The Green Shades of the Storm: Exposure to Extreme Weather Increases Voting for Environmentally Unfriendly Incumbents*

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March 23, 2022

Preliminary and incomplete draft.

*The authors thank seminar participants at Bocconi University for their helpful comments. Simone Cremaschi acknowledges funding from the European Research Council (Grant Agreement N. 864687). Contact information: Simone Cremaschi: simone.cremaschi@unibocconi.it; Piero Stanig: piero.stanig@unibocconi.it.

Abstract

Evidence shows that exposure to extreme weather events raises concern for climate change and increases pro-environment voting. But research also shows that exposure to natural disasters increases support for local incumbents who are able to successfully provide disaster relief. We examine the contrasting electoral effects of climate-related disruption by studying the aftermath of the 2018 Vaia storm in Northeast Italy, which destroyed about 42 million trees on an area of 41,000 hectares. Our causal identification exploits the stark variation in damage intensity between adjacent and closely similar municipalities. We measure exposure to the Vaia storm by combining satellite and georeferenced data on forest disruption, and blackout-related changes in nightlights intensity. We estimate its effect on voting behavior in the 2019 European elections within a difference-in-difference setting. We find that the storm significantly increased support for the local incumbent—the far-right League party in nine out of ten severely affected provinces—and did not generate positive electoral returns for pro-environment parties. Our findings temper the hypothesis that the increasing frequency of extreme weather events will increase support for policies aimed at reducing climate change.

Studying the Vaia storm

Our study focuses on the Vaia storm which hit Northeast Italy on the night between 28 and 29 October 2018. Vaia is the most damaging windstorm that has ever affected Italy in recent history. Wind reached speeds higher than 190 km/h, uprooting about 42 million trees over an area of 41,000 hectares, causing blackouts that affected more 200,000 accounts, and generating economic damage for around Euro 2 billions. Udali et al. (2021) report that the disaster felled nine million cubic meter of wood in total. Considering that in normal times the total industrial roundwood production for the whole of Italy is around two million cubic meters, the sudden more than four-fold increase in supply also led to a dramatic fall in prices of roundwood.

The storm hit with particular intensity six provinces governed by four local administrative authorities which were in charge of managing disaster relief: the two autonomous provinces of Trento and Bozen/Bolzano, and the Veneto and Friuli- Venezia Giulia regions. It also hit, albeit more moderately, five provinces governed by the Lombardia region.

The populist radical right League governed eight out of the ten provinces that were hit, and was about to start its term in a ninth, while the regionalist and pro-autonomy party Südtiroler Volkspartei (SVP) controlled the government of one, the Bozen/Bolzano autonomous province. Importantly, the Northern League has been part of the governing coalition of the Veneto region since 2000, and the governor in office since 2010 is a League member; the SVP has continuously controlled the government of the Autonomous Province of Bolzano/Bozen since democratization. Friuli - Venezia Giulia experienced alternation in office between center-left and center-right governors; since the Spring of 2018, and therefore at the time of the storm, the governor is from the League. The autonomous province of Trento was held by the center-left coalition at the time of the Vaia storm, but control of the administration changed hands to the League just five days after the storm, therefore the League-controlled provincial executive was in charge of the bulk of the relief.[1]

The Northern League is one of the prototypical radical right parties of western Europe, and it is currently the oldest party in continuous existence to contest Italian elections. Initially the expression of a protest movement against the statist and centralist tendencies of the Italian government, and

[1]The election was held on October 21, 2018.

opposing the alleged exploitation of the more prosperous northern regions by the rest of the country, the Northern League then adopted increasingly virulent nativist stances. In recent years, it discarded most of its federalist platform elements and the anti-southern rhetoric to assume, instead, a more (Italian) nationalist character, discarding the "Northern" in its name and rebranding itself, under the leadership of Matteo Salvini, in the mold of other radical right nationalist parties like the National Front in France.

Natural Disasters, Environmental Concern, and Disaster Relief

Recent literature has highlighted a relationship between exposure to extreme weather events related to climate change and political attitudes. Overall, being exposed to a natural disaster of this kind tends to increase the environmental beliefs and preferences of voters. In a seminal paper, Egan and Mullin (2012) show that in the U.S. public there's a systematic relationship between experiences of extreme weather and beliefs about climate change. More recently, Hoffmann et al. (2022) show that, across Europe, environmental concern and support for Green parties are affected by temperature anomalies; Baccini and Leemann (2021) show that support for environmental policies in Swiss referendums is higher in areas hit by floods. Yet, this recent work has also documented that extreme weather events and other climate-change related disasters increase environmental concern only if they find fertile ground in the predispositions of those affected. Overall, the effects of weather anomalies are stronger in more well-off and more educated areas, and ideological leanings play an important role: Hazlett and Mildenberger (2020) document how in the case of California, exposure to wildfires increases support for environmental policy in ballot initiatives only in more Democratic municipalities, but not in Republican areas.

A more traditional political science literature has documented the electoral effects of natural disasters and disaster relief. In particular, one strand in the literature has interpreted the anti-incumbent effects of natural disasters as evidence of "blind retrospection" among voters (Achen and Bartels 2017). In a nutshell, voters punish the incumbent for negative events, regardless of whether responsibility for the event can be attributed to policymakers. Yet, it is not clear whether this interpretation is warranted, and, rather than attributing to incumbents the responsibility for natural events, voters

evaluate incumbent performance in terms of the provision of disaster relief, or the quality of disaster preparedness policies (Arceneaux and Stein 2006). In a study of the U.S., Healy and Malhotra (2010) show that incumbents are punished for economic damages, but not for deaths, caused by tornadoes. This is consistent with voters realizing that while economic damages can be mitigated by policy, the number of casualties is not under control of policymakers. Gasper and Reeves (2011) document how voters in the U.S. can attribute responsibility to presidents and governors for relief funding. Stout (2018) further argues that the response to a natural disaster reveals the competence of incumbents, and shows, with data on U.S. governors, that vote share is increasing in damages when relief is provided, while it is decreasing in damages when a disaster declaration is not issued.

In a large scale study on India, Blankenship et al. (2021) document how voters only punish state legislative incumbents from opposition parties, that do not have access to relief funds, for droughts and floods. Masiero and Santarossa (2021) document how in Italy, vote for the mayoral incumbent increases in areas hit by earthquakes. This advantage can be attributed to the ability of the incumbent to target disaster relief, and to the increased media visibility of local administrators in areas hit by an earthquake. Cooperman (2021) shows that in Brazil drought declarations, that then trigger relief policies, are used strategically by mayors to increase their electoral performance. Dodlova and Zudenkova (2021), in a study of candidates to the U.S. House of Representatives, show that incumbents who perform better during post-disaster recovery can also adopt more extremist platforms.

If following a natural distaster like a storm of the magnitude of Vaia the environmental concern – and the preference for mitigation policies – increase, the League incumbents might stand to lose in terms of electoral support. In fact, it is well-documented that the radical right in western Europe has channeled climate change skepticism and opposition to mitigation policies and to attempts to transform the economy in a "green" direction (e.g., Lockwood 2018; Jylhä and Hellmer 2020; Jylhä, Strimling, and Rydgren 2020; Gemenis, Katsanidou, and Vasilopoulou 2012; Forchtner 2019). In a seminal study on the U.S., McCright and Dunlap 2011 show that in the U.S., conservative (white) males are much more likely to endorse denialist views regarding climate change. Krange, Kaltenborn, and Hultman (2019), in a study of Norway, replicate these findings, also connecting them more directly to right-wing nationalism. In addition, one of the key elements of the League platform, since its inception in the early 1990s, has been a clear

pro-business stance and opposition to government regulation of economic activity. Plausibly, this further pushes the League towards opposition (or very lukewarm support) of climate mitigation policies that involve setting constraints on firms' behavior. For these reasons, it is an unlikely recipient of environmentally motivated votes. Conversely, while unattended natural disasters might harm incumbents, access to and control of relief funds, as well as media exposure and credit-claiming opportunities for national politicians linked to local and regional administrations, might award an advantage to incumbent parties. This means that the popularity of regional incumbents (the League in most of the affected provinces) might have increased following the Vaia storm. If the incumbent administrations are able to deliver disaster relief, and, importantly, claim credit for it in an effective way, their popularity might increase. Ironically, a climate-change related natural disaster might then benefit even a party with lukewarm or skeptical stances regarding climate change and environmental mitigation.

To sum up, one can posit that there exist two countervailing effects of the direct experience of a natural disaster. The first one pushes voters towards stronger environmental concern (and, indirectly, away from radical right parties like the League); the second pushes voters towards incumbents (regardless of their ideology) as long as these are able to provide relief, and in this case pushes voters towards the League. We can call the former the *environmental concern* effect, and the second the *disaster relief* effect.

Importantly, if prior ideological predispositions affect the extent to which voters reacting in an environmentalist direction to a natural disaster, one can expect the disaster relief effect to dominate the environmental concern effect. In fact, the Vaia storm hit areas in large part traditionally supporting the League and might have not increased environmental concern or environmentalist policy preferences much, while it has provided an excellent set of opportunities for incumbent regional/provincial administration to engage in relief distribution and related credit-claiming.

The Empirical Study

Data

Our dependent variable is the municipal share of voters supporting the local incumbent (League and SVP in respective provinces) in European Parliament

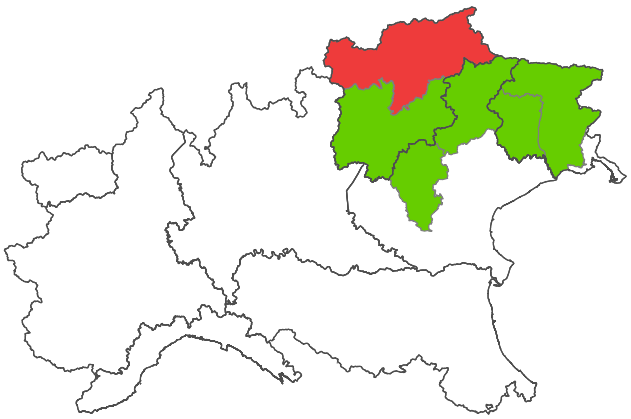

Figure 1: Regional incumbents in severely affected provinces (green = League; red = SVP).

(EP) elections. There are three main reasons behind our decision to use EP elections in our analysis. First of all, the European Parliament election takes place less than a year after the Vaia storm, while the last legislative election took place in the spring of 2018, just a few months before the Vaia storm, and the next legislative election is to be held in 2023. In addition, the EP election, given its more expressive nature compared to the more "instrumental" municipal elections, would probably be an easy case to detect the effects of a climate-change induced extreme weather event on support for environmentalist platforms (the environmental concern effect). Conversely, a vote for the regional or local incumbent in regional or municipal elections is plausibly affected to a larger extent also by incumbent performance, including disaster response and disaster relief. European elections are therefore a hard

case to detect the disaster relief effect. Finally, there are some practical considerations that make the study of municipal elections unappealing. In fact, these have staggered schedules across municipalities, hence giving rise to concerns regarding election timing as a source of noise or a confounder, and, most importantly, in most smaller municipalities elections are non-partisan, with "civic lists" often only implicitly affiliated with national political parties, making comparisons across municipalities next to impossible.

We obtain municipal voting data from the Italian Ministry of Interior and compile a panel dataset covering elections held before (12-13 June 2004; 6-7 June 2009; 22-25 May 2014) and after the Vaia storm (4-7 June 2019).

Our main treatment variable is the intensity of tree damage in each municipality. We extract tree damage perimeters and intensity from the Forwind database (Forzieri et al. 2020), which offers an accurate and fine grained measurement based on both satellite and ground data for all the severely affected provinces. We spatially merge tree damage data and municipal perimeters to obtain different measures of damage intensity (average damage and maximum damage) for each municipality.

As a secondary treatment variable, we consider blackout duration. We calculate the standardized variation in nightlight intensity using monthly averages in November 2017 and 2018 measured through satellite data and spatially merge these data with municipal perimeters to obtain a municipal level measure of blackout duration.

In robustness tests, we extend our analysis to moderately affected provinces. For these provinces, no high quality data on tree damage intensity is available. We thus rely on tree damage perimeters provided by Lombardia region and combine them with perimeters obtained from the Forwind database to obtain a comparable measure of damage extension over the whole affected area. We use the same procedure as before to obtain municipal level measure of three damage extension and blackout duration.

We complement our data by adding variables accounting for observable municipal characteristics such as population size and density, share of foreigners, share of population less than 15 and more than 64, average income, share of citizens holding a university degree, surface, altitude, and surface covered by forest. These variables capture factors that may determine differential voting behavior and may have determined a differential exposure to the storm. We use these variables to test the robustness of our results to selection into treatment.

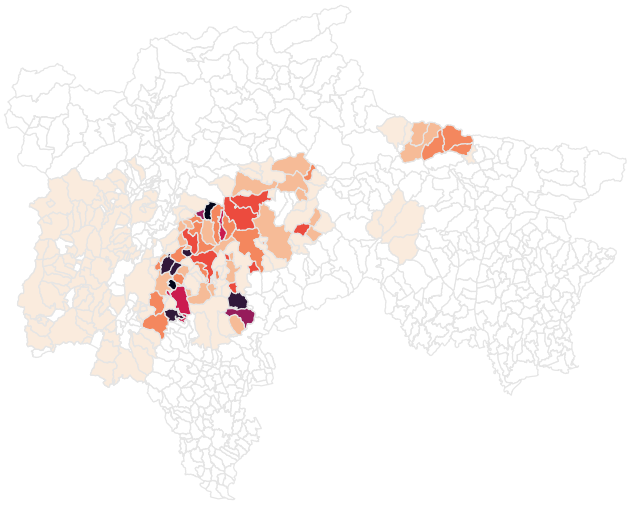

Figure 2: Tree damage in severely affected provinces.

Empirical Strategy

To identify the causal effect of exposure to the Vaia storm on electoral support for the local incumbent, we follow a difference-in-differences (DID) strategy. The underlying logic behind the research design is that we construct the counterfactual change in vote for the local incumbent between May 2014 and June 2019 for the municipalities that were affected by the Vaia storm by using the change in vote for the local incumbent in unaffected municipalities. In other words, we assume that had the affected province not been hit by the storm they would have experienced the same change in vote for the local incumbent as the unaffected municipalities. This strategy yields causal estimates so long as the parallel trend assumption holds. In the present context, this assumption implies that the vote share for the local incumbent would follow the same trajectory from May 2014 to June 2019 among treated

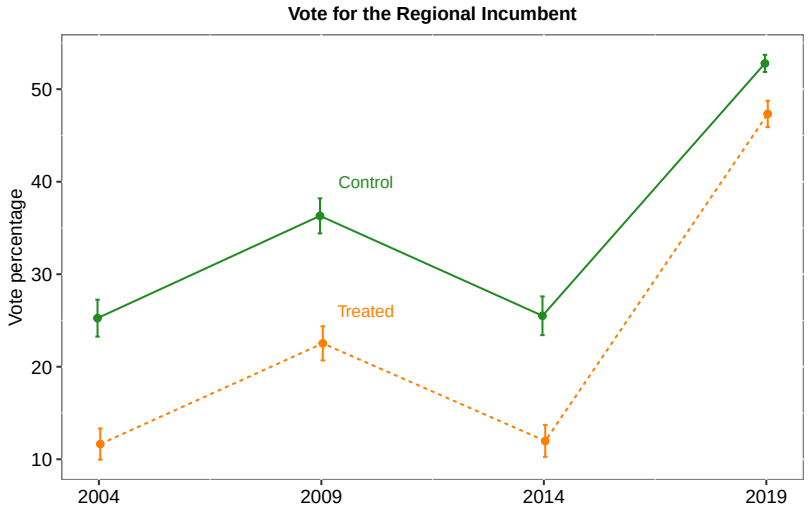

Figure 3: Parallel trends in vote for local incumbent.

and non treated municipalities in the absence of the Vaia storm.

To assess whether this assumption holds and evaluate the validity of the research design, we turn to past European elections, exploring whether the over-time trend in vote share for the local incumbent differs between treatment and control units. Figure 3 shows two lines, each representing the over-time change in the vote share for the local incumbent from the first 2004 election until the last election of 2019. The orange line denotes treated unit, and the green line denotes control units. Both groups travel in parallel until the 2014 election, with treated municipalities displaying a significantly lower vote share for the local incumbent than control municipalities. Vote share for the local incumbent increases in both treated and control municipalities after the Vaia storm, but too a much larger extent among the former ones. The figure strenghtens our confidence in the validity of the DID design.

To estimate the effect of the storm on municipal vote share for the local incumbent we use the following two-way fixed effects model:

$$v_{i,t} = \alpha + \beta t_{it} + \gamma_t + \phi_{p,t} + \mu_i + \varepsilon_i$$

where $v_{i,t}$ is vote share for the local incumbent in municipality i at time t, t_{it} is exposure to Vaia storm (measured as tree damage intensity or blackout duration), γ_t is election fixed effects (2004-09-14-19), $\phi_{p,t}$ is Province time

Table 1: Effect of Vaia on votes for the regional incumbent.

	Tree Damage			Blackout	
	Binary	Mean	Max	Binary	Mean
Damage	0.056^{***}	0.533^{***}	0.067^{***}	0.037^{**}	0.063^{+}
	(0.008)	(0.107)	(0.009)	(0.012)	(0.037)
Year FE	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes	Yes
Province Trends	Yes	Yes	Yes	Yes	Yes
N	2575	2575	2575	2575	2575
r2	0.85	0.85	0.85	0.85	0.85

Notes: $^{+}$ $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

trends, and μ_i is municipality fixed effects. We test the robustness of our results to selection into treatment, spatial spillovers, and the inclusion of moderately affected provinces. Finally, we replicate our analysis changing the dependent variable to focus on the vote share for pro-environment parties.

Results

Main Results

Table 1 presents the main results and shows that the Vaia storm increased electoral returns for local incumbents. Column 1 to 3 use tree damage as a treatment variable defined in three different forms: a binary variable taking value 1 if the municipality was affected by tree damage (Column 1), a continuous variable measuring the average damage intensity over the municipality area (Column 2), a continuous variable measuring the maximum damage intensity over the municipality area (Column 3). The three models consistently indicate that tree damage from the Vaia storm increased votes for the local incumbent. Column 4 and 5 use blackout duration as a treatment variable defined in two different forms: a binary variable taking value 1 if the municipality experienced a decrease in nightlight intensity (Column 4), and a continuous variable measuring variation the variation in nightlight intensity (Column 5). In line with results on tree damage, the columns 4 and 5 indicate that experiencing blackouts due to the Vaia storm increased

support for the local incumbent.

Robustness Tests

We test the robustness of our results addressing the two main threats to causal inference in the present context: selection into treatment and spatial spillovers. By selection into treatment, we mean the fact the storm did not hit municipalities within affected provinces at random. Figure 2 shows how the storm hit municipalities close to each other with very different intensities due to orographic features that are most likely unrelated to electoral behavior. But damages concentrated in an area within the affected provinces that is likely to have specific characteristics. This intuition is confirmed by Table A1, which shows that affected municipalities have lower average income, a smaller share of foreign population, smaller population size, larger surface covered by forest, higher altitude, and lower population density.

To address the possibility that these differences are driving our results, we recur to different techniques to weight our estimates on observable characteristics. We focus on the binary tree damage measure and calculate the sample's propensity score based on the covariates listed in Table A1. We use the score to implement Inverse Probability Weighting and increasingly restrictive versions of Nearest Neighbor Matching, introducing a caliper and reducing its radius (from 0.1 to 0.001). We impose common support on all estimates. We restrict matching to a single neighbor with no replacement. Table A2 shows how this exercise returns consistent results.

By spatial spillovers, we mean the fact that the storm may have indirectly affected voters living in control municipalities. To address this second issue, we replicate our estimates aggregating municipalities from the same Labor Market Area, defined by Eurostat on the basis of work commuting patterns. This strategy is particularly demanding for the data, because it severely reduces the number of units and reduces the precision of our measures. Nonetheless, Table A3 shows how the positive electoral returns for the local incumbent of exposure to the Vaia storm persist.

As a further additional tests, we replicate our results extending our analysis to provinces that were only moderately affected by the storm (Figure 4). A rather large area in the neighboring region Lombardia was only moderately affected by the Vaia storm. Given the moderate damage caused by the storm, we may expect that the storm had no electoral consequence.

Table 2: Effect of Vaia on votes for Green parties.

	Tree Damage			Blackout	
	Binary	Mean	Max	Binary	Mean
Damage	-0.003^{+}	-0.067	-0.005^{*}	-0.002	0.007
	(0.002)	(0.046)	(0.002)	(0.003)	(0.008)
Year FE	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes	Yes
Province Trends	Yes	Yes	Yes	Yes	Yes
N	1933	1933	1933	1933	1933
r2	0.61	0.61	0.61	0.61	0.61

Notes: $^{+}$ $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

The limited consequences of the storm are also evident in the absence of good quality data aimed at measuring its effect. Given that we lack data on damage intensity, we estimate the global effect of the storm over moderately and severely affected areas by relying on a binary indicator and on a continuous variable capturing the fraction of municipal area affected by tree damage. We also replicate our results on the effect of blackouts, which were concentrated in severely affected areas. The results reported in Table A5 are consistent with previous ones.

Results on Pro-Environment Parties

As a final step we evaluate how the Vaia storm affected electoral returns for parties that support pro-environment policies. In Table 2 we replicate results for our two-way fixed effect model of electoral returns by changing the dependent variable to the vote share for green parties. Unlike the main estimates, the model includes only three European elections because no green party run for the 2009 election. Green parties may not entirely capture pro-environment vote because of their rather marginal and discontinuous presence in the Italian party system. We assess another possible channel of pro-environment vote by looking at votes for the Five Star Movement, a party that has included environmentalism in its agenda since its conception. The model estimating the effect of the Vaia storm on vote share for the Five Star Movement includes the two elections in which the party ran (2014

Table 3: Effect of Vaia on votes for other pro-environment parties (Five Star Movement).

	Tree Damage			Blackout	
	Binary	Mean	Max	Binary	Mean
Damage	−0.002	-0.114^{+}	−0.002	−0.004	−0.010
	(0.005)	(0.059)	(0.006)	(0.003)	(0.011)
Year FE	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes	Yes
Province Trends	Yes	Yes	Yes	Yes	Yes
N	1933	1933	1933	1933	1933
r2	0.87	0.87	0.87	0.87	0.87

Notes: $^{+}$ $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

and 2019). Table 3 reports results for this second model. The two tables indicate that the Vaia storm did not increase votes for pro-environment parties supporting the idea that the disaster relief effect prevailed over the environmental concern one.

Conclusion

Natural disasters potentially attributable to climate change can be expected to awaken voters regarding the importance of adequate environmental policies, and therefore direct them to support parties with environmentalist platforms. Yet, natural disasters also provide the opportunity for local and national governments to display competence by providing relief, both in terms of management of the immediate emergency and in terms of economic compensation. In turn, competent management of disaster relief might increases support for incumbents, regardless of their programmatic platforms.

We define these two the *environmental concern* and the *disaster relief* effects. We explore the relative role these two might have played in voting behavior in the aftermath of the Vaia storm, an unprecedented windstorm that in the fall of 2018 destroyed a significant fraction of the forest cover in north-east Italy. We find that municipalities more affected by the disaster became more supportive of the incumbent parties at the regional level, the

radical right League in most of the affected areas, and the pro-autonomy SVP in the province of Bozen/Bolzano. A difference-in-difference identification strategy, and robustness checks using propensity scores based on observable features of the municipalities, warrant a causal interpretation of the estimates. On the other hand, we do not detect any increase in support for the two environmentalist options available to voters in the 2019 election we study: the Federation of the Green, and the Five Star Movement, a party that since its inception has incorporated environmentalist stances in its platform. Importantly, our analysis focuses on the European Parliament elections, which are not aimed at choosing the regional administration (that was directly in charge of disaster relief). We should then interpret the results as a consequence of the increased perceived general competence of the parties in control of subnational governments. To explore in more detail the mechanism linking the disaster to a popularity boost for the regional/provincial incumbents, and in particular how visibility and credit-claiming might explain the effect, we plan to augment the analysis with direct measures of credit-claiming by incumbent parties. In particular, the national leader of the League visited some of the affected areas in the immediate aftermath of the storm. Collecting data on the schedule of these appearances from the local media we might be able to explore the heterogeneity of the effect as a function of direct credit-claiming.

References

Achen, Christopher H, and Larry M Bartels. 2017. *Democracy for realists.* Princeton University Press.

Arceneaux, Kevin, and Robert M Stein. 2006. "Who is held responsible when disaster strikes? The attribution of responsibility for a natural disaster in an urban election." *Journal of Urban Affairs* 28 (1): 43–53.

Baccini, Leonardo, and Lucas Leemann. 2021. "Do natural disasters help the environment? How voters respond and what that means." *Political Science Research and Methods* 9 (3): 468–484.

Blankenship, Brian, Ryan Kennedy, Johannes Urpelainen, and Joonseok Yang. 2021. "Barking up the wrong tree: How political alignment shapes electoral backlash from natural disasters." *Comparative Political Studies* 54 (7): 1163–1196.

Cooperman, Alicia. 2021. "(Un) Natural Disasters: Electoral Cycles in Disaster Relief." *Comparative Political Studies,* 00104140211047410.

Dodlova, Marina, and Galina Zudenkova. 2021. "Incumbents' performance and political extremism." *Journal of Public Economics* 201:104473.

Egan, Patrick J, and Megan Mullin. 2012. "Turning personal experience into political attitudes: The effect of local weather on Americans' perceptions about global warming." *The Journal of Politics* 74 (3): 796–809.

Forchtner, Bernhard. 2019. "Climate change and the far right." *Wiley Interdisciplinary Reviews: Climate Change* 10 (5): e604.

Forzieri, Giovanni, Matteo Pecchi, Marco Girardello, Achille Mauri, Marcus Klaus, Christo Nikolov, Marius Rüetschi, Barry Gardiner, Julián Tomaštík, David Small, Constantin Nistor, Donatas Jonikavicius, Jonathan Spinoni, Luc Feyen, Francesca Giannetti, Rinaldo Comino, Alessandro Wolynski, Francesco Pirotti, Fabio Maistrelli, Ionut Savulescu, Stéphanie Wurpillot-Lucas, Stefan Karlsson, Karolina Zieba-Kulawik, Paulina Strejczek-Jazwinska, Martin Mokroš, Stefan Franz, Lukas Krejci, Ionel Haidu, Mats Nilsson, Piotr Wezyk, Filippo Catani, Yi-Ying Chen, Sebastiaan Luyssaert, Gherardo Chirici, Alessandro Cescatti, and Pieter S. A. Beck. 2020. "A Spatially Explicit Database of Wind Disturbances in European Forests over the Period 2000–2018." *Earth System Science Data* 12 (1): 257–276.

Gasper, John T, and Andrew Reeves. 2011. "Make it rain? Retrospection and the attentive electorate in the context of natural disasters." *American Journal of Political Science* 55 (2): 340–355.

Gemenis, Kostas, Alexia Katsanidou, and Sofia Vasilopoulou. 2012. "The politics of anti-environmentalism: positional issue framing by the European radical right."

Hazlett, Chad, and Matto Mildenberger. 2020. "Wildfire exposure increases pro-environment voting within democratic but not republican areas." *American Political Science Review* 114 (4): 1359–1365.

Healy, Andrew, and Neil Malhotra. 2010. "Random events, economic losses, and retrospective voting: Implications for democratic competence." *Quarterly Journal of Political Science* 5 (2): 193–208.

Hoffmann, Roman, Raya Muttarak, Jonas Peisker, and Piero Stanig. 2022. "Climate change experiences raise environmental concerns and promote Green voting." *Nature Climate Change* 12 (2): 148–155.

Jylhä, Kirsti M, and Kahl Hellmer. 2020. "Right-wing populism and climate change denial: The roles of exclusionary and anti-egalitarian preferences, conservative ideology, and antiestablishment attitudes." *Analyses of Social Issues and Public Policy* 20 (1): 315–335.

Jylhä, Kirsti M, Pontus Strimling, and Jens Rydgren. 2020. "Climate change denial among radical right-wing supporters." *Sustainability* 12 (23): 10226.

Krange, Olve, Bjørn P Kaltenborn, and Martin Hultman. 2019. "Cool dudes in Norway: climate change denial among conservative Norwegian men." *Environmental Sociology* 5 (1): 1–11.

Lockwood, Matthew. 2018. "Right-wing populism and the climate change agenda: exploring the linkages." *Environmental Politics* 27 (4): 712–732.

Masiero, Giuliano, and Michael Santarossa. 2021. "Natural disasters and electoral outcomes." *European Journal of Political Economy* 67:101983.

McCright, Aaron M, and Riley E Dunlap. 2011. "Cool dudes: The denial of climate change among conservative white males in the United States." *Global environmental change* 21 (4): 1163–1172.

Stout, Kevin R. 2018. "Weathering the storm: conditional effects of natural disasters on retrospective voting in gubernatorial elections—a replication and extension." *Research & Politics* 5 (4): 2053168018813766.

Udali, Alberto, Nicola Andrighetto, Stefano Grigolato, and Paola Gatto. 2021. "Economic impacts of forest storms—Taking stock of after-vaia situation of local roundwood markets in northeastern italy." *Forests* 12 (4): 414.

Appendix

Table A1: Differences in means (and relative standard deviation) of observable municipal characteristics.

	Control		Treatment		
	Mean	SD	Mean	SD	Diff
University Degree (%, 2011)	0.07	0.03	0.07	0.02	0.00
Average Income (2017)	19,262.26	2,466.04	18,356.91	1,892.91	905.35*
Below 15 Years Old (%, 2018)	0.13	0.00	0.13	0.00	0.00
Over 65 Years Old (%, 2018)	0.23	0.00	0.23	0.00	0.00
Foreigners (%, 2018)	0.06	0.03	0.05	0.03	0.01*
Population Size (2018)	5,154.54	9,948.96	2,861.89	9,516.42	2,292.65*
Forest (%, 2010)	0.42	0.28	0.64	0.14	-0.22*
Surface (Km2)	40.64	41.26	45.19	38.59	-4.55
Altitude (m)	712.58	642.58	1,339.99	397.89	-627.41*
Population Density	188.70	247.77	69.95	93.63	118.74*
N	484		166		

Notes: * $p < 0.05$.

Table A2: Effect of Vaia on vote for the incumbent adjusted on observable municipality characteristics.

	(1)	(2)	(3)	(4)
Damage	0.066***	0.079***	0.067***	0.069**
	(0.013)	(0.014)	(0.014)	(0.023)
Balancing Method	IPW	NNM	NNM	NNM
Caliper	-	-	0.10	0.001
Municipality FE	Yes	Yes	Yes	Yes
Province Trend	Yes	Yes	Yes	Yes
N	1547	1175	872	396
r2	0.84	0.83	0.84	0.83

Notes: Adjusted estimates using Inverse Probability Weighting (IPW) and Nearest Neighbor Matching (NNM). $^{+}$ $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table A3: Effect of Vaia on votes for the regional incumbent aggregating by Labor Market Area.

	Tree Damage			Blackout	
	Binary	Mean	Max	Binary	Mean
Damage	0.088*	3.076***	0.110*	0.278***	−0.000
	(0.043)	(0.871)	(0.044)	(0.024)	(0.003)
Year FE	Yes	Yes	Yes	Yes	Yes
LMA FE	Yes	Yes	Yes	Yes	Yes
Province Trends	No	No	No	No	No
N	208	208	208	208	208
r2	0.72	0.72	0.73	0.70	0.70

Notes: $^{+}$ $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

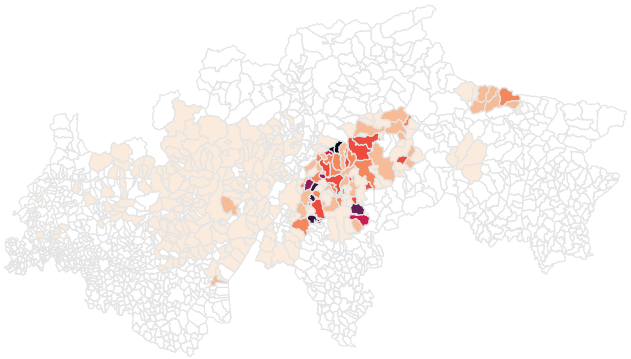

Figure 4: Tree damage in moderately and severely affected provinces.

Table A5: Effect of Vaia on vote for the incumbent including moderately affected provinces.

	Tree Damage		Blackout	
	Binary	Fraction	Binary	Mean
Damage	0.039***	0.549***	0.027*	0.024
	(0.007)	(0.097)	(0.013)	(0.035)
Year FE	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
Province Trends	Yes	Yes	Yes	Yes
N	4091	4091	4091	4091
r2	0.83	0.83	0.83	0.83

Notes: $^{+}$ $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.