The dimensions of public opinion on climate change:
belief, issue salience and support for government action

By

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A thesis

submitted to the Victoria University of Wellington
in fulfilment of the requirements for the degree of
Doctor of Philosophy

Victoria University of Wellington

2020

Abstract

Climate change is a problem that requires urgent attention. In most countries, large sections of the population accept that climate change is happening and that it is a serious problem. Despite this, the political response in many developed nations has so far been inadequate, and emissions continue to climb globally. Some authors have used this apparent lack of policy responsiveness to public preferences as evidence that vested interests have excessive influence over climate change policy. But this perspective does not fully account for the complexity of climate change opinion. For instance, many people who are highly concerned about climate change rank it as a low priority issue compared with issues such as the economy, healthcare and education. Moreover, some people who believe that climate change is happening and is a serious problem do not support government action to address it.

I therefore investigate public opinion on climate change in terms of three dimensions: belief, issue salience and support for government action. Focussing on developed countries, I rely on survey data from Eurobarometer, the New Zealand Election Study and data collected as part of this research project. I investigate the nature of opinions with respect to these three dimensions and examine how opinions vary between individuals and across countries. Furthermore, I investigate the forces that shape climate opinion on these three dimensions, including external influence (such as messages from interest groups), individual characteristics (such as social and political attitudes) and country-level factors (such as country wealth).

I find that belief is high in most developed countries, as is support for government action. However, salience is low in most countries, particularly in the less wealthy developed countries. Political orientation and other social attitudes relate positively to belief, issue salience and support for government action, although the relationships tend to be stronger for salience. By investigating the factors that shape climate opinion in different dimensions, this study contributes to knowledge of why people hold particular climate views. Moreover, my examination of the complexity of public opinion on climate change in terms of belief, issue salience and support for government action sheds light on why the political response to climate change has been ineffective in many countries.

Acknowledgements

I am very grateful for the guidance and support of both my supervisors, Hilde Coffé and Ralph Chapman. Hilde's advice on how to conduct quantitative research and, particularly, how to frame the results in a way that a reader can connect to, has been invaluable. Ralph has also frequently used his broad knowledge of climate change to help point me in the right direction. I hope that now I've reached the end of this journey, I can find ways to continue working with both of you. In addition, I'd like to thank all those I've discussed this research project with over the years, whether at conferences, online or in passing.

There are many other people around Victoria University of Wellington who have helped me out in various ways over the last few years. All of the academic staff that I've interacted with in the Political Science and International Relations programme (as a tutor, research assistant or student) have been helpful, professional and friendly. The professional staff, too, have been amazing, particularly Jonette Crysell and Sam Bigwood. There has also been a fantastic community spirit among the Political Science/International Relations postgraduates, which has really helped to stave off the feelings of isolation at times. On top of that, the Postgraduate Students Association has been an exceptional resource, and I greatly value my time on the executive. Finally, Lisa Woods has offered invaluable statistical advice, the staff at the Faculty of Graduate Research have provided first-class seminars and other help (particularly Lizzie Towl) and the team behind the Rāpoi cluster have also done an outstanding job, and have been very helpful.

I also need to acknowledge the (approximately) 800 anonymous respondents who participated in my survey. Your input was vital for my research, and I trust that my reporting on your responses has been sufficiently diligent. I would also like to thank the teams behind the Eurobarometer and the New Zealand Election Study for running excellent projects and making their data so easily accessible.

The analyses conducted in this thesis have made extensive use of open source tools, particularly R and a number of packages from CRAN. Thank you to all the authors of this software, many of who are volunteers. I am particularly grateful to the package maintainers who tolerated my bug reports and reviewed and merged my bug fixes. Additionally, I am grateful to the developers of L^AT_EX, who provide an excellent document authoring

tool.

Finally, I'd like to thank Pinky, for her patience and understanding throughout the last few years. And also to Julie, who is extremely high maintenance, but is (mostly) a good girl.

Contents

Abstract	ii
Acknowledgements	iii
Contents	v
List of Figures	x
List of Tables	xii
Nomenclature	xv
1 The climate change puzzle	1
1.1 The consequences of climate change and the international response so far	4
1.2 National-level climate policy in developed, liberal democracies	9
1.2.1 Narrowing the focus: the importance of developed, liberal democracies	9
1.2.2 Assessing the climate policy response in developed countries	11
1.3 Politics, complexity and climate policy	14
1.4 What shapes climate politics? Economic elites, corporations and public opinion	18
2 Dimensions of climate opinion and the forces that shape them	22
2.1 Selecting the critical dimensions of climate opinion	23
2.2 The dimensions in detail	27
2.2.1 Belief	27
2.2.2 Issue salience	30
2.2.3 Support for government action	34
2.2.4 Summary	36

2.3	What shapes climate opinions?	37
2.3.1	External influence	38
2.3.2	Individual characteristics	40
2.3.3	Country-level factors	42
2.3.4	Summary	42
2.4	Case selection	43
2.5	Summary of empirical chapters	44
3	Public opinion on climate change: belief and concern, issue salience and support for government action	47
3.1	Introduction	48
3.2	Theory	49
3.2.1	The dimensions of climate change opinion	49
3.2.2	Climate change opinion in the UK	53
3.2.3	Sociopolitical characteristics of the publics	54
3.3	Data and Method	56
3.4	Results	58
3.4.1	Latent Class Analysis	58
3.4.2	Sociopolitical Covariates	63
3.5	Discussion and Conclusion	67
	Chapter Appendix	72
3.A	Method	72
3.A.1	Data collection procedure	72
3.A.2	Survey weights	73
3.B	Data	76
3.C	Results	79
4	Cross-country variation in three dimensions of public opinion on climate change in the EU	86
4.1	Introduction	87
4.2	Theory	89
4.2.1	Dimensions of climate change opinion	89
4.2.2	Cross-country variation in climate change opinion and its causes	91
4.3	Data and Method	96
4.3.1	Dependent Variables	97
4.3.2	Individual-Level Explanatory Variables	98

4.3.3 Country-Level Explanatory Variables	99
4.3.4 Control variables	99
4.3.5 Analytic Strategy	99
4.4 Results	101
4.4.1 Descriptive Statistics	101
4.4.2 Multilevel Regression Analyses	103
4.4.3 Cross-level interactions	109
4.5 Discussion and Conclusion	111
Chapter Appendix	115
4.A Data	116
4.B Method details	119
4.B.1 Overview	119
4.B.2 Prior distributions	119
4.B.3 Model selection and testing	119
4.B.4 Survey weights	120
4.B.5 Predicted probability generation	120
4.C Results	121
4.C.1 Descriptive statistics	121
4.C.2 Bivariate correlations	123
4.C.3 Variation in country means of individual-level inde- pendent variables	124
4.C.4 Regression model coefficients	125
4.C.5 Regression coefficients for interaction models	130
4.C.6 Multi-category predicted probabilities for climate change seriousness	141
4.C.7 Climate change seriousness, 10 category analysis	142
5 To what extent do interest group messages shape the public's climate change policy preferences?	143
5.1 Introduction	144
5.2 The influence of interest group arguments on public opinion	145
5.2.1 Climate change interest group activity in the UK	149
5.3 Data and Method	151
5.4 Results	156
5.5 Discussion and conclusion	159
Chapter Appendix	164

5.A Survey Details - Prolific	164
5.B Descriptive statistics	165
5.C Results	169
6 Disentangling the relationships between conservative economic and social attitudes and support for environmental action	171
6.1 Introduction	172
6.2 Theory	173
6.2.1 Political orientation and environmental attitudes . . .	173
6.2.2 Conservative economic attitudes	175
6.2.3 Conservative social attitudes	177
6.2.4 Do conservative economic and social attitudes independently relate to environmental attitudes?	180
6.3 Data and Method	181
6.3.1 Dependent Variables	181
6.3.2 Explanatory Variables	182
6.3.3 Control variables	185
6.3.4 Analytic Strategy	185
6.4 Results	186
6.4.1 Descriptive Analyses	186
6.4.2 Explanatory Analyses	187
6.5 Discussion and conclusion	191
Chapter Appendix	195
6.A Control Variables	196
6.B Method	197
6.B.1 Multiple imputation	197
6.B.2 Prior specification	197
6.C Descriptive statistics	198
6.D Results	202
6.D.1 Regression coefficients for main analyses	202
6.D.2 Regression results for dependent variables with all categories	206
6.D.3 Interaction analyses	208
7 Discussion and Conclusion	209

7.1	The nature of belief, issue salience and support for government action	209
7.1.1	Belief	209
7.1.2	Issue Salience	211
7.1.3	Support for government action	212
7.2	The factors that shape climate opinion	213
7.2.1	Individual characteristics	213
7.2.2	Country-level factors	215
7.2.3	External Influence	215
7.3	The complexity of climate opinion	216
7.3.1	Belief	217
7.3.2	Issue salience	219
7.3.3	Support for government action	221
7.3.4	Stability of climate opinion	222
7.3.5	Other aspects of climate opinion	223
7.3.6	Summary	224
7.4	The relationship between climate opinion and policy	225
7.5	Issue salience and representative democracy	228
7.6	Concluding remarks	233
A	Appendix - Survey text	237
	Bibliography	248

List of Figures

3.1	Predicted probabilities of latent class membership by age (with 95% confidence intervals)	64
3.2	Predicted probabilities of latent class membership by left-right political orientation (with 95% confidence intervals)	64
3.3	Predicted probabilities of latent class membership by income (with 95% confidence intervals)	65
3.4	Predicted probabilities of latent class membership by possession of a degree (with 95% confidence intervals)	66
3.5	Predicted probabilities of latent class membership by gender (with 95% confidence intervals)	66
4.1	Plot of means for each of the dependent variables	102
4.2	Country-level standard deviation from each step of the analysis for each of the dependent variables	105
4.3	Predicted probabilities (with 95% credible intervals) of viewing climate change as a very serious problem for each explanatory variable	107
4.4	Predicted probabilities (with 95% credible intervals) of viewing climate change as important relative to other issues for each explanatory variable	108
4.5	Predicted probabilities (with 95% credible intervals) of believing the government is responsible for addressing climate change for each explanatory variable	109
4.6	Predicted probabilities (with 95% credible intervals) of supporting increased subsidies for renewable energy for each explanatory variable	110
4.7	Predicted probabilities (with 95% credible intervals) by levels of GDP per capita of seriousness and salience of climate change for different values of left-right orientation	111

4.8	Climate change seriousness, multi-category predicted probabilities plots (with 95% credible intervals)	141
4.9	Climate change seriousness, 10 category (linear multi-level model) predicted probabilities plots (with 95% credible intervals)	142
5.1	Predicted probabilities of the effect of the arguments for each dependent variable (with 95% confidence intervals)	157
5.2	Predicted probabilities of the effect of the arguments depending on the personal importance of climate change for each dependent variable (with 95% confidence intervals)	158
5.3	Predicted probabilities of the effect of the arguments/frame combinations for each dependent variable (with 95% confidence intervals)	160
6.1	Average marginal effects (with 95% credible intervals) of conservative attitudes and control variables on support for government action on climate change	188
6.2	Average marginal effects (with 95% credible intervals) of conservative attitudes and control variables on preference for protection of the environment over economic development	190
6.3	Support for government action dependent variable (all categories)	206
6.4	Environmental vs. Economy dependent variable (all categories)	207

List of Tables

3.1	Summary of possible climate change publics	52
3.2	Model fit statistics	59
3.3	Summary of Latent Classes	61
3.4	Summary of variables	76
3.5	Descriptive statistics	78
3.6	Full results of the latent class analysis	79
3.7	Multinomial logistic regression of sociopolitical covariates on latent class membership (reference class: denier)	83
3.8	Ordinal logistic regression of sociopolitical covariates on or- dinal climate change opinion measures	84
4.1	Summary of steps in regression analyses	100
4.2	Means and variation of country-level means for the dependent variables measuring climate change opinions	103
4.3	Correlations / Jaccard's coefficient between the dependent variables measuring climate change opinions	104
4.4	Summary of variables	116
4.5	Dependent variables (after observations with missing values on independent variables removed)	121
4.6	Independent variables (after observations with missing values on independent variables removed)	122
4.7	Bivariate correlations	123
4.8	Variation in country means of individual-level independent variables	124
4.9	Climate change seriousness (1 -> 2)	125
4.10	Climate change seriousness (2 -> 3)	126
4.11	Climate change salience	127
4.12	Government responsibility	128
4.13	Support for clean energy	129

4.14	Coefficients for interaction with GDP per capita for climate change seriousness (1 -> 2)	131
4.15	Coefficients for interaction with GDP per capita for climate change seriousness (2 -> 3)	132
4.16	Coefficients for interaction with GDP per capita for climate change salience)	133
4.17	Coefficients for interaction with GDP per capita for government responsibility	134
4.18	Coefficients for interaction with GDP per capita for support for clean energy	135
4.19	Coefficients for interaction with CO2 emissions per capita for climate change seriousness (1 -> 2)	136
4.20	Coefficients for interaction with CO2 emissions per capita for climate change seriousness (2 -> 3)	137
4.21	Coefficients for interaction with CO2 emissions per capita for climate change salience	138
4.22	Coefficients for interaction with CO2 emissions per capita for government responsibility	139
4.23	Coefficients for interaction with CO2 emissions per capita for support for clean energy	140
5.1	Summary of treatment and control groups	154
5.2	Descriptive statistics for all main variables	165
5.3	Descriptive statistics for all dependent variables by argument received	166
5.4	Descriptive statistics for all dependent variables by argument and frame received	167
5.5	Descriptive statistics for all socio-demographic and attitudinal statistics included in the survey	168
5.6	Binary and ordinal logistic regressions analysing the effect of arguments on attitudes towards climate change policies	169
5.7	Binary and ordinal logistic regressions for the effects of arguments and the use of frames and attitudes towards climate change policies	170
6.1	Summary of dependent variables	182
6.2	Summary of composite variables measuring conservative attitudes	183

6.3	Correlations between measures of conservative attitudes, left-right orientation, and support for environmental action	187
6.4	Summary of control variables	196
6.5	Counts, means and standard deviations of continuous independent variables	198
6.6	Counts for categorical independent variables	199
6.7	Counts for dependent variables	200
6.8	Independent variables correlation matrix	201
6.9	Regression coefficients for Support for climate change policy .	202
6.10	Regression coefficients for Environment vs. economy	204

Nomenclature

AME average marginal effect

CAT Climate Action Tracker

CCCM climate change counter-movement

CCS carbon-capture and sequestration

CO₂ carbon dioxide

ETS emissions trading scheme

GDP gross domestic product

GHG greenhouse gas

IPCC Intergovernmental Panel on Climate Change

MII most important issue

NDC nationally determined contributions

NZES New Zealand Election Study

RWA right-wing authoritarianism

SDO social dominance orientation

UNFCCC United Nations Framework Convention on Climate Change

Chapter 1

The climate change puzzle

As I read it, the scientific evidence is compelling: the global climate is changing as the earth's atmosphere gets warmer. Now, the Congress must begin to consider how we are going to slow or halt that warming trend and how we are going to cope with the changes that may already be inevitable. (US Senator Timothy E. Wirth, quoted in Shabecoff, 1988)

More than three decades ago, James Hansen and several other climate scientists testified to a US senate committee about the greenhouse effect (Shabecoff, 1988). Their testimony was based on scientific research beginning in the 1950s, indicating that climate change is happening, and is primarily driven by human activities (Peterson et al., 2008). The above quote, from one of the senators on this committee, shows that – even by 1988 – climate change was an issue that had begun to appear on the political agenda. Since then, our understanding of climate change has advanced substantially, as has our confidence that the causes are largely anthropogenic. It is now abundantly clear that climate change – if left to run its course – will cause catastrophic damage to global society during the 21st century and beyond (Arnell et al., 2013; Schellnhuber et al., 2016).

The situation, therefore, calls for swift action (Schleussner et al., 2016). If the world can reduce atmospheric global greenhouse gas (GHG) concentrations to the levels recommended by the Intergovernmental Panel on Climate Change (IPCC), it is possible that global temperatures will rise no more than 2°C above pre-industrial levels, meaning that the worst effects of climate change will be avoided. Beginning in the late 1980s, various jurisdictions – including those at the local, national

and international levels – have taken steps to curb emissions, ranging from international treaties, to emissions trading schemes, to subsidies on electric vehicles (Giddens, 2011). Throughout this period, however, global emissions have continued to climb (Boden et al., 2017; IEA, 2020). It appears that whatever actions have been taken so far have been inadequate (United Nations Environment Programme, 2019). The lack of sufficient action, which I expand on below, presents a puzzle: despite the increasing scientific certainty about the causes and effects of climate change, not enough action has been taken globally to address it. Why is this the case?

Many authors begin to answer this question by emphasising the “vested interests” of fossil fuel companies, some of which are among the largest companies in the world (Hein & Jenkins, 2017; Klein, 2015). These vested interests – which could face substantial economic losses during a transition to a low emissions world (Stern, 2015) – are thought by some to heavily influence climate change policy in many countries. They exert influence by lobbying politicians, contributing to political campaigns, spreading disinformation and fostering uncertainty about the science of climate change (Dunlap & McCright, 2015; Klein, 2015; McKibben, 2015; Supran & Oreskes, 2017). From this perspective, the concerns of economic elites and fossil fuel companies are at the front of politicians’ minds when they make decisions about climate policy (Hein & Jenkins, 2017). Klein (2015) even goes so far as to suggest that the present situation demonstrates that liberal capitalism is incompatible with effective mitigation of climate change.

Survey data on the public’s climate change views is sometimes used to support the perspective that vested interests are influencing climate policy (e.g. Greenpeace, 2011). In most countries a majority of the population are concerned about climate change – between 71% and 93% in developed countries (Pew Research Center, 2015) – and would like something to be done about it. The public thus appears to broadly accept the science of climate change and is concerned about the issue. However, even in democracies, where public opinion could be expected to have a strong influence over policy (Burstein, 2003; Dalton, 2013; Raile et al., 2014), governments have not addressed climate change sufficiently. It could therefore be assumed that politicians are ignoring the public with respect to climate policy, and are instead beholden to vested interests

(Klein, 2015).

However, the argument that the preferences of vested interests dominate the climate policy process – and, by implication, that public preferences have little impact on climate policy – does not account for the full complexity of public opinion on climate change. For example, previous research has revealed that, even though a majority of the public accepts that climate change is happening and is a serious problem, many rank it as a low priority issue (Bromley-Trujillo & Poe, 2018; Lorenzoni et al., 2006; M. C. Nisbet & Myers, 2007). Moreover, some individuals with high levels of concern do not support strong government action to address climate change (Drews & van den Bergh, 2016; Dreyer & Walker, 2013). In other words, while many studies on climate change opinion have investigated people's *beliefs* about climate change, few consider the extent to which there are differences among people who accept the science of climate change, in terms of dimensions such as issue salience and support for government action (Corry & Jørgensen, 2015). These differences among climate believers may be important when considering the relationship between public opinion and climate policy. In particular, politicians are unlikely to be moved to act by members of the public who are highly concerned about climate change, but who rank it as a low salience issue, or who do not support government policies to reduce emissions.

This thesis thus explores the nature of public opinion to address climate change with respect to three dimensions: belief, issue salience and support for government action. Belief in climate change refers to people's perceptions of the climate change phenomenon itself, including whether it is actually happening, is caused by humans and is a serious problem. Issue salience is the importance people ascribe to climate change relative to other issues, such as the economy, education and healthcare. Support for government action is the degree to which a person supports a response to climate change driven by the government, or particular government policies to address climate change. In chapter 2, I describe these dimensions in more detail.

I aim to answer two over-arching research questions relating to these dimensions. The first research question examines the three dimensions of climate opinion in terms of how they vary between individuals and across countries. The second research question asks to what extent different factors shape people's climate change opinions, with respect to the

dimensions of belief, issue salience and support for government action. These factors include external influence (such as messages from interest groups), individual characteristics (such as social and political attitudes) and country-level factors (such as country wealth). To answer these questions, I rely on survey data collected as part of this research project, as well as existing data from Eurobarometer and the New Zealand Election Study (NZES).

In the remainder of this introductory chapter, I aim to explain why public opinion is an important part of understanding the climate change puzzle. I begin by expanding on the problem of climate change, its possible consequences and the nature of the international response. I show that the measures that have been taken internationally to reduce GHG emissions have so far proved to be insufficient. In the third section, I explain my focus on developed liberal democracies, and why the state is central to understanding (the lack of) action to mitigate climate change. In the fourth section, I argue that while the complexity of climate change is partly to blame for the inadequate political response in developed countries, the politics of climate change has also held back the response. In the fifth section, I introduce some of the forces that influence the politics of climate change. In the next chapter, I explain why the particular dimensions of climate opinion that I have selected shed light on the politics of climate change.

1.1 The consequences of climate change and the international response so far

In this section, I first briefly describe our understanding of the likely consequences of climate change if the world continues on its current trajectory. I then detail the inadequacy of the global response so far.

Assuming that climate change policy remains insufficient in most countries, and emissions continue to climb, it is probable that average global temperatures will rise between 3°C and 5°C above pre-industrial levels by the end of this century (Sherwood et al., 2020; Tollefson, 2020). A temperature rise of this magnitude could lead to a wide range of natural consequences, many of which have been described in the Assessment Reports compiled by the IPCC (Field et al., 2014; Xu et al., 2020). Consequences include sea level rise, which has been projected to reach

up to one metre by 2100 (DeConto & Pollard, 2016; Horton et al., 2014; Tollefson, 2016). Weather patterns will also be affected, with increased precipitation or drought in some areas, as well as an increase in severe weather events, such as cyclones, heat waves and storms (Field et al., 2014). Finally, global warming will lead to rising ocean temperatures and ocean acidification, resulting in substantial negative effects on marine wildlife and ecosystems (Field et al., 2014; Gattuso et al., 2015).

These natural effects of climate change may lead to a number of consequences for global society (Field et al., 2014). For example, heat waves could result in an increase in health problems (Altizer et al., 2013; Coumou & Robinson, 2013) and changes in weather patterns and sea level rise could lead to migration and refugee crises (Reuveny, 2007; Xu et al., 2020). Temperature changes and extreme weather events could also disrupt food production systems, potentially leading to severe food shortages in some regions (Wheeler & von Braun, 2013). Interaction between the different effects of climate change may also increase the severity of the consequences for society. For example, some areas may experience an increase in the number of storms (and storm surges), the effects of which may be worse due to sea level rise (Field et al., 2014). These effects are likely to affect the poor and vulnerable with greater severity than the rich. For example, if climate change causes crops to fail, resulting in food shortages, the richer members of society may be more able to absorb price rises, while the poor may not (Winsemius et al., 2015). Another possible social consequence is an increase in political instability and (violent) conflict due to migration and increasingly scarce resources (particularly water) (Raleigh & Urdal, 2007; see also: Theisen et al., 2013; The White House, 2015).

To avoid the worst of these consequences, international agreements have set a goal of limiting warming to “well below” 2°C above pre-industrial levels (Schleussner et al., 2016). Although there is some controversy over this goal – with some arguing it is not stringent enough (Schleussner et al., 2016) – one of the reasons it was selected is due to the increased likelihood of tipping points beyond 2°C, which could trigger a much worse set of impacts (Lenton & Ciscar, 2013; Lenton et al., 2019). Important tipping points include loss of Arctic sea-ice, the collapse of polar ice sheets and disruption to monsoons in India and West Africa (Lenton & Ciscar, 2013; Lenton et al., 2019). Consequently, there may be

no half-measures when it comes to mitigating climate change: if the world is unable to keep temperatures under 2°C, it may then be impossible to avoid warming of up to 5°C, along with the worst of the consequences (Lenton & Ciscar, 2013; Steffen et al., 2018).¹ Moreover, efforts to reduce emissions cannot be delayed until the latter half of this century if temperature objectives are to be reached; as activist Bill McKibben puts it, “winning slowly is the same as losing” (McKibben, 2017).

It is clear, then, that despite the uncertainties, the risk of catastrophic – even existential – damage to society is substantial, and the consequences will affect the entire planet, albeit unevenly (Field et al., 2014; Gasper et al., 2011; Urry, 2015; Wheeler & von Braun, 2013). Therefore, only one prudent course of action is available to global society: to do everything possible to avoid or minimise the impact of the worst effects of climate change. There are, broadly, two types of response to climate change: mitigation and adaptation (Burkett et al., 2014). The former attempts to prevent further warming from happening by reducing GHG emissions, while the latter attempts to prepare for the effects of warming that may occur, for example by creating and extending sea walls to protect against sea level rise (Füssel, 2007). Historical emissions, and the fact that greenhouse gasses – particularly CO₂ – remain in the atmosphere for many years, mean that there is no way to avoid further warming over the course of the 21st century (Burkett et al., 2014). Some degree of adaptation is therefore unavoidable (Burkett et al., 2014). However, if global temperatures increase by over 4°C, adaptation is likely to be mostly ineffective, as the speed and magnitude of changes to the climate will be difficult for societies to manage (Burkett et al., 2014; M. S. Smith et al., 2011). Mitigation is therefore crucial, and for this reason, the focus of this thesis is on mitigation rather than adaptation.

Beginning in 1988, the international community initiated an effort to mitigate climate change, first by forming the IPCC and tasking it with increasing the clarity of the science of climate change (IPCC, 2013). In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted by the UN, and has now been ratified by 197 countries (UNFCCC, n.d.). Under the UNFCCC, two major international treaties intended to reduce emissions have been signed by countries encompassing the vast majority of global emissions. The first, the Kyoto

¹However, as Lenton and Ciscar (2013) point out, even staying within 2°C of warming is no guarantee of avoiding tipping points.

protocol, which entered into force in 2005, involved legally binding emissions reduction commitments for 43 industrialised countries (UNFCCC, 2014). While it was an important first step in reducing emissions (Metz, 2013), several limitations with the protocol (such as the fact that not all countries were subject to binding emissions reduction commitments) led to it being superseded by the Paris agreement in 2015 (Falkner, 2016). The latter agreement requires all participating countries – which, as of July 2020, number 187, accounting for 97% of global emissions (World Resources Institute, 2020) – to submit non-binding reports on their intended emissions reductions every 5 years. While this mechanism does mean that there are no legal consequences for countries which do not meet their emissions targets, at the very least, it allows for better accounting of what future global emissions trends might be (Clémentçon, 2016).

Reaching this level of international cooperation has not been an entirely straightforward process. While some countries have been eager to commit to the treaties, to contribute financially to the international regime and to adopt emissions reductions targets, others have been slower to do so (Bernauer, 2013). The US, for example, did not ratify the Kyoto protocol (Bodansky, 2010), and President Trump has withdrawn the US from the Paris agreement (Meyer, 2017) (although President-elect Biden has pledged to rejoin as soon as he takes office in early 2021). Canada, which initially ratified the Kyoto protocol, later withdrew along with several other countries (Falkner, 2016). These differences in the willingness of particular countries to participate in the international climate change regime demonstrate the different political forces operating in respective countries. I will return to these differences in the next section.

The existence of the UNFCCC and the treaties that have been constructed within it represent a significant global response to climate change. The mechanisms that have been put in place mean that there is a continued international focus on climate change, and that countries' current and intended future emissions can be catalogued. However, the only true measure of the effectiveness of such a regime is the extent to which it impacts on global emissions (Broadbent, 2010). Between 2014 and 2016 global CO₂ emissions did not increase substantially, a trend which was driven mostly by a reduction in coal use, particularly in China, as well as gains in energy efficiency (Jackson et al., 2017). However, the

subsequent years have shown a continued increase in global emissions, with a year-on-year increase of 1.5% in 2017, 2.1% in 2018 and 0.6% in 2019 (Jackson et al., 2019).²

It could be argued that, while emissions may currently be climbing, the world is still “on track” to remain well below 2°C of warming by 2100. Some assert that it may be possible to meet temperature objectives if emissions peak in 2020, or – with the use of negative emissions technology – as late as 2030 (Energy & Climate Intelligence Unit, 2015). However, even if emissions do peak by 2020, the necessary decline is still likely to be very difficult to achieve, and is beyond what den Elzen et al. (2010) have previously calculated as the maximum feasible rate of a 3 to 4% yearly reduction in global emissions (unless negative emissions technology can be deployed on a large scale). There is also uncertainty as to whether achieving the low emissions pathway specified by the IPCC will result in temperature increases below 2°C (Arnell et al., 2013; Sherwood et al., 2020). In sum, while it is impossible to be completely certain, it seems most likely that the world is not currently on track to remain under 2°C, and may soon reach (or have already reached) a point where such an objective is impossible to achieve (Anderson & Bows, 2011; den Elzen et al., 2010; Friedlingstein et al., 2014; Raftery et al., 2017). Current projections place warming by the end of the century around 3°C, even assuming substantial action to reduce emissions is taken in the mean time (Climate Action Tracker, 2019).³ The international climate change regime, then – while not without merit – has, so far, failed to achieve its most important goal (Jamieson, 2014).

There is now overwhelming evidence that anthropogenic climate change is not only occurring, but poses substantial risk to global society. The international community has taken steps to address the problem, action which began more than 30 years ago. Despite this, emissions have not been brought under control, and the world is facing catastrophic consequences unless global emissions soon begin to decline rapidly. In the next section, I explain how the interests of individual countries are crucial to understanding why more aggressive global action on climate

²The coronavirus pandemic and associated global economic downturn are likely to result in a substantial reduction in global emissions in 2020, projected to be as large as 7% (Le Quéré et al., 2020). This decrease is not primarily a result of climate policy, however, and therefore is unlikely to persist after the pandemic is over.

³Some models place the 2100 temperature increase as low as 2.35°C, assuming China meets its recent pledge of achieving carbon neutrality by 2060 (Pollitt, 2020)

change has so far not been taken.

1.2 National-level climate policy in developed, liberal democracies

The global climate response has not, so far, resulted in emissions reductions that are compatible with internationally agreed temperature targets. To understand why this is the case, it is useful to examine and compare the response in different countries. In this section, I explain how comparing responses in different countries can help to unravel the climate change puzzle, and that it is particularly helpful to examine developed, liberal democracies. I then briefly assess the overall climate policy response in these developed countries.

1.2.1 Narrowing the focus: the importance of developed, liberal democracies

Although global emissions are all that ultimately matter in terms of curbing climate change (Broadbent, 2010), to get a clearer picture of why the global response has so far been ineffective, it can be fruitful to examine the emissions records and policies to reduce emissions at the country-level. In fact, the most important actors in addressing climate change are the national-level governments of individual countries. The international regime outlined in the previous section can only be effective if countries are fully committed to reducing emissions (Aklin & Mildenberger, 2020). The importance of countries in shaping the climate response is best illustrated by the nature of the Paris agreement, which has emissions reduction pledges rather than binding targets at its heart (Cléménçon, 2016). Many states found it difficult to accept the binding targets of the Kyoto protocol, and negotiations around a successor agreement collapsed due to disputes over how emissions cuts should be distributed (Falkner, 2016). Fresh rounds of negotiations led to the Paris agreement, which did away with binding emissions targets. As a result, the ratification process for the Paris agreement was, in comparison to Kyoto, straightforward. It was much easier for countries to commit to making voluntary pledges to reduce emissions, rather than commit to targets which may be domestically unpopular (Falkner, 2016). In order to fully understand the climate

change puzzle, therefore, it is necessary to carefully scrutinise the actions and interests of individual countries (Broadbent, 2010; McGrath & Bernauer, 2017; Purdon, 2015; von Stein, 2008).

At the country level, the principal means of coordinating action to address a problem of the scale of climate change is through the state. While the actions of individuals, corporations, local governments and other institutions play an important role in reducing emissions, without some kind of coordinating drive at the state level it will be difficult to achieve the deep cuts in emissions that are required (Giddens, 2011). Coordination by national governments is required because of the problem of “free riding”, where individuals or organisations are able to benefit from the emissions reductions of others without taking the same actions themselves (Giddens, 2011). Thus, the public policy of various governments around the world – particularly those that make up a high percentage of global emissions, or are in a position to take a leadership role – is of vital importance to the world’s hopes of curtailing climate change.

Due to the centrality of individual countries in addressing climate change, I focus on national-level government policy and public opinion on climate change within these countries. Specifically, I focus on developed nations that are liberal democracies.⁴ These countries, although diverse, have similar political systems and sociopolitical contexts, meaning that they can be more easily compared than if developing or authoritarian nations are also included. This focus excludes some important emitters, in particular, China, Brazil, Russia and India. However, it includes countries that have been responsible for the majority of historical emissions, that are among the highest emitters per capita (Rocha et al., 2015), and that are currently responsible for a large proportion of the consumer demand leading to emissions in exporting countries such as China (Helm, 2015; C. L. Weber et al., 2008). Moreover, developed nations – in particular the US and EU nations – tend to have a greater input into world affairs than developing nations. Developed countries often take leadership roles in international agreements or organisations – such as the World Trade Organisation, the International Monetary Fund, or the various components of the UN – or veto action that they disapprove of. For example,

⁴While there are several definitions of the term “developed country”, this thesis considers the 37 member states of the OECD as developed countries. This definition has the advantage that all members are liberal democracies. For brevity, throughout this thesis, I will use the term “developed countries” to refer to this list of 37 OECD members.

the decision by the US not to ratify the Kyoto protocol caused climate negotiations to go into “deep freeze” for several years (Bodansky, 2010). Finally, developed nations are expected by many to act on climate change before developing nations, as they are richer and are therefore more able to absorb any associated costs (Harris, 1999).

A focus on developed countries includes some smaller countries that may appear to have little international influence, and may only make a small contribution to global emissions. However, these countries are still important, as they can exert influence within the developed nations “club”, and therefore have a role to play. An example of this for another international issue is New Zealand’s nuclear free stance of the 1980s, which opened up debate about the use of nuclear weapons and nuclear power across the developed world (Dalby, 1993).

Developed countries, then, are not only central to addressing the issue of climate change, but focussing on them allows for cross-country comparison. While, theoretically, my interest is in all developed countries, the empirical chapters focus on the UK, EU and New Zealand. I expand on my reasons for selecting these cases in section 2.4.

1.2.2 Assessing the climate policy response in developed countries

There are two ways to assess the record of a particular country: the level and change in GHG emissions (policy outcomes) and the policy that the national government has put in place to reduce emissions (policy outputs) (Bernauer, 2013). Although emissions levels are the ultimate measure of performance in addressing climate change, in a national context, policy outputs are also worth evaluating, as it is possible for a country to have poor policy outputs but good climate change outcomes (that is, their emissions are dropping) (Bättig & Bernauer, 2009; Howlett & Kemmerling, 2017). For example, a country may adopt a policy of moving high-emissions production to other countries, thus giving the appearance that the country has taken effective action on climate change, whereas global emissions have not been reduced (C. L. Weber et al., 2008). Below, I briefly assess the response to climate change in developed countries in terms of policy outcomes and outputs.

Beginning with policy outcomes, there is substantial variation in emissions reduction records among developed countries. A handful of coun-

tries have reduced their emissions considerably. For example, the UK now has lower levels of CO₂ emissions than it did in 1890, a change which has been driven by large-scale adoption of renewable energy generation, and increases in energy efficiency (Hausfather, 2019). Other countries, such as Sweden and Denmark, have made sizeable cuts relative to 1990, the year when mitigation efforts began in earnest (Ritchie & Roser, 2017). Several countries, including Australia, New Zealand, Canada and the US have seen no real change in emissions since 1990, although there has been a decline in emissions in these countries in the last decade, while emissions in South Korea and Turkey have continued to climb even in recent years (Ritchie & Roser, 2017).

Overall, despite significant variation between countries, policy outcomes in developed countries since 1990 have been insufficient. While emissions are declining or are flat in most developed countries, few – if any – countries have reduced their emissions in line with a path that would keep warming well below 2°C by 2100 (OECD, 2020). Therefore, deeper cuts will be required in developed countries over the coming decades.

The policy outputs of individual countries can be assessed by examining whether or not the country's government has put in place some of the “baseline” policies necessary to tackle climate change, as well as how effective these policies appear to be. Two such policies – which are relatively straightforward to evaluate – are a mechanism that creates a price on emissions, and an emissions reduction target. A price on emissions is considered by most experts to be required to properly account for the market externalities of emitting GHGs (Deep Decarbonization Pathways Project, 2015; Rockström et al., 2017; World Bank, 2020). Many national governments (as well as sub- and supra-national bodies) have instituted some kind of price on emissions, through either an emissions trading scheme (ETS), a carbon tax, or some combination of the two (World Bank, 2020). However, few countries include all emissions sectors, and few have systems encompassing substantially more than 50% of the country's emissions (World Bank, 2020). Notably, the US and Australia have no mandatory, national-level price on GHG emissions (World Bank, 2020).⁵ In countries that do have a price on carbon, that price is

⁵However, in both countries, some sub-national jurisdictions have instituted a price on emissions, and Australia has a voluntary federal emissions reduction credit scheme (World Bank, 2020).

almost universally too low to have a significant effect on emissions. While there is substantial disagreement over effective carbon prices, estimates suggest that the current price should be between \$US40 to \$US400 per tonne of CO₂ equivalent emitted (Chapman, 2015; Stiglitz et al., 2017; World Bank, 2020). However, few countries have a carbon price above \$US20 per tonne, and the global average price is under \$US2 per tonne (Newell et al., 2014; World Bank, 2020).

Turning to emissions reduction targets, as part of being party to the Paris agreement, all developed countries have compiled Nationally Determined Contributions (NDC), which include an emissions target. The online resource Climate Action Tracker (CAT) has assessed the targets of several countries, as well as the policies intended to meet those targets. All developed countries assessed by CAT are categorised as having at best “insufficient” policy, with some “highly insufficient” and the US “critically insufficient” (Climate Action Tracker, 2019). This indicates that none of the developed countries assessed by CAT are on track to reduce emissions to a level in line with the Paris temperature objectives. CAT assesses the EU – often seen as a world leader on climate change mitigation – as having an insufficient commitment to Paris goals and suggests that “the EU’s climate action needs to be accelerated and broadened” (Climate Action Tracker, 2019, p. 18). Other sources, while perhaps somewhat more optimistic, also highlight the policy inadequacy in many countries (e.g. Compston & Bailey, 2016; den Elzen et al., 2010; Rogelj et al., 2016). Assessments of G20 member states, for example, have found that few countries have submitted NDC’s compatible with Paris Agreement temperature targets and with notions of equity of responsibility for emissions reductions (Averchenkova & Matikainen, 2016; Robiou du Pont, 2017).

Moreover, in countries where emissions have been declining, the reasons for the decline may not contribute to an overall reduction in global emissions. For example, the US has seen a moderate decline in CO₂ emissions over the last decade. However, this decline is mostly attributable to an expanded use of natural gas for energy generation (de Gouw et al., 2014; Olivier et al., 2017). While burning natural gas generates lower emission levels than coal, extraction of natural gas can cause leakage of methane, meaning its overall contribution to warming can be higher than that of coal (Howarth, 2014; Zhang et al., 2014). Additionally, replacing coal with natural gas – rather than renewable energy generation – can

create path dependencies, meaning that future emission reductions are more difficult to achieve (Lazarus et al., 2015). In the wealthier countries, de-industrialisation can also be a factor, where heavy manufacturing is moved overseas, along with any associated emissions, thus giving the appearance of a reduction in the original country (C. L. Weber et al., 2008).

Based on these assessments of policy outcomes and outputs, overall, it seems that developed countries are not addressing climate change adequately. However, there have been a range of policy responses among developed countries, along with a range of resulting policy outcomes. The nature of the international system means that national governments, particularly those in developed, liberal democracies, play a central role in the international climate response. Therefore, when attempting to understand why more has not been done about climate change, it is useful to consider not just the world as a whole, but the differences between countries (Purdon, 2015).

1.3 Politics, complexity and climate policy

Given that the potentially catastrophic effects of climate change and the urgent need for action – as described in section 1.1 – have been known about for some time, explanations are required for why developed countries have largely failed to put in place adequate policies to address climate change. Plausible explanations include the complexity of climate change as an issue, and the politics surrounding the issue. I focus on the latter in this thesis, and specifically on the role that public opinion plays in political decision-making. However, it is worth bearing in mind the problems that complexity can create. In this section, I briefly examine how complexity and politics appear to have influenced climate policy, before discussing the role of public opinion (and other political factors) in the following section.

It is difficult to deny that climate change is a complex issue, due to its interaction with many aspects of the natural and social world, and its implications for many policy domains (Allan, 2017; Giddens, 2011; Steffen, 2011). This complexity makes it challenging for existing governance systems to conceptualise and address climate change, leading some to refer to it as a “super wicked” problem (Levin et al., 2012; Sun & Yang, 2016). In particular, the temporal and spatial characteristics of climate

change create substantial difficulties for decision-makers. The temporal dimension refers to the fact that climate change is a long-term issue that requires immediate action. While the worst effects of climate change may still be some decades away, the actions needed to prevent those effects – along with the associated costs of those actions – must be taken today (Boston & Lempp, 2011; Steffen, 2011). As explained in section 1.2, the spatial dimension of climate change means that, given its global character, addressing the climate change problem requires a substantial degree of international coordination (Keohane, 2015; von Stein, 2008).

The complexity of climate change also means that the possible solutions are difficult for decision-makers to assess and to implement. To illustrate this point, I discuss how selecting technology options and policy tools to address climate change can create complications for policy-makers. Beginning with technology options, a number of different types of technology can be employed to help reduce emissions (Giddens, 2011), of which there are three broad categories. First, there are alternatives to existing high-emissions technologies, such as electric vehicles replacing petrol-powered cars (Hawkins et al., 2013; C. Li et al., 2015), or renewable energy generation such as solar and wind replacing coal-fired power plants (Helm, 2015). Second, alterations to existing technologies attempt to minimise emissions, such as retrofitting carbon capture and sequestration (CCS) devices to coal-fired power plants (Giddens, 2011). Finally, “geoengineering” technologies absorb GHGs from the atmosphere, or prevent warming by blocking out the sun (Goldblatt & Watson, 2012; IPCC, 2012).

The problem with all these technology options is that it is often unclear how to select the most effective mix of technologies for a specific situation or location (Giddens, 2011; Kriegler et al., 2014). Selecting a particular technology may also create path dependencies, meaning decisions must take into account consequences that are several decades in the future (Clausen et al., 2017; Levin et al., 2012; Peters et al., 2013). Additionally, many of these technologies require research and development to solve major problems. For example, while existing renewable power generation technology has advanced substantially in recent decades, further breakthroughs (such as improved battery technology or next generation solar-power, involving artificial photosynthesis) may be required to cater to increasing energy demands (Helm, 2015). It is thus challenging

for decision-makers to know which technologies are likely to be successful, and how much investment is necessary (Helm, 2015). Finally, some technologies – particularly geoengineering – may have unintended consequences, and could even aggravate problems associated with climate change (Goldblatt & Watson, 2012; IPCC, 2012).

Selecting the correct policy tools to address climate change is another area where predicting outcomes – and therefore, making decisions – is difficult. There are a range of policy tools to reduce emissions, which tend to fall into four broad categories: market-based (such as emissions trading schemes and taxes), regulatory (mandating performance standards), informational (providing information to influence behaviour) and voluntary (commitments made voluntarily by companies and other organisations to reduce their emissions) (Jordan et al., 2011). There are often debates over which of these is likely to be the most effective, as well as the specific way in which each type of policy should work. Emissions trading schemes, in particular, are often highly complex, able to be configured in many different ways (Egenhofer, 2007), and difficult to implement in an effective and timely manner (Romm, 2008). Additionally, there is disagreement over the extent to which the definition of “effective” should include economic considerations to ensure emissions are reduced at “least cost” (Rimmer, 2016; Rosen & Guenther, 2015).

Required policy likely goes well beyond putting a price on emissions. Some countries may also need policies to facilitate alternative transport or energy options or to stimulate growth in certain industries to ensure there are reasonably-priced alternatives to high emissions technologies (Chapman, 2015; Fischer & Newell, 2008). For example, a high price on carbon would likely mean that driving a petrol-powered car becomes expensive. However, emissions will not necessarily fall if electric vehicles (or other low-emissions transport options) are either not available or are too expensive for consumers. There have also been discussions about the need for far-reaching changes to society, such as re-planning of urban areas to increase energy efficiency and reduce GHG emissions (Chapman, 2017; O’Brien, 2018; Seto et al., 2014). It is not always clear which policies are the most likely to result in the quickest and deepest emissions reductions, or which will do so in the most efficient manner (Fischer & Newell, 2008).

While complexity probably explains part of the inadequate climate re-

sponse in most countries, politics has also been central to how the response has unfolded (Aklin & Mildemberger, 2020; Giddens, 2011). Many authors refer to a lack of “political will” to adopt the necessary policies (e.g. Boston & Lempp, 2011; Howlett & Kemmerling, 2017; Palmer, 2015; Pralle, 2009; Stern, 2015). As British Green MP Caroline Lucas put it, “It’s not that we don’t know what to do. It’s that the vast majority of politicians have neither the vision nor the commitment to do it” (Lucas, 2011). In countries where politics is not a substantial impediment to action on climate change, complexity and institutional barriers may slow down the process of policy creation, and the complexity of the solutions may result in those policies failing (and the country’s emissions climbing) (Sun & Yang, 2016). However, over time, a country will be able to fine tune or overhaul the policy to ensure that it achieves the desired effect (May, 1992; Nilsson, 2005). In contrast, countries where politics contributes to a slow response to climate change may implement some of the policies recommended by experts, but it will be evident to independent observers that the policy is unlikely to lead to outcomes in line with temperature goals (Boston & Lempp, 2011; Howlett & Kemmerling, 2017; Pralle, 2009).

The policy assessments compiled by CAT, along with the other details of the climate policy of developed countries described in the previous section, are particularly relevant here. No developed country assessed by CAT has set an emissions reduction target that is compatible with keeping temperatures under 2°C of warming (Climate Action Tracker, 2019). In other words, no developed country has set climate objectives that are in line with the agreed Paris goals. The fact that developed countries have been unable to even set adequate voluntary targets suggests that it is the politics of climate change preventing stronger action, rather than the complexity of the problem alone. While it may be complex to meet a target, setting a target only requires specifying a broad policy program in a NDC. Several authors and organisations, including CAT, have provided specific details on the actions countries need to take to meet the Paris goals, but as yet no developed country has fully embraced these suggestions, even under the non-binding framework of the Paris agreement (Climate Action Tracker, 2019; Deep Decarbonization Pathways Project, 2015).

Moreover, national governments of some countries have been able to

put in place a range of policies, while others have failed to take even initial steps to address climate change (World Bank, 2020). For example, Denmark has a price on emissions under the EU ETS (European Environment Agency, 2017), and aims to be “a low-emission society independent of fossil fuels by 2050” (IEA, 2017). The US, on the other hand, has no national-level price on emissions (World Bank, 2020), and has a renewable energy program that has been substantially cut back under the Trump administration (Climate Action Tracker, 2019). Four failed attempts have been made to pass federal climate legislation in the US (Vandeweerd et al., 2016). An analysis of the last of these bills – the 2009 Waxman–Markey bill – shows that representatives were substantially less likely to vote for it if their district may have suffered negative consequences (Holland et al., 2015). The failure of the US to put into place national-level climate legislation, when many other developed countries have managed to do so, shows that efforts to address climate change there are largely held back by the politics of climate change.

In sum, politics is key to understanding the puzzle of the inadequate response to climate change. Climate change is, undoubtedly, an extremely complex problem, and this characteristic partly explains the slow response to date. However, the politics of climate change has created barriers to an effective response in many countries. Many authors have focussed on the politics of climate change when discussing the inadequate climate response, often framing the problem as a lack of political will (e.g. Boston & Lempp, 2011; Howlett & Kemmerling, 2017; Palmer, 2015; Pralle, 2009; Stern, 2015). Few, though, expand on exactly what political will means, and more importantly, what drives it. In the next section, I discuss some of the political factors that have structured the politics of climate change, with a particular emphasis on the central focus of this thesis, public opinion.

1.4 What shapes climate politics? Economic elites, corporations and public opinion

A range of actors may hold influence over climate change policy decisions, including political and economic elites, interest groups such as industry and environmental groups, and the general public (Gilens & Page, 2014). As mentioned earlier, it is assumed by some that vested interests (in-

cluding economic elites and fossil fuel companies) are the primary reason behind inaction (Klein, 2015). However, the investigation of public opinion on climate change undertaken in this thesis is driven by the view that public opinion plays an important role in the politics of climate change. In this section, I examine some of the claims about vested interests and their role in climate policy, and briefly explain why there is reason to believe that the views of the public have allowed policy-makers space to avoid enacting adequate climate policy.

Many activists addressing the question of why developed countries have insufficient climate policy tend to focus on the influence of those who have a vested interest in continued high emissions of fossil fuels, particularly fossil fuel companies and the economic elites who control them. For example, Klein (2015, p. 149) claims that fossil fuel companies “are so profitable that they have money not just to burn, but to bribe” politicians in the US and elsewhere, through campaign donations and lobbying. Greenpeace (2011) asserts in a report on the reasons for a lack of effective climate change legislation in many countries that “Carbon-intensive corporations and their networks of trade associations are blocking policies that aim to transition our societies into green, sustainable, low-risk economies” (Greenpeace, 2011, p. 10).

A number of academics have also examined the role of economic elites and corporations with respect to climate policy. Brulle (2014), for instance, documents a network of organisations that constitute a “climate change counter-movement” (CCCM). Organisations in the CCCM often specialise in promoting free-market policies and have links to corporations and individuals with vested interests in fossil fuels (see also: Rickards et al., 2014). The CCCM disputes the science of climate change, and spreads misinformation about it, actions that are intended to sow doubt among the public (Brulle, 2014; Oreskes & Conway, 2010). The lobbying activities of vested interests on climate change issues have also been a focus for some authors (Ard et al., 2017; Brulle, 2018). Meng and Rode (2019) calculate that lobbying in the US over the Waxman–Markey bill, which would have introduced a national price on emissions, decreased the probability of the bill passing the Senate by 13%. From this perspective, then, the role of public influence on climate change policy is minimal, and industry lobby groups and the economic elites who fund them hold the most sway.

At first glance, claims of a weak influence of the public on climate change policy may appear to be well founded. Polls show that a majority of the public in most developed countries believe that climate change is occurring, is caused by humans, is a serious problem, and that most people would like something to be done about it (e.g. Ipsos, 2016). For example, a Pew Research Center (2015) survey indicated that 71% of respondents in Poland (the lowest percentage of the developed countries included) and 93% of those in France (the highest percentage) view climate change as a somewhat or very serious problem. Given that many countries have inadequate climate policies, these statistics appear to indicate that the public has – at best – only a weak influence on policy. Since a large majority among the public appear to have accepted the science of climate change, if the public had a strong influence on climate policy, some argue, many more countries would have adopted stronger climate policy by now (Greenpeace, 2011; Klein, 2015).

However, as I began to outline at the beginning of this chapter, this perspective on public opinion on climate change and its relationship to policy does not account for the full complexity of climate change views (Barasi, 2017). Even though most people in developed countries believe that climate change is happening and is a serious problem, there are differences among these “believers” (Corry & Jørgensen, 2015). Specifically, when asked to rank issues from the most to least important, many people who accept the science of climate change will rank it as one of the least important (Hagen et al., 2016). Climate change is thus a low salience issue for many members of the public. Issue salience contributes strongly to many people’s vote choice (Dalton, 2013; Dennison, 2019), meaning that politicians are much more likely to respond to public opinion on high salience issues than low salience issues (Burstein, 2003).

Another difference among the majority of the public who accept the science of climate change is the extent to which they support government action to address it. As described in this chapter, action by national governments is central to the response to climate change. However, some citizens may be hesitant to support the far-reaching policies that are likely to be necessary to adequately combat climate change. In particular, some people may be opposed to government intervention in the economy, because they believe that free markets are the best way to manage an economy (Antonio & Brulle, 2011). Previous research has shown that

public support for government action on climate change is not as strong as belief in climate change (Drews & van den Bergh, 2016). Even if a country has high public belief that climate change is a serious problem, politicians may be hesitant to act on climate change if they perceive that the public does not support the government taking a central role in the response (Raile et al., 2014).

It is important, therefore, to understand the complexity of climate opinion in order to fully appreciate its role in the inadequate response to climate change in developed countries. To this end, I investigate three dimensions of public opinion on climate change: belief, issue salience and support for government action. Belief in climate change has received substantial attention in previous studies of public opinion on climate change (e.g. McCright & Dunlap, 2011; Poortinga et al., 2011; Scruggs & Benegal, 2012). Some studies have focused on support for government action (Drews & van den Bergh, 2016), but – despite its theoretical importance – the issue salience of climate change has been investigated by very few previous studies. Investigating these dimensions of climate opinion in combination can uncover more about the nature of climate opinion and thus provide greater insight into the politics of climate change.

In sum, understanding the nature of public opinion on climate change, and the forces that influence it, is a key part of understanding the climate change puzzle. Other factors, such as complexity and vested interests have doubtless also played a role. Yet, given the link between public opinion and policy that has previously been established (Burstein, 2003), it is important not to discount the role of public opinion. In this thesis, I do not directly test the extent to which public opinion influences policy. However, my examination of public opinion on climate change in terms of the dimensions of belief, issue salience and support for government action suggests that there are reasons to believe that public opinion is an important factor in the lack of response to climate change in developed countries. In the next chapter, I expand on why these dimensions of climate opinion are particularly relevant in the context of the relationship between public opinion and climate policy, and review the literature in light of my research questions.

Chapter 2

Dimensions of climate opinion and the forces that shape them

In the previous chapter I explained that, in efforts to understand the inadequate political response to climate change in developed countries, public opinion is a factor that deserves attention. Because of the complexity of people's climate change opinions, it can be easy to assume that politicians are not responding to public opinion on climate change. Large majorities in most countries accept the science of climate change, and are concerned about the possible consequences. However, people do not tend to rank climate change as a high salience issue, and not everyone who accepts the seriousness of climate change supports government action to address it. It is therefore important to not only investigate people's beliefs about the climate change phenomenon, but also to examine their perspectives on the issue salience of climate change and the extent to which they support government action. Moreover, to gain a deeper understanding of people's climate views, it is important to understand which individual characteristics and country-level factors relate to people's climate views, and the extent to which they may be influenced by external actors, such as interest groups.

While each of the empirical chapters (3 to 6) contain an in-depth theoretical discussion and detailed expectations relating to the specific research questions they address, the current chapter provides an overview of the literature and theory relating to my over-arching research questions. I explain why I have selected the three dimensions of belief, issue salience and support for government action as the focus of this thesis and present detailed definitions of each of these dimensions. I also ex-

plain why I have selected the specific cases I focus on, and summarise how the four empirical chapters included in this thesis address the two over-arching research questions.

2.1 Selecting the critical dimensions of climate opinion

Most previous research on public opinion on climate change has focussed on people's beliefs about the climate change phenomenon, including whether or not climate change is happening, is primarily caused by human activities, and is a serious problem (e.g. McCright & Dunlap, 2011; Poortinga et al., 2011; Tranter & Booth, 2015). However, there are a variety of other aspects of climate opinion that may be important, particularly when considered in the context of the possible influence of public opinion on climate policy. Corry and Jørgensen (2015) argue that the sceptic-believer dichotomy applied to many studies of climate politics simplifies the true nature of people's positions on climate change (see also: Shwom et al., 2015). For instance, some groups (including political and economic elites, and sections of the public) might be "believers" in climate science, but "sceptics" when it comes to specific climate policies, such as carbon pricing (Corry & Jørgensen, 2015).

A number of studies have considered dimensions of public opinion on climate change other than belief (Shwom et al., 2015). For instance, studies have examined people's willingness to take personal action on climate change, such as flying less, reducing consumption of meat and using public transport (Tobler et al., 2012; Xie et al., 2019). Another strand of climate opinion research considers the extent to which people accept that there is a scientific consensus about climate change (Benegal & Scruggs, 2018; Bolsen & Druckman, 2018; McCright et al., 2013). Researchers have also investigated people's external and internal climate efficacy; that is, to what extent do people think that anything can be done about climate change, and whether they believe they can personally contribute to climate outcomes (Bostrom et al., 2018; Roser-Renouf et al., 2014). Previous studies have examined the extent to which people support particular climate policies, such as carbon taxes, resource-efficiency strategies and restrictions on aviation emissions (Cherry et al., 2018; Hagmann et al., 2019; Kantanbacher et al., 2018). Attention has also been paid to opin-

ions on whether the government is primarily responsible for mitigating climate change, and to people's willingness to pay higher taxes to help address climate change (McCright et al., 2013; Tvinnereim et al., 2017). Finally, a number of studies have investigated people's perceptions of the importance of climate change, often in relation to other social and political issues that are typically high salience (Bromley-Trujillo & Poe, 2018; Herrnstadt & Muehlegger, 2014).

Opinion on climate change is therefore complex, and there is a range of different aspects or dimensions that could be investigated. As explained in chapter 1, my aim in investigating public opinion on climate change is to understand how it might relate to climate policy. Given this context, to select the dimensions that are most important for this thesis, I employ the concept of "public will". Public will is formally defined by Raile et al. (2014, p. 105) as "a social system's shared recognition of a particular problem and resolve to address the situation in a particular way through sustained collective action". If there is a clear public will for government action on an issue, politicians could be expected to respond by enacting policy to meet the public's preferences. Public will can therefore be used as a framework to investigate public opinion about a particular issue, which can provide insights into how public opinion may influence policy on that issue.

Raile et al. (2014) decompose the concept of public will into five components, which help to further illustrate the concept, and can be used to identify the important dimensions of public opinion on climate change. The five components are:

1. "Social system;
2. Shared recognition of a particular problem;
3. Resolve to address the situation;
4. In a particular way;
5. Through sustained collective action" (Raile et al., 2014, p. 111).

Below, I describe each of these five components, and explain how they can be used to select the dimensions of climate opinion that are the most important for the aims of this thesis. A "social system" – the first component of public will – refers to a "public" within a society that has particular

opinions on an issue. For reasons explained in chapter 1, my focus is on national governments in developed countries. Thus, the social systems I am interested in are contained within nations. Each country will typically have multiple publics, each of which vary with respect to the other components of public will. For instance, publics may have differing understandings of the problem, or different preferences for the particular way the problem should be addressed. Publics may be highly integrated and organised, or only loosely associated and lacking in direction. As I explain below, determining the relative sizes of these publics and their opinions (in terms of the components of public will) towards a particular issue can shed light on the prospects of public opinion influencing policy on the issue.

The second, third and fourth components of public will can be used to directly identify the important aspects of public opinion on climate change for the purposes of this thesis. For a public to have a collective opinion on an issue, they must have a “shared recognition” or understanding of the problem. In the context of climate change, this shared understanding can be determined by measuring people’s belief in climate change. People who accept the existence, human cause and seriousness of climate change can be said to have a shared understanding of the problem. A “resolve to address the situation” can be measured by the relative importance people place on climate change, or the issue salience of climate change. The degree to which people within the social system support government action on climate change and specific climate policies can be used to operationalise the “particular way” people prefer to address the situation.

“Sustained collective action” on climate change, the fifth component of public will, can include both democratic participation (particularly voting) and activism. Being the primary mechanism that holds politicians to account, voting is particularly important. If large sections of the population have particular policy preferences in mind when voting, politicians can ill-afford to ignore those preferences (Burstein, 2003; Soroka & Wlezien, 2010). Activists have been highly active on climate change (Carter & Childs, 2018; Oosterman, 2016), and there is evidence that activism can amplify public opinion (Agnone, 2007). Both voting and activism are therefore important ways in which public opinion is revealed to politicians. However, investigating these activities is beyond the scope of this

thesis, as my focus is on the nature of public opinion on climate change in the context of its possible influence on policy, rather than the particular mechanisms that convey public opinion to decision-makers.

The application of the public will concept to public opinion research can improve our understanding of the relationship between public opinion and policy. Specifically, the public will on a particular issue can only be fully appreciated when identifying and describing the multiple publics that exist within a country. For example, there may be no clear public will in a country with two approximately equal sized publics, both of which have very different understandings of the problem. Alternatively, there may be a large public that wants action on a particular issue, but with only weak resolve to address the problem, and a smaller, highly organised and committed public which prefers the status quo. Raile et al. (2014) refer to the issue of gun control in the US as an illustration of the latter scenario. While support for tightening gun control is widespread in the US, it is not a high salience issue for most people (Raile et al., 2014). However, a smaller public (which includes pro-gun lobby groups) with a high degree of resolve opposes any increase in gun restrictions. This situation means that policy-makers are not under public pressure to enact gun reform, even though most of the population supports stricter gun laws. Analysing public opinion through the lens of public will can therefore help to explain policy outputs given the nature of public opinion on particular issues.

Using public will, I have identified three dimensions of climate opinion – belief, issue salience and support for government action – which can shed light on the relationship between public opinion and climate policy. Only countries that contain a large public with high levels of belief that climate change is happening and is a serious problem, strong support for government action to address climate change, and high levels of salience can be said to have strong public will to act on climate change (Leiserowitz, 2019; Raile et al., 2014). Conversely, countries where only a small section of the population has a strong belief that climate change is a serious problem, is a high salience issue and is best addressed through government action can be said to have weak public will to act on climate change.

Given the complexity of addressing climate change and the high level of political will necessary to push through some of the required policies

(as described in chapter 1), countries with higher levels of public will are more likely to adopt stronger climate change policies than countries with lower levels of public will (Bromley-Trujillo & Poe, 2018; Drummond et al., 2018; Vandeweerd et al., 2016). While I do not test this proposition directly in this thesis, I demonstrate that there is variation within and between societies on the dimensions of belief, issue salience and support for government action. Therefore, in any analysis of the relationship between public opinion and climate policy, all three dimensions should be considered. In the following section, I define each of the dimensions in detail, and review the existing research that has investigated them.

2.2 The dimensions in detail

2.2.1 Belief

Belief in the phenomenon of climate change has been the focus of most studies of public opinion on climate change (e.g. McCright & Dunlap, 2011; Poortinga et al., 2011; Scruggs & Benegal, 2012; Tranter & Booth, 2015). Belief is often investigated in terms of three different aspects: belief that climate change is happening, that it is caused by humans and that it is a serious problem. Rahmstorf (2004) refers to these three aspects as – respectively – trend, attribution and impact scepticism (see, also: Poortinga et al., 2011).¹ In most studies across a range of countries, the first two kinds of scepticism are typically found to be rare (Poortinga et al., 2019; Steentjes et al., 2017). Most people in developed countries appear to believe that climate change is happening and that humans are largely responsible for causing climate change. For instance, in a study comparing climate views in European countries, Poortinga et al. (2019) find that both the belief that climate change is not happening and is not primarily caused by humans (respectively, trend and attribution scepticism) are found in under 10% of the population in most countries. Krange et al. (2018) find only just over 1% of respondents in a Norwegian survey

¹There has been debate in the literature over whether people who do not accept the science of climate change should be referred to as “sceptics”, “deniers” or some other term (Poortinga et al., 2011). Throughout the thesis, I favour the more commonly used term “deniers”. This choice is mainly due to the term “sceptic” referring to someone who questions established facts in good faith, rather than a “denier” who chooses to ignore or dispute facts without any substantial evidence to back up their claims. I therefore reserve the use of the term “sceptic” or “scepticism” for reference only to existing literature which uses these terms.

could be considered trend sceptics, although nearly 40% of respondents had some degree of scepticism about climate change (see, also: Bergquist & Warshaw, 2019; Björnberg et al., 2017; Jylhä, Tam et al., 2020; McCright, Charters et al., 2016; Steentjes et al., 2017).

There are, however, larger sections of the population who do not regard climate change as a particularly serious problem, are not concerned about climate change or do not perceive climate change as a significant risk (e.g. Kvaloy et al., 2012; Poortinga et al., 2011; van der Linden, 2017). Low levels of public concern about climate change (or impact scepticism) may be due to people not believing that climate change will cause significant problems for society. Alternatively, people may believe that the relevant authorities will be able to prevent or reduce damage caused by climate change, and thus they see little reason to worry about climate change (Lo & Chow, 2015). Whichever the case, approximately one in five people (or more) in most developed countries are sceptical about the severity of climate change impacts. Leining and White (2015), for example, find that 27% of New Zealanders do not believe that New Zealand is likely to be negatively affected by climate change. A recent Pew survey shows that 40% of Americans see climate change as either a minor or no threat to the United States (Poushter & Fagan, 2020; see, also: Lee et al., 2015; Poortinga et al., 2019; Steentjes et al., 2017; Tranter & Booth, 2015). Although the belief that climate change is not a serious threat is a minority view in most countries, it does appear to be the most common belief about the climate change phenomenon that runs contrary to climate science.²

Much of the research on belief in climate change has been driven by a desire to measure and explain denial of climate change (Cann & Raymond, 2018; Engels et al., 2013; McCright & Dunlap, 2011). The fact that sections of the population refuse to accept the now well-established science of climate change is a natural focal point for social scientists, and has been connected to a wider distrust in science among sections of the population (Björnberg et al., 2017; E. C. Nisbet et al., 2015). Moreover, some authors argue that climate denial is driven, in part, by the activity of interest groups spreading disinformation about climate science (Brulle, 2014; McCright, 2016). From this perspective, bolstering public climate

²Studies investigating intensity of concern (for example, the percentage of people who see climate change as “very serious”) typically find that less than half the population are very concerned about climate change (e.g. Brulle et al., 2012; Lewis et al., 2019).

denial is part of a strategy by vested interests (such as fossil fuel companies) to block or delay climate policies that may be harmful to their business. While climate denial is clearly present among the public of many developed countries (McCright & Dunlap, 2011; Tranter & Booth, 2015), a clearer understanding of its role in the inadequate climate response can be gained by broadening the range of dimensions of climate opinion that are considered.

Another aspect of the belief dimension that has been examined by a number of authors is certainty of belief. Previous studies have found that a number of people express uncertainty or doubt when asked about their climate beliefs (Hagen et al., 2016; Haltinner & Sarathchandra, 2021; Poortinga et al., 2011; Whitmarsh, 2011). For example, when asked if climate change is happening, many people will respond “I don’t know”. Uncertainty about climate beliefs may be driven by a genuine lack of knowledge or confusion about the science (Myers et al., 2012; Whitmarsh, 2011). However, given that uncertainty about climate change is related to people’s ideology, some people expressing uncertainty about climate change may do so because they do not want to accept the reality of climate change (Scruggs & Benegal, 2012; Whitmarsh, 2011).

There is considerable cross-country variation in terms of all aspects of belief. For instance, McCright (2016) finds that all forms of scepticism are rare in Germany, but are more common in the UK, Australia and the US. The US appears to have the highest levels of denial in all its forms among developed countries (Dunlap & McCright, 2011). However, cross-country studies show that countries such as the UK, NZ and Australia have comparable levels of denial to the US (e.g. Kim & Wolinsky-Nahmias, 2014; Lee et al., 2015; Tranter & Booth, 2015), and E. K. Smith and Mayer (2019) note similarities among all the anglophone countries with respect to climate opinion. I begin to discuss some of the factors underlying this cross-country variation in section 2.3.3, and explore them in detail in chapter 4.

In sum, only a minority of the public deny (in some sense) the science of climate change or express uncertainty about it. Belief (including uncertainty of beliefs) in climate change is important, as it is a fundamental aspect of climate opinion. Moreover, public denial of and uncertainty about climate change probably does contribute – at least to some extent – to the inadequate political response to climate change (Engels

et al., 2013; Kammermann & Dermont, 2018). It is, however, important to move beyond the believer-denier dichotomy and pay closer attention to the diverse views of the majority of the public who believe that climate change is happening and is a serious problem (Barasi, 2017; Corry & Jørgensen, 2015). In particular, focussing on the combination of the dimensions of belief, issue salience, and support for government action can shed light on public will and thus the role that public opinion is playing in the inadequate response to climate change. In the next subsection, I consider in detail a second critical dimension of public opinion on climate change, issue salience.

2.2.2 Issue salience

Issue salience – broadly defined as the importance citizens place on an issue relative to other issues – is a central concept in theories of electoral behaviour and the relationship between public opinion and policy (Burstein, 2003; Dahl, 1956; Dennison, 2019; Page & Shapiro, 1983). Some members of the public decide their vote based on the issue positions of candidates and parties (Dalton, 2013). However, for most voters, not all issues are of equal importance. Most people are especially interested in no more than a handful of issues, and these issues will tend to hold the most sway over their vote choice (Bélanger & Meguid, 2008; Fournier et al., 2003). Dalton (2013) describes this process – where a voter filters their preferences on multiple issues (along with other factors, such as candidate assessments) to arrive at a single vote choice – as the “funnel of causality”. Only a small number of issues can pass through this funnel, because most people are only primarily interested in a few issues, and it is difficult for an individual to find a party or candidate that aligns with their own views on many different issues.

The impact of salience on voting means that it is critical to the prospects of substantial policy being adopted in response to public preferences on an issue (Burstein, 2003; Soroka & Wlezien, 2010). Politicians have limited capacity to address issues, as well as limited capital to invest in enacting policies which may be politically costly. Consequently, politicians tend to focus their attention on issues that are most likely to affect electoral outcomes.³ Low salience issues can be given a low priority

³This is not to suggest that politicians are driven purely by electoral outcomes; for example, some issues may be of particular personal importance to politicians. How-

– or even ignored – by politicians, while high salience issues are generally addressed to the satisfaction of the public, as far as is possible (Soroka & Wlezien, 2010). Thus, as explained in the discussion about public will in section 2.1 above, even if the public broadly agrees on what should be done about an issue, it does not necessarily mean that those preferences will be acted on by politicians if the issue salience is low.

As Dennison (2019) points out, the importance of issue salience as a concept in models of political behaviour and policy responsiveness has not resulted in clarity of its definition. He identifies two major strands in the literature, which define issue salience respectively as an attitude and as a weight given to behavioural choices. The first definition suggests that issue salience is the importance a person places on an issue, or the intensity of concern they feel about an issue. The second definition, which views issue salience as a weight used in decision-making, ties the concept directly to behaviour, particularly voting. According to the second definition, issue salience is not itself an attitude, but is a component of other attitudes. Throughout this thesis, I use the first definition of issue salience, which considers it an attitude, for two reasons. First, viewing issue salience as an attitude aligns with the “resolve to address” component of public will, and supports the investigation of issue salience as a dependent variable (Dennison, 2019; Raile et al., 2014). As will be demonstrated in later chapters, issue salience has properties that are similar to other attitudes (such as belief in climate change), in that it varies throughout the population based on demographic and other individual characteristics. Second, while issue salience has a strong link to electoral behaviour (Fournier et al., 2003), it does not necessarily determine behaviour. Thus, it makes sense to separate the attitude (issue salience) from the behaviour (voting).

Due, in part, to measurement difficulty, issue salience has not been widely studied empirically with respect to climate change opinion, or in public opinion research in general, particularly as a dependent variable (Dennison, 2019; Wlezien, 2005). At least four different methods have previously been employed to measure issue salience, and there is not widespread agreement among public opinion researchers on which is the most appropriate. Below, I briefly review each of these four methods, and explain the advantages of using issue-ranking questions – which I employ

ever, in aggregate, politicians will tend to prioritise high salience issues, because of the possible negative electoral consequences of ignoring them.

in chapters 3 and 4 – over the other methods.

The first method measures salience for a country (or region) as a whole, by counting the number of news articles on a particular issue, or by examining Google Trends data to measure the frequency of searches for a particular topic (Helbling & Tresch, 2011; Herrnstadt & Muehlegger, 2014). This method has the advantage of being available in many contexts, even if appropriate questions are not included in a particular survey dataset. Moreover, the method is useful when the theoretical focus is on the role of the media in agenda-setting and raising the salience of particular issues (Helbling & Tresch, 2011; Pralle, 2009). However, its major downside is that it cannot account for differences in salience at the level of the individual. Additionally, it measures national or media issue salience rather than public or personal salience (Moniz & Wlezien, 2020). Given that this thesis focusses on individual-level public opinion (including issue salience) and its determinants, this kind of measure is not appropriate for my specific research questions.

Many studies use an open-ended “Most Important Issue” (MII) question to measure issue salience (Dennison, 2019; Wlezien, 2005), which is the second method I consider. The main advantage of this approach is that this question is asked in many surveys, and historical data goes back several decades for some surveys. However, such a question only provides limited information about a respondent’s views of salience (Johns, 2010; Wlezien, 2005). For instance, people may respond that “the environment” is the most important issue; we do not know if the environment includes “climate change” or not. Moreover, even if climate change is not someone’s most important issue, it may be their second most important, but we cannot know this from the response to this question (Moniz & Wlezien, 2020).

A third approach to measuring issue salience is to ask respondents how important particular issues are, with responses usually given on a Likert-like scale, ranging from “very important” to “not at all important” (e.g. Hagen et al., 2016). This method can easily be included in a survey, and the salience of a large number of issues can potentially be measured. However, asking questions in this way does not align well with the concept of issue salience employed in this thesis. Specifically, people can respond that most (or even all) issues are “very important”, even though – when funnelling their issue preferences through a vote – people are typ-

ically forced to prioritise a small number of issues as the most important (Dalton, 2013; Moniz & Wlezien, 2020). Thus, because it does not force respondents to choose between issues, this method does not measure the *relative* salience of issues.

The final method of measuring issue salience involves asking respondents to rank a number of issues (usually eight to ten) from the most to least important, or to choose some of these issues as the most important. This type of measurement has the advantage that it mimics the process of prioritising issues that a voter typically goes through when selecting a candidate or party to vote for. Moreover, in the version of this question that allows respondents to rank all issues, this measure can capture the full range of individual-level variation of issue preferences (for the issues included), differentiating between people who rank a particular issue as high, medium or low importance. The main drawback is that surveys are limited to including a relatively small number of issues, and the selection of issues may influence results (Moniz & Wlezien, 2020). Additionally, different question designs may be required depending on whether the survey is conducted face-to-face, by phone or online. However, on balance, as this approach to measuring issue salience most closely aligns with the concept defined above, it is the preferred method used throughout this thesis.⁴

Despite the theoretical importance of issue salience, only a handful of studies have previously investigated the salience of climate change (Dannevig & Hovelsrud, 2016; Spartz et al., 2017). Hagen et al. (2016), for example, assess the levels of climate change salience in the Netherlands, Spain, Germany and the UK, finding that climate change was ranked in the bottom third of nine issues in all four countries, and last in the Netherlands and the UK. Investigating the US, Bromley-Trujillo and Poe (2018) find that salience is low in most states, but that there does seem to be a positive relationship between salience and the adoption of climate

⁴There is another debate in the literature about what the frame of reference should be in any question asking about issue salience (Johns, 2010; J. M. Miller et al., 2017; Wlezien, 2005; Yeager et al., 2011). People may respond differently when asked about whether an issue is important to the country, the world or to them personally. The questions I use in chapters 3 and 4 ask respondents about the importance of issues to the country and world respectively. These frames are appropriate for climate change, as the effects of climate change are collective, and may be unevenly distributed throughout society. Thus, asking people about whether an issue is important to the country or world may help to focus people on the societal effects of climate change, rather than their personal risk of being affected by climate change.

policy. Most previous studies confirm that in most countries the issue salience of climate change is, overall, low (Herrnstadt & Muehlegger, 2014; M. C. Nisbet & Myers, 2007). Other issues such as healthcare, education and the economy tend to be ranked by the public as more important than climate change.

Applying the lens of public will, it is important to consider individual-level variation in issue salience. Even if most of the population of a particular country views climate change as low salience, there may be a small, highly-engaged public which sees climate change as very high salience.

2.2.3 Support for government action

Even if the majority of the public accepts that climate change is a serious problem and has a strong resolve to address it, they may not agree on how it should be addressed. Without this agreement, there may not be sufficient public will for politicians to act (Raile et al., 2014). As described in the previous chapter, addressing climate change requires substantial direction and action by central government in order to overcome coordination problems such as free riding. However some people may be opposed to strong government action on the grounds that they value individual liberty, preferring that society relies on voluntary action and “light touch” government regulation, for example (Antonio & Brulle, 2011). Therefore, to improve knowledge of public opinion on climate change – and its possible relationship with climate policy – it is important to investigate the extent to which people support the government taking a central role in the climate response. In addition, it can be useful to investigate support for specific policies and taxes, as some policies may be more palatable to sections of society than others. In particular, policies that have an obvious and immediate cost to consumers or citizens tend to struggle to receive wide-ranging support from the public (Drews & van den Bergh, 2016).

Although more frequently included in studies of public opinion on climate change than issue salience, support for government action has received less attention in the academic literature than belief in climate change. A handful of studies have investigated levels of general support for government action on climate change, typically finding them to be high, often comparable to levels of belief. For example, in a study surveying the public in Canada and the US, Lachapelle et al. (2012) find that

89% of Canadian respondents, and 73% of US respondents believe that the federal government is responsible for addressing climate change. Using data from a large probability sample of New Zealanders, Milfont and Sibley (2014) investigate support for the government regulating carbon emissions and find a mean response of nearly five on a 7-point agreement scale (see, also: Spence & Pidgeon, 2010; Tvinnereim et al., 2017). In general, citizens do not look to other countries to justify climate (in)action, and instead tend to view climate policy as a national-level concern and support unilateral action (McGrath & Bernauer, 2017; see, also Aklin & Mildemberger, 2020)

As debates over carbon pricing have tended to dominate public discourse on climate change, a number of studies have examined support for specific carbon pricing mechanisms. Support for a carbon tax is substantially lower than general support for government action, as illustrated by Umit and Schaffer (2020), who find that majorities in most of the 23 European countries they investigate oppose carbon taxes (see, also: Carattini et al., 2018; Hagmann et al., 2019; Kotchen et al., 2017; Krosnick & MacInnis, 2013). Dreyer and Walker (2013) gauge attitudes towards the (now repealed) Australian carbon tax, finding that only 47% of respondents supported the policy. However, when increases in taxes are more tightly tied to outcomes, willingness to pay tends to increase. For example, in a survey experiment, Alberini et al. (2018) find that respondents in Italy and Czechia are, on average, willing to pay up to €133 and €94 respectively for each ton of CO₂ emissions avoided when the cost was clearly linked to household emissions reductions. Graham et al. (2019) link higher carbon taxes to a reduction in climate-related deaths, and find 61% of British respondents were willing to pay more tax to avoid deaths.

Support for specific climate policies that do not have an obvious cost to citizens is generally high. For example, in the US, McCright et al. (2013) find that over 70% of respondents support higher emissions standards for vehicles and businesses, and for mandatory greenhouse emissions targets. Investigating support for policies to curb emissions from air travel, Kantanbacher et al. (2018) find that there is broad support among the UK public for such policies, especially if the policies emphasise the responsibilities of industry rather than the public to take action or incur costs. Cherry et al. (2018) find policies promoting resource-efficiency of

household items and activity – a policy strategy that has the potential to make significant cuts in emissions – also has broad support among participants from the UK (see, also: Hagen et al., 2016; Sokoloski et al., 2018).

Drews and van den Bergh (2016) review a range of studies on support for climate policies, noting that coercive policies (for example, taxes) tend to be less popular among the public than non-coercive policies (for example, subsidies). Moreover, their review indicates that support for climate policies is closely linked to a person's degree of concern about climate change. Similarly, Tvinnereim and Ivarsflaten (2016) find that people employed by the fossil fuel industry are less likely to support policies that may cause substantial losses in their industry.

Investigating levels of support for government action can provide insight into the nature of climate opinion and its relationship to policy. A country with high levels of belief that climate change is a serious problem but with a population that does not accept that the government should take a central role in the climate response, or that does not support strong climate policies does not have strong public will to address climate change. Although, as mentioned, a number of existing studies have investigated various aspects of support for government action, they have mostly focussed on the larger developed countries (such as the US, UK, Canada and Germany) and thus do not provide a broad cross-national perspective (see however: Fairbrother et al., 2019; Umit & Schaffer, 2020). Throughout this thesis, I therefore investigate the extent to which the public supports government action alongside beliefs about climate change and issue salience.

2.2.4 Summary

To put existing knowledge about climate opinion in the language of public will, there appears to be a shared recognition of the problem, and broad agreement on how it should be addressed. However, there does not seem to be strong resolve to address climate change. Recent literature paints a fairly clear picture that belief in climate change (or the shared recognition of the problem) is high across the developed world (Capstick et al., 2015; Kim & Wolinsky-Nahmias, 2014; Lee et al., 2015). In almost every developed country, at least 90% of the population accept that climate change is happening and is primarily caused by humans, and around

70% or more of the population see climate change as a serious problem. There is also some evidence that support for government action (the particular way the issue should be addressed) is high, although the exact level of support depends on the specific policy. Finally, although there is a paucity of existing empirical research, the salience of climate change (resolve to address the issue) is generally agreed to be low.

Because of the gap in research on the public issue salience of climate change, we do not have a clear picture of the public will on climate change, particularly outside the larger developed countries. Only a handful of studies have empirically investigated issue salience, and the degree to which issue salience varies across countries is largely unknown. Belief in climate change may be well understood, and knowledge about levels of support for government action on climate change has increased in recent years. However, few studies have examined all three of these dimensions of climate opinion in combination. Therefore, my first over-arching research question begins to fill this gap by investigating the nature of public opinion on climate change in terms of belief, issue salience and support for government action.

2.3 What shapes climate opinions?

In addition to measuring levels of belief, issue salience and support for government action on climate change in various contexts, I examine some of the factors that shape people's climate opinions with respect to these dimensions. I divide these factors into three broad categories: external influence, individual characteristics and country-level factors. External influence includes efforts by prominent individuals or groups to change the minds of the public on climate change. Individual characteristics encompasses socio-demographic attributes, as well as people's political orientation and political and social attitudes. These attitudes have previously been found to have a particularly strong relationship with climate opinion (McCright, Marquart-Pyatt et al., 2016). Country-level factors known to relate to cross-country variation in climate opinion include country wealth (Kim & Wolinsky-Nahmias, 2014).⁵ I describe each of

⁵There are a range other factors that can also influence climate opinions. For instance, changes in the weather or climate appear to have a small positive effect on concern about climate change (Howe et al., 2019). However, the three categories of factors I consider (external influence, individual characteristics and country-level factors) fit well

these three categories of factors below, and explain why they are important to consider in the context of understanding how public opinion might relate to climate policy.

2.3.1 External influence

A number of scholars have argued that people's opinions are highly malleable, and can easily be "blown about" by sufficient external influence (Zaller, 1992, p. 311; see, also: Converse, 2006). Such influence can come from many sources, including politicians, economic and other kinds of elites and interest groups. If these scholars are right about the ease with which these kinds of actors can influence public opinion, then the interpretation of any relationship between public opinion and policy is significantly altered. Instead of such a relationship being evidence that public opinion influences policy, it could indicate that politicians are able to change the minds of the public. It is therefore important to consider the extent to which external actors are able to influence climate opinions.

While politicians and elites have played an important role in shaping the climate debate (Rickards et al., 2014; Sohlberg, 2016), my focus in this thesis (specifically in chapter 5) is on interest groups. This focus is for two reasons. First, as explained below, interest groups have been particularly active on the issue of climate change, with groups lobbying to influence public opinion on both sides of the debate (Brulle, 2014; Oosterman, 2016). Although the aim of a great deal of interest group activity is to directly lobby politicians, many interest groups seek indirect influence over policy, by influencing public opinion (Dür, 2018; Yu, 2005). Second, although interest groups have been active on climate change, there has been little academic research on their influence on public opinion (Dür, 2018).

Previous research has uncovered substantial activity by interest groups seeking to spread misinformation about climate change (McCright, 2016; McCright & Dunlap, 2003, 2010; Oreskes & Conway, 2010). The identification of the network of climate change counter-movement (CCCM) organisations in the US by Brulle (2014) is particularly instructive, as are other analyses identifying similar organisations elsewhere, particularly in the UK, Canada and Australia (Dunlap & McCright, 2011; McKie, 2019). There are also a number of environmental

with the political aspects of climate change opinion that are the focus of this thesis.

interest groups that campaign in favour of stronger climate policy (Carter & Childs, 2018; Oosterman, 2016). Such groups have been part of a large global movement that has staged massive protests around the world in recent years (Boulianne et al., 2020). Both types of interest group seek not only to directly influence climate policy, but to influence public opinion and thus indirectly influence policy (McCright & Dunlap, 2010; Wapner, 1996).

It is unclear exactly how successful interest groups are in influencing public opinion. Some authors believe that the high level of activity by CCCM organisations and the existence of denial and doubt among the public demonstrates that CCCM influence on public opinion is substantial (Brulle, 2014; McCright, 2016). Given the pervasiveness of misinformation about climate change, particularly in countries such as the US and UK, it is probable that some sections of the population are influenced by the “denial machine” (McCright, 2016). There have also been suggestions that environmental groups can influence opinion (Carter & Childs, 2018; Schifeling & Hoffman, 2017). For example, recent protests by Extinction Rebellion in the UK seemed to spark an expanded public debate on climate change (Gunningham, 2019). However, few studies have directly demonstrated the capacity for interest groups to influence the public (Dür, 2018). Additionally, there is evidence that many people have quite stable opinions on climate change, meaning that the possibilities for external influence are limited (Bernauer & McGrath, 2016; Brulle et al., 2012; McCright, Charters et al., 2016; Whitmarsh, 2011). I return to the debate over the extent to which the public can be influenced by external actors in chapter 5.

My investigation of external influence on climate opinion uses the dimension of support for government action. Environmental groups tend to focus their arguments on climate policy, typically demanding that the government should adopt stronger policies such as a price on carbon or greater investment in public transport (Carter & Childs, 2018; Oosterman, 2016). CCCM groups also often make statements regarding policy, for example criticising the economic inefficiencies of government regulations aimed at reducing emissions (McCright & Dunlap, 2010; D. Miller & Dinan, 2015). The focus of interest groups on policy therefore makes support for government action an appropriate dimension for investigation of external influence.

2.3.2 Individual characteristics

The existing research on public opinion on climate change has examined the relationship between people's climate views and a number of different individual characteristics, such as political and social attitudes, and socio-demographic attributes (McCright, Marquart-Pyatt et al., 2016; Shwom et al., 2015; van der Linden, 2017). Several of these characteristics, particularly political orientation, have consistently been found to have a strong relationship with climate opinions (Beiser-McGrath & Huber, 2018; Hornsey et al., 2016; McCright, Marquart-Pyatt et al., 2016; Poortinga et al., 2019). People on the left tend to be more engaged with climate change than those on the right. In the context of this thesis, it is important to understand which factors shape public opinion on climate change for two reasons. First, analysis of the main factors that shape climate opinion can help to illuminate why people hold the particular climate views that they do. In turn, knowing why people hold particular climate views can provide insight into how stable people's opinions may be, and thus the extent to which those opinions may change over time.

Second, as I am investigating dimensions of climate opinion that have not been widely studied (particularly issue salience), little is currently known about how individual characteristics might relate to these dimensions. It is reasonable to assume that factors such as political orientation will be related to support for government action and issue salience, just as they are for belief. However, few empirical studies have tested this assumption. An empirical investigation of these relationships can also help to uncover details (such as differences in the strength of relationships, depending on the dimension) which contribute to a more complete picture of public opinion on climate change.

More extensive reviews of previous literature on the relationships between individual characteristics and climate opinions can be found in later chapters. However, it is worth highlighting here the relationship between political orientation and climate beliefs. While research has consistently found that people to the right of the political spectrum are less likely to believe that climate change is happening or is a serious problem compared with those to the left (Hornsey et al., 2016; McCright, Marquart-Pyatt et al., 2016), much of this research has been done in the US, where political divisions over climate change are particularly deep

(McCright, Dunlap & Marquart-Pyatt, 2016). Research has found that political orientation does have a similar, but weaker, relationship with climate beliefs in Western European and anglophone countries (McCright, Dunlap & Marquart-Pyatt, 2016; Poortinga et al., 2019). However, it is less clear whether political ideology plays the same role in other countries (McCright, Dunlap & Marquart-Pyatt, 2016).

A number of studies have also found that other political and social attitudes relate to perceptions of climate change. People with an individualist worldview, high levels of right-wing authoritarianism or a strong social dominance orientation tend to be more likely to deny the science of climate change (Milfont et al., 2018; Milfont et al., 2013; J. Shi et al., 2015). Moreover, socio-demographic factors have a link with climate views, although one that is not as strong as that between political and social attitudes and perceptions of climate change. In particular, people who are older, male and do not have a university degree tend to be less likely to accept the existence and seriousness of climate change compared to those who are younger, female and do have a degree (McCright & Dunlap, 2011; Poortinga et al., 2019; van der Linden, 2017).

Most previous research on individual characteristics has focussed on the dimension of belief in climate change and there are few examples of studies that have investigated how political and social attitudes (or other individual characteristics) relate to the issue salience of climate change. Indeed, studies investigating the determinants of the salience of any issue – let alone specifically for climate change – are rare (Dennison, 2019). There has been some research on the relationship between various individual characteristics and support for government action on climate change. For example, in the US, McCright et al. (2013) find that – similar to belief in climate change – people who identify as liberal or Democrat are more likely to support government action on climate change compared with people who identify as conservative or Republican (see, also: Kantanbacher et al., 2018; Shwom et al., 2010; Umit & Schaffer, 2020). Support for government action and issue salience are critical to understanding the relationship between public opinion and policy (as outlined in section 2.1). Therefore, improving our understanding of how climate views vary across populations with respect to these dimensions provides a clearer picture of why countries have had different political responses to climate change.

2.3.3 Country-level factors

Investigating the relationship between country-level factors and climate opinion can help us to understand the patterns of climate beliefs across countries. For example, a number of studies have investigated the extent to which country wealth relates to people's scepticism about climate change, or their perceptions of the seriousness of climate change (Kim & Wolinsky-Nahmias, 2014; Knight, 2016; Lo & Chow, 2015). Although the results have been mixed, overall, the findings suggest that levels of belief are lower in richer countries than in poorer countries. In wealthier countries, the higher opportunity cost of addressing climate change may lead to lower levels of belief that climate change is a serious problem compared with poorer countries. Moreover, people in wealthier countries may be more likely to believe that their government is capable of protecting them from the effects of climate change compared with people in poorer countries (Lo & Chow, 2015). Understanding the patterns of cross-country variation in climate opinion therefore sheds light on how opinions on climate change are formed and what the prospects of changes in opinion might be.

In chapter 4, I conduct a cross-country analysis investigating how country-level factors relate to belief, issue salience and support for government action on climate change. While some studies have investigated cross-country variation in belief and support for government action, few have examined country-level factors and their relationship to the issue salience of climate change. Given the importance of these dimensions (in the context of public will), understanding the patterns of cross-country variation can provide insight into why some countries have adopted stronger climate policies than others.

2.3.4 Summary

As described above, we can gain a clearer picture of public opinion on climate change, as well as some insights into why people hold particular climate opinions, by examining the extent to which various factors relate to or shape people's climate views. In turn, improving our understanding of climate opinion by investigating the factors that shape it can provide insight into the extent to which people's opinions (on each of the three dimensions) might change over time. In particular, if people's climate

views are closely tied to their political attitudes and wider worldview, and are not easily influenced by external actors such as interest groups, this may indicate that many people's climate opinions are quite stable.

Moreover, since most studies on public opinion on climate change have focussed on belief, investigating the factors that shape other dimensions of climate opinion can further improve our understanding of people's climate views. Specifically, it is worth understanding whether the patterns of relationships between different explanatory factors and climate opinion are similar for each dimension of opinion, given the importance of each dimension for the concept of public will. Thus, in this thesis I investigate in detail how these factors relate to climate opinion.

2.4 Case selection

The population of countries considered by this thesis, as outlined in section 1.2, includes all developed, liberal democracies. However, I focus specifically on the UK (chapter 3 & 5), New Zealand (chapter 6) and the EU (chapter 4). Each of these cases was chosen because they illustrate something about at least one of the dimensions of public opinion on climate change. The UK analyses are based on an original dataset, and therefore include a number of questions relating to all three dimensions. In chapter 6, the analysis using New Zealand survey data focusses on the support for government action dimension. Finally, the Eurobarometer data used in chapter 4 covers all three dimensions, although with a smaller number of questions than the UK data does.

All three of these cases have specific political contexts that serve to expand understanding of public opinion on climate change, and help to widen the geographical focus beyond the US, where most of the literature has been focussed. The UK has been a world leader on climate change policy, passing the Climate Change Act in 2008, one of the first pieces of comprehensive national-level climate legislation, requiring the government to cut emissions and produce regular reports on their progress (Fankhauser et al., 2018). This policy has been accompanied by impressive outcomes, with 2018 emissions being 38% lower than 1990 emissions (Hausfather, 2019). That said, there have been accusations of backsliding in recent years (Harrabin, 2020), and questions have been raised about how robust the UK's climate regime will be in the long run

(Fankhauser et al., 2018). In New Zealand, the policy response has been much slower and more politically difficult than in the UK, partly due to a strong farming lobby opposed to deep cuts in agricultural emissions (D. Bullock, 2012). However, a climate act similar to the UK's was passed in 2019, although this improvement in policy has yet to make a substantial dent in emissions (Ministry for the Environment, 2020). While all EU countries operate under the EU's emissions trading scheme, many other aspects of climate policy are left to the governments of individual members (Delbeke & Vis, 2016). There is thus a range of climate responses in the EU, with some countries – such as Denmark and Sweden – seen as world leaders, while others, particularly in the east, often seen as laggards (Tidey, 2020).

Case selection was also partially driven by the availability of data. In particular, existing datasets with questions on issue salience that use rank-ordering – the preferred way to measure issue salience, as outlined in section 2.2.2 – are rare. A number of datasets, including the World Values Survey and International Social Survey Programme, have questions relating to climate change, but these mostly focus on climate belief. The Eurobarometer dataset has an ordering question on issue salience which includes climate change as an option, as well as questions encompassing elements of belief and support for government action, thus making it ideal for a cross-country comparison within the framework of this thesis.

In sum, while any of the countries from the population of developed nations would have made interesting cases, the cases I have selected provide illustrations about at least one of the three dimensions that are the focus of this thesis. Moreover, each case has appropriate data available, and has a political context that provides interesting backdrops for my investigation of public opinion on climate change.

2.5 Summary of empirical chapters

Chapters 3 to 6 are empirical studies which address the two over-arching research questions of this thesis: (1) what is the nature of public opinion on climate change with respect to the dimensions of belief, issue salience and support for government action, and (2) to what extent do external influence, individual characteristics and country-level factors shape public opinion on climate change? Below, I briefly outline each chapter, and

explain how it addresses one or both of the over-arching research questions.

Chapter 3 relies on data that I collected through an original online survey among UK citizens and explores the different publics of climate change opinion. As explained in section 2.1, the concept of public will suggest that there are multiple social systems with respect to a particular issue, each of which may have a different understanding of the problem, resolve to address the issue, and particular way they would prefer it to be addressed. I therefore use latent class analysis of the survey data to identify five publics, each of which has differing beliefs, degree of support for government action and views of the issue salience of climate change. While chapter 3 primarily examines the nature of climate opinion, it also investigates profiles of these publics, in terms of socio-demographic characteristics and political attitudes.

In chapter 4, I examine cross-country variation in belief, issue salience and support for government action. Relying on Eurobarometer data, I compare the levels of opinion on the three dimensions in the (at the time of the survey) 28 EU member states. I also explore the extent to which country-level and individual-level factors relate to climate views. I include two contextual factors in my analyses: country wealth and level of greenhouse gas emissions. Additionally, I use individual-level measures of political and social attitudes to test the extent to which different compositions of each country's population may explain some of the cross-country variation. Thus, chapter 4 investigates not just the nature of climate opinion, but also some of the factors that shape it.

Chapter 5 tests the extent to which people's climate opinions can be influenced by external actors. As explained in section 2.3.1, various interest groups, which campaign both in favour and against stronger climate policy, have been particularly active on climate change. I therefore use a survey experiment to test the extent to which people can be influenced by hypothetical messages from interest groups supporting either side of the climate debate. Specifically, I investigate whether arguments made by interest groups supporting or opposing a price on emissions affect people's support for such a policy, and their wider views of government action on climate change. I rely on survey data from the UK (the same survey that is the basis of chapter 3) for the analysis in chapter 5.

The final empirical study, chapter 6, investigates the extent to which

conservative economic and social attitudes relate to support for government action on climate change and the environment in general. Using data from the 2017 New Zealand Election Study (NZES), I aim to bring clarity to the debate over why people on the right of the political spectrum tend to be less engaged with climate change and the environment than those on the left. Addressing climate change and other environmental issues is likely to require substantial government economic intervention (Hursh & Henderson, 2011; McCright & Dunlap, 2003). Right-wing people tend to support free market economic policies and oppose strong government intervention in the economy, and thus are less likely to support government action on the environment. However, people holding social attitudes such as right-wing authoritarianism and exclusionary attitudes tend to be less likely to support government action on climate change. I therefore include both sets of factors in the analysis to disentangle the relationship between conservative social and economic attitudes, and support for government action on climate change and the environment.

In these four empirical studies, I aim to provide evidence that contributes to a greater understanding of the dimensions of belief in climate change, the public issue salience of climate change and support for government action on climate change. As I have explained throughout this chapter, knowledge of these dimensions can shed light on the degree of public will for climate action. Understanding these dimensions therefore provides insight into the possible influence of public opinion on climate policy. Additionally, by investigating the forces that shape people's climate views, I hope to contribute to knowledge of why people hold particular climate opinions, and thus what the prospects for greater public engagement with climate change might be. In the discussion in chapter 7, I assess the results of the four empirical chapters with respect to these two over-arching research questions.

Chapter 3

Public opinion on climate change: belief and concern, issue salience and support for government action

Abstract

Climate policy across the developed world remains inadequate, despite high levels of concern about climate change among the public. Yet public opinion on climate change is complex, with individuals differing on three key opinion dimensions: belief and concern, issue salience, and support for government action. In this study, we investigate how these dimensions intersect at the individual level. Based on data from an online survey conducted in 2018 in the United Kingdom (N = 787), a latent class analysis reveals that there are five climate change opinion publics. The two largest publics have strong beliefs that climate change is occurring, but view it as a low salience issue, or are wary of government action to address it. We also investigate sociopolitical covariates of each public. By providing a detailed picture of climate change views, these findings can help us to better understand the relationship between public opinion and climate policy.

3.1 Introduction

While climate change is a problem that requires immediate and substantial action, to date, pledges from national governments to reduce emissions have been inadequate. Almost none of the countries party to the Paris agreement are on track to keep emissions to a level compatible with the goal of remaining well under the maximum of 2°C of warming by the end of the 21st century. While a variety of factors may account for this lack of action, in liberal democracies, the views of the public often play a role in determining the policies that governments select (Burstein, 2003; Shapiro, 2011; Soroka & Wlezien, 2010), and previous research suggests that there is a link between public opinion and climate policy (Tjernström & Tietenberg, 2008; Vandeweerdt et al., 2016). It is important, then, to properly understand the nature of the public's views on climate change.

Previous studies have examined a range of dimensions of climate change opinion, including the belief that climate change is occurring, degree of concern about climate change, and the salience of the issue (e.g. Egan & Mullin, 2017; Lewis et al., 2019; McCright & Dunlap, 2011; Scruggs & Benegal, 2012). Typically, however, these dimensions are analysed separately, and the focus is often primarily on people's degree of belief or concern about climate change, or the extent to which people deny that climate change is occurring. A handful of studies have examined how multiple dimensions of climate change opinion interact at the individual-level (Leiserowitz et al., 2009; Maibach et al., 2011; Metag et al., 2017), although they do not include the dimension of issue salience.

Relying on an original online survey conducted in the UK in August 2018, the current study investigates three dimensions of climate change opinion. In contrast to previous studies investigating multiple dimensions of climate change opinion, we examine not only belief in and concern about climate change, but also issue salience and support for government action on climate change. Issue salience can account for the differences in resolve to address climate change among those who believe that climate change is happening (Bromley-Trujillo & Poe, 2018). Moreover, issue salience is likely to be critical in determining whether public opinion influences policy (Burstein, 2003), as it is a clear signal from the public on whether more needs to be done by the government (Soroka & Wlezien, 2010). Investigating these three dimensions, there-

fore, can help to create a clearer picture of the relationship between climate change views and climate policy than considering belief in climate change alone (Bromley-Trujillo & Poe, 2018; Burstein, 2003; Hagen et al., 2016). We address two research questions in this study. First (descriptive), how do the three dimensions intersect at the individual level to form different “publics” of climate change views? Second (explanatory), to what extent do sociopolitical characteristics relate to membership of these publics?

3.2 Theory

3.2.1 The dimensions of climate change opinion

Research suggests that large majorities in most countries believe that climate change is occurring, and are concerned about it (Tranter & Booth, 2015). It could be inferred from these findings that policy-makers – who have so far failed to address climate change adequately – are ignoring public opinion by not adopting stronger climate policies. However, few of those who accept the science of climate change see it as a high salience issue, or support government action to address it (Bromley-Trujillo & Poe, 2018; Kotchen et al., 2017). Therefore, any hesitancy by climate policy-makers to adopt a more comprehensive policy programme may be due not to the public’s denial of climate change, but to the fact that the public views climate change as a low salience issue and are concerned about the consequences of government policy action.

Given the multi-dimensional nature of climate change views, it is important to ensure that all relevant aspects are accounted for when analysing opinion on climate change. One tool to assist with identifying these relevant aspects is the concept of “public will”. As Raile et al. (2014, p. 105) explain, public will is “a social system’s shared recognition of a particular problem and resolve to address the situation in a particular way through sustained collective action. Central to this definition are the ideas that many different ‘publics’ can exist at any given time and that a public need not represent a majority of the population to be meaningful.” Public will has two important implications for the current study. First, society comprises multiple publics with respect to particular issues, each with distinct views of an issue, which may not fit along a single dimension. Identifying and characterising each public with respect to these

dimensions can allow us to get a better understanding of climate change opinion in the context of its possible effect on policy.

Second, the concept of public will can be used to select the relevant dimensions of climate change opinion that define the different publics. A “shared recognition of the problem” can be determined by investigating citizens’ belief in climate change and its causes, the certainty with which those views are held, and the degree of concern about the problem. Issue salience can be used to understand a public’s degree of “resolve to address the issue”. Finally, the “particular way” in which each public believes the problem should be solved is interpreted here as the extent to which individuals believe government policy (as opposed to voluntary action by individuals and businesses) should be used to mitigate emissions.

These dimensions of climate change opinion (belief and concern, salience, and support for government action) have been examined in previous studies, although most studies focus on one of the three dimensions (rather than combining them). Of the three, the belief and concern dimension has received by far the most attention (M. C. Nisbet & Myers, 2007; Knight, 2016; Pew Research Center, 2015; Scruggs & Benegal, 2012), with research on belief often focussing on denial or scepticism (McCright & Dunlap, 2011; Poortinga et al., 2011; Tranter & Booth, 2015). Less attention has been paid to issue salience, even though it is generally agreed to be important for understanding climate change views because climate change appears to be of very low salience for much of the population (Bromley-Trujillo & Poe, 2018; Herrnstadt & Muehlegger, 2014). Some previous research has examined support for government action to address climate change, often by examining the extent to which people are willing to pay higher taxes to address climate change, or whether they support or oppose particular policies (Kotchen et al., 2017; Maibach et al., 2011; McCright et al., 2013).

In adopting the concept of public will, this study takes a “person-centred” approach to investigate climate change opinion, rather than the “variable-centred” approach typically used in quantitative social science research (Laursen & Hoff, 2006; Magnusson, 2003). A person-centred approach seeks to identify groups of individuals within a population that have similarities with respect to the specific measures under investigation (Laursen & Hoff, 2006). Such an approach offers two main advantages

for the purposes of our study. First, identifying groups within a population fits well with the concept of public will, which suggests the existence of multiple publics. Second, a person-centred approach accounts for the various positions an individual may take on the three dimensions we investigate. For example, although many people may believe that climate change is happening, some see it as a high salience issue, whereas others only see it as medium or low salience. Two groups could thus be identified among those who believe in climate change: one where members believe in climate change and see it as high salience, and another where members also believe in climate change, but see it as medium or low salience. These two groups may have differences between them with respect to other measures of climate change opinion (for example, the extent to which they support the government taking action), and to predictors of group membership (such as demographic variables). Taking a person-centred approach, then, means that the opinions of the various groups within the population can be understood with greater clarity than if only a variable-centred approach was used, where the relationships between measures such as belief and salience can only be understood at the aggregate level (Laursen & Hoff, 2006).

Previous research has used person-centred techniques to investigate climate change opinion, dividing individuals into “audience segments”. Using a latent class analysis of survey data, Leiserowitz et al. (2009) identify six segments of the American public with various attitudes to climate change ranging from “alarmed” to “dismissive” (see also: Metag et al., 2017; Morrison et al., 2013). Importantly, however, these studies have mainly aimed at understanding how best to communicate with the different groups (hence the use of language such as “audience segments”) (Maibach et al., 2011). Additionally, the standard survey tools employed by these studies do not include questions on issue salience (Maibach et al., 2011). Yet, politicians are more likely to respond to public opinion if most people are not only concerned about climate change but also see it as highly salient (Burstein, 2003; Raile et al., 2014). Therefore, including issue salience in a person-centred analysis can lead to an improved understanding of how public opinion relates to policy, as it allows differentiation between people who are concerned, but see climate change as either a low or high salience issue.

To form expectations about which publics we might find in the pop-

Table 3.1: Summary of possible climate change publics

	Strong belief in / concern about climate change?	Sees issue as high salience?	Supports government action?
Highly engaged	Yes	Yes	Yes
Moderately engaged	Yes	No	Yes
Non-interventionists	Yes	Yes/No	No
Deniers	No	No	No

ulation, we examined the different possible combinations of positions on the three key dimensions: belief and concern, salience, and support for government action. These positions suggest four possible climate change publics, as summarised in table 3.1: the highly engaged, the moderately engaged, the non-interventionists and the deniers. While other combinations may also be possible (for instance, someone could support government action, despite not being concerned about climate change, or seeing it as high salience), these four outlooks are likely to be large enough to warrant investigation, based on previous research (e.g. Egan & Mullin, 2017; Leiserowitz et al., 2009; Tranter & Booth, 2015).

In most countries, a committed group of citizens are deeply concerned about climate change, strongly support government action to address it, and – we anticipate – see climate change as a high salience issue (Leiserowitz et al., 2009). We refer to this public as the “highly engaged”. Although most countries have a high proportion of highly concerned citizens, on average, climate change is rated as low salience (Bromley-Trujillo & Poe, 2018; Egan & Mullin, 2017). We thus expect a large group of citizens to form the “moderately engaged” public, whose members have high levels of belief that climate change is occurring, and would like the government to act on it, but tend to believe that other issues are more salient. Given that some citizens may be ideologically opposed to strong government regulations or economic intervention, we also expect there will be a “non-interventionist” public, which has high levels of belief that climate change is happening, may or may not view it as highly salient, but does not support strong government action on climate change (Drews & van den Bergh, 2016). Many studies have confirmed that sections of the population in most countries do not believe climate change is happening, or is a serious threat (Tranter & Booth, 2015). We thus anticipate a “den-

ier” public to have strong beliefs that climate change does not exist, or that it is not a serious threat, and therefore will not see climate change as high salience, or support government action to address it.

Additionally, some individuals will not fit into any of these categories, such as those who are uncertain or ambivalent about climate change. We refer to this group as the “uncertain”. Their positions on the three main dimensions are more difficult to establish from the existing literature. However, previous research has indicated a substantial proportion of the public are uncertain about whether climate change is occurring, and what should be done about it (Hagen et al., 2016; Poortinga et al., 2011). A person-centred approach can identify whether or not the uncertain is a genuine “public”, or merely a catch-all for individuals who do not fit into the other publics. Consistent climate change views among members of the uncertain group (for instance, having similar ideas about the seriousness of climate change), and similarities in the sociopolitical profile of members of the uncertain group would both be indications that the group is a genuine, separate public. As uncertainty about climate change has previously been found to be common, we expect individuals forming the uncertain group to have consistent views on many aspects of climate change, and that our analysis will help to more clearly define what these views are.

3.2.2 Climate change opinion in the UK

Turning to the specific case investigated in this study, the UK is a country which has been at the forefront of climate change policy. In 2008, the UK passed the Climate Change Act 2008, which has been seen as one of the most innovative and comprehensive pieces of climate change legislation adopted at the national level (Fankhauser et al., 2018). Existing research shows that public opinion about climate change is similar in the UK to most other developed countries. In particular, most people in the UK are concerned about climate change, with a 2015 Pew Research Center poll reporting that 77% of people in the UK believe that climate change is a very or somewhat serious problem (Pew Research Center, 2015). Absolute denial or scepticism about climate change is relatively rare in the UK, although some studies have found that many people are uncertain about whether or not climate change is happening (Poortinga et al., 2011; Taylor, Dessai et al., 2014; Whitmarsh, 2011). These levels

of concern and denial appear to be relatively stable over time.

Despite the reasonably strong belief and concern about climate change in the UK, salience of the issue is low (Lorenzoni & Pidgeon, 2006). For example, a 2016 study found that only two percent of respondents in the UK said “climate change” was the most important issue facing the country (in response to an open-ended question) (Steentjes et al., 2017). People tend to be more worried about issues such as the economy, healthcare and immigration instead (Steentjes et al., 2017). Even when compared with other environmental issues, climate change tends to receive a low ranking (M. C. Nisbet & Myers, 2007).

There is a reasonable degree of support in the UK for government policy to address climate change (Rietig & Laing, 2017), although support is typically for policies that would not result in higher prices being passed on to consumers (Kantenbacher et al., 2018). The British public tends to believe responsibility for action on climate change rests primarily with national governments, international organisations, and businesses rather than with individuals (Pidgeon, 2012; Spence et al., 2010).

To summarise the expectations relating to the first research question, we expect each of the four publics to be found in the UK, given that UK opinion on climate change is fairly similar to that in other developed countries. In addition, we expect a fifth group (the uncertain) to consist of a collection of views that do not fit into the four main publics.

3.2.3 Sociopolitical characteristics of the publics

Investigating climate change opinion using a person-centred approach allows for analysis of the sociopolitical profile of each of the publics, which is the second research question addressed in this study. Previous research conducted in developed countries has investigated the sociopolitical characteristics of people with particular climate change views, finding that age, political orientation, education level, and socioeconomic status often relate to people’s outlook on climate change (Knight, 2016; McCright & Dunlap, 2011; Poortinga et al., 2011; Tranter & Booth, 2015; van der Linden, 2017). Given that the relationship between sociopolitical characteristics and climate change views can vary across countries (Poortinga et al., 2019; Tranter & Booth, 2015), it is important to consider the specific context of the UK.

In the UK, older people with below average income are more likely to be sceptical of climate change (Capstick & Pidgeon, 2014; Clements, 2012; Poortinga et al., 2011). Previous research has also revealed that those with lower levels of education are more likely to be sceptical about climate change (Capstick & Pidgeon, 2014; Clements, 2012), and there is some evidence that men are also more likely to be deniers (Clements, 2012). Few studies have examined the differences in climate change views in the UK among different ethnicities, although Clements (2012) finds some evidence that those who identify as white are more likely to be supportive of tackling climate change.

The theoretical explanations for why such demographic characteristics relate to climate change views are, however, rarely considered (van der Linden, 2017). One plausible explanation is that post-material values, often found to be positively correlated to belief in climate change (Kvaloy et al., 2012; Mostafa, 2016), are also associated with being younger and on a higher income (Moors, 2003). Gender differences can be explained by women tending to be socialised to have higher levels of empathy than men, leading them to hold stronger pro-environmental attitudes (Milfont & Sibley, 2016). Several studies have suggested that the effect of education on climate change views does not come from the inability of those with less education to understand the science of climate change, but is instead related to the political orientation of the highly educated (Hamilton, 2011; Hamilton et al., 2015; Kahan et al., 2012). In other words, it seems that the highly educated are more able than those with less education to receive political cues on climate change, and engage in motivated reasoning that aligns with their existing ideology (Hamilton et al., 2015; Kahan, 2015). Overall, demographic differences in climate change views seem to be related to differences in political and environmental values (Dietz et al., 2005).

Unlike the US, views on climate change in the UK do not seem to be starkly politically polarised. While there is evidence that Labour voters tend to believe climate change is a more serious problem than Conservatives, it is a much smaller gap than that between Republican and Democrat supporters in the US (Pew Research Center, 2015). Clements (2012) finds that those on the right in the UK are more likely to be sceptical about climate change. Political orientation may be connected to climate change views through motivated reasoning, where individuals evaluate

information about a topic based on their existing ideological precepts, rather than on its objective truth (Kahan, 2015; Kahan, 2016). Alternatively, people may simply dismiss information sources as not credible if the information provided by the sources does not conform to their existing beliefs or ideology (Druckman & McGrath, 2019).

We have clear expectations, then, about the sociopolitical characteristics of the highly engaged and denier publics. In particular, we expect members of the former to be typically younger, more left-leaning, more highly educated and with a higher than average income, while the denier public will be older, more right-leaning, less highly educated, and with a lower than average income. Given the lack of existing research on the other publics, developing expectations about their sociopolitical characteristics is more challenging. Overall, we expect the moderately engaged to be similar to the highly engaged, and the non-interventionists and uncertain to be similar to the deniers.

3.3 Data and Method

To gain a better understanding of the dimensions of climate change opinion, we conducted an original online survey in the UK. Respondents were recruited through the online platform “Prolific”, a UK-based service where individuals can sign up to participate in surveys, receiving a small payment in return. Researchers post the details of their survey, including any pre-screening criteria, and the Prolific system emails eligible participants. Prolific is similar to Amazon MTurk (a platform that has been used for a number of studies Buhrmester et al., 2011); however, Prolific is designed specifically for surveys, and caters more to academic researchers (Peer et al., 2017). While previous research has shown that social science studies conducted using Prolific have similar results to those conducted using more traditional respondent pools (Palan & Schitter, 2017; Peer et al., 2017), we applied weightings (based on gender, age, education and ethnicity) to the responses to reduce some of the sample’s bias.¹

The survey comprised questions – many of which were based on those

¹A more detailed discussion of the method employed, including data collection, application of weights and the list of variables can be found in section 3.A. Descriptive statistics and the text of the survey are presented in section 3.B and Appendix A respectively. The results of the latent class and multinomial regression analyses presented below were roughly the same whether or not weightings were used.

used by Maibach et al. (2011) – on the three dimensions of climate change investigated in this study: belief in and concern about climate change, issue salience, and support for government action. Additionally, respondents were asked about their sociopolitical characteristics, including age, gender, education, income, political orientation, and party preference. A detailed description of the variables can be found in section 3.B. Two variables warrant explanation here: belief in climate change and issue salience. The belief measure is derived from two survey questions, the first asking “Do you think that climate change is happening?” (with responses being “yes”, “no” or “don’t know”), and the second asking “How certain are you that climate change is/isn’t happening?”, with responses on a five point scale, ranging from “not at all certain” to “extremely certain”. The belief variable was coded by assigning 1 to those who are extremely or very certain climate change is not happening, and 7 to those who are extremely or very certain climate change is happening, with remaining responses placed accordingly along the scale. Second, salience – which we define as the perceived importance of an issue for the country relative to other issues – was measured by asking participants to rank eight issues from the most to least important to the country. The salience variable is coded as the ranking each participant gave to climate change, with 1 indicating that the participant sees climate change as the most important of the eight issues, and 8 indicating the participant sees it as the least important.

The survey was conducted in late August 2018, at the end of the hottest British summer on record (BBC, 2018). Previous research has shown that people tend to become more concerned about climate change after experiencing unusual weather patterns (Taylor, Bruine de Bruin et al., 2014), an effect which tends to be particularly strong for recent weather events. It is likely, then, that more people in the UK were concerned about climate change at the time of the survey than if there had been a more historically typical summer. Respondents were all British citizens, aged 18 and over and currently resident in the UK. 820 people completed the survey. After respondents were removed for not being resident in the UK, missing data or failing two attention checks, 787 respondents were included in our final sample.² To ensure that answers to the salience

²The first attention check began by mentioning climate change and the news, but then requested that respondents select the “Not at all interested” option. The second attention check was a question about a short article on climate change and policy re-

question were not affected by priming, the initial purpose of the survey was withheld from respondents, and the survey was instead advertised as being about “important political issues”. After survey responses were submitted, a debrief message was displayed to respondents explaining the true purpose of the survey.

The data were analysed using a latent class analysis with Mplus 8.2. Two separate analyses were conducted. In the first analysis, addressing the first research question, a measurement model was selected by investigating models with different numbers of classes, and reviewing the fit statistics and substantive interpretation to select the appropriate model. In the second analysis, addressing the second research question, sociopolitical covariates were introduced. This was done using the “three-step” method, where the covariates are regressed on a manifest class variable, which also takes into account the uncertainty of classification for individuals (Asparouhov & Muthén, 2014). For the second analysis, observations with missing values for the independent variables were dropped, meaning 740 observations were included.

3.4 Results

3.4.1 Latent Class Analysis

We conducted a latent class analysis using the indicator variables. Models allowing for between one and eight classes were investigated. The runs for models consisting of six, seven and eight classes did not produce duplicated log-likelihood values, and therefore were considered not well-identified. Fit statistics are presented for the remaining models in table 3.2.

These statistics indicate that the three, four or five class models all have a good fit for the data. Although the CAIC and AWE statistics point to a three class model, and the BIC statistic points to a four class model, for substantive reasons we selected the five class model as the preferred model. In the three and four class models, the classes were harder to interpret. For instance, the class that could be labelled the “highly engaged” in the three and four class models had higher response prob-

spondents were asked to read. The question asked respondents to select one of four statements that summarised the text they had read. The text, and associated questions, were part of an experiment, the results of which are not included in this chapter.

Table 3.2: Model fit statistics

Classes	Parameters	LL	BIC	SABIC	CAIC	AWE	BF	Entropy
1	54	-12681.15	25722.39	25550.91	25776.39	25803.39	1121.06	-
2	109	-11376.72	23480.28	23134.15	23589.28	23643.78	335.67	0.902
3	164	-10857.67	22808.94	22288.15	22972.94	23054.94	2.90	0.91
4	219	-10671.40	22803.13	22107.69	23022.13	23131.63	-46.86	0.898
5	274	-10534.88	22896.85	22026.76	23170.85	23307.85	-	0.871

Note:

LL = log-likelihood; BIC = Bayesian Information Criterion; SABIC = Sample-size adjusted BIC; CAIC = Consistent Akaike Information Criterion; AWE = Approximate Weight of Evidence Criterion; BF = Bayes Factor; Bolded values indicate "best" fit for each respective statistic. Models for 6, 7 and 8 class solutions were also run, but are not displayed here as they were not well identified.

abilities for the lower salience categories than in the five class model. Additionally, those who are uncertain tended to be spread across the classes. There are sufficient differences between the moderately engaged and non-interventionist publics to aid in substantive interpretation of the data. Moreover, these two classes have different sociopolitical profiles (see below).³

Table 3.3 displays a summary of the results of the latent class model as well as the class labels that were assigned to each of the classes.⁴ Four of the five classes fit well with the publics (and the uncertain group) that had been derived from the literature (see table 3.1). However, the fifth (the non-interventionists) differed from our expectations. Although members of this public are less willing to pay higher taxes to address climate change, the model predicts that members of this public have a 0.57 probability of believing that the government is not doing enough to address climate change. For this reason, we relabelled the non-interventionists as the “action-wary”.

The highly engaged public has a prevalence of 0.17. All members of this public have a very strong belief that climate change is occurring, and typically rank climate change as one of the three most important issues. They are also very likely to believe that climate change is an extremely serious problem, is caused by humans and that there is scientific consensus on climate change. Although the highly engaged feel the most informed of the five publics, many members of this public still feel unsure about their own knowledge of climate change, with a mean score of 3.7 (on a five point scale) in response to the question about how informed they feel about climate change. Not surprisingly, the highly engaged feel that the government is not doing enough about climate change, that climate change should be a very high priority for the government, and is best addressed by government policy.

The moderately engaged public is the second largest of the five publics, with a prevalence of 0.29. Like the highly engaged, they have a very strong belief that climate change is occurring, and are certain in that

³Local independence checks for the five class model showed some pairs of indicators had significant bivariate residuals (Asparouhov & Muthén, 2015). We therefore investigated alternative models which included residual covariances. These models produced similar results to the initial five class model. We therefore selected the initial five class model on the basis that it was the most parsimonious.

⁴The full results of the latent class analysis can be found in table 3.6 in the chapter appendix.

Table 3.3: Summary of Latent Classes

Variable	Scale	Mean or Probability (Standard Error In Brackets)				
		Highly Engaged	Moderately Engaged	Action-wary	Uncertain	Deniers
Latent class prevalence	-	0.170 (0.058)	0.293 (0.054)	0.328 (0.032)	0.147 (0.022)	0.062 (0.014)
Relative salience of climate change	1-8	3.473 (0.376)	5.284 (0.426)	6.956 (0.172)	7.426 (0.134)	7.239 (0.329)
Belief in climate change	1-7	7.000 (0.000)	6.898 (0.033)	6.498 (0.133)	5.260 (0.235)	2.757 (1.472)
Human causation (probability)	-	0.947 (0.055)	0.890 (0.036)	0.740 (0.049)	0.384 (0.071)	0.036 (0.036)
Scientific consensus (probability)	-	0.954 (0.034)	0.813 (0.044)	0.716 (0.042)	0.585 (0.074)	0.203 (0.122)
Climate change harming people now (probability)	-	0.788 (0.052)	0.654 (0.049)	0.244 (0.055)	0.052 (0.037)	0.053 (0.060)
Seriousness	1-5	4.959 (0.029)	4.528 (0.141)	3.896 (0.081)	2.812 (0.101)	1.718 (0.187)
Personal importance	1-5	4.721 (0.213)	3.896 (0.103)	2.957 (0.073)	1.798 (0.156)	1.251 (0.087)
How informed respondent feels about climate change	1-5	3.717 (0.197)	2.982 (0.091)	2.509 (0.067)	2.125 (0.116)	2.679 (0.197)
Government priority of climate change	1-4	3.488 (0.113)	2.863 (0.155)	2.114 (0.053)	1.492 (0.099)	1.000 (0.000)
Importance of jobs and prices for policy	1-5	3.191 (0.124)	3.386 (0.125)	3.128 (0.077)	2.717 (0.167)	2.443 (0.258)
Government policy preferred to finding own solutions (probability)	-	0.970 (0.018)	0.903 (0.032)	0.771 (0.037)	0.594 (0.069)	0.158 (0.100)
Willingness to pay higher taxes	1-5	4.043 (0.241)	3.179 (0.121)	2.532 (0.115)	1.716 (0.107)	1.071 (0.056)
Government is not doing enough (probability)	-	0.957 (0.038)	0.786 (0.068)	0.567 (0.045)	0.242 (0.069)	0.000 (0.000)

Note:

Means calculated from values estimated by latent class model

belief, having a mean score on the seven point belief scale of 6.9, just below the highly engaged. However, the moderately engaged tend to rank climate change as only a medium or low priority compared with other issues. In other respects, they are quite similar to highly engaged citizens, being confident about the scientific consensus, human causes and extremely serious nature of climate change. The moderately engaged are less willing than the highly engaged to pay much higher taxes to address climate change, and believe that climate change should be only a high (as opposed to very high) priority for the government.

The action-wary public is the largest group, having a prevalence of 0.33. They have a high level of belief that climate change is occurring, only slightly below the moderately and highly engaged. However, they see climate change as a very low salience issue, having a 0.73 probability of ranking climate change as either the seventh or eighth most important out of the eight issues. They are reasonably confident that climate change is caused by humans, and that scientists agree on climate change, but are relatively unlikely to believe climate change is affecting people now. With respect to government action, the action-wary tend to believe the government is not doing enough to address climate change, having a 0.57 probability of providing this response. However, they believe that climate change should be only a medium priority for the government, and most are unwilling to pay higher taxes to address climate change.

The uncertain (prevalence 0.15) believe, on average, that climate change is occurring, but are not certain about their beliefs. They view climate change as having very low salience, giving it a mean ranking of 7.43 out of the eight issues. The uncertain are very unlikely to believe climate change is harming people now, although they see it as a moderately serious problem. They feel the least informed of the five publics, having a probability of 0.72 of feeling slightly or not at all informed about climate change. For the questions asking when people will be harmed by climate change and how the government is performing on climate change, members of the uncertain public are more likely to answer “don’t know” than to provide any other response.

Finally, the deniers are the smallest public, having a prevalence of 0.06. Most deniers do not believe that climate change is happening, although they are not overly confident in this belief, having only a 0.29 probability of being extremely or fairly certain that climate change is not

happening. They believe that climate change is a low salience issue, with their mean ranking being slightly less than that of the uncertain. Deniers do not attribute climate change to humans, and do not believe that scientists agree about climate change. Most deniers believe that climate change should be a low priority for the government, and that businesses and individuals should find their own solutions to climate change.

3.4.2 Sociopolitical Covariates

Turning to our explanatory research question, we conducted a multinomial logistic regression of the sociopolitical covariates on latent class membership. Below, we present predicted probabilities plots for the five variables that appeared to have statistically significant relationships with the probability that an individual is a member of a public: age, political orientation, income, education and gender.⁵ The other variables we investigated (ethnicity and party preference) do not seem to have a clear relationship with latent class membership. Table 3.7 in the chapter appendix presents the regression results. The dashed line in each figure below indicates the overall probability of membership of each latent class.

As illustrated in figure 3.1, age has a moderate effect on membership of the highly and moderately engaged, with younger people being more likely to be members of both publics. Contrary to our expectations, age does not seem to affect the probability of a person being a member of the action-wary. However, in line with our expectations, older people have a higher probability of being deniers than younger people.

The link between left-right political orientation and latent class membership (figure 3.2) is as expected. Left wing voters are more likely to be members of the highly and moderately engaged than the deniers. Individuals on the far right of the spectrum have a probability close to zero of belonging to the highly engaged, while those on the left have a probability of over 0.4. The action-wary, deniers and uncertain have opposite trends, with members being more likely to have a right than left-wing orientation.

Income also shows a statistically significant relationship with latent class membership (figure 3.3). However, contrary to our expectations, those in lower income categories are more likely to be members of the

⁵The predicted probabilities were calculated using marginal standardisation rather than holding the other variables in the model at their means. This method has been shown to produce more accurate results for non-linear models (Muller & MacLehose, 2014). Confidence intervals were obtained by non-parametric bootstrapping.

Figure 3.1: Predicted probabilities of latent class membership by age (with 95% confidence intervals)

Figure 3.2: Predicted probabilities of latent class membership by left-right political orientation (with 95% confidence intervals)

Figure 3.3: Predicted probabilities of latent class membership by income (with 95% confidence intervals)

highly and moderately engaged than the deniers, compared with people on a higher income. To further explore the effect of income, we ran ordinal logistic regression analyses for each of the categorical indicators of climate change opinion separately (the results are presented in table 3.8 in the chapter appendix). These analyses show that, while people on higher incomes are more likely to believe that climate change is happening than people on lower incomes, people on higher incomes see climate change as a less serious issue, and believe that it should be a lower priority for the government than those on lower incomes.

Individuals with a tertiary degree are statistically more likely to be members of the highly engaged public, and less likely to be members of the uncertain group than those without a degree (figure 3.4). Holding a degree does not seem to significantly affect membership of any of the other publics. The ordinal logistic regression presented in table 3.8 in the chapter appendix, which analyses the different dimensions of climate change opinion separately, also suggests that holding a degree tends to be associated with viewing climate change as a high salience issue and supporting government action rather than belief in the existence of climate change.

Finally, the multinomial logistic regression reveals that men tend to be more likely than women to be members of the highly engaged (figure 3.5). Yet, gender does not seem to affect the probability of membership of any of

Figure 3.4: Predicted probabilities of latent class membership by possession of a degree (with 95% confidence intervals)

Figure 3.5: Predicted probabilities of latent class membership by gender (with 95% confidence intervals)

Note: due to the small number of respondents identifying as transgender, intersex or other, only male and female respondents are included in this figure.

the other publics. Given that women are typically more concerned about climate change (Clements, 2012; McCright & Dunlap, 2011), this is a somewhat surprising result. The results of the ordinal logistic regression (see table 3.8 in the chapter appendix) indicate that women (compared with men) tend to view climate change as less serious, and also feel less informed about climate change.

Overall, our analysis shows that the latent classes defined in the previous section can be thought of as genuine publics whose members not only tend to have similar views on climate change, but also share sociopolitical characteristics. They also tend to be of similar age, and place themselves at similar positions on the left-right political spectrum. Despite having much in common in their views on climate change, the moderately engaged and action-wary have quite different sociopolitical characteristics: the moderately engaged are left-leaning while the action-wary are right-leaning. The sociopolitical differences between the publics also add support to the selection of a five class model, as opposed to the three or four class models in which the moderately engaged and action-wary would not have been defined as separate classes. Finally, our results indicate that the uncertain can be considered a coherent “public”, rather than simply a collection of individuals, as members have similar views on many measures, and have some sociopolitical similarities.

3.5 Discussion and Conclusion

The aim of our study was to provide a detailed understanding of public opinion about climate change by using a person-centred approach to identify different “publics”. We investigated three dimensions of climate change opinion: belief in and concern about climate change, issue salience and support for government action. Our results demonstrate that incorporating multiple dimensions when analysing opinion on climate change creates a detailed and precise picture of what people think about climate change and how it might be addressed. This picture suggests that – in the UK context at least – deniers are only a small section of society. As younger and left-wing people were over-represented in the sample used in our study, the size of the denier public may be somewhat larger than reported here: other studies place denial of climate change in the UK between 10 and 12% (Steentjes et al., 2017; Tranter & Booth,

2015). Yet, the attention paid to climate change denial – in both the popular and academic literature – appears to be out of proportion given the current size of the denier public. Moreover, those who have a strong belief that climate change is happening have a diverse range of views that can be better captured by use of a person-centred approach.

The majority of the UK population seems to fit into either the “moderately engaged” or “action-wary” publics, both of which are certain in their belief that climate change is occurring, but differ in their degree of support for government action on climate change. Which one of these publics an individual is a member of appears to be related to their political orientation: left-wing people tend to be moderately engaged, while right-wing people tend to be action-wary. The moderately engaged and action-wary have similar climate views to the highly engaged, with the main difference being that they see climate change as low or medium salience, whereas the highly engaged believe it to be high salience. Given the large sizes of the moderately engaged and action-wary in the UK, the beliefs of these publics is an area that future research could pay more attention to.

Like the “Six Americas” study (Leiserowitz et al., 2009), the publics that we identified can be ordered from the most to least engaged with climate change with respect to almost all the indicator variables. This is different from the initial model that we proposed, where we expected some members of a “non-interventionist” public to feel that climate change is a high salience issue, but to prefer to address it through non-governmental action rather than governmental action such as paying higher taxes. Instead, it appears that most people in the action-wary public acknowledge that government policy is the appropriate way to address climate change. This suggests that “hard” ideological opposition to government action on climate change is not particularly prevalent in the UK, and any hesitancy about government action is a relatively “soft” concern, perhaps related to seeing other (policy) issues as more important.

Of the sociopolitical variables we considered, age and left-right political orientation have the clearest relationship to membership of the publics. The fact that older people are more likely to be deniers, while younger people are more likely to be highly or moderately engaged suggests that post-material values – which are more commonly found among younger people (Moors, 2003) – are influencing climate change views. Additionally, the effect of age on membership of the publics could be explained

by the lower levels of environmental concern (which is linked to climate change scepticism) among older people (Whitmarsh, 2011), as well as a preference for maintaining existing social structures which older people are typically more a part of than younger people (Jylhä & Akrami, 2015; Poortinga et al., 2019).

Those on the left are significantly more likely to be highly engaged than those on the right, while members of the action-wary, uncertain and deniers tend to be mostly right wing. However, party preference did not seem to relate to membership of the publics, suggesting that the relationship between political orientation and climate change views is not about partisanship – as it may be in the US (Bolsen & Druckman, 2018; van der Linden, 2017) – but is rather related to people’s wider environmental values. It is likely that individuals on the right engage in motivated reasoning to deny or doubt climate science, the implications of which threaten their individualistic world views (Kahan, 2016; Kahan et al., 2012).

Our analyses also revealed that education, gender and income are related to membership of the publics. We find support for previous research on the link between education and climate change opinion, with people who possess a degree having a higher probability of being a member of the highly engaged, and a lower probability of being a member of the uncertain public, compared with those without a degree. Gender and income relate to membership of the publics in ways that were unexpected given the results of previous research. Men having a higher probability of being members of the highly engaged public compared with women appears to be due to women tending to view climate change as less serious and feeling less informed about it, compared with men. Similarly, those on a higher income are less likely to be members of the highly or moderately engaged than those on a lower income. While there is little difference in belief in climate change among income categories, people on higher incomes tend to be more hesitant to back government action on climate change than those on lower incomes.

Our results therefore underline the importance of considering multiple dimensions of climate change opinion (rather than just belief and concern), as the relationship between sociopolitical measures and the different dimensions of climate change views may be complex. This complexity may help to explain the inconsistent results of previous studies investigating the relationship between climate change views and various sociopol-

itical variables (Hornsey et al., 2016; van der Linden, 2017). Moreover, our use of both person-centred and variable-centred analyses – which Laursen and Hoff (2006, p. 383) argue are “complementary rather than competing approaches” – allow us to understand the complexity of the relationship between climate change views and sociopolitical variables, and to illustrate how the sociopolitical covariates relate to the climate change publics in the UK.

More broadly, the characterisation of the publics in terms of both climate change opinion and sociopolitical covariates illustrates the value of using a person-centred approach to investigate climate change views. In particular, a person-centred approach allows us to move beyond the believer-sceptic dichotomy adopted by many previous studies on climate change opinion (Corry & Jørgensen, 2015). As our results demonstrate, there are many differences among climate change “believers”, with respect to both salience and support for government action. Additionally, a person-centred approach allowed us to reveal the variation in the relationships between the sociopolitical covariates and climate change views across different sections of the population (Laursen & Hoff, 2006).

One criticism that may be raised against the validity of the findings presented in this study is our reliance on a non-probability sample. While sample weights were employed in our analyses, this is unlikely to have removed all of the bias. Caution is therefore required for generalising the relative sizes of the publics. This is particularly so for the deniers, due to older and right-leaning people – who tend to be more likely to deny the existence of climate change – being under-represented in the sample. Despite this, the prevalences do give us a broad indication of the sizes of the publics, which is confirmed by the fact that they are comparable to similar previous research (Leiserowitz et al., 2009; Steentjes et al., 2017). Moreover, given that sample weights did not substantially affect the results of our analyses and that the main viewpoints on climate change in the UK are likely to be captured in this sample (and, thus, the latent class model), we believe that the results present an accurate picture of public opinion on climate change in the UK. As a person-centred analysis of climate change opinion has not been previously conducted in the UK, future research using a probability sample could help to confirm these results. Such a study could also include a wider range of questions and incorporate other dimensions of climate change views, such as the degree

to which people engage in individual actions (for example, limiting personal emissions or engaging in political activism) to help address climate change.

With respect to the wider question of whether public opinion plays a role in the inadequate climate change policy adopted in many countries, this chapter can only offer an initial answer with reference to the concept of public will. As noted by Raile et al. (2014), politicians do not necessarily respond to the preferences of the majority of the public when selecting policies. Other aspects of public opinion, such as people's resolve to address the issue (or issue salience), are also important. A small public with a high degree of resolve – such as the highly engaged – may be able to influence policy, and this appears to have been a factor in the UK adopting the robust policy framework of the Climate Change Act 2008 (Carter & Childs, 2018). However, given what is known about the role of salience in the extent to which policy-makers respond to public opinion (Burstein, 2003), caution is warranted. While the UK has made better progress than most, there is the perception among some experts that this progress is fragile (Fankhauser et al., 2018), and further progress could easily be stalled in the face of other political crises that may arise.

Chapter Appendix

3.A Method

3.A.1 Data collection procedure

We used “Prolific” to recruit respondents for the survey (more information can be found on the Prolific website: <https://www.prolific.ac/>). Prolific, a UK-based service, has been used in a number of social science studies in recent years (e.g. Anthony & Moulding, 2018; Zmigrod et al., 2018) and has been found to produce results similar to these more traditional respondent pools (Peer et al., 2014). Due to the increasing costs and falling response rates of probability samples in recent years, many studies in the social science have used non-probability samples such as those provided by Prolific (A. W. Mercer et al., 2017). Many such studies have used Amazon MTurk; however Prolific has several advantages over MTurk. First, it is designed for survey research, rather than a broader set of functions as MTurk is. Second, it requires that respondents be compensated at a minimum hourly rate (at least £5 per hour). Third, respondents are typically more naive and less dishonest than those recruited from MTurk (Peer et al., 2017).

Prolific recruits individuals to sign up to take part in surveys run by a range of researchers (many of whom are academics). Researchers then post an invitation to registered users to complete their survey. Researchers can filter potential respondents by demographic and other criteria. Potential respondents receive an email with a link to the survey when a survey is made available for which they are eligible, containing a brief description of the study. Respondents can then elect to complete the survey (in exchange for a small payment) by clicking the survey link. Respondents are able to withdraw their response either part way through, or shortly after they complete the survey. Researchers are allowed to re-

ject low quality responses (for instance, those failing attention checks). Respondents who have their responses rejected do not receive payment. In our case, respondents were paid £1 for completing the survey, which took most people less than ten minutes.

Of the 820 people who completed the survey, 787 were retained in our final sample. We removed 19 responses for failing both attention checks (the attention checks are described in footnote 2 of the main text), 5 respondents were not currently resident in the UK, and are not included in the analysis, 11 respondents began the survey, but elected to withdraw part-way through, and 9 were removed due to having missing values on the variables used for weighting.

In addition to the data collected in our survey (which was hosted on Qualtrics), Prolific provides some additional anonymised information on each participant which can be matched to the survey responses. For our analysis, we used the “age” data provided by Prolific, rather than the “age” variable we collected in our survey, as the latter was an age range. The continuous age variable provided by Prolific proved to be more useful for our purposes. The data file of survey responses is available on request.

In order to prevent excessive bias in the sample, we collected samples in five tranches, at different times of the day on 20th and 21st August 2018. Each tranche ranged between 110 and 242 responses. As the earlier tranches had gender imbalances (being skewed towards female respondents), we used Prolific’s filtering features so that some of the later tranches were open to male respondents only. The sample, like many convenience samples collected on the internet, is skewed towards younger, highly educated and left-leaning respondents. For this reason, we employed survey weights to help reduce bias, as described below.

3.A.2 Survey weights

To reduce some of the bias in the sample, we employed weights on four demographic measures: gender, age, education (whether or not a person has a university degree), and ethnicity. Weights were generated by raking based on frequencies obtained from the 2011 UK census, using the R “survey” package (Lumley, 2019). 9 observations with missing values on one or more of the weighted measures were removed from the analyses. The weights were trimmed to range between 0.3 and 3.

Although adding weights to an analysis of data from a non-probability sample is unlikely to remove all of the bias (A. Mercer et al., 2018), adding these weights does appear to make the sample more representative of the section of society that is more likely to deny that climate change is occurring. For example, in the unweighted sample, 5.1% of respondents did not believe that climate change is happening, while in the weighted sample, this increases to 6.7%. The latter figure is in line with the results from the European Social Survey (European Social Survey, 2016) – which uses a probability sample – where approximately 7% of respondents answering a similar question did not believe that climate change is happening. The ESS survey question asks “Do you think the world’s climate is changing?”, with possible answers being “Definitely changing”, “Probably changing”, “Probably not changing” or “Definitely not changing”. In the UK sample, after applying weights, 1.4% of respondents believe the climate is definitely not changing, and 5.3% feel it is probably not changing. However, a question from another UK probability sample puts deniers at 12% of the population (Steentjes et al., 2017).

The addition of weights did not change the results of the latent class analysis and the multinomial logistic regression substantially. The latent class model, in particular, was quite similar with and without weights (one of the more notable changes was an increase of the prevalence for the denier public from 0.049 to 0.062). The lack of change in the latent class model indicates it is quite robust, despite the use of a non-probability sample. The regression of the sociopolitical variables on latent class membership was also moderately affected by the addition of weights. While age and left-right political orientation were mostly unchanged, education did not have a statistically significant relationship with being a member of the uncertain public in the unweighted analysis, but did in the weighted analysis, and, similarly, income did not have a statistically significant relationship with any of the public in the unweighted version, but did for some publics in the weighted model. For both variables, this seems to be a matter of changes in statistical power, as the p-values are close to the 5% “threshold”.

Overall, the addition of weights does seem to remove some of the bias in the sample (although it is difficult to quantify exactly how much). Additionally, the fact that adding weights did not substantially alter the results suggests they are robust. In particular, the latent class model is

mostly unaffected by the bias in the sample, although there is likely to be some error in the prevalence estimates (which is not accounted for in the standard error values).

3.B Data

Table 3.4: Summary of variables

Variable	Description	Scale / Categories
Climate Change Salience Dimension		
Relative salience of climate change	Where respondents ranked climate change relative to 7 other issues: health care, education, crime, immigration the economy, terrorism, poverty	(1) Climate change ranked highest to (8) Climate change ranked lowest
Climate Change Belief and Concern Dimension		
Belief in climate change	Belief/certainty of belief in climate change, based on two questions: (1) Do you think that climate change is happening? (yes/no/don't know) (2) How certain are you that climate change is/isn't happening? (5-point scale, from 1 (not at all certain) to 5 (extremely certain))	(1) Extremely/fairly certain it is not occurring (2) Moderately certain it is not occurring (3) Slightly/not at all certain it is not occurring (4) Don't know (5) Slightly/not at all certain it is occurring (6) Moderately certain it is occurring (7) Extremely/fairly certain it is occurring
Causes of climate change	Respondents' views on main causes of climate change	(1) Caused mostly by humans, (2) Caused mostly natural changes, (3) Other, (4) Climate change is not happening, or (5) Don't know
Level of scientific consensus	Respondents' views on whether or not scientists agree that climate change is happening	(1) Scientists agree climate change is happening, (2) Scientists agree climate change is not happening, (3) Scientists disagree, or (4) Don't know
Timing of harm	Respondents' views on when climate change will start to harm people in the UK	(1) Never, (2) In 100 years, (3) In 50 years, (4) In 25 years, (5) In 10 years, (6) Now, or (7) Don't know
Seriousness	Respondents' views on how serious a problem climate change is for the world	(1) Not at all serious to (5) Extremely serious
Personal importance	How important respondents feel climate change is to them, personally	(1) Not at all important to (5) Extremely important
How informed respondent feels about climate change	How informed respondents consider themselves to be about climate change	(1) Not at all informed to (5) Extremely well informed
Support For Government Action Dimension		
Government priority of climate change	How much of a priority respondents think climate change should be for the UK government	(1) Low priority to (4) Very priority high

(continued)

Variable	Description	Scale / Categories
Importance of jobs and prices for policy	How important respondents think it is for the UK government to consider prices and jobs when addressing climate change	(1) Not at all important to (5) Extremely important
Government policy or finding own solutions	Respondents' views on the most effective way of addressing climate change	(1) Government policy, (2) Finding own solutions or (3) Don't know
Willingness to pay higher taxes	Respondents' willingness to pay much higher taxes	(1) Very unwilling to (5) Very willing
Government performance on climate change	What respondents think of the way the UK government is tackling climate change at the moment	(1) Govt. doing too much, (2) Govt. doing right amount, (3) Govt. not doing enough, (4) Don't know
Sociopolitical Covariates		
Gender		(1) Male, (2) Female, (3) Transgender / Intersex / Other
Income	Personal income per year before tax.	(1) No income to (12) More than £100,000. Increments of £10,000
Left-right political scale	Where respondents positions themselves on a left-right scale	(1) Left to (10) Right
Does respondent have a degree?	Whether or not respondent has a degree of any type	(0) No degree or (1) Has degree
Ethnicity	Ethnicity of respondent	(0) White or (1) Non-white
Age	Continuous variable	
Party identification	Party respondent most identifies with	(1) Conservative, (2) Labour, (3) Liberal Democrat, (4) Prefer not to say / Other

Table 3.5: Descriptive statistics

Variable	Min	Max	Unweighted			Weighted		
			Obs.	Mean or Prop.	S.D.	Obs.	Mean or Prop.	S.D.
Latent Class Indicator Variables								
Relative salience of climate change	1	8	791	5.78	2.32	786	5.96	2.26
Belief in climate change	1	7	795	6.42	1.34	790	6.27	1.47
Causes of climate change								
CC caused mostly by humans			610	76.63%		572	72.31%	
CC caused mostly by natural changes			132	16.58%		160	20.23%	
Other			29	3.64%		29	3.67%	
CC not happening			8	1.01%		12	1.52%	
Missing / Don't Know			17	2.14%		19	2.4%	
Level of scientific consensus								
Most scientists think CC happening			605	76.01%		577	72.95%	
Most scientists think CC not happening			5	0.63%		6	0.76%	
Scientists disagree			163	20.48%		183	23.14%	
Missing / Don't Know			23	2.89%		25	3.16%	
Timing of harm	1	6	686	4.77	1.57	683	4.63	1.66
Seriousness	1	5	795	4.07	1.01	790	3.96	1.05
Personal importance	1	5	795	3.39	1.19	790	3.25	1.21
How informed respondent feels about climate change	1	5	795	2.9	0.88	790	2.81	0.86
Government priority of climate change	1	4	796	2.52	0.93	791	2.41	0.92
Importance of jobs and prices for policy	1	5	795	3.21	1	790	3.19	1.02
Government policy or finding own solutions								
Government policy			648	81.41%		613	77.5%	
Own solutions			70	8.79%		82	10.37%	
Neither / Can't decide			76	9.55%		95	12.01%	
Missing / Don't Know			2	0.25%		1	0.13%	
Willingness to pay higher taxes	1	5	795	2.89	1.21	790	2.77	1.21
Government performance on climate change								
Govt. is doing too much			37	4.65%		49	6.19%	
Govt. is doing right amount			123	15.45%		135	17.07%	
Govt. not doing enough			526	66.08%		483	61.06%	
Missing / Don't Know			110	13.82%		124	15.68%	
Sociopolitical Covariates								
Gender								
Male			383	48.12%		357	45.13%	
Female			411	51.63%		433	54.74%	
Transgender / Intersex / Other			2	0.25%		1	0.13%	
Income	1	12	746	3.79	1.87	742	3.51	1.65
Left-right political scale	1	10	795	4.57	1.88	790	4.8	1.94
Does respondent have a degree?	0	1	795	0.51	0.5	791	0.27	0.44
Ethnicity								
White			725	91.08%		697	88.12%	
Non-white			71	8.92%		94	11.88%	
Age	18	75	793	36.33	12.09	791	40.19	14.16
Party identification								
Conservative			125	15.7%		140	17.7%	
Labour			331	41.58%		306	38.69%	
Liberal Democrat			68	8.54%		58	7.33%	
Prefer not to Say / Other			272	34.17%		287	36.28%	

3.C Results

Table 3.6: Full results of the latent class analysis

Variable	Probability of Response (Standard Error In Brackets)				
	Highly Engaged	Moderately Engaged	Action-wary	Uncertain	Deniers
Latent class prevalence					
	0.170 (0.058)	0.293 (0.054)	0.328 (0.032)	0.147 (0.022)	0.062 (0.014)
Relative salience of climate change					
1	0.285 (0.064)	0.057 (0.065)	0.009 (0.010)	0.010 (0.001)	0.000 (0.000)
2	0.160 (0.058)	0.041 (0.019)	0.014 (0.010)	0.000 (0.002)	0.000 (0.000)
3	0.143 (0.044)	0.096 (0.029)	0.029 (0.018)	0.000 (0.000)	0.036 (0.036)
4	0.055 (0.048)	0.163 (0.039)	0.026 (0.017)	0.034 (0.027)	0.061 (0.060)
5	0.139 (0.036)	0.140 (0.033)	0.081 (0.026)	0.028 (0.019)	0.049 (0.044)
6	0.055 (0.034)	0.170 (0.040)	0.114 (0.031)	0.077 (0.031)	0.066 (0.049)
7	0.113 (0.045)	0.181 (0.049)	0.178 (0.031)	0.132 (0.047)	0.057 (0.045)
8	0.050 (0.036)	0.152 (0.041)	0.549 (0.052)	0.720 (0.058)	0.731 (0.099)
Belief in climate change					
No CC & extremely / fairly certain	0.000 (0.000)	0.000 (0.000)	0.005 (0.005)	0.012 (0.008)	0.292 (0.088)
No CC & moderately certain	0.000 (0.000)	0.000 (0.000)	0.017 (0.015)	0.054 (0.026)	0.245 (0.095)
No CC & slightly / not at all certain	0.000 (0.000)	0.000 (0.000)	0.004 (0.004)	0.021 (0.018)	0.195 (0.078)
Don't know	0.000 (0.000)	0.020 (0.004)	0.050 (0.024)	0.323 (0.071)	0.148 (0.112)
CC happening & slightly / not at all certain	0.000 (0.000)	0.000 (0.007)	0.010 (0.007)	0.128 (0.043)	0.000 (0.893)
CC happening & moderately certain	0.000 (0.000)	0.042 (0.029)	0.200 (0.039)	0.092 (0.048)	0.043 (0.307)
CC happening & extremely / fairly certain	1.000 (0.000)	0.938 (0.032)	0.714 (0.053)	0.371 (0.073)	0.077 (0.594)
Causes of climate change					
CC caused mostly by humans	0.947 (0.055)	0.890 (0.036)	0.740 (0.049)	0.384 (0.071)	0.036 (0.036)
CC caused mostly by natural changes	0.001 (0.004)	0.085 (0.039)	0.143 (0.042)	0.571 (0.071)	0.725 (0.095)
Other	0.052 (0.055)	0.006 (0.013)	0.080 (0.023)	0.011 (0.011)	0.000 (0.000)
CC not happening	0.000 (0.000)	0.000 (0.000)	0.005 (0.005)	0.000 (0.000)	0.216 (0.086)
Don't know	0.000 (0.000)	0.018 (0.014)	0.032 (0.016)	0.035 (0.021)	0.023 (0.023)

(continued)

Variable	Probability of Response (Standard Error In Brackets)				
	Highly Engaged	Moderately Engaged	Action-wary	Uncertain	Deniers
Level of scientific consensus					
Most scientists think CC happening	0.954 (0.034)	0.813 (0.044)	0.716 (0.042)	0.585 (0.074)	0.203 (0.122)
Most scientists think CC not happening	0.007 (0.006)	0.006 (0.006)	0.015 (0.011)	0.000 (0.000)	0.000 (0.000)
Scientists disagree	0.029 (0.036)	0.162 (0.041)	0.237 (0.039)	0.356 (0.073)	0.753 (0.126)
Don't know	0.010 (0.011)	0.019 (0.010)	0.032 (0.015)	0.058 (0.031)	0.043 (0.043)
Timing of harm					
Never	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.116 (0.042)	0.599 (0.126)
100 years	0.000 (0.000)	0.043 (0.022)	0.103 (0.027)	0.214 (0.050)	0.021 (0.017)
50 years	0.056 (0.035)	0.039 (0.033)	0.158 (0.034)	0.137 (0.042)	0.034 (0.036)
25 years	0.064 (0.036)	0.060 (0.029)	0.155 (0.034)	0.115 (0.042)	0.000 (0.000)
10 years	0.065 (0.023)	0.165 (0.048)	0.121 (0.033)	0.042 (0.027)	0.000 (0.000)
Now	0.788 (0.052)	0.654 (0.049)	0.244 (0.055)	0.052 (0.037)	0.053 (0.060)
Don't know	0.027 (0.015)	0.039 (0.019)	0.219 (0.049)	0.324 (0.074)	0.293 (0.139)
Seriousness					
Not at all serious	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.425 (0.114)
Slightly serious	0.000 (0.000)	0.000 (0.000)	0.003 (0.007)	0.261 (0.073)	0.522 (0.122)
Moderately serious	0.000 (0.000)	0.031 (0.026)	0.226 (0.052)	0.681 (0.069)	0.000 (0.000)
Very serious	0.041 (0.029)	0.410 (0.110)	0.641 (0.050)	0.041 (0.037)	0.017 (0.048)
Extremely serious	0.959 (0.029)	0.559 (0.124)	0.129 (0.035)	0.016 (0.016)	0.036 (0.036)
Personal importance					
Not at all important	0.000 (0.000)	0.005 (0.004)	0.000 (0.000)	0.378 (0.078)	0.749 (0.087)
Slightly important	0.000 (0.000)	0.017 (0.016)	0.201 (0.035)	0.447 (0.069)	0.251 (0.087)
Moderately important	0.028 (0.063)	0.179 (0.051)	0.655 (0.053)	0.176 (0.092)	0.000 (0.000)
Very important	0.222 (0.102)	0.675 (0.074)	0.130 (0.051)	0.000 (0.000)	0.000 (0.000)
Extremely important	0.749 (0.155)	0.124 (0.066)	0.014 (0.011)	0.000 (0.000)	0.000 (0.000)
How informed respondent feels about climate change					
Not at all informed	0.000 (0.000)	0.029 (0.019)	0.029 (0.014)	0.210 (0.053)	0.038 (0.029)

(continued)

Variable	Probability of Response (Standard Error In Brackets)				
	Highly Engaged	Moderately Engaged	Action-wary	Uncertain	Deniers
Slightly informed	0.034 (0.020)	0.110 (0.039)	0.467 (0.054)	0.505 (0.068)	0.445 (0.123)
Moderately informed	0.404 (0.123)	0.721 (0.046)	0.472 (0.059)	0.234 (0.058)	0.352 (0.096)
Very informed	0.373 (0.067)	0.130 (0.047)	0.028 (0.015)	0.050 (0.035)	0.129 (0.074)
Extremely well informed	0.189 (0.081)	0.010 (0.009)	0.004 (0.004)	0.000 (0.000)	0.036 (0.036)
Government priority of climate change					
Low	0.018 (0.015)	0.007 (0.008)	0.073 (0.024)	0.515 (0.078)	1.000 (0.000)
Medium	0.053 (0.031)	0.234 (0.093)	0.748 (0.043)	0.478 (0.066)	0.000 (0.000)
High	0.351 (0.101)	0.647 (0.073)	0.170 (0.038)	0.007 (0.032)	0.000 (0.000)
Very high	0.578 (0.101)	0.112 (0.077)	0.008 (0.012)	0.000 (0.000)	0.000 (0.000)
Importance of jobs and prices for policy					
Not at all important	0.050 (0.028)	0.019 (0.016)	0.046 (0.016)	0.141 (0.047)	0.312 (0.094)
Slightly important	0.167 (0.050)	0.084 (0.043)	0.116 (0.029)	0.289 (0.063)	0.255 (0.095)
Moderately important	0.326 (0.088)	0.389 (0.056)	0.503 (0.049)	0.281 (0.057)	0.111 (0.067)
Very important	0.218 (0.052)	0.494 (0.081)	0.275 (0.048)	0.196 (0.063)	0.133 (0.093)
Extremely important	0.239 (0.096)	0.014 (0.010)	0.061 (0.024)	0.093 (0.046)	0.189 (0.091)
Government policy or finding own solutions					
Government policy	0.970 (0.018)	0.903 (0.032)	0.771 (0.037)	0.594 (0.069)	0.158 (0.100)
Own solutions	0.008 (0.010)	0.024 (0.014)	0.117 (0.026)	0.168 (0.049)	0.469 (0.108)
Neither / Can't decide	0.022 (0.015)	0.072 (0.029)	0.112 (0.029)	0.238 (0.060)	0.372 (0.122)
Willingness to pay higher taxes					
Very unwilling	0.015 (0.015)	0.036 (0.023)	0.170 (0.038)	0.473 (0.077)	0.929 (0.056)
Fairly unwilling	0.041 (0.030)	0.199 (0.051)	0.321 (0.050)	0.349 (0.080)	0.071 (0.056)
Neither willing nor unwilling	0.133 (0.087)	0.339 (0.052)	0.326 (0.044)	0.167 (0.052)	0.000 (0.000)
Fairly willing	0.507 (0.061)	0.398 (0.065)	0.174 (0.040)	0.011 (0.011)	0.000 (0.000)
Very willing	0.304 (0.110)	0.027 (0.020)	0.010 (0.012)	0.000 (0.000)	0.000 (0.000)
Government performance on climate change					
Govt. is doing too much	0.011 (0.011)	0.011 (0.007)	0.029 (0.017)	0.068 (0.040)	0.606 (0.144)

(continued)

Variable	Probability of Response (Standard Error In Brackets)				
	Highly Engaged	Moderately Engaged	Action-wary	Uncertain	Deniers
Govt. is doing right amount	0.028 (0.037)	0.121 (0.053)	0.244 (0.041)	0.259 (0.055)	0.217 (0.089)
Govt. not doing enough	0.957 (0.038)	0.786 (0.068)	0.567 (0.045)	0.242 (0.069)	0.000 (0.000)
Don't know	0.004 (0.004)	0.082 (0.034)	0.160 (0.032)	0.431 (0.077)	0.178 (0.115)

Table 3.7: Multinomial logistic regression of sociopolitical covariates on latent class membership (reference class: denier)

Variable	Highly Engaged	Moderately Engaged	Action-wary	Uncertain
Age	-0.082** (0.025)	-0.073** (0.023)	-0.07** (0.022)	-0.067** (0.023)
Degree				
Has Degree	0.836 (0.587)	0.445 (0.544)	-0.082 (0.545)	-0.683 (0.608)
Ethnicity				
Non-white	1.256 (1.172)	0.942 (1.132)	1.459 (1.137)	0.934 (1.184)
Gender (Ref: Male)				
Female	-0.725 (0.595)	0.132 (0.56)	-0.083 (0.549)	0.158 (0.594)
Transgender	18.33*** (1.941)	19.384 (0)	-2.555 (0)	-2.371 (0)
Income	-0.323* (0.16)	-0.293* (0.144)	-0.205 (0.14)	-0.047 (0.152)
Left-Right	-0.77** (0.253)	-0.414* (0.199)	-0.241 (0.186)	-0.175 (0.2)
Party Preference (Ref: Labour)				
Conservative	-0.147 (0.935)	-0.351 (0.801)	-1.029 (0.748)	-0.728 (0.811)
Liberal Democrats	2.565 (2.808)	2.063 (2.788)	1.068 (2.832)	2.993 (2.856)
Other Parties /	-1.233 (0.779)	-1.208 (0.739)	-1.599* (0.717)	-1.086 (0.762)
Prefer not to say	10.267*** (1.858)	8.722*** (1.718)	8.03*** (1.695)	5.854** (1.79)
(Intercept)				

Note:

* p<0.05; ** p<0.01; *** p<0.001

Table 3.8: Ordinal logistic regression of sociopolitical covariates on ordinal climate change opinion measures

Variable	Dependent Variable								
	Belief	Salience	Government priority	Timing of harm	Informed	Jobs and Prices	Personal import-ance	Seriousness	Willingness to pay tax
Age	-0.032*** (0.006)	0.003 (0.005)	-0.013** (0.005)	-0.007 (0.006)	0 (0.005)	0.003 (0.005)	-0.016** (0.005)	-0.02*** (0.005)	-0.012* (0.005)
Degree									
Has Degree	0.414 (0.222)	-0.44** (0.16)	0.787*** (0.167)	0.538** (0.183)	0.794*** (0.173)	-0.031 (0.162)	0.435** (0.164)	0.658*** (0.171)	0.468** (0.162)
Ethnicity									
Non-white	-0.046 (0.297)	0.54* (0.222)	-0.564* (0.218)	-0.157 (0.235)	-0.848*** (0.227)	0.566** (0.208)	-0.189 (0.214)	-0.153 (0.217)	-0.071 (0.216)
Gender (Ref: Male)									
Female	0.009 (0.181)	0.211 (0.136)	-0.359* (0.139)	0.172 (0.155)	-0.841*** (0.146)	-0.036 (0.137)	-0.115 (0.136)	-0.341* (0.142)	-0.173 (0.137)
Transgender	10.686*** (0)	-1.53 (1.325)	0.202 (1.434)	-0.599 (1.43)	-2.217 (1.594)	1.026 (1.499)	0.686 (1.512)	-0.796 (1.519)	-0.096 (1.456)
Income	-0.085 (0.057)	0.147** (0.046)	-0.176*** (0.046)	-0.098* (0.048)	-0.116* (0.048)	-0.01 (0.043)	-0.112* (0.044)	-0.171*** (0.045)	-0.083 (0.044)
Left-Right	-0.214*** (0.055)	0.233*** (0.043)	-0.256*** (0.044)	-0.237*** (0.047)	-0.155*** (0.044)	-0.117** (0.044)	-0.326*** (0.044)	-0.219*** (0.045)	-0.314*** (0.044)
Party Preference (Ref: Labour)									
Conservative	-0.588* (0.289)	-0.331 (0.229)	0.337 (0.232)	0.218 (0.247)	0.079 (0.241)	0.426 (0.227)	0.348 (0.229)	-0.079 (0.229)	0.351 (0.23)
Liberal	0.152 (0.435)	-0.742** (0.27)	0.12 (0.281)	-0.18 (0.28)	-0.096 (0.281)	0.085 (0.267)	0.238 (0.276)	0.173 (0.287)	0.465 (0.272)
Other Parties /	-0.924*** (0.229)	-0.41* (0.165)	0.086 (0.167)	0.325 (0.194)	-0.19 (0.174)	-0.048 (0.167)	-0.035 (0.162)	-0.087 (0.169)	-0.385* (0.164)
Prefer not to say									
Intercepts									

1 2	-7.22*** (0.532)	-1.165*** (0.33)	-4.035*** (0.355)	-4.098*** (0.394)	-4.675*** (0.38)	-2.986*** (0.34)	-4.765*** (0.362)	-6.267*** (0.431)	-3.912*** (0.345)
2 3	-6.255*** (0.49)	-0.594 (0.321)	-2.116*** (0.331)	-3.086*** (0.371)	-2.283*** (0.339)	-1.633*** (0.317)	-3.637*** (0.341)	-4.826*** (0.379)	-2.681*** (0.329)
3 4	-5.93*** (0.48)	-0.025 (0.317)	-0.356 (0.325)	-2.398*** (0.363)	0.172 (0.326)	0.055 (0.31)	-2.271*** (0.326)	-3.49*** (0.355)	-1.559*** (0.321)
4 5	-5.01*** (0.459)	0.462 (0.315)		-1.858*** (0.358)	1.893*** (0.361)	1.997*** (0.326)	-0.812* (0.321)	-1.951*** (0.34)	0.565 (0.332)
5 6	-4.771*** (0.455)	0.967** (0.316)		-1.37*** (0.356)					
6 7	-4.134*** (0.444)	1.472*** (0.318)							
7 8		2.124*** (0.322)							
McFadden Pseudo R ²	0.025	0.077	0.027	0.047	0.045	0.047	0.047	0.008	0.05
Nagelkerke Pseudo R ²	0.09	0.165	0.081	0.126	0.137	0.121	0.126	0.024	0.147
Obs.	736	738	624	737	738	737	738	737	736

Note:

* p<0.05; ** p<0.01; *** p<0.001

Chapter 4

Cross-country variation in three dimensions of public opinion on climate change in the EU

Abstract

Cross-country research on public opinion on climate change has mostly focused on people's beliefs about whether climate change is happening or is a serious problem, with little attention paid to other opinion dimensions such as issue salience. Relying on Eurobarometer data from 28 EU member states, we examine three dimensions of climate opinion among citizens: belief, issue salience and support for government action. Using Bayesian multilevel analysis, our results show that the salience of climate change varies substantially across countries and is positively related to country wealth. Cross-country variation in climate belief and support for government action is low. We find little evidence that cross-national variation in climate opinion can be explained by cross-country differences in the demographic and attitudinal compositions of national populations. Our findings suggest that there are important country-level differences in public opinion on climate change, and these differences extend to dimensions beyond belief, particularly issue salience.

4.1 Introduction

The increasingly likely catastrophic effects that society is facing as a result of climate change means that there is an urgent need to understand all aspects of how society perceives climate change. Public opinion on climate change has therefore been the focus of many academic studies over the course of the last two decades. Researchers have sought to both quantify and explain the climate views of the public (e.g. McCright & Dunlap, 2011; Poortinga et al., 2011; Scruggs & Benegal, 2012). Recently, a number of studies have analysed public opinion on climate change across multiple countries, bringing to light the variation between nations, and identifying contextual factors that may influence climate change views (Echavarren et al., 2019; Fairbrother et al., 2019; Kim & Wolinsky-Nahmias, 2014; Knight, 2016; Kvaloy et al., 2012; Lee et al., 2015; Lewis et al., 2019; Lo & Chow, 2015; McCright, Marquart-Pyatt et al., 2016; Mostafa, 2016; Poortinga et al., 2019; Sandvik, 2008; Tranter & Booth, 2015; Tvinnereim et al., 2020).

Most previous comparative studies on public opinion on climate change have limited their investigations to the extent to which people are aware of climate change, believe it is happening, or are concerned about it; in other words, studies have centred on people's beliefs about the climate change phenomenon itself. This choice of focus is understandable, given that gauging the public's general perceptions of climate change is a prerequisite for understanding other dimensions of climate opinion (such as support for government action to address climate change). Moreover, in most developed countries, a section of the population strongly rejects the science of climate change. Many social scientists have sought to explain why well-established climate facts continue to be denied by some members of the public (Bain et al., 2012; Dunlap, 2013; McCright & Dunlap, 2011; E. U. Weber & Stern, 2011).

This previous research has shown that more than 70% of the population in most countries accept the science of climate change and are concerned about the consequences (Lee et al., 2015; Tranter & Booth, 2015). However, there is reason to believe that people cannot simply be classified as "sceptic" or "believer" with respect to their climate views (Corry & Jørgensen, 2015). Specifically, among those who believe that climate change is happening, some see climate change as a high salience issue, while others do not (Bromley-Trujillo & Poe, 2018; Hagen et al., 2016;

W. Shi et al., 2019). Moreover, some people who accept the science of climate change are happy to support government action to address climate change, while others are wary of such action (Drews & van den Bergh, 2016; Dreyer & Walker, 2013; McCright et al., 2013). While a handful of single-country studies have accounted for this variation among believers in climate change (e.g. Crawley et al., 2020; Leiserowitz et al., 2009), few studies have examined and compared multiple dimensions of public opinion on climate change across a large number of countries.

In this study, we therefore compare three dimensions of climate change opinion in a cross-national context: belief in climate change, public issue salience of climate change and support for government action to address climate change. While there are other dimensions of climate opinion that may be important (such as willingness to take personal action on climate change), investigating salience and support for government action are particularly relevant in explaining why policy-makers may have been hesitant to take the necessary actions required to address climate change (United Nations Environment Programme, 2019). Politicians tend to be more likely to respond to specific public policy preferences than public beliefs about an issue, and to prioritise issues that the public sees as high salience (Burstein, 2003; Dennison, 2019).

We use data from Eurobarometer 87.1 (European Commission and European Parliament, 2017) to examine cross-national variation in the – at that time – 28 European Union (EU) member states. Using Bayesian multilevel analysis, we investigate to what extent compositional factors (citizens' education, left-right orientation, concern about inequality and interest in politics) and/or contextual effects (country wealth, level of greenhouse gas emissions) explain this cross-country variation.

A core characteristic of climate change is that it is a coordination problem, meaning that action by central bodies – particularly national governments – is required in order to mitigate the effects of climate change (Stern, 2015). In a democracy, public opinion plays an important role in shaping public policy (Burstein, 2003). By comparing climate change opinion across the EU, in terms of the dimensions of belief, issue salience and support for government action we aim to cast light on the nature of climate change opinion and the factors that shape it. In turn, a deeper understanding of how climate change opinion varies across countries can help us to understand why particular climate policies are adopted in dif-

ferent countries.

4.2 Theory

Below, we first briefly review the previous research on the dimensions of belief, issue salience and support for government action. We then discuss studies that have examined these dimensions in a cross-national context, before considering the extent to which compositional or contextual factors may explain cross-country variation.

4.2.1 Dimensions of climate change opinion

4.2.1.1 Belief in climate change

The vast majority of studies examining public opinion on climate change focus on the dimension of belief (e.g. McCright & Dunlap, 2011; Poortinga et al., 2011; Scruggs & Benegal, 2012). Typically, three main aspects of belief are examined: the degree to which people believe climate change is happening at all, whether or not people believe climate change is primarily caused by humans, and the extent to which people believe climate change is a serious problem (Poortinga et al., 2011). These three aspects of belief are tied together in that they measure people's perceptions of the climate change phenomenon itself, rather than what should be done about it, or where it fits among other major economic or social issues. Empirical studies have confirmed that people's belief in the existence, human cause and seriousness of climate change are interlinked (Poortinga et al., 2011).

The extensive research on belief in climate change has shown that, in most countries large majorities accept the science of climate change (Kvaloy et al., 2012; Poortinga et al., 2019). However, more people believe that climate change is happening and is at least partly caused by humans, than believe that it is a serious or very serious problem (McCright, 2016). Poortinga et al. (2011), for instance, find that 78% of people in the UK think that climate change is happening and is at least partly caused by humans. However, of people who agree that climate change is happening, 31% believe that the seriousness of climate change has been exaggerated (Poortinga et al., 2011).

4.2.1.2 Issue salience

The nature of representative democracy means that the personal priority individuals place on issues plays an important role. People's political issue preferences are essentially funnelled through a single vote, meaning that only issues that are of high salience to voters have any substantial bearing on their vote choice (Dalton, 2013). As voting is the strongest signal of public preferences available to politicians, the salience of issues is crucial. Politicians tend to have substantial leeway on low salience issues, but cannot afford to ignore the wishes of the public on high salience issues, as they risk being voted out of office at the next election (Burstein, 2003; Pralle, 2009). Empirical research has found that salience moderates the effect of public opinion on policy, illustrating that issue salience is often at the front of the minds of elected policy-makers (Burstein, 2003; Dennison, 2019).

Despite the theoretical importance of issue salience, it has not widely been investigated in research on public opinion on climate change. The research that does exist suggests that the salience of climate change is low, with issues such as the economy, healthcare and education often ranking higher (Bromley-Trujillo & Poe, 2018; Hagen et al., 2016; Herrnschmidt & Muehlegger, 2014). In fact, when respondents are given lists of issues to rank in terms of importance, many rank climate change as one of the least important issues (Crawley et al., 2020).

4.2.1.3 Support for government action

Not everyone who accepts that climate change is happening also supports government action to address it. There are various reasons citizens may have for supporting government action on climate change, including the belief that the government should refrain from intervening in the economy (Drews & van den Bergh, 2016; Dreyer & Walker, 2013; McCright et al., 2013), the belief that individual action is sufficient to combat climate change (Tvinnereim et al., 2017), or aversion to paying higher taxes to combat climate change (Hagen et al., 2016; Kotchen et al., 2017).

Overall, previous research has revealed relatively high support for government action on climate change, which has also been found to be closely related to belief (Drews & van den Bergh, 2016). Lachapelle et al. (2012), for example, find that 89% of Canadian respondents and 73% of American respondents believe that the federal government is responsible

for addressing climate change. Examining support for specific policies, Kantanbacher et al. (2018) find that there is substantial support in the UK for policies initiated by the government to help reduce emissions from air travel (see also: Cherry et al., 2018).

4.2.2 Cross-country variation in climate change opinion and its causes

Previous cross-country studies on public opinion on climate change have consistently found that belief in climate change is high throughout the developed world (Capstick et al., 2015; Kim & Wolinsky-Nahmias, 2014; Lee et al., 2015). For instance, investigating perceptions of the seriousness of climate change in 47 countries using data from the World Values Survey, Kvaloy et al. (2012) find that all EU countries included had mean scores of 3.4 or higher on a 4-point scale measuring individuals' perceptions of the seriousness of climate change. Using data from the European Social Survey, Poortinga et al. (2019) find that the public in most European countries are, on average, "somewhat concerned" about climate change.

Few studies have investigated support for government action or issue salience across multiple countries, and those that do tend to compare only a handful of countries. Kim and Wolinsky-Nahmias (2014) reviewed evidence from a number of cross-national surveys and found that belief that the government should prioritise action on climate change was high in most countries. Steentjes et al. (2017) conclude that there is strong support for a range of policies to combat climate change in France, Germany, Norway and the UK, except for those policies which might impose costs or taxes directly on consumers (see also: Fairbrother et al., 2019; E. K. Smith & Mayer, 2018). In a four-country study comparing the salience of climate change, Hagen et al. (2016) find that climate change is considered the least important in the UK and the Netherlands among the nine issues they investigate, and is ranked in the bottom third of issues in Spain and Germany. A divide in issue salience has also been noted in Europe, with salience tending to be higher in Western European compared with Eastern European countries (Lorenzoni & Pidgeon, 2006; McCright, Dunlap & Marquart-Pyatt, 2016).

While cross-country patterns of belief in climate change have thus been well-established by previous research, little is known about how is-

sue salience and support for government action on climate change differs between countries. Moreover, few studies have investigated the extent to which compositional and contextual factors may help to explain cross-country differences in issue salience and support for government action. We expand on these factors below.

4.2.2.1 Compositional factors

Country-level differences in public opinion can be due to countries being composed of different kinds of individuals (with respect to their demographics and attitudes), or so-called “compositional effects” (Gelissen, 2007; Lubbers et al., 2002). For example, as egalitarianism is positively related to people’s climate views (Hornsey et al., 2016), countries with a more egalitarian population could be expected to have higher levels of belief, issue salience and support for government action on climate change than countries with populations containing fewer egalitarians. Compositional effects could be structural (based on socio-demographic differences between countries, such as level of education) or attitudinal (based on overall differences in the attitudes or opinions of national populations) (Lubbers et al., 2002). We consider one structural compositional effect (education) and three attitudinal compositional effects (political orientation, political worldview and political interest), all of which are characteristics known to relate to people’s opinions of climate change.

People who have higher levels of education tend to be more concerned about climate change than those who have received less education (Lee et al., 2015; Lewis et al., 2019; Poortinga et al., 2019; Tranter & Booth, 2015). Some studies examining issue salience or support for government action have also found a link between education and climate views (Crawley et al., 2020), although others have been unable to discern such a relationship (McCright et al., 2013). Given that overall level of education can be expected to vary substantially between EU countries (Schlicht et al., 2010), we could therefore expect a compositional effect of education to explain some of the cross-country variation in climate opinion.

One of the most consistent findings in the determinants of climate opinion literature is that people holding liberal or politically left-wing values are more likely to be concerned about climate change than those with conservative or politically right-wing values (Kvaloy et al., 2012; McCright, Marquart-Pyatt et al., 2016; Mostafa, 2016; Poortinga et al.,

2019; Tranter & Booth, 2015). Similar relationships between political ideology and climate opinion have been found for measures of support for government action (McCright et al., 2013) and issue salience (Crawley et al., 2020). This relationship between political orientation and climate change views is partly due to the politicisation of climate change in many countries (especially the US), where conservative parties have opposed strong climate change policies and in some cases refused to accept the science of climate change (McCright & Dunlap, 2010). Studies investigating European countries have found that political orientation does tend to relate to opinions about climate change, although the relationship is stronger in Western Europe compared with Eastern Europe (McCright, Dunlap & Marquart-Pyatt, 2016).

Furthermore, as worldviews can influence opinions about climate change through motivated reasoning (Druckman & McGrath, 2019), people who see the world in hierarchical or individualistic terms may find it harder to accept the existence or seriousness of climate change compared with those holding a more egalitarian or collectivist outlook (Hornsey et al., 2016; McCright, Dunlap & Marquart-Pyatt, 2016; J. Shi et al., 2015). Given that the causes of and solutions to climate change highlight the interconnected nature of society, acknowledging the existence or seriousness of climate change can directly challenge an individualistic worldview. Although people who see the world in hierarchical terms tend to be more sympathetic to environmental limits than individualists (Lachapelle et al., 2014), the far-reaching changes to society (and existing hierarchies) required to properly address climate change appear to make hierarchists less concerned about climate change than egalitarians or collectivists (McCright, Dunlap & Marquart-Pyatt, 2016). Egalitarians are also more likely to support environmental policies (Carlisle & Smith, 2005), and there also appear to be links between people's cultural worldview and perceptions of the salience of climate change (Dannevig & Hovelsrud, 2016).

Climate change is reported on with increasing regularity in the media and news (Schmidt et al., 2013). It can thus be expected that those who have a stronger interest in politics – and are consequently more exposed to news and information about climate change – will be more likely to believe that climate change is a serious problem compared with those who have less interest in politics (Kvaloy et al., 2012; Morrison et al.,

2013). Moreover, although climate change is typically not among the most frequently discussed political issues, it is at least on the political agenda in most countries (Pralle, 2009). It therefore seems fair to assume that those interested in politics will also be more likely to be concerned about climate change, to see it as a high salience issue, and to support government action compared with those less interested in politics, as people with a stronger interest in politics will be more in tune with the “mainstream” of politics.

All four individual-level attributes (education, political orientation, political worldview and political interest) can be expected to relate to climate opinion. As the composition of populations in different EU countries could vary with respect to these attributes, we expect that compositional effects will explain some of the cross-country variation in public opinion on climate change. Our first hypothesis therefore reads as:

H1: The compositional effects of education, political orientation, political world view and political interest will explain some of the cross-country variation in levels of belief, issue salience and support for government action on climate change.

4.2.2.2 Contextual factors

We examine two contextual factors which are expected to influence the public’s climate change views: country wealth and level of greenhouse gas emissions. There has been an extensive debate on the degree to which country wealth relates to people’s climate views. Some authors expect that people in wealthier countries will tend to be more concerned about climate change than those in poorer countries, because wealthier countries are more willing and able to direct economic resources to manage climate change and other environmental issues (Mostafa, 2016). Others have argued that, because the opportunity cost of addressing climate change seems higher in wealthier countries than in poorer countries, some people in wealthier countries may be reluctant to support government action to address climate change (Kim & Wolinsky-Nahmias, 2014).

Results of empirical tests of these hypotheses have been mixed. Some studies have found that people in wealthier countries are more aware and concerned about climate change, and are more likely to see human activity as the main cause of climate change, compared with those in

poorer countries (Knight, 2016). Other studies have found a negative relationship between a country's level of wealth and climate views (Mostafa, 2016; Sandvik, 2008), while some did not detect any relationship (Kvaloy et al., 2012).

These mixed results are likely driven, in part, by the specific dimensions of climate opinion investigated in each study. For instance, in a study incorporating 33 countries, Lo and Chow (2015) find that country wealth has a negative relationship with perceptions of how dangerous climate change is, but a positive relationship with how important climate change is (relative to other environmental issues). They argue that people in wealthier countries tend to acknowledge that climate change is an important problem, but believe that their country has the capacity to avoid the most dangerous effects of climate change. Similarly, Kim and Wolinsky-Nahmias (2014) find that, while concern about climate change tends to be lower in wealthier countries than in poorer countries, people in wealthier countries are more likely to support government action on climate change (especially if any proposed policies do not include an obvious cost to consumers) compared with people in poorer countries.

We thus have different expectations for the relationship between country wealth and the dimension of belief than we do for the dimensions of issue salience and support for government action. When focussing on belief in climate change (including concern and perceptions of risk) most previous studies have found a negative relationship with country wealth (Kim & Wolinsky-Nahmias, 2014; Lo & Chow, 2015; Mostafa, 2016; see, however: Knight, 2016). However, a positive relationship with country wealth has typically been found in studies investigating support for government action or the importance of climate change (Kim & Wolinsky-Nahmias, 2014; Lo & Chow, 2015). Thus, we formulate our next two hypotheses as:

H2a: Wealthier countries will have lower levels of belief in climate change among the public than poorer countries.

H2b: Wealthier countries will have higher levels of issue salience and support for government action on climate change among the public than poorer countries.

Several cross-country studies have investigated the link between a country's levels of reliance on fossil fuels (typically measured by level of greenhouse gas emissions) and the climate change views of the population

(Knight, 2018; Kvaloy et al., 2012; Lo & Chow, 2015; Sandvik, 2008). The general expectation is that people living in countries that have higher levels of greenhouse gas emissions are likely to express lower levels of concern about climate change than those who live in countries with lower levels of greenhouse gas emissions. The idea behind this expectation is that countries with higher emissions tend to have economies more closely tied to high carbon industries, and thus a move to a carbon zero economy would be perceived as difficult and expensive compared with countries that already have lower emissions.

Several studies have found support for this expectation, although typically the relationship between country-level greenhouse gas emissions and climate change beliefs is found to be weak (McCright, Dunlap & Marquart-Pyatt, 2016; Sandvik, 2008; see, however: Kvaloy et al., 2012). There is some evidence that the negative relationship exists for support for government action on climate change (McCright, Dunlap & Marquart-Pyatt, 2016), although the relationship between greenhouse gas emissions and the importance of climate change is unclear (Lo & Chow, 2015). As a number of studies have found some support for a negative relationship between greenhouse gas emissions and different dimensions of climate opinion, our final hypothesis is:

H3: Countries with higher levels of greenhouse gas emissions will have lower levels of belief, issue salience and support for government action on climate change among the public than countries with lower levels of greenhouse gas emissions.

4.3 Data and Method

To investigate the variation in climate change views in the 28 EU member states, we analyse data from Eurobarometer 87.1 (European Commission and European Parliament, 2017), which includes a series of questions relating to climate change (a full list of variables used in this study can be found in table 4.4 in the chapter appendix). The survey was conducted with face-to-face interviews, between 18th and 27th March 2017. Participants were resident in an EU member state, and aged 15 and over. In most countries, the sample size is between approximately 1,000 and 1,500 respondents, although some of the smaller countries have only 500

responses.¹ Before removing observations with missing data, the total sample size was 27,901. Respondents who had missing information on one or more of the individual-level independent variables were dropped from the sample. The final sample size used for the analyses presented below is 21,304.²

4.3.1 Dependent Variables

We focus on three dimensions of public opinion on climate change: belief, issue salience and support for government action. To measure *beliefs* about climate change, we rely on a question asking respondents how serious a problem they think climate change is, with possible responses ranging from “not at all serious” (1) to “extremely serious” (10). In the analyses below, we use the recoded, three-category version of this variable (provided by Eurobarometer) as a measure of belief about climate change, where 0 indicates “not a serious problem” (1-4 on the original scale), 1 “a fairly serious problem” (5-6) and 2 “a very serious problem” (7-10). As described in the theory section above, concern about climate change is one of the three main aspects of belief that has been the focus of previous studies (the other two being belief in the existence and human cause of climate change).

To measure *issue salience*, we use a question asking respondents to indicate which of the following issues are among the most important to the world today: climate change, international terrorism, poverty, hunger and lack of drinking water, spread of infectious diseases, the economic situation, proliferation of nuclear weapons, armed conflicts or the increasing global population. Respondents were asked which of these issues is the most important, and then for up to three issues that are the next most important. We coded our issue salience variable as 1 if a respondent mentioned climate change as the most or one of the next three most important issues (indicating high salience), and 0 otherwise (indicating low salience).

We use two variables to measure *support for government action*. The first measures whether or not respondents select national governments,

¹See the table 4.5 in the chapter appendix for the sample sizes of each country.

²Given the high percentage of missing observations, we also investigated models that used multiple imputation to estimate the missing values. As the results of models using multiple imputation were similar to those presented below, we decided not to use multiple imputation, in order to reduce the complexity of the analyses.

the EU or “regional or local governments” from a list of possible answers when asked who is responsible for tackling climate change (multiple answers were allowed). These three levels of government have different capabilities in addressing climate change. Respondents who select only one of these levels of government may have different preferences for government policy to address climate change compared with respondents who select a different level of government. However, our interest is in whether individuals think a centralised response to climate change is required or whether they prefer a response to climate change that does not involve the government. We thus coded this variable as dichotomous, with 1 indicating the respondent believes that either national governments, the EU or regional or local governments are responsible for addressing climate change, and 0 if they do not.

The second question relating to support for government action measures respondents’ views of a specific policy that can help to reduce greenhouse gas emissions. The question asked respondents to what extent they endorse increased financial support for clean energy “even if it means subsidies to fossil fuels should be reduced”. Responses to this question were coded as 0 if respondents do not, or tend not to agree with increased support for clean energy, and 1 if they do, or tend to agree with it.

4.3.2 Individual-Level Explanatory Variables

To investigate the extent to which compositional effects explain cross-country variation of public opinion on climate change, we include four measures of individual characteristics in our analyses below: education, left-right political orientation, concern about inequality and the frequency with which respondents engage in political discussion. The education variable is a measure of how old the respondent was when they stopped full-time education, up to age 22. The left-right political orientation question asked respondents to place themselves on a scale from 1 (left) to 10 (right). For the concern about inequality variable, a measure of egalitarianism, responses ranged from 1 (inequality not at all important) to 4 (very important). The variable measuring political discussion was coded as 1 if respondents never discuss political matters to 3 if they frequently discuss them. Coefficients of variation in the country means of each of these three variables ranged between 5% for concern about inequality to

15% for education (see table 4.8 in the chapter appendix).

4.3.3 Country-Level Explanatory Variables

We also include two country-level independent variables in our models, both obtained from World Bank data, to investigate contextual effects on cross-country variation of public opinion on climate change. The first is GDP per capita, measured in 2010 US dollars, which provides a measure of a country's wealth, and the second is metric tons of CO₂ emissions per capita, which gives an indication of how reliant on fossil fuels a country is.

4.3.4 Control variables

As individual-level socio-demographic variables, in particular gender, age and social class, have previously been found to relate to public opinion on climate change (van der Linden, 2017), we also include these variables in our models as controls.

4.3.5 Analytic Strategy

The data were analysed in four separate random intercept, fixed slope multilevel models, one for each dependent variable. For our three dichotomous dependent variables (climate change salience, government responsibility and support for clean energy), we used binary logistic regression. For our three-category ordinal dependent variable (climate change seriousness), proportional odds tests indicated that some of the independent variables did not relate proportionally to the dependent variable. Therefore, we used categorical (multinomial) logistic regression for this dependent variable.³

We opted to use a Bayesian framework, as this approach has advantages over classical “frequentist” models for multilevel modelling. In particular, multilevel Bayesian models are likely to produce more accurate confidence intervals and are more appropriate when the second-level sample size is small (Bryan & Jenkins, 2016; Stegmueller, 2013). The

³We also analysed a model using the original 10 category version of the seriousness variable using linear multilevel regression. The results were similar, and are presented in section 4.C.7.

Table 4.1: Summary of steps in regression analyses

Model	Description	Predictors included
0	Null	None
1	Control variables only	Gender, age and social class
2	Control variables and individual-level explanatory variables	Predictors from Model 1 plus education, left-right political orientation, inequality concern and political discussion
3	Control variables, individual-level explanatory variables and country-level explanatory variables	Predictors from Model 2 plus GDP per capita and CO ₂ emissions per capita

use of Bayesian models can also help to avoid the “black-and-white” interpretation of results (where a relationship is deemed either significant or not), which can be problematic given that relationships between variables are often more complex than this (Kruschke & Liddell, 2018). More information on the method used in this study, including specification of priors, model fit and testing, and the application of survey weights, can be found in section 4.B.

To test for compositional and contextual effects, we introduced the explanatory variables in four steps. The first step, a null model, did not include any predictors. The second step introduced the individual-level socio-demographic control variables, the third step then added the individual-level explanatory variables, and the fourth step included the country-level variables. Comparing the country-level variance between each step in the model allows us to assess the degree of cross-country variation explained by the predictors that have been introduced (and thus to test for the presence of compositional effects in the third step). Table 4.1 summarises each step of the analysis.

4.4 Results

4.4.1 Descriptive Statistics

Figure 4.1 illustrates the means of each of the four dependent variables by country. The dashed line indicates the overall mean. As seen in the figure, there is little cross-country variation in the perceptions of the seriousness of climate change, or support for clean energy. The public in all EU countries views climate change as a very serious problem, with the lowest mean for the three-category measure (mid point = 1) being in Estonia, at 1.32, while the country with the highest level of concern is Spain, with 1.85. Similarly, mean probability of support for clean energy ranges from 0.80 in Romania to 0.97 in Cyprus. The overall high probability of support for clean energy could be partly due to question wording; the question also mentioned reducing subsidies for fossil fuels, which is a popular action among the public (Leiserowitz et al., 2011).

There is greater cross-national variation in the salience and government responsibility variables. Across all countries, respondents had a probability of 0.82 of mentioning at least one of the national government, the EU or regional or local authorities as being responsible for tackling climate change. However, in Latvia, the mean probability of respondents seeing the government as being responsible for addressing climate change was 0.63, while in Sweden, it was 0.94. The probability across all countries that a respondent would list climate change in the four most important of the eight issues provided in the survey was only 0.43. This result aligns with previous findings that, although belief that climate change is a serious problem tends to be widespread, salience is low (Bromley-Trujillo & Poe, 2018). However, there is a range of salience levels in the EU, with respondents in Czechia having a probability of 0.22 of listing climate change in the top four issues, while those in Sweden had a probability of 0.76.

Table 4.2 presents the mean, standard deviation and coefficient of variation (CV) of the country-level distribution of each of the four dependent variables. These statistics confirm that, of the four dependent variables, issue salience has the highest level of cross-country variation, with a CV of 33%. The other three dependent variables all have coefficients of variation below 10%, indicating that cross-country variation for each of these variables is low.

Figure 4.1: Plot of means for each of the dependent variables

Note: the dashed horizontal line indicates mean for all EU countries. Vertical lines on each point indicate standard deviation.

Table 4.2: Means and variation of country-level means for the dependent variables measuring climate change opinions

Dependent Variable	Mean	Std. Dev.	C.V.
CC Salience	0.43	0.14	32.9
CC Seriousness	1.66	0.13	7.9
Gov. Responsibility	0.82	0.07	9.1
Support for clean energy	0.90	0.04	5.0

Note:

C.V. = coefficient of variation

To test the degree to which the three dimensions of climate change opinion are interrelated, we calculated correlations between each of the dependent variables, presented in table 4.3. The table shows that there is not a strong relationship between the dependent variables, except for the two variables that measure support for government action. The lack of a strong relationship between the dependent variables measuring different dimensions supports the view that there are different kinds of “believers” in climate change (Corry & Jørgensen, 2015), as some people who see climate change as a serious problem view it as a low salience issue, or do not support government action to address it.

4.4.2 Multilevel Regression Analyses

In figure 4.2, we present median estimates for the model-based country-level standard deviation (SD) for each of the four steps of the analysis.⁴ A comparison of the SDs across the models allows us to investigate the extent to which differences between countries in public opinion on climate change can be attributed to individual-level attitudinal variables (compositional effects) and to country-level conditions (contextual effects). A reduction in the country-level SD when adding the individual-level (Model 2) or country-level (Model 3) variables indicates the existence of compositional or contextual effects respectively.

As illustrated in figure 4.2, for all dependent variables (including both thresholds of the climate change seriousness variable), adding the additional predictors does not substantially reduce the SD of the country-level intercepts. The one exception is issue salience, where introducing the

⁴Tables of coefficients for the regression models described below can be found in section 4.C.4.

Table 4.3: Correlations / Jaccard's coefficient between the dependent variables measuring climate change opinions

	CC Seriousness	CC Salience	Gov. Responsibility	Support for clean energy
CC Seriousness	1			
CC Salience	0.274	1		
Gov. Responsibility	0.157	0.409	1	
Support for clean energy	0.182	0.433	0.756	1

Note:

Values for combinations of two binary variables use Jaccard similarity test. Values for combinations of a binary variable and the 'Seriousness' ordinal variable use Spearman's Rho. All correlations/coefficientants are statistically significant at $p \leq 0.01$

Figure 4.2: Country-level standard deviation from each step of the analysis for each of the dependent variables

Note: dots indicate median estimate, thicker bars indicate 66% credible intervals, thinner bars indicate 95% credible intervals

country-level variables reduces the standard deviation from 0.56 (Model 2) to 0.44 (Model 3). Although the 66% credible intervals overlap, this change in the SD suggests that there is weak evidence of contextual effects of the country-level variables on issue salience (which is confirmed by the predicted probabilities presented below). Overall, however, the lack of substantial change in SD at each step of the analysis for each of the dependent variables suggest the cross-country variation is not substantially explained by either the compositional or contextual effects that we investigate.

While the individual- and country-level characteristics included in our analyses do not seem to explain a significant part of the differences in public opinion on climate change between countries, some do relate significantly to our different measures of climate change opinion. Figures 4.3 to 4.6 present the predicted probabilities for each combination of explanatory and dependent variable based on the full model (Model 3). Figure 4.3 shows the predicted probabilities of participants seeing climate change as a very serious problem for each of the three individual-level

and two country-level explanatory variables.⁵ As illustrated in the figure, there is little evidence of a relationship between left-right orientation or level of political discussion and perceptions of the seriousness of climate change. However, there is a positive relationship between education and viewing climate change as a very serious problem, which test indices (presented in section 4.C.4) indicate is significant. Concerns about inequality also matter significantly; people who do not see inequality as important have a probability of 0.66 of viewing climate change as a very serious problem, while those who see inequality as very important have a 0.79 probability of seeing climate change as a very serious problem.

Turning to the country-level variables, although the predicted probability plot for GDP per capita shows a positive slope, test indices suggest that the effect is not significant. There is some evidence of a contextual effect for CO₂ emissions per capita, where countries with higher emissions per capita tend to be less likely to view climate change as a very serious problem. However, the wide credible intervals suggest caution is warranted in this interpretation.

The predicted probabilities for salience as the dependent variable are presented in figure 4.4. Three of the individual-level variables do appear to be related to issue salience: those who identify as politically left, have high levels of education or more frequently engage in political discussion are all more likely to rank climate change as an important issue, relative to other issues, although the effect sizes are modest. The country-level variables appear to have a larger effect on climate change salience, particularly GDP per capita, with wealthier countries being much more likely than poorer countries to have a population that sees climate change as a high salience issue.

Education, left-right orientation or concern about inequality do not appear to relate to the belief that the government (either local, regional, national or the EU) is responsible for tackling climate change (see figure 4.5). People who more frequently discuss politics have a slightly higher probability of ascribing responsibility for addressing climate change to the government than those who rarely discuss politics (the difference is

⁵To ease interpretation, only the predicted probabilities for the “very serious” category are presented here. As very few respondents believed climate change was not a serious problem, presenting only the “very serious” category gives a good indication of the results, because the middle “fairly serious” category is close to the inverse of “very serious”. Plots showing predicted probabilities for all three categories are available in section 4.C.6.

Figure 4.3: Predicted probabilities (with 95% credible intervals) of viewing climate change as a very serious problem for each explanatory variable

less than 0.1). The contextual variables (GDP per capita and CO₂ emissions per capita) also make little difference with respect to whether or not people believe the government is responsible for addressing climate change.

Finally, figure 4.6 shows the predicted probabilities for each of the explanatory variables and the dependent variable measuring support for clean energy. Similar to the government responsibility variable, there do not seem to be strong relationships between the individual-level variables and the dependent variable. The largest effect size is for concern about inequality, a relationship which could be considered statistically significant. In substantive terms the effect is quite small however; people not at all concerned about inequality have a 0.83 probability of supporting clean energy, while those very concerned about inequality have a 0.93 probability. Neither of the country-level variables appear to make much difference to support for clean energy subsidies.

Overall, we find little evidence of compositional effects of the four individual-level political values variables (education, left-right political orientation, inequality concern and degree of political discussion) for any

Figure 4.4: Predicted probabilities (with 95% credible intervals) of viewing climate change as important relative to other issues for each explanatory variable

of the four dependent variables. While, in some cases, the individual-level variables do seem to relate to the measures of public opinion on climate change (for instance, the negative relationship between left-right orientation and issue salience), there is no clear evidence to suggest these relationships explain some of the cross-country variation in the dependent variables. H1 is therefore not supported. We do, however, find evidence of contextual effects, at least for issue salience. In particular, countries with higher levels of GDP per capita or with lower levels of CO₂ emissions per capita tend to have populations who view climate change as a high salience issue. There is little evidence of contextual effects for any of the other dependent variables, excepting weak evidence of a negative relationship between CO₂ emissions per capita and seeing climate change as a serious problem. We therefore reject H2a, and accept H2b and H3, but only for the dimension of issue salience.

Figure 4.5: Predicted probabilities (with 95% credible intervals) of believing the government is responsible for addressing climate change for each explanatory variable

4.4.3 Cross-level interactions

Left-right orientation has consistently been found to relate to people's climate change opinions (McCright, Marquart-Pyatt et al., 2016). It was therefore surprising that left-right orientation did not have a large effect on any of our dependent variables. One explanation could be that left-right orientation has a positive relationship with climate views in some countries, but no relationship (or a negative relationship) in others. Indeed, previous studies have found cross-country variation in the relationship between political orientation and climate belief, with the gap between left and right being larger in Western European and (particularly) developed anglophone countries compared with the rest of the world (Lewis et al., 2019; McCright, Dunlap & Marquart-Pyatt, 2016). Therefore, we empirically investigated cross-level interactions between left-right orientation and our contextual variables.⁶

⁶We also investigated models including cross-level interactions between our contextual variables and education, concern about inequality and level of political discussion. Only the interaction between inequality concern and GDP per capita for seeing climate

Figure 4.6: Predicted probabilities (with 95% credible intervals) of supporting increased subsidies for renewable energy for each explanatory variable

The models for the different dependent variables that included the cross-level interactions between political orientation and the two contextual variables only revealed two substantial interactions, both with GDP per capita: seeing climate change as a very serious problem and as a high salience issue.⁷ In figure 4.7, we present the predicted probabilities for seeing climate change as a very serious issue (left plot) and a high

change as a very serious problem could be considered significant. The interaction indicates that people with high levels of concern about inequality are more likely to be concerned about climate change in countries with higher GDP per capita compared with countries with lower GDP per capita. The effect is small, however. The results of all our analyses of models including cross-level interactions are presented in section 4.C.5.

⁷The probability that the interaction is in the reported direction (pd) was 1.00 and 0.97 respectively for these interactions. For the seriousness dependent variable, the “region of practical equivalence” (ROPE) test indicated that the magnitude of the interaction was significant (0.03, ROPE region ± 0.181). For the salience dependent variable, the ROPE value was 0.24, indicating doubt about the significance of the magnitude of the interaction. However, as the predicted probabilities below suggest, there appears to be a substantive difference between how left/right orientation relates to salience depending on the country’s level of GDP. We interpret this evidence as weak support for the interaction between left/right orientation and GDP per capita existing and being of significant magnitude for the issue salience dependent variable.

Figure 4.7: Predicted probabilities (with 95% credible intervals) by levels of GDP per capita of seriousness and salience of climate change for different values of left-right orientation

salience issue (right plot) at different levels of GDP per capita (GDP per capita is plotted at the mean and at ± 1 standard deviation). Left-right political orientation seems to have a stronger relationship with salience and perceptions of the seriousness of climate change in richer countries than in poorer countries. In countries with higher GDP per capita, people on the left are more likely than people on the right to see climate change as a very serious and high salience issue, whereas in countries with lower GDP per capita, there is little difference in how people on the left and right of the political spectrum see the salience of climate change. We discuss the implication of these results below.

4.5 Discussion and Conclusion

This study sought to measure and explain cross-country differences within the EU in three dimensions of public opinion on climate change: belief, issue salience and support for government action. Our analyses revealed that belief in climate change and support for government action is generally high across Europe, with relatively little cross-national variation. In contrast, the issue salience of climate change is low in most EU countries. Most people do not seem to consider climate change to be an important issue, at least relative to other issues such as the economy. However, there is a high degree of cross-country variation in salience, with at least 60% of the population placing climate change in the top four issues in the three Nordic countries, but less than half doing so in almost every other country.

Our analyses also investigated the extent to which contextual factors relate to climate opinions, finding that country-level measures shape issue salience. Specifically, there is strong evidence that people in wealthier countries are more likely to see climate change as high salience than people in poorer countries, at least when considering the relatively wealthy set of countries in the EU. This finding suggests that perceptions of salience may be partially driven by post-material values (Kvaloy et al., 2012; Mostafa, 2016). In other words, people in richer countries have fewer material concerns than people in poorer countries, and are thus able to prioritise climate change as an issue (Mostafa, 2016). Our results also suggest that countries with higher levels of CO₂ emissions tend to have lower levels of issue salience.

There is, at best, only weak evidence of contextual effects for our other dependent variables. We find little evidence that contextual factors explain cross-country variation in support for government action. Moreover, we find no support for the expectation that levels of greenhouse gas emissions relate to perceptions of the seriousness of climate change, and no clear relationship between country wealth and seeing climate change as a serious problem. Our expectation had been that there would be a negative effect of country wealth on perceptions of the seriousness of climate change. While a number of previous studies have found a negative relationship between country wealth and concern about climate change (Mostafa, 2016; Sandvik, 2008), some have found positive relationships (Knight, 2016). Given the inconsistency of these results, it would be beneficial for future research to carefully investigate the ways in which question wording and case selection may be affecting results.

Overall, we find that contextual factors, and particularly country wealth, have different effects on climate opinion, depending on the dimension investigated. Our results thus support the argument made by Lo and Chow (2015) that many people in wealthier countries believe that their country will be able to “weather the storm” of the worst effects of climate change, and are thus not substantially more concerned (or are even less concerned) about climate change than people in poorer countries. However people in wealthy countries are still more likely to see climate change as an important issue than people in poorer countries.

Contrary to our expectations, cross-national variation in public opinion on climate change cannot be explained by country-level differences

in population composition with respect to education levels and political attitudes. Given that previous research has found that all of these variables relate to climate opinions (McCright, Marquart-Pyatt et al., 2016; van der Linden, 2017), it is surprising that we were unable to detect compositional effects for these measures. Indeed, we did find several relationships between our individual-level explanatory variables and the measures of climate change opinion, particularly for issue salience. The lack of evidence of compositional effects may be partly due to the relatively small amount of cross-country variation in the country means of the four individual-level measures (education, political orientation, inequality concern and political discussion).

Another explanation for the lack of compositional effects is that the relationships between the individual-level variables and climate opinions depend on country-level context. We found evidence of cross-country variation in the relationship between political orientation and some of the dependent variables, with left-right orientation having a greater impact in richer than in poorer countries, in particular on the likelihood of seeing climate change as a very serious problem and as a high salience issue. This result suggests that there may be a variety of factors that shape public opinion on climate change in each country, and these factors may be quite different in each context. To improve our understanding of cross-national differences in climate opinion, further research is required to identify the different factors driving climate change opinion in each country. Moreover, research could seek better ways to capture the compositional differences between countries, especially with respect to the political attitudes that are typically related to climate change opinion. Despite the ostensibly varied political contexts across EU countries, our measure of left-right orientation had only a small amount of cross-country variation, suggesting that it did not capture the full range of political attitudes in the EU.

While our investigation was limited to EU countries, there is reason to believe that similar patterns for the salience of climate change will be found in countries beyond the EU. Studies have shown that concern about climate change is high in countries across the world, but salience is generally agreed to be low (Bromley-Trujillo & Poe, 2018). Based on the results of this study, we would expect research examining a wider set of countries to find that salience is lower in countries with lower levels

of affluence and higher in wealthier countries. It would be particularly interesting to confirm this hypothesis in developing countries, some of which have higher levels of concern than many developed countries. Additionally, it would also be interesting to investigate whether structural and attitudinal compositional effects can be identified when comparing developing and developed countries.

Overall, the results of our study suggest that the “front line” in the battle over climate change opinion has moved from perceptions of the climate change phenomenon (including awareness, belief and concern) to issue salience. While people in most countries are concerned about climate change, many continue to rank other issues as more important. The dimension of issue salience thus deserves more attention in the academic literature on public opinion on climate change. Given what we know about the importance of issue salience with respect to the impact of public opinion on policy (Burstein, 2003), unless we observe an increase in the salience of climate change around the world, it appears unlikely that the far-reaching policies required to substantially combat climate change will be widely adopted.

Chapter Appendix

4.A Data

Table 4.4: Summary of variables

Variable	Description	Scale / Categories
Dependent Variables		
CC seriousness (Belief dimension)	From question asking “How serious a problem do you think climate change is at this moment?”, with responses ranging from 1 “Not at all serious” to 10 “Extremely serious”	Recoded (by Eurobarometer) to three-point scale, where: 0 = Not a serious problem (1-4) 1 = A fairly serious problem (5-6) 2 = A very serious problem (7-10)
CC salience (Salience dimension)	Which of the following do you consider to be the single most serious problem facing the world as a whole? (up to 4 answers allowed). Possible responses: Climate change; International terrorism; Poverty, hunger and lack of drinking water; Spread of infectious diseases; The economic situation; Proliferation of nuclear weapons; Armed conflicts; The increasing global population	0 = climate change not mentioned (Includes respondents who answered “None” or “Other”) 1 = climate change mentioned “Don’t know” = coded as missing
Government Responsibility (Support for govt. action dimension)	In your opinion, who within the EU is responsible for tackling climate change? (multiple answers allowed) Possible responses: National governments; The European Union; Regional and local authorities; Business and industry; You personally; Environmental groups	0 = National governments, EU or Regional/local authorities not responsible (Includes respondents who answered “None” or “Other”) 1 = National governments, EU or Regional/local authorities are responsible (Includes respondents who answered “All of them”) “Don’t know” = coded as missing

Variable	Description	Scale / Categories
Support for clean energy (Support for govt. action dimension)	To what extent do you agree or disagree with this statement? “More public financial support should be given to the transition to clean energies even if it means subsidies to fossil fuels should be reduced” Possible responses: Totally agree, tend to agree, tend to disagree, totally disagree	0 = tend to / totally disagree 1 = tend to / totally agree
Individual-level demographic variables		
Gender		0 = male 1 = female
Age		Continuous variable
Education	How old were you when you stopped full-time education? ⁸	0 = no full-time education 1-8 = stopped (or currently studying) at 14-21 years of age 9 = stopped (or currently studying) at 22 years or more
Social Class	Do you see yourself and your household belonging to...? The working / lower middle / middle / upper middle / higher class of society	1 = Working class 2 = Lower middle class 3 = Middle class 4 = Upper middle class 5 = Higher class
Individual-level value variables		
Left-right orientation	In political matters people talk of "the left" and "the right". How would you place your views on this scale?	1 = Left to 10 = Right

⁸Answers indicating the respondent is still studying were recoded to indicate the number of years they had studied after age 14.

Variable	Description	Scale / Categories
Inequality importance	In your opinion, are the inequalities between the different social classes in (OUR COUNTRY) currently very important, fairly important, not very important or not at all important?	1 = not at all important 2 = not very important 3 = fairly important 4 = very important
Political discussion	When you get together with friends or relatives, would you say you discuss frequently, occasionally or never about National political matters?	1 = Never 2 = Occasionally 3 = Frequently
Country-level variables		
GDP per capita	Data sourced from World Bank for 2017	Constant 2010 US dollars
CO ₂ emissions per capita	Data sourced from World Bank for 2014	Metric tons

4.B Method details

4.B.1 Overview

Eurobarometer collects separate samples in east and west Germany, and Northern Ireland, however in our analyses we combine the two German samples, and add the Northern Ireland responses into the United Kingdom sample.

The data were analysed using the R package *brms* (Bürkner, 2017), which is a front-end for the widely used Stan package. Stan implements Markov chain Monte Carlo (MCMC) algorithms to identify posterior distributions. Our analyses used four Markov chains, with 2000 iterations per chain. Evaluation of the trace plots for all models presented in the paper showed the chains converged.

Following the suggestion of Gelman et al. (2014) for logistic regression, all non-binary predictor variables were centred and scaled by 2SD, while binary predictor variables were centred, meaning all predictors had a standard deviation of 0.5.

4.B.2 Prior distributions

To limit the influence of priors, we chose to specify weakly informative priors for all parameters. We used $\text{Cauchy}(0,10)$ prior distributions for intercepts and $\text{Cauchy}(0,10)$ for all other parameters (besides standard deviations) which Gelman et al. (2014) suggest for parameters on the logit scale. For standard deviation parameters, we used a $\text{Student}_t(3, 0, 10)$ prior. Given the large amount of data used in the analysis, we did not expect priors to heavily influence the results. We confirmed this assumption with sensitivity testing (see below).

4.B.3 Model selection and testing

In addition to the models presented in the paper, null models, models with only the level 1 predictors, and a series of models each leaving one of the predictors out were analysed. These models were compared to the full models using Leave-One-Out (LOO) cross-validation. In each case, the full models were the best fitting, or very close to the best fitting model. For substantive reasons, we therefore chose to report results from the full models. We also conducted posterior predictive checks using the models.

The models generated values for the dependent variables that were very similar to the values in the original sample, both for the sample as a whole and for each country, providing further confirmation that the models are a good fit for the data.

We also investigated models which included squared terms for age, GDP per capita and CO₂ emissions per capita to test for non-linear relationships between these variables and the dependent variables. In some cases, the model fit statistics were better than when the polynomial terms were not included, and the predicted probabilities indicated the relationship was non-linear. However, the differences were very minor, with predicted probabilities varying by less than 0.1 across the levels of the independent variable, and were often within credible intervals. We therefore selected the more parsimonious models without the polynomial terms.

To test the influence of priors on the result, we also investigated models where all priors were centred at +5 and at -5 (instead of at 0). For the predictors, these priors indicate a positive/negative relationship with the outcome variables equivalent to an approximately +/-0.5 change in probability. The results of these analyses were very similar to the ones presented in the paper. We can thus conclude that the prior distributions did not have a substantial influence on the results.

4.B.4 Survey weights

As per the Eurobarometer recommendation, we used the survey weights provided. As we used combined data for the UK and Germany, we used the weight variable named “W3A_W4A”. This variable was referenced by the “weight” parameter in the brms models specification.

4.B.5 Predicted probability generation

We used the R package “ggeffects” to generate predicted probabilities (Lüdecke, 2018). To ease interpretation of the resulting plots, the values for the predictors (which were scaled and centred in the model) were replaced with the original values.

4.C Results

4.C.1 Descriptive statistics

Table 4.5: Dependent variables (after observations with missing values on independent variables removed)

Country	N	Dependent variables (Std. Deviation in brackets)			
		CC Seri- ousness	CC Salience	Gov. Re- sponsibility	Support for clean energy
Austria	1001	1.59 (0.67)	0.51 (0.50)	0.82 (0.38)	0.89 (0.32)
Belgium	1023	1.64 (0.60)	0.53 (0.50)	0.79 (0.41)	0.84 (0.37)
Bulgaria	1044	1.71 (0.56)	0.30 (0.46)	0.86 (0.34)	0.90 (0.30)
Croatia	1048	1.59 (0.69)	0.35 (0.48)	0.79 (0.41)	0.88 (0.32)
Cyprus	501	1.73 (0.53)	0.35 (0.48)	0.79 (0.41)	0.97 (0.16)
Czechia	1058	1.46 (0.70)	0.22 (0.42)	0.78 (0.41)	0.81 (0.39)
Denmark	1000	1.73 (0.55)	0.70 (0.46)	0.90 (0.30)	0.89 (0.31)
Estonia	1017	1.32 (0.77)	0.31 (0.46)	0.73 (0.44)	0.87 (0.34)
Finland	1012	1.66 (0.62)	0.60 (0.49)	0.81 (0.39)	0.92 (0.27)
France	1004	1.76 (0.50)	0.51 (0.50)	0.83 (0.37)	0.88 (0.33)
Germany	1537	1.67 (0.63)	0.53 (0.50)	0.86 (0.35)	0.88 (0.33)
Greece	1010	1.83 (0.44)	0.34 (0.47)	0.90 (0.30)	0.96 (0.21)
Hungary	1053	1.80 (0.48)	0.42 (0.49)	0.70 (0.46)	0.88 (0.33)
Ireland	1021	1.62 (0.62)	0.43 (0.50)	0.82 (0.39)	0.94 (0.24)
Italy	1022	1.80 (0.48)	0.34 (0.47)	0.84 (0.36)	0.90 (0.30)
Latvia	1004	1.39 (0.74)	0.29 (0.45)	0.63 (0.48)	0.86 (0.35)
Lithuania	1001	1.63 (0.63)	0.29 (0.46)	0.74 (0.44)	0.93 (0.25)
Luxembourg	510	1.71 (0.57)	0.52 (0.50)	0.78 (0.41)	0.88 (0.33)
Malta	500	1.77 (0.51)	0.49 (0.50)	0.93 (0.25)	0.98 (0.14)
Netherlands	1015	1.73 (0.55)	0.71 (0.45)	0.90 (0.30)	0.91 (0.29)
Poland	1008	1.52 (0.67)	0.28 (0.45)	0.83 (0.37)	0.86 (0.35)
Portugal	1061	1.83 (0.42)	0.27 (0.45)	0.89 (0.31)	0.96 (0.21)
Romania	1033	1.61 (0.63)	0.36 (0.48)	0.74 (0.44)	0.80 (0.40)
Slovakia	1014	1.65 (0.55)	0.31 (0.46)	0.75 (0.43)	0.88 (0.32)
Slovenia	1027	1.64 (0.62)	0.46 (0.50)	0.74 (0.44)	0.89 (0.31)
Spain	1024	1.85 (0.42)	0.42 (0.49)	0.88 (0.33)	0.96 (0.19)
Sweden	1007	1.78 (0.50)	0.76 (0.43)	0.94 (0.24)	0.92 (0.26)
United Kingdom	1346	1.56 (0.68)	0.45 (0.50)	0.87 (0.33)	0.89 (0.31)
Overall	27901	1.66 (0.61)	0.43 (0.50)	0.82 (0.39)	0.89 (0.31)

Table 4.6: Independent variables (after observations with missing values on independent variables removed)

Variable	Obs.	Mean	Std. Dev.	Min	Max
Age	21304	51.92	17.81	15	99
Education	21304	5.81	2.68	0	9
Left/Right	21304	5.28	2.18	1	10
Gender					
Man	9965	46.78%			
Woman	11339	53.22%			
Inequality concern					
Very important	556	2.61%			
Fairly important	2588	12.15%			
Not very important	9648	45.29%			
Not at all important	8512	39.95%			
Political Discussion					
Never	4320	20.28%			
Occasionally	11993	56.29%			
Frequently	4991	23.43%			
Social Class					
Working	5525	25.93%			
Lower middle	3545	16.64%			
Middle	10380	48.72%			
Upper Middle	1677	7.87%			
Higher	177	0.83%			

4.C.2 Bivariate correlations

Table 4.7: Bivariate correlations

Covariate	Dependent Variables			
	CC Seriousness	CC Salience	Gov. Responsibility	Support for clean energy
Age	-0.031*	-0.035*	0.035*	0.011
Education	0.070*	0.153*	0.049*	0.031*
Gender	0.042*	-0.018*	-0.035*	0.027*
Inequality concern	0.097*	0.032*	0.044*	0.082*
Left/Right	-0.056*	-0.076*	-0.022*	-0.052*
Political Discussion	0.067*	0.103*	0.094*	0.045*
Social Class	0.038*	0.134*	0.038*	0.008

Note:

* = significant at $p \leq 0.01$

4.C.3 Variation in country means of individual-level independent variables

Table 4.8: Variation in country means of individual-level independent variables

Dependent Variable	Mean	Std. Dev.	C.V.
Age	47.96	1.32	2.7
Education	5.71	0.87	15.2
Gender	1.52	0.01	1.0
Inequality concern	3.21	0.16	5.1
Left/Right	5.28	0.35	6.6
Political Discussion	1.94	0.18	9.0
Social Class	2.38	0.31	13.0

Note:

C.V. = coefficient of variation

4.C.4 Regression model coefficients

Notes for tables below:

- Median - median value of the posterior distribution
- CI - 95% credible intervals of the median value
- pd - Probability of direction. High values indicate that an effect exists, and is in the direction indicated.
- ROPE - Region of Practical Equivalence percentage. Low values indicate the posterior distribution does not lie within the null region. The null region was defined as +/-0.181, which equates to an approximately +/- 0.09 difference in probability if the mean of the response is 0.5. In other words, low values indicate a high probability that there is a small or larger relationship between the covariate and the dependent variable.

Table 4.9: Climate change seriousness (1 -> 2)

Parameter	Model 0			Model 1			Model 2			Model 3		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender				0.45	1.00	0.00	0.42	1.00	0.00	0.42	1.00	0.00
Age				0.15	0.99	0.69	0.15	0.99	0.70	0.15	0.99	0.71
Social Class				-0.04	0.74	0.99	0.00	0.51	0.99	0.00	0.50	0.99
Education							0.00	0.53	0.98	0.00	0.51	0.99
Left/Right							-0.01	0.59	0.99	-0.01	0.58	0.99
Inequality concern							0.01	0.59	1.00	0.01	0.59	1.00
Political Discussion							-0.26	1.00	0.09	-0.26	1.00	0.09
CO2 emissions per capita										-0.32	0.96	0.21
GDP per capita										0.17	0.82	0.49
Intercept	1.12	1.00	0.00	1.18	1.00	0.00	1.17	1.00	0.00	1.17	1.00	0.00
Country-level S.D.	0.38	1.00	0.00	0.38	1.00	0.00	0.38	1.00	0.00	0.37	1.00	0.00

Table 4.10: Climate change seriousness (2 -> 3)

Parameter	Model 0			Model 1			Model 2			Model 3		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender				0.57	1.00	0.00	0.57	1.00	0.00	0.57	1.00	0.00
Age				-0.02	0.67	1.00	0.04	0.75	0.99	0.04	0.76	1.00
Social Class				0.20	1.00	0.35	0.10	0.95	0.90	0.11	0.96	0.89
Education							0.41	1.00	0.00	0.41	1.00	0.00
Left/Right							-0.15	1.00	0.71	-0.14	0.99	0.74
Inequality concern							0.37	1.00	0.00	0.37	1.00	0.00
Political Discussion							0.05	0.82	0.99	0.05	0.83	0.98
CO2 emissions per capita										-0.76	0.99	0.03
GDP per capita										0.48	0.94	0.14
Intercept	2.50	1.00	0.00	2.54	1.00	0.00	2.58	1.00	0.00	2.58	1.00	0.00
Country-level S.D.	0.68	1.00	0.00	0.71	1.00	0.00	0.71	1.00	0.00	0.66	1.00	0.00

Table 4.11: Climate change salience

Parameter	Model 0			Model 1			Model 2			Model 3		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender				-0.02	0.74	1.00	0.00	0.52	1.00	0.00	0.53	1.00
Age				-0.27	1.00	0.00	-0.20	1.00	0.32	-0.20	1.00	0.31
Social Class				0.36	1.00	0.00	0.23	1.00	0.06	0.23	1.00	0.06
Education							0.39	1.00	0.00	0.39	1.00	0.00
Left/Right							-0.23	1.00	0.04	-0.23	1.00	0.04
Inequality concern							0.15	1.00	0.85	0.15	1.00	0.87
Political Discussion							0.24	1.00	0.03	0.24	1.00	0.03
CO2 emissions per capita										-0.38	0.96	0.17
GDP per capita										0.90	1.00	0.00
Intercept	-0.24	0.98	0.30	-0.26	0.98	0.23	-0.26	0.98	0.23	-0.27	1.00	0.14
Country-level S.D.	0.62	1.00	0.00	0.60	1.00	0.00	0.58	1.00	0.00	0.44	1.00	0.00

Table 4.12: Government responsibility

Parameter	Model 0			Model 1			Model 2			Model 3		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender				-0.13	1.00	0.92	-0.10	1.00	0.99	-0.10	0.99	0.99
Age				0.21	1.00	0.24	0.23	1.00	0.10	0.23	1.00	0.10
Social Class				0.19	1.00	0.42	0.08	0.97	0.99	0.08	0.98	0.99
Education							0.24	1.00	0.08	0.24	1.00	0.09
Left/Right							-0.04	0.85	1.00	-0.04	0.84	1.00
Inequality concern							0.19	1.00	0.39	0.19	1.00	0.40
Political Discussion							0.34	1.00	0.00	0.34	1.00	0.00
CO2 emissions per capita										-0.36	0.92	0.22
GDP per capita										0.43	0.95	0.14
Intercept	1.61	1.00	0.00	1.63	1.00	0.00	1.65	1.00	0.00	1.66	1.00	0.00
Country-level S.D.	0.55	1.00	0.00	0.56	1.00	0.00	0.54	1.00	0.00	0.52	1.00	0.00

Table 4.13: Support for clean energy

Parameter	Model 0			Model 1			Model 2			Model 3		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender				0.18	1.00	0.54	0.19	1.00	0.43	0.19	1.00	0.44
Age				-0.02	0.65	1.00	0.00	0.53	1.00	0.00	0.53	1.00
Social Class				0.16	1.00	0.66	0.11	0.98	0.92	0.11	0.98	0.91
Education							0.19	1.00	0.46	0.19	1.00	0.44
Left/Right							-0.26	1.00	0.05	-0.26	1.00	0.06
Inequality concern							0.53	1.00	0.00	0.53	1.00	0.00
Political Discussion							0.24	1.00	0.11	0.24	1.00	0.12
CO2 emissions per capita										-0.40	0.94	0.17
GDP per capita										0.28	0.86	0.31
Intercept	2.25	1.00	0.00	2.27	1.00	0.00	2.32	1.00	0.00	2.32	1.00	0.00
Country-level S.D.	0.55	1.00	0.00	0.56	1.00	0.00	0.53	1.00	0.00	0.53	1.00	0.00

4.C.5 Regression coefficients for interaction models

Coefficients for our models including cross-level interactions are presented below. Separate models were used for each combination of country-level and explanatory individual-level variable (and for each of the four dependent variables), as specifying interactions for all combinations in a single model would result in a very large number of model parameters, meaning computation time would be extremely long and interpretation of results difficult.

Table 4.14: Coefficients for interaction with GDP per capita for climate change seriousness (1 -> 2)

Parameter	Education			Left/Right			Inequality concern			Political Discussion		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender	0.42	1.00	0.00	0.42	1.00	0.00	0.42	1.00	0.00	0.42	1.00	0.00
Age	0.15	0.99	0.70	0.16	0.99	0.66	0.16	1.00	0.66	0.15	0.99	0.70
Social Class	0.00	0.52	0.99	0.01	0.54	0.99	0.00	0.50	0.99	0.00	0.51	0.99
Education	-0.02	0.61	0.96	0.00	0.51	0.98	0.00	0.52	0.98	-0.01	0.54	0.99
Left/Right	-0.01	0.57	1.00	-0.06	0.78	0.95	0.00	0.51	0.99	-0.01	0.59	1.00
Inequality concern	0.01	0.59	1.00	0.01	0.53	1.00	0.01	0.56	0.96	0.01	0.59	1.00
Political Discussion	-0.26	1.00	0.10	-0.26	1.00	0.11	-0.26	1.00	0.10	-0.26	1.00	0.17
CO2 emissions per capita	-0.26	0.93	0.33	-0.34	0.97	0.18	-0.32	0.95	0.22	-0.30	0.94	0.25
GDP per capita	0.15	0.80	0.53	0.19	0.84	0.45	0.22	0.86	0.41	0.15	0.80	0.52
Education * GDP per capita	-0.11	0.75	0.62									
Left/Right * GDP per capita				-0.23	0.92	0.38						
Inequality concern * GDP per capita							0.35	0.98	0.15			
Political Discussion * GDP per capita										0.12	0.78	0.63
Intercept	1.17	1.00	0.00	1.17	1.00	0.00	1.18	1.00	0.00	1.17	1.00	0.00

Table 4.15: Coefficients for interaction with GDP per capita for climate change seriousness (2 -> 3)

Parameter	Education			Left/Right			Inequality concern			Political Discussion		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender	0.56	1.00	0.00	0.57	1.00	0.00	0.57	1.00	0.00	0.57	1.00	0.00
Age	0.03	0.73	1.00	0.06	0.87	0.98	0.05	0.82	0.99	0.04	0.76	0.99
Social Class	0.11	0.96	0.89	0.12	0.97	0.82	0.11	0.96	0.88	0.10	0.95	0.90
Education	0.35	1.00	0.04	0.40	1.00	0.00	0.41	1.00	0.00	0.41	1.00	0.00
Left/Right	-0.15	0.99	0.71	-0.22	0.97	0.38	-0.13	0.99	0.80	-0.14	0.99	0.75
Inequality concern	0.36	1.00	0.00	0.35	1.00	0.00	0.35	1.00	0.02	0.37	1.00	0.00
Political Discussion	0.05	0.80	0.99	0.05	0.79	0.99	0.05	0.82	0.98	0.02	0.61	0.98
CO2 emissions per capita	-0.78	0.99	0.03	-0.76	0.99	0.03	-0.77	0.99	0.03	-0.80	0.99	0.03
GDP per capita	0.50	0.94	0.13	0.50	0.94	0.14	0.53	0.95	0.12	0.52	0.95	0.12
Education * GDP per capita	-0.03	0.56	0.67									
Left/Right * GDP per capita				-0.67	1.00	0.03						
Inequality concern * GDP per capita							0.50	1.00	0.03			
Political Discussion * GDP per capita										0.39	0.99	0.09
Intercept	2.57	1.00	0.00	2.59	1.00	0.00	2.60	1.00	0.00	2.58	1.00	0.00

Table 4.16: Coefficients for interaction with GDP per capita for climate change salience)

Parameter	Education			Left/Right			Inequality concern			Political Discussion		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender	0.00	0.52	1.00	0.00	0.56	1.00	0.00	0.51	1.00	0.00	0.53	1.00
Age	-0.20	1.00	0.31	-0.18	1.00	0.46	-0.19	1.00	0.33	-0.19	1.00	0.33
Social Class	0.23	1.00	0.06	0.24	1.00	0.03	0.23	1.00	0.06	0.22	1.00	0.09
Education	0.38	1.00	0.00	0.39	1.00	0.00	0.40	1.00	0.00	0.40	1.00	0.00
Left/Right	-0.23	1.00	0.04	-0.23	1.00	0.25	-0.23	1.00	0.05	-0.23	1.00	0.06
Inequality concern	0.15	1.00	0.85	0.14	1.00	0.93	0.15	1.00	0.80	0.15	1.00	0.81
Political Discussion	0.24	1.00	0.03	0.23	1.00	0.05	0.24	1.00	0.03	0.22	1.00	0.21
CO2 emissions per capita	-0.40	0.98	0.13	-0.14	0.81	0.56	-0.35	0.94	0.21	-0.37	0.96	0.17
GDP per capita	0.89	1.00	0.00	0.78	1.00	0.00	0.85	1.00	0.00	0.89	1.00	0.00
Education * GDP per capita	0.02	0.58	0.91									
Left/Right * GDP per capita				-0.28	0.97	0.24						
Inequality concern * GDP per capita							0.07	0.78	0.88			
Political Discussion * GDP per capita										0.16	0.94	0.56
Intercept	-0.28	1.00	0.12	-0.28	1.00	0.12	-0.26	1.00	0.19	-0.28	1.00	0.13

Table 4.17: Coefficients for interaction with GDP per capita for government responsibility

Parameter	Education			Left/Right			Inequality concern			Political Discussion		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender	-0.10	1.00	0.99	-0.10	0.99	0.98	-0.10	0.99	0.99	-0.10	1.00	0.98
Age	0.23	1.00	0.10	0.22	1.00	0.17	0.23	1.00	0.11	0.23	1.00	0.10
Social Class	0.08	0.98	0.99	0.09	0.98	0.98	0.09	0.98	0.99	0.08	0.98	0.99
Education	0.23	0.99	0.27	0.25	1.00	0.05	0.24	1.00	0.09	0.24	1.00	0.08
Left/Right	-0.05	0.90	1.00	-0.02	0.59	0.96	-0.04	0.87	1.00	-0.04	0.85	1.00
Inequality concern	0.19	1.00	0.41	0.19	1.00	0.36	0.17	1.00	0.56	0.19	1.00	0.37
Political Discussion	0.34	1.00	0.00	0.34	1.00	0.00	0.34	1.00	0.00	0.32	1.00	0.02
CO2 emissions per capita	-0.37	0.94	0.21	-0.34	0.92	0.24	-0.38	0.95	0.19	-0.35	0.93	0.23
GDP per capita	0.42	0.96	0.14	0.41	0.95	0.17	0.43	0.96	0.14	0.43	0.97	0.14
Education * GDP per capita	0.03	0.57	0.72									
Left/Right * GDP per capita				0.11	0.72	0.61						
Inequality concern * GDP per capita							-0.09	0.79	0.81			
Political Discussion * GDP per capita										-0.01	0.54	0.83
Intercept	1.66	1.00	0.00	1.68	1.00	0.00	1.65	1.00	0.00	1.66	1.00	0.00

Table 4.18: Coefficients for interaction with GDP per capita for support for clean energy

Parameter	Education			Left/Right			Inequality concern			Political Discussion		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender	0.19	1.00	0.41	0.18	1.00	0.47	0.19	1.00	0.41	0.20	1.00	0.37
Age	0.00	0.53	1.00	0.03	0.71	1.00	0.01	0.57	1.00	0.01	0.58	1.00
Social Class	0.11	0.98	0.91	0.12	0.99	0.87	0.11	0.98	0.91	0.11	0.98	0.91
Education	0.10	0.86	0.80	0.18	1.00	0.50	0.18	1.00	0.52	0.18	1.00	0.47
Left/Right	-0.26	1.00	0.05	-0.29	1.00	0.09	-0.27	1.00	0.03	-0.26	1.00	0.05
Inequality concern	0.52	1.00	0.00	0.51	1.00	0.00	0.47	1.00	0.01	0.53	1.00	0.00
Political Discussion	0.24	1.00	0.13	0.24	1.00	0.13	0.24	1.00	0.12	0.23	0.98	0.31
CO2 emissions per capita	-0.50	0.99	0.05	-0.44	0.95	0.15	-0.53	0.98	0.07	-0.45	0.97	0.12
GDP per capita	0.36	0.94	0.20	0.32	0.90	0.26	0.31	0.89	0.27	0.31	0.89	0.28
Education * GDP per capita	-0.09	0.69	0.63									
Left/Right * GDP per capita				-0.52	1.00	0.03						
Inequality concern * GDP per capita							-0.19	0.85	0.45			
Political Discussion * GDP per capita										-0.11	0.70	0.54
Intercept	2.32	1.00	0.00	2.32	1.00	0.00	2.33	1.00	0.00	2.33	1.00	0.00

Table 4.19: Coefficients for interaction with CO2 emissions per capita for climate change seriousness (1 -> 2)

Parameter	Education			Left/Right			Inequality concern			Political Discussion		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender	0.42	1.00	0.00	0.42	1.00	0.00	0.42	1.00	0.00	0.42	1.00	0.00
Age	0.15	0.99	0.71	0.15	0.99	0.70	0.15	0.99	0.68	0.15	0.99	0.70
Social Class	0.00	0.51	0.99	0.01	0.54	0.99	0.00	0.50	0.99	0.00	0.50	0.99
Education	-0.03	0.63	0.96	-0.01	0.54	0.98	0.00	0.51	0.99	0.00	0.51	0.99
Left/Right	-0.01	0.56	1.00	-0.04	0.70	0.97	-0.01	0.53	1.00	-0.01	0.58	1.00
Inequality concern	0.02	0.60	1.00	0.01	0.57	1.00	0.01	0.55	0.96	0.01	0.60	1.00
Political Discussion	-0.27	1.00	0.10	-0.26	1.00	0.12	-0.27	1.00	0.09	-0.26	1.00	0.16
CO2 emissions per capita	-0.30	0.95	0.25	-0.32	0.95	0.23	-0.34	0.97	0.18	-0.30	0.95	0.24
GDP per capita	0.12	0.75	0.59	0.15	0.81	0.53	0.20	0.86	0.44	0.16	0.80	0.52
Education * CO2 emissions per capita	0.11	0.77	0.64									
Left/Right * CO2 emissions per capita				-0.17	0.86	0.51						
Inequality concern * CO2 emissions per capita							0.02	0.55	0.71			
Political Discussion * CO2 emissions per capita										0.12	0.80	0.65
Intercept	1.16	1.00	0.00	1.17	1.00	0.00	1.16	1.00	0.00	1.17	1.00	0.00

Table 4.20: Coefficients for interaction with CO2 emissions per capita for climate change seriousness (2 -> 3)

Parameter	Education			Left/Right			Inequality concern			Political Discussion		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender	0.56	1.00	0.00	0.57	1.00	0.00	0.57	1.00	0.00	0.57	1.00	0.00
Age	0.03	0.72	1.00	0.05	0.84	0.99	0.05	0.79	0.99	0.04	0.76	1.00
Social Class	0.11	0.96	0.88	0.12	0.98	0.83	0.11	0.96	0.89	0.10	0.95	0.90
Education	0.35	1.00	0.04	0.40	1.00	0.00	0.41	1.00	0.00	0.41	1.00	0.00
Left/Right	-0.15	1.00	0.70	-0.20	0.94	0.44	-0.14	0.99	0.78	-0.14	0.99	0.76
Inequality concern	0.37	1.00	0.00	0.35	1.00	0.00	0.36	1.00	0.03	0.37	1.00	0.00
Political Discussion	0.05	0.80	0.99	0.05	0.79	0.98	0.05	0.81	0.99	0.02	0.59	0.96
CO2 emissions per capita	-0.75	0.99	0.03	-0.71	0.99	0.05	-0.77	0.99	0.03	-0.81	0.99	0.02
GDP per capita	0.51	0.95	0.12	0.41	0.89	0.20	0.51	0.92	0.14	0.61	0.96	0.10
Education * CO2 emissions per capita	-0.03	0.56	0.69									
Left/Right * CO2 emissions per capita				-0.30	0.89	0.27						
Inequality concern * CO2 emissions per capita							0.07	0.66	0.68			
Political Discussion * CO2 emissions per capita										0.08	0.69	0.69
Intercept	2.56	1.00	0.00	2.58	1.00	0.00	2.59	1.00	0.00	2.57	1.00	0.00

Table 4.21: Coefficients for interaction with CO2 emissions per capita for climate change salience

Parameter	Education			Left/Right			Inequality concern			Political Discussion		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender	0.00	0.51	1.00	0.00	0.56	1.00	0.00	0.52	1.00	0.00	0.54	1.00
Age	-0.20	1.00	0.30	-0.19	1.00	0.42	-0.19	1.00	0.33	-0.19	1.00	0.32
Social Class	0.23	1.00	0.05	0.25	1.00	0.03	0.23	1.00	0.07	0.23	1.00	0.10
Education	0.38	1.00	0.00	0.39	1.00	0.00	0.39	1.00	0.00	0.40	1.00	0.00
Left/Right	-0.23	1.00	0.04	-0.22	1.00	0.28	-0.23	1.00	0.05	-0.23	1.00	0.05
Inequality concern	0.15	1.00	0.84	0.14	1.00	0.93	0.14	1.00	0.81	0.15	1.00	0.81
Political Discussion	0.24	1.00	0.03	0.23	1.00	0.06	0.24	1.00	0.03	0.23	1.00	0.20
CO2 emissions per capita	-0.39	0.97	0.15	-0.20	0.84	0.43	-0.36	0.96	0.19	-0.36	0.96	0.18
GDP per capita	0.88	1.00	0.00	0.56	1.00	0.02	0.85	1.00	0.00	0.85	1.00	0.00
Education * CO2 emissions per capita	0.05	0.69	0.87									
Left/Right * CO2 emissions per capita				0.09	0.73	0.67						
Inequality concern * CO2 emissions per capita							-0.09	0.85	0.82			
Political Discussion * CO2 emissions per capita										0.08	0.74	0.81
Intercept	-0.27	1.00	0.16	-0.28	1.00	0.15	-0.27	1.00	0.16	-0.27	1.00	0.14

Table 4.22: Coefficients for interaction with CO2 emissions per capita for government responsibility

Parameter	Education			Left/Right			Inequality concern			Political Discussion		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender	-0.10	1.00	0.99	-0.10	1.00	0.99	-0.10	1.00	0.98	-0.10	0.99	0.98
Age	0.23	1.00	0.11	0.22	1.00	0.16	0.23	1.00	0.09	0.23	1.00	0.08
Social Class	0.08	0.97	0.99	0.10	0.99	0.98	0.08	0.98	0.99	0.09	0.97	0.99
Education	0.23	0.99	0.28	0.25	1.00	0.05	0.24	1.00	0.09	0.25	1.00	0.07
Left/Right	-0.05	0.89	1.00	-0.02	0.58	0.96	-0.04	0.87	1.00	-0.04	0.84	1.00
Inequality concern	0.19	1.00	0.42	0.19	1.00	0.36	0.18	1.00	0.54	0.19	1.00	0.36
Political Discussion	0.34	1.00	0.00	0.34	1.00	0.00	0.34	1.00	0.00	0.32	1.00	0.02
CO2 emissions per capita	-0.37	0.93	0.20	-0.36	0.92	0.23	-0.38	0.93	0.19	-0.35	0.92	0.23
GDP per capita	0.45	0.97	0.13	0.43	0.96	0.15	0.43	0.96	0.13	0.45	0.96	0.13
Education * CO2 emissions per capita	0.16	0.83	0.54									
Left/Right * CO2 emissions per capita				-0.01	0.52	0.71						
Inequality concern * CO2 emissions per capita							-0.08	0.78	0.81			
Political Discussion * CO2 emissions per capita										0.07	0.70	0.79
Intercept	1.65	1.00	0.00	1.67	1.00	0.00	1.66	1.00	0.00	1.67	1.00	0.00

Table 4.23: Coefficients for interaction with CO2 emissions per capita for support for clean energy

Parameter	Education			Left/Right			Inequality concern			Political Discussion		
	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE	M	pd	ROPE
Gender	0.19	1.00	0.42	0.18	1.00	0.49	0.19	1.00	0.42	0.19	1.00	0.39
Age	0.00	0.53	1.00	0.02	0.67	1.00	0.01	0.58	1.00	0.01	0.58	1.00
Social Class	0.11	0.98	0.90	0.11	0.98	0.89	0.11	0.98	0.92	0.11	0.98	0.92
Education	0.11	0.87	0.80	0.18	1.00	0.52	0.18	1.00	0.50	0.18	1.00	0.47
Left/Right	-0.26	1.00	0.04	-0.26	0.99	0.21	-0.27	1.00	0.03	-0.26	1.00	0.05
Inequality concern	0.52	1.00	0.00	0.51	1.00	0.00	0.47	1.00	0.00	0.53	1.00	0.00
Political Discussion	0.24	1.00	0.13	0.24	1.00	0.12	0.24	1.00	0.13	0.24	0.99	0.27
CO2 emissions per capita	-0.35	0.94	0.20	-0.45	0.96	0.14	-0.43	0.95	0.14	-0.41	0.95	0.16
GDP per capita	0.28	0.92	0.28	0.40	0.92	0.20	0.25	0.85	0.34	0.29	0.89	0.29
Education * CO2 emissions per capita	-0.22	0.90	0.39									
Left/Right * CO2 emissions per capita				-0.06	0.61	0.60						
Inequality concern * CO2 emissions per capita							-0.34	0.97	0.20			
Political Discussion * CO2 emissions per capita										-0.28	0.91	0.30
Intercept	2.32	1.00	0.00	2.33	1.00	0.00	2.32	1.00	0.00	2.32	1.00	0.00

4.C.6 Multi-category predicted probabilities for climate change seriousness

Figure 4.8: Climate change seriousness, multi-category predicted probabilities plots (with 95% credible intervals)

4.C.7 Climate change seriousness, 10 category analysis

Figure 4.9: Climate change seriousness, 10 category (linear multi-level model) predicted probabilities plots (with 95% credible intervals)

Chapter 5

To what extent do interest group messages shape the public's climate change policy preferences?

Abstract

Interest groups campaign to influence public opinion on climate change, yet few studies have empirically examined whether they are successful in their aims. The current study investigates the extent to which characteristic arguments used by environmental and industry-backed interest groups are able to influence the public's climate policy preferences. Using an original online survey experiment conducted in the UK (N = 796), we find that interest group messages can affect climate policy preferences. After reading an argument supporting a policy, respondents were significantly more likely than the control group to support the (strong or weak) policy endorsed by the argument, although broader policy views were unaffected. Policy endorsements had the same effect on policy preferences whether or not emphasis frames were used, and the effects were not moderated by the personal importance of climate change. Overall, the moderate effect sizes suggest that interest groups have limited influence over the public's climate policy preferences.

5.1 Introduction

The contentious nature of climate change as a political issue has meant that interest groups, elites, social movements and politicians campaign actively to try to influence the views of the public (Brulle, 2014; McCright & Dunlap, 2010; Schifeling & Hoffman, 2017). The link between climate change views and political affiliation or ideology is well established (Krange et al., 2018; McCright, Dunlap & Marquart-Pyatt, 2016; Tranter & Booth, 2015), and there is evidence that this link is often driven by political elite influence (Benegal & Scruggs, 2018; Ehret et al., 2018; Kousser & Tranter, 2018; Merkley & Stecula, 2018). Yet, little scholarly attention has been paid to the extent to which the substantial effort by interest groups – campaigning for or against action on climate change – is able to shift the climate policy preferences of the public.

The current study aims to fill this gap, by investigating the extent to which arguments made by interest groups influence people's views on the government's appropriate role in the response to climate change. The UK has seen its share of interest groups campaigning on climate change (Carter & Childs, 2018; D. Miller & Dinan, 2015), some of which continue to deny that climate change is happening, or is a serious problem (Painter & Gavin, 2016). The UK public, however, are generally convinced that climate change is occurring and that something must be done about it (Steentjes et al., 2017). The debate over the role of government in addressing climate change thus seems to be more relevant in the UK than the debate over whether or not climate change is happening.

It is challenging, however, to empirically test the influence of external actors – such as interest groups – on public opinion, because of the difficulty in testing the counterfactual: that opinions would have been different without such influence (Dür, 2018). One approach that avoids this problem is to investigate whether or not the types of arguments used by interest groups are likely to be successful in shaping public opinion. We therefore use an online survey experiment conducted among British citizens in 2018 to test the extent to which arguments used by environmental and industry-backed lobby groups are able to influence the views of members of the public on climate change.

The main research question motivating our study is: to what extent do the types of arguments made by interest groups influence the climate policy preferences of the public? We examine arguments in favour of both

strong and weak climate change policy. The strong climate policy argument (often employed by civil society and environmental groups) supports the government setting a price on emissions. The weak climate policy argument (which aligns with positions taken by industry-led interest groups) supports the government encouraging businesses to take voluntary action to reduce emissions.

In addition to examining the overall effect of these arguments on the public's policy preferences, we investigate the extent to which the use of emphasis frames enhances the influence of interest group arguments. Emphasis frames – where a communicator emphasises a particular aspect of a debate in order to gain support for their position – are often employed by interest groups in the hope that they will help to convince the public to support their arguments (McEntire et al., 2015). We investigate the extent to which emphasis frames used in interest group arguments are more effective at changing the minds of the public than simple endorsements of a particular policy.

Climate policy in most countries is insufficiently “ambitious” if the internationally agreed Paris agreement target of remaining well under 2°C of warming by 2100 is to be achieved (United Nations Environment Programme, 2019). A number of factors may influence which climate policies are (or are not) adopted in particular countries, including the preferences and activities of economic and political elites, and direct lobbying by interest groups. Public opinion is also likely to play an important role (Burstein, 2003; Vandeweerdt et al., 2016). Some have argued that one of the main barriers to countries adopting stronger climate policy is the efforts of interest groups backed by economic elites and corporations to influence the policy process (e.g. Hein & Jenkins, 2017; Klein, 2015). Understanding the extent to which interest groups are able to successfully shape public opinion can therefore help us to determine the degree to which interest group influence is contributing to the failure of most countries to adopt effective climate policy.

5.2 The influence of interest group arguments on public opinion

An extensive academic literature considers how easy it is for elites to influence or manipulate the views of the general public. On one side of

the debate, some authors claim that most members of the public have “non-attitudes” rather than coherent opinions, and are therefore ripe for influence by elites (Converse, 2006). Zaller (1992), for instance, argues that citizens do not usually have fixed opinions on issues. When citizens are required to form a definitive opinion on a topic, they tend to search their memories for “considerations” that may be relevant, usually giving preference to information that was received more recently (Zaller, 1992). Such a “memory-based” model of opinion formation means that elites can craft messages to bring particular considerations to the fronts of individuals’ minds, and individuals will thus be more likely to adopt the position the elite desires (L. R. Jacobs & Shapiro, 2000; Taber & Young, 2013; Zaller, 1992).

On the other side of the debate, many authors argue that members of the public often do have sophisticated opinions on issues (Ansolabehere et al., 2008; Druckman, 2001). Goren (2012), who is among the authors with the most confidence in the capability of the public, claims that even individuals with low levels of political awareness have broad “policy principles” that guide the formation of their views. Experimental studies have shown that people tend to rely on policy information more than elite cues when forming their opinions on issues (J. G. Bullock, 2011; Coffé, 2018). From this perspective, elites (particularly political parties) may play a role in influencing public opinion, but information from elites typically acts to structure and simplify citizen decisions, rather than to manipulate citizens’ views (Leeper & Slothuus, 2014).

Most studies examining the extent to which elites can influence the preferences of the public have focussed on politicians and political parties (e.g. Ehret et al., 2018), while few have systematically investigated how much interest group messages might shape public opinion (however, see: Dür, 2018; McEntire et al., 2015). Interest groups can achieve their goals of policy change either *directly* (by influencing politicians) or *indirectly* (by influencing public opinion) (Yu, 2005). The current study focuses on indirect influence, which is often the central purpose of interest group campaigns (Dür, 2018; Kollman, 1998). Such campaigns aim to influence the policy preferences of the public who are, in turn, expected to influence policy makers and the policies themselves (Burstein, 2003). To convince the public, interest groups engage with the media to get their carefully crafted messages across (Terkidsen et al., 1998), employing, for

example, advertising campaigns, statements on the daily news, or internet advocacy (McKnight & Hobbs, 2013).

Despite extensive interest group activity on climate change, there has been surprisingly little research investigating the extent to which interest groups are able to influence the climate policy preferences of the public (see, however: Dür, 2018). Studies investigating interest group influence on public opinion in general usually find that such groups are able to change the minds of at least some members of the public (Dür, 2018; Gerber & Phillips, 2003; McEntire et al., 2015; McKnight & Hobbs, 2013; Schifeling & Hoffman, 2017). For instance, using a survey experiment, Dür (2018) found that people were more likely to support (or oppose) their country adopting a free trade agreement after reading interest group arguments in favour of (or against) such an agreement. In the same study, Dür (2018) found that the positions of environmental or business groups had a small influence on people's opinions about the 2015 Paris Climate Agreement.

Several other studies have uncovered evidence of the persuasive power of interest groups. Using a survey experiment to examine the use of frames by human rights organisations, for example, McEntire et al. (2015) find that people were more likely to be opposed to the use of sleep deprivation as an interrogation method after reading different types of frames typically used by human rights organisations. Schifeling and Hoffman (2017) use text analysis of news articles to show how the climate activist group 350.org has helped to widen the public debate over climate change. Investigating voting behaviour in California, Lupia (1994) finds that voters were able to use a complex set of information cues – including cues from interest groups – to assist their decisions on insurance reform referendums.

Based on these previous studies, we expect arguments – defined here in line with Dür (2018, pg. 514) as “a statement given in support of a specific idea” – made by interest groups to shape public policy preferences. Our first hypothesis thus reads as follows:

H1: Interest group arguments in favour of a proposed government policy on climate change will increase the likelihood that an individual will hold positive attitudes towards the policy.

However, the likelihood that someone will be influenced by an argument

is expected to depend on how involved they are with an issue. Previous work on persuasion has shown that people who are involved with an issue – in that they pay attention to the debate around it, and believe that it is important to them – are likely to have a stable opinion on the issue (Gilens & Murakawa, 2002; Johnson & Eagly, 1989). In other words, it is harder for interest groups to influence someone who has high levels of involvement with an issue. Conversely, for people who have low levels of involvement with an issue, arguments made by interest groups may be valuable sources of information (Gerber & Phillips, 2003; Johnson & Eagly, 1989). Interest groups therefore may have a greater degree of success in influencing people with low issue involvement.

We thus expect the degree of personal involvement a person has with an issue to moderate the extent to which interest group arguments affect their climate change policy preferences. Therefore, our second hypothesis is:

H2: Individuals who believe that climate change is an important issue to them personally will be less likely to be influenced by arguments made by interest groups than those who do not believe that climate change is an important personal issue.

Emphasis frames are often employed by interest groups when making an argument in favour of a particular policy (Dür, 2018). A frame refers to the particular way in which a communicator presents or orients their perspective on a topic to attempt to influence the receiver (Chong & Druckman, 2007; Druckman, 2001). Emphasis frames – a type of frame often used in political discourse – are used by communicators who stress a particular aspect of a debate (Druckman, 2001). For example, a communicator seeking to persuade people to oppose international climate change agreements might emphasise the potentially problematic effects of such agreements on national sovereignty (McCright, Charters et al., 2016). With respect to the debate considered in this study, industry-backed interest groups (e.g. Energy Intensive Users Group, 2016) use frames to emphasise the potential economic costs of setting a price on emissions. In contrast, environmental interest groups often emphasise the detrimental effects of climate change, such as sea level rise, to help focus people on the urgent need for government action.

Given that arguments employing emphasis frames provide more information than simple statements of position, we expect that the former will be more persuasive than the latter. Although many people may simply accept an interest group policy endorsement and use it as a heuristic cue when forming an opinion (Gilens & Murakawa, 2002), others are likely to be moved only after receiving additional detail explaining why a particular policy is better than another. Such information may create a framing effect, meaning that the particular considerations emphasised by the frame become more salient to the individual, thus altering their opinion (Chong & Druckman, 2007; Nelson & Oxley, 1999).

A range of studies have investigated the effect of emphasis frames on climate change views, generally finding that emphasis frames do tend to more successfully alter public opinion about climate change than arguments that do not emphasise particular aspects of a debate, although the effect sizes are usually modest (Bernauer & McGrath, 2016; N. Li & Su, 2018; Spence & Pidgeon, 2010). For instance, G. de Vries et al. (2016) found that people tend to have more positive perceptions of carbon capture and storage (CCS) technology after reading information emphasising the positive side of CCS compared with those who read a more balanced text. Based on the existing literature and research, hypothesis 3 can be formulated as follows:

H3: Interest group arguments that employ an emphasis frame will have a greater influence on individuals' climate change views compared with arguments that do not employ a frame.

5.2.1 Climate change interest group activity in the UK

Recent studies show that the UK public mostly believe that climate change is happening, and that it is a serious problem that requires action to address it (Steentjes et al., 2017; Tranter & Booth, 2015). Steentjes et al. (2017), for instance, find that 86% of the UK public think the world's climate is changing, and 59% are prepared to greatly reduce energy use to help address climate change. Public debate on climate change in the UK now primarily revolves around what should be done about it, a debate which is largely framed within the parameters of the Climate Change Act 2008. The recently amended Act requires UK greenhouse gas emissions

to be to net zero by 2050, and regular emissions budgets to be published by the government (Fankhauser et al., 2018; Hirst et al., 2019). The broad acceptance of climate science in the UK is underlined by the fact that the 2019 order setting the net zero target was passed in the House of Commons unanimously.

Although there appears to be a broad consensus among political elites on how to address climate change, industry groups and think tanks have attempted to make arguments against both the science of climate change, and the policies that have been adopted.¹ Some groups (such as the Global Warming Policy Foundation) deny that climate change is happening. Others broadly accept that climate change is happening, and that emissions must be reduced, but highlight the costs to business of doing so. For example, the Energy Intensive Users Group, which represents British industries that consume large amounts of energy – including steel, cement and chemicals – suggested in 2016 that the UK price floor on carbon should be abolished, and that subsidies should be given to “vulnerable, trade-exposed” industries in order to offset the costs of carbon pricing (Energy Intensive Users Group, 2016). Research on groups campaigning against strong climate policy (which mostly focuses on the US) confirms that such groups tend to both promote doubt about the science of climate change and to criticise proposed climate policies (Cann & Raymond, 2018; Dunlap & McCright, 2015; Hein & Jenkins, 2017; Oreskes & Conway, 2010).

Environmental NGOs and activist groups have also been active in debates around climate policy (Carter & Childs, 2018; Oosterman, 2016), including in the UK where several civil society and environmental groups are campaigning for stronger action on climate change. Groups such as the UK Student Climate Network have called for the UK government to adopt a Green New Deal (UK Student Climate Network, n.d.). The Campaign against Climate Change has called for a stronger version of the Climate Change Act 2008 on the grounds that policies are not matching up to goals, and that the targets are not ambitious enough (Campaign against Climate Change, n.d.).

A range of views on the existence of climate change, as well as the appropriate policies to address it, are thus espoused by interest groups in the UK. In this study, we focus on the extent to which interest groups are

¹A database of such groups is maintained on the DeSmog UK website:<https://www.desmog.co.uk/>

able to influence specific climate policy preferences, rather than beliefs about climate change. Although interest groups both opposed to and in favour of strong climate policy try to influence the public's perceptions of the climate change phenomenon itself, as noted earlier, the majority of the public in the UK are already convinced that climate change is happening, and is a serious problem (Steentjes et al., 2017; Tranter & Booth, 2015). Debates over policy are therefore more salient than those over the existence of climate change, at least among most of the population.

Specifically, we chose to examine arguments around the government pricing of greenhouse gas emissions, a debate which interest groups in the UK have engaged with. Industry groups have emphasised the negative economic consequences to consumers and businesses of pricing emissions, and argue that the free market would be a better way of reducing emissions. For instance, a report published by the Institute of Economic Affairs, a British free-market think tank, argues that greenhouse gas emissions should not be priced by the government, as market forces will price emissions appropriately (Whyte, 2013). While some environmental groups prefer banning or regulating emissions, most – including Greenpeace and Friends of the Earth – accept that pricing emissions is necessary (Friends of the Earth, 2019; Kahya, 2014). For example, a non-profit think tank called “Sandbag” founded in the UK has published an extensive set of reports detailing how best to tune the EU emissions trading scheme in order to achieve the deepest possible cuts to emissions.²

5.3 Data and Method

To investigate the extent to which interest group arguments and emphasis frames are able to influence the public's views on climate change, we conducted an original online survey experiment in 2018 in the UK.³ We recruited respondents – aged 18 and over, British citizens, and UK residents – using “Prolific”, a UK-based online service. Prolific allows researchers to access a pool of individuals who have registered to take part in surveys. Online services such as Prolific have become popular for social science research in recent years, and studies have been conducted

²The reports are available on the Sandbag website:<https://sandbag.org.uk/>

³The survey data file is available on request. More details on Prolific and descriptive statistics can be found in sections 5.A and 5.B. The full survey text can be found in Appendix A.

to confirm that they tend to give similar results to traditional respondent pools (Coppock, 2019; Mullinix et al., 2015; Palan & Schitter, 2017; Peer et al., 2017). For example, Coppock (2019) replicated the results of 15 survey experiments which originally used representative samples with convenience samples from Amazon MTurk. The results of the replication experiments were very similar to the originals, which Coppock argues is due to homogeneous effects of the experimental treatments.⁴

Based on the arguments made by UK interest groups detailed in the previous section, our experiment adopts two positions to represent arguments made by industry and environmental interest groups respectively. First, to represent positions taken by environmental groups, we use an argument supporting a price on emissions. The frame supporting the environment argument emphasises the possible serious consequences of failing to address climate change properly. Second, the argument representing positions taken by industry groups opposes a price on emissions, and instead supports the government encouraging voluntary action by businesses. Although most industry-backed interest groups tend to argue against climate policies rather than to propose alternatives, for the purposes of the experiment, we used an argument supporting a policy of encouraging voluntary action so that we can compare it to arguments made by environmental groups in favour of putting a price on emissions. These two arguments, which are simplified but still accurate representations of arguments promoted by interest groups, allow for an experiment that can measure their effect on members of the public.

The survey experiment conducted in this study thus involved randomly assigning respondents to one of five groups: four treatment groups and one control group. Each group was shown the same short introductory text entitled “Climate change causes and solutions”, in a style typically used for news stories. This text gave some background on the causes of climate change, and two of the main government policy options that can help to reduce emissions: setting a price on emissions, and encouraging businesses to take voluntary action to reduce emissions. The control group received no further text besides the introductory text.

The four treatment groups were asked to read some additional text

⁴The sample collected in this study over-represents younger and left-leaning people, compared with the UK averages. However, as there is no reason to believe the experimental treatments in this study will have heterogeneous effects, we believe the results are externally valid. See Coppock (2019) for a more detailed discussion.

relating to arguments given by interest groups in favour of one of the two options for reducing emissions: setting a price on emissions or supporting voluntary action. The additional text stated that the arguments were being made by “organisations”; no further information on the source of the argument was given. Previous work investigating elite influence on citizens’ views has shown that “source cues” (such as party labels) are often an important part of what changes people’s minds about an issue, especially for individuals with partisan attachments (Benegal & Scruggs, 2018). However, the limited previous research on the effect of interest group arguments has found that source cues are not typically an important factor in determining whether or not interest groups are successful in moving public opinion (Dür, 2018). Therefore, we do not include source cues in this study and focus instead on the effect of arguments and frames on individuals’ opinions. The intention of using the label “organisations” was to indicate to respondents that the argument is being made by interest groups rather than political parties or politicians.

Two of the treatment groups received a “weak policy” message which is used by business groups. This weak policy argument supported voluntary action by businesses to curb emissions, claiming that this is sufficient to reduce emissions to an appropriate level. A different version of the weak policy argument was given to each of the two groups. The first version contained a simple message supporting voluntary action by businesses. The second version (used to test H3) added an emphasis frame to the message to reinforce the argument, suggesting that putting a price on emissions might cause harmful economic effects.

The final two groups received a “strong policy” argument that has been used by environmental groups. This argument claimed that a price on emissions was necessary to reduce emissions to an appropriate level. As with the weak policy message, different versions of the strong policy argument were given to each of the two groups. The first version contained a simple message supporting a price on emissions. The second added an emphasis frame which highlighted the potential effects of climate change if it is not dealt with properly, including sea level rise and increases in severe weather effects. Table 5.1 summarises the four treatment groups and the control group.

After reading the text, respondents were asked three post-treatment questions measuring their attitudes towards climate policy. The first

Table 5.1: Summary of treatment and control groups

	Weak Policy Argument	Strong Policy Argument
No frame	N=133	N=132
With frame	N=133	N=133
Control group: N=265		

post-treatment question gauged respondents' *policy preferences*, by asking whether they preferred the government setting a price on emissions or supporting voluntary action to reduce emissions. This question also allowed a third "neither" response. Given that we are investigating which government policies people support, we removed the 20 respondents who selected the "neither" response from the analysis. This allowed us to code responses to this question (dependent variable (DV) 1) as a dichotomous variable, with 0 indicating a preference for setting a price on emissions and 1 indicating a preference for encouraging businesses to take voluntary action to reduce emissions. Coding DV1 in this way means that the data can be analysed using a binary rather than multinomial logistic regression, making the interpretation more straightforward.⁵

The remaining two post-treatment questions asked respondents about their more general *concerns* relating to climate change policy. The second post-treatment question (DV2) asked respondents how concerned they were that government action to address climate change might harm the economy. The third post-treatment question (DV3) asked respondents how concerned they were that government action may not avoid the worst effects of climate change. For both questions, responses were on a five-point scale, ranging from "Not at all concerned" (coded as 1) to "Extremely concerned" (coded as 5).

Measuring the two types of dependent variables (specific policy preferences and more general concerns about the consequences of climate change policy) allows us to test the effect of the arguments on two different kinds of climate change attitude: policy preferences, which relate closely to the argument being made, and broader concerns about the effects of climate policy. Given that arguments may affect these types of attitudes differently (Hopkins & Mummolo, 2017), measuring these two types of attitudes allows us to gain a more complete picture of the effects

⁵Multinomial logistic regression analyses for DV1 operationalized as a variable with three categories – specifying the "neither" response-category as a separate category – revealed nearly identical results to those presented below.

of the arguments on people's climate views.

Prior to the treatments we asked respondents "How important is the issue of climate change to you, personally?", with answers on a five-point scale ranging from "Not at all important" to "Extremely important". The responses – which allow us to test H2 – were recoded as the "personal importance" variable, a dichotomous measure, with those who indicated climate change was moderately, slightly or not at all personally important coded as 0, and those who said climate change was very or extremely personally important coded as 1. We also included a manipulation check, a question which asked respondents to select the statement that best described the text that they read from four options. Only those who selected the one correct summary were deemed to have passed the manipulation check. Those who failed the manipulation check, as well as an attention check earlier in the survey, were removed from the analysis.⁶ After removing these responses, a total of 796 observations were used in the analyses below.

Given that DV1 is a dichotomous variable, and that DV2 and DV3 are ordinal variables, the data were analysed using a binary logistic regression for DV1, and ordinal logistic regressions for DV2 and DV3.⁷ Two sets of analyses were conducted. First, to test H1 and H2, we ran two models for each dependent variable: one including only the argument and another adding an interaction term between the argument and the variable measuring how important the issue of climate change is to respondents. Second, to test H3, we analysed the effect of the combination of the argument and the frame (receiving text with or without a frame) on all three dependent variables. We did not include socio-demographic or attitudinal "control" variables (such as gender, age and political orientation) in any of the regression models, as the respondents were randomly assigned to the

⁶The attention check began by mentioning climate change and the news, but then requested respondents to select the "Not at all interested" option. Berinsky et al. (2014) note that those who fail manipulation checks often have particular socioeconomic profiles (in particular, often being younger than those who pass manipulation checks). They therefore recommend adding the manipulation check for survey experiments as a variable in the regression model instead of dropping respondents who fail the attention check from the analysis. However, for our analysis, neither removing those who failed the manipulation check, nor adding it as an independent variable had much impact on results. We therefore present results below without the manipulation check as an independent variable, and removing only those respondents who failed both the attention check and the manipulation check from the sample ($N = 19$).

⁷Although the proportional odds assumption appears to hold in the models for both DV2 and DV3, we also investigated models using multinomial logistic regression. The results were similar to those presented below.

experimental groups. The causal relationship of the variables in the regression model should therefore not be confounded by socio-demographic or attitudinal covariates (Mutz, 2011).

5.4 Results

We first present the results of testing our first hypothesis, which states that being exposed to interest group arguments in favour of a policy will increase the likelihood that a person will have positive attitudes towards that policy. Figure 5.1 shows the predicted probabilities for each of the three main experimental groups, and for each of the three dependent variables.⁸ In panel 1.1, we plot the predicted probability of a person preferring the government to focus on encouraging businesses to take voluntary action to reduce emissions rather than setting a price on emissions (DV1). As illustrated in panel 1.1, the type of argument does have a significant effect on the responses relative to the responses of respondents in the control group. Those who received the weak policy argument have a probability of 0.46 of preferring voluntary action, while those who received a strong policy argument have a probability of 0.17 of preferring voluntary action (compared with the control group, which has a probability of 0.29 of preferring voluntary action).

Panels 1.2 and 1.3 in figure 5.1 show the predicted probabilities of responses to the questions measuring DV2 (concern about government action negatively affecting the economy) and DV3 (concern about government action failing to avoid the worst effects of climate change) respectively for each of the main experimental groups. As can be seen, there is little difference in the responses between the control and the weak and strong treatment groups for either dependent variable. The results presented in figure 5.1 thus indicate that H1 can only be partially confirmed, as the arguments influenced people's preferences for specific policies (DV1), but did not seem to affect their broader concerns about climate policy (DV2 and DV3).

Figure 5.2 shows the predicted probabilities for the three dependent variables depending on whether a person feels climate change is not personally important (left column) or that it is personally important (right

⁸Tables of the regression coefficients for the models used to produce figures 5.1 to 5.3 can be found in section 5.C.

Figure 5.1: Predicted probabilities of the effect of the arguments for each dependent variable (with 95% confidence intervals)

column). Whether or not someone feels climate change is personally important appears to influence all three dependent variables. People who feel that climate change is an important personal issue are more likely to support the government setting a price on emissions than encouraging businesses to support voluntary action (DV1, panels 2.1 and 2.2). People who see climate change as an important personal issue are also less likely to be concerned about the economic effects of government action to address climate change (DV2, panels 2.3 and 2.4), and are more likely to be concerned about government action failing to avoid the worst effects of climate change (DV3, panels 2.5 and 2.6) compared with those who do not see climate change as an important personal issue. However, the effects of the treatments do not seem to depend on the personal importance of climate change, as the interaction was not statistically significant for any of the dependent variables. H2, which suggested that individuals who feel that climate change is an important issue to them personally would be

Figure 5.2: Predicted probabilities of the effect of the arguments depending on the personal importance of climate change for each dependent variable (with 95% confidence intervals)

less likely to be influenced by arguments made by interest groups compared with those who do not feel climate change is an important personal issue, must therefore be rejected.

Turning to the effects of the use of frames on views about government action on climate change, as specified in Hypothesis 3, figure 5.3 presents the predicted probabilities for each of the four treatment groups (weak or strong policy argument, with or without a frame) and the control.⁹ Panel 3.1, which plots support for voluntary action over setting a price on emissions (DV1) shows that those who read an argument supporting a weak policy through voluntary action have a higher probability of preferring voluntary action than those not receiving an argument (the control group); however there is little difference between the treatments with and without a frame. Similarly, those who received a strong policy treatment have a lower probability of preferring voluntary action than the control, but there is also little difference between the versions with and without a frame. The results presented in panels 3.2 and 3.3 for DV2 and DV3 respectively show that arguments with or without frames do not seem to affect people's broader attitudes towards climate policy. Overall, these results suggest that interest group arguments employing frames do not seem to have a stronger effect on people's views than arguments that are simple position statements, rejecting H3.¹⁰

5.5 Discussion and conclusion

This study investigated the extent to which arguments made by interest groups can influence public opinion on climate change policy, and the degree to which interest group arguments are enhanced by the use of frames. Based on the evidence presented above, it appears that arguments made by interest groups are able to change the specific climate

⁹We also investigated models using the five different groups (the four treatment groups plus the control) and including an interaction with the "personal importance" variable. As with the analyses presented above, including this variable in the model did not substantially affect the results. The personal importance of climate change therefore does not appear to moderate the degree to which arguments (whether or not they employ a frame) affect attitudes toward climate change.

¹⁰We also ran analyses for the models used to generate figure 5.3 using each of the two "no frame" categories as the reference category. In each case (and for all three dependent variables), the coefficient for the "with frame" category was not statistically significant, indicating that the difference between the effects of the arguments with and without frames is statistically indistinguishable from zero.

Figure 5.3: Predicted probabilities of the effect of the arguments/frame combinations for each dependent variable (with 95% confidence intervals)

policy preferences of the public, but not their broader concerns about the consequences of climate policy (specifically, their concerns about the possible economic consequences of government action, and about government action failing to avoid the worst effects of climate change). Previous research has suggested that arguments (in particular, emphasis frames) tend to have a narrow impact on people's views (Hopkins & Mummolo, 2017), which may explain why the broader attitudes about climate change policy were not affected, whereas more specific policy preferences were.

This difference in the effects of arguments on specific policy preferences and broader concerns about the consequences of climate change policy also suggests that citizens' minds were changed through a heuristic cue, rather than a more deliberative process (Gilens & Murakawa, 2002; Redlawsk & Lau, 2013; Slothuus, 2008). Specifically, respondents may have read the arguments as interest group endorsements of one of

the policies, and this policy endorsement may have become the main criterion in the respondents' minds when asked about their specific policy preferences (as measured by DV1). However, the argument's influence did not extend to the broader concerns about climate policy (as measured by DV2 and DV3), as there was no equivalent heuristic that could be adopted by respondents when answering those questions.

The finding that – contrary to expectations – arguments with frames did not have a greater effect on respondents' views than arguments that were simple statements of position adds weight to the interpretation of the results presented here that cueing (rather than changes to belief structures) was the main mechanism that affected people's responses. Research on how emphasis frames change opinions usually finds that they do so through changes to beliefs (typically by making certain beliefs or considerations more salient to the person) (Cacciatore et al., 2016; Nelson & Oxley, 1999; Slothuus, 2008). In this study, however, it appears that respondents were affected only by the argument, and the addition of the frame did not make the argument more compelling. These results suggest that research on emphasis frames should compare the effects of frames and simple policy endorsements on individuals' views to ensure that it is not actually the policy endorsement (rather than the emphasis frame) that is shifting opinions.

It is less clear why the effects of the arguments did not vary depending on the personal importance of the climate issue. People who are more involved in an issue tend to be more likely to rely on information and their existing knowledge about an issue rather than on cues or frames (Gilens & Murakawa, 2002; Petty & Cacioppo, 1984). However, given the complex and abstract nature of climate change, it is possible that even people with a personal connection to climate change still preferred the ease of making a decision using the cue supplied in the interest group argument rather than having to rely on the more difficult cognitive process of forming an opinion using any information they possessed on the topic. Alternatively, perhaps the measure of personal involvement used here captured many people who feel the issue is personally important to them, but who do not spend more time thinking about climate change than those who do not feel that it is personally important to them, and therefore do not have fixed opinions on the issue.

As always, the current study has some limitations. First, the two

frames used in this study are used to highlight the possible negative consequences of particular climate actions (economic consequences in the weak policy case and environmental consequences in the strong policy case). Previous research has shown that “loss” frames such as these typically have a stronger effect on policy preferences than “gain” frames, where the positive consequences are emphasised (Bilandzic et al., 2017). We chose to focus on loss frames as many of the UK interest group statements were oriented around loss (particularly those arguing against strong climate policy). Future studies, however, could investigate the extent to which there are differences between gain and loss frames as used by interest groups in the policy debates over climate change.

A second limitation is that the arguments received by participants may be processed in different ways in a survey context than they would in the real world. In particular, people are not often asked to express their opinion on an issue immediately after receiving an argument supporting one side of a debate. In a situation where people are asked to form an opinion several days after being exposed to an argument, the argument may be less likely to influence their preferences (Chong & Druckman, 2010). Additionally, the treatments read by participants presented only one-sided arguments, whereas, in a real-world environment, people more often receive information about arguments on both sides of a debate, which may cancel each other out (Zaller, 1992). Although these messages may not be received entirely evenly, particularly for the debate on climate change where interest groups opposed to strong climate policy have been particularly vocal in the UK (Painter & Gavin, 2016), the more complex mix of messages received by people in the real world may affect them differently than the one-sided messages used in this experiment.

Despite these shortcomings, our results demonstrate that interest groups are able to influence public preferences on climate policy, even if their influence is limited to the specific policy preferences supported or opposed by the interest group, and the effect of the influence may not last for long. Overall, based on the moderate effects of the interest group arguments, our results seem to support the perspective that most people have fairly stable opinions on climate change, rather than non-attitudes that can easily be manipulated. This conclusion aligns with most other studies on the influence of arguments and frames on citizens’ climate change views, which typically show that, while arguments can change

people's views, the effects are usually small (Bernauer & McGrath, 2016; McCright, Charters et al., 2016). Given that most people are aware of climate change, and have an opinion about it (Steentjes et al., 2017; Tranter & Booth, 2015), it is perhaps not surprising that it is difficult for interest group arguments to change most people's opinions on climate change.

Our study thus makes important contributions to debates on elite influence on public opinion, and adoption of national-level climate policy respectively. With respect to elite influence on public opinion, we offer evidence that – like politicians or political parties, which have been the focus of most previous studies – interest groups have a small degree of influence over the public's policy preferences. Moreover, interest group influence appears to operate largely through simple statements of position or policy arguments, rather than via more detailed information – such as frames – and primarily affects opinions on the immediate policy, rather than wider concerns relating to the issue. Finally, at least for the issue of climate change, interest group influence is not moderated by the personal importance of the issue. These novel findings could be tested further in future studies.

The results presented here also shed light on why countries adopt particular climate policies. The need for governments to implement strong policy action to reduce greenhouse gas emissions is growing ever more urgent, with a recent Intergovernmental Panel on Climate Change report indicating that – in order to avoid an increasing range of potentially catastrophic risks – the world has until only 2030 to reduce emissions by around 45 percent (IPCC, 2018). Interest groups continue to lobby on both sides of the debate, seeking to influence public opinion in order to indirectly influence policy. The results presented here suggest that interest groups are likely to be only modestly successful in these aims, at least in the short term. While the activities of interest groups, therefore, may have played a role in the failure of most countries to adopt adequate climate policy, other factors may be equally or more important, including a lack of political leadership, the success of direct lobbying of government by interest groups, and the generally low salience of climate change among the public.

Chapter Appendix

5.A Survey Details - Prolific

We used “Prolific” to recruit respondents for the survey (more information can be found on the Prolific website: <https://www.prolific.ac/>). Prolific allows researchers (often academics) to post an invitation to any registered users to complete their survey. Researchers can filter potential respondents by demographic and other criteria. Potential respondents receive an email when a new survey is made available for which they are eligible, containing a brief description of the study. Respondents can then elect to complete the survey (in exchange for a small payment) by clicking the survey link. Respondents are able to withdraw their response either part way through, or shortly after they complete the survey. Researchers are allowed to reject low quality responses (for instance, those failing attention checks). Respondents who have their responses rejected do not receive payment.

In our case, respondents were paid £1 for completing the survey, which took most people less than ten minutes. Respondents who failed both the attention check and the manipulation check had their responses rejected, so did not receive payment. 11 respondents either withdrew their responses or did not complete the survey once they started it.

5.B Descriptive statistics

Table 5.2: Descriptive statistics for all main variables

Variable	N	Percentage
Climate change policy preference (DV1)		
(0) Setting a price on emissions	536	67.3%
(1) Voluntary action	240	30.2%
Level of concern about economic impacts of government action (DV2)		
(1) Not at all concerned	71	8.9%
(2) Slightly concerned	189	23.7%
(3) Moderately concerned	316	39.7%
(4) Very concerned	150	18.8%
(5) Extremely concerned	70	8.8%
Level of concern about government action not avoiding worst effects of climate change (DV3)		
(1) Not at all concerned	46	5.8%
(2) Slightly concerned	94	11.8%
(3) Moderately concerned	247	31%
(4) Very concerned	252	31.7%
(5) Extremely concerned	156	19.6%
Manipulation check		
(0) Failed manipulation check	97	12.2%
(1) Passed manipulation check	699	87.8%
Personal importance of climate change		
(0) Climate change not personally important	405	50.9%
(1) Climate change is personally important	390	49%

Table 5.3: Descriptive statistics for all dependent variables by argument received

Variable	Group		
	Control	Weak policy	Strong policy
Climate change policy preference (DV1)			
(0) Setting a price on emissions	183 (70.7%)	139 (53.7%)	214 (82.9%)
(1) Voluntary action	76 (29.3%)	120 (46.3%)	44 (17.1%)
Level of concern about economic impacts of government action (DV2)			
(1) Not at all concerned	23 (8.7%)	22 (8.3%)	26 (9.8%)
(2) Slightly concerned	60 (22.6%)	66 (24.8%)	63 (23.8%)
(3) Moderately concerned	110 (41.5%)	100 (37.6%)	106 (40%)
(4) Very concerned	53 (20%)	49 (18.4%)	48 (18.1%)
(5) Extremely concerned	19 (7.2%)	29 (10.9%)	22 (8.3%)
Level of concern about government action not avoiding worst effects of climate change (DV3)			
(1) Not at all concerned	19 (7.2%)	10 (3.8%)	17 (6.4%)
(2) Slightly concerned	28 (10.6%)	30 (11.3%)	36 (13.6%)
(3) Moderately concerned	75 (28.4%)	84 (31.6%)	88 (33.2%)
(4) Very concerned	89 (33.7%)	82 (30.8%)	81 (30.6%)
(5) Extremely concerned	53 (20.1%)	60 (22.6%)	43 (16.2%)

Note:

Number in brackets is the percentage of respondents in the group that gave the response.

Table 5.4: Descriptive statistics for all dependent variables by argument and frame received

Variable	Group				
	Control	Weak policy (no frame)	Weak policy (with frame)	Strong policy (no frame)	Strong policy (with frame)
Climate change policy preference (DV1)					
(0) Setting a price on emissions	183 (70.7%)	69 (53.5%)	70 (53.8%)	107 (82.9%)	107 (82.9%)
(1) Voluntary action	76 (29.3%)	60 (46.5%)	60 (46.2%)	22 (17.1%)	22 (17.1%)
Level of concern about economic impacts of government action (DV2)					
(1) Not at all concerned	23 (8.7%)	11 (8.3%)	11 (8.3%)	13 (9.8%)	13 (9.8%)
(2) Slightly concerned	60 (22.6%)	34 (25.6%)	32 (24.1%)	27 (20.5%)	36 (27.1%)
(3) Moderately concerned	110 (41.5%)	46 (34.6%)	54 (40.6%)	55 (41.7%)	51 (38.3%)
(4) Very concerned	53 (20%)	26 (19.5%)	23 (17.3%)	23 (17.4%)	25 (18.8%)
(5) Extremely concerned	19 (7.2%)	16 (12%)	13 (9.8%)	14 (10.6%)	8 (6%)
Level of concern about government action not avoiding worst effects of climate change (DV3)					
(1) Not at all concerned	19 (7.2%)	7 (5.3%)	3 (2.3%)	10 (7.6%)	7 (5.3%)
(2) Slightly concerned	28 (10.6%)	14 (10.5%)	16 (12%)	17 (12.9%)	19 (14.3%)
(3) Moderately concerned	75 (28.4%)	40 (30.1%)	44 (33.1%)	42 (31.8%)	46 (34.6%)
(4) Very concerned	89 (33.7%)	44 (33.1%)	38 (28.6%)	40 (30.3%)	41 (30.8%)
(5) Extremely concerned	53 (20.1%)	28 (21.1%)	32 (24.1%)	23 (17.4%)	20 (15%)

Note:

Number in brackets is the percentage of respondents in the group that gave the response.

Table 5.5: Descriptive statistics for all socio-demographic and attitudinal statistics included in the survey

Variable	Obs.	Mean / Percentage	S.D.	Min	Max
Age	793	36.33	12.09	18	75
Left-right political scale	795	4.57	1.88	1	10
Does respondent have a degree?					
No Degree	391	49.12%			
Has Degree	404	50.75%			
Missing / Don't Know	1	0.13%			
Ethnicity					
White	725	91.08%			
Non-white	67	8.42%			
Missing / Don't Know	4	0.5%			
Gender					
Male	383	48.12%			
Female	411	51.63%			
Transgender / Intersex / Other	2	0.25%			
Party identification					
Conservative	125	15.7%			
Labour	331	41.58%			
Liberal Democrat	68	8.54%			
Prefer not to Say / Other	272	34.17%			

5.C Results

Table 5.6: Binary and ordinal logistic regressions analysing the effect of arguments on attitudes towards climate change policies

	Dependent Variable					
	Policy Preference (DV1) ^a		Concern about economic effects (DV2) ^b		Concern about policy inadequacy (DV3) ^c	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Argument (ref: No argument)						
Weak policy	0.732*** (0.185)	0.717** (0.26)	0.044 (0.157)	0.075 (0.226)	0.09 (0.157)	0.347 (0.231)
Strong policy	-0.703** (0.215)	-0.741** (0.275)	-0.063 (0.157)	-0.27 (0.22)	-0.231 (0.157)	0.114 (0.225)
Personal Importance		-0.815** (0.279)		-0.616** (0.222)		2.786*** (0.249)
Weak policy x Importance		0.055 (0.377)		-0.081 (0.314)		-0.287 (0.323)
Strong policy x Importance		-0.138 (0.459)		0.349 (0.315)		-0.281 (0.325)
Constant	-0.879*** (0.136)	-0.475* (0.188)				
N	776	775	796	795	795	794

Note:

* p<0.05; ** p<0.01; *** p<0.001

^a Policy preference, either (0) setting a price on emissions, or (1) supporting voluntary action

^b Concern about possible negative economic effects of climate policy, ranging from (1) not at all concerned to (5) extremely concerned

^c Concern about government policy not avoiding the worst effect of climate change, ranging from (1) not at all concerned to (5) extremely concerned

Table 5.7: Binary and ordinal logistic regressions for the effects of arguments and the use of frames and attitudes towards climate change policies

	Dependent Variable		
	Policy Preference (DV1) ^a	Concern about economic effects (DV2) ^b	Concern about policy inadequacy (DV3) ^c
	Model 1	Model 2	Model 3
Argument / frame (ref: No argument / frame)			
Weak policy (no frame)	0.739** (0.223)	0.084 (0.194)	0.061 (0.191)
Weak policy (with frame)	0.725** (0.223)	0.005 (0.192)	0.119 (0.192)
Strong policy (no frame)	-0.703** (0.271)	0.057 (0.193)	-0.208 (0.193)
Strong policy (with frame)	-0.703** (0.271)	-0.18 (0.191)	-0.253 (0.19)
Constant	-0.879*** (0.136)		
N	776	796	795

Note:

* p<0.05; ** p<0.01; *** p<0.001

^a Policy preference, either (0) setting a price on emissions, or (1) supporting voluntary action

^b Concern about possible negative economic effects of climate policy, ranging from (1) not at all concerned to (5) extremely concerned

^c Concern about government policy not avoiding the worst effect of climate change, ranging from (1) not at all concerned to (5) extremely concerned

Chapter 6

Disentangling the relationships between conservative economic and social attitudes and support for environmental action

Abstract

Scholars have debated why people on the right of politics are consistently found to be less likely to support environmental action than those on the left. Some authors argue that this relationship is primarily driven by conservative economic attitudes, while several studies have demonstrated a negative link between conservative social attitudes and environmental attitudes. However, as few studies include both conservative economic and social attitudes, it remains unclear whether both sets of attitudes relate to environmental attitudes independently, or whether one confounds the other. This study uses Bayesian regression analyses of data from the 2017 New Zealand Election Study, finding that both conservative economic attitudes (free market support, opposition to welfare) and conservative social attitudes (exclusionary attitudes, right-wing authoritarianism) have independent negative relationships with environmental attitudes. These results imply that the link between conservative ideology and environmental attitudes is as much about social attitudes and worldview as about economics.

6.1 Introduction

Research on public opinion on the environment has consistently found that people who place themselves on the right of the political spectrum tend to be less engaged with environmental issues compared with those on the left (Cruz, 2017; Dunlap, 1975; Harring et al., 2017; Hornsey et al., 2016; Liu et al., 2014; McCright, Dunlap & Marquart-Pyatt, 2016; McCright, Marquart-Pyatt et al., 2016; Nawrotzki, 2012). Yet, we do not have a clear understanding of why right-leaning people are hesitant to support action on the environment. Two broad explanations have been suggested for the link between right-wing ideology and environmental attitudes. The first proposes that right-wing support for free markets conflicts with the collective action that is necessary to address most environmental issues (Buttel & Flinn, 1978; Heath & Gifford, 2006; Longo & Baker, 2014; McCright & Dunlap, 2013). The second posits that conservative social attitudes, such as exclusionary attitudes and right-wing authoritarianism, are linked to low levels of engagement with environmental issues through support for existing hierarchies and beliefs about human domination over nature (Milfont et al., 2018; Milfont et al., 2013; Stanley et al., 2017).

While there is empirical support for both conservative economic and social attitudes being negatively related to environmental attitudes, few studies have tested the relationship between conservative economic and social attitudes and environmental attitudes simultaneously (see, however: Jylhä, Strimling et al., 2020). It is thus unclear whether conservative economic and social attitudes independently explain the relationship between right-wing orientation and environmental attitudes, or whether one confounds the other.

Using data from the 2017 New Zealand Election Study (NZES, 2017), the current study investigates the extent to which both conservative economic and social attitudes relate to public support for government action on climate change and people's preference for environmental protection over economic development. I thus seek to determine the independent influence of conservative economic and social attitudes on opinions about environmental action and policy. In doing so I aim to advance our understanding of why left-right political orientation is consistently found to be a predictor of people's views on climate change and other environmental issues.

Solving environmental problems such as climate change requires far-reaching government action and policies which must be legitimised by public support. Support for these policies, however, seems to be much weaker among people who consider themselves right-wing compared with those on the left of politics. Improving our understanding of which parts of conservative ideology negatively relate to opinions about the environment can therefore help to shed light on why political ideology seems to be so strongly associated with people's environmental views. This improved understanding can, in turn, help environmental activists and communicators seeking to advance the acceptance of the environmental policies they wish to see adopted.

6.2 Theory

6.2.1 Political orientation and environmental attitudes

A number of potentially catastrophic environmental problems caused by human activity have become apparent in recent decades. Solving these problems will likely require substantial changes to society, with a recent Intergovernmental Panel on Climate Change report on the actions necessary to prevent warming over 1.5°C, for example, noting that “there is no historical precedent for the scale of the necessary transitions, in particular in a socially and economically sustainable way” (IPCC, 2018, p. 392). Necessary changes could include requiring industry to reduce pollution (including greenhouse gasses), changes to individual lifestyles, such as travel, eating habits and leisure, and re-thinking urban planning to increase sustainability and reduce human encroachment on natural areas.

People's worldview or ideology can make it difficult to accept such wide-scale social changes. For instance, many people believe that the government should refrain from “interfering” with the economy, and therefore reject government regulation to curb environmental problems (Dreyer & Walker, 2013; Longo & Baker, 2014). Individuals may dismiss suggested changes to their preferred lifestyle aimed at addressing environmental problems (such as dietary changes), seeing such suggestions as a challenge to their way of life (Jost & Andrews, 2011). Some people also believe that it is the place of humans to dominate nature, and therefore reject the notion that wildlife and biodiversity requires substantial pro-

tection (Milfont et al., 2013). There are thus strong theoretical reasons to expect that people's ideology will relate to attitudes towards environmental issues.

The literature empirically demonstrating the link between political ideology and environmental views is vast. Many studies have demonstrated that political orientation (including left-right spatial orientation, liberal / conservative identification and party affiliation) relates to people's opinions on environmental issues, at least in developed countries (Cruz, 2017; Dunlap, 1975; Harring et al., 2017; Hornsey et al., 2016; Liu et al., 2014; McCright, Dunlap & Marquart-Pyatt, 2016; McCright, Marquart-Pyatt et al., 2016; Nawrotzki, 2012). For example, in a review covering over 140 studies on public opinion on climate change, McCright, Marquart-Pyatt et al. (2016) find that left-right orientation is the second most consistent predictor of climate views, after pro-environmentalism. Cruz (2017) uses a meta-analysis to demonstrate that political ideology has a robust relationship with environmental concern in the US, where those on the left have higher levels of concern than those on the right.

While the link between political orientation and environmental attitudes is strongly supported empirically, most previous studies have relied on single-item measures of political orientation, typically asking respondents to place themselves on a left-right spatial scale, with possible responses ranging from 0 or 1 (indicating the far left) to 10 (indicating the far right) (e.g. Cruz, 2017). However, political orientation is a broad concept, and there are likely to be a range of differing attitudes among people who identify as "right" (or "left") (S. Feldman, 2013; Mair, 2007; Stenner, 2009). Specifically, there are economic and social attitudes which are often associated with being right-wing, but are not necessarily consistently held among people who consider themselves right-wing (Altemeyer, 1981; Mair, 2007). For example, some people on the political right may be primarily concerned about economic issues, and support measures to liberalise or marketise the economy (S. Feldman, 2013). Others on the right may prioritise social issues, for instance, preferring a social order where some individuals or groups maintain higher status and wealth than others (Altemeyer, 1981; Sidanius & Pratto, 2001).

Despite the variation in economic and social attitudes held among people on the right of politics, there are specific sets of attitudes that are closely related to considering oneself "right-wing". I refer to these

sets of economic and social attitudes – which I define in detail below – as “conservative” attitudes. As Jost et al. (2003) argue, conservative political ideology has at its heart resistance to change and acceptance of inequality. From this basic definition, a number of different aspects of conservative ideology can be identified, including exclusionary attitudes, a preference for authoritarianism and opposition to social welfare (Jost et al., 2003; Stenner, 2009). However, as Stenner (2009) points out, these conservative attitudes are distinct and are sometimes in opposition to one another. For example, some people who embrace free markets may also oppose strong leaders (and thus authoritarianism), as they value individual liberty in economic, social and political matters (Stenner, 2009).

To understand the relationship between political orientation and environmental attitudes, it is important to disentangle the ways in which conservative economic and social attitudes may relate to support for action on the environment. Many authors believe that conservative *economic* attitudes, particularly a preference for free market economics, best explain the link between right-wing orientation and environmental attitudes (Buttel & Flinn, 1978; Heath & Gifford, 2006; Longo & Baker, 2014; McCright & Dunlap, 2013). Given that wide-ranging government action is central to addressing most environmental problems, it is easy to see why people who oppose government economic intervention might also resist government action to halt or mitigate environmental problems. However, a number of recent studies have also found that conservative *social* attitudes, such as support for group-based hierarchies, authoritarianism and exclusionary attitudes negatively relate to support for environmental action (Milfont et al., 2018; Milfont et al., 2013; Stanley et al., 2017).

In the remainder of this section, I review the existing literature on conservative economic and social attitudes, and state my expectations on the relationship between the economic and social attitudes and environmental attitudes. I then describe my expectations about whether the previously observed negative link between right-wing orientation and support for addressing environmental issues is more about economic ideas, social worldview or a combination of the two.

6.2.2 Conservative economic attitudes

Conservative economic attitudes include both support for free markets, and opposition to government welfare. Support for free markets and pref-

erences for minimal government intervention in the economy have been a central aspect of conservative politics since at least the 1980s (Antonio & Brulle, 2011). People who support free markets often do so not just on pragmatic grounds (that is, the argument that free markets produce greater economic growth), but also on ideas about individual liberty (Henry, 2008). A closely related (but distinct) attitude is the extent to which people oppose the welfare state or other government methods to reduce inequality (Achterberg et al., 2011; Otjes, 2018).

However, a conservative economic outlook is not universally held among people who position themselves to the right of the political spectrum. In particular, radical right-wing populist parties tend to have a diverse set of positions on economic interventionism (Achterberg et al., 2011; Otjes et al., 2018). Some radical right-wing populist parties, for instance, apply their nativist view of politics to economics, supporting a welfare state for “natives”, but not for “foreigners” (Otjes et al., 2018), or, alternatively, adopt market-friendly policies primarily to enhance their appeal to voters rather than on ideological grounds (Coffé, 2008). Moreover, some supporters of radical right parties may oppose welfare on the grounds that it encourages “sponging”, but continue to support economic redistribution (and disapprove of free market policies) due to their insecure personal economic positions (Achterberg et al., 2011).

Support for free markets and economically liberal policies has a natural tension with concern about environmental issues, as comprehensively addressing environmental problems requires a degree of state action, including implementing taxes and regulations (Hursh & Henderson, 2011; McCright & Dunlap, 2003). While the exact degree of necessary government intervention in the economy is widely debated, it is difficult to see how adequately addressing issues such as climate change is fully compatible with highly liberal free market economics (Jaffe et al., 2005; V. K. Smith, 2015). People with a strong conservative economic outlook are thus likely to find it difficult to support the action necessary to address environmental problems, as it conflicts with their views about how the economy should be managed.

A number of studies have directly tested the extent to which a conservative economic outlook is associated with low levels of support for environmental action (Buttel & Flinn, 1978; Dreyer & Walker, 2013; Dunlap et al., 2001; Heath & Gifford, 2006; Longo & Baker, 2014; McCright et

al., 2014; E. K. Smith & Mayer, 2019). For example, in the US, Longo and Baker (2014) find that a measure of support for government economic intervention was strongly and negatively related to concern about environmental issues. Investigating acceptance and support for climate policy in Australia, Dreyer and Walker (2013) find that people who approve of free market principles were less likely to support the adoption of carbon pricing by the Australian federal government. Based on the above research, my first hypothesis reads as:

H1: People with a strong conservative economic outlook will tend to have lower levels of support for environmental action and policies compared with people with a weak conservative economic outlook.

6.2.3 Conservative social attitudes

In addition to conservative economic characteristics, people on the right tend to hold particular views about how society should be structured. I consider two well-theorised concepts that have previously been found to correlate with right-wing orientation, and are associated with conservative ideology (Jost et al., 2003): exclusionary attitudes (Jylhä & Hellmer, 2020; Jylhä, Strimling et al., 2020) and right-wing authoritarianism (Altemeyer, 1981; Milfont et al., 2013).

Exclusionary attitudes towards particular groups are often found among people to the right of politics. These attitudes are often understood through the lens of social dominance theory, and its individual-level attribute, social dominance orientation (SDO) (Pratto et al., 1994; Sidanius & Pratto, 2001). SDO measures the extent to which a person believes that certain groups are inherently superior to others, and prefers politicians and policies that protect the status of their own group (often defined by ethnicity, nationality, age or gender) (Pratto et al., 1994). Typically, people with a high SDO belong to groups that already occupy privileged positions in society, and are more likely to be white and male than those with low levels of SDO (Pratto et al., 1994; Sidanius & Pratto, 2001).

Social dominance theory did not initially incorporate ideas about nature and the environment, and therefore did not make clear predictions about the relationship between SDO and support for environmental ac-

tion. However, Milfont et al. (2013) argue that, while social dominance is about the dominance of one group over another, the concept can easily be extended to dominance of humans over nature. People oriented towards social dominance tend to adhere to legitimising myths, such as sexism and racism, used to justify group-based hierarchies (Sidanius & Pratto, 2001). Legitimising myths about dominance of humans over nature are thus easily adopted by people with high SDO, as they are similar to the myths they already believe about hierarchies (Milfont et al., 2013). There may also be more indirect links between SDO and environmental concern; for example, given that people who support group-based hierarchies tend to belong to privileged groups, the substantial social changes that may be required to address environmental problems are a direct threat to existing hierarchies (Jylhä & Akrami, 2015; Milfont et al., 2014).

Milfont and colleagues (Milfont et al., 2018; Milfont et al., 2014; Milfont et al., 2013; Milfont & Sibley, 2016) have produced a number of studies demonstrating the link between SDO and low levels of environmental concern and support for environmental action (see also: Carrus et al., 2018; Häkkinen & Akrami, 2014; Jylhä & Akrami, 2015; Stanley et al., 2017). Using data from the New Zealand Values and Attitudes Study, Milfont et al. (2013) found that people with high levels of SDO also tended to have low levels of environmental concern, and Milfont et al. (2018) found a similar pattern in a multi-country, cross-cultural sample of students.

SDO is typically measured by items that refer to inter-group dominance in general, for example “Some groups of people are just more worthy” (Sidanius & Pratto, 2001). In contrast, exclusionary attitudes are negative attitudes towards specific groups such as women or immigrants. Jylhä and Hellmer (2020) find that exclusionary attitudes are closely related to SDO, and that exclusionary attitudes mediate a large portion of the relationship between SDO and environmental attitudes (specifically climate change denial). The hypothesis relating to exclusionary attitudes is thus formulated as:

H2: People who hold exclusionary attitudes towards particular groups will tend to have lower levels of support for environmental action and policies compared with people who do not hold exclusionary attitudes.

Right-wing authoritarianism (RWA) is a closely related, but separate

concept to SDO (Altemeyer, 1981; Sidanius & Pratto, 2001). In contrast to SDO, people who score high on RWA believe in individual-based hierarchies, rather than group-based hierarchies as with SDO. Altemeyer (1981) defines RWA as characterised by deference to authority, aggression and conventionalism. He describes deference as trust in and respect of established authority figures of many kinds, including parents, religious officials and heads of government. People with high RWA tend to hold aggressive attitudes towards various targets when they believe this aggression is supported by established authorities and conventions (Altemeyer, 1981). For instance, right-wing authoritarians will generally be in favour of physical discipline of children and of capital punishment for criminals (Altemeyer, 1981). Finally, right-wing authoritarians hold conventional and traditional attitudes on issues such as religion, marriage and gender roles (Altemeyer, 1981).

A clear theoretical link between RWA and environmental concern has yet to be established. It is typically suggested that system justification is the primary reason people with high RWA tend to have low levels of belief in or concern about environmental issues (Häkkinen & Akrami, 2014; Schultz & Stone, 1994). In other words, it is the challenge to the status quo presented by environmental issues that prevents people with high levels of RWA from fully engaging with environmental issues. Thus, the conventionalism aspect of RWA offers the most obvious theoretical link to environmental views.

A number of studies have confirmed the negative association between RWA and environmental concern (Carrus et al., 2018; Häkkinen & Akrami, 2014; Jylhä, Strimling et al., 2020; Milfont et al., 2013; Schultz & Stone, 1994; Stanley et al., 2017). Schultz and Stone (1994), for example, find a negative correlation between RWA and a general measure of environmental concern. Investigating climate change denial, Carrus et al. (2018) find that people with high RWA are more likely to deny the existence and human causes of climate change. A panel study by Stanley et al. (2017), based on a sample of students at a New Zealand university, also suggests that causality flows from RWA to environmental attitudes, rather than in the opposite direction. The above research leads to the following hypothesis:

H3: People with high levels of right-wing authoritarianism will tend to have lower levels of support for environmental ac-

tion and policies compared with people with low levels of right-wing authoritarianism.

6.2.4 Do conservative economic and social attitudes independently relate to environmental attitudes?

Both conservative economic and social attitudes have been shown to explain at least part of the relationship between left-right orientation and environmental attitudes. However, as the economic and social components of conservative ideology may be related (S. Feldman, 2013), it is possible that any relationship between conservative social attitudes and environmental attitudes is confounded by economic attitudes (or vice versa). For example, SDO may appear to relate to environmental attitudes only because people with high SDO are also more likely to support a conservative economic outlook. To gain a clear understanding of why people on the right tend to have negative attitudes towards environmental action, it is critical to determine whether people on the right reach this view of environmental issues primarily through their economic attitudes, social attitudes or both.

Few studies investigating environmental attitudes, however, have investigated both conservative economic and social attitudes as explanatory measures. One exception is Jylhä, Strimling et al. (2020), who explore the differences in climate denial among radical right, mainstream right and left-wing voters in Sweden. They investigate the relationship between climate change denial and conservative attitudes, including conservative economic attitudes, exclusionary attitudes towards women and immigrants, SDO and RWA. Their results indicate that most of the conservative attitudes examined have positive relationships with climate denial, however economic and exclusionary attitudes (towards women) were stronger predictors of climate denial than SDO and RWA. The final hypothesis thus reads:

H4: Conservative economic and conservative social attitudes have independent negative relationships with support for environmental action and policies.

Although there have been few studies previously testing this hypothesis, it seems reasonable to assume that both conservative economic and social attitudes will independently relate to environmental attitudes, given

there are clear theoretical reasons for each of these relationships, as outlined above.

6.3 Data and Method

To test the extent to which conservative economic and social attitudes relate to climate change and environmental attitudes, I used data from the 2017 New Zealand Election Study (NZES, 2017). The NZES is conducted after each election in New Zealand (usually every three years). The study randomly selects respondents from the New Zealand electoral roll. Respondents are initially sent a letter containing the survey with instructions on how to respond, and are allowed to complete the survey either online or by returning the questionnaire via post. In all, 3,445 respondents completed the 2017 NZES survey.¹

6.3.1 Dependent Variables

I use two measures of environmental attitudes: *support for government action* on climate change and *support for environmental protection over economic development*.² The first dependent variable, measuring support for government action, uses the response to a question asking respondents about the extent to which they support stronger government policies to reduce carbon emissions.

A second dependent variable was constructed from a question asking respondents to position themselves on a 7-point scale, where 1 stands for the opinion that we should do more to protect the environment, while 7 stands for the opinion we should do more to encourage economic development. This variable was reverse coded, so that supporting the environment represented a higher value. To ensure the models were parsimonious and to ease interpretation of the results, I reduced both the depend-

¹ 1,339 respondents had previously participated in the 2014 NZES. The response rate for participants who had completed the 2014 survey was 61.6%, and 30.6% for the rest of the sample.

² Most previous studies on the relationship between political ideology and environmental attitudes use belief in environmental problems as the dependent variable (such as whether the environmental problem actually exists or is a serious problem) (e.g. Longo & Baker, 2014; Milfont et al., 2013). However, some studies have investigated other dimensions of environmental attitudes, such as support for government action and environmental policy, finding that there is a similar relationship between these dependent variables and ideology as between belief and ideology (Crawley et al., 2020; Dreyer & Walker, 2013; Kulin & Sev, 2019).

Table 6.1: Summary of dependent variables

Variable	Survey Question	Response Coding (proportion of responses in brackets)
Support for government action	To act against climate change, stronger government policies are needed to reduce carbon emissions	1. Strongly/somewhat disagree (12.6%) 2. Neither agree or disagree (11.3%) 3. Strongly/somewhat agree (65.0%) 4. Missing / Don't know (11.0%)
Environment vs. economy	1 stands for the opinion that we should do more to protect the environment, even if that means less economic development. 7 stands for the opinion that we should do more to encourage economic development even if that means more harm to the environment. Where would you place your view?	1. Do more to encourage economic development (5/6/7 on original scale) (17.0%) 2. Neither (4 on original scale) (19.3%) 3. Do more to protect environment (1/2/3 on original scale) (56.3%) 4. Missing / Don't know (7.2%)

ent variables to three categories.³ The Spearman's rank-order correlation coefficient between the two dependent variables is 0.34. Table 6.1 summarises the dependent variables.

6.3.2 Explanatory Variables

To measure conservative economic and social attitudes I constructed five composite variables by combining responses (almost all of which were on a 5-point scale, ranging from "Strongly disagree" to "Strongly agree") to a number of statements about political and economic issues. The responses were averaged to create a composite score, with any missing values dropped when calculating the mean. Table 6.2 summarises the five independent variables, and presents metrics for reliability (Cronbach's Alpha, α) and internal consistency (inter-item correlation).

³I also completed the analyses described below using the original number of categories for both dependent variables (with five and seven categories respectively). The results were similar, and are presented in section 6.D.2.

Table 6.2: Summary of composite variables measuring conservative attitudes

Conservative attitudes	Variable	Indicators	α	IIC
Economic attitudes	Support for free markets	<ul style="list-style-type: none"> • Trade unions in New Zealand have too much power • The government should remove tax breaks currently available to property investors (R) • Privatisation of state-owned enterprises has gone too far (R) • Big business in New Zealand has too much power (R) 	0.62	0.28
	Opposition to welfare	<ul style="list-style-type: none"> • Should there be more or less public expenditure in each of the following areas? Welfare benefits (R)^a • The government should take measures to reduce differences in income levels (R) • Unemployed people should have to work for their benefits • Many people who get welfare benefits don't really deserve any help • With lower welfare benefits people would learn to stand on their own two feet 	0.78	0.41
Social Attitudes	Anti-minority attitudes	<ul style="list-style-type: none"> • Minorities should adapt to the customs and traditions of the majority • Reference to the Treaty of Waitangi should be removed from the law • The will of the majority should always prevail, even over the rights of minorities • Māori should have more say in all government decisions (R) 	0.74	0.41

Conservative attitudes	Variable	Indicators	α	IIC
	Anti-feminism attitudes	<ul style="list-style-type: none"> • Society would be better off if women stayed home with their children • On the whole, men make better political leaders than women do • The law should be strengthened to reduce pay differences between women and men (R) • Should there be more efforts to increase the number of women MPs? If so, what means would you prefer?^b 	0.55	0.23
	Right-wing authoritarianism	<ul style="list-style-type: none"> • Having a strong leader in government is good for New Zealand, even if the leader bends the rules to get things done • The death penalty should be brought back for some murders • A few strong leaders could make this country better than all the laws and talk • What young people need most of all is strict discipline by their parent • Should there be more or less public expenditure in each of the following areas? Police and law enforcement^a 	0.68	0.30

Notes:

- All indicator responses coded as 1 (Strongly disagree) to 5 (Strongly agree) unless otherwise indicated
- (R) = item reverse coded
- α = standardised Cronbach's alpha
- IIC = inter-item correlation
- ^a = coded as 1 (much less) to 5 (much more)
- ^b = there were five possible answers to this question, two indicating "no", and three indicating "yes". The response was therefore coded as 0 (no) or 1 (yes)

Conservative economic attitudes are measured by two variables capturing respondents' degree of support for free market policies and the extent to which respondents' believe the government should be actively addressing inequality, particularly through welfare. I include two variables that relate to respondents' level of exclusionary attitudes, measuring respondents' degree of negative attitudes towards minorities and women. Finally, the measure of RWA includes items on support for strong leaders, discipline and law and order.

6.3.3 Control variables

The analyses also include some control variables. To control for the possibility that any link between political orientation and environmental attitudes is due to party sorting (Cruz, 2017), I also include a variable indicating which party the respondent voted for in the 2017 election. Dummy variables for each of the major parties (National, Labour, New Zealand First, and Green)⁴ were included, with the reference category being support for minor party. Finally, I also included several socio-demographic control variables that have previously been found to relate to environmental attitudes: gender, age, whether the respondent has a university-level degree, employment status, ethnicity and level of interest in politics (Hornsey et al., 2016). Full details of the control variables can be found in section 6.A.

6.3.4 Analytic Strategy

To analyse the data, I first calculated correlations (using Spearman's rank-order correlation) between the dependent variables and main explanatory variables. This first step gives an initial indication of the relationships between the measures of conservative social and economic attitudes, and the measures of environmental attitudes. To estimate the independent relationships between the social and economic variables on environmental attitudes, I modelled the relationship between the independent and dependent variables using Bayesian multinomial logistic re-

⁴The two largest parties in New Zealand, National and Labour are positioned to the centre-right and centre-left respectively. The Green Party is an environmentally-focussed party, positioned to the left of Labour on many issues. It can be difficult to precisely place New Zealand First on the political spectrum; however in recent years they have mostly taken centrist positions, and often engage in populist rhetoric.

gression. While ordinal logistic regression is often used when the dependent variable is ordinal, proportional odds tests suggested that the proportional odds assumption was violated, and therefore multinomial logistic regression was a more appropriate choice.

As 13% of the observations in the dataset had one or more “don’t know” or missing values, I employed multiple imputation to estimate these values. The results for models using the original data set (without multiple imputation) were similar to those presented below. Further details on the approach to multiple imputation, and other aspects of the method used, can be found in section 6.B.

6.4 Results

6.4.1 Descriptive Analyses

As an initial test of the relationship between the main independent variables and the dependent variables, Spearman’s rank-order correlations are presented in table 6.3. The table also includes a measure of left-right orientation to test the extent to which the variables measuring conservative economic and social attitudes tend to be higher among those who position themselves on the right of the political spectrum. The left-right orientation variable relies on a question asking respondents to place themselves on a left-right scale, with 0 being the most left, and 10 being the most right.

As illustrated in Table 6.3, all the measures of the conservative attitudes have positive correlations with left-right orientation, indicating that people with high scores on these measures tend to place themselves to the right of the political spectrum. All of the correlations between left-right orientation and the measures of conservative attitudes are medium to large in magnitude, with the largest being support for the free market, which has a correlation of 0.46.

Table 6.3 also shows that all the measures of conservative attitudes have negative correlations with the dependent variables measuring support for environmental action, indicating that people who see themselves as right-wing, or hold the conservative attitudes that are investigated in this study, are more likely to have negative environmental attitudes. Most of the correlations are small to medium in magnitude, with the largest

Table 6.3: Correlations between measures of conservative attitudes, left-right orientation, and support for environmental action

Right-wing value	Support for climate change policies	Environment vs. economy	Left/right orientation
Right-wing authoritarianism	-0.14	-0.24	0.35
Anti-feminism views	-0.31	-0.27	0.41
Anti-minority views	-0.25	-0.28	0.42
Free-market support	-0.20	-0.31	0.50
Anti-welfare views	-0.24	-0.27	0.49

Note:

All values significant at $p \leq 0.01$

being -0.31 between anti-feminist views and support for stronger government action on climate change.

6.4.2 Explanatory Analyses

The analyses presented below investigate the extent to which the bivariate negative relationships described above still hold when social and economic attitudes are introduced simultaneously in a multivariate model and when controlling for mainstream socio-economic characteristics. Below I present average marginal effects (AME) of each of the independent variables on each of the dependent variables (Leeper, 2018). In the plots below, the x axis represents the AME of the predictor on the dependent variable for each of the three levels of the dependent variable.⁵

Figure 6.1 shows the AMEs of the independent variables for each level of support for stronger government policies to address climate change. The lowest level indicates the respondent somewhat or strongly disagrees that the government should do more about climate change, the middle category indicates neither agree or disagree, and the highest level indicates somewhat or strongly agree. As expected, people who hold anti-feminism or anti-minority views, support free markets or oppose government welfare measures are less likely to support government action on climate change. The effect sizes are quite substantial for all four of these

⁵The AMEs were rescaled so that the independent variable effectively ranged between 0 and 1. Doing so allows for easier comparison between the effects of the independent variables. Section 6.D.1 presents the full results from the regression analyses described here.

Figure 6.1: Average marginal effects (with 95% credible intervals) of conservative attitudes and control variables on support for government action on climate change

variables; someone with the maximum anti-feminism score has a 0.34 lower probability of supporting stronger government policies than a person with the minimum anti-feminism score.

However, people holding high levels of right-wing authoritarianism appear to be more likely to support stronger government action on climate change than someone with low levels of RWA. Given that the bivariate correlation between right-wing authoritarianism and support for government climate action is negative (see table 6.3), this unexpected relationship appears to be partly because other conservative attitudes have partialled out the aspects of RWA that negatively relate to environmental attitudes. The remaining effect of RWA thus has a positive relationship with supporting the environment over the economy. I expand on the possible interpretation of this result in the discussion section below.⁶

Most of the control variables do not have a noticeable effect on support for government action on climate change, with the exception of being female, having a strong interest in politics and voting for the Green party, all of which have small positive effects. People who cast their vote for the National party were moderately less likely to support government action on climate change compared with voters supporting a minor party, while there was also a small negative effect of religiosity on support for government action.

The AMEs for the “environment over the economy” dependent variable are presented in figure 6.2. All of the variables measuring conservative attitudes have the expected negative relationship with wanting to do more to protect the environment over encouraging economic development. Support for the free market has the largest effect, which is unsurprising given the dependent variable is specifically about economic policy. People who support the free market had a 0.20 increased probability of giving the middle “neutral” answer, and the effect size of a high level of free-market support on giving an answer in the lowest category was 0.19. However, there are also substantial effects for the variables measuring levels of exclusionary attitudes and RWA, with right-wing authoritarianism, anti-feminism and anti-minority views having effects sizes ranging between -0.12 and -0.26 on the probability of a person preferring that more is done to protect the environment, even if it means less economic

⁶Stepwise regression suggests that the direction of the authoritarian coefficient changes from negative to positive when the anti-feminism, anti-minority and anti-welfare variables are added to the model.

Figure 6.2: Average marginal effects (with 95% credible intervals) of conservative attitudes and control variables on preference for protection of the environment over economic development

development.

Compared with voters supporting a minor party, people who vote for the Green party are substantially more likely to support action on the environment over the economy. The other control variables do not appear to strongly relate to preferring the environment over the economy, although being female (compared with being male) has a small positive effect, and voting for the National party has a small negative effect.

In light of these results, H1 is supported, as both measures of conservative economic attitudes have negative relationships with supporting environmental action. H2 is also accepted, as people with exclusionary attitudes tend to have lower levels of both dependent variables measuring environmental attitudes. RWA appears to have a positive relationship with support for government action; thus H3 is supported for the second dependent variable, but not the first. As the variables measuring both conservative economic and social attitudes have independent relationships with the measures of environmental attitudes, H4 is also accepted.⁷

6.5 Discussion and conclusion

In this study, I have examined the extent to which conservative economic and social attitudes relate to individuals' views on climate change and the environment. The results suggest that both conservative economic and social attitudes have independent negative relationships with environmental attitudes. Economic views (including preferences for less government intervention in the economy, and being opposed to welfare measures) are strongly linked to people's perspectives on environmental action and policy. The reasons for this link between economic and environmental opinions are relatively clear: people who favour a more free market conception of the economy, or who oppose government measures to reduce inequality through welfare will tend to see environmental issues as a challenge to this method of economic management, and therefore will

⁷In addition to investigating the extent to which social and economic attitudes have an independent relationship with support for action on the environment, I also empirically explored whether there are interactions between the different measures of social and economic attitudes. Most of these interactions were not significant, suggesting that the effects of conservative economic and social attitudes do not reinforce one another. Further details of the analyses including interactions can be found in section 6.D.3.

engage less with environmental issues compared with those who do not hold conservative economic views (Longo & Baker, 2014).

Conservative social attitudes are also linked to lower levels of support for environmental action and policy. In particular, exclusionary attitudes such as anti-feminist and anti-minority views consistently relate to low levels of support for government action on climate change and a preference for economic development over environmental protection. These results align with previous studies suggesting that exclusionary attitudes, which are part of SDO, have a negative relationship with environmental attitudes (Jylhä & Hellmer, 2020; Milfont et al., 2013). However, the results presented here confirm this relationship exists even when controlling for conservative economic attitudes, which are known to be correlated with SDO (Jylhä, Strimling et al., 2020). My findings thus support Milfont et al. (2013), who suggest that those who are high in SDO tend to have negative attitudes towards the environment because they see the environment as something to be dominated by humans.

I did not expect to find a positive relationship between right-wing authoritarian attitudes and support for government action on climate change. Bivariate correlations between RWA and support for increased government action on climate change showed a negative relationship (see table 6.3). However, when the other conservative attitudes are accounted for (particularly anti-minority, anti-feminist and anti-welfare views) the relationship between RWA and support for government action on climate change appears to be positive (see figure 6.1). This positive relationship suggests that people who have high levels of RWA, but low levels of some of the other conservative attitudes tend to support government action on climate change. It is possible that deference to authority – a central component of right-wing authoritarianism (Altemeyer, 1981) – was mostly involved in the positive relationship with a preference for stronger government action on climate change when the other conservative attitudes were accounted for in the model. This interpretation is supported by the fact that, even when controlling for the other conservative attitudes, RWA has a negative relationship with the second dependent variable, where the preference for government action was not strongly stated in the question.

In contrast to most existing research on environmental attitudes, this study focuses on support for environmental action and policies, rather

than belief in the existence or seriousness of environmental problems (e.g. Longo & Baker, 2014; Milfont et al., 2013). Previous studies have shown that, while a large majority of the public accepts the existence or seriousness of environmental problems, support for policies or action to address environmental issues is not always as widespread (Crawley et al., 2020; Dreyer & Walker, 2013). Despite this difference between dimensions of environmental attitudes, the results presented here align with previous findings that political ideology has a similar relationship with support for environmental action as it does for belief in environmental problems (Crawley et al., 2020; Kulin & Sevä, 2019).

One limitation of this study is that it does not include all economic and social components of right-wing orientation and conservative ideology. In particular, I did not explicitly include a measure of system justification – where individuals believe that the status quo should be protected – an attribute that has previously been found to negatively relate to environmental attitudes (Feygina et al., 2010). Despite this limitation, the results presented here suggest that relying on the frequently used left-right positional measure (where respondents are asked to place themselves on a scale ranging from “very left” to “very right”) when investigating the relationship between political orientation and environmental views may mask some important differences between the economic and social aspects of right-wing orientation (such as the positive relationship of some elements of right-wing authoritarianism with environmental attitudes). Overall, however, given that all aspects of right-wing orientation had negative correlations with environmental attitudes, left-right orientation could be considered a useful proxy for a set of economic and social attitudes that are commonly considered right-wing, at least when investigating the relationship between political orientation and environmental views.

The focus of this study is the relationship between political orientation and environmental views in New Zealand, a country which has (compared with other developed nations) low population density, a strong agricultural sector and a history of governments adopting market-oriented policies (Nicholls, 2018). These factors contribute to a unique environmental and political context. One should therefore be careful about generalising the results presented above to other countries. However, there is reason to believe that similar relationships between conservative at-

attitudes and public opinion on climate change and the environment will exist in other countries. These relationships may be more readily found in countries with political contexts that are similar to New Zealand, such as Australia, Canada, the UK and – to a lesser extent – the US, all of which are liberal market economies. In coordinated market economies, such as Germany, and most of the EU, conservative economic attitudes may hold less sway over environmental views, due to free market ideology tending to be less prevalent in those countries. Indeed, the relationship between political orientation and environmental views seems to vary by country (McCright, Dunlap & Marquart-Pyatt, 2016; E. K. Smith & Mayer, 2019). Future research may therefore be able to gain greater insight into this country-level variation by comparing the relationships between different aspects of right-wing orientation and environmental attitudes in different contexts.

This study confirms previous findings that political orientation is one of the most consistent and strongest predictors of environmental attitudes, and that people holding attitudes characteristic of the right of the political spectrum are less likely to support action or policies to address environmental issues (e.g. McCright, Marquart-Pyatt et al., 2016). The results I have presented give us a more detailed picture of this link between political orientation and environmental attitudes. In particular, the results indicate that people who identify as right-wing tend to be less engaged with environmental issues not just because of concerns about economic impacts, but also because the reality of climate change and other environmental problems challenges their preferences for how society should be ordered. In short, the link between right-wing ideology and environmental attitudes is not just about economics, but is also about social attitudes and worldview.

The results therefore have implications for environmental communicators or activists seeking to increase support for action on climate change and other environmental issues. It is not enough to convince people that environmental problems will be economically devastating if not properly addressed. To accept the necessary large-scale social changes that are needed to address environmental issues, many people on the political right will need reassurance that, if these changes are made, they will still have a place in the world.

Chapter Appendix

6.A Control Variables

Table 6.4: Summary of control variables

Variable	Categories
Gender	<ul style="list-style-type: none"> • Male • Female
Degree	<ul style="list-style-type: none"> • No degree • Has degree
Religiosity	<ul style="list-style-type: none"> • Never • Once a year • 2-11 times a year • Once a month • 2-3 times a month • At least once a week
Interest in politics	<ul style="list-style-type: none"> • Very interested • Somewhat interested • Not very interested • Not at all interested
Age	Continuous variable
Ethnicity	<ul style="list-style-type: none"> • Non-Maori • Maori
Work Status	<ul style="list-style-type: none"> • Not in paid work • In paid work
Party vote in 2017 election	<ul style="list-style-type: none"> • National • Labour • NZ First • Green • Other

Notes:

- Gender: the 8 respondents who gave their gender as “other” were removed from the data, as including them resulted in unstable models
- Degree: recoded from NZES variable “reduc”. Degree was set to 1 if reduc was “University Degree”, and 0 for all other categories.
- Religiosity: introduced as a continuous variable in the analyses
- Work Status: constructed from NZES question F13, which allowed multiple answers to indicate the respondent’s employment status. Coded as 1 if respondent indicated they have part time or full time work, or 0 otherwise.

- Party vote: recoded from NZES “rpartyvote” variable so that all responses besides the four main parties were coded as “Other”.

6.B Method

6.B.1 Multiple imputation

I used the R package “mice” (van Buuren & Groothuis-Oudshoorn, 2011) to do multiple imputation of missing values. 25 data sets were imputed, using 30 iterations. Missing values for all independent variables were estimated. To improve estimation of the missing variables, a number of auxiliary variable that are plausibly related to the variables with missing values were included in the imputation model. Auxiliary variables included the dependent variables, as well as a number of other variables from the NZES data set, such as the degree to which the respondent liked each political party, their self-reported position on a left-right political orientation scale, and whether they believe politicians are trustworthy. As I used Bayesian regression to estimate the relationships between the variables, pooling the results from each of the multiply imputed data sets was straightforward (and was done following the instructions provided as part of the R “brms” package).

6.B.2 Prior specification

I adopted a strategy of specifying “weakly informative” priors. Following the advice of Gelman et al. (2014), to simplify prior specification, all binary model inputs (including the dummy variables for the Party Vote categorical variable) were centred, while all other inputs were centred and scaled by 2 standard deviations. Cauchy(0,10) prior distributions were used for all parameters.

6.C Descriptive statistics

Table 6.5: Counts, means and standard deviations of continuous independent variables

Variable	Obs.	Mean	Std. Dev.	Min	Max	Missing
Anti-feminism views	3378	0.33	0.23	0	1	1.89%
Anti-minority views	3389	0.49	0.24	0	1	1.57%
Right-wing authoritarianism	3413	0.56	0.21	0	1	0.87%
Anti-welfare views	3376	0.49	0.21	0	1	1.95%
Free-market support	3310	0.35	0.2	0	1	3.86%
Age	3443	49.77	18.73	18	96	0.00%

Table 6.6: Counts for categorical independent variables

Variable	Obs.	Proportion
Has a degree		
No degree	2567.51	74.57%
Has degree	870.15	25.27%
In paid work		
Not in paid work	1320.24	38.35%
In paid work	2117.43	61.5%
Political interest		
Very interested	99.97	2.9%
Somewhat interested	466.95	13.56%
Not very interested	1682.19	48.86%
Not at all interested	1156.65	33.59%
Missing / Don't Know	31.91	0.93%
Maori ethnicity		
Non-Maori	2969.39	86.24%
Maori	468.27	13.6%
Party Vote 2017		
Green	170.21	4.94%
Labour	1019.51	29.61%
National	1239.46	36%
NZ First	200.58	5.83%
Other	142.24	4.13%
Missing / Don't Know	665.67	19.33%
Religious Service Attendance		
Never	1941.45	56.39%
Once a year	470.98	13.68%
2-11 times a year	353.93	10.28%
Once a month	89.01	2.59%
2-3 times a month	133.18	3.87%
At least once a week	332.02	9.64%
Missing / Don't Know	117.1	3.4%
Gender		
Male	1635.86	47.51%
Female	1720.7	49.98%
Missing / Don't Know	81.11	2.36%

Table 6.7: Counts for dependent variables

Variable	Obs.	Proportion
Support for climate change policies		
Strongly/somewhat disagree	435.27	12.64%
Neither	387.36	11.25%
Strongly/somewhat agree	2238.91	65.03%
Missing / Don't Know	376.13	10.92%
Environment vs. economy		
Do more to encourage economic development	582.51	16.92%
Neither	665.87	19.34%
Do more to protect environment	1939.83	56.34%
Missing / Don't Know	249.45	7.25%

Table 6.8: Independent variables correlation matrix

	Right-wing authoritari- anism	Anti- feminism views	Anti- minority views	Free- market support	Anti-welfare views
Right-wing authoritarianism	1				
Anti-feminism views	0.363	1			
Anti-minority views	0.414	0.423	1		
Free-market support	0.17	0.237	0.261	1	
Anti-welfare views	0.439	0.403	0.472	0.358	1

Note:

All correlations are statistically significant at $p \leq 0.01$

6.D Results

6.D.1 Regression coefficients for main analyses

Table 6.9: Regression coefficients for Support for climate change policy

Parameter	(1 -> 2)				(2 -> 3)			
	M	CI	pd	ROPE	M	CI	pd	ROPE
Intercept	-0.01	[-0.25: 0.23]	0.52	0.86	2.25	[2.08: 2.42]	1.00	0.00
Social Attitudes								
Right-wing authoritarianism	-0.06	[-0.41: 0.31]	0.62	0.65	0.36	[0.07: 0.65]	0.99	0.12
Anti-feminism views	-0.04	[-0.37: 0.29]	0.58	0.70	-1.04	[-1.31:-0.77]	1.00	0.00
Anti-minority views	-0.70	[-1.09:-0.32]	1.00	0.00	-0.93	[-1.24:-0.63]	1.00	0.00
Economic Attitudes								
Free-market support	0.32	[0.00: 0.65]	0.97	0.19	-0.26	[-0.52: 0.01]	0.97	0.29
Anti-welfare views	-0.25	[-0.64: 0.12]	0.90	0.34	-0.67	[-0.98:-0.37]	1.00	0.00
Controls								
Has degree	-0.05	[-0.42: 0.32]	0.60	0.64	0.12	[-0.18: 0.42]	0.79	0.63
Female (ref: male)	0.78	[0.47: 1.07]	1.00	0.00	0.75	[0.51: 1.00]	1.00	0.00
Political interest	-0.25	[-0.53: 0.02]	0.96	0.30	0.04	[-0.19: 0.26]	0.62	0.87
Age	-0.51	[-0.85:-0.18]	1.00	0.03	-0.31	[-0.58:-0.04]	0.99	0.17
Relgiosity	0.26	[-0.01: 0.55]	0.97	0.28	-0.12	[-0.35: 0.11]	0.83	0.70
Maori (ref: other ethnicity)	-0.07	[-0.54: 0.38]	0.62	0.54	-0.26	[-0.63: 0.10]	0.92	0.32

Paid Work (ref: not in paid work)	-0.07	[-0.40: 0.26]	0.65	0.67	-0.21	[-0.48: 0.06]	0.94	0.41
Party Vote Labour (ref: Other)	1.01	[0.03: 2.02]	0.98	0.03	-0.08	[-0.66: 0.48]	0.61	0.46
Party Vote National (ref: Other)	1.15	[0.21: 2.19]	0.99	0.02	-0.39	[-0.96: 0.16]	0.92	0.21
Party Vote NZ First (ref: Other)	0.62	[0.07: 1.21]	0.99	0.06	-0.25	[-0.59: 0.10]	0.93	0.34
Party Vote Green (ref: Other)	0.04	[-1.11: 1.13]	0.53	0.26	0.42	[-0.20: 1.10]	0.92	0.20

Table 6.10: Regression coefficients for Environment vs. economy

Parameter	(1 -> 2)				(2 -> 3)			
	M	CI	pd	ROPE	M	CI	pd	ROPE
Intercept	0.39	[0.20: 0.59]	1.00	0.01	1.70	[1.54: 1.87]	1.00	0.00
Social Attitudes								
Right-wing authoritarianism	-0.39	[-0.69:-0.10]	1.00	0.08	-0.64	[-0.90:-0.38]	1.00	0.00
Anti-feminism views	-0.48	[-0.75:-0.22]	1.00	0.01	-0.90	[-1.15:-0.67]	1.00	0.00
Anti-minority views	-0.49	[-0.80:-0.18]	1.00	0.02	-0.61	[-0.88:-0.33]	1.00	0.00
Economic Attitudes								
Free-market support	-0.07	[-0.34: 0.19]	0.70	0.77	-0.86	[-1.10:-0.63]	1.00	0.00
Anti-welfare views	-0.20	[-0.49: 0.10]	0.91	0.44	-0.45	[-0.71:-0.19]	1.00	0.02
Controls								
Has degree	0.09	[-0.21: 0.38]	0.73	0.69	-0.21	[-0.49: 0.05]	0.94	0.40
Female (ref: male)	-0.11	[-0.34: 0.13]	0.81	0.72	0.27	[0.06: 0.48]	0.99	0.19
Political interest	-0.28	[-0.52:-0.05]	0.99	0.20	-0.22	[-0.43:-0.01]	0.98	0.35
Age	-0.20	[-0.46: 0.07]	0.93	0.45	-0.29	[-0.53:-0.06]	0.99	0.18
Relgiosity	-0.47	[-0.69:-0.24]	1.00	0.01	-0.46	[-0.66:-0.26]	1.00	0.00
Maori (ref: other ethnicity)	-0.39	[-0.76:-0.04]	0.98	0.13	-0.54	[-0.85:-0.22]	1.00	0.01
Paid Work (ref: not in paid work)	-0.10	[-0.37: 0.17]	0.77	0.70	-0.21	[-0.44: 0.03]	0.96	0.41
Party Vote Labour (ref: Other)	0.40	[-0.24: 1.05]	0.89	0.21	-0.15	[-0.67: 0.35]	0.72	0.45

Party Vote National (ref: Other)	0.42	[-0.23: 1.05]	0.90	0.20	-0.39	[-0.91: 0.12]	0.93	0.20
Party Vote NZ First (ref: Other)	0.26	[-0.14: 0.67]	0.90	0.33	0.08	[-0.25: 0.40]	0.68	0.67
Party Vote Green (ref: Other)	0.29	[-0.62: 1.31]	0.74	0.25	0.99	[0.24: 1.86]	1.00	0.01

Notes:

- M - median value of the posterior distribution
- CI - 95% credible intervals of the median value
- pd - Probability of direction. High values indicate that an effect exists, and is in the direction indicated.
- ROPE - Region of Practical Equivalence percentage. Low values indicate the posterior distribution does not lie within the null region. The null region was defined as +/-0.181, which equates to an approximately +/- 0.09 difference in probability if the mean of the response is 0.5. In other words, low values indicate a high probability that there is a small or larger relationship between the covariate and the dependent variable.

6.D.2 Regression results for dependent variables with all categories

The plots below show the results of the regression analyses with the full set of categories for each of the two dependent variables. The analyses were done using the data set with observations with missing values removed (i.e. not used the multiply imputed data sets).

Figure 6.3: Support for government action dependent variable (all categories)

Figure 6.4: Environmental vs. Economy dependent variable (all categories)

6.D.3 Interaction analyses

Models including interactions between each of the three measures of social attitudes and the two economic attitude variables were analysed for each of the two dependent variables. Of the 12 interactions investigated, three showed significant effects. For both dependent variables, the anti-minority variable had a significant negative interaction with the anti-welfare variable, indicating that people with high levels of both opposition to welfare policies and negative attitudes towards minorities are more likely to disagree that stronger government policies are required to address climate change and to believe that the economy should be prioritised above the environment compared with people who have high levels of only one of the two attitude variables.

The third significant interaction was between right-wing authoritarianism and support for free markets for the environment vs. the economy dependent variable. This interaction indicated that people with high levels of support for the economy and low levels of RWA are less likely to support the environment over the economy compared with people who have high levels of both RWA and support for free markets. This somewhat unexpected interaction could be because parties appealing to people high in RWA do not typically have strong free market policies. People scoring high in both RWA and support for free markets thus could hold uncertain views on political issues, a possibility supported by the fact that they were significantly more likely to give a middle category answer in responding to the dependent variable question.

Overall, then, besides the interaction between anti-minority and anti-welfare views, the lack of negative interactions between the economic and social measures suggests their effects on the dependent variables may be independent of each other and do not reinforce one another.

Chapter 7

Discussion and Conclusion

In this chapter, I summarise the results of the four empirical chapters, and discuss the wider implications of these findings. The first two sections review the results in light of my two over-arching research questions. In the subsequent sections, I reflect on the wider significance of these results for the study of public opinion on climate change, the relationship between climate opinion and policy and for representative democracy. Finally, I summarise the main contributions of this thesis, and offer some concluding remarks.

7.1 The nature of belief, issue salience and support for government action

Below, I summarise the results relating to the first over-arching research question, which examined the nature of belief, issue salience and support for government action on climate change.

7.1.1 Belief

The results from chapters 3 and 4, which included investigations of the belief dimension, confirmed that levels of belief in climate change are high in developed countries. Chapter 3, in particular, included a range of questions on belief, finding that a large majority in the UK believe that climate change is occurring (table 3.5). For instance, on the seven-point scale combining belief in climate change and certainty of belief, where a 7 indicates a person is very or fairly certain that climate change is happening, the mean was 6.3. In addition, 72% believed climate change

is mostly caused by humans, and 73% accept that most scientists agree that climate change is happening.¹ The mean on the five-point scale measuring perceptions of the seriousness of climate change was almost 4.

Chapter 3 also identified five publics with differing views of climate change. Members of the highly and moderately engaged publics (which, combined, account for approximately 46% of the UK population) have mean belief scores of 7 and 6.9 respectively on the seven-point belief scale, while the action-wary public (33% of the population) have a mean score of 6.5 on the belief scale (table 3.3). The three largest UK publics have similarly high levels of belief in the human cause and seriousness of climate change.

The cross-country analysis in chapter 4 indicates that the high levels of belief in climate change are common across the whole of the EU (table 4.5). In each of the (at the time of the survey) 28 EU member states, the mean belief score was well above the scale mid-point, demonstrating that most people in each EU country see climate change as a serious problem. As noted in that chapter, there was a degree of cross-country variation, with Czechia, Latvia and Estonia having the lowest levels of climate concern in the EU, while Spain, Greece and Portugal had the highest levels. These findings align with previous research that has found high levels of belief in developed countries (Poortinga et al., 2019; Tranter & Booth, 2015).

The high levels of belief in climate change across the developed world raise questions about just how important belief is in understanding public opinion on climate change, especially in the context of its possible influence on policy. Although a substantial body of academic research has focussed on denial of climate change, it appears to be a relatively fringe opinion. Research on other dimensions of climate change opinion is therefore likely to be more valuable for scholars interested in understanding the relationship between climate opinion and climate policy. In section 7.3, I expand on how the continued academic focus on climate

¹The proportion of respondents who did not believe that climate change is mostly caused by humans was 20% (once survey weights were applied). This is higher than most other UK surveys, which tend to show no more than 10% of the population are “attribution” sceptics (Poortinga et al., 2019; Steentjes et al., 2017). It is possible that question wording played a role. Many other surveys allow respondents to choose “both human and natural causes” as being responsible for climate change, however this was not an option in the survey conducted for chapter 3.

denial may be limiting our understanding of public opinion on climate change.

7.1.2 Issue Salience

The results in chapters 3 and 4 confirm that the issue salience of climate change is generally low, at least when compared with other issues such as the economy, healthcare and education. Among the five UK publics identified in chapter 3, all but the highly engaged ranked climate change in the bottom half of the eight issues they were asked about, and approximately half of the entire sample ranked climate change in the bottom two issues (table 3.3). Even among the highly engaged, only 29% ranked climate change as the most important issue of the eight available options (table 3.6), and the mean ranking for the highly engaged was 3.5.

The cross-country data I examined in chapter 4, however, shows that there is variation in issue salience across EU member states (table 4.5). Salience is particularly low in countries such as Czechia, Portugal and Poland but high in the Nordic countries. In the Eurobarometer sample, the percentage of people placing climate change in their four most important issues among the three Nordic EU countries ranged from 60% in Finland to 76% in Sweden. In fact, 37% of Swedish respondents ranked climate change as their most important issue of the eight options.

Many authors have previously noted that climate change is a low salience issue and a handful of single-country and small-N cross-country studies have confirmed this empirically (Bromley-Trujillo & Poe, 2018; Hagen et al., 2016; Herrnschmidt & Muehleger, 2014). However, to my knowledge, no large cross-country study has included a measure of relative issue salience as I did in chapter 4.² The cross-country variation in issue salience illustrated in chapter 4 is therefore not widely appreciated. The low salience of climate change in most countries has likely contributed to the inadequate policy responses in many countries, a point to which I return in section 7.4.

²See, however Lo and Chow (2015), who investigate the salience of climate change relative to other environmental issues.

7.1.3 Support for government action

In chapter 6, I found that 65% of the sample from the New Zealand Election Study (NZES) agreed that stronger government policies should be put in place to combat climate change (table 6.1), and 61% of the UK respondents in the survey used in chapter 3 believe that the government is not doing enough on climate change (table 3.5). These results align with previous studies, which have examined the extent to which the public supports government action on climate change (Drews & van den Bergh, 2016). Overall, the public seems to be broadly behind a central role for government in addressing climate change (Drews & van den Bergh, 2016; Krosnick & MacInnis, 2013).

Specific policies to mitigate climate change are also widely supported in many cases, with over 80% of respondents in each EU country supporting subsidies for clean energy (table 4.5). Chapter 5 noted that 67% of respondents preferred the government setting a price on emissions (as opposed to voluntary action) to deal with climate change, regardless of which interest group message they received (table 5.2). However, as illustrated in the results of chapter 3, people were less willing to pay substantially higher taxes to address climate change. When the UK sample was asked how willing they were to pay tax, the mean response on the five-point scale (with a mid-point of 3) was 2.8 (table 3.5).

As noted in previous studies (Drews & van den Bergh, 2016), while support for government action does seem to be quite closely related to climate beliefs, belief and support for government action do appear to be separate dimensions. As shown in chapters 3 and 4, when measuring broad support for the role of the government acting on climate change, levels of support for government action tend to be slightly lower than overall belief in climate change, indicating that there are some people who are concerned about climate change but do not support government action to address it. Moreover, as illustrated in the analysis in chapter 3, where multiple publics were identified, a substantial section of society appears to have reservations about some aspects of government action. For example, the action-wary public had only slightly lower levels of belief in climate change compared with the highly or moderately engaged. However, members of the action-wary were much less willing to pay substantially higher taxes and were less likely to believe that the government was not doing enough on climate change than the highly and moderately

engaged. As I discuss in section 7.3, support for government action is thus a dimension worth considering in investigations of public opinion on climate change.

7.2 The factors that shape climate opinion

My second over-arching research question examined the extent to which particular factors shape climate opinion on all three dimensions (belief, issue salience and support for government action). I investigated individual characteristics, country-level factors and external influences (specifically interest group messages). I discuss each of these below.

7.2.1 Individual characteristics

Throughout the empirical chapters, I examined the extent to which individual characteristics, including political attitudes and socio-demographic attributes, relate to climate opinion. A number of previous studies have demonstrated that people on the left of politics are more likely to believe that climate change is a serious problem than people on the right (Hornsey et al., 2016; McCright, Marquart-Pyatt et al., 2016), and some studies have examined the relationship between political (left-right) orientation and support for government action (Drews & van den Bergh, 2016; Umit & Schaffer, 2020). Building on this research, I have investigated the relationship between political orientation and climate opinion for the dimensions of belief, issue salience and support for government action. The results presented in chapters 3, 4 and 6 show that people on the left are more likely to believe that climate change is a serious problem, support government action to address it and, particularly, to see climate change as high salience compared with those on the right.

In chapter 6, I investigated the specific aspects of right-wing orientation that appear to relate to climate opinion (specifically, support for government action). The results show that conservative economic and social attitudes have independent, negative relationships with supporting stronger government action on climate change. People who support free-market economics might object to action on climate change because they see government intervention as inefficient. People who hold authoritarian attitudes or support the social dominance of certain groups over others perhaps oppose climate action because they believe nature should

be dominated by humans (Milfont et al., 2018; Sohlberg, 2011). Thus, the link between political orientation and climate opinion is complex, being as much about people's broader worldview as their degree of support of free-market economics.

Political orientation does not, however, appear to relate to climate views in the same way in every country. In chapter 4, I found that left-right orientation does not relate as strongly to climate views in relatively poorer countries as it does in wealthier countries. The cross-country variation in the relationship between political orientation and climate views, which has previously been observed in a handful of studies (McCright, Dunlap & Marquart-Pyatt, 2016; Poortinga et al., 2019), may be partly driven by different understandings of the left-right scale in different countries (McCright, Dunlap & Marquart-Pyatt, 2016). Interpretation of the left-right spectrum may vary depending on the age of the democracy and the extent to which its party system is institutionalised (Mair, 2007). Measures of political orientation besides the standard left-right scale (such as the attitudinal measures employed in chapter 6) may thus be required to understand how climate opinion relates to economic and political attitudes in cross-national contexts.

My findings confirm that several demographic attributes relate to climate opinion, and that the relationships are similar across the three dimensions. Older people tend to be less likely to believe that climate change is a serious problem, view climate change as a high salience issue or support government action to address climate change. Women tend to have higher engagement with climate change than men, although the difference is typically small. However, it appears that men may be slightly more likely than women to view climate change as high salience (figure 3.5), perhaps because women are more likely to view issues such as education and healthcare as high salience.

In chapters 3, 4 and 6, I also confirmed that social attributes – including education, income and social class – are linked to climate opinion, and that these relationships are similar for all three dimensions that I consider. People with higher levels of education and income, and from a higher social class, will tend to be more engaged with climate change across the three dimensions. Level of education is typically a good predictor of climate opinion. For example, in chapter 3, people holding a degree were more likely to be members of the “highly engaged” public than

people without a degree (figure 3.4). Overall, however, socio-demographic attributes do not usually have as strong a relationship with climate opinion as political attitudes do.

In sum, political attitudes – particularly political orientation – are a major factor shaping people’s climate views. Of the three dimensions of climate opinion considered in this thesis, political attitudes appear to relate most strongly to issue salience. The strength of the relationship between political orientation and issue salience highlights the importance of the latter in understanding climate opinion.

7.2.2 Country-level factors

I examined the extent to which several country-level factors influence climate opinion in the EU on all three dimensions in chapter 4. Differences in the composition of countries (in terms of attitudinal measures, such as political orientation) did not seem to relate to climate opinion, although – as noted in chapter 4 – this could be driven by cross-country differences in the interpretation of the survey questions. In wealthier countries (as measured by GDP per capita), citizens do seem to find climate change substantially more salient than citizens in poorer countries. This finding suggests that post-material values may be driving some of the cross-country variation in climate opinions, and that these values are particularly relevant for issue salience. As mentioned in chapter 4, it would considerably improve our understanding of the forces that shape public opinion on climate change if future studies found ways to investigate how attitudinal differences between countries are linked to climate opinion, and particularly issue salience.

7.2.3 External Influence

In chapter 5, I reported on a survey experiment in which I aimed to determine the extent to which interest groups are able to influence climate opinion. The results show that interest group messages can change people’s minds on climate policy, although the extent of interest group influence was moderate. Those receiving messages from interest groups arguing either for weaker or stronger climate policy had a less than 0.2 higher probability of supporting that policy compared with the control group (figure 5.1). Moreover, interest group messages seemed to affect

opinions on the specific policy they referred to, but not broader opinions about climate policy. Interest groups, therefore, do have an impact on the climate views of some members of the public. However, although some people are easily influenced by arguments or messages from interest groups – as well as from other sources such as politicians (Benegal & Scruggs, 2018; Kousser & Tranter, 2018) – most people’s opinions seem to be largely unaffected by such messages.

The evidence presented in chapter 5 and elsewhere (e.g. Bernauer & McGrath, 2016; L. Feldman & Hart, 2018) suggests that – while not insignificant – the degree of influence that external actors (including interest groups, political parties and economic elites) have on climate opinion is small. The information provided by external actors probably contributes to people’s processes of opinion formation, but only as part of a broader mix of factors, including pre-existing attitudes and values (Bechtel et al., 2015).

7.3 The complexity of climate opinion

In the previous two sections, I have reviewed the key findings from the four empirical chapters of this thesis. I discuss the wider implications of my research in the following three sections. I begin with this section, where I consider what my findings imply about the complexity of climate opinion and for future research on public opinion on climate change.

As I have shown, public opinion on climate change is multifaceted. My results demonstrate that belief, issue salience and support for government action can be considered distinct dimensions of climate opinion. Most of the population in developed countries believe that climate change is happening and is a serious problem. Most also believe that the government should be taking a central role in the response to climate change, and support many government policies to address climate change, such as subsidies for clean energy. Many even support higher taxes to address climate change, although support is not as strong as for government action in general. In almost all countries, however, salience is low, with issues such as the economy, healthcare and education ranked by most people as more important than climate change. In other words, there is only a small public in each country that could be considered highly engaged with climate change. The remainder of the population fit into

publics that do not have high levels of resolve to address it, are uncertain about it or deny the existence or seriousness of climate change.

The complexity of climate opinion means that, in research on public opinion on climate change, care should be taken to select the appropriate dimensions or measures of climate opinion. The important dimensions for a particular research project will depend on the specific research context. For instance, the Yale Climate Change Communications project includes measures mainly relating to belief in climate change and support for government action. As the focus of the Yale project is understanding how best to communicate climate issues to the public, this may be an entirely appropriate focus (although, arguably, a measure of issue salience might also be of use). As I explained in chapter 1, the context of this thesis is the relationship between public opinion and climate policy. Belief, issue salience and support for government action are important dimensions in this context. In the remainder of this section, I reflect on the implications of my results for further research on each of these dimensions, as well as research on the stability and other aspects of climate opinion.

7.3.1 Belief

Since belief in climate change is a fundamental part of a person's climate opinion, research on aspects of belief (such as belief in the existence, human cause and seriousness of climate change) will undoubtedly continue. In fact, most studies on climate opinion have focussed on belief in climate change, most often framed as an examination of denial of climate change (e.g. McCright & Dunlap, 2011; Poortinga et al., 2011). Much of this focus has been driven by the readily apparent activity of well-funded climate denial organisations, leading to questions about how effective such organisations are at influencing public opinion (Boussalis & Coan, 2015; Dunlap & McCright, 2015; McCright & Dunlap, 2010). Moreover, many scholars are concerned about the extent to which denial among the public is slowing down the adoption of policies to address climate change (Cann & Raymond, 2018; Dunlap, 2013; Poortinga et al., 2011).

However, there are reasons to question whether the academic focus on climate denial is proportionate to its importance as a social phenomenon (Barasi, 2017). Climate denial among the population appears to be quite rare, especially with respect to the existence and anthropogenic nature

of climate change. Few surveys over the last decade in any developed country have found that substantially more than 10% of the population are climate deniers in these terms (although denial about the existence and anthropogenic nature of climate change may be higher in the US). The belief that climate change is not a (particularly) serious problem is more common, although still one generally only held by less than 30% of the population in developed countries. As already suggested in section 7.2.3, the influence of climate denial organisations on public opinion also seems to be moderate at best (although they may be more successful in spreading uncertainty, a point which I return to below).

It is unclear why climate denial among the public could be expected to be a substantial factor contributing to inadequate climate policies, given the low levels of public denial of climate change. In contrast, elite climate denial is likely to hold considerable influence over climate policy. In some countries, major political parties and politicians deny the science of climate change. For example, in the US, the Republican party and President Trump routinely cast doubt on the existence and seriousness of climate change (Hahnel et al., 2020; Porter et al., 2019). Politicians holding power who deny climate change, will – as a matter of course – do what they can to slow or halt political action on climate change. Climate denial among politicians probably does, therefore, contribute to inadequate climate policy in these countries. However, in most developed countries, the major political parties acknowledge the existence and seriousness of climate change (publicly, at least) (Båtstrand, 2015). As the public also broadly accept the science of climate change, it is difficult to see how climate denial could sufficiently explain the inadequate political response to climate change in these countries.

There are many contexts where it is appropriate for research on public opinion on climate change to focus on climate denial, such as studies investigating the psychological underpinnings of denial of science. Moreover, the fundamental nature of belief in climate change means that it is worth including in most studies, even if it is not the main focus. However, if research on climate opinion seeks to unravel the “climate change puzzle” identified in chapter 1 (that is, to explain why countries have not adopted more comprehensive climate policies), a broader set of dimensions of climate opinion are required. Furthermore, given the relatively small numbers who deny climate change, it seems that more scholarly at-

tention could be paid to the section of the public who accept the science of climate change.

7.3.2 Issue salience

As has been argued throughout this thesis, issue salience is critical to a more complete understanding of climate opinion. The salience of climate change is low, and therefore politicians are unlikely to feel public pressure to act on climate change. Despite the importance of issue salience, it is not widely included, particularly as a dependent variable, in studies on public opinion on climate change. An increased focus on issue salience would substantially enhance our understanding of public opinion on climate change.

In particular, there is still much to uncover about the factors that underpin people's views of the salience of climate change. I have shown that younger, left-wing people with high levels of education are more likely to see climate change as high salience compared with older, right-wing people with lower levels of education, and that wealthier countries tend to show higher levels of climate change salience than poorer countries. However, examining the relationship between social and economic attitudes (such as those considered in chapter 6) and issue salience might provide further insight into the main factors influencing people's ranking of climate change relative to other issues.

Research could also investigate the extent to which issue salience (both individually and collectively) is stable. Some authors believe that people's political issue priorities can change easily and tend to respond to events (Dennison, 2019; Moniz & Wlezien, 2020). Theories of agenda-setting hold that the media plays a central role in focussing the minds of the public on particular issues, especially during an election campaign (Kratz & Schoen, 2017). Moreover, candidates are often able to influence the issue agenda during an election (Hayes, 2008). People's perceptions of the issue salience of climate change may thus be more fluid than their beliefs or policy preferences (Spartz et al., 2017). Indeed, there is some evidence that the salience of climate change may have been rising in recent years. For example, in a 2020 US poll, 18% of respondents indicated that climate change was one of the two issues that would influence their vote in the presidential elections (Climate Nexus, 2020).

However, the issue salience of climate change does appear to relate to

political orientation and other social and political attitudes (J. M. Miller et al., 2017; Moniz & Wlezien, 2020). At least for some people, then, climate change is a low salience issue because of their existing worldview. While people's worldview can change, such changes tend to happen over long periods of time. Moreover, the nature of climate change means that people can find it difficult to connect to it as an issue (Barasi, 2017). For instance, someone who has a relative in hospital might view healthcare as high salience, while a parent with school-age children might prioritise education above other issues. The opportunities for such a personal connection to climate change are, however, limited. Finally, climate change itself is likely to be an inherently low salience issue. In particular, climate change can be perceived by many as spatially and temporally distant (E. U. Weber, 2016), and this perception can lead to people viewing climate change as a low salience issue. More research is thus required to understand the extent to which people's ranking of climate change as low salience is likely to change, and the extent to which it may have been increasing in recent years.

The lack of studies that include the issue salience of climate change is probably due, in part, to the measurement issues discussed in chapter 2. The New Zealand Election Study, the basis of the analysis in chapter 6, includes an open-ended "most important issue" (MII) question. However, the open-ended nature of the question and the fact that respondents are asked for only their most important issue (and not second, third and so on) makes it difficult to use as a measure of issue salience. In the 2017 NZES data, as is typical for this kind of question (Yeager et al., 2011), very few respondents indicated climate change was the most important issue, and only around 5% of responses were coded as relating to "the environment". It is possible that many people see climate change as their second or third most important issue, which could still be considered high salience. Additionally, the small number of respondents stating climate change is the most important issue means that it is difficult to detect the statistical effects of explanatory variables on the dependent variable. The uncertainty around the validity of the MII question for measuring issue salience (Johns, 2010; Wlezien, 2005), and the small number of responses indicating climate change was the most important issue meant that I was unable to include issue salience in the analysis in chapter 6. This situation highlights the difficulty of conducting analyses which

include issue salience. As discussed in chapter 2, questions asking respondents to rank issues avoid many of these problems.

Overall, the fact that most people see climate change as a low salience issue, and that a number of individual characteristics and country-level factors relate to issue salience suggests that it is an important dimension to consider in future studies of public opinion on climate change. In particular, more studies that use issue salience as a dependent variable (rather than as a variable used to explain issue preferences or vote choices) would help to improve understanding of what shapes people's perceptions of issue salience. Moreover, understanding the factors that explain variation in issue salience across individuals or countries, and the stability of public issue salience will help to shed light on the likelihood that the overall salience of climate change might rise in the future.

7.3.3 Support for government action

Support for government action, while important, does not seem to be as critical as issue salience to understanding the relationship between public opinion and climate policy. People tend to support a central role for the government in the response to climate change at similar high levels as they believe that climate change is happening and is a serious problem. Thus, a lack of support for government action (in general) does not seem to be a plausible major factor in the inadequate political response to climate change in the same way that low issue salience is. As discussed in chapter 3, there does not seem to be a large section of the population who accept the science of climate change, but object – on ideological grounds – to government regulation and intervention in the economy to address it. Instead, any opposition to government action on climate change in general tends to come from people who already deny or are uncertain about climate change.

However, as I have noted, support for government action depends on exactly what the proposed policy is. Some citizens are, understandably, hesitant to support actions that could be personally costly to them. While others have noted the significance of this finding for communicating and framing climate policies (Drews & van den Bergh, 2016), it is possible that there are more consequential implications for the response to climate change. If most people are only willing to accept climate policies that have no obvious cost to consumers or citizens, then this could cre-

ate a substantial barrier to future government action. The “Yellow Vest” protests in France, sparked in part by fuel price rises due to the adoption of a carbon tax, are an example of the problems that could occur if governments fail to heed concerns among the public about the costs to consumers of climate policies (Kinniburgh, 2019).

In sum, it seems that there is broad agreement among the public that the government should be one of the main actors in the climate response. This fact is reassuring, given that most analysts assume the state must play a central role in addressing climate change (Giddens, 2011). However, it is less clear exactly what the public specifically wants the government to do to combat climate change. Therefore, it is still valuable to include measures of support for government action – and particularly support for policies that may have a cost to consumers – in analyses of public opinion on climate change. In particular, it would be valuable if future research expanded our knowledge of why people are hesitant to support policies that have attached costs. Is it simply a matter of improving communication and framing, or are people genuinely concerned about their personal pocketbooks? Moreover, what role does poverty and inequality play in people’s objections to such costs? Analyses addressing questions such as these will contribute to our understanding of the extent to which public support for government action is involved in the political response to climate change.

7.3.4 Stability of climate opinion

The results of the survey experiment in chapter 5 suggest that people’s climate beliefs and policy preferences are somewhat stable, even when they receive arguments in favour of or opposed to particular policies (Bernauer & McGrath, 2016; L. Feldman & Hart, 2018; Kousser & Tranter, 2018). Moreover, aggregate climate beliefs seem to be quite stable, at least in developed countries (Capstick et al., 2015; Milfont et al., 2017). The link between climate opinions (on all three dimensions) and political and social attitudes also suggests that people’s climate opinions may not change easily, as they are tied to their wider ideology, worldview and environmental “sensibilities” (McCright, Marquart-Pyatt et al., 2016; Wapner, 1996), which tend to change slowly, if at all.

The apparent stability of climate opinion does not necessarily imply that most people’s opinions are set in stone (Milfont et al., 2017). Re-

search tracking the trends in climate opinion have noted changes over time. Notably there was a dip in concern about climate change around 2008, which coincided with the Global Financial Crisis (Scruggs & Benegal, 2012). Moreover, people's ideology and worldview (and thus, potentially, their climate opinions) can change over time, and can be influenced by a number of different sources, including family, friends, political and other elites, interest groups and activists (C. E. de Vries et al., 2013; Freire, 2006; Rico & Jennings, 2016). Such changes are likely to happen over significant periods of time however, and are difficult to detect through survey experiments (Druckman et al., 2012).

Due to the paucity of research on the public salience of climate change, as mentioned above, it is not clear how stable public perceptions about the salience of climate change are. Future research examining the extent to which interest group messages, or other kinds of external influence, can change people's perceptions of the salience of climate change would therefore be valuable.

7.3.5 Other aspects of climate opinion

Aside from the three dimensions of belief, issue salience and support for government action that I have considered in this thesis, my results have implications for other aspects of climate opinion. Here, I briefly discuss two areas that future research could focus on: uncertainty in climate opinion and additional dimensions which may assist in understanding the relationship between climate opinion and policy.

In addition to focussing on dimensions beyond belief in climate change, future research on public opinion on climate change could pay more attention to uncertainty about climate change. As I demonstrated in chapter 3, uncertainty about climate change encompasses a set of opinions that are distinct from and more common than climate denial. Moreover, people who are uncertain about climate change tend to have different characteristics compared with deniers. In particular, the uncertain seem to be, on average, younger than deniers. Organisations that spread misinformation about climate change often seek to sow uncertainty as much as encourage denial, as alluded to in the title of the book about the activities of such organisations, "Merchants of Doubt", by Oreskes and Conway (2010). Public uncertainty about climate change is therefore an area which requires more research, and can incorporate

multiple dimensions of public opinion, including perceptions of the existence and seriousness of climate change and support for specific climate policies.

The three dimensions I have considered here are not the only ones that may be important for understanding climate opinion. I selected these dimensions with reference to the concept of public will, as outlined in chapter 2. I did not include a dimension of climate opinion that related to the “sustained collective action” part of the definition of public will, because I assumed that this was mostly about voting for parties that had appropriate policies to address climate change, or engaging in climate activism. However, another interpretation of public will could highlight people’s willingness to make sacrifices to address climate change. To meet temperature targets, it may be necessary for people to collectively make lifestyle changes such as flying less, eating less meat and purchasing fewer products in general (Creutzig et al., 2018). In short, it might require sustained collective action to change the consumer culture that currently dominates Western society. Are people – even those who believe climate change is a serious problem, support government action to address it and see it as a high salience issue – willing to make these kinds of sacrifices to help address climate change? Future research could explore this question, contributing to our understanding of public will and climate change.

7.3.6 Summary

In sum, our understanding of climate opinion will be enhanced if we continue to expand the scope of investigation. In particular, including the dimension of issue salience is critical in research seeking to contribute to knowledge of the relationship between public opinion and the inadequate policy response to climate change. In the next section, I explain how examining multiple dimensions of climate opinion – and thus gaining a deeper understanding of its complexity – can inform expectations about how public opinion may be influencing climate policy.

7.4 The relationship between climate opinion and policy

Throughout this thesis, I have examined public opinion on climate change in the context of its possible effect on climate policy. While I do not directly test the extent to which public opinion relates to climate policy, the insights gained from my analysis of climate opinion can help to form some expectations about what the likely relationship with policy is. In this section, I describe these expectations.

Most research on the relationship between public opinion and policy operates on the basis that if people's beliefs or policy preferences align with policy, or if changes in public opinion result in changes in policy, then politicians can be considered to be responsive to public opinion (Burstein, 2003; Canes-Wrone, 2015; Soroka & Wlezien, 2010; Wlezien & Soroka, 2007). However, politicians will generally not respond to public opinion on low salience issues (Burstein, 2003; Soroka & Wlezien, 2010). A lack of alignment between public policy preferences and policy on low salience issues does not necessarily represent a breakdown of political responsiveness to public opinion. In fact, it is arguably an example of political responsiveness working as it should. Politicians – who have limited resources, in terms of finances, political capital and time – are responding to public opinion if they prioritise issues that the public views as the most important and focus less on issues that are less important to the public.

Climate change appears to be an issue on which politicians are, broadly speaking, responding to public opinion. Climate opinion and policy do not seem to align, at least when considering only the dimensions of belief and support for government action on climate change. Most countries have inadequate climate policies despite the high levels of belief in climate change and support for government action among the public. However, because of low issue salience, politicians have tended to focus their attention on issues such as the economy, healthcare and security, which are more important to most people than climate change. Thus, politicians are responding to public opinion on climate change, if public opinion is understood in terms of public will (which includes the degree of public resolve to address the issue), rather than only climate beliefs and policy preferences.

Tentative evidence supporting the claim that issue salience is central to political responsiveness on climate change can be found by examining the differences in policy between countries with different levels of issue salience. The cross-country analysis in chapter 4 showed that Sweden, Denmark and Finland all have high levels of issue salience. The organisation Germanwatch assigns high rankings to all three of these countries in its Climate Change Performance Index (CCPI), indicating that they are assessed as having among the best climate policies (Burck et al., 2019). Countries with low levels of salience, such as Czechia, Poland and Portugal all receive low rankings. Yet, there are some exceptions to these patterns. The Netherlands – a country which has high issue salience – is ranked 29th in the CCPI, primarily because of its comparatively low use of renewable energy. Moreover, Lithuania and the UK, which have below average and average levels of issue salience respectively, are both ranked in the top 10. However, without a more comprehensive analysis, it is unclear whether countries such as the Netherlands, Lithuania and the UK represent outliers (where path dependence or contingencies may have played a role in their policy response) or provide evidence against the role of issue salience in policy formation.

It is important to remember that, although the issue salience of climate change is low, it is still an issue that is on the political agenda in most countries. Climate change is routinely mentioned in the media and in party manifestos (Barkemeyer et al., 2017; Farstad, 2018). Moreover, there are sections of the public who see climate change as the most important issue facing society (chapter 3). Even though only a small proportion of the population is highly engaged with climate change (and other environmental issues), this public is large enough to be noticed by politicians and to form a substantial constituency for Green parties in many developed countries (MacInnis & Krosnick, 2017). Climate change thus maintains a position on the political agenda, in contrast to very low salience issues – such as parliamentary procedure – which are typically not on anyone's agenda beyond the “beltway”.

This status of climate change as an issue on the political agenda (albeit a relatively low salience one) explains how countries have been able to put in place policies which – while inadequate – are not insignificant. For instance, most developed countries have adopted some kind of a price on carbon, and have ratified international agreements on cli-

mate change (Climate Action Tracker, 2019). Indeed, the handful of studies that have investigated the relationship between climate opinion and policy have tended to find that there is a relationship between the two, despite low salience (Bromley-Trujillo & Poe, 2018; Drummond et al., 2018; Kammermann & Dermont, 2018; Tjernström & Tietenberg, 2008; Vandeweerd et al., 2016). In other words, in most countries, politicians have not been able to completely ignore the issue and have responded to the public support for action on climate change that does exist. However, the action taken so far is not enough to ensure temperature rises are kept under the agreed target of 2°C, let alone 1.5°C (Climate Action Tracker, 2020).

To get a better understanding of the relationship between public opinion and climate policy, further research is needed to test this relationship directly. However, there are considerable methodological barriers to doing so. First, as I have argued throughout this thesis, any analysis of the relationship between climate opinion and policy would need to incorporate issue salience. Yet, as described in chapter 2, issue salience can be difficult to measure. Most major surveys therefore do not include an appropriate measure of issue salience. Second, assuming a quantitative cross-national comparison is adopted as the research design, it is not clear what the dependent variable should be. Climate policy does not easily lend itself to measurement, and the definition of “good” climate policy may differ between contexts. While indices of climate policy such as the CCPI are available, it can be difficult to assess their validity. Moreover, competing indices can disagree on their assessments of particular countries (Bernauer & Böhmelt, 2013). Finally, there can be statistical challenges in multi-level analyses where the dependent variable is measured at the country level. While it is possible to conduct a so-called “micro-macro” multi-level analysis (Croon & van Veldhoven, 2007), the limited number of countries available in most datasets means that statistical power becomes an issue. This problem is compounded by the dearth of datasets containing measures of issue salience, meaning that researchers may have to choose between datasets with either not enough countries, or without the necessary measures of climate opinion. Creative solutions to these problems, or innovative research designs (including those employing qualitative methods), are thus required to investigate the extent to which public opinion relates to climate policy.

Although not conclusive, the available evidence does suggest that politicians are at least somewhat responsive to public preferences on climate change, and that this responsiveness is more apparent when issue salience is incorporated in analyses. The public (in general) does not prioritise climate change as an important issue, and politicians (in general) respond by focussing more on other issues. To put it in the terms of public will, there appears to be only a small public with sufficient resolve to address the issue. Most of the population have a shared understanding of the problem, and broadly support government action to address it, but their lack of resolve to address climate change means that politicians are not under sufficient public pressure to put in place the policies that are necessary to substantially reduce emissions. Thus, while other factors such as vested interests and the complexity of climate change undoubtedly contribute, the low issue salience of climate change is one of the reasons why climate policy is inadequate. In the next section, I discuss the implications of the low salience of climate change (and the resulting inadequate policy) for representative democracy.

7.5 Issue salience and representative democracy

In their book “Degrees of Democracy”, Soroka and Wlezien (2010) examine the relationship between public opinion and policy in the US, UK and Canada for a range of issues including defence, welfare, health and the environment. Based on their results – which indicate that public opinion often appears to influence policy, particularly for high salience issues – they conclude that “Democracy works” (Soroka & Wlezien, 2010, p. 182). A number of other studies have also found that a relationship between public opinion and policy exists – at least in some contexts, and for some issues – leading to the assertion by many political scientists that modern representative (liberal) democracy is relatively healthy (Roberts & Kim, 2011; Stimson et al., 1995; Wlezien & Soroka, 2007).

In contrast, several authors have been less optimistic about the health of representative democracy, and have used inaction on climate change as a central example (Boston, 2017; Klein, 2015; Shearman & Smith, 2007). Many such authors point out the role of vested interests, and how vulnerable representative democracy is to lobbying and campaign

funding from special interests (Klein, 2015; Parsons, 2018). Thus, from this perspective, the wishes of the public on climate change are being ignored in favour of elites and fossil fuel companies with almost limitless resources (Klein, 2015).

As was argued in the previous section – and in contrast to these claims – politicians are, in fact, responding to public opinion on climate change. The public salience of climate change is low and politicians have responded to these public preferences by focussing on other issues. Soroka and Wlezien (2010) (and others) suggest that democracy can be considered to be “working” if politicians are responding to public opinion. Thus, by this definition, when it comes to climate change, democracy is working.

This definition of democracy “working” given by Soroka and Wlezien (2010) is, however, a narrow one (Sabl, 2015). Climate change is an existential threat to advanced civilisation, and – if the worst effects of climate change come to pass – it is unclear whether or not representative democracy (at least as it is currently understood) could continue to function (Leahy et al., 2010). It is difficult to see how a system could be described as “working” well if it is unable to prevent its own possible demise. Put differently, political responsiveness to public opinion on climate change may be an illustration of representative democracy working as intended, but it can hardly be considered to be representative democracy working effectively.

The fact that climate change is a low salience issue, that the salience of climate change seems unlikely to increase substantially in the near future and that representative democracies take substantial action primarily on high salience issues has led some authors to suggest that changes to representative democracy may be required (e.g. Boston, 2017; Machin, 2013; Shearman & Smith, 2007). As discussed above, there are reasons to believe that climate change is an inherently low salience issue due to its perceived temporal and spatial distance for many people. Moreover, as salience is linked to people’s worldviews – which tend to change only slowly, if at all – the salience of climate change may continue to be relatively low among the majority of the public in developed countries. Therefore, if the salience of climate change is unlikely to rise quickly, and the system of representative democracy intrinsically struggles to address and respond to low salience issues, then a possible way through the impasse on climate action is to change the system.

Various authors have proposed changes to representative democracy aimed at improving the political response to climate change, ranging from substantial reforms to wholesale replacement (e.g. Klein, 2015; Machin, 2013; Shearman & Smith, 2007). I briefly discuss three stylised proposals here (eco-authoritarianism, radical democracy and future-oriented institutional reform) and argue that it is unclear whether any of these alternatives to representative democracy will improve the response to climate change. In any case a transition to a new system may not be possible in the time required to act. These three perspectives range from limiting or eliminating democracy (eco-authoritarianism) to significantly expanding democracy (radical democracy). Future-oriented institutional reform is somewhere between the two more extreme proposals, and can lean towards either more or less democracy, depending on the specifics. Moreover, each of these proposals overlaps to some extent, and there is no clear delineation between them. Additionally, not all of these proposals have the same point of departure as I do; whereas I argue that it is low issue salience that might lead to questions about whether representative democracy should be changed, authors supporting radical democracy often argue that the problem is that elites (including politicians) are not listening to what the public wants (Klein, 2015). However, reviewing how these proposals might help to overcome the barrier of low issue salience can still help to determine whether far-reaching system changes are warranted.

The first proposal, eco-authoritarianism, begins from the premise that the public is unlikely to ever engage with climate change enough to encourage politicians to take sufficient action (Shahar, 2015; Shearman & Smith, 2007). From this perspective, protections against the will of the public are required, as members of the public tend to be short-sighted, selfish and unable to accept the far-reaching measures that will need to be taken to address climate change (Shahar, 2015). Thus, the suggested solution is to minimise or exclude the irrationality of the public from policy-making, and instead delegate decisions relating to climate change (and other environmental issues) to scientists and other experts (Shearman & Smith, 2007). In short, proponents of this approach to reform support the adoption of technocratic authoritarianism.

At the other end of the spectrum are supporters of radical forms of democracy, many of who have activist backgrounds. Supporters of this

perspective argue for the adoption of systems that allow for greater engagement and direct power for members of the public. These systems include deliberative or participatory democracy, and perhaps even anarchism (Alexander & Burdon, 2017; Machin, 2013). In contrast to eco-authoritarians, support for radical democracy is based on the assumption that it is not the public that is the problem, but political and economic elites failing to take action (Klein, 2015; Machin, 2013; Wilks-Heeg, 2014). Generally, the implication is that vested interests have too much influence over the system, delaying action on climate change. I have argued that the role of vested interests is likely to be overstated by some authors (e.g. Klein, 2015), and that the problem is more about low issue salience. However, supporters of radical democracy might claim that in a more participatory system, people would engage more deeply and holistically with societal problems, allowing them to have greater awareness of the relative importance of issues (Eckersley, 2020). Moreover, moving away from the paradigm of representation would remove the “funnel” of voting, allowing a wider range of issues to be addressed; issue salience would therefore be less important than it is in representative democracy. For most supporters of such a perspective, capitalism is also part of the problem, and must be replaced with some kind of communitarian system if climate change is to be averted (Klein, 2015; Parenti, 2013).

Finally, a number of authors suggest institutional reform to try to overcome the “presentist bias” inherent in representative democracy (Boston, 2017). From this perspective, due to factors such as uncertainty about the future, and a short-term focus among the public, representative democracy tends to struggle to adequately address long-term problems such as climate change (Boston, 2017; A. M. Jacobs, 2016). In particular, regular elections mean that politicians are incentivised to focus only on what can be done in the next electoral term to maximise their chances of re-election, rather than focus on longer-term issues where any positive outcomes for which politicians can claim credit might be decades away (A. M. Jacobs, 2016). The presentist bias of representative democracy has led some to suggest various reforms aimed at overcoming this bias and enabling the representation of future generations (Beckman, 2008; Boston, 2017). For example, Boston (2017) suggests that the NZ parliament could establish a select committee for the “future”, and that independent institutions could be created to advise governments on is-

sues such as climate change. For most authors who support this kind of institutional reform, any changes should broadly fit within the system of liberal democracy, and should have some kind of civic accountability (Boston, 2017).

Each of these proposed reforms has its own advantages and disadvantages. However, there are two significant problems with all three sets of proposals. First, it is very difficult to evaluate the extent to which any of these changes would actually make it easier to address climate change. It is not certain, for instance, that leaders in an authoritarian regime would be more committed to addressing climate change than leaders in liberal democratic regimes are (Shahar, 2015). It is also possible that members of a society employing deliberative democracy – or even anarchism – would act in selfish ways, and continue to prioritise short-term issues (Irvin & Stansbury, 2004; Sanders, 1997). Some countries have already adopted some of the suggested future-oriented institutional reforms – for example, Finland instituted a parliamentary Committee for the Future in 1993. Yet, such countries still, generally, have inadequate climate policies, suggesting that the changes have not overcome the tendencies of representative democracy to prioritise short-term problems over long-term ones, at least to any substantial extent. While it is possible that some of the proposed reforms outlined above could make a considerable improvements to the response to climate change, it is also possible that any changes will make no substantial difference at all, or could even make the situation worse.

Second, transitioning to any new system would be extremely complex, and will likely take many years to complete. Even the more modest future-oriented reforms to representative democracy that have been suggested would take substantial time to design, build democratic agreement around and put in place. Changing to completely new ways of organising society – which would be the case if eco-authoritarianism or radical democracy were adopted – would require an even longer and more complex transition. Given that time is already running short for the world to take substantive action on climate change (Lenton et al., 2019), it seems unlikely that there will also be enough time for developed countries to make substantial changes to the way they are governed. Thus, even if these proposed changes could actually assist in moving forward the response to climate change, which is not certain, it is not feasible to pursue

them at the current time. Representative democracy may be flawed, and may not be the best possible system, but it is currently the only practical choice (Wilks-Heeg, 2014).

In summary, substantial changes to how developed countries are governed involves significant risk and uncertainty. The best hope for overcoming the problems of the low public salience of climate change, therefore, is not a change to the system of governance in developed countries but a change in issue salience. System changes may still happen over the coming decades, particularly some of the institutional reforms proposed by Boston (2017) and others. But we should not assume that such changes are *required* in order to address climate change, particularly in light of the uncertainty over their efficacy and the transition challenges highlighted above.

7.6 Concluding remarks

Throughout this thesis, I have sought to expand knowledge of public opinion on climate change, with respect to the dimensions of belief, issue salience and support for government action. Additionally, I have investigated the factors that shape climate opinion on these three dimensions. In this section, I summarise my contributions to the study of public opinion on climate change and briefly revisit how public opinion fits in with other factors that may influence climate policy, such as vested interests.

The primary contribution of this thesis is an expanded understanding of the nature and importance of the public issue salience of climate change. The importance of issue salience is highlighted by the fact that most of the population in developed countries accepts that climate change is happening, sees it as a serious problem, and supports government action to address it; yet most people see climate change as low salience. I have demonstrated that issue salience is more central to people's world-views than belief in climate change or support for government action. Moreover, I have shown that issue salience varies across countries, and is substantially higher in wealthier countries than in poorer countries, a novel finding that requires further research to fully explain. In short, analysing issue salience is crucial for a complete understanding of public opinion on climate change and its relationship to the inadequate political response to climate change.

In addition, my research has contributed to knowledge about why left-right orientation so consistently relates to climate opinion (and the environment) in most developed countries. This relationship is not just about support or otherwise for free market principles, as some authors have assumed (Buttel & Flinn, 1978; Heath & Gifford, 2006; Longo & Baker, 2014; McCright & Dunlap, 2013), but social and political attitudes as well. I have also built on the results of previous studies showing that the link between left-right orientation and climate opinion varies between countries (McCright, Dunlap & Marquart-Pyatt, 2016; Poortinga et al., 2019), demonstrating that the relationship appears to be stronger in wealthier countries compared with poorer countries. Finally, my results also have implications for our understanding of the stability of climate opinion. The finding that the influence of interest group activity on people's climate views appears to be only moderate implies that aggregate opinions on climate change may be quite stable, at least in the short to medium term.

More broadly, I trust that I have illustrated the importance of investigating public opinion on climate change within the field of political science. Much of the previous research on climate opinion has been done by sociologists and psychologists. These fields undoubtedly have much to contribute to the study of public opinion on climate change. However, as I have argued, the politics of climate change are currently a considerable barrier to substantial climate action. Theories about political behaviour, political influence and political responsiveness to public opinion – all of which are well established in political science – can help to illuminate the ways in which politics and public opinion are part of the cause of climate inaction (Keohane, 2015). Thus, while a few political scientists have explored public opinion on climate change (e.g. Krosnick & MacInnis, 2013; Scruggs & Benegal, 2012), the study of climate opinion could benefit from greater attention from within political science.

While this thesis has been concerned with public opinion and its possible relationship to climate policy, a lack of public will is not the only reason behind the inadequate response to climate change. Vested interests have also had direct and indirect influence on climate policy (Brulle, 2014, 2018; McCright, 2016; Rickards et al., 2014). Fossil fuel companies, other corporations and individuals with a lot to lose if large-scale decarbonisation goes ahead, have spread misinformation about cli-

mate change, lobbied politicians to slow down action on climate change and reduced public trust in government to act effectively (Brulle, 2018; McCright & Dunlap, 2010). There is no reason to think that there is an end in sight for this kind of activity; vested interests will, most likely, continue to block and slow down action on climate change as much as they can for the foreseeable future.

A number of authors have pointed to insufficient political will as being responsible for the lack of political action on climate change (Gurría, 2008; Shue, 2011). Yet, as I argued in chapter 1, without understanding what drives political will, knowing that there is not enough of it does little to help to solve the climate change puzzle. I have focussed on the role of public opinion in driving political will; however politicians are not expected to blindly follow public opinion (Dahl, 1956; Manin, 1997). Indeed, some politicians haven taken a moral stand on climate change, and some have even tried to lead public opinion. Although he did not oversee significant political action on climate change in the US, Barack Obama made climate change a central pillar of his presidency, despite high levels of public climate denial when he took office in 2008 (Davis et al., 2016). However, there are few ready examples of politicians in powerful positions in developed countries spending their political capital to push through unpopular climate policies simply because they believe that such policies are necessary to address climate change.

Barriers to stronger climate action – such as a lack of political leadership, the activities of vested interests and the complexity of climate change discussed in chapter 1 – are difficult to overcome. However, it is important to note that, because they are often critical to their re-election chances, politicians tend to be highly responsive to high salience issues. Massive climate marches have been seen around the world in recent years, with one protest in New Zealand in 2019 estimated as involving 3.5% of the entire country's population (RNZ, 2019). If such public sentiment on climate change continues to grow, and translates into electoral outcomes, politicians will be forced to respond to public will, and it will be difficult for vested interests to maintain any direct or indirect control they have over the policy process.

Overall, I hope that the results and analyses in this thesis contribute towards solutions to the climate change puzzle. Bringing emissions under control grows more urgent by the day, and yet climate policy does not

seem to advance at the required pace. Solving any problem requires a sound understanding of what the causes are. To that end, I trust that I have demonstrated that the debate over what is holding back climate policy should place less emphasis on the role of vested interests, and the small section of society who deny the existence of climate change. Instead, more focus should be directed towards the low salience of climate change among the public who accept that it is happening.

Appendix A

Survey text

Below are the questions used for this study. Text in square brackets indicate how the form operates.

1. Please rank the following eight issues by ordering them from most important to least important for the United Kingdom (UK) today. Please drag and drop the issues to reorder.

[Initial order of options is random. Participants can drag and drop to reorder]

- Health care
- Education
- Crime
- Climate change
- Immigration
- The economy
- Terrorism
- Poverty

Recently you may have noticed that climate change has been getting some attention in the news. Climate change refers to the idea that the world's average temperature has been increasing over the past 150 years, may continue to increase more in the future, and that the world's climate may change as a result. This process is sometimes referred to as "global warming".

2. What do you think? Do you think that climate change is happening?

- Yes
- No
- Don't know

[Ask Q3 if answer to Q2 is "Yes"]

3. How certain are you that climate change is happening?

- Extremely certain
- Fairly certain
- Moderately certain
- Slightly certain
- Not at all certain

[Ask Q4 if answer to Q2 is "No"]

4. How certain are you that climate change is not happening?

- Extremely certain
- Fairly certain
- Moderately certain
- Slightly certain
- Not at all certain

5. Assuming climate change is happening, do you think it is...

- Caused mostly by human activities
- Caused mostly by natural changes in the environment
- Other (Please specify) [Textbox]
- None of the above because climate change is not happening
- Don't know

6. Of the following statements, which comes closest to your own view?

- Most scientists think climate change is happening
- Most scientists think climate change is not happening
- There is a lot of disagreement among scientists about whether or not climate change is happening

- Don't know
7. When do you think climate change will start to harm people in the UK?
- People are already being harmed
 - In 10 years' time
 - In 25 years' time
 - In 50 years' time
 - In 100 years' time
 - Never
 - Don't know
8. How serious a problem do you think climate change is for the world?
- Extremely serious
 - Very serious
 - Moderately serious
 - Slightly serious
 - Not at all serious
9. How important is the issue of climate change to you, personally?
- Extremely important
 - Very important
 - Moderately important
 - Slightly important
 - Not at all important
10. How informed do you consider yourself to be about climate change?
- Extremely well informed
 - Very informed
 - Moderately informed
 - Slightly informed
 - Not at all informed

11. How much of a priority do you think climate change should be for the UK government?

- Low priority
- Medium priority
- High priority
- Very high priority

12. Keeping up with climate change requires paying attention to the news. However, to show you are paying attention to this survey, please select “Not at all interested” below.

- Extremely interested
- Very interested
- Moderately interested
- Slightly interested
- Not at all interested

13. How important do you think it is for the UK government to consider prices and jobs when addressing climate change?

- Extremely important
- Very important
- Moderately important
- Slightly important
- Not at all important

14. Climate change could be addressed with government policy (such as laws and regulations on actions that cause climate change) or by allowing people and businesses to find their own solutions.

What do you think? Which of these two ways of addressing climate change do you think is likely to be the *most* effective in the UK?

- Government policy (such as laws and regulations on actions that cause climate change)
- Allowing people and businesses to find their own solutions

- Neither / Can't decide

15. How willing would you be to pay much higher taxes to help prevent climate change?

- Very willing
- Fairly willing
- Neither willing nor unwilling
- Fairly unwilling
- Very unwilling

16. What do you think of the way the UK government is tackling climate change at the moment?

- The government is not doing enough
- The government is doing about the right amount
- The government is doing too much
- Don't know

[Ask Q17 if answer to Q2 is "yes" or "don't know"]

17. Some people say that the world as a whole has not done enough to address climate change. Assuming this is true, what do you think is the main reason that the world hasn't done more to address climate change?

- Politicians don't care enough about climate change
- Large corporations have too much influence over politicians
- The general public doesn't care enough about climate change
- The media don't report on climate change accurately
- There is too much uncertainty about the causes of climate change
- Organisations funded by large corporations are spreading too much false information about climate change
- None of the above

[For the following section of the survey, participants are randomly assigned to one of five groups: the “anti-action/no frame” group, the “anti-action/economic frame” group, the “pro-policy/no frame” group, the “pro-policy/effects frame” group and the “control” group.

The following text is displayed to all groups.]

Please read the following short article. Afterwards, there will be some questions about this article.

Climate change causes and solutions

A recent study shows that 97% of climate scientists agree that climate change is occurring, and that it is mostly driven by human activities. The human activities causing climate change include the burning of fossil fuels (such as petrol and coal) and agriculture. Both of these types of activities produce “greenhouse gas” emissions, which need to be reduced to stop climate change from happening. Businesses account for a large share of the UK’s greenhouse gas emissions.

The UK government has considered two ways of reducing emissions. The first is to introduce government regulation, which would involve the government **setting a price on emissions** to make sure that businesses pay for their emissions.

The second is for the government to encourage businesses to take **voluntary action** to reduce emissions.

[The following text is displayed only to the anti-action/no frame group]

Many organisations prefer voluntary action

Several organisations have called for the government to support voluntary action by businesses to reduce emissions instead of making businesses pay for emissions.

“Voluntary measures are all that are required to reduce emissions to an appropriate level,” said a spokesperson for one group.

[The following text is displayed only to the anti-action/economic frame group]

Many organisations prefer voluntary action

Several organisations have called for the government to support voluntary action by businesses to reduce emissions instead of making businesses pay for emissions. They point to the fact that making businesses pay might harm the economy, and could result in higher costs to consumers for food, transport and power.

“Voluntary measures are all that are required to reduce emissions to an appropriate level,” said a spokesperson for one group. “Putting a price on emissions will even lead to job losses in some industries. Voluntary measures allow businesses to decide the best way to reduce their emissions. This means we can tackle climate change without negatively affecting the economy.”

[The following text is displayed only to the pro-policy/no frame group]

Many organisations prefer a price on emissions

Several organisations have called for the government to set a price on emissions from businesses instead of relying on voluntary agreements to reduce emissions.

“A price on emissions is necessary to ensure emissions are reduced to an appropriate level,” said a spokesperson for one group.

[The following text is displayed only to the pro-policy/effects frame group]

Many organisations prefer a price on emissions

Several organisations have called for the government to set a price on emissions from businesses instead of relying on voluntary agreements to reduce emissions. They point to the urgent need to reduce emissions leading to climate change, with a price on emissions being the quickest and most effective way of ensuring businesses change their practices and reduce emissions.

“A price on emissions is necessary to ensure emissions are reduced to an appropriate level,” said a spokesperson for one

group. "Relying on voluntary action by businesses will not reduce emissions enough. A price on emissions is necessary to ensure that emissions are reduced to a level that will prevent the worst effects of climate change, such as sea level rise and increases in severe weather events."

18. Which of the following actions do you think that the UK government should focus on to tackle climate change?

- Set a price on emissions
- Encourage businesses to take voluntary action to reduce emissions
- Neither - they should do nothing

19. How concerned are you that actions taken by the UK government to reduce emissions may harm the economy (for example, making things more expensive to buy, or causing job losses)?

- Extremely concerned
- Very concerned
- Moderately concerned
- Slightly concerned
- Not at all concerned

20. How concerned are you that the UK government may not do enough to avoid the worst effects of climate change (for example, sea level rise, or severe weather events)?

- Extremely concerned
- Very concerned
- Moderately concerned
- Slightly concerned
- Not at all concerned

21. Which of the following statements best summarises the article that you have just read?

- The UK government has put a lot of effort into reducing emissions, but not much has been achieved so far

- The UK government does not accept that climate change is caused by greenhouse gas emissions
- The UK government can help businesses reduce emissions by either putting a price on emissions or by encouraging businesses to voluntarily reduce emissions
- The UK government is unsure about how to act on climate change because experts disagree about whether emissions are causing climate change

Finally, please answer a few questions about yourself.

22. What is your age?

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- 75-84
- 85+

23. Do you identify as:

- Male
- Female
- Transgender / Intersex / Other
- Prefer not to say

24. Which ethnic group do you primarily identify with?

- White
- Mixed / Multiple ethnic groups
- Asian / Asian British
- Black / African / Caribbean / Black British
- Other ethnic group (please describe) [Textbox]

- Prefer not to say

25. What is the highest level of education you have completed?

- No formal qualification
- Secondary (GCSE/O-Levels)
- Post-Secondary (College, A-Levels, NVQ3 or below, or similar)
- Vocational Qualification (Diploma, Certificate, BTEC, NVQ 4 and above, or similar)
- Undergraduate Degree (BA, BSc, etc.)
- Post-graduate Degree (MA, MSc, etc.)
- Doctorate (PhD)
- Prefer not to say

26. In political matters people talk of "the left" and "the right". How would you place your views on this scale?

(Left) 1 2 3 4 5 6 7 8 9 10 (Right)

27. Which political party do you most identify with?

- Conservative
- Labour
- Liberal Democrat
- Scottish National Party (SNP)
- UK Independence Party (UKIP)
- Green
- Democratic Unionist Party (DUP)
- Sinn Féin
- Plaid Cymru
- Other (please specify) [Textbox]
- None
- Prefer not to say

28. What is your personal income per year (before tax)?

- No income

- Less than £10,000
- £10,000 - £19,999
- £20,000 - £29,999
- £30,000 - £39,999
- £40,000 - £49,999
- £50,000 - £59,999
- £60,000 - £69,999
- £70,000 - £79,999
- £80,000 - £89,999
- £90,000 - £99,999
- More than £100,000
- Prefer not to say

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