

**Environmental attitudes, environmental problems and party choice. A large-N
comparative study**

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INTRODUCTION

The relationship between environmental attitudes and party choice is well documented. Scholars overwhelmingly agree that ‘greener’ voters tend to vote for ‘greener’ parties. The aim of this paper is to contribute to this literature in a nuanced way. It argues that the effect of environmental attitudes on party choice is moderated by *the severeness of environmental problems*. It is theorized that citizens with weak environmental attitudes, whose countries are exposed to natural disasters and air pollution vote in an increasingly pro-environmental way – much like their peers with strong environmentalist attitudes. Hence, the attitudinal differences between people does not translate into similar differences in ‘greener’ voting: the gap closes when environmental problems are present.

This study has three key features. First, comparative research on how environmental attitudes and the exposure to environmental problems interact in shaping vote choice has been scarce. Exposure does not only influence attitudes, as documented in the scholarship (among others Arp and Kenny 1996; Bassett, Jenkins-Smith, and Silva 1996; Elliott et al. 1993; Blake 2001), but it may also change how attitudes translate into the vote. The study underlines the importance of attitudes in pro-environmental voting, but at the same time reveals that *attitudes quickly lose their explanatory power as environmental conditions are changing for the worse*. Second,

relying on data from the World Values Survey (Inglehart et al. 2014) and the European Social Survey (Norwegian Centre for Research Data 2018), this paper performs a comparative analysis of party choice in 38 countries and 139 country-surveys from 1995 to 2016. So far, this is the largest sample on which the connection between environmental attitudes and pro-environmental voting have been investigated in the scholarship. Third, when exploring the effect of environmental attitudes on vote choice in *multi-party systems*, scholars tend to focus on green party success (for instance Carroll et al. 2009; Schumacher 2014; Patulny and Norris 2005). However, precisely because of their role in articulating the governments' environmental policies mainstream parties should not be excluded from such studies. In the analysis, all parties are placed on a scale of 'greenness' (see also Carter 2013), and the 'greenness' of party choice is regressed on voter attitudes and the country's exposure to environmental problems.

The 'greenness' of parties is assessed using data from the Comparative Manifesto Project (Volkens et al. 2019), while information on natural disasters is borrowed from the EM-DAT dataset (CRED / UCLouvain 2020). The results of the multilevel linear models suggest that, on the one hand, 'greener' voters choose parties with 'greener' party programmes. On the other hand, bad environmental conditions make people vote greener than it would be expected solely based on their environmental attitudes. Thus, the effect of environmental attitudes is dependent on exposure to environmental problems.

The study of the 'greenness' of electoral choice gains momentum in light of current environmental processes. Temperature and weather changes, extreme weather events, sea level rise, and natural disasters have overarching effects on food security, migration, and public health, to name a few. Empirics indicate that the number and severity of natural disasters rapidly increases (Joshi, Roberts, and Tryggvason 2019; Coronese et al. 2019). Additionally, and

relevant to this analysis, growing literature reports the adverse effects of air pollution on human health (Vohra et al. 2021; Wu et al. 2020; Li et al. 2021). The parties' decision to embrace the issue of the environment has consequences to climate change mitigation: research shows that the salience of the environmental issue in the government parties' agenda affects how well the country performs along a number of indicators. Knill et al. (2010) demonstrate that the number of environmental outputs increases if government parties adopt more environmentalist positions, and Jensen and Spoon (2011) find that countries where government parties give higher priority to the environment in their manifestos get closer to the Kyoto emission target. Evidence also supports that parliamentary green and left-libertarian party strength correlates with lower pollution levels (Neumayer 2003). Therefore, from the perspective of environment protection it is key that parties with coalition potential actively support this issue. Importantly, vote and office-seeking parties are more likely to take up issues that are salient to voters (Hobolt and Klemmensen 2008; Steenbergen, Edwards, and de Vries 2007). Hence, it is crucial that we understand how the voters' environmental attitudes translate into electoral choices, and what external factors influence the salience of these attitudes.

ENVIRONMENTAL ATTITUDES, ENVIRONMENTAL PROBLEMS, AND PARTY

CHOICE

Environmental Attitudes Explain Environmental Action and Party Choice

To fully understand environmental behaviour, besides the costs and benefits of pro-environmentalist action (Deacon and Shapiro 1975; Kahn and Matsusaka 1997; Kahn 2002; Sciarini, Bornstein, and Lanz 2007), one must take environmental attitudes into account. Research on the relationship between environmental attitudes and action is vast and primarily rest on single-case studies. For example, Kahn (2002) and Baldassare and Katz (1992) show

for the US that environmental concern affects both consumer choices (i.e. purchase of hybrid vehicles, commuting by public transport, consume less gasoline) and environmental practices (i.e. recycling, conserve water, limit their driving). Mapping wildlife preservation voting intentions in Colorado, US, Vaske and Donnelly (1999) demonstrate how value orientations are fully mediated by attitudes affecting behavioural intentions. The study of Butler and Francis (1997) find that environmental attitudes even explain apparel purchasing behaviour for women. Numerous other studies find a significant connection between environmental attitudes and various types of environmental behaviour in different countries and for different sub-populations (for example Scott and Willits 1994; D. S. Levine and Strube 2012; Holbert, Kwak, and Shah 2003; Blake 2001; Casaló and Escario 2018; Cottrell 2003). Often times, party choice is perceived as a form of environmental action where citizens vote for parties offering solutions to environmental problems. Many scholars report that ecological concern and attitudes directly impact green voting in a broad selection of locations such as California and Colorado (Gill, Crosby, and Taylor 1986), New Jersey (Rudman, McLean, and Bunzl 2013), Belgium (Boonen, Meeusen, and Quintelier 2014), New Zealand (Edwards and Lomax 2012), Australia (Gauja and Jackson 2016), and Germany (Rüdiger 2012), to name a few.

Environmental Problems Affect as a Moderator to Environmental Attitudes

Based on the evidence in the scholarship, this study departs from the strong correlation between ‘greener’ attitudes and ‘greener’ party support. At the same time, it argues that attitudes may not affect behaviour with the same magnitude across all geographical locations. This section theorizes how environmental problems *moderate* the effect of environmental attitudes on environmental action.

We already know a great deal about how exposure to environmental problems affect environmental action, and more particularly electoral behaviour. Most prominently, voters seem to react to how governments handle natural disaster relief. Voters rewarded incumbent parties following landslides in Colombia (Gallego 2018), after Hurricane Sandy in the US (Velez and Martin 2013), and after the 2002 Elbe flooding in Germany (Bechtel and Hainmueller 2011). Although Ramos and Sanz (2020) do not find evidence that wildfires in Spain affect incumbent party vote share on the national level, they demonstrate a positive effect at the local elections. At other instances citizens react to natural disasters by punishing government parties. The 1927 flood (Heersink, Peterson, and Jenkins 2017), tornadoes (Healy and Malhotra 2010) and severe weather damage in the US (Gasper and Reeves 2011), and catastrophic rainfalls in India (Cole, Healy, and Werker 2012) are all shown to have a negative impact on incumbent support.¹ These developments indicate that voters expect leadership at times of dramatic events (Baccini and Leemann 2021), and select parties that fulfil this expectation.

Extreme weather events and the overall quality of the environment also makes citizens reflect on their general health and safety. Research has demonstrated that the geographical proximity of the environmental problem makes people more concerned about the environment, but at least about that specific problem (Arp and Kenny 1996; Bassett, Jenkins-Smith, and Silva 1996; Elliott et al. 1993; Blake 2001). As demonstrated by Hazlett and Mildemberger (2020), wildfire exposure in California, US increases pro-environmental voting in the case of Democrats. Temperature extremes are also shown to increase climate concern (Brooks et al. 2014; Bergquist and Warshaw 2019; Hoffmann et al. 2022), while experiencing hazards increases

¹ Besides their effects on the vote, disasters affect election turnout (Fair et al. 2017; Chen 2013), and referendum votes (Baccini and Leemann 2021).

support for mitigation and adaptation policies (Spence et al. 2011; Demski et al. 2017). Furthermore, people are more willing to take action if environmental problems are perceived to affect their health and well-being (Baldassare and Katz 1992; Stern, Dietz, and Kalof 1993; Stern et al. 1995; Schultz et al. 2005). Indeed, environmental risk perceptions, such as the awareness of negative consequences to self, seem important in articulating citizen support to government measures to address climate change (O'Connor, Bard, and Fisher 1999). Similarly, if framed as a public health issue climate change mitigation policy action finds more support among Americans (Maibach et al. 2010), and elicits emotional reactions consistent with support for climate change mitigation (Myers et al. 2012).

At the same time, Bernauer and McGrath (2016) find that a simple reframing of the climate change issue (to, for instance, a health related issue) does not boost public support for climate policy. The reason for this, they argue, is that citizens are exposed to many competing frames about climate change, and thus come 'pre-treated' to the 'framing exercise'. Some individuals already have strong environmental attitudes, while others are not particularly interested in environmental issues. Supporting this argument are Howe and Leiserowitz (2013) and Myers et al. (2012), who demonstrate that the people's response to experiencing environmental problems depends on their pre-existing beliefs and identities. In other words, exposure to environmental problems and attitudes *interact* in generating a behavioural outcome. This study focuses particularly on how the effect of environmental attitudes is *moderated* by the severeness of environmental problems.

The starting point of the argument is that citizens with stronger environmental attitudes vote for greener parties. It follows that, in the unlikely case of no environmental problems, the difference between voters at the different levels of environmental concern is noticeable. Green voters vote

for greener parties, while others choose the less green. However, as suggested above, experiencing environmental problems, pushes everyone towards greener parties. But not everyone to the same extent. Supposedly, individuals with stronger attitudes are already choosing parties matching their level of environmental concern. Adding environmental problems to this equation cannot increase the greenness of party choice to a similarly large extent as in the case of weaker attitudes. However, citizens with no prior concern for the environment have more room to adjust: from parties with lower levels of greenness they can still upgrade to greener parties. Hence, the attitudinal differences between people will not translate into similar differences in voting when environmental problems are severe: the effect of environmental attitudes becomes smaller.

The above argument rest on the assumption that the salience of both environmental attitudes and environment problems in green voting remains the same over the different levels of both predictors. However, one may expect that with the increasing severeness of environmental problems the salience of the more general environmental concern decreases. So, if one is faced with more environmental problems, these environmental problems gain explanatory power on the account of environmental attitudes, which become less salient in explaining vote choice. While this study cannot answer the question which mechanism is stronger, and if the relative salience of attitudes and environmental problems change, they lead to similar outcomes and empirically appear as moderating effects.

To sum up, if people think or feel that environmental problems are relevant to them they pay more attention to such issues and act in an environment conscious manner. This is so regardless of their prior beliefs about environment protection and environmental attitudes. Therefore, it is to be expected that citizens who do not share environmental attitudes, but are exposed to the

negative consequences of a declining environment still act in a pro-environmental way – which in this case is voting for a ‘greener’ party.

Hypothesis: The effect of ‘green’ attitudes on the vote for a ‘greener’ party is smaller in the case of citizens exposed to environmental problems.

THE ‘GREENER’ VOTE

This study focuses on electoral choice as a form of environmental behaviour. Instead of distinguishing between parties on the basis of party ideology (i.e. Green and not Green) it places all parties on a scale of ‘greenness’, and interprets voting as a choice between the different *levels of green*. But what leads to the greening of mainstream parties?

The puzzle mainstream parties have to solve is that very commonly the green issue cuts across the traditional left-right partisan alignments (Knutsen 1988; Carter 2013). Therefore, adapting the green issue results in issue overlap between parties (Green and Hobolt 2008; Vliegenthart, Walgrave, and Meppelink 2011; Spoon, Hobolt, and Vries 2014). Small inter-party issue differences leads the issue to be de-emphasized, and loses its potential to structure votes (Guber 2001; Abou-Chadi 2016). On the other hand, sometimes the environmental issue is incorporated into the left-right ideological divide (Birch 2020; Farstad 2018). In such cases, it is picked up by parties according to their ideological profile. The evidence suggest that democrats, liberals, and left-wing politicians and citizens are more likely to recognise and support environmental action than republicans, conservatives and right-wingers (R. E. Dunlap, Xiao, and McCright 2001; Gromet, Kunreuther, and Larrick 2013; Cruz 2017; McCright, Dunlap, and Marquart-Pyatt 2016; Clayton 2018; Fobissie 2019; Coffey and Joseph 2013).

Evidently, sometimes niche party success triggers mainstream party policy shifts. Its magnitude depends on how much of a threat the greens pose to mainstream parties (Spoon, Hobolt, and Vries 2014; Meguid 2005; Abou-Chadi 2016). Parties are also more likely to emphasize issues that are salient to voters (Hobolt and Klemmensen 2008; Adams et al. 2006; Steenbergen, Edwards, and de Vries 2007) and which are likely vote winners (Adams et al. 2006; Ezrow 2007). As a consequence, parties vary in terms of how much emphasis they put on the issue of the environment.

DATA AND VARIABLES

The paper tests the effects of endogenous (i.e. environmental attitudes) and exogenous (i.e. environmental problems) variables and their interactions on party choice. To this end, individual level data is used from the *World Values Survey (WVS)*² (Inglehart et al. 2014) and the *European Social Survey (ESS)* (Norwegian Centre for Research Data 2018)³. Appendix 1 in the Supplementary Material list countries and country-surveys included into the analysis.

Dependent Variable – The Relative Greenness of Party Choice

The most straightforward candidate for dependent variable is the *Greenness* of the party choice. Taking into account the party the respondents voted for at the previous election (ESS), and the party respondents would choose at the next election (WVS), *Greenness* could be

² Downloaded file: WVS_Longitudinal_1981_2016_stata_v20180912.dta; Version website: <http://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp>

³ Downloaded file: ESS1-8e01.dta

operationalised as the percentage of the party's election manifesto with 'positive mentions about the protection of the environment'⁴ as coded in the Manifesto Project Dataset (MPDS)⁵ (Volkens et al. 2019). This approach, however, has several disadvantages. First, *Greenness* does not take into account that voters have to decide between parties with varying levels of greenness in the different countries. In other words, it neglects information on the greenness of the competition, disregards the complexity of voter choice, and makes country-comparison problematic. Second, the environmental issue became increasingly popular in party manifestos after the 1970-1980s. As a consequence, voters of earlier elections, could only vote for less green parties, while more recently, all voters vote for greener parties irrespective of their environmental attitudes. This falsely weakens the statistical relationship between environmental attitudes and the 'greener' vote. To make sure that the observed effects are not the products of the continuously increasing value of the DV, one has to factor out the effect of a temporal increase in salience. To remedy these problems, the variable *Relative Greenness* measures the greenness of a party relative to the average greenness of all the parties running at the particular election. *Relative Greenness* takes into account the greenness of the competition (i.e. is the party in question greener than other parties?) and flattens out the temporal tendencies in the salience of environmentalism in the manifestos.

$$Relative\ Greenness_{Partyij} = \frac{Greenness_{Partyij}}{\frac{\sum_{i=1}^n Greenness_{Partyij}}{n_j}},$$

where n is the number of competing parties at the election, i refers to the party at the respective election, and j denotes the election. As the dependent variable is related to party choice, only

⁴ The Reader can find the variable *Greenness* in the MPSD under variable name PER501 ('Positive mentions about the protection of the environment').

⁵ The analysis uses Version 2019a.

respondents who reported their party preference are included into the sample. Moreover, not all parties⁶ in the citizen survey are included in the MPDS. Voters of these parties are also dropped.⁷

But how much of party manifestos reach the average voter? We can realistically expect only a small number of voters actually reading party programs. Most citizens acquire information from other sources, most prominently the traditional and the social media (Helbling and Tresch 2011). Manifestos influence voter decisions to an extent to which manifesto content is translated to these alternative venues. Merz (2017) finds that in Germany mass media translates manifesto content rather well: there is ‘little to no systematic bias’ towards any type of party. A comparative study of Helbling and Tresch (2011) shows that regarding estimates of party positions media coverage data converges with manifesto and expert survey measures. Interestingly, they also show that public perceptions measured with national surveys correlate at a higher level with manifesto data than with media coverage. Schwarzbözl et al. (2020) demonstrate that issue salience of large parties translates to mass media quite accurately. For small parties, not so much as issue salience but issue ownership plays an important role in their media representation. These studies agree that there is a strong correlation between manifesto content and the information voters may acquire through various media sources. However, because manifesto content is not perfectly represented in the media, manifesto data remains only a proxy of how citizens might see parties.

⁶ Most commonly, the smallest parties are excluded.

⁷ For an assessment of potential bias caused by the exclusion of respondents without a party preference see the Supplementary Material. Furthermore, Appendix 5 of the Supplementary Material presents models with *Greenness* as a dependent variable (i.e. PER501 in the Manifesto Project Dataset). All conclusions of the analysis presented in the main text hold.

Independent Variables – Environmental Attitudes and Environmental Problems

This study tests the effect of two types of independent variables (IVs) on the relative greenness of party choice: (1) environmental attitudes, and (2) the country’s exposure to environmental problems. Survey items measuring environmental attitudes are listed in Table 1. Item #1 is a general statement of environmental concern, while Items #2 and #3 include the cost of environment protection. Whereas, in Item #2 environmental action may or may not affect the respondent's financial wellbeing, and the price of action is paid on the level of society, Item #3 refers to the direct cost of environmental action which the individual pays. Assuming that the willingness to pay the costs of environmental action resonates with stronger environmental attitudes, Item#1 is considered the weakest and #3 the strongest indicator of environmentalism.

Table 1. Survey items measuring environmental attitudes

Items	Values	Original item	Availability
Item #1 She strongly believes that people should care for nature. Looking after the environment is important to her	1 – Not like the respondent at all . . . 6 – Very much like the respondent	IMPENV	ESS 1-8
Item #2 Which of the following items is closer to your own point of view?	1 – Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs. 2 – Economic growth and creating jobs should be the top priority, even if	B008	WVS 3-6

the environment suffers to some extent

3 – Other answer (volunteered)

Item #3 I would agree to an increase	1 – Strongly disagree	B002	WVS 2-5
in taxes if the extra money were used	.		
to prevent environmental pollution	.		
	4 – Strongly agree		

Importantly, unlike many studies before, this paper does not focus on the effect of people’s risk perception, but, similar to Blake (2001) for instance, it uses objective measures to assess the effect of spatial variation in environmental problems. Two highly distinct variables were selected to measure environmental problems. If the hypothesis can be confirmed using two very different exposure variables, it is likely that the effect is similar in the case of a broader selection of environmental problems. First, *Disasters* counts the number of natural (climatological and meteorological) disasters in the respondent's country during the two years prior to the survey. The dataset includes the following disastrous events: droughts, floods, earthquakes, storms, extreme temperature, wildfires, landslides, insect infestations, volcanic activities and epidemics. While not all disasters are weather related, all require some sort of reflection to environment protection and relief. An event is classified as a disaster if at least one of the following criteria is met: 10 or more dead, 100 or more affected, state emergency declared or international assistance is called for. The data is borrowed from the EM-DAT dataset at the Centre for Research on the Epidemiology of Disasters, Université catholique de Louvain (CRED / UCLouvain 2020).⁸

⁸ <https://www.emdat.be/>; Date of access: 30 January 2020.

The second exposure variable is *air pollution*. It is widely recognized that long time exposure to small particles in the air poses a health risk. These particles are easily able to enter airways, affect the respiratory system, and can also trigger cardiovascular-related mortality (Pope et al. 2002). In fact, a recent study finds that deaths related to air pollution worldwide is about twice as frequent as prior studies suggested (Vohra et al. 2021). Exposure to airborne particulate matter less than 2.5 μm has been shown to increase the likelihood of female infertility (Li et al. 2021; Gaskins et al. 2019). Furthermore, air pollution reportedly affects one's physical (Mabahwi, Leh, and Omar 2014; Gu et al. 2015) and mental health (Signoretta, Buffel, and Bracke 2019), as well as reported subjective wellbeing (Laffan 2018; Wu et al. 2020; Zheng et al. 2019). Obviously, its effects are less conspicuous as those of natural disasters. At the same time air pollution affects a larger share of the population making people more aware of environmental problems. *Air Pollution* measures the population-weighted mean annual exposure to particles of matter with a diameter smaller than 2.5 micrometres (PM_{2.5}) (in micrograms per cubic metres)⁹, and is a country-year level measure.¹⁰

Both the number of disasters and air pollution show considerable country-year level variation. Interestingly, the relationship between the number of disasters and a country's development is not of high account. A high number of natural disasters (> 10) is found in Russia, Mexico, Turkey, Romania, but also in Canada, Germany, Spain, France, the UK, and Italy. These countries (with the exception of Romania and the UK) are amongst the largest countries in the sample indicating a statistical relationship between country size and the frequency of disasters. In the case of air pollution, almost none of the countries in the sample meets the WHO

⁹ For comparison, dust, pollen and mould are PM₁₀.

¹⁰ <https://ourworldindata.org/outdoor-air-pollution>; Date of access: 30 January 2020. The original version of the data is published by World Bank – World Development Indicators; <https://datacatalog.worldbank.org/dataset/world-development-indicators>

guidelines of less than the annual mean value of 10 micrograms per cubic meters¹¹. With an air pollution level above 20 micrograms per cubic meters (annual mean) we see countries of the former Eastern Bloc, such as Bulgaria, the Czech Republic, Hungary, Poland, Slovakia, Romania, Russia, Lithuania, Georgia, and the Ukraine. The data indicates high levels of air pollution also in South Korea, Turkey and Mexico. Unlike natural disasters, air pollution significantly correlates with the country's economic development, and geopolitical position, which will be taken into account in the models as follows.

Control Variables

First of all, citizens are most likely to vote green in advanced industrial societies, where economic prosperity and political development creates an opportunity for public concern to manifest in activism (Inglehart 1977; Dalton 2005; Dalton and Rohrschneider 2002; Frank, Hironaka, and Schofer 2000; Grant and Tilley 2019). Accordingly, the models control for *GDP Growth* (annual %), *Inequality* (GINI index) and *Unemployment* (% of total labour force).¹² GDP Growth is expected to positively affect the green vote, while negative effects are associated with larger inequality and larger unemployment. The inclusion of these variables is also expected to factor out development from the effect of air pollution on party choice. To account for the overall support of green parties in the society, two controls are introduced: *Green Party Available* is a dummy with '1' if there is a green party competing at

¹¹ [https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health); Date of access: 24 February 2021

¹² The source of all three variables is the World Bank – World Development Indicators. GDP per capita growth (annual %): <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG>
Income inequality GINI index: <https://data.worldbank.org/indicator/SI.POV.GINI>
Unemployment (% of total labour force): <https://data.worldbank.org/indicator/SL.UEM.TOTL.NE.ZS>

the election; and *Green Party Vote Share* which is the total vote share of the green parties¹³.

Green Party Vote Share is '0' if no green parties are available.

Even on a similar stage of economic development, individual factors markedly differentiate between voters. Green voters are primarily young, educated, live in urban areas, and are in good health (Schumacher 2014; Dolezal 2010; Dalton 2005; R. Dunlap and Mertig 1992; Dalton and Rohrschneider 2002). High income does not only make the green vote more likely (Dolezal 2010), but also the willingness to contribute to public goods such as the environment through taxation and supporting environmental projects (Sciarini, Bornstein, and Lanz 2007; Bornstein and Lanz 2008; Kahn 2002; Carlsson and Johansson-Stenman 2000). The models control for age (*Age*), the level of education (*Education*), individual income (*Income*), subjective general health (*Health*) and employment status (*Unemployed*). In the WVS, *Education* is measured as the age the respondents completed their education, and in the ESS, it shows the number of school-years completed. In each case, larger values represent more educated individuals. The variable *Health* is measured on a 5 point scale in both surveys. Larger values are associated with better subjective general health. The 1-10 (WVS) and 1-12 (ESS) income scales are ranked and standardized to range between 0 and 1, with larger values representing larger income.

The literature presents us with mixed results in the cases of marital status (*Married*), gender (*Gender*), and religiousness (*Religious*). Comparative studies have found that the voters of green parties are primarily female (Dolezal 2010), but this effect is not robust to all country cases and measures of environmental concern (Schumacher 2014; Carlsson and Johansson-Stenman 2000). Similarly, prior results on the effects of marital status and religion (Schumacher 2014; Dolezal 2010) should also be treated with careful consideration. In both datasets, *Married*

¹³ In some cases, multiple green parties compete at the same election.

is a dummy variable with '1' for married respondents. *Religious* in the WVS is a categorical variable distinguishing between 'religious', 'not religious' persons, and 'convinced atheists'. In the ESS, *Religious* is a scale variable running from 0 ('Not at all religious') to 10 ('Very religious'). To account for the respondents' general political views, the variable *Ideological Scale* is included into the models. The scale is standardized to range between 0 and 1, with 0 representing left.¹⁴

Limitations of the data

As in the case of most empirical studies with secondary analyses a few limitations arise from the available data. First, although a sizeable number of countries are included into the sample, Western type democracies are overrepresented. Additionally, no data was available for such important countries as the United States or China. Second, data availability restricts the list of survey items measuring environmental attitudes. There is not one question that is available to the whole sample, and there are a lot of questions only available for a few countries. Selecting the three questions for the analysis was the product of a trade-off: including questions that measure a broad spectrum of environmental attitudes, and at the same time, do not substantially restrict the sample size.

Thirdly, ideally, the exercise requires geo-coded data that connect citizen locations with the occurrence of natural disasters on the one hand, and air quality on the other. However, relying on available data would substantially restrict the number of countries as well as the number of respondents in the sample. Thus, while the argument of the paper rests on the proximity of environmental problems, empirically the analysis relies on country-level aggregate measures.

¹⁴ For technical details about the variables in the analysis, consult Appendix 2 in the Supplementary Material.

This discrepancy can compromise the validity of results. At the same time, there is evidence that environmental problems do not necessarily need to hit citizens directly to induce a behavioural outcome. Natural disasters are most commonly reported in the national (Sood, Stockdale, and Rogers 1987) and social media (Nagar, Seth, and Joshi 2012; Al-Saggaf and Simmons 2015). Therefore, citizens are likely to have a solid idea on how exposed their country is to environmental disasters. This is so irrespective of whether they were actually among the victims of the disaster. It is demonstrated that news outlets often frame disasters within a national solidaristic narrative (West and Smith 1997), while the frequent usage of hashtags in social media further bolsters national solidarity (see Finau et al. 2018). The media coverage of natural disasters has also been shown to have severe psychological effects on those not directly affected by the disaster (Pfefferbaum et al. 2014). The adverse psychological impact of ‘second hand’ exposure to events (Goodwin et al. 2013) is widely demonstrated in the psychology literature. Rodgers et al. (2012) show that an increasing number of non-Japanese participants report signs of eating disorder after exposure to television and internet coverage of the 2011 earthquake in Japan. Goodwin et al. (2013) demonstrate that the consumption of social media content about Hurricane Sandy in 2012 significantly increased anxiety among New York residents. Lau et al. (2006) find that being exposed to news reports about the 2004 tsunami in Hong Kong increased stress scores in the case of the studied Chinese adults. Interestingly, McLeish and Del Ben (2008) find no correlation between depression scores and the hurricane impact variables (i.e. how respondents were affected by the hurricane) after Hurricane Katrina in New Orleans, but they show that hurricane related news consumption significantly increased depression scores. Further research (M. Levine and Thompson 2004) highlights the role of identity (i.e. British and European) in post-disaster helping behaviour as opposed to geographical proximity. Maki et al. (2019) also argue that a common national identity is a key motivator to take action related to disaster relief. Furthermore, the literature on sociotropic

voting presents us with evidence that voters take macro-level economic conditions into account (for instance Kramer 1971; Kiewiet and Lewis-Beck 2011; Lewis-Beck and Stegmaier 2008). Thus, there is good reason to believe that other contextual variables (here environmental problems) also shape electoral decisions. While the available data may not seem ideal for the analysis, it can still provide us with relevant insight into the relationship between environmental attitudes, environmental problems and party choice.¹⁵

Last, but not least, this study looks at only two measures of environmental problems: the number of natural disasters and the level of air pollution in the respondents' country. It is possible that the selection of these variables affect the conclusions of the analysis. Selecting other types of environmental problems, such as water and soil pollution, loss of biodiversity, deforestation, ozone layer depletion or acid rain, may yield different results in terms of the way environmental attitudes translate into party choice. Strengthening the results of this study is the fact, however, that the two types of environmental problems are very different: if the analysis leads to similar conclusions for the selected environmental problems, they are likely to reflect general tendencies instead of patterns valid for only one specific environmental problem.

ANALYSIS

Random intercept multilevel linear regression models with country-year as level-2 test the hypothesis of the paper. Likelihood-ratio tests suggest that the multilevel linear model is superior to the simple linear model. The Intraclass Correlation Coefficient (ICC) ranges from 0.109 through 0.21 across all models, indicating that some of the variation in the DV is

¹⁵ The robustness check presented in Appendix 7 confirms that taking country size into account along with the country-level disaster measure does not change the conclusions of the study.

explained by the clustering in the data, but the overwhelming share is observed on the individual level. Based on the low values of the Variance Inflation Factor (VIF), multicollinearity is not cause for concern (avg. VIF = 1.39). Tables 2 and 3 summarize the relevant results of the nine models. Models 1, 2 and 3 test the effect of environmental attitudes as operationalised by the three survey items. Models 4, 5 and 6 include the interaction of environmental attitudes and the number of disasters, while Models 7, 8 and 9 control for the interaction of attitudes and air pollution¹⁶.

Table 2 Multilevel linear models explaining the relative ‘greenness’ of the vote

	Model 1	Model 2	Model 3
Item #1 (The importance of the environment)	0.039* (0.002)		
Item #2: Pro-environment ^a		0.075* (0.009)	
Other answer ^a		0.014* (0.024)	
Item #3 (Willingness to pay taxes)			0.043* (0.007)
Controls	Included	Included	Included
N	88245	18242	9204

* p < 0.05

Entries are linear regression coefficients. Robust standard errors in parentheses are clustered by country-year.

Models 1: ESS, Models 2, 3: WVS

^a Control category: Pro-economy

Results of Table 2 confirm the departing point of the study: respondents with stronger environmental attitudes vote for ‘greener’ parties. One unit increase in Item #1 increases the value of *Relative Greenness* by 0.04. Increasing the importance of the environment from its minimum value (1) to the maximum (6), we obtain a growth of 0.2 (from 0.708 to 0.907) in *Relative Greenness*. As to Item #2 (i.e. environment vs. economic growth), those who think that protecting the environment should be given priority choose parties with an average of 0.898 on the *Relative Greenness* scale, while those who consider economic growth more important vote for parties with a value of 0.822. And finally, respondents who are absolutely willing to

¹⁶ For full model results see Appendix 3 in the Supplementary Material.

pay taxes to protect the environment vote for parties with an average score of 0.884 (Item #3). As a comparison, citizens who do not report willingness to pay taxes go with parties scoring 0.755 on average. Now, at first sight the estimated effects of environmentalism do not appear too massive. However, looking at the distributional features of *Relative Greenness*, a different picture emerges. Everything else fixed at their mean values environmental attitudes always push the value of the dependent variable over its median¹⁷ and mean¹⁸. Citizens with environmental attitudes vote for parties that achieve an above-average level of greenness, while parties supported by citizens with no such (or weaker) attitudes stay below average. Standardized coefficients further reveal that only education (0.064¹⁹) and ideological orientation (-0.092) have slightly stronger effects on the greenness of the party choice than environmental attitudes (0.055). Attitudes are, thus, considered as important building blocks of a greener vote.

To test the main hypothesis of the paper, namely that of the moderating effect of a country's exposure to environmental problems, Models 4 to 9 include the number of disasters and air pollution as independent variables in interaction with the three types of environmental attitude variables. Table 3 shows the relevant coefficients of the multilevel linear models explaining the relative 'greenness' of the vote.

Table 3 Multilevel linear models explaining the relative 'greenness' of the vote

	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
<i>Exposure</i>						
Disasters	0.011 (0.009)	0.016 (0.013)	0.030* (0.012)			
Air pollution				0.017* (0.006)	0.017 (0.010)	0.019 (0.014)
<i>Environmental attitudes</i>						

¹⁷ Model 1: 0.738; Model 2: 0.836; Model 3: 0.633. The differences in descriptive statistics is the product of varying data availability in the different models.

¹⁸ Model 1: 0.857; Model 2: 0.857; Model 3: 0.845.

¹⁹ Standardized coefficients from Model 1 are reported in the text.

Item #1 (The importance of the environment)	0.044* (0.003)			0.068* (0.005)		
Item #2: Pro-environment ^a		0.109* (0.013)			0.176* (0.019)	
Other answer ^a		-0.002 (0.037)			-0.004 (0.057)	
Item #3 (Willingness to pay taxes)			0.061* (0.011)			0.101* (0.015)
<i>Interactions</i>						
Disasters × Item #1	-0.001* (0.001)					
Disasters × Item #2: Pro-environment		-0.004* (0.001)				
Disasters × Item #2: Other answer		0.001 (0.003)				
Disasters × Item #3			-0.002* (0.001)			
Air pollution × Item #1				-0.002* (0.000)		
Air pollution × Item #2: Pro-environment					-0.006* (0.001)	
Air pollution × Item #2: Other answer					0.001 (0.003)	
Air pollution × Item #3						-0.004* (0.000)
Controls	Included	Included	Included	Included	Included	Included
N	88245	18242	9204	88245	18242	9204

* p < 0.05

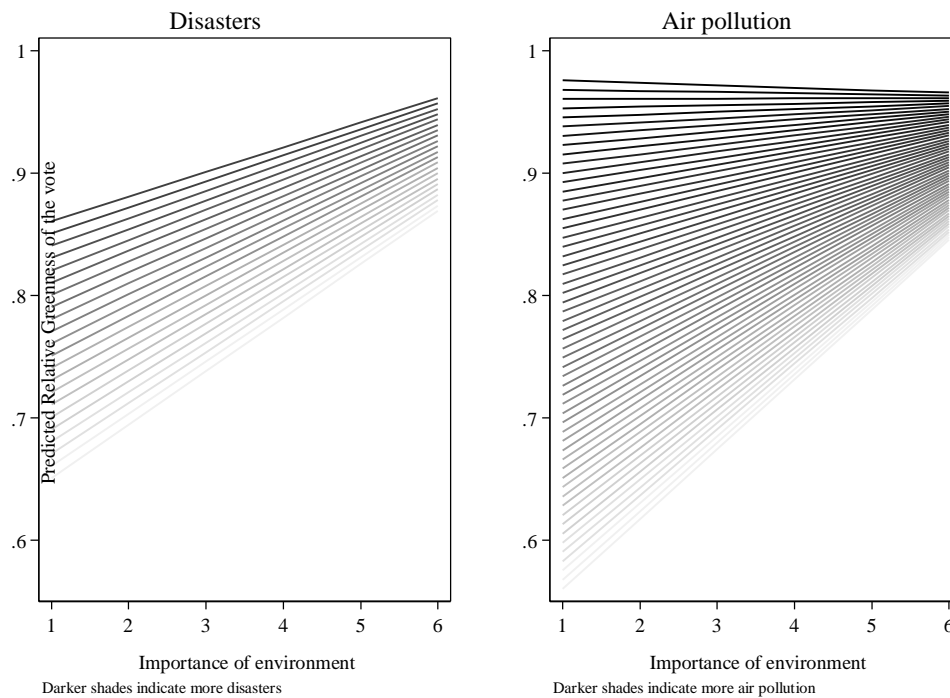
Entries are maximum likelihood coefficients. Standard errors are robust and are clustered by country-survey.

Models 4, 7 ESS, Models 5, 6, 8, 9: WVS

^a Control category: Pro-economy

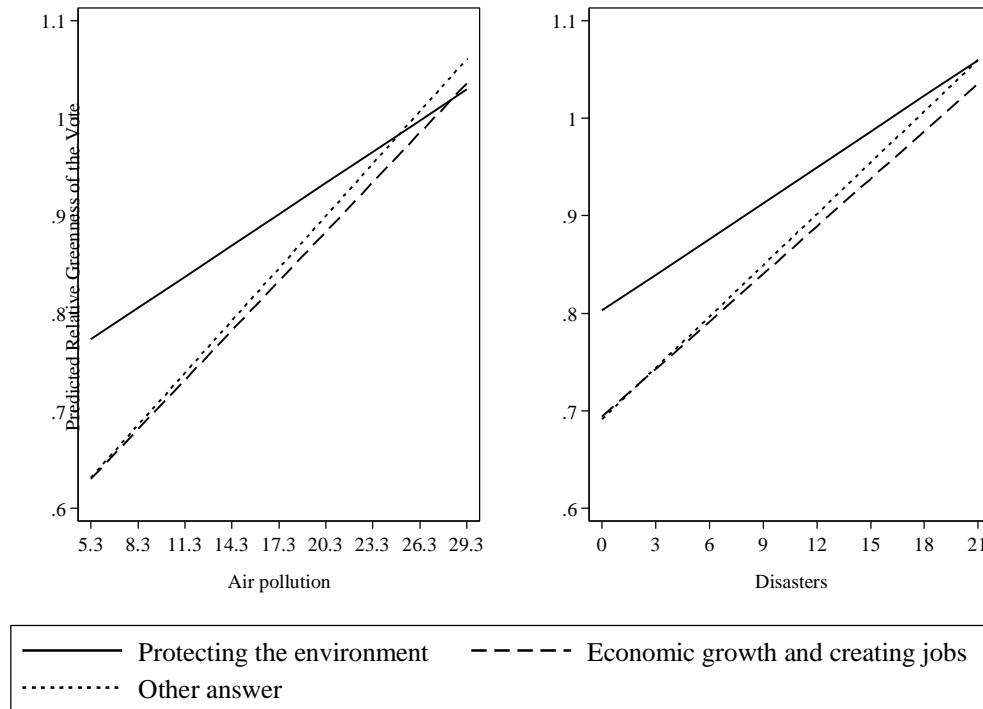
In all six models, the number of disasters and air pollution significantly decreases the effects of environmental attitudes. In other words, the difference between environmentalists and those with neutral positions decreases as disasters become more frequent and air pollution increases. Bad conditions make people vote greener than it would be expected solely based on their environmental attitudes. Figure 1 visualizes this tendency in the case of the importance of the environment (Item #1) variable. The lightest shade represents the effect of the environmental attitude in the case of the smallest exposure to environmental problems in the sample. The darker the lines the greater the exposure. As lines are getting darker the slopes are decreasing, which indicates a diminishing effect of attitudes on party greenness.

Figure 1 The predicted relative greenness of the vote across the different values of environmental attitudes and exposure to disasters and air pollution



The analysis of the effect of willingness to pay extra taxes (i.e. Item #3) and exposure reveal similar relationships, and hence their visualizations are not reported here. While these two items measure the level of agreement with a statement, Item #2 captures a choice between environment protection and economic growth. Figure 2 shows how the interaction between exposure and Item #2 affects the greenness of the vote. In the cases of limited or no exposure to disasters and air pollution we find a significant difference between pro-environment and pro-economy respondents, with the former voting for greener parties. As exposure increases, the distance between the two groups narrows, and eventually disappears. Importantly, even pro-economy respondents tend to choose greener parties if they are exposed to environmental problems.

Figure 2 The predicted relative greenness of the vote across the different values of environmental attitudes and exposure to air pollution and disasters



Apart from testing the hypothesis of the paper, the models are eligible to report on the effects of the ‘usual suspects’ of the scholarship. Across all models the effects of *Age*, *Education*, *Unemployed*, *Income* and *Ideology* were found significant. According to the results, age negatively affects the greenness of the vote. Education has a positive effect: more educated people are voting for ‘greener’ parties. The effect of individual unemployment is no surprise either: unemployed citizens are less willing to cast a ‘greener’ vote. With regard to income, a consistently negative coefficient reveals that people with larger income tend to vote less green. This contradicts the popular notion that wealthier people are more concerned about the environment. The effect of political ideology is consistent with the literature: left-wingers vote greener than citizens on the right. In the largest sample (ESS), women are found ‘greener’ than men, and religiousness has a negative effect on the greenness of the vote. Curiously, variables measuring the economic development of the countries have no effect on the vote. This confirms that citizens of less developed countries also find value in voting green (Dalton 2005). And last

but not least, all conclusions of this study remain robust to including country fixed-effects into the models.²⁰

CONCLUSIONS

This paper asked the question how much environmental attitudes translate into the greenness of party choice across varying levels of environmental problems. The greenness of party choice is operationalised as the share of environmental policy in the parties' election manifestos. Voting for greener parties is especially important for environmental protection because greener votes are the keys to national, and eventually, global action mitigating the effects of environmental degradation. It was tested if exposure to environmental problems moderates the effect of attitudes on the greenness of the vote. The analysis relied on the European Social Survey, the World Values Survey, the Manifesto Project Database, the EM-DAT dataset, as well as World Bank data, and covers 139 surveys in 38 countries between 1995 and 2016.

Multilevel linear regressions reveal that, 'greener' voters, as operationalised by three different survey items, chose 'greener' parties as expected. The effect is quite meaningful, and robust for a number of model specifications. Furthermore, it appears that voters detect the green issue in the parties' programmes and campaign messages, are able compare parties in terms of their 'greenness', and chose parties so that it is alignment with their environmental attitudes.

At the same time, environmental problems change how these attitudes translate into the vote. Exposure to environmental problems (measured with air pollution and the incidence of natural disasters) decreases the effect of attitudes, by significantly increasing the green vote cast by

²⁰ See Appendix 4 in the Supplementary Material.

citizens not particularly concerned with the environment. It seems that non-environmental attitudes are substituted by environmental problems in increasing the greenness of the vote. When people meet bad environmental conditions, they are more willing to take environmental action irrespective of their attitudes towards environment protection. In other words, attitudes matter the most when environmental conditions are good. Under worsening conditions, the support for greener parties increases irrespective of the voters' attitudes. This foreshadows an increasing overall emphasis on environmental issues in national party politics as more and more countries are forced to face the consequences of a degrading environment.

While the overall robustness of the models is confirmed by the analysis future research should address the reported problems with the data: the empirical exercise should be repeated with a different set of countries and environmental attitudes, using a sample with geo-coded data connecting respondents directly to environmental problems, and look at how voters react to various other types of environmental issues. The hypotheses of the study could also be further developed to reveal a more nuanced relationship between key variables. The current article focused on the *moderating* effect of environmental problems. However, there is good reason to believe that environmental problems also have a *mediating* effect on party choice through influencing environmental attitudes. A larger sample of countries would enable researchers to test both the moderating and mediating effects simultaneously, which would likely result in a fuller picture of explaining the relationship between environmental problems and greener voting.

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