Italian denomination)	Authoritarian score	Party name (Italian denomination)	Populist score
Communist Refoundation Party (Partito della Rifondazione Comunista)	19	Union of the Centre (Unione di Centro)	34
Left Ecology Freedom (Sinistra Ecologia Libertá)	20	New Centre-Right (Nuovo Centrodestra)	37
Democratic Party (Partito Democratico)	37	Come on Italy (Forza Italia)	37
Five Star Movement (Movimento Cinque Stelle)	39	Civic Choice (Scelta Civica)	41
Aosta Valley (Vallée d’Aoste)	47	Aosta Valley (Vallée d’Aoste)	46
Civic Choice (Scelta Civica)	55	South Tyrolean People’s Party (Südtiroler Volkspartei)	49
Democratic Centre (Centro Democratico-Diritti e Libertá)	57	Democratic Centre (Centro Democratico-Diritti e Libertá)	50
South Tyrolean People’s Party (Südtiroler Volkspartei)	60	Democratic Party (Partito Democratico)	58
Union of the Centre (Unione di Centro)	70	Brothers of Italy (Fratelli d’Italia)	62
New Centre-Right (Nuovo Centrodestra)	74	Left Ecology Freedom (Sinistra Ecologia Libertá)	71
Come on Italy (Forza Italia)	76	(Northern) League (Lega (Nord))	78
(Northern) League (Lega (Nord))	86	Communist Refoundation Party (Partito della Rifondazione Comunista)	92

Brothers of Italy (Fratelli d'Italia)	91	Five Star Movement (Movimento Cinque Stelle)	100
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Far-right populist parties – Classification by Rooduijn et al. (2019)

Brothers of Italy (Fratelli d'Italia)	(Northern) League (Lega (Nord))	Southern Action League (Lega d'Azione Meridionale)
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Table A.2: Definition of the variables included in the analysis

Variable name	Definition	Time period	Source
Average building age	Average age of building construction	2001, 2011	Italian National Statistics Institute (ISTAT)
Electoral turnout	Percentage of voters over the electorate	2004, 2006, 2008, 2009, 2013, 2014, 2018, 2019	Italian Ministry of the Interior
Income per capita (euro, constant 2010 values)	Deflated income per capita	2003, 2005, 2007, 2008, 2012, 2013, 2017, 2018	Italian National Statistics Institute (ISTAT)
Intensity of the Emilian earthquake	Seismic intensity, Modified Mercalli Intensity (MMI) scale	2012	National Institute of Geophysics and Vulcanology (INGV)
Intensity of L'Aquila earthquake	Seismic intensity, Modified Mercalli Intensity (MMI) scale	2009	National Institute of Geophysics and Vulcanology (INGV)
N. of employees (log)	Total number of employees	2001, 2006, 2007, 2008, 2012, 2013, 2016, 2017	Statistical Register of Active Enterprises archive (ASIA), ISTAT
Population (log)	Population size	2003, 2005, 2007, 2008, 2012, 2013, 2017, 2018	Italian National Statistics Institute (ISTAT)
Population density	Total population over surface (kmq)	2003, 2005, 2007, 2008, 2012, 2013, 2017, 2018	Italian National Statistics Institute (ISTAT)
Seismic risk classification	Seismic risk, classes from 1 to 4	2003	O.P.C.M. 3274 (2003)
Share of authoritarian vote	Share of vote multiplied by authoritarian score	2004, 2006, 2008, 2009, 2013, 2014, 2018, 2019	Italian Ministry of the Interior & Norris and Inglehart (2019)
Share of authoritarian-populist vote (employed for sensitivity only)	Share of votes as a weighted average of authoritarian and populist scores	2004, 2006, 2008, 2009, 2013, 2014, 2018, 2019	Italian Ministry of the Interior & Norris and Inglehart (2019)
Share of net migration	Difference between n. of residents and n. people unregistered; growth rate with respect to 2002	2003, 2005, 2007, 2008, 2012, 2013, 2017, 2018	Italian National Statistics Institute (ISTAT)
Share of elderly population (over 65)	Percentage of over-65 aged people over the total population	2003, 2005, 2007, 2008, 2012, 2013, 2017, 2018	Italian National Statistics Institute (ISTAT)
Share of populist vote (employed for sensitivity only)	Share of vote multiplied by populist score	2004, 2006, 2008, 2009, 2013, 2014, 2018, 2019	Italian Ministry of the Interior & Norris and Inglehart (2019)

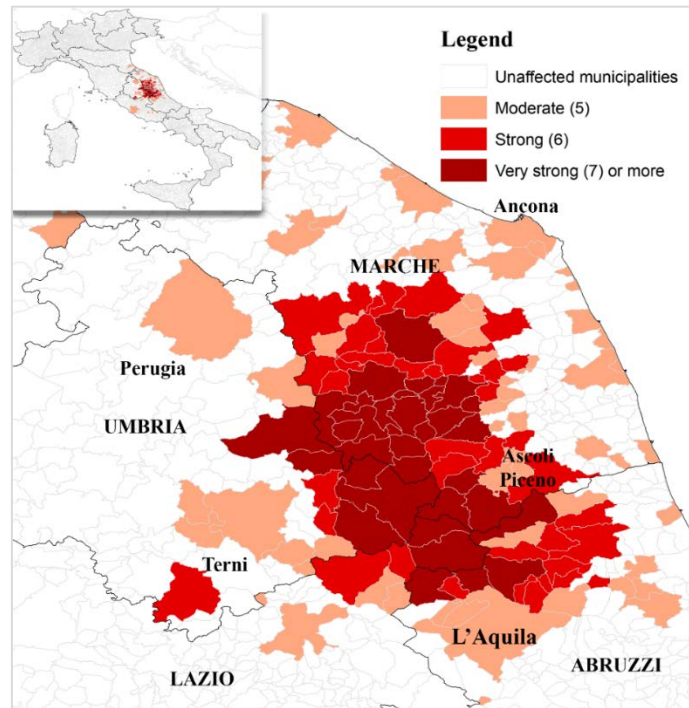
Share of young population (18-24)	Percentage of 18-24 aged people over the total population	2003, 2005, 2007, 2008, 2012, 2013, 2017, 2018	Italian National Statistics Institute (ISTAT)
Share of secondary education	Percentage of graduates over 15-64 aged population	2001, 2011	Italian National Statistics Institute (ISTAT)
Workforce rate	Percentage of employees over 15-64 aged population	2001, 2006, 2007, 2008, 2012, 2013, 2016, 2017	Statistical Register of Active Enterprises archive (ASIA), ISTAT

Appendix B – Additional analyses and robustness checks

a) Central Italy 2016-2017

The Central Italy earthquakes were a series of four main seismic events, three of which took place on 24th August, 26th October, and 30th October 2016, with a moment magnitude, respectively, of 6.18 Mw, 6.07 Mw, and 6.61 Mw; and on 18th January 2017, with a magnitude of 5.70 Mw. Jointly, this seismic sequence affected 135 municipalities belonging to four adjacent regions: Marche, Umbria, Abruzzi, and Lazio. In total, 299 people were killed by the shocks. Among the most devastated municipalities were Accumoli, Pescara del Tronto, Arquata del Tronto and Amatrice. In Amatrice, 238 people died out of a total population of about 2500 people (Massazza et al., 2019).

Figure B.1: Central Italy 2016-2017 earthquakes – Seismic intensity (MMI scale)



Notes: The map shows the maximum seismic intensity registered by each municipality. 68 municipalities were hit by a ‘moderate’ shaking, 38 municipalities were hit by a ‘strong’ shaking, and 33 municipalities were hit by a ‘very strong’ or higher shaking. The highest intensity (11) was experienced in the municipalities of Arquata del Tronto and Amatrice.

The sample built for this analysis excludes the same set of municipalities excluded for L’Aquila. We limit the dataset by removing the municipalities previously hit by the other disaster events, and for a more refined matched set, we also exclude Rome from the analysis. We set $L = 3$ and $F = 1$. Figure B.2 shows the balancing of the covariates, stable across the three pre-treatment electoral rounds and

fully within the $(-1, 1)$ range of the standard deviation. The level of imbalance for the lagged values of the share of authoritarian vote stays relatively constant over the entire pre-treatment period.

Figure B.2: Covariate balancing for Central Italy 2016 – 2017

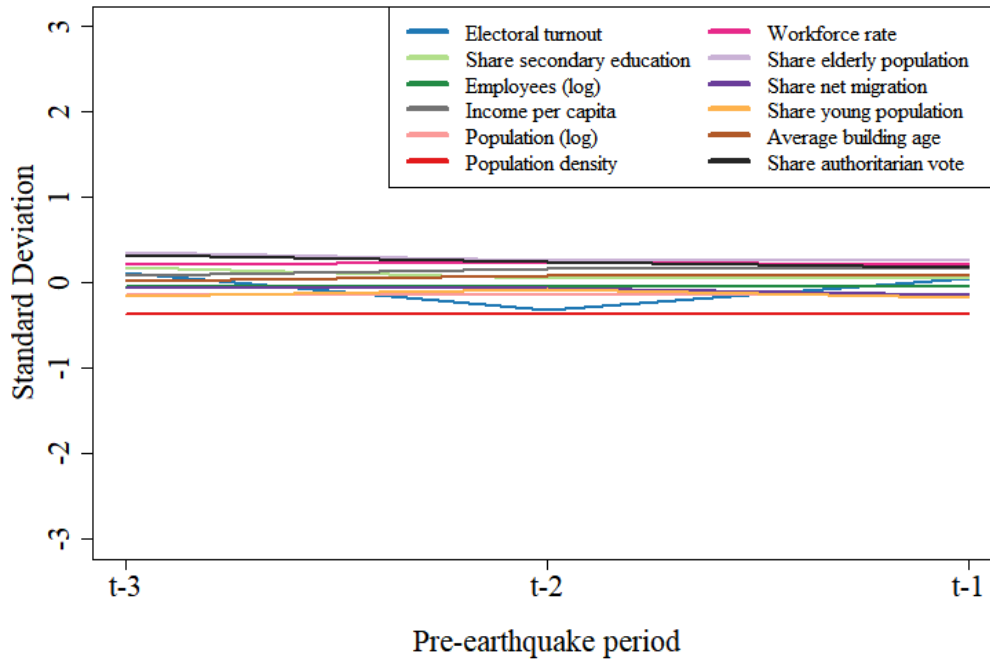


Table B.1 shows the overall results for the impact of the Central Italy earthquakes on the authoritarian vote share. There is a positive and strongly significant effect on right-wing populist voting at time t (2018 national elections) and a positive but insignificant effect at $t+1$ (2019 European elections). Note, however, that there was an unprecedented boom of votes for the League party in these areas (especially the most affected ones like Amatrice, Accumoli, Arquata del Tronto) at the 2019 European elections, a fact which featured heavily in media reports.³⁰

³⁰ See, for example, here: <https://www.iltempo.it/politica/2019/05/28/news/comuni-crateri-terremoto-lega-elezioni-europee-boom-salvini-amatrice-arquata-tronto-visso-umbria-marche-lazio-abruzzo-1162267/> and here: https://www.repubblica.it/dossier/politica/elezioni-europee-2019-ue-23-26-maggio/2019/05/28/news/lega_comuni_crateri_centro_italia_amatrice_sindaco_fontanella-227429261/ (both sources in Italian).

Table B.1: Impact of Central Italy 2016-2017 on the right-wing populist vote share (%)

Intensity > 5 (71 municipalities)		
Treatment period	t (2018)	t+1 (2019)
Point estimates	1.97***	1.44
Block-bootstrapped SE	(0.43)	(1.27)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

In the same spirit of the main analysis, we disaggregate by intensity levels. As shown in Tables B.2 and B.3, only when looking at severely affected municipalities do the voting effects appear.

Table B.2: Impact of Central Italy 2016-2017 on the right-wing populist vote share (%)
– By intensity levels

Intensity > 5 and Intensity ≤ 6 (38 municipalities)		
Treatment period	t (2018)	t+1 (2019)
Point estimates	0.34	0.80
Block-bootstrapped SE	(0.80)	(1.72)

Intensity > 6 (33 municipalities)		
Treatment period	t (2018)	t+1 (2019)
Point estimates	2.17***	2.17
Block-bootstrapped SE	(0.60)	(1.70)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

b) Removal of municipalities hit by Central Italy 2016-2017 earthquakes

Table B.3: Impact of L'Aquila 2009 on the right-wing populist vote share (%)

– Without municipalities hit by Central Italy 2016-2017

Intensity > 5 (75 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	4.78***	1.02	1.28	2.84***	4.13***
Block-bootstrapped SE	(0.70)	(0.70)	(0.79)	(0.76)	(1.28)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

c) *Placebo tests*

- *Only municipalities with intensity equal to 5 (“moderate”)*

Table B.4: Impact on the right-wing populist vote share (%) – Intensity = 5

L’Aquila 2009 - Intensity = 5 (47 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	1.02**	-0.65	-0.71	0.45	1.12
Block-bootstrapped SE	(0.51)	(0.56)	(0.64)	(0.56)	(1.51)
Emilia 2012 - Intensity = 5 (13 municipalities)					
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)	
Point estimates	-0.04	-0.03	-0.21	-0.18	
Block-bootstrapped SE	(1.28)	(1.06)	(0.43)	(2.40)	

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively

- *Random re-assignment of the treatment*

**Table B.5: In-space placebo test for the impact of L’Aquila 2009
on the right-wing populist vote share (%)**

Intensity > 5 (89 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	0.05	-0.20	0.05	0.40	0.45
Block-bootstrapped SE	(0.65)	(0.59)	(0.53)	(0.50)	(0.96)
Intensity > 5 and Intensity ≤ 6 (69 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	0.15	-0.31	0.02	0.28	0.76
Block-bootstrapped SE	(0.49)	(0.66)	(0.60)	(0.53)	(1.08)
Intensity > 6 (20 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	-0.29	0.18	0.15	0.78	-0.62
Block-bootstrapped SE	(2.52)	(1.44)	(1.34)	(1.36)	(2.23)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

**Table B.6: In-space placebo test for the impact of Emilia 2012
on the right-wing populist vote share (%)**

Intensity > 5 (30 municipalities)				
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)
Point estimates	0.36	0.07	0.09	-0.35
Block-bootstrapped SE	(1.11)	(0.94)	(0.50)	(1.11)
Intensity > 5 and Intensity ≤ 6 (10 municipalities)				
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)
Point estimates	0.94	0.21	0.70	0.30
Block-bootstrapped SE	(2.65)	(2.12)	(0.78)	(2.24)
Intensity > 6 (20 municipalities)				
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)
Point estimates	0.07	0.00	-0.21	-0.67
Block-bootstrapped SE	(1.34)	(1.13)	(0.67)	(1.48)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

d) *Alternative neighbour numbers*

- *Size equal to 3*

Table B.7: Impact on the right-wing populist vote share (%) – Size match = 3

L'Aquila 2009 - Intensity > 5 (89 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	4.75***	1.62**	1.71**	3.07***	4.05***
Block-bootstrapped SE	(0.61)	(0.64)	(0.72)	(0.71)	(1.30)
Emilia 2012 - Intensity > 5 (30 municipalities)					
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)	
Point estimates	-0.58	-0.54	-0.34	0.01	
Block-bootstrapped SE	(0.79)	(0.71)	(0.29)	(1.40)	

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

- *Size equal to 10*

Table B.8: Impact the right-wing populist vote share (%) – Size match = 10

L'Aquila 2009 - Intensity > 5 (89 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	4.97***	1.62***	1.70***	3.46***	4.27***
Block-bootstrapped SE	(0.59)	(0.57)	(0.64)	(0.63)	(1.18)
Emilia 2012 - Intensity > 5 (30 municipalities)					
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)	
Point estimates	-0.53	-0.61	-0.18	0.18	
Block-bootstrapped SE	(0.78)	(0.67)	(0.30)	(1.30)	

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively

e) *Alternative matching methods*

Table B.9: Impact of L'Aquila 2009 on the right-wing populist vote share (%)
– Propensity score matching

Intensity > 5 (89 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	3.61***	0.75	0.89	1.89**	2.99**
Block-bootstrapped SE	(0.75)	(0.74)	(0.89)	(0.89)	(1.48)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

Figure B.3: Covariate balancing for L'Aquila 2009 – Propensity score matching

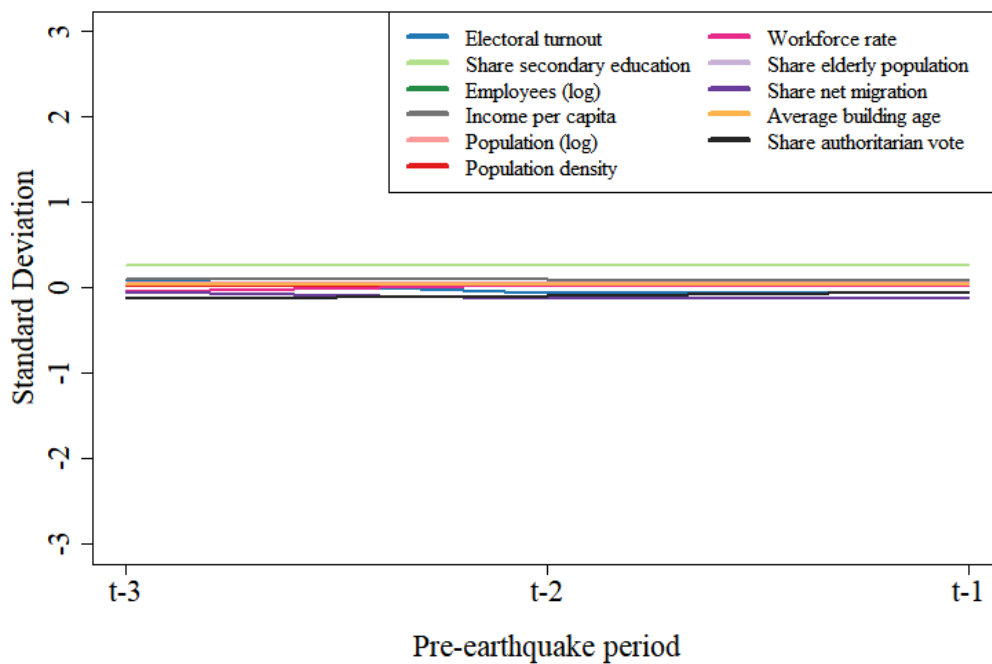
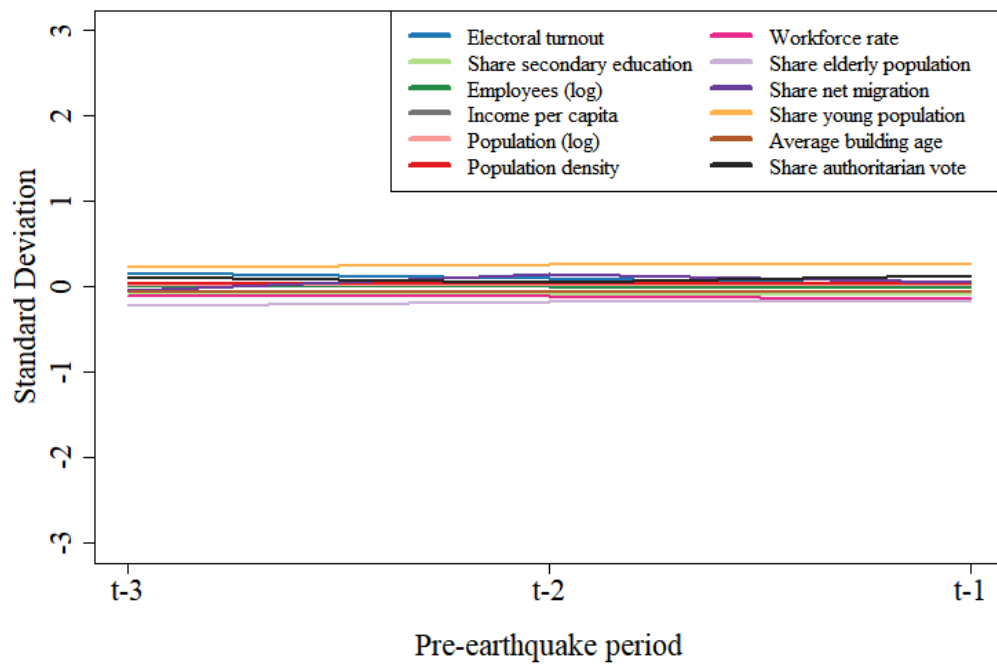


Table B.10: Impact of Emilia 2012 on the right-wing populist vote share (%)
– Propensity score matching

Intensity > 5 (30 municipalities)				
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)
Point estimates	-0.30	-0.48	-0.19	0.26
Block-bootstrapped SE	(0.82)	(0.68)	(0.35)	(1.31)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

Figure B.4: Covariate balancing for Emilia 2012 – Propensity score matching



f) Removal of distant regions from each sample

Table B.11: Impact of L'Aquila 2009 on the right-wing populist vote share (%)
– Close regions only (Umbria, Marche, Abruzzi, Lazio, Molise, Campania)

Intensity > 5 (89 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	4.46***	0.42	0.87	2.49***	3.33**
Block-bootstrapped SE	(0.59)	(0.67)	(0.74)	(0.73)	(1.30)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

Table B.12: Impact of Emilia 2012 on the right-wing populist vote share (%)
– Close regions only (Veneto, Lombardy, Emilia-Romagna)

Intensity > 5 (30 municipalities)				
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)
Point estimates	-0.37	-0.46	-0.13	0.20
Block-bootstrapped SE	(0.79)	(0.68)	(0.30)	(1.28)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

g) *Alternative outcome variables*

- *Composite score (both authoritarian and populist components) of Norris and Inglehart (2019)*

Table B.13: Impact on the populist-authoritarian vote share (%)

L'Aquila 2009 - Intensity > 5 (89 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	3.02***	1.08	1.58	1.26	2.41
Block-bootstrapped SE	(0.43)	(1.11)	(1.39)	(1.65)	(2.03)
Emilia 2012 - Intensity > 5 (30 municipalities)					
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)	
Point estimates	-0.87	-0.62	-0.21	0.06	
Block-bootstrapped SE	(0.93)	(1.19)	(1.68)	(2.16)	

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

- *Only populist component of Norris and Inglehart (2019) score*

Table B.14: Impact on the populist vote share (%)

L'Aquila 2009 - Intensity > 5 (89 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	1.30***	0.31	1.43	-0.92	0.21
Block-bootstrapped SE	(0.41)	(2.01)	(2.34)	(2.93)	(2.92)
Emilia 2012 - Intensity > 5 (30 municipalities)					
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)	
Point estimates	-1.16	-0.62	-0.14	0.25	
Block-bootstrapped SE	(2.37)	(2.81)	(3.07)	(2.81)	

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

Appendix C – Mechanisms

a) Pre-existing territorial disparities

Table C.1: Impact of L'Aquila 2009 on the right-wing populist vote share (%)
– By median of average income growth (2000-2008)

Intensity > 5 (Below the median)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	5.95***	1.19	1.46*	2.44***	3.90**
Block-bootstrapped SE	(0.85)	(0.83)	(0.91)	(0.93)	(1.54)
Intensity > 5 (Above the median)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	3.18***	1.96**	1.45	4.41***	4.82**
Block-bootstrapped SE	(0.74)	(0.92)	(1.01)	(0.92)	(1.91)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

Table C.2: Impact of Emilia 2012 on the right-wing populist vote share (%)
– By median of average income growth (2000-2008)

Intensity > 5 (Below the median)				
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)
Point estimates	-0.48	-0.39	-0.22	0.12
Block-bootstrapped SE	(0.89)	(0.79)	(0.32)	(1.41)
Intensity > 5 (Above the median)				
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)
Point estimates	-0.74	-1.03	0.38	0.92
Block-bootstrapped SE	(2.36)	(1.97)	(0.92)	(4.46)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

b) Filtering out the promise effect

Table C.3: Impact of the earthquakes on the far-right populist vote share (%)
– Classification by Rooduijn et al. (2019)

L'Aquila 2009 - Intensity > 5 (89 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	-0.05	0.00	0.26	5.78***	5.11
Block-bootstrapped SE	(0.13)	(0.05)	(0.77)	(1.67)	(3.23)
Emilia 2012 - Intensity > 5 (30 municipalities)					
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)	
Point estimates	0.04	-0.25	-0.98	0.87	
Block-bootstrapped SE	(1.94)	(0.98)	(2.42)	(4.76)	

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

Table C.4: Impact of the earthquakes on “People of Freedom/Come on Italy” vote share (%)

L'Aquila 2009 - Intensity > 5 (89 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	8.51***	2.12	1.26	0.98	-1.10
Block-bootstrapped SE	(0.95)	(1.61)	(1.84)	(2.32)	(2.76)
Emilia 2012 - Intensity > 5 (30 municipalities)					
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)	
Point estimates	0.01	-0.88	0.16	-0.32	
Block-bootstrapped SE	(1.77)	(2.45)	(2.85)	(3.71)	

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

c) *Different seismic intensities*

Table C.5: Impact of L'Aquila earthquake on the right-wing populist vote share (%)
– Intensity ≤ 8

5 < Intensity ≤ 8 (84 municipalities)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	4.67***	1.31**	1.23*	3.20***	4.14***
Block-bootstrapped SE	(0.63)	(0.64)	(0.69)	(0.67)	(1.22)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

d) *Economic impacts*

- *Employment*

Table C.6: Impact of the earthquakes on employment (log)

L'Aquila 2009 - Intensity > 5 (89 municipalities)				
Treatment period	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	0.05*	0.02	-0.04	-0.05
Block-bootstrapped SE	(0.03)	(0.03)	(0.04)	(0.04)
Emilia 2012 - Intensity > 5 (30 municipalities)				
Treatment period	t+1 (2014)	t+2 (2018)	t+3 (2019)	
Point estimates	-0.01	0.01	0.00	
Block-bootstrapped SE	(0.03)	(0.03)	(0.03)	

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

- *Income*

Table C.7: Impact of the earthquakes on annual real income per capita (in 2010 Euro values)

L'Aquila 2009 - Intensity > 5 (89 municipalities)				
Treatment period	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	390.42***	366.42***	614.11***	585.44***
Block-bootstrapped SE	(81.07)	(77.89)	(106.48)	(97.44)
Emilia 2012 - Intensity > 5 (30 municipalities)				
Treatment period	t+1 (2014)	t+2 (2018)	t+3 (2019)	
Point estimates	90.16	223.30**	235.34*	
Block-bootstrapped SE	(126.04)	(99.74)	(143.73)	

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively.

e) *Reconstruction patterns*

Table C.7: Impact of L'Aquila 2009 on the right-wing populist vote share (%)
– By median of the share of public reconstruction fund disbursement completion
as of 2017 (%)

Intensity > 5 (Below the median)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	7.37***	2.44*	3.20**	4.73***	6.56***
Block-bootstrapped SE	(1.16)	(1.33)	(1.47)	(1.45)	(2.24)
Intensity > 5 (Above the median)					
Treatment period	t (2009)	t+1 (2013)	t+2 (2014)	t+3 (2018)	t+4 (2019)
Point estimates	4.25***	1.47**	0.50	2.51***	3.30**
Block-bootstrapped SE	(0.56)	(0.62)	(0.68)	(0.66)	(1.51)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively. The number of treated units for L'Aquila is 79, as data are missing for 4 municipalities from Lazio (Amatrice, Borgorose, Borgo Velino, Fiamignano) and 6 municipalities from Abruzzi (Cerchio, Collepietro, Molina Aterno, Castiglione a Casauria, Civitaquana, Pietranico).

Table C.8: Impact of Emilia 2012 on the right-wing populist vote share (%)
– By median of share of reconstruction fund disbursement completion as of 2017 (%)

Intensity > 5 (Below the median)				
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)
Point estimates	-1.31	-0.73	0.11	0.57
Block-bootstrapped SE	(1.31)	(1.18)	(0.41)	(2.12)
Intensity > 5 (Above the median)				
Treatment period	t (2013)	t+1 (2014)	t+2 (2018)	t+3 (2019)
Point estimates	-0.14	-0.25	0.10	0.36
Block-bootstrapped SE	(1.34)	(1.11)	(0.54)	(2.20)

Notes: ***, **, * denote significance at the 1, 5, and 10% level, respectively. The number of treated units for Emilia 2012 is 25, as data for 5 municipalities are not available (Gonzaga, Pegognaga, Quingentone, Quistello, San Giacomo delle segnate, all belonging to Lombardy region).