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School is not enough: The role of climate-specific knowledge for transformative climate policy and economic system preferences

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Abstract

Despite risen awareness of human-made climate change, there are still gaps in knowledge about the precise nature and the impact of the climate crisis for many people. This paper investigates to what extent factual knowledge about climate change is linked to publics' policy preferences regarding climate crisis measures. It expands on existing research by widening the focus beyond climate-specific policy and also investigates whether knowledge about the crisis is connected to preferences for greater state involvement in the economy structurally. Comparing representative survey results from eight European countries and the USA, this paper shows that climate-specific knowledge is indeed strongly linked to both—while greater formal education does not show strong associations or is even linked to a preference for the status quo in some countries. Important cross-country variations and the implications of emphasising climate specific knowledge in advocacy and policy contexts are discussed to demonstrate how enhancing public knowledge could increase support for transformative climate policies and broader economic change.

Keywords Climate crisis · Climate knowledge · Policy attitudes · Economic attitudes · Formal education

Introduction

Avoiding climate catastrophe requires decisive action and extensive policy changes. However, in democratic societies, major reforms are difficult to implement without public support or at least a lack of opposition. While outright climate change denialism is not a major feature in public attitudes (Smith 2019; Flynn et al. 2021), other forms of scepticism about the scope of the climate crisis—in terms of humanity's contribution on the one hand and the impact on everybody's lives on the other hand—must be taken into account (Rahmstorf 2004). However, to what extent publics show such attribution or impact scepticism differs between countries (European Commission 2019). While recent work has enhanced insights into public conceptions of the climate crisis (Ipsos MORI 2021; Carmichael and Brulle 2017), research on the interplay between objective knowledge, formal education and attitudes towards transformative climate policies is limited. Understanding those links better is essential for our

appraisal of people's views of what action should be taken to address the climate crisis (Bertoldo et al. 2019).

This paper seeks to contribute to this literature using an original survey conducted in eight European countries and the USA. It deepens our insights into the association between understanding the facts behind the crisis and people's desire for transformative change. In doing so, we make two crucial distinctions previous research has shown to be important but which have not been connected yet. First, we distinguish between objective measures of climate crisis knowledge and formal education to examine whether specific knowledge must be obtained, or general education suffices. Second, we do not only focus on people's views about climate-specific policy but separately investigate how knowledge and education are related to attitudes on economic policy in general. This allows us to investigate whether any potential associations with climate-specific knowledge extend to broader systemic policy attitudes. In particular, we look at whether there is a link between how people view the economy and what they know about the climate crisis. Bringing both dimensions together in this paper enables us to demonstrate that climate-specific knowledge indeed is crucially linked to more transformative climate policy views, but fundamentally also to broader economic system perspectives. The latter

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has been shown to be essential to enact required structural changes (UNCTAD 2009: 145). At the same time, greater formal education is shown to be less relevant and at times even presents a barrier to change, being associated with status quo support rather than a desire for transformative policies. While overall patterns exist across the countries studied, we also highlight that important country differences can be observed—cautioning against generalisations from similar research in single-country settings.

Review of existing research

While all major democracies have signed the Paris Agreement, none of them has produced a national climate plan compatible with its goals so far (Willis et al. 2021; Climate Action Tracker 2020). Meanwhile, the impact of the climate crisis has become ever more manifest (Pierrehumbert 2019). Transformative policy changes are needed and have to address the wider economic system. The global economy today functions in a way that is incompatible with the limits of the Earth and its long-term sustainability (Phelan et al. 2013). But how can governments in democratic countries achieve transformation in both specific climate policies and the wider economic system while maintaining public support?

Knowledge vs formal education

A key instrument often invoked as elementary in increasing public support for climate action is knowledge about the crisis. Researchers have argued for a while that climate attitudes are a product of risk perceptions and concern for the climate crisis, which simultaneously are dependent on the degree of specific knowledge that people have regarding this matter (Kellstedt et al. 2008; Bergquist et al. 2022). However, despite the severity of the climate crisis and the urgency for a straightforward response to it, public understanding of the issue remains limited (Fischer et al. 2019). Millner and Ollivier (2016) advance several explanations to people's lack of understanding about the climate crisis, including the difficulty of grasping gradual changes and of drawing a link between complex causes and distant consequences. Concerns about a lack of knowledge are not new. In 2006, a UK study found that 40% of respondents still agreed that 'climate change is too complex and uncertain for scientists to make useful forecasts' (Downing and Ballantyne 2007). While the debate has evolved, knowledge gaps still persist. In their study about knowledge of climate change across six countries, Shi et al. (2016) found that only 75% of respondents correctly agreed that 'climate change is mainly caused by human activities' and only 18% correctly reject the statements that 'today's global CO₂ concentration in the atmosphere has already occurred in the past 650,000 years'.

As recently as 2020, significant parts of European publics incorrectly thought that scientists were evenly divided on whether climate change is mostly caused by humans—ranging from just over a third in Spain to half in Poland and 2/3 in the Czech Republic (Eichhorn et al. 2020). There is, therefore, an evident gap between the scientific consensus around the causes and consequences of climate change, and public perceptions of the same phenomena. This has been formalised in the so-called knowledge deficit model. It argues that, as experts have a higher degree of understanding and consensus of specific issues than the public, an increase in public knowledge would occur with a lag—ultimately shrinking the knowledge gap and leading to convergence of citizen and scientists' attitudes (Stoutenborough and Vedlitz 2014).

Nevertheless, initial studies that sought to formalise the relationship between public climate-specific knowledge and policy attitudes found results that challenge such optimistic assumptions. Some of them (e.g. Kellstedt et al. 2008) even found that the more informed an individual was about global warming, the less responsible and less concerned they felt for it personally. Others simply found no significant relationship between knowledge about climate change and, for instance, scepticism regarding its risk and implications (Whitmarsh 2011). Findings on the link between knowledge and attitudes have not been consistent.

Some of those counter-intuitive findings can be explained by methodological shortcomings, as earlier studies frequently relied on measures of self-perceived knowledge about the climate crisis (that is, how informed a respondent reported to be regarding climate matters). Self-perceived knowledge, however, has been shown to be unreliable as an indicator. For instance, Durant and Legge Jr. (2005) found that self-reported levels of information and objective knowledge measures were largely uncorrelated and worked in opposite directions. A mismatch can also be seen in the aggregate: while levels of self-reported knowledge about climate change had been rising from the 1990s to the 2010s (Upham et al. 2009), the proportion of people in the UK holding views reflecting attribution scepticism, such as 'claims that human activities are changing the climate are exaggerated', almost doubled simultaneously from 2003 to 2008, increasing from 15 to 29 per cent (Whitmarsh 2011). More recent studies, using objective measures of knowledge to explore the same relationship instead, have found more consistent links with knowledge about the climate crisis and the perceived gravity of the issue, readiness to adopt lifestyle changes and welcoming climate-mitigating policy measures (Douenne and Fabre 2020; Eichhorn et al. 2021). Shi et al. (2016) found that objective knowledge significantly increased concern about climate change in a European, North America and Chinese national context, albeit with mixed results when using knowledge about the physical effects and consequences of climate change. Maestre-Andrés

et al. (2021) showed that people with greater objective knowledge were more supportive of carbon taxes and, through survey experiments, that providing information can affect people's attitudes. To what extent people are willing to revisit existing views appears to be relational: people who overestimate how common their perceptions of carbon taxation are, tend to be less likely to alter their views following the introduction of new information (Drews et al. 2022a). These insights demonstrate the need for more detailed analyses, but, unfortunately, many surveys with detailed questions on climate policy attitudes do not contain extensive (or any) questions on objective climate crisis knowledge.

A further limitation is that research in the field of climate change and policy attitudes for a long time had a strong concentration in the USA (Upham et al. 2009; Lewis et al. 2019). This is particularly important given the distinct influence that certain moderators have on the relationship between knowledge and attitudes for American publics. Malka et al. (2009), for instance, showed that party identification affected the relationship between a respondent's degree of knowledge of the climate crisis and their concern for it. Similarly, Kahan et al. (2012) as well as McCright and Dunlap (2011) showed that, while education by itself had little effect on the perceived risks attributed to climate change, the interaction between education and political orientation had a strong significant influence. European scholarship has found that many of these patterns were not present or did not work in the same way in European countries. For example, in their study of French climate attitudes, Douenne and Fabre (2020) did not find the same political polarisation that characterises the US or evidence that political partisanship would lead to dismissal of scientific evidence regarding the climate crisis. Thus, while political positioning and other ideological factors might still have an effect over the European public's willingness to adopt climate policy measures, it is pertinent to question whether they affect the relationship between climate-specific knowledge and climate attitudes in the same way as they do in the US.

It is therefore essential to further develop scholarship on this issue, which explicitly compares attitudes in the US to those elsewhere and takes into account objective measures of climate-specific knowledge. This is all the more important as general formal education has been shown to be linked poorly to climate-specific knowledge repeatedly. Ziegler (2017) found no significant effect of education on the likelihood of believing in anthropogenic climate change. Therefore, we cannot assume that more formal education automatically translates into greater climate-specific knowledge and a greater willingness for transformative change. Kahan et al. (2012) found that skills associated with higher education (greater scientific and numerical literacy) do not lead to an increase in perceived risk of climate change, but rather an increase in polarized perceptions (in the USA). In their

exploration of students' knowledge about climate change, Wachholz et al. (2012) found that students at university still held numerous misconceptions about the basic causes and consequences of climate change. For example, the majority conflated the phenomena of climate change and the ozone hole, and a third of them did not comprehend the degree of scientific consensus around the climate crisis. Comparing populations in North America and Europe, Eichhorn et al. (2020) found that climate-specific knowledge was strongly linked to personal and government climate action, while formal education was only weakly or moderately associated. Bergquist et al. (2022) found that effects of education were only applicable in certain geographic contexts, while Drews et al. (2022b), Shi et al. (2016), Ziegler (2017) and Thomas et al. (2022) found little to no effect of education on climate change concern or support for climate policies once other socio-demographic variables were controlled for.

Economic system contexts and ideological moderators

As researchers have demonstrated, action to combat the climate crisis cannot be limited to a narrow array of climate-specific policy options, but rather requires systemic engagement with the economic system (see Paterson 2021). However, concerns about negative economic consequences as a perceived trade-off to transformative action are amongst the reasons publics can be weary of greater change (Hennes et al. 2016). Therefore, we should investigate whether the impact of climate-specific knowledge extends beyond the specific array of climate policies into distinct economic system preferences as well. On the one hand, we may indeed expect a positive relationship, assuming that climate-specific knowledge could imply greater awareness of the risks and consequences of climate breakdown, involving extensive economic disruption and hardship (Gilding 2011; Siegrist and Árvai 2020). On the other hand, some studies have suggested that such knowledge, if paired with a 'doom and gloom' perspective around the crisis, may demotivate action (Chapman et al. 2017) or that 'system-defensive motivations' may be activated even before scientific information about the climate crisis is processed by the public (Hennes et al. 2016). Others suggest that respondents' economic attitudes to climate change mitigation systematically overestimate personal costs of taxation and underestimate the cost of government spending (Jagers and Hamar 2009). This would mean that those people who have an interest in the preservation of the economic system status quo would not process climate-specific information in the first instance—effectively avoiding any connection between their economic worldview and information on climate questions.

The specific role of climate policy discussions within wider economic debates are, of course, deeply political.

Accordingly, we must explore how the interplay of knowledge and education with climate policy and economic system attitudes may be affected by political ideology. Indeed, left-wing leanings have often been shown to be associated with more environmental concern and more willingness to act on it. Kulin et al. (2021), for example, have shown that individuals holding nationalist attitudes—which are an increasingly recurrent trait of European right-wing parties, albeit not synonymous—were more sceptical towards the climate crisis and more likely to oppose taxes on fossil fuels. Similarly, McCright et al. (2016) found that citizens on the right of the political spectrum were less likely than those on the left to believe the anthropogenic causes of climate change, to perceive climate change as a serious problem that should be dealt with and to support policies targeting greenhouse gas emissions reduction. Poortinga et al. (2019) also argue that individuals identifying with the right are less likely to identify negative impacts from the climate crisis and to be concerned about climate change. These studies complement findings from earlier inquiries.

However, ideological orientations do not operate identically in all places. Left-right polarisation on climate crisis perceptions has been shown to not be as prominent in all countries (McCright et al. 2016; Ziegler 2017). Beyond the aforementioned divide between the US and Europe, some studies found that the UK might also operate in a distinct way to continental Europe (McCright et al. 2016). In fact, Eichhorn et al. (2020) find political polarisation to be more pronounced in the USA and UK than other countries in Europe, such as the Czech Republic, including on questions about climate knowledge. In similar fashion, recent scholarship (see Kulin et al. 2021; Lewis et al. 2019; Smith and Mayer 2019) have also found that classic political polarisation is far more divisive within Western Europe than it is in Eastern European countries.

In summary, we need a nuanced and comparative perspective to appraise in more detail how climate-specific knowledge may be associated with support for transformative action. In this paper, we contrast the effect of objective knowledge with general formal education on both climate-specific policy and general economic system preferences—taking into account people's ideological position and comparing results from eight European countries and the United States.

Data and methods

Data source

This paper uses data from an original survey conducted 7–25 August 2020 in nine countries (Germany, France, Italy,

Poland, Czech Republic, Sweden, Spain, USA and UK). In each country, just over 1000 respondents aged 18 to 74 were recruited, except for Germany where twice as many people were interviewed (10,287 in total). Data collection was undertaken using the online panel of the firm Bilendi, who, together with partners, have a large base of possible respondents across those nine countries. Panel-based quota designs using online panels have been shown to be a viable approach for general population surveys, if the quality of the panels is good (Baker et al. 2010) and a detailed quota design is used, which includes quotas beyond basic demographics, such as education or social class reflecting socio-economic differences. However, these approaches require very careful management to ensure effective sampling that minimises biases which can otherwise occur (Couper 2017). Therefore, quotas were applied for age, gender, sub-national regions and education levels of respondents. Additionally, to ensure that distributions were balanced across quotas, cross-quotas were applied to set education levels within each region as well as age groups within each region (thus also linking education and age indirectly). Invitations to the survey were issued gradually to ensure balance across quotas, which were maintained as long as feasible to minimise the need for weighting to account for deviations from population parameters on quotas and cross-quotas. Age was restricted to 74 across all countries, as panels in some countries did not contain enough participants beyond that limit. The resulting sample distributions were very close to population parameters on all main quotas (please see Appendix 2 for a detailed overview of those distributions). Weights were applied to take into account deviations, but overall, weights were small and only affected the outcomes minimally. Frequency distributions of key dependent and independent variables only shifted by up to one percentage point for specific values when weights were applied. All analyses presented in this paper use those weights.

The questionnaire used in the survey was designed by the research team incorporating existing questions from established surveys on climate change attitudes and formulating new questions on climate crisis knowledge, policy orientations and economic system preferences. The survey was written in English and translated by a professional agency. The translations were then checked by academics whose mother tongue was the respective language of the countries surveyed and question texts edited where necessary. The survey programming was extensively tested on various devices (laptops, tablets and mobile phones) and the survey was piloted first with 50 respondents in each country to identify any issues of concern with particular questions.

The survey was conducted following ethical review by the organisations responsible for it and meeting all professional standards upheld by survey providers with Bilendi holding all common industry certifications.

Dependent variables

We conduct regression models to examine the association of climate-specific knowledge and formal education, taking into account political self-positioning and relevant control variables, for two dependent variables: support for transformative climate policies on the one hand and economic system preferences on the other.

Both dependent variables are based on standardised composite scores made up of responses to several questions. The first variable measures whether on a range of questions about policies addressing the climate crisis respondents favoured the status quo or supported transformative options. Answer options across questions were re-coded from their respective scales in equidistant steps between 0 (least transformative/status quo) to 10 (most transformative). This was done as responses to different questions in the survey used different scales, but we wanted to include the information from a broad variety of policy-oriented questions. The mean of all responses was then calculated (resulting in an overall score between 0 and 10). Nine questions were included, mixing questions on policy principles with questions about specific policy areas, including:

- How governments should get people and businesses respectively to act more climate-friendly (if at all);
- How reliant on technology policy should be;
- How comprehensive government policy on climate action should be;
- How emissions from meat production should be addressed;
- How emissions from air travel should be addressed;
- How emissions from car travel should be addressed; and
- How emissions from construction should be addressed.

The second variable measures preferences about the economic system and specifically the extent to which respondents want the state to be involved in steering the economy. Again, answer options across questions were coded in equidistant steps between 0 (no/most restrictive state role) to 10 (most extension state intervention). The mean of all responses was calculated (resulting in an overall score between 0 and 10). Four questions were used, addressing:

- What goals should guide economic decisions of government primarily and secondarily;
- How wealth inequality should be addressed (if at all) and
- How the state and firms should interact.

The detailed set of questions and the coding can be found in Appendix 2.

Independent variables

To assess factual knowledge, we combine the response from six questions asked of respondents in the survey. We follow Fischer et al. (2019) in their approach of integrating questions from different knowledge domains, thus establishing a broader assessment of people's understanding of the climate crisis. We include questions that capture (i) the description of the state of affairs, (ii) an assessment of the causes and (iii) questions assessing people's appreciation for the consequences. The questions covered the following aspects (the exact question wording can be found in the Appendix):

- Whether respondents knew that the climate is changing (i);
- Whether respondents knew about the 1.5 and 2 degree goals of the Paris Climate Conference (i);
- Whether respondents knew that scientists were nearly unanimous in their assessment that climate change is largely caused by humans (i);
- Whether respondents knew that climate change is mostly caused by human activity (rather than being a natural occurrence), (ii).
- Whether respondents knew that the richest half of the global population are responsible for roughly 90 per cent of global carbon emissions (ii);
- Whether respondents knew that climate change would be likely to impact their lives by 2035 (iii).

The score is increased by one for each correct answer, resulting in a score ranging from 0 to 6. The score is roughly normally distributed. We were limited in the range of issues we could use in the models by the questions that were asked in the survey. A dedicated survey to assess knowledge in an even more nuanced way would incorporate a wider set of questions for each of the three knowledge domains (e.g. Shi et al. 2016). However, as we have been able to at least capture one item per knowledge domain, the overall measure acts as a good indicator differentiating between people who have a better or worse understanding of the climate crisis—which is how the indicator is used in the analyses. People scoring highly need to be able to correctly answer questions about the state of the expert debate in terms of science and politics (i), correctly understand the human role in causing climate change and the unequal attribution of emissions globally (ii), as well as that their lives are very likely to be impacted by a changing climate in the near future (by 2035) already (iii) with, for example, extreme heatwaves in Europe becoming a standard occurrence (CCAG 2022).

The measure for education distinguishes three comparable levels (coded from country-specific education qualifications): lower secondary education or below, upper secondary education and tertiary education.

The variable to assess political ideology attitudes is a classic left-right self-positioning indicator, asking respondents to position themselves on a scale from 1 (most left) to 10 (most right).

We also add a range of control variables that have been shown to differentiate population views on the climate crisis previously (Ballew et al. 2020), in particular: gender see (Knight and Givens 2021; Pearson et al. 2017; Poortinga et al. 2019), age (see Weckroth and Ala-Mantila 2022; Poortinga et al. 2019; Schubert and Soane 2008; Savin et al. 2022), socio-economic background (Whitmarsh 2011; Douenne and Fabre 2020), operationalised here through housing tenure, economic activity status and town type (the centre-periphery divide between urban and rural areas was found to be a key divide in climate perspectives in Arndt et al. 2022; socio-tropic effects were found in Schimpf et al. 2021).

Approach

Both dependent variables were normally distributed (see Appendix 3 for the distributions) and showed no non-linear relationships with independent variables. Therefore, multiple linear regression models using ordinary least squares were used. While the individual data items would be most appropriately understood as ordinal variables, the combined scores can be interpreted in a continuous manner. As other research has demonstrated, in large-N studies with normal, non-extreme outcome distributions OLS models typically perform similarly well to probit or logit models (except for models aimed to develop predictions; Pohlmann and Leitner 2003), even if the outcome variable were dichotomous (Hellevik 2009). We compute two models for each dependent variable: a model with the key independent variables, climate knowledge and education, as well as control variables (1), to which we then add the left-right ideology moderator (2). The models were computed for each country separately and for all countries jointly. In the latter case, we include country dummies to account for unobserved heterogeneity. Additionally, we conduct a robustness check by removing the knowledge variable from the full models for each country to assess to what extent the effects observed for formal education and ideology may be conditional on considering climate-specific knowledge (see Appendix 4).

Results

Climate-specific knowledge

People who answer more factual questions about the climate crisis correctly are significantly more likely to support transformative climate policy options. Overall, answering one more question correctly is associated with a 0.102-point

increase in support for transformative policy choices when we model the relationship jointly for all nine countries (Table 1). We find the same association for respondents in each country separately, too (Table 2(a)). People with greater knowledge of the climate crisis specifically are significantly more likely to support more transformative climate policies in all nine countries. However, there is a little variation in the strength of the association, as illustrated in Fig. 1. The knowledge effect is greatest in Germany (0.133) and Poland (0.107) and a little smaller in the UK (0.079), Czech Republic (0.077) and Sweden (0.064). The overall relationship pattern is similar across all countries.

This continues to be true after including people's ideological self-positioning (Table 2(b)). Overall, people who identify as more left leaning are more likely to support transformative climate policies when analysing respondents from all countries jointly (Table 1). However, this masks important cross-country differences. There is no significant left-right association with climate policy preferences in Poland, Italy or France, while the association is most pronounced in Sweden and Germany, followed by Spain and the UK (Table 2(b)). Crucially, the inclusion of ideological self-positioning does not substantially affect the findings discussed above. While the effect size of climate-specific knowledge on climate policy views is reduced slightly in some countries, overall patterns and levels of significance remain similar.

Climate-specific knowledge is not only related to specific climate policy attitudes. It also matters greatly for broader views about the economic system and the role of the state. Indeed, people across the sample who answer more questions about the climate crisis correctly are significantly more likely to support greater engagement of the state in shaping the economy. Answering one more factual question correctly is associated with a 0.250-point increase in preferences for stronger state involvement on average (Table 1). Again, we find the relationship holds true in the models for each country separately (Table 3(a)), but there is quite a large amount of variation between countries regarding the size of the association (Fig. 2). It is most pronounced in the USA (0.282), Spain (0.250) and France (0.240) and least extensive in Sweden (0.109), the Czech Republic (0.136) and Poland (0.156).

Again, the effect is robust to the inclusion of the left-right self-identification measure. Overall, and perhaps unsurprisingly, those who identify as more left are more likely to favour greater state action in the economy (Table 1). Some country differences exist, however. In Poland, there is no significant relationship between ideological self-positioning and economic policy views and the association is much smaller in size in Italy (and to some extent France) than elsewhere (Table 3(b)). Crucially, the inclusion of the new variable does not alter the findings discussed above. While the association strength between climate-specific knowledge

Table 1 OLS regressions for climate policy preferences (with positive values indicating an association with a preference for more transformative climate policies)

	Dependent variable:			
	Climate policy preferences (more transformative)		Economic system preference (more state involvement)	
	(1)	(2)	(1)	(2)
Intercept	4.647 (0.051) ^{***}	4.889 (0.059) ^{***}	4.425 (0.092) ^{***}	5.487 (0.103) ^{***}
Knowledge	0.102 (0.006) ^{***}	0.090 (0.006) ^{***}	0.250 (0.011) ^{***}	0.196 (0.011) ^{***}
Education (ref: lower sec or below)				
Upper secondary	- 0.024 (0.026)	- 0.025 (0.026)	- 0.167 (0.047) ^{***}	- 0.168 (0.046) ^{***}
Tertiary	- 0.049 (0.028) ⁺	- 0.047 (0.028) ⁺	- 0.353 (0.050) ^{***}	- 0.348 (0.049) ^{***}
Female	0.109 (0.018) ^{***}	0.099 (0.018) ^{***}	0.223 (0.033) ^{***}	0.167 (0.033) ^{***}
Age (ref: 18–30)				
31–54	0.078 (0.024) ^{**}	0.074 (0.024) ^{**}	0.070 (0.043)	0.064 (0.042)
55–74	0.147 (0.028) ^{***}	0.144 (0.028) ^{***}	0.172 (0.050) ^{***}	0.147 (0.050) ^{**}
Area (ref: big city)				
Suburbs/big city outskirts	0.006 (0.029)	0.013 (0.029)	- 0.022 (0.052)	- 0.014 (0.051)
Town/small city	0.011 (0.024)	0.013 (0.024)	0.104 (0.042) [*]	0.089 (0.042) [*]
Country village	- 0.017 (0.030)	- 0.017 (0.030)	0.064 (0.054)	0.053 (0.053)
Farm/countryside home	- 0.070 (0.055)	- 0.054 (0.055)	0.155 (0.099)	0.186 (0.097) ⁺
Prefer not to say	- 0.092 (0.110)	- 0.109 (0.113)	0.207 (0.197)	0.179 (0.199)
Tenure (ref: own alone)				
Own with partner	0.020 (0.024)	0.015 (0.024)	0.030 (0.044)	0.011 (0.043)
Rent alone	0.074 (0.031) [*]	0.064 (0.031) [*]	0.311 (0.056) ^{***}	0.272 (0.055) ^{***}
Rent with partner	0.028 (0.030)	0.018 (0.030)	0.256 (0.054) ^{***}	0.219 (0.053) ^{***}
Rent room in shared place	0.083 (0.057)	0.079 (0.057)	0.522 (0.102) ^{***}	0.463 (0.101) ^{***}
Stay for free (e.g. family)	0.015 (0.036)	- 0.001 (0.036)	0.193 (0.065) ^{**}	0.143 (0.064) [*]
Other	0.117 (0.083)	0.120 (0.083)	0.263 (0.150) ⁺	0.285 (0.147) ⁺
Prefer not to say	0.044 (0.065)	0.057 (0.067)	0.281 (0.117) [*]	0.199 (0.118) ⁺
Economic activity (ref: working)				
Retired	0.104 (0.029) ^{***}	0.093 (0.030) ^{**}	0.091 (0.053) ⁺	0.055 (0.052)
Full-time education	0.040 (0.039)	0.032 (0.039)	- 0.041 (0.071)	- 0.091 (0.070)
Home-focussed (family care)	- 0.048 (0.041)	- 0.043 (0.042)	0.026 (0.075)	0.024 (0.074)
Long-term sick/disabled	0.101 (0.046) [*]	0.089 (0.046) ⁺	0.295 (0.082) ^{***}	0.245 (0.081) ^{**}
Unemployed	0.011 (0.034)	0.003 (0.035)	0.159 (0.062) [*]	0.117 (0.061) ⁺
Prefer not to say	0.013 (0.067)	0.007 (0.068)	- 0.101 (0.120)	- 0.152 (0.119)
Country (ref: Germany)				
UK	0.045 (0.038)	0.060 (0.038)	- 0.204 (0.068) ^{**}	- 0.124 (0.067) ⁺
USA	- 0.204 (0.039) ^{***}	- 0.187 (0.039) ^{***}	- 0.348 (0.071) ^{***}	- 0.254 (0.070) ^{***}
Spain	- 0.102 (0.039) ^{**}	- 0.102 (0.039) ^{**}	- 0.140 (0.071) [*]	- 0.132 (0.069) ⁺
Sweden	- 0.214 (0.038) ^{***}	- 0.192 (0.038) ^{***}	- 0.242 (0.068) ^{***}	- 0.146 (0.067) [*]
Cz. Republic	- 0.349 (0.038) ^{***}	- 0.338 (0.038) ^{***}	- 0.496 (0.069) ^{***}	- 0.450 (0.068) ^{***}
Poland	- 0.279 (0.038) ^{***}	- 0.275 (0.039) ^{***}	- 0.343 (0.069) ^{***}	- 0.309 (0.068) ^{***}
Italy	- 0.052 (0.039)	- 0.026 (0.039)	- 0.163 (0.070) [*]	- 0.042 (0.069)
France	0.252 (0.038) ^{**}	0.262 (0.038) ^{**}	0.014 (0.069)	0.093 (0.068)
Left (1) - right (10) self-ID		- 0.036 (0.004) ^{***}		- 0.158 (0.007) ^{***}
Observations	9820	9725	9821	9726
Adjusted R ²	0.086	0.092	0.092	0.133

Displayed are coefficients with standard errors in parentheses. *** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$, + $p \leq 0.1$

Table 2 OLS regressions for climate policy preferences by country (with positive values indicating an association with a preference for more transformative climate policies)

<i>Dependent variable: climate policy preferences (More transformative)</i>									
a	UK	USA	Spain	Sweden	Czech Republic	Poland	Italy	France	Germany
Intercept	4.917 (0.152)***	4.304 (0.139)***	4.477 (0.121)***	4.765 (0.144)***	4.220 (0.170)***	3.935 (0.148)***	4.766 (0.141)***	4.758 (0.133)***	4.598 (0.103)***
Knowledge	0.099 (0.019)***	0.105 (0.016)***	0.117 (0.019)***	0.095 (0.021)***	0.079 (0.020)***	0.108 (0.019)***	0.088 (0.020)***	0.087 (0.018)***	0.133 (0.014)***
Education (ref: lower sec or below)									
Upper secondary	-0.279 (0.084)***	0.049 (0.094)	0.027 (0.076)	-0.254 (0.103)*	0.043 (0.127)	0.394 (0.117)***	-0.057 (0.067)	0.071 (0.072)	-0.045 (0.064)
Tertiary	-0.329 (0.089)***	0.059 (0.101)	0.028 (0.067)	-0.206 (0.108)+	-0.033 (0.136)	0.433 (0.124)***	-0.184 (0.082)*	-0.005 (0.078)	-0.058 (0.070)
Female	0.086 (0.060)	0.215 (0.057)***	0.024 (0.058)	0.105 (0.064)	0.130 (0.059)*	0.191 (0.059)**	-0.086 (0.062)	0.142 (0.054)**	0.142 (0.041)***
Age (ref: 18–30)									
31–54	0.063 (0.079)	0.086 (0.071)	0.026 (0.077)	-0.113 (0.084)	0.152 (0.079)+	0.036 (0.078)	0.027 (0.080)	0.172 (0.068)*	0.081 (0.056)
55–74	0.045 (0.097)	0.074 (0.083)	0.112 (0.084)	-0.192 (0.101)+	0.381 (0.095)***	0.266 (0.096)**	0.055 (0.086)	0.266 (0.094)**	0.092 (0.062)
Area (ref: big city)									
Suburbs/ big city outskirts	0.091 (0.097)	0.093 (0.075)	0.010 (0.091)	0.036 (0.094)	0.034 (0.109)	-0.326 (0.140)*	0.220 (0.119)+	-0.006 (0.085)	-0.074 (0.063)
Town/ small city	0.179 (0.089)*	-0.010 (0.082)	0.020 (0.062)	-0.048 (0.084)	-0.020 (0.075)	-0.052 (0.067)	0.185 (0.082)*	-0.069 (0.077)	0.021 (0.051)
Country village	0.079 (0.110)	0.168 (0.164)	-0.681 (0.238)**	-0.033 (0.106)	0.017 (0.088)	-0.007 (0.084)	0.139 (0.092)	-0.023 (0.082)	-0.085 (0.060)
Farm/ country- side home	0.371 (0.240)	0.095 (0.120)	-0.013 (0.211)	-0.092 (0.130)	-1.285 (0.330)***	-0.314 (0.338)	-0.076 (0.202)	-0.172 (0.168)	0.035 (0.140)
Prefer not to say	-0.210 (0.429)	0.022 (0.262)	0.073 (0.276)	-0.988 (0.551)+	-1.115 (0.581)+	-0.050 (0.640)	0.021 (0.297)	0.032 (0.249)	-0.176 (0.396)
Tenure (ref: own alone)									
Own with partner	-0.069 (0.080)	-0.082 (0.071)	0.020 (0.073)	0.117 (0.087)	-0.026 (0.076)	0.039 (0.070)	-0.022 (0.080)	0.165 (0.080)*	-0.045 (0.063)
Rent alone	-0.135 (0.108)	0.087 (0.096)	0.248 (0.119)*	0.184 (0.089)*	0.028 (0.097)	0.076 (0.120)	0.110 (0.124)	0.122 (0.093)	0.057 (0.063)
Rent with partner	-0.115 (0.102)	0.015 (0.099)	0.055 (0.087)	0.178 (0.105)+	0.034 (0.092)	-0.032 (0.114)	-0.018 (0.108)	0.146 (0.093)	0.008 (0.063)
Rent room in shared place	0.055 (0.162)	0.231 (0.137)+	-0.004 (0.162)	-0.290 (0.247)	0.123 (0.215)	0.001 (0.215)	0.102 (0.214)	0.396 (0.224)+	0.086 (0.115)
Stay for free (e.g. family)	-0.125 (0.126)	-0.092 (0.110)	0.080 (0.099)	0.072 (0.154)	0.194 (0.111)+	-0.088 (0.106)	-0.128 (0.104)	0.252 (0.129)+	0.191 (0.099)+
Other	0.352 (0.233)	0.211 (0.197)	0.071 (0.260)	0.546 (0.429)	0.006 (0.251)	0.264 (0.328)	-0.064 (0.221)	0.178 (0.321)	-0.203 (0.230)
Prefer not to say	-0.371 (0.211)+	0.219 (0.221)	0.109 (0.211)	-0.384 (0.276)	0.017 (0.232)	0.195 (0.185)	-0.096 (0.181)	0.281 (0.183)	0.288 (0.163)+

Table 2 (continued)

Economic activity (ref: working)									
Retired	0.195 (0.096)*	- 0.005 (0.091)	0.155 (0.092)+	0.090 (0.105)	0.070 (0.092)	0.014 (0.097)	0.118 (0.091)	0.016 (0.095)	0.074 (0.065)
Full-time education	0.228 (0.138)+	- 0.022 (0.134)	- 0.033 (0.112)	0.033 (0.126)	0.031 (0.131)	0.060 (0.142)	- 0.016 (0.131)	- 0.037 (0.125)	- 0.023 (0.080)
Home-focussed (family care)	0.068 (0.136)	0.032 (0.105)	0.195 (0.155)	- 0.071 (0.241)	- 0.124 (0.118)	- 0.015 (0.131)	- 0.049 (0.107)	- 0.240 (0.136)+	- 0.177 (0.111)
Long-term sick/disabled	0.102 (0.128)	0.089 (0.107)	0.235 (0.171)	0.214 (0.143)	- 0.150 (0.220)	0.077 (0.151)	0.005 (0.230)	0.186 (0.132)	0.061 (0.110)
Unemployed	0.049 (0.125)	0.098 (0.098)	0.020 (0.086)	- 0.146 (0.134)	0.104 (0.139)	0.070 (0.123)	- 0.041 (0.089)	0.037 (0.101)	0.170 (0.121)
Prefer not to say	0.217 (0.274)	0.054 (0.180)	0.121 (0.159)	0.228 (0.244)	0.030 (0.308)	- 0.221 (0.273)	0.076 (0.186)	- 0.106 (0.179)	- 0.107 (0.196)
Observations	997	973	973	992	971	1001	961	953	1999
Adjusted R ²	0.053	0.047	0.042	0.036	0.054	0.072	0.031	0.036	0.052
b									
<i>Dependent variable: climate policy preferences (more transformative)</i>									
	UK	USA	Spain	Sweden	Czech Republic	Poland	Italy	France	Germany
Intercept	5.297 (0.188)***	4.546 (0.173)***	4.820 (0.144)***	5.304 (0.181)***	4.410 (0.195)***	4.001 (0.171)***	4.835 (0.170)***	4.807 (0.159)***	5.041 (0.129)***
Knowledge	0.079 (0.019)***	0.089 (0.018)***	0.092 (0.020)***	0.064 (0.022)**	0.077 (0.020)***	0.107 (0.020)***	0.087 (0.020)***	0.086 (0.018)***	0.116 (0.014)***
Education (ref: lower sec or below)									
Upper secondary	- 0.273 (0.085)**	0.044 (0.095)	0.053 (0.076)	- 0.242 (0.102)*	0.024 (0.128)	0.408 (0.117)***	- 0.062 (0.067)	0.076 (0.073)	- 0.063 (0.064)
Tertiary	- 0.322 (0.089)***	0.058 (0.102)	0.055 (0.067)	- 0.193 (0.107)+	- 0.041 (0.137)	0.436 (0.125)***	- 0.180 (0.083)*	0.005 (0.079)	- 0.083 (0.069)
Female	0.066 (0.061)	0.203 (0.057)***	0.024 (0.057)	0.068 (0.065)	0.132 (0.060)*	0.179 (0.060)**	- 0.075 (0.063)	0.134 (0.055)*	0.121 (0.041)**
Age (ref: 18–30)									
31–54	0.062 (0.079)	0.087 (0.071)	0.044 (0.077)	- 0.115 (0.083)	0.148 (0.079)+	0.022 (0.079)	0.013 (0.080)	0.175 (0.070)*	0.082 (0.055)
55–74	0.056 (0.097)	0.083 (0.083)	0.119 (0.084)	- 0.171 (0.100)+	0.363 (0.096)***	0.253 (0.097)**	0.039 (0.087)	0.269 (0.095)**	0.078 (0.062)
Area (ref: big city)									
Suburbs/big city outskirts	0.089 (0.097)	0.090 (0.075)	0.034 (0.090)	0.040 (0.093)	0.073 (0.110)	- 0.325 (0.140)*	0.230 (0.119)+	- 0.019 (0.086)	- 0.057 (0.063)
Town/small city	0.166 (0.090)+	- 0.019 (0.083)	0.010 (0.062)	- 0.052 (0.083)	- 0.023 (0.075)	- 0.032 (0.067)	0.194 (0.082)*	- 0.069 (0.078)	0.031 (0.051)
Country village	0.055 (0.110)	0.173 (0.166)	- 0.618 (0.236)**	- 0.038 (0.106)	0.008 (0.089)	- 0.001 (0.085)	0.149 (0.092)	- 0.032 (0.084)	- 0.084 (0.060)
Farm/country-side home	0.415 (0.240)+	0.109 (0.120)	- 0.036 (0.209)	- 0.043 (0.129)	- 1.280 (0.329)***	- 0.321 (0.339)	- 0.072 (0.202)	- 0.179 (0.171)	0.014 (0.144)

Table 2 (continued)

Prefer not to say	- 0.247 (0.429)	0.002 (0.262)	0.196 (0.286)	- 0.955 (0.544) ⁺	- 1.061 (0.591) ⁺	- 0.035 (0.639)	- 0.093 (0.316)	- 0.009 (0.266)	- 0.121 (0.394)
Tenure (ref: own alone)									
Own with partner	- 0.057 (0.080)	- 0.093 (0.071)	0.018 (0.073)	0.099 (0.086)	- 0.037 (0.076)	0.036 (0.070)	- 0.023 (0.080)	0.160 (0.081) [*]	- 0.060 (0.063)
Rent alone	- 0.148 (0.108)	0.084 (0.096)	0.260 (0.118) [*]	0.126 (0.089)	0.019 (0.097)	0.102 (0.122)	0.096 (0.124)	0.119 (0.095)	0.017 (0.063)
Rent with partner	- 0.138 (0.102)	0.003 (0.100)	0.066 (0.086)	0.126 (0.104)	0.012 (0.092)	- 0.033 (0.114)	0.003 (0.109)	0.140 (0.094)	- 0.023 (0.063)
Rent room in shared place	0.024 (0.162)	0.217 (0.138)	0.006 (0.160)	- 0.278 (0.244)	0.110 (0.215)	0.138 (0.222)	0.098 (0.214)	0.386 (0.226) ⁺	0.048 (0.114)
Stay for free (e.g. family)	- 0.143 (0.126)	- 0.116 (0.111)	0.059 (0.099)	0.029 (0.152)	0.171 (0.112)	- 0.091 (0.106)	- 0.131 (0.104)	0.264 (0.134) [*]	0.142 (0.099)
Other	0.365 (0.232)	0.209 (0.198)	0.082 (0.258)	0.599 (0.424)	- 0.017 (0.251)	0.268 (0.327)	- 0.075 (0.221)	0.170 (0.324)	- 0.210 (0.228)
Prefer not to say	- 0.362 (0.215) ⁺	0.197 (0.221)	0.216 (0.219)	- 0.408 (0.272)	0.065 (0.243)	0.176 (0.190)	- 0.032 (0.192)	0.275 (0.187)	0.214 (0.166)
Economic activity (ref: working)									
Retired	0.203 (0.096) [*]	- 0.023 (0.092)	0.157 (0.091) ⁺	0.040 (0.105)	0.062 (0.093)	0.005 (0.098)	0.121 (0.092)	0.014 (0.096)	0.071 (0.065)
Full-time education	0.214 (0.140)	- 0.016 (0.136)	- 0.038 (0.110)	0.020 (0.125)	0.058 (0.132)	0.043 (0.142)	- 0.028 (0.132)	- 0.044 (0.131)	- 0.041 (0.079)
Home-focussed (family care)	0.060 (0.136)	0.044 (0.106)	0.193 (0.154)	- 0.054 (0.245)	- 0.143 (0.119)	- 0.021 (0.133)	- 0.034 (0.109)	- 0.232 (0.138) ⁺	- 0.137 (0.111)
Long-term sick/disabled	0.090 (0.128)	0.077 (0.107)	0.238 (0.171)	0.170 (0.142)	-0.157 (0.220)	0.068 (0.151)	0.014 (0.231)	0.194 (0.137)	0.047 (0.111)
Unemployed	0.041 (0.125)	0.086 (0.098)	- 0.004 (0.085)	- 0.179 (0.132)	0.095 (0.139)	0.102 (0.124)	- 0.048 (0.090)	0.034 (0.103)	0.159 (0.120)
Prefer not to say	0.113 (0.283)	0.059 (0.180)	0.127 (0.160)	0.120 (0.242)	-0.045 (0.327)	- 0.199 (0.273)	0.133 (0.191)	- 0.109 (0.186)	- 0.139 (0.195)
Left (1) - right (10) self-ID	- 0.054 (0.016) ^{***}	- 0.030 (0.012) [*]	- 0.055 (0.012) ^{***}	- 0.069 (0.014) ^{***}	- 0.027 (0.014) ⁺	- 0.012 (0.012)	- 0.013 (0.013)	- 0.008 (0.012)	- 0.066 (0.012) ^{***}
Observations	990	967	965	984	964	990	950	934	1981
Adjusted R ²	0.061	0.053	0.065	0.055	0.057	0.072	0.032	0.035	0.066

Displayed are coefficients with standard errors in parentheses. *** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$, + $p \leq 0.1$

and economic policy preferences reduces a bit in most countries, the pattern and significance of the effects are largely unchanged.

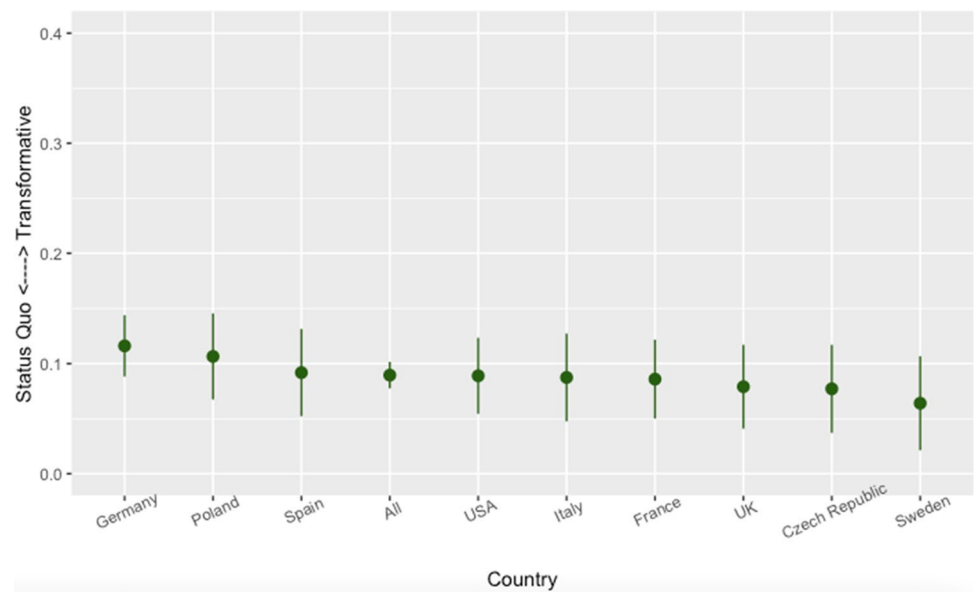
Climate-specific knowledge is consistently associated with preferences for both climate policy and the role of the state in the economy in general. Those who have more factual knowledge favour more transformative climate policy choices and a more ambitious role for the state in the organisation of the economy. The findings are robust to the

inclusion of people's left-right self-identification. While the size of the association differs between countries, especially for overall views on the organisation of the economy, the pattern is consistent.

Formal education

The relationship between formal education and policy preferences is much less consistent (Fig. 3). Overall, there is a

Fig. 1 Association between greater climate crisis knowledge and climate policy preferences (coefficient from full regression models with 95% confidence interval)



statistically significant negative association between formal educational attainment and transformative climate policy views (Table 1). In the single-country models (Table 2(a)), it is only significant and negative in Sweden (-0.206 for tertiary education compared to lower secondary and less) and Italy (-0.184). In those contexts, people with greater formal educational attainment are more likely to favour status quo choices on climate policy questions. In most countries, there is no significant relationship at all. Only in Poland is greater formal educational attainment related to more transformative climate policy views (0.433).

These findings are robust to the inclusion of the left-right self-positioning measure. While the effect sizes are slightly affected (in both directions), there is no change in the overall patterns or significance. We can therefore summarise that there is no consistent association between formal education and views on climate policy (Figure 3). In some countries, more formal education is actually associated with a greater adherence to opposing transformative climate policies.

The country differences and inconsistencies in findings continue when we look at the interplay between formal education and views on the economic system overall. There is no significant effect across the full sample (Table 1). However, there are significant effects that are substantial in size for some countries (Table 3(a)). Indeed, in the USA (-1.102), Spain (-0.457), Italy (-0.346), Germany (-0.300) and (marginally) the Czech Republic (-0.478) those with tertiary education (and to a lesser extent upper secondary education) are much more likely to prefer less state involvement in the economy. There is no significant relationship in the other three countries (though the coefficients are also negative).

These effects remain robust when taking into account the left-right position of respondents (Table 3b). Effect sizes are affected somewhat in both directions, but overall patterns remain the same. Higher educational attainment tends to be associated with a tendency to reject greater ambition for state action in the organisation of the economy in most of the countries studied, albeit with extensive variation between countries (Fig. 4).

Robustness checks

Overall, the results are robust to the exclusion of the variable measuring climate-specific knowledge. The relationship between formal education and climate policy preferences is only significantly altered for holding tertiary education in Sweden (where the effect is rendered statistically insignificant after the exclusion). Otherwise, coefficient sizes do not change in any systematic fashion. They are slightly increased or decreased for certain countries, but these changes do not result in any substantive change in the interpretation of the findings. Instead, these checks seem to confirm that the role of formal education in climate policy preferences is not consistent across countries. The association of political position and those policy preferences is also mostly robust to excluding knowledge. For nearly all countries (except the Czech Republic), we notice a small increase in the coefficient size. This indicates that climate-specific knowledge and left-right-orientation are somewhat related to each other. However, the substantive interpretation of finding is not altered majorly. The direction of effects remains the same in all countries and statistically significant results remain significant. Deviations are only noticed in Poland and Italy where the moderate increase in coefficient sizes renders the ideology variable

Table 3 OLS regressions for economic system preferences by country (with positive values indicating an association with a preference for more state intervention)

a	<i>Dependent variable: economic system preference (more state involvement)</i>								
	UK	USA	Spain	Sweden	Czech Republic	Poland	Italy	France	Germany
Intercept	3.685 (0.269)***	4.574 (0.283)***	4.088 (0.215)***	4.001 (0.231)***	4.503 (0.305)***	4.180 (0.262)***	4.898 (0.239)***	4.180 (0.269)***	4.064 (0.182)***
Knowledge	0.271 (0.033)***	0.393 (0.033)***	0.337 (0.035)***	0.187 (0.034)***	0.137 (0.037)***	0.168 (0.034)***	0.188 (0.033)***	0.271 (0.036)***	0.259 (0.025)***
Education (ref: lower sec or below)									
Upper secondary	-0.082 (0.150)	-0.804 (0.191)***	-0.265 (0.136) ⁺	0.021 (0.166)	-0.343 (0.228)	-0.093 (0.206)	-0.187 (0.113) ⁺	0.149 (0.145)	-0.150 (0.113)
Tertiary	-0.195 (0.158)	-1.102 (0.206)***	-0.457 (0.120)***	-0.085 (0.174)	-0.478 (0.245) ⁺	-0.240 (0.220)	-0.346 (0.139) [*]	-0.194 (0.157)	-0.300 (0.123) [*]
Female	0.201 (0.107) ⁺	0.431 (0.115)***	-0.049 (0.102)	0.497 (0.104)***	0.183 (0.107) ⁺	0.255 (0.105) [*]	-0.010 (0.105)	0.267 (0.110) [*]	0.275 (0.072)***
Age (ref: 18-30)									
31-54	0.297 (0.140) [*]	-0.278 (0.143) ⁺	0.020 (0.138)	-0.019 (0.135)	-0.309 (0.142) [*]	0.286 (0.138) [*]	0.031 (0.135)	0.240 (0.138) ⁺	0.264 (0.098)**
55-74	0.345 (0.172) [*]	-0.292 (0.168) ⁺	0.040 (0.150)	0.009 (0.162)	0.254 (0.171)	0.394 (0.171) [*]	0.124 (0.145)	0.387 (0.190) [*]	0.460 (0.110)***
Area (ref: big city)									
Suburbs/ big city outskirts	0.198 (0.172)	-0.076 (0.152)	-0.375 (0.161) [*]	0.190 (0.151)	-0.156 (0.196)	0.183 (0.248)	-0.223 (0.201)	-0.083 (0.171)	-0.018 (0.112)
Town/ small city	0.153 (0.159)	0.062 (0.167)	0.173 (0.110)	0.106 (0.135)	0.176 (0.134)	0.128 (0.118)	-0.004 (0.139)	-0.026 (0.156)	0.042 (0.091)
Country village	0.288 (0.195)	-0.150 (0.333)	-0.326 (0.423)	0.164 (0.171)	0.116 (0.158)	0.067 (0.149)	-0.049 (0.156)	-0.034 (0.167)	0.062 (0.106)
Farm/ country- side home	-0.094 (0.427)	0.342 (0.243)	-0.223 (0.376)	0.096 (0.210)	0.302 (0.592)	0.191 (0.598)	0.233 (0.342)	0.469 (0.339)	0.095 (0.248)
Prefer not to say	0.872 (0.763)	-0.222 (0.532)	0.188 (0.491)	-0.026 (0.887)	-0.721 (1.044)	0.137 (1.131)	0.354 (0.502)	0.105 (0.504)	0.662 (0.702)
Tenure (ref: own alone)									
Own with partner	0.145 (0.143)	0.069 (0.144)	0.213 (0.130)	-0.101 (0.140)	0.063 (0.136)	-0.053 (0.123)	0.013 (0.136)	-0.129 (0.162)	0.175 (0.111)
Rent alone	0.580 (0.192)**	-0.160 (0.194)	0.635 (0.211)**	0.456 (0.144)**	0.086 (0.174)	0.412 (0.213) ⁺	-0.069 (0.210)	0.298 (0.189)	0.493 (0.111)***
Rent with partner	0.639 (0.181)***	0.237 (0.202)	0.119 (0.154)	0.127 (0.169)	0.075 (0.165)	0.151 (0.201)	0.136 (0.183)	0.230 (0.189)	0.501 (0.112)***
Rent room in shared place	0.960 (0.288)***	0.243 (0.279)	0.601 (0.287) [*]	0.454 (0.397)	0.089 (0.386)	0.307 (0.380)	0.265 (0.362)	1.188 (0.452)**	0.600 (0.203)**
Stay for free (e.g. family)	0.411 (0.224) ⁺	-0.113 (0.224)	0.285 (0.176)	-0.034 (0.247)	0.256 (0.199)	0.077 (0.188)	0.220 (0.176)	0.236 (0.261)	0.224 (0.176)
Other	0.621 (0.413)	-0.109 (0.401)	0.258 (0.462)	-0.196 (0.691)	0.014 (0.452)	0.762 (0.579)	0.599 (0.374)	0.144 (0.649)	-0.305 (0.407)
Prefer not to say	0.631 (0.375) ⁺	0.172 (0.448)	0.188 (0.376)	0.053 (0.444)	-0.124 (0.417)	0.666 (0.327) [*]	0.256 (0.306)	0.421 (0.370)	0.476 (0.289) ⁺

Table 3 (continued)

Economic activity (ref: working)									
Retired	0.015 (0.171)	0.053 (0.185)	0.253 (0.163)	0.407 (0.169)*	0.002 (0.166)	- 0.001 (0.172)	- 0.201 (0.155)	- 0.036 (0.192)	0.100 (0.115)
Full-time education	- 0.031 (0.244)	- 0.019 (0.273)	0.222 (0.198)	0.079 (0.203)	- 0.136 (0.234)	- 0.241 (0.251)	0.109 (0.222)	- 0.028 (0.253)	- 0.125 (0.141)
Home-focussed (family care)	- 0.158 (0.242)	- 0.439 (0.214)*	0.292 (0.276)	0.347 (0.389)	0.473 (0.213)*	- 0.148 (0.232)	- 0.044 (0.181)	- 0.021 (0.276)	0.028 (0.196)
Long-term sick/disabled	- 0.009 (0.228)	0.348 (0.218)	0.289 (0.305)	0.332 (0.231)	0.808 (0.396)*	- 0.172 (0.267)	0.029 (0.390)	0.333 (0.267)	0.579 (0.195)**
Unemployed	0.183 (0.222)	0.151 (0.199)	0.346 (0.152)*	0.812 (0.215)***	0.157 (0.249)	- 0.144 (0.217)	- 0.073 (0.151)	0.063 (0.205)	- 0.079 (0.214)
Prefer not to say	- 0.444 (0.488)	0.446 (0.365)	0.077 (0.283)	0.097 (0.393)	0.358 (0.553)	- 0.622 (0.482)	- 0.545 (0.316) ⁺	- 0.220 (0.362)	- 0.262 (0.348)
Observations	997	973	973	992	971	1001	961	953	2000
Adjusted R ²	0.077	0.157	0.115	0.079	0.035	0.030	0.030	0.065	0.087
b									
<i>Dependent variable: economic system preference (more state involvement)</i>									
	UK	USA	Spain	Sweden	Czech Republic	Poland	Italy	France	Germany
Intercept	5.248 (0.324)***	6.291 (0.340)***	5.269 (0.249)***	5.570 (0.283)***	5.889 (0.338)***	4.374 (0.302)***	5.424 (0.287)***	5.058 (0.316)***	5.424 (0.225)***
Knowledge	0.191 (0.034)***	0.282 (0.035)***	0.250 (0.035)***	0.109 (0.034)**	0.136 (0.035)***	0.156 (0.035)***	0.158 (0.034)***	0.239 (0.036)***	0.205 (0.025)***
Education (ref: lower sec or below)									
Upper secondary	- 0.029 (0.146)	- 0.868 (0.186)***	- 0.176 (0.132)	0.042 (0.160)	- 0.426 (0.222) ⁺	- 0.082 (0.206)	- 0.203 (0.113) ⁺	0.153 (0.146)	- 0.183 (0.111) ⁺
Tertiary	- 0.155 (0.153)	- 1.139 (0.200)***	- 0.381 (0.116)**	- 0.056 (0.168)	- 0.513 (0.238)*	- 0.240 (0.220)	- 0.336 (0.140)*	- 0.176 (0.157)	- 0.343 (0.121)**
Female	0.123 (0.104)	0.331 (0.112)**	- 0.079 (0.099)	0.363 (0.101)***	0.146 (0.104)	0.231 (0.106)*	- 0.031 (0.105)	0.243 (0.110)*	0.211 (0.071)**
Age (ref: 18–30)									
31–54	0.276 (0.136)*	- 0.281 (0.139)*	0.067 (0.133)	- 0.018 (0.131)	- 0.281 (0.137)*	0.265 (0.139) ⁺	0.031 (0.134)	0.230 (0.138) ⁺	0.262 (0.096)**
55–74	0.392 (0.167)*	- 0.270 (0.163) ⁺	0.024 (0.145)	0.037 (0.156)	0.220 (0.167)	0.374 (0.172)*	0.072 (0.146)	0.409 (0.189)*	0.382 (0.108)***
Area (ref: big city)									
Suburbs/big city outskirts	0.226 (0.167)	- 0.122 (0.147)	- 0.314 (0.156)*	0.181 (0.146)	- 0.151 (0.191)	0.165 (0.248)	- 0.223 (0.200)	- 0.066 (0.171)	0.035 (0.110)
Town/small city	0.131 (0.155)	- 0.017 (0.162)	0.128 (0.107)	0.098 (0.130)	0.112 (0.130)	0.120 (0.119)	- 0.006 (0.138)	- 0.014 (0.156)	0.075 (0.089)
Country village	0.219 (0.189)	- 0.035 (0.326)	- 0.125 (0.409)	0.149 (0.166)	0.007 (0.154)	0.092 (0.150)	- 0.052 (0.156)	- 0.056 (0.166)	0.074 (0.104)
Farm/country-side home	0.131 (0.414)	0.423 (0.235) ⁺	- 0.319 (0.363)	0.142 (0.203)	0.264 (0.571)	0.156 (0.598)	0.208 (0.340)	0.496 (0.340)	0.100 (0.250)

Table 3 (continued)

Prefer not to say	0.659 (0.741)	-0.369 (0.515)	0.268 (0.496)	0.075 (0.853)	-0.739 (1.025)	0.143 (1.128)	0.306 (0.532)	0.156 (0.528)	0.854 (0.686)
Tenure (ref: own alone)									
Own with partner	0.188 (0.138)	-0.011 (0.140)	0.188 (0.126)	-0.148 (0.135)	0.063 (0.132)	-0.063 (0.124)	0.015 (0.135)	-0.130 (0.160)	0.143 (0.109)
Rent alone	0.531 (0.186)**	-0.240 (0.189)	0.642 (0.204)**	0.288 (0.140)*	0.079 (0.168)	0.437 (0.216)*	-0.041 (0.209)	0.262 (0.188)	0.407 (0.109)***
Rent with partner	0.536 (0.176)**	0.138 (0.196)	0.130 (0.149)	0.003 (0.164)	-0.005 (0.159)	0.134 (0.201)	0.207 (0.184)	0.217 (0.187)	0.442 (0.110)***
Rent room in shared place	0.855 (0.280)**	0.114 (0.270)	0.588 (0.278)*	0.512 (0.382)	0.088 (0.373)	0.193 (0.392)	0.237 (0.360)	1.038 (0.448)*	0.513 (0.199)**
Stay for free (e.g. family)	0.373 (0.218) ⁺	-0.281 (0.218)	0.191 (0.171)	-0.140 (0.239)	0.210 (0.194)	0.063 (0.188)	0.221 (0.175)	0.229 (0.265)	0.094 (0.172)
Other	0.670 (0.400) ⁺	-0.149 (0.388)	0.299 (0.447)	-0.034 (0.665)	-0.037 (0.436)	0.765 (0.578)	0.579 (0.372)	0.035 (0.642)	-0.292 (0.397)
Prefer not to say	0.572 (0.370)	-0.013 (0.434)	0.128 (0.379)	0.022 (0.427)	-0.137 (0.421)	0.600 (0.334) ⁺	0.151 (0.323)	0.179 (0.370)	0.250 (0.288)
Economic activity (ref: working)									
Retired	0.046 (0.166)	-0.053 (0.180)	0.274 (0.159) ⁺	0.323 (0.164)*	-0.126 (0.162)	-0.012 (0.173)	-0.198 (0.154)	-0.054 (0.190)	0.102 (0.113)
Full-time education	-0.187 (0.241)	0.085 (0.267)	0.211 (0.192)	0.042 (0.196)	-0.219 (0.229)	-0.277 (0.251)	0.094 (0.222)	-0.091 (0.259)	-0.192 (0.138)
Home-focussed (family care)	-0.183 (0.234)	-0.351 (0.207) ⁺	0.310 (0.266)	0.198 (0.385)	0.403 (0.206) ⁺	-0.155 (0.234)	-0.043 (0.183)	-0.076 (0.273)	0.128 (0.194)
Long-term sick/disabled	-0.066 (0.221)	0.267 (0.211)	0.278 (0.297)	0.234 (0.222)	0.695 (0.382) ⁺	-0.190 (0.266)	0.120 (0.389)	0.307 (0.272)	0.579 (0.193)**
Unemployed	0.149 (0.215)	0.062 (0.193)	0.334 (0.148)*	0.723 (0.207)***	0.100 (0.241)	-0.183 (0.218)	-0.086 (0.151)	0.020 (0.204)	-0.096 (0.209)
Prefer not to say	-0.629 (0.488)	0.475 (0.353)	-0.106 (0.278)	-0.220 (0.380)	0.464 (0.568)	-0.593 (0.482)	-0.402 (0.322)	-0.175 (0.369)	-0.360 (0.340)
Left (1) - right (10) self-ID	-0.229 (0.028)***	-0.202 (0.024)***	-0.175 (0.020)***	-0.205 (0.022)***	-0.212 (0.025)***	-0.022 (0.022)	-0.069 (0.021)**	-0.136 (0.024)***	-0.210 (0.021)***
Observations	990	967	965	984	964	990	950	934	1982
Adjusted R^2	0.136	0.215	0.177	0.153	0.102	0.027	0.037	0.095	0.132

Displayed are coefficients with standard errors in parentheses. *** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$, + $p \leq 0.1$

statistically significant when knowledge is excluded (in the same direction as in other countries, i.e. with left-wing-orientations being associated with slightly greater climate policy transformation preferences). Finally, the checks demonstrate the added value of including the knowledge variable in the models, as the explained variance decreases in the models without it.

The outcomes for the economic system preferences are similar in nature. Overall, findings are robust to the exclusion of the knowledge variable. There is no systematic change in the formal education coefficients, pointing, again, to country differences in the role thereof. Statistically significant results remain so, with the exception of the effect of upper secondary education in Germany. Once again, effect sizes for the

Fig. 2 Association between greater climate crisis knowledge and economic system preferences (coefficient from full regression models with 95% confidence interval)

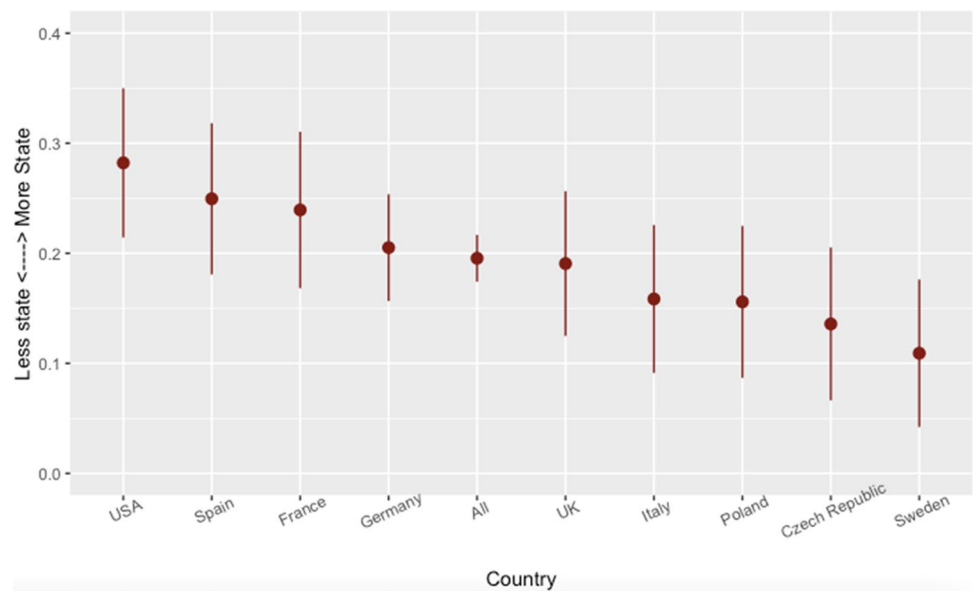
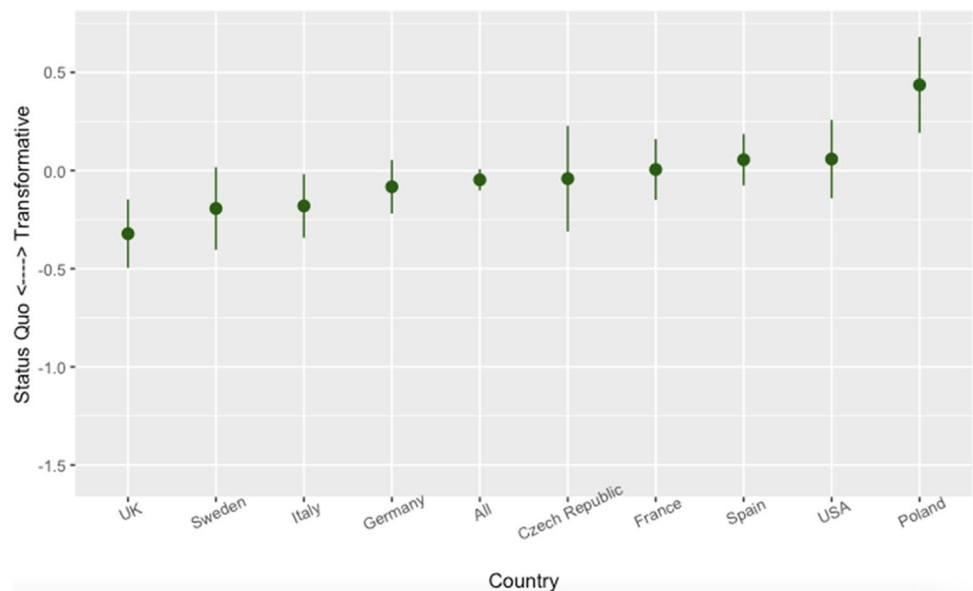


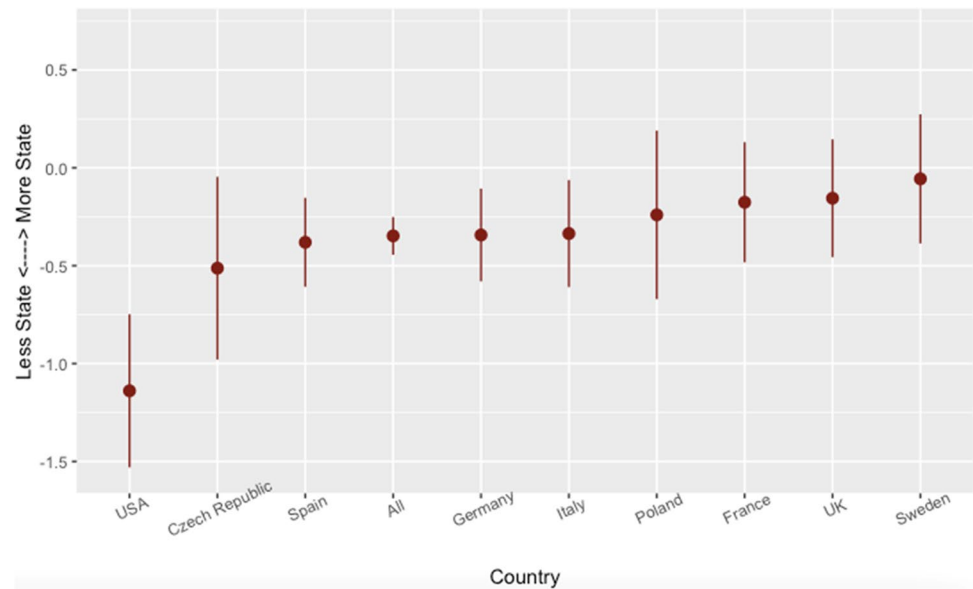
Fig. 3 Association between greater formal education (tertiary vs. below upper secondary) and climate policy preferences (coefficient from full regression models with 95% confidence interval)



association between political ideology and economic system preferences slightly increase in size. However, direction and statistical significance are not altered (with the exception of the coefficient for Poland which now becomes statistically significant). While this indicates again an interplay between knowledge and ideology, the substantive interpretation of findings is not altered. However, we also see again that the explained variance across all models drops when we exclude climate-specific knowledge, suggesting that the variable adds explanatory value.

In summary, in most countries, formal educational attainment is not associated with more transformative climate policy preferences. In two countries, those who have higher levels of education actually show a tendency to choose more status quo-oriented policy choices on climate issues. When it comes to general systemic economic views, greater formal education is associated with a tendency to reject greater state involvement in organising the economy in most, albeit not all, of the countries studied. Climate-specific knowledge and formal education are thus associated very differently with climate policy and general economic system preferences.

Fig. 4 Association between greater formal education (tertiary vs. below upper secondary) and economic system preferences (coefficient from full regression models with 95% confidence interval)



Discussion

People who have greater factual knowledge of the climate crisis are consistently more likely to support more transformative climate policies across the nine countries studied. We know that there are still significant gaps in people's climate knowledge (Eichhorn et al. 2020). This study cannot examine causality, and thus, we cannot claim that greater knowledge directly leads to such policy attitudes. Indeed, it is plausible to assume that there could be an effect of people holding certain policy views and thus seeking out more information on the climate crisis. However, it is difficult to imagine that the latter causal path would be the sole driver of the association investigated in this paper—especially as studies have shown people adapting their policy views after being introduced to factual information (Maestre-Andrés et al. 2021). Factual knowledge about the climate crisis indeed seems to matter. This extends beyond the specific realm of climate policy attitudes. As we have shown, there is also a strong and consistent association with wider views on economic structures. People who know more about the climate crisis specifically also favour greater ambitions for states to shape their respective economies in general. This is very important as successful climate policy transformations require broader structural changes in the economic system

(Paterson 2021; Anderson 2019). Seeing that those who call for both have greater levels of factual knowledge about the climate crisis is encouraging. It suggests that with further increasing awareness of the mechanisms behind the crisis and the impacts it has, a window of opportunity to engage with people's climate-specific and general economic policy views might open more widely.

As we have also shown, it is crucial to note that there are significant country differences in these patterns. The role climate crisis knowledge might play in the formation of policy attitudes depends substantially on a range of structural factors shaping people's views in different ways across the countries studied. This is evident in the case of formal educational attainment. There is no consistent relationship between educational attainment and attitudes on climate policies across countries. In Sweden and Italy, those who had tertiary education were more likely to favour status quo orientations in climate policy and reject more transformative ideas. Potential climate crisis knowledge effects could thus be seen as actually having to overcome a difficult context in which educationally more privileged people are resisting change—presumably because they are benefiting from the current status quo. This pattern is even more pervasive when we focus on economic system questions. In most of the countries studied, those with greater formal education reject

a more ambitious role for states to shape the economy, while climate crisis knowledge had the opposite effect. Crucially, efforts aimed at increasing awareness about the climate crisis should therefore not be conflated with general education levels. Raising people's factual levels of knowledge must be an ambition across all of society and may be even more pertinent for people otherwise tending to favour status quo positions—who might be those with higher formal education levels.

This article makes an important contribution to this debate but has some limitations. Thus, we require further research to deepen our understanding of the precise mechanisms explaining the role of climate crisis knowledge and formal education. First, the present study is cross-sectional. We cannot infer causality from the findings. While there is a high degree of plausibility that knowledge and education should at least partially play a role in shaping attitudes, we cannot quantify the extent thereof. Additionally, there may be endogeneity mechanisms we cannot fully account for. Through the robustness checks, we have seen that knowledge and ideology are related to each other and while findings were robust overall, better assessing such mechanisms would enhance our understanding of causal pathways. Second, the measures used to estimate climate crisis policy and economic system views are not directly comparable. While the scales are operationalised in the same range and we see larger effect sizes for the relationship with economic system views than climate policy preferences, the different constructions of the scores prevent us from estimating the relative strength of the associations directly. A dedicated survey for which equivalent scales were constructed intentionally would provide us with measures that would allow for a more explicit quantification of the effects studied rather than the identification of associations only. Third, while the climate policy measure contains both more abstract and more concrete policy questions and thus covers a good range of policy debates, the set of questions is not capable of studying different domains of policy in a robust manner. In a dedicated survey, instruments designed to differentiate policy domains could be studied comparatively to investigate whether knowledge is more important for some or others.

This would enhance the extensive body of literature investigating how the characteristics of different policy types affect popular support (see Bergquist et al. 2022; Drews and van den Bergh 2016). Fourth, the economic questions contained in the survey for this study only allow us to study generally whether people favour more or less state engagement in the economy. A greater variety of questions that would enable us to distinguish different domains of economic system preferences would be desirable to increase the depth of our study. Fifth, apart from ideological self-identification, there are other moderators that might affect the relationship between climate crisis knowledge, education and policy preferences. For example, several studies have shown that trust in politicians and political institutions is an important determinant of stronger support for climate policies (see Rafaty 2018; Fairbrother et al. 2021; Hamm et al. 2019; Drews et al. 2022b); and, similarly, trust in scientists is argued to be critical in promoting crisis awareness and according behaviours (see Huber et al. 2021; Huber 2020; Sarathchandra and Haltiner 2020). Having a more expansive survey would allow us to extend the set of controls and moderators (including also more fine-grained measures of socio-economic differences, including a comparable measure of household income) and also permit the use of instrumental variable approaches to better assess endogeneity concerns. Sixth, while the suggestions made so far would enable us to meaningfully expand on our quantitative insights, qualitative extensions would be crucial to deepen our understanding of how knowledge may affect people's construction of and perspectives on climate policy debates. For example, running focus groups separately with people who have greater or lesser factual knowledge on the climate crisis, but are otherwise composed similarly, may give us insights into whether and how discussions on the issue are approached differently.

Seeing the consistent association of factual climate crisis knowledge on both climate policy and economic system preferences, we suggest that expanding the work on this topic would be important and potentially helpful in developing approaches to engage with publics effectively in achieving comprehensive climate policy transitions that involve discussions about economic structures as well.

Appendix 1: Sample distribution on key quotas compared to population parameters (pre-weighting), in %

		Germany		Spain		Sweden		Czech Republic		Poland	
		Pop.	Samp.	Pop.	Samp.	Pop.	Samp.	Pop.	Samp.	Pop.	Samp.
Sex	Male	50.3	49.8	50.4	48.9	50.8	51.2	50.0	49.6	49.1	48.9
	Female	49.7	50.2	49.6	51.1	49.2	48.8	50.0	50.4	50.9	51.1
Age	Under 25	12.8	11.4	9.4	8.4	11.5	8.8	8.7	7.1	10.1	9.7
	25-34	17.2	17.2	15.6	15.6	20.0	20.1	17.7	17.9	19.6	18.6
	35-44	16.4	17.0	21.8	22.6	17.8	19.1	21.9	23.4	21.2	22.3
	45-54	20.3	21.5	21.9	22.3	18.8	20.1	18.8	16.9	16.6	15.1
	55-64	19.7	21.1	17.8	19.5	16.3	16.3	16.6	17.5	18.4	19.6
	65-74	13.7	11.8	13.5	11.5	15.6	15.6	16.2	17.3	14.1	14.8
Highest education	Lower Secondary	13.4	13.3	38.7	38.6	39.9	13.0	6.2	5.1	7.4	6.8
	Upper Secondary	56.8	56.6	22.7	22.9	43.0	43.9	69.5	70.7	60.6	59.9
	Tertiary	29.9	30.1	38.6	38.4	17.0	43.1	24.2	24.2	32.0	33.3
Region	1	13.4	13.4	9.2	9.1	39.9	40.1	12.4	13.1	20.6	20.9
	2	15.9	15.9	9.4	9.1	43.0	42.8	12.7	13.2	16.3	16.3
	3	4.4	4.6	14.2	15.0	17.0	17.2	11.5	10.9	10.2	10.3
	4	3.0	2.8	11.6	11.9			10.6	9.8	15.2	15.2
	5	0.8	0.8	29.2	29.2			14.2	14.5	9.8	9.3
	6	2.2	2.3	21.5	21.4			15.9	16.0	14.0	13.8
	7	7.6	7.8	4.9	4.2			11.4	11.3	13.9	14.2
	8	1.9	2.0					11.4	11.3		
	9	9.6	9.5								
	10	21.6	21.7								
	11	4.9	4.9								
	12	1.2	1.1								
	13	4.7	4.5								
	14	2.6	2.8								
	15	3.5	3.3								
	16	2.5	2.7								
				Italy		France		UK		USA	
Sex	Male			49.5	48.6	48.7	48.4	49.6	49.1	49.4	50.0
	Female			50.5	51.4	51.3	51.6	50.4	50.9	50.6	50.0
Age	Under 25			9.6	7.3	11.7	9.8	12.1	9.1	13.2	11.3
	25-34			15.1	16.0	16.8	17.5	19.2	19.4	19.5	20.9
	35-44			18.6	20.6	18.0	19.7	17.9	19.0	17.9	18.6
	45-54			22.4	22.6	19.3	20.9	19.4	21.1	17.9	19.1
	55-64			18.9	18.4	18.3	17.1	17.2	17.1	18.2	18.1
	65-74			15.4	15.1	15.9	14.9	14.2	14.2	13.2	12.0
Highest education	Lower Secondary			37.8	31.3	21.0	20.1	18.9	17.7	11.7	10.4
	Upper Secondary			42.5	47.6	43.0	42.2	36.4	36.3	47.2	48.8
	Tertiary			19.6	21.1	37.0	37.8	44.7	46.0	41.2	40.8

Region		26.4	29.2	12.0	12.5	4.0	3.7	4.7	4.6	
	2	19.2	20.1	4.0	3.8	11.0	11.0	12.7	12.7	
	3	19.9	19.7	5.0	5.1	8.2	8.2	14.3	15.1	
	4	23.4	19.8	4.0	4.1	7.2	7.2	6.4	6.6	
	5	11.1	11.1	1.0	0.3	8.9	9.0	20.1	20.6	
	6			9.0	8.8	9.4	9.2	5.8	6.0	
	7			9.0	9.3	13.5	14.1	12.1	11.3	
	8			19.0	18.9	13.8	13.7	7.4	7.4	
	9			5.0	4.4	8.4	8.4	16.5	15.7	
	10			9.0	9.1	4.7	4.9			
	11			9.0	9.6	8.2	8.4			
	12			6.0	6.0	2.8	2.3			
	13			8.0	7.9					
	14									
	15									
	16									
		Germany	Spain	Sweden	Czech Republic	Poland	Italy	France	UK	USA
Region	1	Baden-Württemberg	Noroeste (Galicia, Principado de Asturias, Cantabria)	Östra Sverige (Stockholm, Östra Mellansverige)	Praha	Południowy (Małopolskie, Śląskie)	Nord-Ovest (Piemonte, Valle d'Aosta, Lombardia, Liguria)	Auvergne-Rhône-Alpes	North East	New England
	2	Bayern	Noreste (País Vasco, Comunidad Foral de Navarra, La Rioja, Aragón)	Södra Sverige (Småland med öarna, Sydsverige, Västsverige)	Střední Čechy	Północno-Zachodni (Wielkopolskie, Zachodniopomorskie, Lubuskie)	Nort-Est (Trentino Alto Adige, Veneto, Friuli Venezia Giulia, Emilia Romagna)	Bourgogne-Franche-Comté	North West	Middle Atlantic
	3	Berlin	Comunidad de Madrid	Norra Sverige (Norra Mellansverige, Mellersta Norrland, Övre Norrland)	Jihozápad	Południowo-Zachodni (Dolnośląskie, Opolskie)	Centro (Toscana, Umbria, Marche, Lazio)	Bretagne	Yorkshire and The Humber	East North Central
	4	Brandenburg	Centro (Castialla y León, Castilla-la Mancha, Extremadura)		Severozápad	Północny (Kujawsko-pomorskie, Warmińsko-Mazurskie, Pomorskie)	Sud (Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria)	Centre-Val de Loire	East Midlands	West North Central
	5	Bremen	Este (Cataluña, Comunidad Valenciana, Illes Balears)		Severovýchod	Centralny (Łódzkie, Świętokrzyskie)	Isole (Sicilia, Sardegna)	Corse	West Midlands	South Atlantic
	6	Hamburg	Sur (Andalucía, Región de Murcia, Ciudad Autónoma de Ceuta, Ciudad Autónoma de Melilla)		Jihovýchod	Wschodni (Lubelskie, Podkarpackie, Podlaskie)		Grand Est	East of England	East South Central

7	Hessen	Canarias	Střední Morava	Województwo Mazowieckie (Warszawski Stołeczny, Mazowiecki Regionalny)	Hauts-de-France	London	West South Central
8	Mecklenburg-Vorpommern		Mo-ravskolezsko		Ile de France	South East	Mountain
9	Niedersachsen				Normandie	South West	Pacific
10	Nordrhein-Westfalen				Nouvelle-Aquitaine	Wales	
11	Rheinland-Pfalz				Occitanie	Scotland	
12	Saarland				Pays de Loire	Northern Ireland	
13	Sachsen				Provence - Alpes-Côte d'Azur		
14	Sachsen-Anhalt						
15	Schleswig-Holstein						
16	Thüringen						

Appendix 2 Overview of instruments used

Table 4 Dependent variable: items used to calculate climate policy preferences score

Question	Response	Value (0: less to 10: more transformative)
Which of the following comes closest to your view on what the government should do to get individuals to act in a climate-responsible way, if anything at all?	<p>There should be no government actions to get individuals to act in a climate-responsible way 0</p> <p>Individuals should get rewards for behaving in a climate-responsible way 2.5</p> <p>There should be a mix of rewards, disincentives and bans for individuals 5</p> <p>Individuals should be taxed on behaviour that is damaging to the climate 7.5</p> <p>Individuals should be prohibited from behaving in ways that are damaging to the climate 10</p>	
And which of the following comes closest to your view on what the government should do to get businesses to act in a climate-responsible way, if anything at all?	<p>There should be no government actions to get businesses to act in a climate-responsible way 0</p> <p>Businesses should get rewards for behaving in a climate-responsible way 5</p> <p>There should be a mix of rewards, disincentives and bans for businesses 5</p> <p>Businesses should be taxed on behaviour that is damaging to the climate 7.5</p> <p>Businesses should be prohibited from behaving in ways that are damaging to the climate 10</p>	
There are different views about the potential role of technology in addressing climate change compared to change people have to make in their lives. Which of the following comes closest to your own view?	<p>New technologies can solve climate change without individuals having to change their lives too much 0</p> <p>New technologies can help address climate change, but individuals will also have to make changes to their lives 3.33</p> <p>New technologies can only have a small effect in addressing climate change, it is more important that individuals change their lives 6.67</p> <p>New technologies cannot really help address climate change and may actually stop individuals from changing their lives 10</p>	

Table 4 (continued)

Question	Response	Value (0: less to 10: more transformative)
In your opinion, which of the following policies should the [COUNTRY ADJECTIVE] government pursue to best address your concerns about climate change, if any at all? AND And what would be the second best policy, in your opinion? (We obtain ONE item for both questions combined, where the scaled value for each respondent is $x = (\text{value response First choice} * 0.6) + (\text{value response Second choice} * 0.4)$)	The government should not pursue any of these policies Allow communities of households to generate their own energy with shared renewable sources, such as local solar or wind turbine parks Increase the number of nuclear energy power plants Only give out government funding to businesses that engage in environmentally sustainable activities Make public transport very cheap or free of charge Apply a higher tax on all flights people take Increase the price of meat by adding a special meat tax Apply a tax on all carbon emissions Do not change anything Run public awareness and education campaigns Cut subsidies (financial help) currently given to animal farmers Raise a tax on meat Ban large-scale farming of animals Ban all non-organic meat production Do not change anything Improve train and bus networks, making them cheaper and faster with more routes Increase taxes on flights, but only for people who fly more than 3 times a year Increase taxes on all flights Ban flights within [COUNTRY] Ban all flights Do not change anything Reduce the speed at which cars can travel on all motorways Introduce or increase tolls to use all highways Improve the infrastructure for bicycles (e.g., better cycle paths) Improve the infrastructure for electric cars (e.g., more charging stations) Make public transport free of charge Provide financial support for people to buy cars that don't use petrol (e.g., electric cars) Ban cars from city centres	0 1.43 2.86 4.29 5.71 7.14 8.57 10 0 2 4 6 8 10 0 2 4 6 8 10 6 8 10 0 1.43 2.86 4.29 5.71 7.14 8.57 10
Raising animals for meat consumption has a strong impact on emissions that contribute to climate change. Which of the following do you consider the best response the [COUNTRY ADJECTIVE] government could choose? Please select what you believe is the best response and what your believe is the second best response.		
Flights have a strong impact on emissions that contribute to climate change. Which of the following do you consider the best response the [COUNTRY ADJECTIVE] government could choose? Please select what you believe is the best response and what you believe is the second best response.		
Car traffic has a strong impact on emissions that contribute to climate change. Which of the following do you consider the best response the [COUNTRY ADJECTIVE] government could choose? Please select...		

Table 4 (continued)

Question	Response	Value (0: less to 10: more transformative)
How we construct homes has a strong impact on emissions that contribute to climate change. Which of the following do you consider the best response the [COUNTRY ADJECTIVE] government could choose? Please select...	Do not change anything	0
	Provide support for people building new homes to make them more energy efficient	2
	Make it mandatory that all new homes have to have solar panels installed	4
	Pay for improvements to insulation in people's homes	6
	Build many new, state-owned energy efficient homes to rent to people	8
	Ban the construction of new homes that are not highly energy efficient	10

Table 5 Dependent variable: items used to calculate economic system preferences score

Question	Response	Value (0: less to 10: more state involvement)
In your view, economic decisions by the [COUNTRY ADJECTIVE] government should be guided first and foremost by the goal to AND	Reduce [COUNTRY]'s national debt	0
	Increase economic growth	2
	Provide jobs for all people in the country	4
And what would you say should be the second highest priority for economic decisions by the [COUNTRY ADJECTIVE] government?	Increase people's overall wellbeing	6
	Reduce inequality in society	8
	Minimise the impact on the environment	10
Many people are concerned that the distribution of material wealth in [COUNTRY] has become very unequal. Which of the following comes closest to your own view about what should ideally be done about that?	Nothing	0
	We should make it easier for individuals to invest their money (e.g., in shares)	2
	We should provide more services free of charge (such as public transport)	4
	We should increase the taxes for those who earn most	6
	We should fundamentally change the economic system to redistribute wealth	8
	We should provide every person in [COUNTRY] with a Universal Basic Income every month	10
There is a lot of debate about how the state and businesses should work together. Which of the following comes closest to your own view?	The state should provide basic legal frameworks for businesses, but otherwise not engage in economic activities	0
	The state should provide basic legal frameworks for businesses and provide a safety net for people who do not have a job, but should not directly engage in economic activities	2.5
	Private businesses should be allowed to operate within the legal framework the state provides, but the state should intervene in areas where markets do not work well for people	5
	Private businesses should be allowed to operate within the legal framework the state provides, but the state should prohibit activities that only benefit very few people and are harmful to many others	7.5
	The state should plan and organize all economic activities	10

Table 6 Independent variable: items used to calculate knowledge score

Question	Response	Value
You may have heard the idea that the world's climate is changing due to increases in temperature over the past 100 years. What is your personal opinion on this? Do you think the world's climate is changing?	Definitely changing	1
	Probably changing	0
	Probably not changing	0
	Definitely not changing	0
	Don't know	0
If no action is taken to address climate change, to what extent do you think your life will be changed by 2035?	My life will get better, because of climate change	0
	My life will not be changed substantially due to climate change	0
	My life will change somewhat and I will have to adapt to the changed climate	0
	My life will be strongly disrupted by climate change in a way that will change it fundamentally	1
	My life will become very hard and a deep struggle to secure even basic needs, because of climate change	1
In 2015, governments from around the world agreed at the United Nations Climate Change Conference (COP 21) in Paris to limit temperature rises to below 2°C and aim for 1.5°C.	Don't know	0
	True	1
The richest half of the global population is responsible for about 90 per cent of the world's emissions of carbon into the atmosphere.	False	0
	True	1
Scientists are roughly equally divided in their views on whether climate change is man-made or not.	False	0
	True	1
Do you think that climate change is caused by natural processes, human activity, or both?	Entirely by natural processes	0
	Mainly by natural processes	0
	About equally by natural processes and human activity	0
	Mainly by human activity	1
	Entirely by human activity	1
	I don't think climate change is happening	0

Appendix 3 Histograms of dependent variable distributions

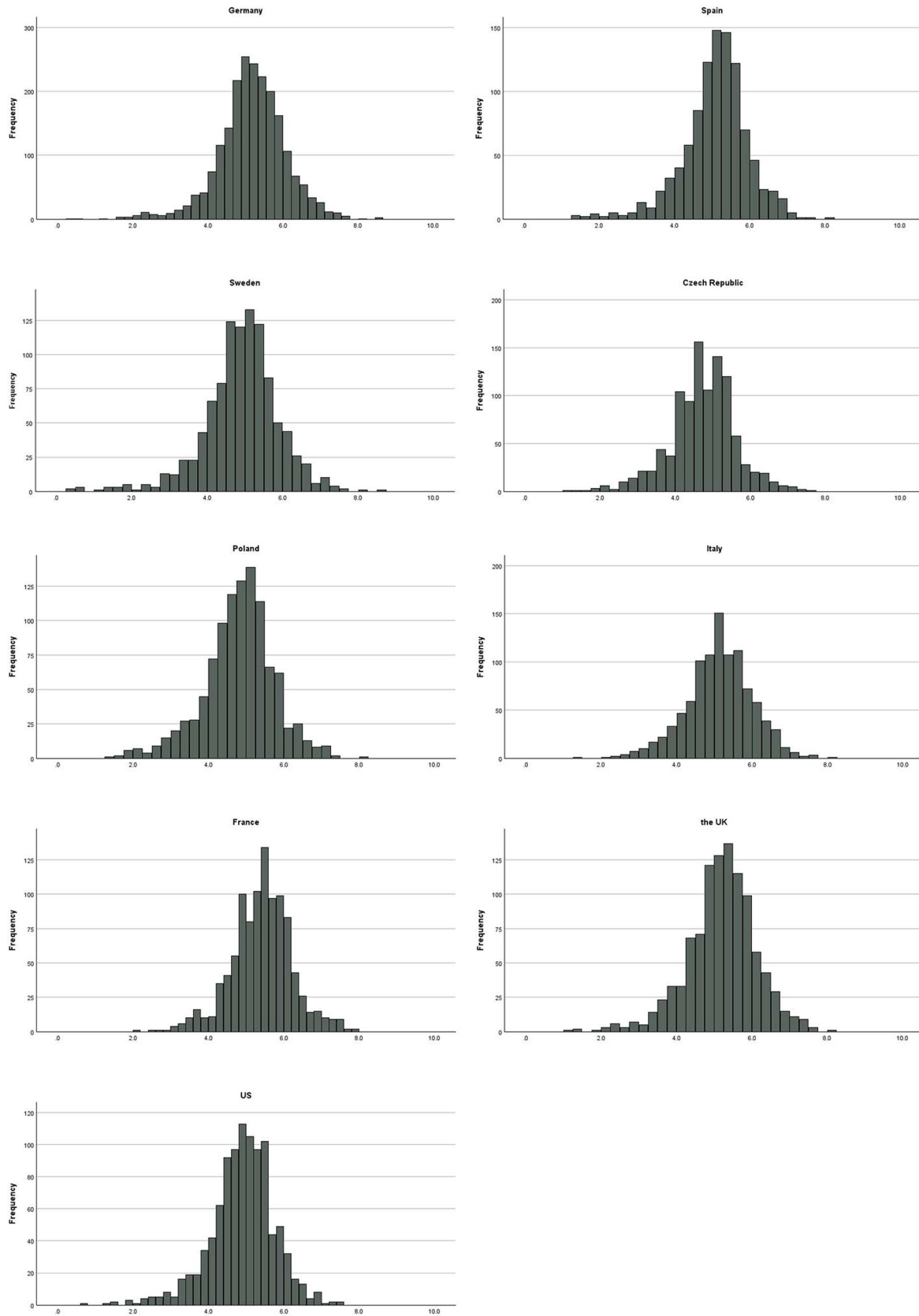


Fig. 5 Climate policy preferences score. Economic system preference score

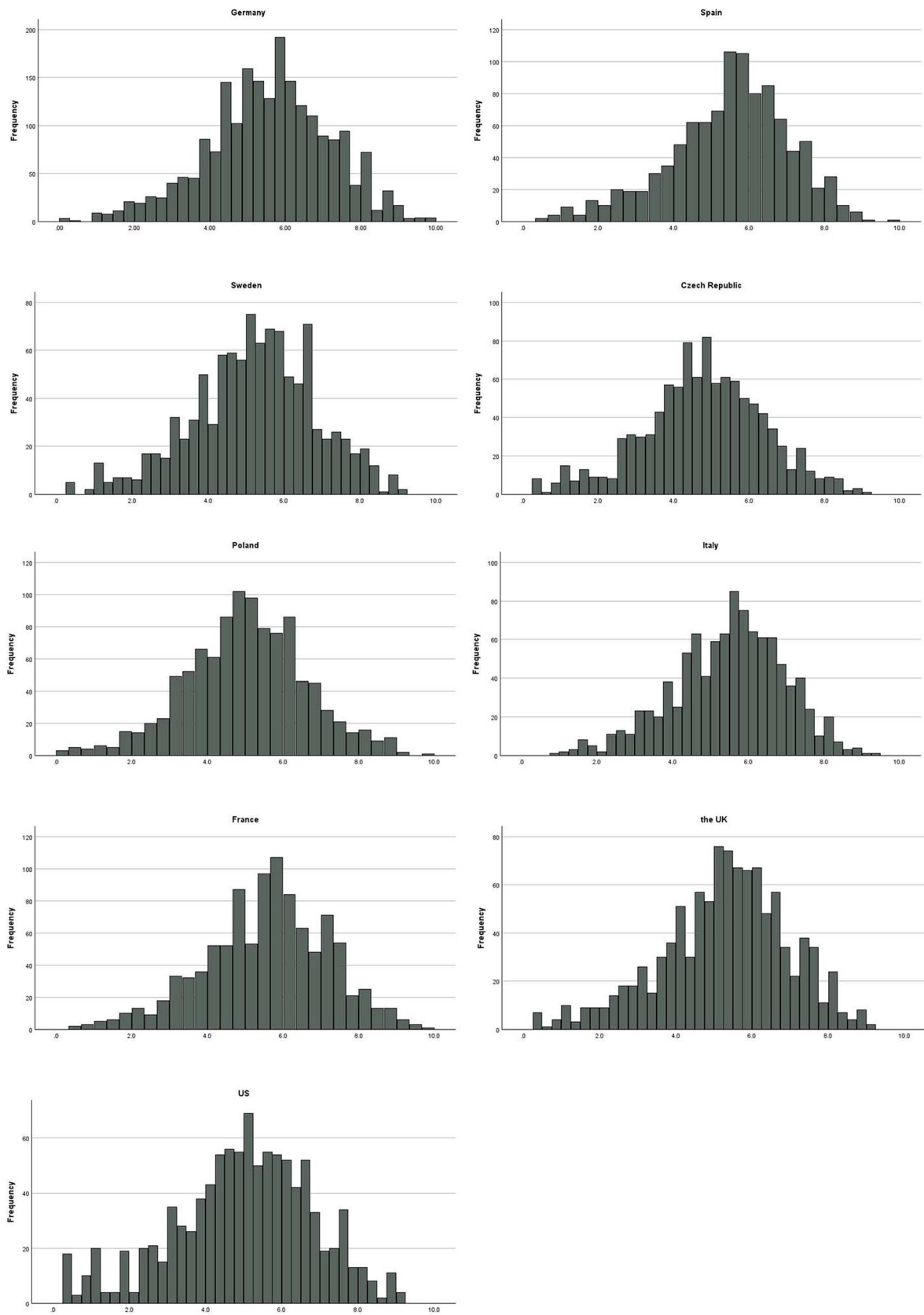


Fig. 5 (continued)

Appendix 4 Robustness checks (full models without knowledge variable)

Table 7 OLS regressions for economic system preferences by country (with positive values indicating an association with a preference for more transformative climate policies)

	Dependent variable: climate policy preferences (<i>More transformative</i>)									
	UK	USA	Spain	Sweden	Czech Republic	Poland	Italy	France	Germany	
Intercept	5.595 (0.165)***	5.057 (0.151)***	5.214 (0.116)***	5.559 (0.158)***	4.623 (0.179)***	4.334 (0.156)***	5.186 (0.147)***	5.120 (0.139)***	5.507 (0.115)***	
Education (ref: lower sec or below)										
Upper secondary	-0.213 (0.084)*	0.002 (0.094)	0.006 (0.077)	-0.215 (0.098)*	0.035 (0.124)	0.479 (0.116)***	-0.077 (0.066)	0.082 (0.071)	-0.020 (0.063)	
Tertiary	-0.223 (0.087)*	0.069 (0.101)	0.095 (0.068)	-0.137 (0.102)	0.001 (0.133)	0.549 (0.123)***	-0.158 (0.082)+	0.058 (0.076)	-0.024 (0.069)	
Female	0.033 (0.060)	0.185 (0.057)**	0.025 (0.058)	0.053 (0.063)	0.123 (0.058)*	0.191 (0.060)**	-0.084 (0.062)	0.122 (0.054)*	0.102 (0.041)*	
Age (ref: 18–30)										
31–54	0.084 (0.079)	0.052 (0.071)	0.088 (0.079)	-0.112 (0.082)	0.134 (0.078)+	0.008 (0.079)	0.027 (0.079)	0.152 (0.069)*	0.113 (0.055)*	
55–74	0.094 (0.095)	0.039 (0.083)	0.143 (0.085)+	-0.167 (0.098)+	0.352 (0.094)***	0.211 (0.097)*	0.060 (0.086)	0.236 (0.093)*	0.103 (0.062)+	
Area (ref: Big city)										
Suburbs/big city	0.078 (0.097)	0.057 (0.076)	0.022 (0.092)	0.046 (0.091)	0.027 (0.108)	-0.385 (0.139)***	0.246 (0.116)*	-0.021 (0.084)	-0.074 (0.063)	
outskirts										
Town/small city	0.152 (0.089)+	-0.073 (0.083)	0.002 (0.063)	-0.070 (0.081)	-0.038 (0.073)	-0.053 (0.068)	0.241 (0.080)**	-0.094 (0.077)	0.019 (0.051)	
Country village	0.044 (0.109)	0.080 (0.169)	-0.544 (0.238)*	-0.036 (0.103)	-0.010 (0.086)	-0.019 (0.085)	0.188 (0.090)*	-0.046 (0.081)	-0.082 (0.060)	
Farm/countryside	0.414 (0.243)+	0.059 (0.121)	-0.039 (0.207)	-0.061 (0.126)	-1.315 (0.329)***	-0.307 (0.346)	-0.054 (0.195)	-0.178 (0.172)	-0.038 (0.145)	
home										
Prefer not to say	-0.344 (0.434)	-0.037 (0.259)	0.215 (0.280)	-1.018 (0.541)+	-1.112 (0.573)+	-0.170 (0.533)	0.066 (0.283)	-0.099 (0.267)	-0.136 (0.398)	
Tenure (ref: own alone)										
Own with partner	-0.074 (0.079)	-0.091 (0.072)	0.013 (0.074)	0.100 (0.084)	-0.017 (0.074)	0.034 (0.070)	0.003 (0.079)	0.197 (0.078)*	-0.074 (0.063)	
Rent alone	-0.157 (0.107)	0.043 (0.097)	0.240 (0.121)*	0.127 (0.087)	0.055 (0.095)	0.088 (0.124)	0.067 (0.122)	0.150 (0.092)	0.009 (0.063)	
Rent with partner	-0.148 (0.101)	-0.055 (0.098)	0.101 (0.089)	0.137 (0.102)	0.023 (0.090)	0.009 (0.114)	0.005 (0.108)	0.185 (0.092)*	-0.023 (0.063)	
Rent room in shared place	0.048 (0.161)	0.158 (0.139)	0.048 (0.162)	-0.247 (0.242)	0.101 (0.215)	0.121 (0.227)	0.157 (0.209)	0.341 (0.227)	0.072 (0.115)	
Stay for free (e.g., family)	-0.107 (0.126)	-0.108 (0.111)	0.099 (0.100)	0.092 (0.148)	0.148 (0.108)	-0.117 (0.106)	-0.116 (0.104)	0.277 (0.130)*	0.117 (0.098)	
Other	0.368 (0.235)	0.183 (0.192)	0.104 (0.267)	0.672 (0.421)	-0.042 (0.234)	0.330 (0.280)	-0.056 (0.222)	0.260 (0.326)	-0.193 (0.231)	
Prefer not to say	-0.397 (0.213)+	0.145 (0.223)	0.251 (0.217)	-0.327 (0.266)	0.095 (0.236)	0.105 (0.193)	-0.090 (0.189)	0.268 (0.180)	0.130 (0.160)	
Economic activity (ref: working)										
Retired	0.182 (0.094)+	0.004 (0.091)	0.116 (0.093)	0.021 (0.101)	0.019 (0.090)	0.045 (0.097)	0.108 (0.090)	0.026 (0.092)	0.071 (0.065)	
Full-time education	0.197 (0.139)	0.015 (0.137)	-0.026 (0.113)	0.026 (0.121)	0.115 (0.129)	0.032 (0.141)	-0.035 (0.130)	-0.046 (0.131)	0.050 (0.079)	

Table 7 (continued)

Home-focussed (family care)	0.086 (0.135)	0.119 (0.105)	0.190 (0.156)	- 0.094 (0.243)	- 0.162 (0.115)	- 0.066 (0.132)	- 0.040 (0.107)	- 0.236 (0.136)+	- 0.134 (0.111)
Long-term sick/ disabled	0.112 (0.128)	0.045 (0.109)	0.274 (0.173)	0.146 (0.140)	- 0.080 (0.209)	0.098 (0.154)	- 0.023 (0.231)	0.191 (0.134)	0.085 (0.111)
Unemployed	0.039 (0.124)	0.051 (0.098)	- 0.021 (0.087)	- 0.211 (0.130)	0.108 (0.137)	0.061 (0.126)	- 0.070 (0.088)	0.039 (0.099)	0.182 (0.121)
Prefer not to stay	0.146 (0.285)	0.078 (0.182)	- 0.032 (0.155)	0.099 (0.238)	0.011 (0.308)	- 0.074 (0.267)	0.112 (0.189)	- 0.102 (0.186)	- 0.111 (0.192)
Left (1) - right (10) self-ID	- 0.068 (0.015)***	- 0.054 (0.011)***	- 0.070 (0.012)***	- 0.082 (0.013)***	- 0.026 (0.014)+	- 0.026 (0.012)*	- 0.026 (0.012)*	- 0.015 (0.012)	- 0.086 (0.012)***
Observations	1029	997	999	1022	1019	1031	988	993	2036
Adjusted R ²	0.037	0.026	0.040	0.049	0.040	0.050	0.017	0.013	0.034
<i>Dependent variable: economic system preference (More state involvement)</i>									
b									
Intercept	6.119 (0.285)***	7.668 (0.301)***	6.356 (0.197)***	6.028 (0.249)***	6.194 (0.311)***	5.031 (0.270)***	6.115 (0.248)***	5.968 (0.278)***	6.271 (0.201)***
Education (ref: lower sec or below)									
Upper secondary	0.028 (0.145)	- 0.903 (0.188)***	- 0.118 (0.131)	0.031 (0.155)	- 0.365 (0.214)+	- 0.185 (0.200)	- 0.200 (0.111)+	0.185 (0.141)	- 0.105 (0.110)
Tertiary	- 0.052 (0.151)	- 0.982 (0.201)***	- 0.270 (0.115)*	- 0.012 (0.160)	- 0.434 (0.230)+	- 0.276 (0.213)	- 0.315 (0.139)*	0.002 (0.152)	- 0.219 (0.120)+
Female	0.069 (0.103)	0.284 (0.114)*	- 0.040 (0.100)	0.348 (0.099)***	0.135 (0.100)	0.247 (0.104)*	0.015 (0.104)	0.181 (0.107)+	0.183 (0.071)**
Age (ref: 18-30)									
31-54	0.263 (0.136)+	- 0.316 (0.142)*	0.107 (0.134)	- 0.027 (0.129)	- 0.281 (0.135)*	0.278 (0.137)*	0.032 (0.133)	0.215 (0.138)	0.281 (0.097)**
55-74	0.400 (0.165)*	- 0.404 (0.165)*	0.099 (0.146)	0.016 (0.154)	0.164 (0.162)	0.400 (0.168)*	0.085 (0.144)	0.364 (0.185)*	0.374 (0.108)***
Area (ref: big city)									
Suburbs/big city outskirts	0.187 (0.167)	- 0.176 (0.151)	- 0.363 (0.157)*	0.207 (0.143)	- 0.202 (0.187)	0.078 (0.240)	- 0.211 (0.197)	- 0.054 (0.168)	0.004 (0.110)
Town/small city	0.094 (0.154)	- 0.163 (0.165)	0.155 (0.108)	0.115 (0.127)	0.054 (0.126)	0.098 (0.117)	0.066 (0.135)	- 0.046 (0.153)	0.071 (0.089)
Country village	0.134 (0.189)	- 0.220 (0.336)	0.045 (0.406)	0.181 (0.162)	0.009 (0.149)	0.011 (0.148)	0.029 (0.151)	- 0.044 (0.163)	0.099 (0.104)
Farm/countryside home	0.152 (0.419)	0.374 (0.240)	- 0.318 (0.353)	0.153 (0.198)	0.224 (0.570)	0.117 (0.599)	0.114 (0.329)	0.506 (0.343)	0.030 (0.253)
Prefer not to stay alone	0.373 (0.750)	- 0.661 (0.517)	0.355 (0.478)	- 0.003 (0.851)	- 0.506 (0.994)	0.061 (0.921)	0.165 (0.478)	- 0.0001 (0.533)	0.756 (0.693)
Tenure (ref: own alone)									
Own with partner	0.156 (0.137)	- 0.059 (0.143)	0.151 (0.126)	- 0.175 (0.132)	0.019 (0.128)	- 0.064 (0.122)	0.019 (0.134)	- 0.074 (0.156)	0.127 (0.109)
Rent alone	0.486 (0.184)**	- 0.296 (0.194)	0.680 (0.206)**	0.240 (0.137)+	0.117 (0.164)	0.361 (0.215)+	- 0.094 (0.206)	0.293 (0.184)	0.413 (0.110)***
Rent with partner	0.536 (0.175)**	0.070 (0.196)	0.117 (0.151)	- 0.016 (0.161)	0.0002 (0.156)	0.165 (0.197)	0.103 (0.182)	0.240 (0.184)	0.434 (0.110)***

Table 7 (continued)

Rent room in shared place	0.800 (0.277)**	0.073 (0.276)	0.638 (0.277)*	0.525 (0.381)	0.064 (0.372)	0.151 (0.392)	0.122 (0.353)	0.828 (0.453)+	0.559 (0.200)**
Stay for free (e.g., family)	0.399 (0.217)+	-0.207 (0.221)	0.193 (0.170)	-0.123 (0.233)	0.206 (0.187)	0.135 (0.184)	0.182 (0.175)	0.186 (0.260)	0.095 (0.171)
Other	0.679 (0.405)+	-0.332 (0.384)	0.310 (0.455)	0.050 (0.663)	-0.174 (0.405)	0.630 (0.484)	0.525 (0.374)	0.195 (0.650)	-0.225 (0.403)
Prefer not to say	0.351 (0.369)	-0.043 (0.445)	0.063 (0.370)	0.074 (0.419)	-0.212 (0.410)	0.494 (0.333)	0.038 (0.320)	-0.095 (0.359)	0.181 (0.280)
Economic activity (ref: working)									
Retired	0.045 (0.163)	0.022 (0.182)	0.207 (0.158)	0.311 (0.160)+	-0.070 (0.156)	0.021 (0.168)	-0.240 (0.152)	-0.040 (0.184)	0.116 (0.113)
Full-time education	-0.193 (0.240)	0.191 (0.273)	0.141 (0.193)	0.106 (0.191)	-0.119 (0.223)	-0.291 (0.244)	0.094 (0.219)	-0.078 (0.261)	-0.071 (0.138)
Home-focussed (family care)	-0.174 (0.233)	-0.273 (0.210)	0.203 (0.266)	0.133 (0.383)	0.362 (0.200)+	-0.158 (0.229)	-0.173 (0.181)	-0.127 (0.271)	0.054 (0.193)
Long-term sick/disabled	-0.069 (0.221)	0.257 (0.217)	0.360 (0.296)	0.213 (0.220)	0.669 (0.362)+	-0.172 (0.266)	0.045 (0.391)	0.252 (0.267)	0.611 (0.194)**
Unemployed	0.137 (0.214)	0.024 (0.196)	0.288 (0.148)+	0.658 (0.205)**	0.107 (0.237)	-0.147 (0.217)	-0.140 (0.149)	0.029 (0.197)	-0.057 (0.212)
Prefer not to say	-0.475 (0.493)	0.532 (0.363)	-0.377 (0.264)	-0.264 (0.375)	0.316 (0.535)	-0.494 (0.462)	-0.436 (0.320)	-0.074 (0.371)	-0.241 (0.335)
Left (1) - right self-ID	-0.267 (0.026)***	-0.276 (0.023)***	-0.217 (0.020)***	-0.221 (0.021)***	-0.204 (0.024)***	-0.043 (0.021)*	-0.092 (0.020)***	-0.156 (0.024)***	-0.252 (0.020)***
Observations	1029	997	999	1022	1019	1031	988	993	2037
Adjusted R ²	0.103	0.163	0.136	0.140	0.086	0.009	0.015	0.049	0.103

Displayed are coefficients with standard errors in parentheses. *** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$, + $p \leq 0.1$

Author contributions JE designed the study framework, coordinated the data collection and took the lead in writing up the results. JT took the lead in programming the analyses and writing up the “Results” section. AGS took the lead in writing up the literature review and organised the data operationalisation. All authors read and approved the final manuscript.

Data availability The survey dataset used for the analyses in this paper is not yet publicly available and the license does not permit publication. However, there are plans by the data owner to deposit the data going forward. Data access can, however, be granted on a case-by-case basis on request through a data usage agreement. Interested scholars can contact the authors for information directly.

Declarations

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Competing interest The authors declare no competing interests

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