ERASMUS UNIVERSITY ROTTERDAM
ERASMUS SCHOOL OF ECONOMICS
MSc Economics & Business
Master Specialisation Economics of Markets and Organisations

Exposure to environmental disasters in early adulthood shape the environmental attitude

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Finish date: August 2020

PREFACE AND ACKNOWLEDGEMENTS

During the writing of this paper I have learned to use all my gathered knowledge and skills from the ESE bachelor and master program and apply it to finish a final project for my academic journey. It was interesting and fun to write about a subject that was slightly different from the typical economic projects. I want to thank my supervisor prof. dr. Dur for helping me with this final project. I really appreciate the fast feedback on my project and the brainstorming to come up with ideas and theories. I think this helped me improve my final thesis and led to a final version that I am proud of. I also want to thank my roommates and some fellow students that have helped me through brainstorms and discussions to improve this final project. At last, I want to thank the Erasmus University for the access to all necessary databases and literature.

ABSTRACT

The experiences during the impressionable years, between age 18 and 25, are important in shaping attitudes, values, and even political behaviour. This paper studies the exposure to environmental disasters during these impressionable years and the impact it has on the attitude towards the environment and on the voting behaviour. 11 environmental disasters with significant damage and media exposure are used to test the impressionable years hypothesis for European countries. When exposed to environmental disasters during the impressionable years, individuals have a more caring attitude towards the environment and vote more often for green parties. This shaped attitude and voting behaviour persists during the rest of their life.

Keywords: impressionable years hypothesis, environmental disaster, attitude, voting behaviour
JEL classifications: D72, N5, Q5

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CHAPTER 1 INTRODUCTION

Environmental concerns are rising globally in the last few years (Lampert et al., 2019). Children and young adults have been protesting worldwide to raise awareness of the global warming and the climate change (New York Times, 2019). Global warming is not the only concern, since technological and natural hazards also have a big impact on the environment. Figure 1 and Figure 2 illustrate that both type of disasters have been increasing since the last century. However, the concern for the future of the environment and the harm of environmental disasters is not new. Brundtland (1987) already published a report where he states that we need to act now against environmental disasters and look at the future of the environment. The attitude of every individual towards nature and the environment is key in preserving the planet for the future. An example of a recent attitude change are the investment choices on the financial market. Investors are now incorporating the environment as one of the criteria when they are investing (Busch et al., 2016), and 'green' investment funds such as mutual funds have been increasing in the last decades (Munoz et al., 2014).

According to the media and recent protests, the youth and adolescent are concerned and care the most about the future of the environment (New York Times, 2019). A survey in the UK shows that almost half of the 18- to 24-year-olds place the concerns about environmental issues in the top three, compared to only 27% of the general population (The Guardian, 2019). However, Wray-Lake, Flanagan and Osgood (2010) show that the environmental concerns of the youth did not increase over the years and is even declining. Whether this finding still holds for the present is still the question. An explanation could be that certain generations have different attitudes towards the environment. It is already established in the previous literature that there is a generation gap that represents different values and preferences across generations (e.g. Payne et al., 1973), which may vary based on previous shared experiences (Jaeger, 1985). This concept is known as the impressionable years hypothesis in the literature. Evidence for the impressionable years hypothesis is mostly found for different political attitudes

(Osborne et al., 2011) and for different values and preferences based on different macroeconomic experiences (Giuliano and Spilimbergo, 2014). However, the link between the differences in the environmental preferences and attitudes, and the impressionable years hypothesis is still unexplored in the literature. To contribute to the existing literature of the impressionable years hypothesis, this paper will explore the differences in the environmental attitude and test if these are influenced by large shared historic events, specifically environmental disasters. Previous literature shows that environmental disasters can directly lead to an attitude change and policy shift (Parrado, 2018; Birkland, 1998). But the long-term effects of an environmental disaster on the attitude is still a gap in the literature, which will be examined in this paper with the test of the impressionable years hypothesis.

The research question of this paper is the following: *How do shared experiences of environmental disasters during young adulthood influence the attitude towards the environment and voting behaviour?*

The essential hypothesis that will be tested to answer the research question is the impressionable years hypothesis. The hypothesis is tested with survey data from the European Social Survey, that carried out 9 different survey rounds from 2002 to 2018. A wide variety of European countries is covered in the 9 survey rounds. The 11 environmental disasters that are selected for this paper are based on the list of Hernan (2010), with some alterations based on the criteria of damage and media exposure specific to Europe. According to psychologists, individuals are most impressionable during their early adulthood, so the age range 18-25 is used to test the impressionable years hypothesis. Next, it is classified whether individuals experienced an environmental disaster during the age 18-25. OLS and logit regressions are estimated to test the effect of the exposure during the impressionable years, 18-25, on the environmental attitude and the voting behaviour. The voting behaviour illustrates whether an individual has voted for a green party, which is a valuable addition to the analysis because it

shows whether the self-reported environmental attitude is actually the underlying preference of the individuals.

The results of this paper show that individuals that have experienced environmental disasters during their impressionable years care more about the environment and vote more often on a green party. The voting behaviour results are robust when the most preferred party is used as a dependent variable instead of the party they voted for. The results also indicate that there is a threshold for the impressionable years effect. Most regressions only show a significant effect on the attitude or voting behaviour when the respondent has experienced at least two disasters.

Next, this paper provides evidence for a significant effect for other life stages beside age 18-25. The experiences during life stage 0-9 even show a significantly higher effect on the attitude and voting behaviour compared to the life stage 18-25. Overall, it seems that the life stages before age 34 are the most relevant in shaping the attitude and voting behaviour for the later life stages. The effect persists over the later life stages and even hints to an increase in the life stage 51-75. At last, an analysis of the effect of the environmental disasters individually shows a significant difference between the disasters. Experiencing the Torrey Canyon oil disaster, the Seveso disaster or the Bhopal gas leak shows a consistent and positive effect on the attitude and voting behaviour of the respondents. On the contrary, disaster that happened outside Europe mostly show an insignificant effect on either the attitude or voting behaviour. The last finding of this paper shows that the Western European region has a significant positive effect on the attitude and voting behaviour, while the Eastern Europe region reports an insignificant effect.

This paper is organized as follows. In section 2 the previous literature is discussed to place the research of this paper in context. Section 3 explains the data that is used in this paper and shows the descriptive statistics of the sample. Next, section 4 shows the methodology and the

corresponding key equations to test the impressionable years hypothesis. Section 5 presents the results and section 6 provides a conclusion and discussion.

CHAPTER 2 LITERATURE

2.1 Type of disaster

The International Federation of the Red Cross defines a disaster as: “a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community’s or society’s ability to cope using its own resources”. Of course, not every disaster is the same, so previous literature has identified different types and causes of disasters. The first cause of a disaster are natural hazards (Torry et al, 1979; Shaluf, 2007). Natural hazards can be classified in four different categories (Shaluf 2007). Natural phenomena beneath the earth surface[1], topographical phenomena[2], meteorological phenomena[3] and biological phenomena[4]. These natural hazards are purely caused by nature and are not caused by human decisions or actions.

Since the 20th century a new cause of disasters is emerged, originating from the technological development (Erikson, 1994). The second cause of disasters is based on social, technological, or organisational factors (Dunlap and Catton, 1979). These disasters are also called man-made disasters since these result from human decision making. Richardson (1994) divides the cause of man-made disasters in four different categories. Plant or factory failures, transport failures, public place failures and production failures. Some examples are oil spills, nuclear meltdowns, and chemical pollution. These natural hazards are purely caused by man-made actions or decisions and man-made structures.

Both causes, natural and human, are increasing worldwide since the 1970s, see Figure 1. The same applies for Europe in specific, see Figure 2. The reason for this is the growth of

[1] Earthquakes, tsunamis and volcanic eruptions
[2] Landslides and avalanches.
[3] Tornados, floods, drought and heat waves.
[4] Epidemics and infestations

technological development over the last 50 years, which increases technological accidents, but also leads to global warming, which increases natural disasters. The last cause category is a hybrid cause which is based on nature and human error combined (Shaluf, 2007). An example of this is cutting down forests, that cause landslides in times of heavy rain.

Next to different causes, disasters can also have different consequences. A disaster can have an economic and social impact, such as damages to houses, injuries or even death in some cases. The other consequence is the impact on the environment, for example oil spills have a long-term impact on the aquatic ecosystem (Kingston, 2002). This paper focuses on the man-made disaster that have an impact on the environment, which will be referred to as environmental disasters in the rest of the paper. The reason for choosing environmental disasters is because big environmental disasters receive a lot of media attention which leads often to policy changes (Birkland, 1988), and people often remember large historic events for the rest of their life (Mannheim, 1952). This is discussed in more detail in the next two chapters of the literature section.

2.2 Consequences of environmental disasters

As mentioned, environmental disasters are harmful for the environment. This can be in various ways, such as polluting the aquatic ecosystems, as a consequence of oil spills, or polluting an entire region with nuclear radiation, Chernobyl 1986, or poisonous gas, Bhopal 1984. An environmental disaster can affect the environment of multiple countries at once[5], and can harm the environment in the short-term and long-term. In the short-term animals and vegetation are directly affected and potentially killed by toxic waste or pollution. In the long term, environmental disasters can disrupt the entire aquatic ecosystem (Kingston, 2002), or in the case of nuclear radiation, the radiation is still present after decades and continues to affect animals and vegetation.

[5] Directorate-General for European Civil Protection and Humanitarian Aid Operations (ECHO) (European Commission), 2017

Environmental disasters also have indirect consequences for the society. Kuran and Sunstein (1999) mention that any mass upheaval event, such as the toxic waste dump at Love Canal, can trigger new regulations and policies. This can happen via the availability cascades, that work like a snowball effect fuelled by the media. The media provides footage of an environmental disaster, which is further spread through social media by people. The footage influences opinions and beliefs of more and more people, just like a snowball effect, and finally causes an uprising that leads to new regulations. So, the media can shift the attention of people to a certain disaster or crisis. This can consequently put the focus on an issue that people had not considered at first (Kurtz, 2004), or it can show them that the risk for their personal safety is higher than they initially thought (Viscusi and Zeckenhauser, 2006). An example of this is presented in Goebel et al. (2015), who measured an increase in environmental concerns in Germany after the Fukushima disaster, which is most likely induced by an increase in perceived risk and fear of a similar nuclear disaster in one of the nuclear plants in Germany itself. This illustrates that an environmental disaster overseas can influence the attitudes of residents and even domestic policies. Media coverage of a disaster or shock is key, since recent literature has established that the media can affect a lot of outcomes. For example, the media can affect social outcomes (Kearney and Levine, 2015), economic outcomes, and political outcomes (Stromberg, 2004). However, Kahn (2007) reports a counterintuitive finding, namely congressional representatives decrease their pro-environment voting propensity after an environmental disaster. This could be explained with the fact that after an environmental disaster, the proposed legislation is more likely to originate from the “greener” representatives that want a stringent regulation. So, the results of Kahn (2007) needs to be interpreted with caution, and do not necessarily provide evidence against the fact that disasters can change political outcomes.

Another consequence of environmental disasters is the reputation of the cause of the disaster. Namely after the nuclear disaster of Chernobyl (1986), the nuclear power effort was

discouraged, and the reputation of nuclear power decreased worldwide. Another example is the oil spill in Alaska (1989), caused by Exxon Valdez, which led to a boycott of the retail outlets of Exxon and harmed their reputation (Shabecof, 1989). The reputation of a firm can also be harmed when they violate environmental regulations, even if this did not lead to an environmental disaster. Companies that violated environmental regulations are penalised not just with a fine, but with a decrease in their reputation that leads to a loss in share value (Karpoff et al., 2005). However, the environmental reputation of a firm is not only influenced by its actions or violations, but also by its statements and disclosures. Cho et al. (2014) and Brown et al. (2009) show that environmental disclosure is positively associated with the reputation of a firm, while their actual environmental performance maybe totally different from their disclosure. Companies that have a poor environmental performance mediate the negative effect on the reputation with positive environmental disclosure (Cho et al., 2014). A potential reason for this is that companies widely advertise their environmental disclosure, while their environmental performance maybe lack news coverage. This illustrates again the important role of the media, and how it can influence the opinion of a large portion of the society.

2.3 Impressionable years

Mannheim (1952) was one of the first to write about the fact that people are influenced by notable historic events during their youth. He mentions that certain events can influence and shape entire generations. This concept is now known as the impressionable years hypothesis, and states that social interactions and events that individuals experience during their early adulthood, shape the values and attitudes for the rest of their life (Krosnick and Alwin, 1989). The theory behind the impressionable years hypothesis implies that young adults are more open to change their attitudes, and young adults come more in contact with attitude changing experiences than older adults because of their lifestyle (Tyler and Schuller, 1991). The impressionable years are the most important years, since it is a critical period for the collective memory of people (Schuman and Rodgers, 2004). The events that have happened during the impressionable years leave a permanent marker and overshadow events that people

experience later in life. Also, with age people establish their own social environment with others that share their attitudes and values, while young adults are still confronted with people that have opposing views or attitudes (Newcomb et al., 1967).

Most research on the impressionable years hypothesis has been done using U.S. data and shows that during the impressionable years, the political attitude is influenced by a variety of environmental influences and is shaped for the rest of people's lives (Sears and Levy, 2003; Hatemi et al., 2009; Osborne et al., 2011). Similar findings are reported for Germany (Laudenbach et al., 2019), where the preferences for communism is influenced by the experiences of communist system, and the United Kingdom (Tilley, 2002), where the first electorate experience leads to more or less conservative preference. For developing countries, specifically Algeria, the evidence is mixed and shows that some historical periods shape political attitudes more than others (Tessler et al., 2004). The papers on the political attitude show that the attitude of people is influenced by their social environment and by the political system in place at the time of the impressionable years. However, Giuliano and Spilimbergo (2014) show that the political preferences can also be influenced by large macroeconomic shocks, such as recessions. Besides the influence on political preferences, Giuliano and Spilimbergo (2014) show that the experiences of the impressionable years also influence the support for government redistribution.

There is more evidence for the impressionable years hypothesis in other fields besides political attitudes. The macroeconomic conditions during the early adulthood, can influence the job satisfaction (Bianchi, 2013) and the job preferences (Cotofan et al., 2020) for the rest of peoples life. Aksoy, Eichengreen and Saka (2020a) provide evidence that a pandemic during the impressionable years can influence the confidence in political institutions and public health systems. Also, a pandemic can reduce the confidence in scientists (Aksoy, Eichengreen and Saka, 2020b). So, a notable historic event can affect different types of preferences and attitudes.

One of the key aspects of the impressionable years hypothesis is the presence of large and public events. Sears and Valentino (1997) showed that a presidential campaign can influence the social attitude of young adolescents in later stages of their life. Presidential campaigns are a communication-intensive political event that are considered to be important for the socializing opportunities for the young adolescents. In their next paper, Sears and Valentino (1998) show that it is important how much a young adolescent is exposed to a presidential campaign. They found that the larger the exposure, the larger the socialization gains of the young adolescents were. So, the media exposure of a presidential campaign is key in the effect it has on the impressionable years of people. This also applies to other historic events, where direct and large media exposure is important, so people learn about the event and conversate with one and other about it, which improves the collective memory of the event (Pennebaker and Banasik, 1997).

Alternatively, the observation that young adults are more susceptible to change their attitude, can be explained by the increasing persistence hypothesis. The theory behind the hypothesis states that as people age, their attitudes and values become more resistant to change (Glenn, 1974). This theory originates from the fact that information processing and the collective memory decreases with age (Salthouse, 1996). This makes incorporating new information of new events more difficult as someone ages, which means that the chance that it will change the attitude or values is lower. Also, with age people will collect attitude-relevant information, based on personal experiences, which is used to be more resistant to persuasion of a counter attitudinal message (Wood, 1982).

CHAPTER 3 DATA

To analyse the attitude of people towards the environment and how it is shaped over time, individual-level data from the European Social Survey is used. This survey also contains voting and political preference data. The European Social Survey is conducted every two years and consists of 9 different rounds with intervals of two years, starting in 2002 and ending in 2018. The survey is conducted in 36 different European countries. The list of which country participated in what round is provided in the Appendix (Table A.1).

The environmental disasters are selected based on the most damaging and most media exposure in the European countries. The list of environmental disasters used in this paper is based on the list of Hernan (2010). Hernan (2010) describes in his book the worst environmental disasters around the world. For this paper, a few disasters are excluded[6] because they did not have a direct impact on the European countries and did not have the media exposure in Europe. Environmental disasters that happened outside Europe were only included when they were reported by the media in European countries and led to a public outrage and protests in European countries. If this is not the case, then it is assumed that there was a lack of media exposure and impact in Europe. Three major oil spills were added to the list of environmental disasters, since oil spills have a large and long-term impact on the environment (Kingston, 2002), and can impact the decision-making and policy of a country (Chang et al, 2014). First, the oil spill of Torrey Canyon on the coast of Great Britain in 1967. This oil spill was the first oil spill in Europe and was the first oil spill that was widely broadcasted on television. The oil spill caused a large amount of damage and led people to realize the danger of the technological development (Bell & Cacciottolo. 2017). The second oil spill that is added, is the Exxon Valdez oil spill in Alaska in 1989. This oil spill gained international media attention and showed shocking pictures of oiled shorelines and harmed marine life (Davidson, 1990). The Exxon Valdez oil spill gained a lot more media attention in comparison to other oil

[6] Environmental disasters that are excluded: Minamata Japan (1950), Love Canal New York (1978), Times Beach Missouri (1982), Dassen and Robben Islands South Africa (2000).

spills (Kahn, 2007). The oil spill resulted in such outrage, that it led to the Oil Pollution Act of 1990. The third oil spill is the Deepwater Horizon oil spill, also known as the BP oil spill, in the Gulf of Mexico in 2010. This is the largest oil spill of the U.S. and gained the most international media attention of any oil spill to this date. With the introduction of social media, the Deepwater Horizon oil spill was widely covered and reached a large amount of people worldwide (Starbird et al., 2015). The complete list of the 11 environmental disaster that are used in this paper is provided in the Appendix, Table A.2. The main assumption in this paper is that the respondents of the European countries were exposed to all the different environmental disasters, which can be directly or indirectly via media outlets.

The nine survey rounds of the European Social Survey contain a total number of 422.994 observations. The answer options to the survey questions include a 'don't know' and 'refusal' option. These observations and the missing values are deleted for all the dependent and independent variables of this paper. This results in a sample of 293.513 observations. The descriptive statistics of the sample is shown in Table 1. The first dependent variable, the environmental attitude is measured on a 1 to 6 scale and indicates how much the respondent agrees to the following statement: "He strongly believes that people should care for nature. Looking after the environment is important to him.". When a respondent completely agrees, the value is equal 6, and equals 1 if the respondent completely disagrees. Table 1 shows an average score of 4.89 for the environmental attitude, which means that on average all respondents mostly agree with the statement. So, the respondents report that on average they do care about the environment.

Table 1: Descriptive statistics

	Mean	Standard deviation	Min	Max	N
Main dependent variables					
Environmental attitude	4.89	1.03	1	6	293513
% Voted for a green party	0.06	0.23	0	1	192097
% Feel closest to a green party	0.05	0.22	0	1	192097
Socio-Demographics					
Male	0.47	0.50	0	1	293513
Age	48.94	18.06	14	114	293513
Education level	3.40	2.13	0	7	293513
Household income (Percentile)	5.19	2.72	1	10	293513
% Children living at home	0.38	0.49	0	1	293513
% Christian	0.53	0.50	0	1	293513
% Jewish	0.03	0.16	0	1	293513
% Islamic	0.04	0.19	0	1	293513
% Voted in election	0.73	0.44	0	1	293513
Experiences (18-25)					
% Exposed to at least one disaster	0.70	0.46	0	1	293513
Exposure to number of disasters	1.30	1.28	0	5	293513

Notes: The education levels are classified according to the International Standard Classification of Education (ISCED). The household income is classified in percentiles of the national income, it is equal to 10 if the household has an income that belongs to the top 10 percent of the country.

The other two dependent variables include the political preferences and voting behaviour. These variables show whether a respondent has voted for or preferred a green party. However, not every country in every survey round had an option to vote for or prefer a green party. So, every survey round all the available parties in every country are reviewed to see if there is an available green party option to vote for or prefer. If there is no green party present at the time, the observations for that specific country are deleted for that specific survey round. A party is considered a green party if their main ideology revolves around an environmental standpoint. Examples are animal welfare, preserving the environment or sustainability. After removing the countries with no green party option, the sample for the second analysis consists of 192.097 observations. An overview of the deleted countries is provided in Table A.3 in the Appendix. On average 6% of the respondents voted for a green party and 5% felt closest to a green party.

CHAPTER 4 METHODOLOGY

The ideal experiment for this paper would allocate disasters randomly to affect only specific countries at different points in time and compare the attitudes and voting behaviour. Obviously, this is not possible, so a similar strategy to Aksoy et al. (2020a) is used to examine the impressionable years hypothesis. This strategy uses regression analysis to test whether exposure, to disaster in this paper, affects the attitude or voting behaviour. This approach has some potential threats, so it is important to select the right control variables. The main equation of the first analysis, regarding the attitude, is specified as follows:

$$Attitude_{i,c,t,a} = \beta_0 + \beta_1 Exposure(18-25)_{ic} + \beta_2 X_i + \beta_3 Z_i + \beta_4 C_C + \beta_5 T_t + \beta_6 A_a + \varepsilon_{it} \qquad (1)$$

The dependent variable 'Attitude' is a ranked variable and measured on a 1 to 6 scale, and indicates how much respondent i, living in country c in year t and of age a, cares about the environment. The independent variable 'Exposure (18-25)' is a dummy variable that equals to 1 if the respondent has experienced at least one of the 11 environmental disasters during the impressionable years, age 18-25, and it is the main variable of interest of this equation. To estimate the effect of the impressionable years hypothesis, an OLS regression will be used to estimate β_1.

The independent variable X_i represents the first set of controls, the individual characteristics. These characteristics consist of dummies for gender, different education levels, and different religions. These three variables are a potential threat that can influence the results of the impressionable years hypothesis, based on evidence of previous research. Females and individuals with a higher level of education have a more pro-environment attitude and behaviour (Casey and Scott, 2006; Dietz et al., 2002). On the topic of the relation between religion and the environmental attitude is the previous research mixed, since there is evidence for a positive relation (Kanaby and Willits, 1993) and negative relation (Eckenberg and Blocker, 1989). But these results indicate that there is a possible effect of religion, which means that it

is important to include it in the set of controls. However, there is a potential threat of endogeneity, since a large environmental disaster could alter people's religion choices. So, extra regressions are performed to see if the results change when religion is excluded.

The independent variable Z_i is a vector of household characteristics. This includes the household income and whether there are children present in the household. The demand for the quality of the environment is influenced by the level of income. Individuals with a higher level of income are more concerned about the quality of the environment (McConnel, 1997; Baumol and Oates, 1993). So, different income levels can affect the environmental attitudes of the respondents. Also, the presence of children in a household is relevant because children can have an influence on their parents with environmental education they receive in school (Evans and Gill, 1996).

The terms C_C, T_t and A_a capture respectively the country fixed effects, year of survey fixed effects and the age fixed effects. These fixed effects are essential to include in the regression analysis since there is a large difference in the dependent variables among the countries, Figure 3, the different survey years, Figure 4, and the age of the respondents, Figure 5. These fixed effects are added in the form of a set of dummies for each country, age category and survey year.

To show that the subjective measure of the attitude is a good approximation of the effect of the impressionable years, an additional objective measure will be used. The objective measure is the voting behaviour of the respondents in the most recent election at the time of the survey round. Similarity between the two measures will show that the effects of experiencing a disaster at early adulthood affects real attitudes and behaviour.

$$Voting_{i,c,t,a} = \beta_0 + \beta_1 Exposure(18-25)_{ic} + \beta_2 X_i + \beta_3 Z_i + \beta_4 C_C + \beta_5 T_t + \beta_6 A_a + \varepsilon_{it} \qquad (2)$$

The second equation includes the voting behaviour as the dependent variable. The dependent variable is a dummy variable which equals to 1 when the respondent reports that he or she voted for a 'green party'. To estimate β_1, a logit regression will be used, considering that the dependent variable is dummy. In addition, a linear probability model (LPM) is estimated since it facilitates an easier interpretation of β_1. The interpretations of the linear probability models are only used if the significance of the coefficients is in line with the estimations of the logit regressions.

A potential threat with testing voting behaviour is that people do not always vote for their preferred party. The main reason for this is strategic voting, in which people behave in a strategic fashion (Alvarez et al., 2006), because they think their vote can be decisive (Darmofal, 2010). To address this problem, an additional measure for the political preference will be used as a dependent variable. The answer to the survey question: 'Which political party do you feel closest to?', is used to identify the political preferences of the respondents. This will result in a dependent variable that is a dummy variable and is equal to 1 if a green party is preferred. The results of this alternative measure are used as a robustness check for the results of equation (2).

The terms C_C, T_t and A_a capture respectively the country fixed effects, year of survey fixed effects and the age fixed effects. These fixed effects are essential for equation (2) to include in the regression analysis since there is a large difference in the voting behaviour among the countries, Figure 6, the different survey years, Figure 7, and the age of the respondents, Figure 8.

To show that the environmental attitude is related to the voting behaviour, equation (3) is estimated. This equation includes the environmental attitude as an additional independent variable. The equation estimates whether a more pro-environment attitude, also results in more votes for a green party. The effect of the impressionable years is also included in the equation,

to show if the impressionable years effect on the voting behaviour is mediated by the environmental attitude or if it also has explanatory power by itself. The change in voting behaviour, when exposed to disasters, could be because of a change in the environmental attitude. If this is the case, the environmental attitude fully mediates the effect of the impressionable years on the voting behaviour, and β_1 will be equal to 0.

$$Voting_{i,c,t,a} = \beta_0 + \beta_1 Exposure(18-25)_{ic} + \beta_2 Attitude_{i,c,t,a} + \beta_3 X_i + \beta_4 Z_i + \beta_5 C_C + \beta_6 T_t + \beta_7 A_a + \varepsilon_{it} \quad (3)$$

Next to the main regressions of this paper, some additional regressions are performed to get a more in-depth view of the impressionable years effect. Firstly, the main independent variable, 'Exposure 18-25', which represents if the individual has experienced at least one disaster, is split in six different categories to indicate the different number of experienced disasters. Figure 9 shows the distribution of experienced disasters during the impressionable years. The minimum of experienced disasters is 0 and the maximum is 5. Nobody experienced more than five disasters, considering the distribution of the dates of the disasters and the limited eight-year period of the impressionable years (18-25). The regression is similar to equation (1) and (2) and will show if experiencing more disasters will also result in a larger effect on the environmental attitude or behaviour.

Secondly, other life stages are tested to see if being exposed to disasters in these age ranges has a significant effect on the attitude and political behaviour. The same equations, (1) and (2), are used and a new independent variable is constructed for each age interval to indicate whether the respondent has experienced an environmental disaster during the age range.

Lastly, it is tested whether exposure to a specific disaster or difference in regions results in a smaller or larger effect on the attitude and/or voting behaviour. This is tested with the same equations, (1) and (2), but the variable for the exposure to a disaster is split in 11 dummies,

that indicate whether the individual has experienced a certain disaster or not. The difference between European regions is simply tested by creating two sub samples, one for the Western European countries, and one for the Eastern European countries. This way it is easy to see if the impressionable years effect is present in both regions.

CHAPTER 5 RESULTS

5.1 Environmental attitude

Table 2 reports the results for the attitude towards the environment and how it is influenced by the experienced disasters during the impressionable years. Regression (1), where the controls are excluded, shows a significant coefficient for the exposure to disasters during impressionable years. This means that people who experienced an environmental disaster during their early adulthood, indicate that they care more about the environment compared to people that have not experienced environmental disasters during their early adulthood. This effect is robust when all the controls are added, see regression (2). However, the coefficient significantly decreases, from 0.118 to 0.026. The cause of the change of the coefficient is further investigated by adding every control category one at a time. This illustrated that the age effect is the main reason of the decrease. Regarding the age effect, there is a positive correlation between the age of the respondents and whether they experienced an environmental disaster between age 18 to 25. The reason is that the dates of most of the environmental disasters are around 30 to 40 years before the survey, meaning that older respondents are more likely to experience one of the environmental disasters. Also, older respondents have on average a higher attitude score for the environment, see Figure 5. So, older people experience more often disasters and rate their attitude higher, which means that the effect of the impressionable years in regression (1) was overestimated and the coefficient decreased in regression (2). The magnitude of the coefficient of regression (2) is rather small, since experiencing a disaster during impressionable years leads to a 0.026 higher score on average in caring about the environment on a 1 to 6 scale. Although the coefficient is small, it is still a statistically significant effect. Regression (2) was also performed without the control variable for religion, which resulted in the same significance and size of the coefficient.

Regression (3), and (4) extend the first two regressions by splitting the number of experienced disasters during the impressionable years in six categories. Figure 9 shows the distribution of

experienced disasters during the impressionable years. The minimum of experienced disasters is 0 and the maximum is 5. Most of the respondents have experienced only a single environmental disaster. In line with the first two regressions, all the coefficients significantly decrease when the controls are added, see regression (3) and (4). In regression (4) all the coefficients are positive and significant, which can be interpreted as experiencing any number of disasters during the impressionable years result in a more caring attitude towards the environment. The most interesting result of regression (4) is the difference between the coefficients. The coefficient of experiencing only a single disaster is significantly lower than experiencing two, three, four or five disasters. Proof is provided in Table 3 Panel A that uses a Wald Test for testing for significant differences. The coefficient of experiencing the maximum amount of disasters, which is five, is the largest. However, Table 3 Panel B shows that the coefficient of experiencing five disasters is not significantly higher than experiencing two, three or four disasters. What can be concluded from this, is that experiencing multiple disasters, compared to one, leads to a larger effect on the attitude towards the environment. In other words, experiencing two disasters instead of one, results in an additional impact on the values and attitudes towards the environment for the rest of people's lives.

Table 2: *Dependent variable*: Attitude towards nature

	(1)	(2)	(3)	(4)
Exposure to disaster (18-25)	0.118***	0.026***		
	(0.004)	(0.004)		
Exposure to disaster = 1			0.111***	0.010***
			(0.005)	(0.005)
Exposure to disaster = 2			0.152***	0.047***
			(0.006)	(0.006)
Exposure to disaster = 3			0.105***	0.036***
			(0.010)	(0.010)
Exposure to disaster = 4			0.089***	0.039***
			(0.007)	(0.007)
Exposure to disaster = 5			0.101***	0.055***
			(0.014)	(0.014)
Individual Characteristics	No	Yes	No	Yes
Household Characteristics	No	Yes	No	Yes
Age FE	No	Yes	No	Yes
Country FE	No	Yes	No	Yes
Year FE	No	Yes	No	Yes
N	293513	293513	293513	293513
F-value	256.16	284.55	220.23	266.94
Adjusted R^2	0.01	0.05	0.01	0.05

Notes: The coefficients are estimated with an OLS regression. The dependent variable, attitude towards nature, is measured on a 1 to 6 scale and is equal to 6 if the respondent cares the most about environment. Exposure to disaster (18-25) is a dummy variable and is equal to 1 if the respondent experienced an environmental disaster in their impressionable years. Exposure to disaster = 1 represents the respondents that have experienced exactly one environmental disaster during their impressionable years (18-25). The individual characteristics consist of education level, religion, and gender. The household characteristics consist of the household income and the presents of children in the household. The standard errors are in the parentheses. ∗Significant at the 0.1 level; ∗∗significant at the 0.05 level; ∗∗∗significant at the 0.01 level.

5.2 Voting behaviour

Table 4 presents the results on the voting pattern of the respondents. The coefficient of the first regression is positive and significant at the 5% level. When the controls are added, in regression (2), the magnitude and significance of the coefficient increases. Again, the age effect is the main cause of the shift of the coefficient. In contrast to Table 2, there is a negative correlation between the age of the respondents and the percentage that voted for a green party, see Figure 8. Since older respondents are more likely to experience a disaster, correcting for the age effect results in an increase of the coefficient, since the effect was underestimated.

Table 4: *Dependent variable*: Voting for a green party

	(1)	(2)	(3)	(4)
Exposure to disaster (18-25)	0.048**	0.119***		
	(0.022)	(0.024)		
Exposure to disaster = 1			-0.098***	0.001
			(0.026)	(0.027)
Exposure to disaster = 2			0.109***	0.194***
			(0.029)	(0.031)
Exposure to disaster = 3			0.390***	0.411***
			(0.047)	(0.048)
Exposure to disaster = 4			0.187***	0.199***
			(0.035)	(0.036)
Exposure to disaster = 5			0.203***	0.201***
			(0.067)	(0.069)
Individual Characteristics	No	Yes	No	Yes
Household Characteristics	No	Yes	No	Yes
Age FE	No	Yes	No	Yes
Country FE	No	Yes	No	Yes
Year FE	No	Yes	No	Yes
N	192097	192097	192097	192097
Pseudo R^2	0.04	0.10	0.05	0.10

Notes: The coefficients are estimated with a logit regression. The dependent variable, voting for a green party, is a dummy variable and is equal to 1 if the respondent voted for a party that has strong ideals towards protecting the environment. Exposure to disaster (18-25) is a dummy variable and is equal to 1 if the respondent experienced an environmental disaster in their impressionable years. Exposure to disaster = 1 represents the respondents that have experienced exactly one environmental disaster during their impressionable years (18-25). The individual characteristics consist of education level, religion, and gender. The household characteristics consist of the household income and the presents of children in the household. The standard errors are in the parentheses. ∗Significant at the 0.1 level; ∗∗significant at the 0.05 level; ∗∗∗significant at the 0.01 level.

Regression (2) can be interpreted as being exposed to a disaster in the impressionable years, leads to higher chance of voting for a green party. This behaviour is in line with the positive attitude change of Table 2. The coefficient can be interpreted as experiencing a disaster during early adulthood leads to an increase of the log-odds of 0.119 of voting for a green party. In other words, people that have experienced a disaster in their early adulthood, have 12.6% ($e^{0.119} = 1.126$) higher odds to vote for a green party in the rest of their life. For an easier interpretation of the effect, a linear probability model is estimated for regression (2), see Table 5. Table 5 regression (1) shows that individuals that have experienced an environmental disaster have a 0.5 percentages point higher probability to vote for a green party. The mean of green party votes of this sample is 5.7%, so an increase of 0.5% point is a decent magnitude of the effect. The results illustrate that the experiences during the impressionable years can

significantly affect the voting behaviour in later stages of life, which is in line with previous literature[7]. Regression (2) was also performed without the control variable for religion, which resulted in the same significance and size of the coefficient.

In regression (3) and (4) the number of experienced disasters is split again to get a more in-depth view of the effect of the exposure to disasters. Regression (3) shows a negative and significant coefficient for experiencing a single disaster and positive and significant coefficients for experiencing two, three, four or five disasters. The negative coefficient is surprising; however, the negative sign and significance disappear after adding the control variables, see regression (4). Regression (4) is in line with Table 2, since the coefficient for experiencing a single disaster is significantly lower than the coefficient of experiencing, 2, 3, 4 or 5 disasters, see Table 6 Panel A. The coefficient for the exposure to one disaster is not only lower than the others, but also insignificant at the 1%, 5% and 10% level. So, regression (4) shows that the effect of the impressionable years on the voting pattern is only present when an individual has experienced at least two environmental disasters. This could be interpreted as a threshold for the effect. What is different from Table 2, is that experiencing five disasters is not the largest coefficient, in fact experiencing three disasters has the largest coefficient. Table 6 Panel B shows that experiencing three disasters has a significantly higher effect than experiencing two, four or five disasters. So, this table indicates that there is a threshold for the effect at experiencing more than one disaster and that the optimal number of experienced disasters for the effect is three, after that the effect diminishes.

Table 7 is a robustness check for the results of Table 4. Table 7 reports the effect of the impressionable years on the preferences for a green party. The key difference between Table 4 and 7 is that Table 4 is based on voting behaviour, while Table 7 is based on preferences. This way other present effects at elections, like strategic voting, are corrected for. The results

[7] E.g. Sears and Levy, 2003; Hatemi et al., 2009; Osborne et al., 2011

of Table 7 are similar in terms of size and significance to Table 4. The difference in Table 7 is that in regression (2) the coefficient is slightly higher than in Table 4. The coefficient in Table 7 is 0.169, which can be interpreted as 18.4% higher odds of preferring a green party over another party when having experienced a disaster during early adulthood. The linear probability model, Table 5 regression (2), shows that people that have experienced an environmental disaster have a 0.6%-point higher probability to feel close to a green party. Which is a decent effect size since the mean of preferring a green party is 5.1%.

In regression (4), of Table 7, the coefficient of exposure to one disaster is significant at the 5% level in contrast to Table 4 regression (4). However, the magnitude of the coefficient is significantly lower than the other four, which was tested with a Wald test, indicating that the observed threshold in Table 4 seems to be also present in Table 7. Also, the coefficient of experiencing three disasters is the largest coefficient in this table, just as in Table 4. So, the results of Table 4, the voting behaviour, are robust to the results of Table 7, the political preferences. The conclusion of Table 4 and 7 combined is that individuals that have experienced at least two disasters during the impressionable years, vote more often for green parties and can affiliate themselves more with these parties.

A possible explanation for the positive effect of Table 4 and 7 could be a mediating effect of a higher environmental attitude. Table 2 showed that the experiences during the impressionable years lead to a more caring attitude towards the environment, which then could lead to a political vote or preference for green parties. Table 8 presents results whether the effect of impressionable years on the political votes and preferences is mediated by the environmental attitude. Regression (1) and (3) show a strong and positive relationship between the environmental attitude and the political voting behaviour and preference. The more someone cares about the environment, the more he or she votes for and prefers a green party. Regression (2) and (4) show that the exposure to disaster variable has a significant and similar coefficient compared to Table 4 and 7. This indicates that the effect that the experiences during

the impressionable years have on the political behaviour is not mediated and caused by the change in the environmental attitude. So, experiencing disasters during the impressionable years affects both the environmental attitude and political behaviour.

Table 4 *Dependent variable*: Voting for a green party			Preference for a green party	
	(1)	(2)	(3)	(4)
Environmental attitude	0.562***	0.562***	0.739***	0.738***
	(0.014)	(0.014)	(0.016)	(0.014)
Exposure to disaster (18-25)		0.112***		0.166***
		(0.024)		(0.024)
Individual Characteristics	Yes	Yes	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	192097	192097	192097	192097

Notes: The coefficients are estimated with a logit regression. The dependent variable, prefer a green party, is a dummy variable and is equal to 1 if the respondent feels closest to a party that has strong ideals towards protecting the environment. The dependent variable, voting for a green party, is a dummy variable and is equal to 1 if the respondent voted for a party that has strong ideals towards protecting the environment. Exposure to disaster (18-25) is a dummy variable and is equal to 1 if the respondent experienced an environmental disaster in their impressionable years. Environmental attitude is measured on a 1 to 6 scale and is equal to 6 if the respondent cares the most about environment. The individual characteristics consist of education level, religion, and gender. The household characteristics consist of the household income and the presents of children in the household. The standard errors are in the parentheses. ∗Significant at the 0.1 level; ∗∗significant at the 0.05 level; ∗∗∗significant at the 0.01 level.

5.3 Other life stages

Table 8, 9 and 10 show whether the experiences during the impressionable years, age 18-25, is the only life stage that influences the attitude and voting behaviour, or if other life stages also have a significant influence. There are two different dummies included in the regressions regarding the exposure to disasters since previous tables provided evidence for a difference in experiencing a single disaster and multiple disasters. These two dummies indicate whether an individual has experienced only a single disaster or more than one disaster. The results in Table 8 Panel A show that the experiences of disasters in the earliest life stage, age 0-9, also has a significant influence on the attitude towards the environment. The coefficient is significantly higher than the impressionable years, which means that this life stage seems to matter even more. Panel B and C, age 10-17 and 26-33, show similar results with slightly lower coefficients, but the coefficients are also significant at the 1% level.

Table 8: *Dependent variable*: Attitude towards nature

	(1)	(2)
Panel A: Age 0-9		
Exposure to disaster (0-9) = 1	0.068***	0.054***
	(0.005)	(0.006)
Exposure to disaster (0-9) > 1	0.054***	0.062***
	(0.006)	(0.006)
Exposure to disaster (18-25) = 1		-0.000
		(0.005)
Exposure to disaster (18-25) > 1		0.034***
		(0.006)
Panel B: Age 10-17		
Exposure to disaster (10-17) = 1	0.046***	0.044***
	(0.005)	(0.005)
Exposure to disaster (10-17) > 1	0.044***	0.041***
	(0.005)	(0.005)
Exposure to disaster (18-25) = 1		0.017***
		(0.005)
Exposure to disaster (18-25) > 1		0.042***
		(0.005)
Panel C: Age 26-33		
Exposure to disaster (26-33) = 1	0.012**	0.020***
	(0.005)	(0.005)
Exposure to disaster (26-33) > 1	0.055***	0.050***
	(0.005)	(0.005)
Exposure to disaster (18-25) = 1		0.011**
		(0.005)
Exposure to disaster (18-25) > 1		0.036***
		(0.005)
Panel D: Age 34-41		
Exposure to disaster (33-41) = 1	0.003	0.014**
	(0.005)	(0.005)
Exposure to disaster (33-41) > 1	0.031***	0.035***
	(0.005)	(0.005)
Exposure to disaster (18-25) = 1		0.000
		(0.005)
Exposure to disaster (18-25) > 1		0.059***
		(0.005)
Panel E: Age 42-49		
Exposure to disaster (42-49) = 1	-0.004	-0.018**
	(0.005)	(0.005)
Exposure to disaster (42-49) > 1	-0.015**	-0.008
	(0.006)	(0.007)
Exposure to disaster (18-25) = 1		0.011**
		(0.005)
Exposure to disaster (18-25) > 1		0.049***
		(0.005)
Controls	Yes	Yes
N	293513	293513

Next, Panel D, age 34-41 shows a significant but smaller coefficient than the life stage 18-25. At last, Panel E has negative coefficients for the life stage 42-49, with a significant coefficient for the exposure to a single disaster, which means that this life stage may even have a reverse effect. So, the life stages, 0-9, 10-17, 26-33 are also as relevant as the life stage 18-25, and even more relevant in the case of 0-9. The effect diminishes from the life stage 34-41 and disappears, or even reverses for life stage 42-49.

Another consistent pattern of Table 8 is the difference between the exposure to a single disaster or to more than one disaster. For most of the life stages the coefficient for exposure to more than one disaster is significantly higher than exposure to only a single disaster, which is consistent with the findings of the previous tables.

Table 9 and 10, regarding voting behaviour and preference, show a consistent pattern in comparison to the results of Table 8. Again, the life stages 0-9, 10-17 and 26-33, Panel A, B and C, have a significant influence on the voting for and preferences towards green parties. The life stage 0-9, Panel A, has also the largest coefficient in both tables. Panel D, life stage 34-41 shows an insignificant effect for the exposure to a single disaster and a significant but smaller effect for exposure to multiple disasters compared to the life stage 18-25. Panel E shows again a negative coefficient for the exposure to multiple disasters, which indicates that the effect might reverse around this life stage. What can be concluded from these 3 tables is that the life stage of the impressionable years, 18-25, is not the only life stage that matters and is not the most important life stage that matters. The life stage 0-9 plays a big role in the environmental attitude and voting behaviour. It seems that people are influenced from age 0 to 33, and after 33 the effect diminishes and might even reverse from age 42 to 49.

The previous tables have established that the impressionable years and other life stage before age 34 play a role in shaping the environmental attitude and voting behaviour for the long term. The regressions of Table 11 examine if this effect persists in the long term or decays over time.

If the effect decays over time, then there must be a pattern of decreasing coefficients as the variables of the age groups increases. Considering regression (1), the coefficients of the three different age groups do not significantly differ from each other, indicating that the effect persists and does not decay. As an extra robustness check, regression (2) includes the life stage 0-9, considering that this life stage had the most pronounced effect in the previous tables. Regression (2) reports insignificant coefficients for age group 26-33 and 34-50, but a positive and significant coefficient for age group 51-75. This positive significant coefficient indicates that the effect does not decay, but in fact seems to increase over time.

Table 11: *Dependent variable*: Attitude towards nature

	(1)	(2)
Exposure to disaster (18-25)	-0.009	
	(0.009)	
Exposure to disaster (18-25) * age 26-33	-0.024	
	(0.015)	
Exposure to disaster (18-25) * age 34-50	0.002	
	(0.012)	
Exposure to disaster (18-25) * age 51-75	0.016	
	(0.013)	
Exposure to disaster (0-9)		-0.014
		(0.012)
Exposure to disaster (0-9) * age 26-33		-0.010
		(0.038)
Exposure to disaster (0-9) * age 34-50		0.001
		(0.029)
Exposure to disaster (0-9) * age 51-75		0.042***
		(0.013)
Individual Characteristics	Yes	Yes
Household Characteristics	Yes	Yes
Age FE	Yes	Yes
Country FE	Yes	Yes
Year FE	Yes	Yes
N	293513	293513

Notes: The coefficients are estimated with an OLS regression. The dependent variable, attitude towards nature, is measured on a 1 to 6 scale and is equal to 6 if the respondent cares the most about environment. Exposure to disaster (18-25) is a dummy variable and is equal to 1 if the respondent experienced an environmental disaster in their impressionable years. The variable age 34-50 is a dummy variable that equals 1 if the respondent is between the age of 34 and 50. The individual characteristics consist of education level, religion, and gender. The household characteristics consist of the household income and the presents of children in the household. The standard errors are in the parentheses. ∗Significant at the 0.1 level; ∗∗significant at the 0.05 level; ∗∗∗significant at the 0.01 level.

Next, Table 12 presents the same results for the voting and preference behaviour towards green parties. In regression (1) and (2) the coefficients for all three age groups are insignificant and do not significantly differ from each other according to the Wald test. This indicates a persistent effect of the impressionable years for voting behaviour. Regression (3) and (4) also confirm that there is no decay effect, since the coefficients of the age groups are increasing as the age groups increases. Regression (3) shows that the effect is higher for the age group 34-50 and 51-75, which indicates that the effect is developing and increasing over time. Regression (4) has a similar result for the age group 51-75, since it has a significantly higher coefficient compared to the other groups, just as in Table 11.

In conclusion, Table 11 and 12 show that there is evidence for a persistent effect and not a decay effect. Which means that the experiences of environmental disasters during the impressionable years, shapes the environmental attitude and voting behaviour for the rest of your life. Additionally, there is some evidence that the effect might increase over time. So, the experiences during the impressionable have a larger effect on the environmental attitude and voting behaviour at later life stages, such as age 51 to 75.

5.4 Difference between disasters

Lastly, Table 12 reports whether experiencing a specific disaster, from the 11 that are used in this paper, results in a different effect on the attitude or voting behaviour. The table contains an overview of 6 regressions with the three main dependent variables that were used so far in this paper. To make sure the results are robust, the life stage 0-9 is tested in addition to the impressionable years, 18-25. The symbols of the table illustrate the following, if the coefficient of the disaster is significant at the 5% level, then a $+$ or a $-$ is used to indicate a positive or negative significant coefficient. If there is no significant coefficient, then 'NO' is used to indicate this. The regression results for every dependent variable and life stage are slightly different from each other, however there are some consistent patterns present for several disasters.

Table 12: Dependent variable:	Attitude towards nature		Voting for a green party		Prefer a green party	
	(1)	(2)	(3)	(4)	(5)	(6)
	(0-9)	(18-25)	(0-9)	(18-25)	(0-9)	(18-25)
The London fog	+	-	+	-	+	-
The Windscale fire	+	+	+	-	+	-
Torrey Canyon oil disaster	+	+	+	+	+	+
The Seveso disaster	+	+	+	+	+	+
Three Mile Island accident	NO	NO	NO	NO	NO	NO
Bhopal gas leak	+	+	+	+	NO	+
Chernobyl / Sandoz chemical spill	+	NO	+	NO	NO	NO
Exxon Valdez oil spill	NO	NO	NO	NO	NO	NO
Kuwait oil spills and fires	-	+	NO	NO	NO	NO
BP oil spill	+	-	-	-	NO	-
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	293513	293513	192097	192097	192097	192097

Notes: The coefficients of regression (1) and (2) are estimated with an OLS regression. The dependent variable, attitude towards nature, is measured on a 1 to 6 scale and is equal to 6 if the respondent cares the most about environment. The coefficients of regression (3) – (6) are estimated with a logit regression. The dependent variable, prefer a green party, is a dummy variable and is equal to 1 if the respondent feels closest to a party that has strong ideals towards protecting the environment. The dependent variable, voting for a green party, is a dummy variable and is equal to 1 if the respondent voted for a party that has strong ideals towards protecting the environment. The independent variables represent the different environmental disasters. The individual characteristics consist of education level, religion, and gender. The household characteristics consist of the household income and the presents of children in the household. The standard errors are in the parentheses. ∗Significant at the 0.1 level; ∗∗significant at the 0.05 level; ∗∗∗significant at the 0.01 level.

First, the Torrey Canyon oil disaster and the Seveso disaster both have a clear significant and positive effect on all three dependent variables, the attitude, the voting for a green party and preferring a green party. Similar results are shown for the Bhopal gas leak since the coefficients are also significant and positive except for one insignificant coefficient in regression (5). There are also disasters that do not seem to affect the three dependent variables by themselves. Both the Three Mile Island accident and the Exxon Valdez oil spill have no significant coefficient for any of the regressions. An explanation could be that both disasters happened in the U.S. and did not directly affect the European countries, however the Bhopal gas leak also happened outside Europe and these coefficients do show significance. Next, the Chernobyl / Sandoz chemical spill show mostly insignificant coefficients and only two positive coefficients. This indicates that they might have a positive effect, however it seems more likely that there is no significant effect. These results are remarkable since it is the only case where two disasters happened in the same year. Also, the disaster of Chernobyl is known to be the worst nuclear disaster of all time, so an effect would be expected. Lastly, the Kuwait oil spills, and fires do not have a significant effect on the political voting behaviour and preferences and has no conclusive effect on the environmental attitude. The reason could be the that this disaster also happened outside Europe resulting in a smaller impact and media exposure. To conclude, the individual effect of experiencing most disasters is rather inconclusive, with the exception of a positive effect of the Torrey Canyon oil disaster, the Seveso disaster and the Bhopal gas leak, and an insignificant effect of the Three Mile island accident and the Exxon Valdez oil spill.

Next, Table 13 shows the difference of the effect between the Western Europe region and Eastern Europe region. There is a consistent pattern for all three dependent variables. Regression (1), (3) and (5) show positive and significant coefficients for the Western Europe region, which are similar to but slightly higher than the coefficients of the entire sample. Regression (2), (4) and (6) show the coefficients for the Eastern Europe region, which are not significantly different from 0. So, it seems that the effect of the impressionable years is driven by the Western Europe countries. An explanation could be that these countries have been

exposed more often to the 11 selected environmental disasters since most of the disasters happened near or in the Western European countries. Also, the Eastern European countries were shielded from the Western European media during the cold war. In combination with the dates of the environmental disasters, mostly before the end of the cold war, can this potentially explain the difference of the impressionable years effect between the two regions.

Table 13: *Dependent variable*:	Attitude towards nature		Voting for a green party		Prefer a green party	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: *West-Europe*						
Exposure to disaster (18-25)	0.032***		0.132***		0.186***	
	(0.005)		(0.025)		(0.025)	
Panel B: *East-Europe*						
Exposure to disaster (18-25)		0.015*		0.063		-0.038
		(0.008)		(0.078)		(0.100)
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	216337	77176	161796	30027	161796	30045

CHAPTER 6 CONCLUSION

6.1 Summary

The results of this paper contribute to the large body of evidence of the impressionable years hypothesis. There is evidence that experiences of environmental disasters during, 18-25, and other life stages before age 34, have a significant impact on the environmental attitude. The exposure during the impressionable years also affect the environmental voting behaviour, namely an increase in votes for green parties. The effect of the impressionable years is the most pronounced when respondents have experienced more than one environmental disaster. When it comes to the voting behaviour and political preferences, experiencing a single disaster even results in no impressionable years effect, so experiencing more than one disaster seems to be essential. The effect on the attitude and voting behaviour persists over the later life stages and results even hint to an increase of the effect for later life stages. This rules out a decay of the effect over time.

An analysis of the environmental disasters showed that experiencing the Torrey Canyon oil disaster, the Seveso disaster or the Bhopal gas leak during the impressionable years increases the environmental attitude and voting behaviour for green parties significantly. The disasters that had no significant effect were primarily disasters that happened outside Europe, such as the Three Mile Island accident, the Exxon Valdez oil spill and the Kuwait fires and oil spills. At last, there is evidence that the impressionable years effect of the Eastern Europe region is not significant, while the Western Europe region does show a significant effect. An explanation could be that media exposure for Eastern European countries was difficult during the cold war because of the ‘iron curtain’, and most of the environmental disasters used in this paper happened before the end of the cold war.

6.2 Discussion

The analysis of the different disasters showed that there is a different effect on the attitude and voting behaviour when exposed to certain disasters. This can indicate that the selection of the 11 environmental disaster might be flawed, considering that not all the disasters had a significant effect. The disasters were carefully selected based on damage and media attention; however, it still is hard to observe whether the respondent was exposed to the environmental disaster. This assumption is essential for the results of this paper. One way to solve this in further research is to include a survey question where the respondent is asked whether he/she remembers specific disasters. An alternative approach would be by estimating the distance of each respondent from the place of impact of the environmental disaster, like in Hazlett and Mildenberger (2020). With this approach it is also possible to further explore the smaller environmental disasters, that happened on a more local scale and affected only the local community. This could be a follow up of this paper, since the smaller and local disasters were excluded from the research.

Next, it can be argued that the largest environmental disaster of the last century is missing in this paper, namely global warming leading to climate change. The problem with global warming is, that it is not an environmental disaster that has a specific origins date. It is an environmental disaster that is gradually growing. There is also no specific point in time for the awareness or realization of this problem. Action against climate change was already in the report of Brundtland (1987), which contained proposed solutions and targets. However, the awareness and realization of the public of this problem has only started to significantly increase over the last decade. So, the climate change disaster cannot be assigned to a specific date that can be used for the impressionable years hypothesis. One approach for further research would be to identify the specific year of when respondents became aware of the climate change problem. The specific awareness year of each respondent can be matched with the impressionable years and tested whether this shaped the attitude for the rest of his or her life.

6.3 Final remarks

The most important point of this paper is that past experiences shape the environmental attitude for the rest of your life. The environmental disasters of the last decade or the next decade can help increase the positive attitude towards the environment of the public for the rest of this century

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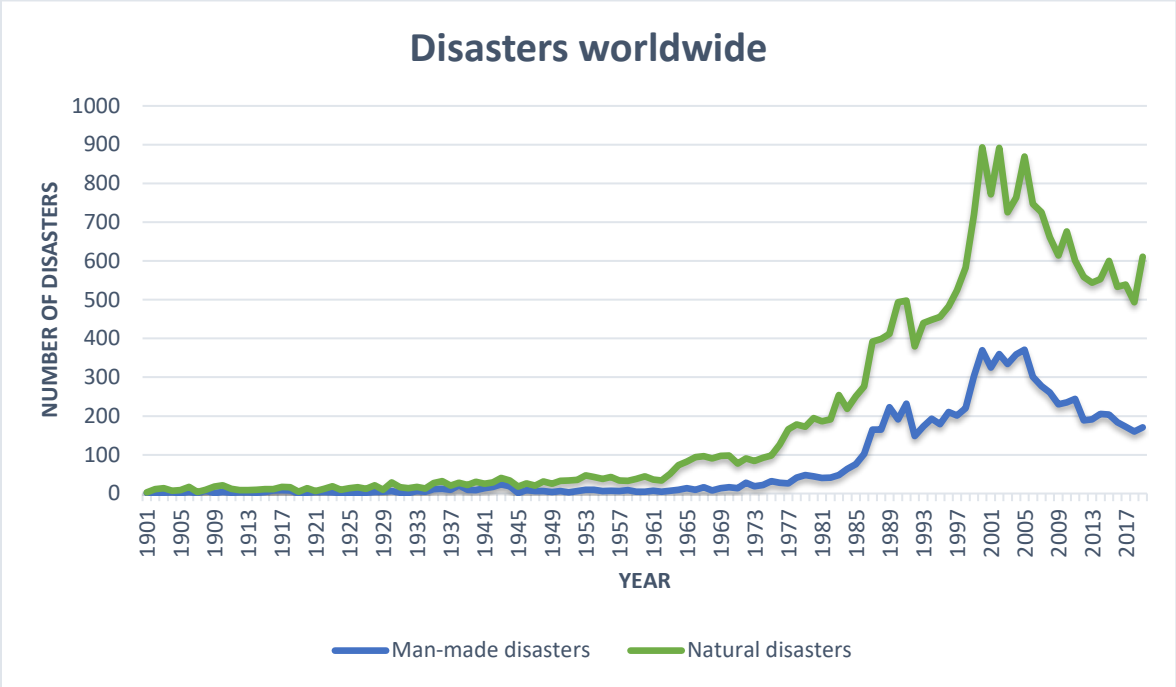

Figure 1: Overview of the total disaster worldwide since the beginning of the 20th century. Data source: The EM-DAT database.

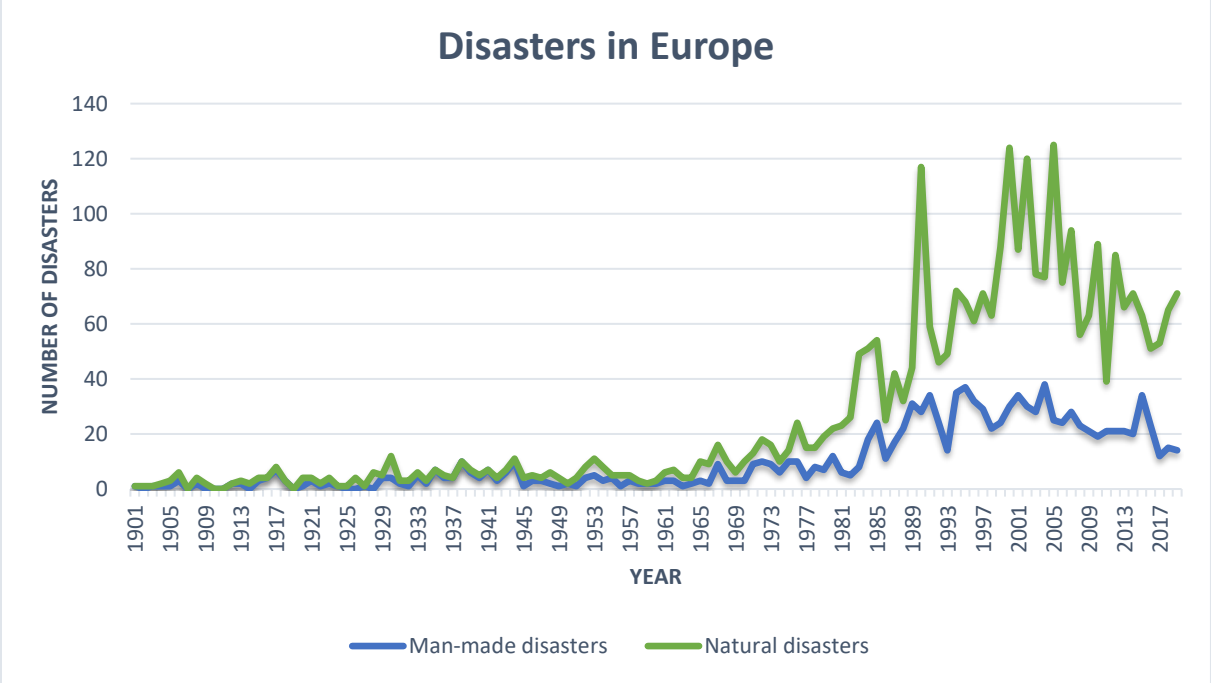

Figure 2: Overview of the total disaster in Europe since the beginning of the 20th century. Data source: The EM-DAT database.

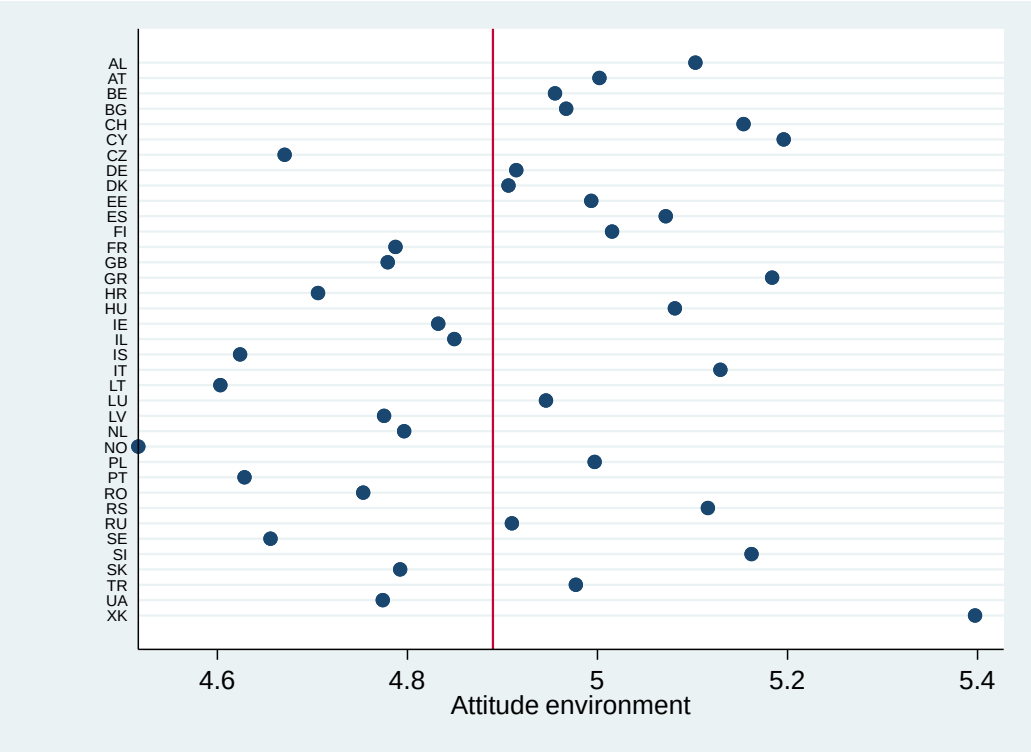

Figure 3: The average score of the environmental attitude per country. The environmental attitude is measured on a scale of 1 to 6 and is equal to 6 if the respondent cares the most about environment.

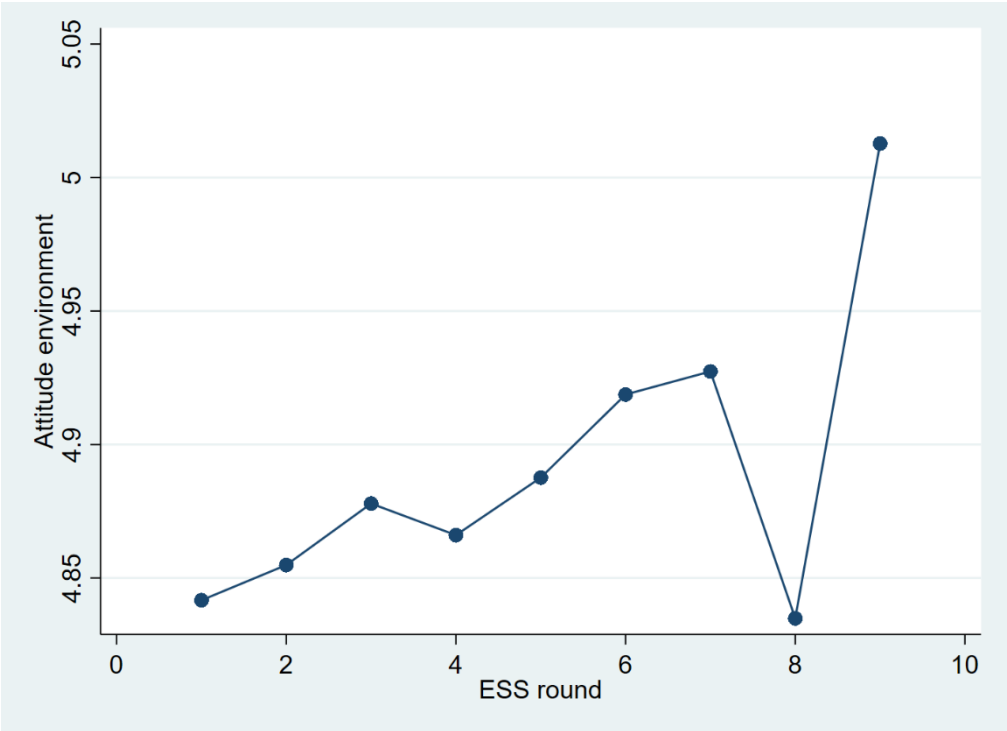

Figure 4: The average score of the environmental attitude per survey round. The environmental attitude is measured on a scale of 1 to 6 and is equal to 6 if the respondent cares the most about environment.

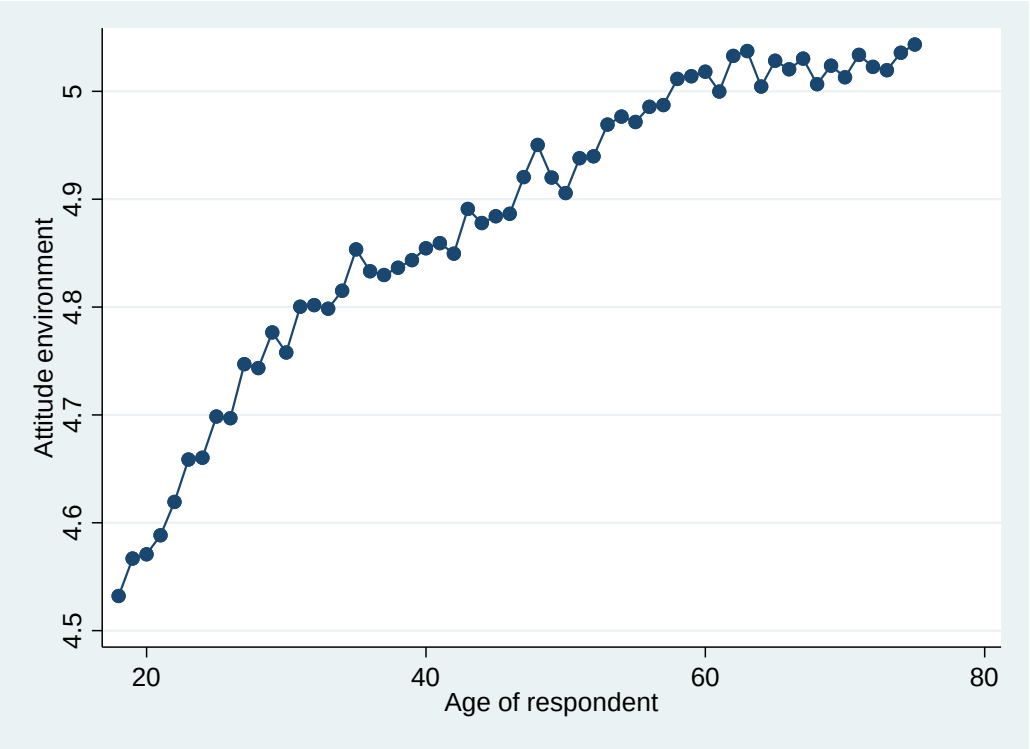

Figure 5: The average score of the environmental attitude per age. The environmental attitude is measured on a scale of 1 to 6 and is equal to 6 if the respondent cares the most about environment

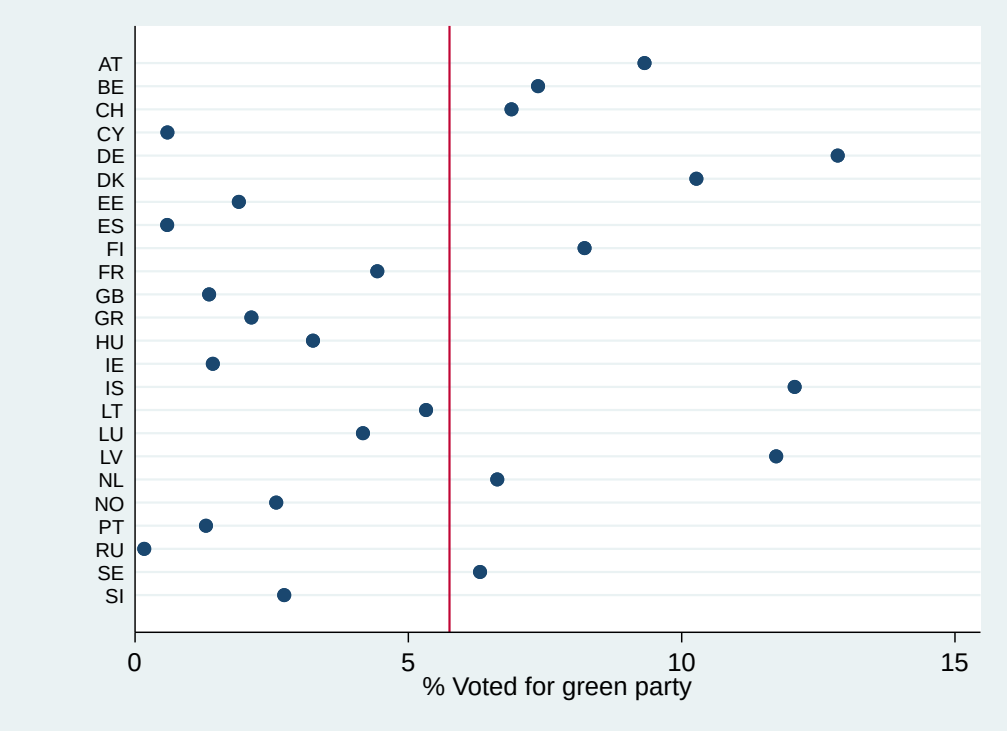

Figure 6: The average voting percentage for green parties per country. The voting percentage is calculated by dividing the total amount of green party votes by the total amount of votes in the sample.

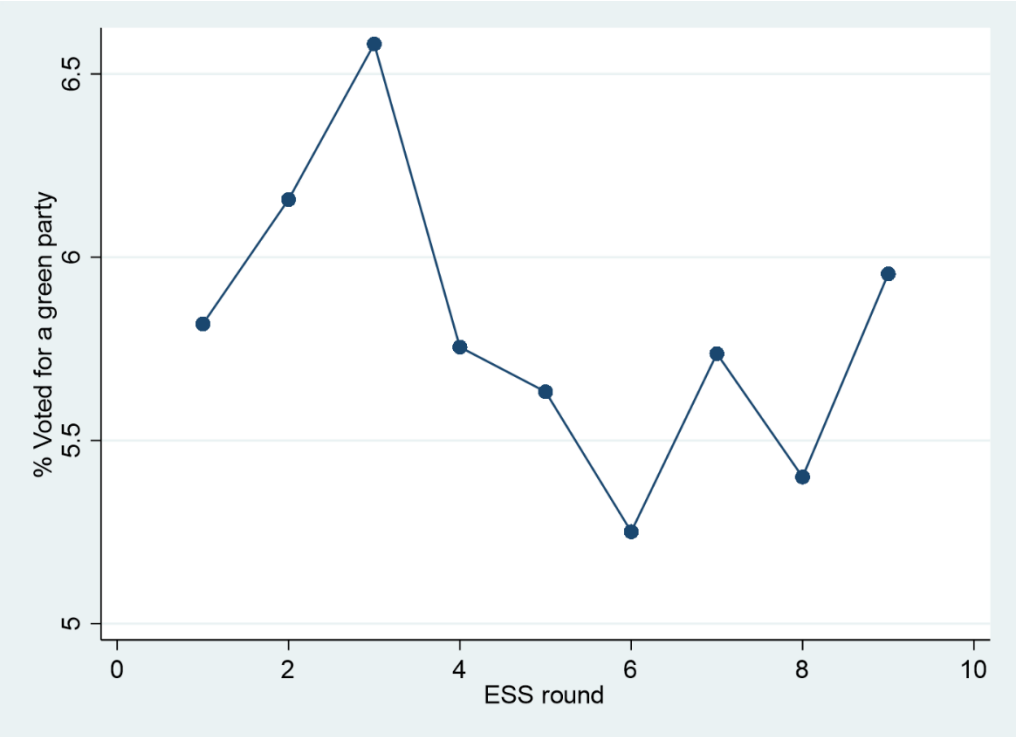

Figure 7: The average voting percentage for green parties per survey round. The voting percentage is calculated by dividing the total amount of green party votes by the total amount of votes in the sample.

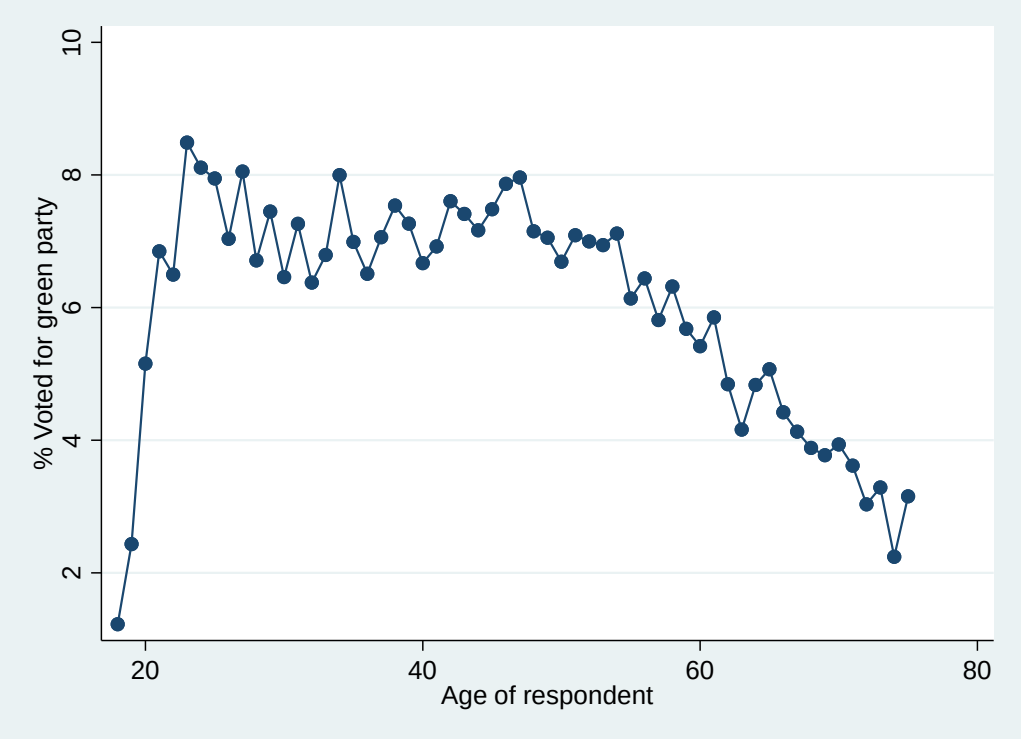

Figure 8: The average voting percentage for green parties per age. The voting percentage is calculated by dividing the total amount of green party votes by the total amount of votes in the sample.

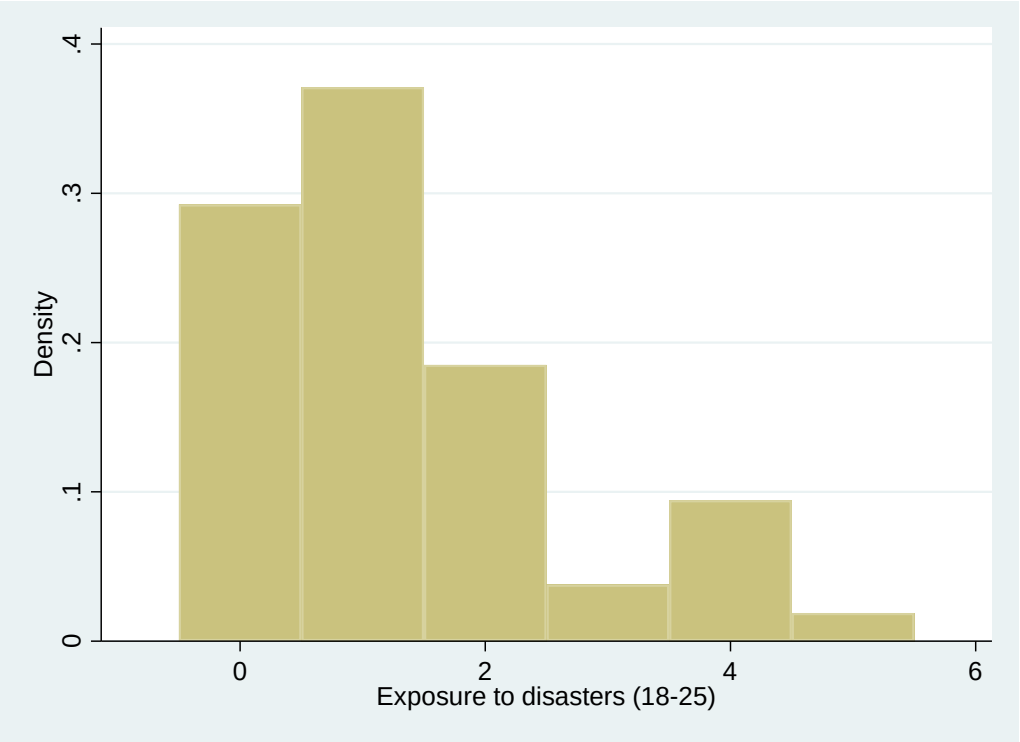

Figure 9: The distribution of the experienced disasters during the impressionable years by the respondents. The maximum possible experienced disasters are equal to 5.

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Table 3: Wald test

Panel A: > β1	P-value	F - statistic
β2	0.00***	50.62
β3	0.01***	6.66
β4	0.00***	17.16
β5	0.01***	10.47
Panel B: < β5		
β1	0.01***	10.47
β2	0.60	0.27
β3	0.26	1.27
β4	0.29	1.12

Notes: The p-values and F-statistics are estimated with the Wald test.

Table 5: *Dependent variable*:	Voting for a green party	Preference for a green party
	(1)	(2)
Exposure to disaster (18-25)	0.005****	0.006***
	(0.001)	(0.001)
Individual Characteristics	Yes	Yes
Household Characteristics	Yes	Yes
Age FE	Yes	Yes
Country FE	Yes	Yes
Year FE	Yes	Yes
N	192097	192097

Notes: The coefficients are estimated with an OLS regression. The dependent variable, vote for a green party, is a dummy variable and is equal to 1 if the respondent votes for a party that has strong ideals towards protecting the environment. The dependent variable, prefer a green party, is a dummy variable and is equal to 1 if the respondent feels closest to a party that has strong ideals towards protecting the environment. Exposure to disaster (18-25) is a dummy variable and is equal to 1 if the respondent experienced an environmental disaster in their impressionable years. Exposure to disaster = 1 represents the respondents that have experienced exactly one environmental disaster during their impressionable years (18-25). The individual characteristics consist of education level, religion, and gender. The household characteristics consist of the household income and the presents of children in the household. The standard errors are in the parentheses. ∗Significant at the 0.1 level; ∗∗significant at the 0.05 level; ∗∗∗significant at the 0.01 level.

Table 6: Wald test

Panel A: > β1	P-value	Chi-squared
β2	0.00***	43.29
β3	0.00***	73.83
β4	0.00***	30.39
β5	0.00***	8.39
Panel B: < β3		
β1	0.00***	73.83
β2	0.00***	19.57
β3	0.00***	16.27
β4	0.01***	7.15

Notes: The p-values Chi-squared values are estimated with the Wald test.

Table 7: *Dependent variable*: Prefer a green party

	(1)	(2)	(3)	(4)
Exposure to disaster (18-25)	-0.002	0.169***		
	(0.023)	(0.025)		
Exposure to disaster = 1			-0.130***	0.065**
			(0.027)	(0.028)
Exposure to disaster = 2			0.060**	0.273***
			(0.030)	(0.033)
Exposure to disaster = 3			0.238***	0.436***
			(0.051)	(0.053)
Exposure to disaster = 4			0.155***	0.256***
			(0.036)	(0.038)
Exposure to disaster = 5			0.117***	0.199***
			(0.073)	(0.075)
Individual Characteristics	No	Yes	No	Yes
Household Characteristics	No	Yes	No	Yes
Age FE	No	Yes	No	Yes
Country FE	No	Yes	No	Yes
Year FE	No	Yes	No	Yes
N	192097	192097	192097	192097
Pseudo R^2	0.04	0.09	0.05	0.10

Notes: The coefficients are estimated with a logit regression. The dependent variable, prefer a green party, is a dummy variable and is equal to 1 if the respondent feels closest to a party that has strong ideals towards protecting the environment. Exposure to disaster (18-25) is a dummy variable and is equal to 1 if the respondent experienced an environmental disaster in their impressionable years. Exposure to disaster = 1 represents the respondents that have experienced exactly one environmental disaster during their impressionable years (18-25). The individual characteristics consist of education level, religion, and gender. The household characteristics consist of the household income and the presents of children in the household. The standard errors are in the parentheses. ∗Significant at the 0.1 level; ∗∗significant at the 0.05 level; ∗∗∗significant at the 0.01 level.

Table 9: *Dependent variable*: Voting for a green party

	(1)	(2)
Panel A: Age 0-9		
Exposure to disaster (0-9) = 1	0.493***	0.433***
	(0.032)	(0.037)
Exposure to disaster (0-9) > 1	0.404***	0.449***
	(0.035)	(0.036)
Exposure to disaster (18-25) = 1		-0.068**
		(0.029)
Exposure to disaster (18-25) > 1		0.137***
		(0.036)
Panel B: Age 10-17		
Exposure to disaster (10-17) = 1	0.175***	0.155***
	(0.027)	(0.028)
Exposure to disaster (10-17) > 1	0.202***	0.162***
	(0.028)	(0.030)
Exposure to disaster (18-25) = 1		0.046*
		(0.029)
Exposure to disaster (18-25) > 1		0.222***
		(0.026)
Panel C: Age 26-33		
Exposure to disaster (26-33) = 1	0.106***	0.142***
	(0.028)	(0.030)
Exposure to disaster (26-33) > 1	0.348***	0.307***
	(0.029)	(0.029)
Exposure to disaster (18-25) = 1		0.029
		(0.030)
Exposure to disaster (18-25) > 1		0.186***
		(0.030)
Panel D: Age 34-41		
Exposure to disaster (33-41) = 1	-0.090***	-0.006
	(0.028)	(0.028)
Exposure to disaster (33-41) > 1	-0.024	0.181***
	(0.032)	(0.037)
Exposure to disaster (18-25) = 1		-0.021
		(0.028)
Exposure to disaster (18-25) > 1		0.267***
		(0.028)
Panel E: Age 42-49		
Exposure to disaster (42-49) = 1	-0.036	-0.033
	(0.027)	(0.028)
Exposure to disaster (42-49) > 1	-0.274***	-0.211***
	(0.039)	(0.040)
Exposure to disaster (18-25) = 1		0.020
		(0.027)
Exposure to disaster (18-25) > 1		0.200***
		(0.028)
Controls	Yes	Yes
N	293513	293513

Table 10: *Dependent variable*: Preference for a green party

	(1)	(2)
Panel A: Age 0-9		
Exposure to disaster (0-9) = 1	0.337***	0.266***
	(0.033)	(0.038)
Exposure to disaster (0-9) > 1	0.141***	0.171***
	(0.036)	(0.036)
Exposure to disaster (18-25) = 1		0.002
		(0.031)
Exposure to disaster (18-25) > 1		0.156***
		(0.038)
Panel B: Age 10-17		
Exposure to disaster (10-17) = 1	0.176***	0.166***
	(0.029)	(0.030)
Exposure to disaster (10-17) > 1	0.116***	0.084***
	(0.030)	(0.032)
Exposure to disaster (18-25) = 1		0.097***
		(0.030)
Exposure to disaster (18-25) > 1		0.281***
		(0.028)
Panel C: Age 26-33		
Exposure to disaster (26-33) = 1	0.012	0.058*
	(0.029)	(0.031)
Exposure to disaster (26-33) > 1	0.345***	0.308***
	(0.031)	(0.031)
Exposure to disaster (18-25) = 1		0.060*
		(0.031)
Exposure to disaster (18-25) > 1		0.198***
		(0.031)
Panel D: Age 34-41		
Exposure to disaster (33-41) = 1	-0.101***	-0.011
	(0.030)	(0.030)
Exposure to disaster (33-41) > 1	0.018	0.248***
	(0.035)	(0.041)
Exposure to disaster (18-25) = 1	0.034	0.034
		(0.029)
Exposure to disaster (18-25) > 1		0.336***
		(0.030)
Panel E: Age 42-49		
Exposure to disaster (42-49) = 1	0.053*	-0.031
	(0.029)	(0.030)
Exposure to disaster (42-49) > 1	-0.254***	-0.190***
	(0.043)	(0.040)
Exposure to disaster (18-25) = 1		0.079***
		(0.027)
Exposure to disaster (18-25) > 1		0.253***
		(0.029)
Controls	Yes	Yes
N	293513	293513

Table 12: *Dependent variable:*	Voting for a green party		Preference for a green party	
	(1)	(2)	(3)	(4)
Exposure to disaster (18-25)	0.038		0.014	
	(0.057)		(0.055)	
Exposure to disaster (18-25) * age 26-33	-0.101		-0.084	
	(0.083)		(0.084)	
Exposure to disaster (18-25) * age 34-50	0.086		0.219***	
	(0.067)		(0.067)	
Exposure to disaster (18-25) * age 51-75	0.074		0.215***	
	(0.083)		(0.088)	
Exposure to disaster (0-9)		0.388***		0.075
		(0.064)		(0.058)
Exposure to disaster (0-9) * age 26-33		-0.222		0.256
		(0.176)		(0.187)
Exposure to disaster (0-9) * age 34-50		-0.254		-0.331**
		(0.146)		(0.153)
Exposure to disaster (0-9) * age 51-75		-0.007		0.295***
		(0.076)		(0.076)
Individual Characteristics	Yes	Yes	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	192097	192097	192097	192097

Notes: The coefficients are estimated with a logit regression. The dependent variable, prefer a green party, is a dummy variable and is equal to 1 if the respondent feels closest to a party that has strong ideals towards protecting the environment. The dependent variable, voting for a green party, is a dummy variable and is equal to 1 if the respondent voted for a party that has strong ideals towards protecting the environment. Exposure to disaster (18-25) is a dummy variable and is equal to 1 if the respondent experienced an environmental disaster in their impressionable years. The variable age 34-50 is a dummy variable that equals 1 if the respondent is between the age of 34 and 50. The individual characteristics consist of education level, religion, and gender. The household characteristics consist of the household income and the presents of children in the household. The standard errors are in the parentheses. ∗Significant at the 0.1 level; ∗∗significant at the 0.05 level; ∗∗∗significant at the 0.01 level.

REFERENCES

Aksoy, C. G., Eichengreen, B., & Saka, O. (2020a). The Political Scar of Epidemics (No. 13351). *Institute of Labor Economics* (IZA).

Aksoy, C. G., Eichengreen, B., & Saka, O. (2020b). Revenge of the Experts: Will COVID-19 Renew or Diminish Public Trust in Science?. Available at SSRN 3613554.

Alvarez, R. M., Boehmke, F. J., & Nagler, J. (2006). Strategic voting in British elections. *Electoral Studies*, 25(1), 1-19.

Baumol, W. J., & Oates, W. E. (1993). Economics, environmental policy, and the quality of life. *Gregg Revivals.*

Bell, B., & Cacciottolo, M. (2017, March 17). Torrey Canyon oil spill: The day the sea turned black. Retrieved from BBC News: https://www.bbc.com/news/uk-england-39223308

Bianchi, E. C. (2013). The bright side of bad times: The affective advantages of entering the workforce in a recession. *Administrative Science Quarterly*, 58(4), 587-623.

Birkland, T. A. (1997). After disaster: Agenda setting, public policy, and focusing events. *Georgetown University Press.*

Birkland, T. A. (1998). In the wake of the Exxon Valdez: How environmental disasters influence policy. Environment: *Science and Policy for Sustainable Development*, 40(7), 4-32.

Brown, D. L., Guidry, R. P., & Patten, D. M. (2009). Sustainability reporting and perceptions of corporate reputation: An analysis using fortune. *Advances in Environmental Accounting & Management*, 4, 83-104.

Brundtland, G. (1987). Our Common Future. *World Commission on Environment and Development: Brussels*.

Busch, T., Bauer, R., & Orlitzky, M. (2016). Sustainable development and financial markets: Old paths and new avenues. *Business & Society*, 55(3), 303-329.

Carrington, D. (2019, June 5). Public concern over environment reaches record high in UK. Retrieved from The guardian Web site: https://www.theguardian.com/environment/2019/jun/05/greta-thunberg-effect-public-concern-over-environment-reaches-record-high

Casey, P. J., & Scott, K. (2006). Environmental concern and behaviour in an Australian sample within an ecocentric–anthropocentric framework. *Australian Journal of Psychology*, 58(2), 57-67.

Chang, S. E., Stone, J., Demes, K., & Piscitelli, M. (2014). Consequences of oil spills: a review and framework for informing planning. *Ecology and Society*, 19(2).

Cho, C. H., Guidry, R. P., Hageman, A. M., & Patten, D. M. (2012). Do actions speak louder than words? An empirical investigation of corporate environmental reputation. *Accounting, organizations and society*, 37(1), 14-25.

Cotofan, M., Cassar, L., Dur, R., & Meier, S. (2020). Macroeconomic Conditions When Young Shape Job Preferences for Life. Working paper

Darmofal, D. (2010). Re-examining the calculus of voting. *Political Psychology*, 31(2), 149-174.

Davidson, Art. "ES&T Books: In the Wake of the Exxon Valdez: The Devastating Impact of the Alaska Oil Spill." *Environmental Science & Technology 24*, no. 10 (1990): 1468-1468.

Dietz, T., Kalof, L., & Stern, P. C. (2002). Gender, values, and environmentalism. *Social science quarterly*, 83(1), 353-364.

Directorate-General for European Civil Protection and Humanitarian Aid Operations (ECHO) (European Commission). (2017). Overview of natural and man-made disaster risks the European Union may face. *Publication Office of the European Union*.

Dunlap, R. E., & Catton Jr, W. R. (1979). Environmental sociology. *Annual review of sociology*, 5(1), 243-273.

Erikson, K. (1994). A new species of trouble. *New York: WW Norton.*

Evans, S. M., Gill, M. E., & Marchant, J. (1996). Schoolchildren as educators: the indirect influence of environmental education in schools on parents' attitudes towards the environment*. Journal of Biological Education*, 30(4), 243-248*.*

Giuliano, P., & Spilimbergo, A. (2014). Growing up in a Recession. *Review of Economic Studies*, 81(2), 787-817.

Glenn, N. D. (1974). Aging and conservatism. *The ANNALS of the American Academy of Political and Social Science*, 415(1), 176-186.

Goebel, J., Krekel, C., Tiefenbach, T., & Ziebarth, N. R. (2015). How natural disasters can affect environmental concerns, risk aversion, and even politics: evidence from Fukushima and three European countries. *Journal of Population Economic*s, 28(4), 1137-1180.

Hatemi, P. K., Funk, C. L., Medland, S. E., Maes, H. M., Silberg, J. L., Martin, N. G., & Eaves, L. J. (2009). Genetic and environmental transmission of political attitudes over a life time. *The Journal of Politics*, 71(3), 1141-1156.

Hazlett, C., & Mildenberger, M. (2020). Wildfire Exposure Increases Pro-Environment Voting within Democratic but Not Republican Areas. *American Political Science Review*, 1-7.

Hernan, R. E. (2010). This borrowed earth: lessons from the fifteen worst environmental disasters around the world. Palgrave Macmillan.

Jaeger, H. (1985). Generations in history: Reflections on a controversial concept. *History and Theory*, 24(3), 273-292.

Kahn, M. E. (2007). Environmental disasters as risk regulation catalysts? The role of Bhopal, Chernobyl, Exxon Valdez, Love Canal, and Three Mile Island in shaping US environmental law*. Journal of Risk and Uncertainty*, 35(1), 17-43.

Karpoff, J. M., Lott, Jr, J. R., & Wehrly, E. W. (2005). The reputational penalties for environmental violations: Empirical evidence. *The Journal of Law and Economics*, 48(2), 653-675.

Kearney, M. S., & Levine, P. B. (2015). Media influences on social outcomes: The impact of MTV's 16 and pregnant on teen childbearing. *American Economic Review*, 105(12), 3597-3632.

Kingston, P. F. (2002). Long-term environmental impact of oil spills. *Spill Science & Technology Bulletin*, 7(1-2), 53-61.

Krosnick, J. A., & Alwin, D. F. (1989). Aging and susceptibility to attitude change. *Journal of personality and social psychology*, 57(3), 416.

Kurtz, R. S. (2004). Coastal Oil Pollution: Spills, Crisis, and Policy Change 1. *Review of Policy Research*, 21(2), 201-219.

Laudenbach, C., Malmendier, U., & Niessen-Ruenzi, A. (2019, May). Emotional tagging and belief formation: The long-lasting effects of experiencing communism. In *AEA Papers and Proceedings,* Vol. 109, pp. 567-71.

Lampert, M., Metaal, S., Liu, S., Gambarin, L. (2019). *Global rise in environmental concern*. Amsterdam: Glocalities.

Mannheim, K. (1952). The problem of generations. In P. Kecskemeti (Ed.), *Essays on the sociology of knowledge*, pp. 276-322.

McConnell, K. E. (1997). Income and the demand for environmental quality. *Environment and development Economics*, 383-399.

Munoz, F., Vargas, M., & Marco, I. (2014). Environmental mutual funds: Financial performance and managerial abilities. *Journal of Business Ethics*, 124(4), 551-569.

Newcomb, T. M., Koenig, K. E., Hacks, R., & Warwick, D. P. (1967). Persistence and change: Bennington College and its students after 25 years. *New York: Wiley*.

Osborne, D., Sears, D. O., & Valentino, N. A. (2011). The end of the solidly democratic South: The impressionable-years hypothesis. *Political Psychology*, 32(1), 81-108.

Parrado, S. (2018). The culture of risk regulation: Responses to environmental disasters. *Regulation & Governance.*

Payne, S., Summers, D. A., & Stewart, T. R. (1973). Value differences across three generations. *Sociometry*, 20-30.

Pennebaker, J. W., & Banasik, B. L. (1997). On the creation and maintenance of collective memories: History as social psychology. *Collective memory of political events: Social psychological perspectives,* 3-19

Salthouse T. A. (1996). The processing-speed theory of adult age differences in cognition. *Psychological Review*, 103, 403–428

Schuman, H., & Rodgers, W. L. (2004). Cohorts, chronology, and collective memories. *Public opinion quarterly*, 68(2), 217-254.

Sears, David O., and Sheri Levy. 2003. Childhood and Adult Political Development. *Oxford Hand- book of Political Psychology*, 60-109, Oxford: Oxford University Press.

Sears, D. O., & Valentino, N. A. (1997). Politics matters: Political events as catalysts for preadult socialization. *American Political Science Review*, 91(1), 45-65.

Sears, D. O. & Valentino, N. A., (1998). Event-driven political communication and the preadult socialization of partisanship. *Political Behavior*, 20(2), 127-154.

Sunstein, C. R., & Kuran, T. (1999). Availability Cascades and Risk Regulation, *Stanford Law Review* 51(4), 683–768.

Richardson, B. (1994). Socio-technical disasters: profile and prevalence*. Disaster Prevention and Management: An International Journal*.

Shabecoff, P. (1989). Six groups urge boycott of Exxon. *New York Times*, A17.

Shaluf, I. M. (2007). An overview on disasters. Disaster Prevention and Management: *An International Journal*.

Starbird, K., Dailey, D., Walker, A. H., Leschine, T. M., Pavia, R., & Bostrom, A. (2015). Social media, public participation, and the 2010 BP Deepwater Horizon oil spill. *Human and Ecological Risk Assessment: An International Journal*, 21(3), 605-630.

Strömberg, D. (2004). Mass media competition, political competition, and public policy. *The Review of Economic Studies*, 71(1), 265-284.

Tessler, M., Konold, C., & Reif, M. (2004). Political generations in developing countries: Evidence and insights from Algeria. *Public Opinion Quarter*ly, 68(2), 184-216.

Tilley, J. (2002). Political Generations and Partisanship in the UK, 1964–1997. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 165(1), 121-135.

Torry, W. I., Anderson, W. A., Bain, D., Otway, H. J., Baker, R., D'Souza, F., & Watts, M. (1979). Anthropological studies in hazardous environments: Past trends and new horizons. *Current anthropology*, 20(3), 517-540.

Tyler, T. R., & Schuller, R. A. (1991). Aging and attitude change. *Journal of Personality and Social Psychology*, 61(5), 689.

Viscusi, W. K., & Zeckhauser, R. J. (2006). National survey evidence on disasters and relief: Risk beliefs, self-interest, and compassion*. Journal of Risk and Uncertainty*, 33(1-2), 13-36.

Wood, W. (1982). Retrieval of attitude-relevant information from memory: Effects on susceptibility to persuasion and on intrinsic motivation. *Journal of Personality and Social Psychology*, 42, 798-810

Wray-Lake, L., Flanagan, C. A., & Osgood, D. W. (2010). Examining trends in adolescent environmental attitudes, beliefs, and behaviors across three decades. *Environment and behavior*, 42(1), 61-85.

APPENDIX

	R1 02	R2 04	R3 06	R4 08	R5 10	R6 12	R7 14	R8 16	R9 18
Albania						•			◦
Austria	•	•	•	•	•		•	•	•
Belgium	•	•	•	•	•	•	•	•	•
Bulgaria			•	•	•	•			•
Croatia				•	•				◦
Cyprus			•	•	•	•			•
Czechia	•	•		•	•	•	•	•	•
Denmark	•	•	•	•	•	•	•		◦
Estonia		•	•	•	•	•	•	•	•
Finland	•	•	•	•	•	•	•	•	•
France	•	•	•	•	•	•	•	•	•
Germany	•	•	•	•	•	•	•	•	•
Greece	•	•		•	•				
Hungary	•	•	•	•	•	•	•	•	•
Iceland		•				•		•	◦
Ireland	•	•	•	•	•	•	•	•	•
Israel	•			•	•	•	•	•	
Italy	•	•				•		•	•
Kosovo						•			
Latvia			•	•			◦		◦
Lithuania				•	•	•	•	•	◦
Luxembourg	•	•							
Montenegro									◦
Netherlands	•	•	•	•	•	•	•	•	•
Norway	•	•	•	•	•	•	•	•	•
Poland	•	•	•	•	•	•	•	•	•
Portugal	•	•	•	•	•	•	•	•	◦
Romania			•	•					◦
Russian Federation			•	•	•	•		•	
Serbia									•
Slovakia		•	•	•	•	•			◦
Slovenia	•	•	•	•	•	•	•	•	•
Spain	•	•	•	•	•	•	•	•	◦
Sweden	•	•	•	•	•	•	•	•	◦
Switzerland	•	•	•	•	•	•	•	•	•
Turkey		•		•					
Ukraine		•	•	•	•	•			
United Kingdom	•	•	•	•	•	•	•	•	•

Table A.1: Overview of the participation of every country in every round of the European Social Survey. The light grey dot indicates that the country did participate, but the data is not yet released. (source: https://www.europeansocialsurvey.org/data/#

Table A.2: Overview of environmental disasters

Name	Year	Country	Description
The London fog	1952	England	A thick layer of smog with severe air pollution over the city of London.
The Windscale fire	1957	England	Nuclear accident that released nuclear fallout over a large part of Europe.
Torrey Canyon oil spill	1967	England	Oil spill on the southwest coast of the UK that affected the coast of the UK and France.
The Seveso disaster	1976	Italy	An accident that caused severe chemical pollution in regions in Italy.
Three Mile Island accident	1979	United States	A nuclear meltdown that released radioactive gases in the environment of Pennsylvania.
Bhopal gas tragedy	1984	India	Gas leak incident that released highly toxic substances in regions in India.
The Chernobyl disaster	1986	Ukraine	Nuclear accident that contaminated the air with nuclear radiation in Russia and Europe.
Sandoz chemical spill	1986	Switzerland	Chemical spill that released toxic chemicals in the Rhine river and carried it through Europe.
Exxon Valdez oil spill	1989	Alaska	Oil spill by Exxon Valdez that polluted the waters and coast of Alaska.
Oil fires Kuwait	1991	Kuwait	Oil wells and created oil lakes were set on fire by Iraqi military forces.
Deepwater Horizon oil spill	2010	United States	Explosion of the Deepwater Horizon drilling rig caused severe oil leakage in the Gulf of Mexico.

	R1 02	R2 04	R3 06	R4 08	R5 10	R6 12	R7 14	R8 16	R9 18
Albania						•			
Austria									
Belgium									
Bulgaria			•	•	•	•			•
Croatia					•				
Cyprus									
Czechia		•		•	•	•		•	•
Denmark									
Estonia		•	•						
Finland									
France									
Germany									
Greece	•	•							
Hungary		•	•	•					
Iceland						•			
Ireland									
Israel	•			•	•	•		•	
Italy	•	•				•		•	•
Kosovo						•			
Latvia									
Lithuania									
Luxembourg									
Montenegro									
Netherlands									
Norway				•		•			
Poland	•	•	•	•	•	•	•	•	•
Portugal	•	•		•		•	•		
Romania			•	•					
Russian Federation			•		•	•			
Serbia									•
Slovakia		•		•	•	•			
Slovenia	•	•	•		•	•			•
Spain	•		•		•	•	•		
Sweden									
Switzerland									
Turkey		•		•					
Ukraine		•	•	•	•	•			
United Kingdom									

Table A.3: An overview of the countries that are deleted based on the missing option to vote on a green party. The black dot indicates that the observations of the country is deleted for that specific survey round.