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The centre-periphery divide and attitudes towards climate change measures among Western Europeans

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ABSTRACT

This article focuses on the spatial dimension of environmental protectionism. Merging regional level and European Social Survey (ESS) data, we examine attitudes towards climate change policies in 186 Western European regions comparatively. Findings from multilevel models confirm that climate policies, which concentrate costs spatially, generate resistance from individuals who incur the costs of these policies. Specifically, individuals in rural and suburban areas who fear income losses and reduced purchasing power are less supportive of climate change policies. Living in poorer regions also drives resistance to such policies. Further, the regional context conditions the effects of egalitarian attitudes. People supporting redistribution oppose climate change measures if they live in poor regions with high unemployment. Overall, we provide empirical evidence of a centre-periphery cleavage dividing Western European attitudes on environment protectionism.

KEYWORDS Climate change; climate change policies; public opinion; centre-periphery; European regions; European Social Survey (ESS)

Introduction

What drives attitudes towards specific climate change policies and who is willing to pay more to protect the environment? A wealth of comparative studies focuses on environmental concerns and attitudes towards climate change (cf. Inglehart 1995, Franzen and Meyer 2010, Scruggs and Benegal 2012, Fairbrother 2013, Franzen and Vogl 2013, Hao 2016, Wolsko *et al.* 2016, Ziegler 2017, Brieger 2019, Arikan and Günay 2021). We know less, however, about the spatial dimension of attitudes towards specific climate change policies such as raising taxes on fossil fuels, abandoning coal as an energy source, or banning diesel cars with high emissions (see Fairbrother *et al.* 2019, Prakash and Bernauer

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2020). Literature on attitudes towards such policies is often limited to single case studies (e.g. Stokes 2016, Fobissie and Inc 2019, Douenne and Fabre 2020) and does not account either for cross-country or regional variations.

The absence of comparative research on the spatial dimension of environmental protectionism opens an important knowledge gap for two reasons. First, literature from public policy suggests we have theoretical reasons to expect attitudinal differences between having overall concerns about an issue, and actually supporting or opposing a specific policy (e.g. Wilson 1980). Indeed, climate change, which is a collective action problem (Ostrom 2010), can trigger different reactions if perceived as diffuse or more specific (Arikan *et al.* 2021). Ego-tropic climate concerns tend to matter more than socio-tropic climate concerns (Arikan and Günay 2021). Accordingly, it is possible that people care about the environment in an abstract way but oppose a particular environmental policy if they deem this policy to be costly to them personally. Second climate policies are likely to incur concentrated local costs (Stokes 2016). Policies which create diffuse gains but concentrated losses have the strongest tendency to generate resistance among those concerned (e.g. Wilson 1980, Weaver 1986, Pierson 1996). Therefore, while, climate policies may receive broad support from the general population, they are also likely to receive concentrated opposition from the rural communities where local costs are incurred. Indeed, people may be more likely to mobilize *against* a policy development in their local area than *in favour* of a climate policy broadly (Stokes 2016).

Phenomena such as the emergence of the yellow vest movement in France as a reaction to rising fuel taxes, or the widening attitudinal gap between metropolitan areas and the countryside witnessed in recent European Parliament elections (Treib 2021) attest to the relevance of these dynamics. Local opposition to climate change measures is key to understanding contemporary political developments, especially given the prominence of the climate issue in the media and political debates. Such opposition is likely to have important implications for voting behaviour, reinforcing territorial cleavages and potentially leading to accountability failures (Stokes 2016) or the rise of populist parties.

This article addresses the important, yet largely overlooked, spatial dimension of environmental protectionism. In doing so, we provide one of the first comprehensive comparative studies of what drives attitudes towards (and polarisation around) climate change policies. Specifically, we analyse worries about energy expenses, attitudes towards taxes on fossil fuels, and support for coal as an energy source at the regional level. Drawing on literature on the micro-foundation of attitudes towards climate change policies and environmental regulation (cf. Fullerton 2011, Bento 2013 for overviews), we develop and test several hypotheses on attitudes towards

climate change policies[1] and their anticipated consequences for citizens in 186 European regions. To explain cross-regional differences, we link individual factors to regional economic characteristics using the European Social Survey's (ESS) Module 'Public Attitudes to Climate Change'. Our multilevel regression models yield considerable attitudinal differences between people living in metropolitan areas and people living in smaller towns or the countryside as the latter two fear income losses as effects of climate change policies. Moreover, we report considerable regional gaps in supporting climate change measures as living in poorer regions drives resistance towards climate change policies. Finally, we show through placebo tests that the structural components of attitudes towards climate change measures are only present and virulent if climate change measures have socially defined losers and winners.

This article adds value to literature on environmental politics in the following ways. First, distinguishing between broad environmental concerns and specific climate change policies allows us to directly test whether 'policy losers' specifically oppose these measures. Second, our analysis of climate policies, which concentrate costs spatially, provides empirical evidence of a centre-periphery divide. Specifically, our results confirm that the 'prosperity hypothesis' (Franzen and Meyer 2010) applies to the regional level, as opposition to climate change policies stems from individuals who incur the concentrated costs of these policies. Third, by merging regional-level data with ESS data, we respond to calls for further survey research on environmental politics that gauges public attitudes towards policy ideas (e.g. Prakash and Bernauer 2020).

We begin by theorising our expectations about climate policy attitudes at the individual and regional levels, then describe our data and methods, and proceed with our empirical analysis. We conclude with a discussion of our findings with respect to ongoing debates about centre-periphery cleavages and repolarisation of Western societies.

Environmental concerns and attitudes towards climate change policies

Individual-level socio-demographics

An extensive body of literature from various disciplines including sociology, political science, and economics focuses on factors that drive environmental concerns and attitudes towards climate change policies (e.g. Sandvik 2008, Franzen and Meyer 2010, Meyer and Liebe 2010, Scruggs and Benegal 2012, Fairbrother 2013, Hao 2016, Brieger 2019).

Scholars have examined the explanatory role of income and standard of living through various mechanisms. One point of departure is the postmaterialist thesis (Inglehart 1995) which suggests that individuals shift from materialist to postmaterialist values only when economic security is achieved. This shift towards postmaterialism includes a growing concern about environmental protection and support for environmental policies even at the expense of economic growth. Therefore, postmaterialist individuals are more likely to express environmental concerns.

This post-materialist view is consistent with, but not identical to, the so-called affluence or prosperity hypothesis, which suggests that income increases both the demand for environmental protection and the willingness to pay more for it, but this is not dependent on a shift to post-materialist values. Rather, income mitigates the trade-off between personal consumption and investment in environmental protection (Franzen and Meyer 2010, Franzen and Vogl 2013, Brieger 2019). Individuals with higher levels of disposable income do not experience a considerable decline in their living standards or consumption patterns if the price of goods or services increases to compensate for their perceived harm on the environment (e.g. eco taxes for fuel or deposits for bottles and cans).

Evidence supporting the affluence and postmaterialist hypotheses is mixed (see Brieger 2019 for a recent summary of empirical results). On the one hand, empirical studies suggest a strong link between affluence and support for environmental policies as they find that citizens in wealthier countries tend to be more concerned about environmental issues than those in poorer countries (Franzen and Meyer 2010). Others contest this view. While Fairbrother (2013) finds some support for the postmaterialist thesis, he reports no relationship between economic development and people's willingness to pay for environmental protection as poorer countries tend to exhibit higher levels of environmental concerns. Residents of richer countries are surprisingly less willing to pay for protecting the environment despite the large numbers of postmaterialist populations in these countries. This is because substantial numbers of materialists in richer countries are unwilling to pay (Fairbrother 2013, p. 918). One crucial caveat here is that concerns about climate change can be widely spread, whereas support for actual climate change policies is more limited if they are perceived as costly (Prakash and Bernauer 2020).

Indeed, climate policy can impose costs on local communities through job losses and negative externalities (Stokes 2016). For example, fuel/carbon taxes have regressive effects and affect households with low incomes most (Bento *et al.* 2009, Nikodinoska and Schröder 2016, Spiller *et al.* 2017). This regressive effect, however, is contingent on household location as low-income earners might use public transport in urban areas as a consequence of the high costs of having a car (Poterba 1991). Accordingly, households

with the highest outlays for fuel, fuel taxes, and other individual transport and energy consumption costs are typically located in rural and sub-urban areas (Poterba 1991, p. 152ff; Filippini and Heimsch 2016, Spiller *et al.* 2017). This means that rural and sub-urban residents have the highest dependence on cars and the regressive nature of climate change measures hits hardest here. Spiller *et al.* (2017) further demonstrate that – in addition to the established income effects – residents of rural areas and those living farther away from the next metropolitan area are more affected by increases in fuel taxes as they have higher price elasticities than urban residents.

In sum, we have reasons to expect from this literature that climate change measures are more costly to poorer individuals, individuals residing in poorer regions and overall rural residents. From a public policy logic (Wilson 1980), these mechanisms indicate that the losses which climate change measures incur should be concentrated among those with low incomes and those living in rural areas, whereas the gains can be expected to be diffuse as everybody would benefit from lower emissions. Hence, we hypothesize:

Hypothesis 1: Lower income individuals are less likely to support climate change measures that affect purchasing power.

Hypothesis 2: Individuals residing in rural areas are less likely to support climate change measures.

Individual-level predispositions

Next, we proceed to theorise how climate change policies with concentrated local losses might affect individual predispositions. Literature on attitudes towards climate change suggests that individual orientations such as ideology and left–right self-placement affect attitudes towards the environment and the willingness to pay for climate change policies (Drews and van den Bergh 2016, Huber 2020). Single case studies on Sweden (Brannlund and Persson 2012), Switzerland (Bornstein and Lanz 2008) and the USA (Wolsko *et al.* 2016) show that left-wing individuals are more likely to develop environmental concerns and they are more willing to pay for climate change policies.

However, this relationship is less straightforward when focusing on attitudes that cut across left–right lines and create new alignments. A good case in point is egalitarianism. Traditionally, egalitarian attitudes have been associated with left-wing ideological predispositions; this would lead us to expect that those with egalitarian attitudes would follow left-wing individuals in their support of environmental policies. More recently, however, research reports 'paradoxical' contradictory positions, combining left-wing stances in

favour of greater equality and government intervention, with right-wing stances on minority rights, immigration, and other 'value' issues (Elchardus and Spruyt 2012). This suggests that egalitarianism is not necessarily dependent on traditional left–right alignments. Accordingly, a general left-wing pro-environmental predisposition might be contradicted by climate change measures if these have regressive effects and go against equality principles by creating concentrated losses for poorer people (e.g. through energy and consumption taxes). People with egalitarian attitudes may be more sceptical about those climate change measures that have the potential to increase the gap in purchasing power between poorer and more well-off citizens (Hammar and Jagers 2007, Jagers and Hammar 2009).

Consequently, we expect that:

Hypothesis 3: Individuals with egalitarian attitudes are less likely to support climate change measures that have regressive effects.

Regional-level differences

We have many reasons to expect regional differences to affect willingness to pay for the environment. First, cross-country analyses cannot fully capture contextual regional differences, such as energy production, urbanisation, regional wealth and local unemployment rates, and their impact on individual level attitudes. Economic contexts and living conditions differ considerably across regions, especially in larger countries such as Germany, Spain, and the United Kingdom. Second, we know from social policy literature (Pierson 1996) that policies with diffuse support and concentrated costs are likely to generate significant resistance from local (especially rural) communities where costs are imposed (Stokes 2016).

Indeed, research reports significant differences in political preferences between cosmopolitan urban areas which are more prosperous, progressive and tolerant versus the often conservative, nationalist and less tolerant rural areas that are lagging behind (De Vries 2018, Gimpel *et al.* 2020). This cleavage divides along socio-cultural, or value-based issues such as immigration and multiculturalism but may also be interpreted as a reflection of increased economic insecurity (De Vries 2018). Common economic interests unite urban and rural populations, respectively. High-income individuals tend to be located primarily in cities and suburbs (Gimpel *et al.* 2020); their political preferences are distinct from rural dwellers, especially those in poorer regions. The mechanism with regard to environmental policies is similar to that at the individual and/or national levels: people in poorer regions remain primarily preoccupied with the economic struggle for survival (Franzen and Meyer 2010). A related mechanism is anxiety and a sense of

threat created by the disruption of local labour markets, if certain jobs are directly threatened by a particular environmental policy (Fullerton 2011). For this reason, environmental economics has identified region as an important determinant for the distributional effects of environmental regulation and climate change policies (Bento 2013, p. 193). The regional concentration of industries and branches implies that climate change measures can lead to local labour market disruptions if employment in mining or logging is a major source of income for towns or whole regions (Fullerton 2011, p. 8). Therefore, we would expect that climate change policies that concentrate costs spatially generate resistance at the regional level, and propose the following hypotheses:

Hypothesis 4: Individuals in poorer regions are less likely to support climate change measures.

Hypothesis 5: Individuals in regions with higher unemployment rates are less likely to support climate change measures.

Hypothesis 6: Individuals in regions with large numbers of threatened jobs in the coal industry are less likely to support climate change measures.

Cross-level interactions

In addition to having a direct effect on attitudes towards climate policies, contextual factors may also moderate the effects of individual level factors such as income or egalitarianism. For example, since contextual economic factors affect attitudes towards climate policies, we would expect them to moderate the effects of individual-level factors related to socio-economic factors and inequality. However, while we have many theoretical and empirical reasons to expect such interactions, with the exception of Franzen and Meyer (2010), existing studies that pose related research questions tend to overlook cross-level interactions (e.g. Brieger 2019, Douenne and Fabre 2020 or Franzen and Vogl 2013).

Specifically, we might expect concerns about the regressive nature of energy taxes to be weaker in prosperous regions compared to poor regions, where such taxes are costly and limit the mobility and purchasing power of those individuals who have to spend a greater proportion of their income on transport. This is because the trade-off between sacrifices for environmental protection and living standards is lower if regional GDP is already high. Franzen and Meyer (2010, p. 228) demonstrate that the effect of postmaterialism on environmental concerns increases with GDP per capita at the national level. We expect a similar mechanism for local unemployment rates where equity concerns should matter most in regions with high unemployment compared to regions with low or full employment:

Hypothesis 7: Regional GDP and regional unemployment levels respectively moderate the effect of egalitarian attitudes on support for climate change measures.

To reiterate, we expect that regions relying on coal production are likely to oppose climate change measures – particularly abandoning coal as an energy source (Hypothesis 6). However, occupational or sectoral mobility might mitigate this resistance if the regional labour market can absorb employees made redundant from the affected industries. In other words, job growth in other industries could outweigh the reduction of employment in industries such as coal or logging (cf. Fullerton 2011, p. 8).

Hypothesis 8: Lower living standards and higher unemployment rates respectively increase the effect of coal industry job losses on attitudes towards climate change measures.

Data and methods

To test our hypotheses, we rely on the multilevel version of the ESS module on 'Public Attitudes to Climate Change' (ESS, Round 8, 2016). This is the most comprehensive existing cross-national survey that includes various items on attitudes towards climate change beyond the standard questions on concerns about climate change or global warming. We combine ESS data with comprehensive regional data from the NUTS-2 or NUTS-3 levels for all countries except the UK and Germany, which consistently use NUTS-1. The NUTS-2 and NUTS-3 data capture fine-grained regional differences and thus have enough variation for multilevel models with cross-level interactions.[2] To gather further information on the number of jobs in the coal industry, we integrate data from the European Commission (Alves Dias *et al.*, 2018). Our dataset contains circa 19.000 individuals clustered within 186 European regions from 14 countries. We focus on Western Europe for comparability purposes. Specifically, climate change is a high salience issue in Western European countries (see Braun and Schäfer 2021), which are also comparable in terms of popular attitudes and emerging societal cleavages (Kriesi 1998, Bornschier 2010).

Dependent variables

To capture concerns about the regressive nature of climate change measures and resistance to tax increases, we use the following two ESS questions, respectively: *How worried are you that energy may be*

too expensive for many people in [country]? and *To what extent are you in favour or against increasing taxes on fossil fuels, such as oil, gas and coal in [country] to reduce climate change?*. These items apply a five-point scale from 1 = not at all to 5 = extremely/strongly respectively. To capture support for the use of coal as an energy source, we use the question *How much electricity in [country] should be generated from [energy source]?*, which allows respondents to rate their preferences between coal and solar power. To demonstrate that only those climate change measures that have clearly defined losers and winners create stronger attitudinal gaps, we use '*subsidies for renewable energies*' and a proposed '*ban against inefficient household appliances*' as two further dependent variables for placebo tests. These two variables apply a five-point scale from 1 = 'Strongly in favour' to 5 = 'Strongly against'.

Independent variables

Our main individual-level independent variables include *income* (household income measured in deciles), *place of residence* (four categories including 1 = 'A big city', 2 = 'Suburbs or outskirts of big city', 3 = 'Town or small city' and 4 = 'Country village/farm/countryside'), and *support for egalitarianism* (we use the ESS item 'Government should reduce differences in income levels" measured on a reversed five-point scale so that 5 = strong agreement).

To investigate the role of regional economic conditions, we use regional unemployment rates (Scruggs & Benegal (2012, p. 510)) and regional GDP per capita (ESS 2016). For the 2016 regional unemployment rates in Finland, Ireland, Sweden, and Switzerland we use data from the respective national statistical agencies. Similarly, for regional GDP per capita data for Ireland and Switzerland, we use data from the Irish Central Statistics Office (CSO) and the Swiss Bundesamt für Statistik (see Online Appendix, part A for a detailed description).

To capture the effects of regional coal production on attitudes towards climate change policies, we integrate a self-constructed variable which captures the number of threatened jobs in coal mines and plants using data from the European Commission's Joint Research Centre (Alves Dias *et al.* 2018). Specifically, we construct our own measure using the item 'Number of jobs in coal mines and plants threatened' at the regional level. When the number of threatened jobs is not available, we calculate it by aggregating the fine-grained NUTS-3 classification, or by geographically locating the power plant mentioned in the report to assess the exact number of jobs for the respective NUTS-2 region. The variable has a considerable range from zero to 43.137 potential job losses. This reflects the fact that some countries do not have coal as

energy source at all (e.g. Norway or Switzerland) while other regions such as the German Land Nordrhein-Westfalen are heavily dependent on the coal industry.

Control variables

We estimate the models with a number of individual-level variables that may impact on environmental attitudes (see Brieger 2019, p. 832 for a summary; Meyer and Liebe 2010, Fairbrother *et al.* 2019, Scruggs and Benegal 2012, Wolsko *et al.* 2016, Ziegler 2017). First, we include standard socio-demographic variables such as age, class, education, and gender. Second, we control for attitudinal variables including political trust, attitudes towards immigration, left–right placement and general worry about climate change.

At the regional level, we further control for population density as it can be correlated with pro-environmental attitudes (Franzen and Meyer 2010, p. 226) and access to modes of transportation (Spiller *et al.* 2017). We also include net migration on the regional level. All data sources, coding decisions, and descriptive statistics appear in the Online Appendix.

Methods

We carry out multilevel regressions to tap into the drivers of attitudes towards climate change measures. Because respondents are nested in NUTS-regions, we have both individual- and regional-level data. This type of hierarchical data requires models accounting for within and between-context variance to obtain unbiased standard errors (Hox 2002, Rabe-Hesketh and Skrondal 2012). Moreover, we have a sufficient number of regions (186) to run multilevel regressions with cross-level interactions if we follow the benchmark of at least 30 or 35 level-2 units for conservative and accurate estimates of the confidence intervals for the contextual variables from Stegmueller (2013) or Bryan and Jenkins (2016).

We inspect the percentage of variance in our dependent variables between regions by computing the Intraclass Correlation Coefficients (ICC) for null models. The ICC for all three dependent variables yielded values between 10 and 20% (see Tables A2-A4 in the Online Appendix). This buttresses the choice of multilevel models since a considerable proportion of the total variance occurs between NUTS-regions (cf. Hox 2002). Since we have at least Likert scales for the three dependent variables, we used linear multilevel regression.

Finally, we are interested in investigating whether and when structural factors such as individual and regional income and residence in urban or rural regions drive attitudes towards climate change measures. To this effect, we carry out 'placebo tests' using two proposals for combatting climate

change which do not incur concentrated local costs for small community residents, i.e. subsidies for renewable energies and a proposed ban on inefficient household appliances. We expect these to be less impactful on incomes compared to regressive measures such as taxes on fossil fuels and therefore to generate lower levels of local resistance.

Results

Main results

To test our hypotheses on the attitudes towards climate change measures, we begin with an inspection of the distribution of the raw data at the regional level. Figure 1 plots the regional means for the three dependent variables 'worried about energy prices', 'taxes on fossil fuels', 'support for coal as an energy source', and the placebo test for 'subsidies for renewable energies' against regional GDP and regional unemployment. In line with the hypothesised relationships, a higher regional GDP is associated with fewer concerns about higher energy prices and lower opposition to taxes on fossil fuels. In contrast, a high regional unemployment rate is associated with higher average worries about energy prices and a stronger resistance against taxes on fossil fuels. The average support for coal as an energy source declines with regional GDP but increases with regional unemployment. For the subsidies for renewable energies, we see an almost flat line for regional GDP and unemployment which supports our argument that climate change policies with a less clear impact on incomes do have a much weaker structural anchor (the results for bans against inefficient household appliances are similar, not shown). These results provide descriptive support for Hypotheses 4–6.

To rigorously test these relationships and the individual-level hypotheses, we now present our baseline models to inspect the expected effects of contextual factors such as the local economy. Table 1 presents the coefficients from a series of multilevel models for the three dependent variables of interest (energy expenses, taxes on fossil fuels, and coal as an energy source) and the two placebo tests (subsidies for renewable energies and banning inefficient appliances). To reiterate, positive coefficients indicate more sceptical stances towards climate change measures.

Beginning with the individual-level demographic factors in Models 1, 2, and 3, we find strong evidence in support of Hypotheses 1, 2 and 3. In all specifications, the income coefficients are negative and highly significant. As expected in Hypothesis 1, we observe that the higher (lower) the household income, the stronger (weaker) the support for climate change measures such as increased taxes on fossil fuels (−0.019) or abandoning coal (−0.02) as energy source. Similarly, with lower household income, we observe stronger concerns about energy becoming too expensive or insecure (−0.02). The size

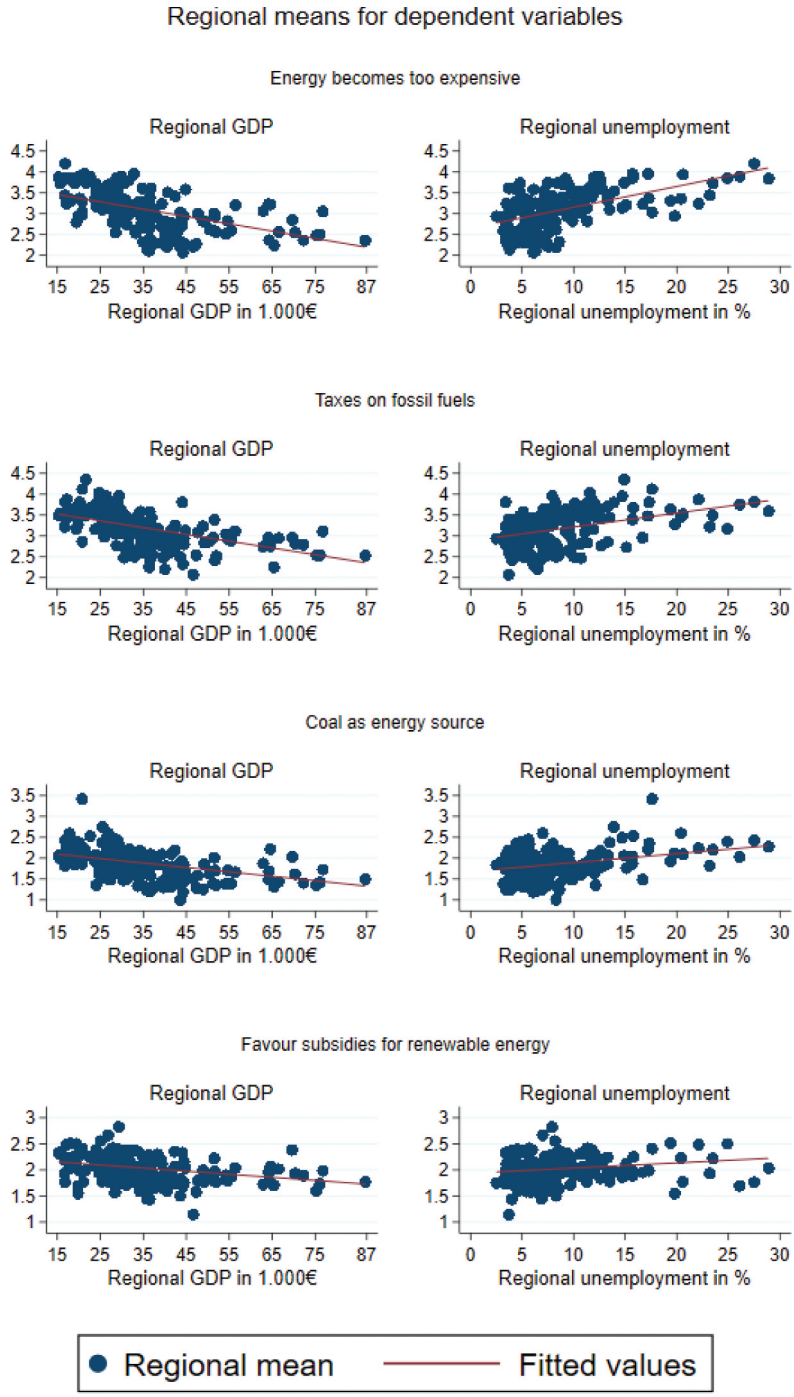

Figure 1. Means for dependent variables across regional GDP and unemployment rate.

Table 1. Attitudes towards climate change measures on individual and regional level.

Dependent variable	M1: Energy expenses	M2: Tax fossil fuels	M3: Coal as energy source	M4: Subsidies for renewable energies	M5: Ban inefficient appliances
Residence (reference: big city or urban area)					
Suburbs or outskirts of big city	0.057*	0.142***	0.011	−0.025	0.018
	(0.024)	(0.032)	(0.023)	(0.027)	(0.032)
Town or small city	0.066**	0.084**	0.046*	−0.030	−0.022
	(0.021)	(0.028)	(0.020)	(0.024)	(0.028)
Country village, farm, countryside	0.072***	0.160***	0.006	−0.039!	0.008
	(0.021)	(0.028)	(0.020)	(0.024)	(0.027)
Household income	−0.020***	−0.019***	−0.020***	−0.009**	−0.019***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Left-right	−0.008*	0.017***	0.010**	0.021***	0.013**
	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)
Egalitarianism	0.081***	−0.082***	−0.004	−0.069***	−0.094***
	(0.007)	(0.009)	(0.006)	(0.007)	(0.009)
Worried Climate Change	0.180***	−0.229***	−0.070***	−0.184***	−0.262***
	(0.007)	(0.010)	(0.007)	(0.008)	(0.010)
Attitudes immigration	0.004***	0.010***	0.004***	0.007***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trust in politicians	−0.050***	−0.062***	0.018***	−0.006!	−0.005
	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
Regional GDP in 1.000 Euro	−0.012***	−0.010***	−0.010***	−0.005**	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Regional unemployment per cent	0.025***	0.016**	0.015**	0.003	−0.002
	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)
Total jobs in coal ind. threatened, 100 jobs	0.000	0.000	0.001*	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Population density in region	0.000**	0.000	0.000**	0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Net migration in region, total	0.000	0.000	0.000***	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	2.241***	3.890***	2.421***	2.556***	3.534***
	(0.133)	(0.135)	(0.111)	(0.108)	(0.112)
Variance components					
Random intercept var.	0.088***	0.064***	0.053***	0.036***	0.026***
	(0.011)	(0.009)	(0.007)	(0.005)	(0.005)
Residual variance	0.685***	1.214***	0.607***	0.865***	1.184***
	(0.007)	(0.013)	(0.006)	(0.009)	(0.012)
N	18480	18,377	17,954	18,434	18,388
Rho	0.114	0.050	0.080	0.040	0.022
−2LL	−22,948.222	−28,008.499	−21,173.101	−24,952.553	−27,736.656
BIC	46210.827	56,331.201	42,659.659	50,219.409	55,787.535
df	29	29	29	29	29

Source: Multilevel regression models with ESS module 'Public Attitudes to Climate Change'. Notes: Standard errors in parentheses, ! $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, demographic control variables omitted, full models appear in Online Appendix, Tables A2-A6.

of the effect of the coefficients in Models 1–3 show that a one unit increase in household income strengthens support for climate change policies quite significantly taking into consideration that our dependent variables are ordinal with values ranging from 1 to 5. For worries about energy prices

and resistance against taxes on fossil fuels, we observe consistent patterns among respondents living in towns or rural areas as they significantly oppose climate change policies compared to respondents from metropolitan areas and big cities across models 1 to 4. These results provide strong evidence for Hypothesis 2. Furthermore, people from suburban areas show similar resistance as people from towns, with the latter also opposing the abandoning of coal as energy (Model 3). For the two placebo tests, we do not observe any significant effects of urban-rural residence and a much weaker effect of income on supporting subsidies for renewable energies.

We have mixed evidence in support of Hypothesis 3 as respondents with egalitarian views share the concern about reduced purchasing power and less stable energy as by-products of climate change measures but are significantly in favour of higher taxes on fossil fuels (−0.082)[3] even if we control for their general left–right predisposition.[4] Egalitarians also support subsidies for renewable energies and banning inefficient household appliances. On that score, we can speculate that people with egalitarian attitudes might see taxes as a general means for redistribution and state intervention and thus generally support higher taxation even if particular taxes have a regressive nature.

When we turn to the coefficients for the regional variables in Table 1, we observe that the effect of regional GDP is, in line with Hypothesis 4, significantly negative across all three dependent variables, suggesting that richer (poorer) regions have inhabitants who are less (more) sceptical towards climate change measures. Similarly, scepticism towards climate changes measures increases significantly with the regional unemployment rate in the models for all three core-dependent variables. This confirms Hypothesis 5.

In the two placebo tests (models 4 and 5), we find that except for the effect of regional GDP on subsidies for renewable energies, all regional variables remain insignificant. Accordingly, only those climate change measures which have regressive effects and/or incur concentrated local costs create attitudinal differences between well-off and low-income people, and urban and rural dwellers respectively. Overall, we found fewer significant effects of demographic variables and the regional context on the two placebo variables compared to the three dependent variables capturing climate change measures, respectively, their perceived effects.

Lastly, living in a region with jobs in the coal industry threatened has a mildly positive but highly significant effect on supporting coal as energy source. This coefficient also indicates that regions without any jobs in the coal industry jeopardised have a much stronger support for abandoning coal as an energy source.[5]

Cross-level interactions

Having shown the main effects of individual-level and regional factors, we now turn to models containing interactions and cross-level interactions that inspect whether the effects of selected predictors are moderated by the local economic context. To reiterate, Hypothesis 7 posited that the effect of attitudes towards inequality on opposing regressive climate change measures is likely to be stronger in poorer regions and regions with high unemployment; and Hypothesis 8 posited further that the effect of potential job losses in the coal industry on supporting coal as an energy source is likely to decrease with regional wealth and increase with local unemployment. The coefficients for the constitutive terms and the cross-level interactions of interest appear in Table 2. The models include a random coefficient for egalitarianism in line with the recommendations to obtain more conservative statistical inference when fitting cross-level interactions from Heisig and Schaeffer (2019). Models without random coefficients, respectively, with country-fixed effects arrive at substantially similar conclusions (Online Appendix, Tables A7-A12 and Figures A3-A8). Since none of the models including the placebo tests yielded significant effects of regional variables before, we only present the results of the cross-level interaction for the three main dependent variables. Given the difficulty in interpreting cross-level interactions from multilevel models solely from regression tables, we further present the results as marginal effects to facilitate interpretation and visualise the substance of the respective effects.

We begin with the effect of egalitarianism on the concern that energy becomes too expensive across regional GDP per capita and unemployment rate. Figure 2 illustrates that the effect of attitudes towards inequality is moderated by the local economic context. Concerns among individuals with egalitarian attitudes that climate change measures will make energy too expensive are greater in regions with low GDP per capita and regions with high unemployment. If regional wealth increases respective unemployment decreases, we observe a declining effect of egalitarian attitudes on this concern which even becomes insignificant in regions with per capita GDP of more than 70.000 Euro.

A similar pattern emerges if we substitute the concerns for energy costs by the attitudes towards taxes on fossil fuels in Figure 3. Keeping in mind that egalitarians did not oppose these taxes from our discussion above, it becomes clear that this support is most pronounced in very wealthy regions and regions with low or absent unemployment. If the regional living standard decreases and unemployment increases, egalitarians become less supportive

Table 2. Regional differences in attitudes towards climate change measure: cross-level interactions with regional economic context.

Dependent variable	Energy expenses(M1)	Energy expenses (M2)	Tax Fossil Fuels (M3)	Tax Fossil Fuels (M4)	Coal as energy source (M5)	Coal as energy source (M6)
	Egalitarianism *x* regional GDP	Egalitarianism *x* reg. unemploym.	Egalitarianism *x* regional GDP	Egalitarianism *x* reg. unemploym.	Coal jobs *x* regional GDP	Coal jobs *x* reg. unemployment
Egalitarianism	0.137***	0.056***	0.010	−0.117***	−0.004	−0.004
	(0.019)	(0.014)	(0.025)	(0.018)	(0.006)	(0.006)
Regional GDP in 1.000 Euro	−0.006**	−0.010***	−0.001	−0.008***	−0.008***	−0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Regional unemployment, %	0.025***	0.015!	0.015**	0.003	0.011*	0.007
	(0.006)	(0.008)	(0.006)	(0.009)	(0.005)	(0.005)
Total jobs in coal industry	0.000	0.000	0.000	0.000	0.031***	−0.003*
threatened, 100 jobs	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.001)
Egalitarianism*regional GDP	−0.001**		−0.002***			
	(0.000)		(0.001)			
Egalitarianism*unemployment		0.003*		0.004*		
		(0.002)		(0.002)		
Coal jobs*regional GDP					−0.001***	
					(0.000)	
Coal jobs*unemployment						0.001***
						(0.000)
Constant	2.031***	2.261***	3.553***	3.915***	2.376***	2.482***
	(0.136)	(0.137)	(0.144)	(0.143)	(0.105)	(0.109)
Variance components						
Random intercept var.	0.052***	0.056***	0.016***	0.016**	0.044***	0.049***
	(0.016)	(0.016)	(0.010)	(0.021)	(0.006)	(0.006)
Random coefficient of egalit.	0.001***	0.001***	0.001***	0.002***	–	–
	(0.001)	(0.001)	(0.001)	(0.002)		
Covariance (egalit. *x* region)	0.003	0.002	0.004***	0.003	–	–
	(0.003)	(0.003)	(0.001)	(0.005)		
Residual variance	0.684***	0.684***	1.212***	1.213***	0.607***	0.607***
	(0.007)	(0.007)	(0.013)	(0.013)	(0.006)	(0.006)
N	18480	18,480	18,377	18,377	17,954	17,954
Rho	0.072	0.078	0.014	0.014	0.067	0.075
−2LL	−22,936.947	−22,939.609	−27,993.932	−28,000.575	−21,159.229	−21,166.716
BIC	46217.749	46,223.073	56,331.525	56,344.809	42,641.713	42,656.685
df	30	30	30	30	30	30

Source: Multilevel regression models with ESS module 'Public Attitudes to Climate Change'. Notes: Standard errors in parentheses, ! $p < 0.10$, * $p < 0.05$,** $p < 0.01$, *** $p < 0.001$, only main effects shown, full models appear in Online Appendix, Tables A2-A4

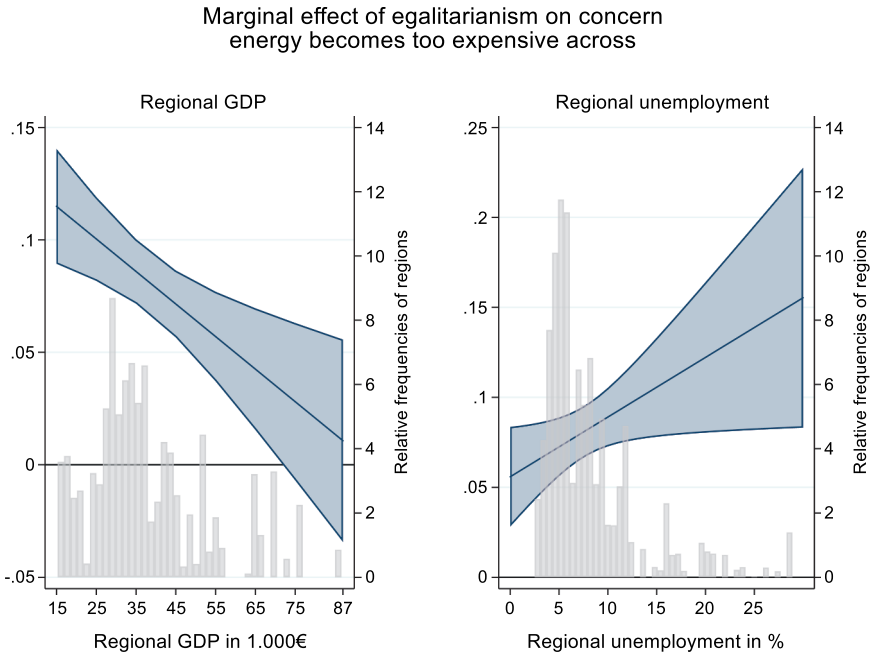

Figure 2. Effects of attitudes towards inequality on energy price concerns across regional GDP and unemployment rate. Source: Marginal effects derived from Models M1 and M2 in Table 2. Note: Shaded areas indicate 95% confidence intervals. Left-hand y-axis indicates marginal effect, right-hand y-axis indicates relative frequencies of regions.

of those taxes. These results confirm our Hypothesis 7 positing that the effect of egalitarian attitudes is moderated by regional GDP and regional unemployment.

Finally, we plot the effects of jeopardised coal industry jobs on supporting coal as an energy source against the regional economic context in Figure 4. To reiterate, our baseline model indicated that regional GDP was significantly negatively related to supporting coal as an energy source, while the local unemployment rate and having coal industry jobs in the region were significantly positively related to supporting coal as energy source. The interactions show how these effects are contingent on each other. Having coal industry jobs in one's region has a significantly positive effect on supporting coal as an energy source if the region is relatively poor – that is below 37.000 Euro per capita income. With rising regional wealth, the effect changes sign and becomes significantly negative for regions with more than 40.000 Euro per capita income. This means that people from poor

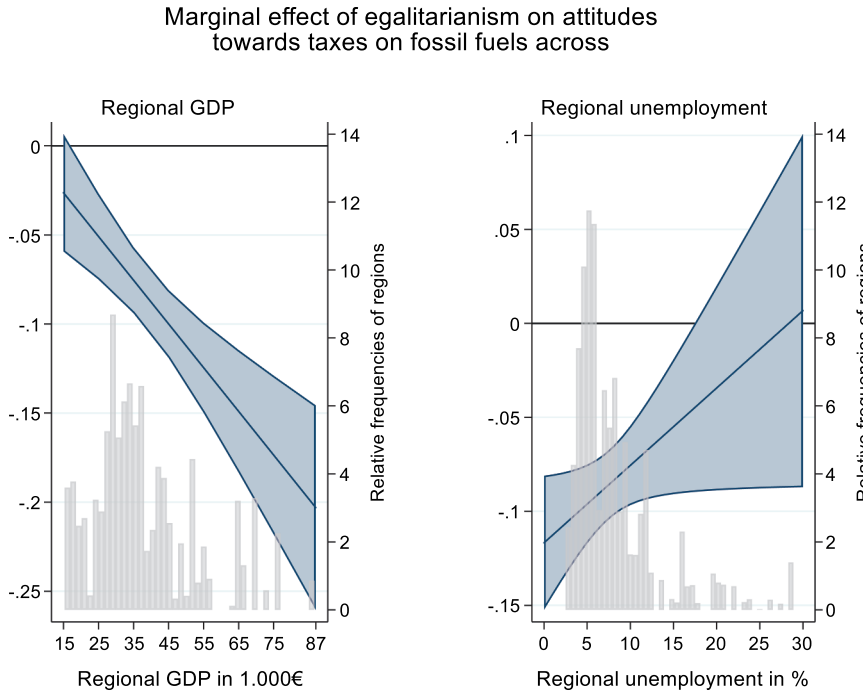

Figure 3. Effects of attitudes towards inequality on taxes on fossil fuels across regional GDP and unemployment rate. Source: Marginal effects derived from Models M3 and M4 in Table 2. Note: Shaded areas indicate 95% confidence intervals. Left-hand y-axis indicates marginal effect, right-hand y-axis indicates relative frequencies of regions.

regions with jobs in the coal industry in jeopardy want to stick to this energy source, whereas the opposite is true for wealthy regions. This regional divide is mirrored by the support for coal as an energy source across local unemployment rates in the right-hand panel of Figure 4. Having jeopardised coal industry jobs in one's region but full employment leads to significantly negative attitudes towards coal as an energy source. If the unemployment rate in a coal region exceeds 5%, the effect of coal jobs becomes significantly positive as people want to stick to this form of energy production. The finding that opposition to abandoning coal is mitigated by the regional labour market supports Hypothesis 8. If employees made redundant from the coal industries can find a new job easily, the effect of coal industry jobs is negative, while it increases with growing regional unemployment and becomes significant as unemployment exceeds 5%.

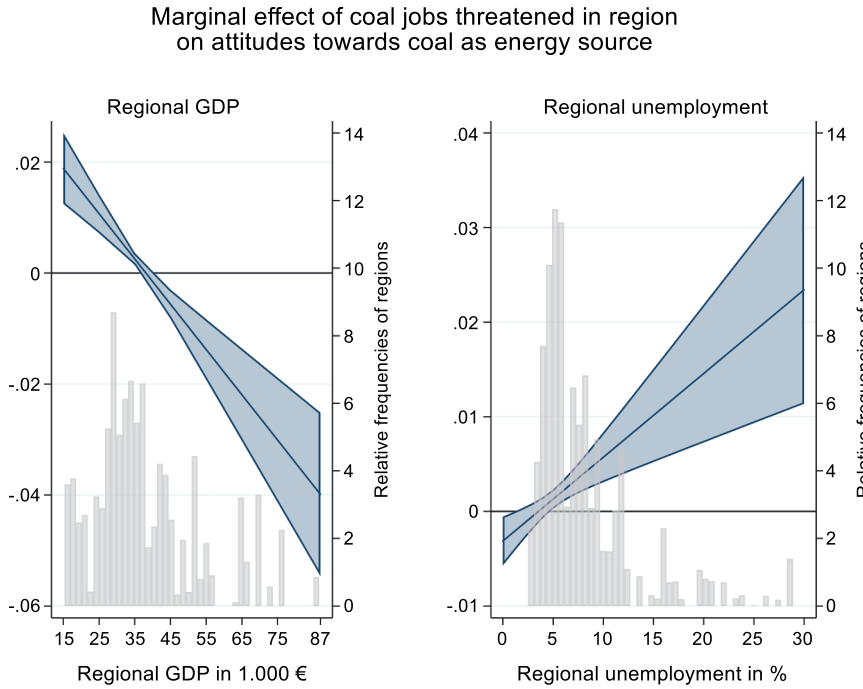

Figure 4. Effects of coal jobs threatened on support for coal as energy source across regional GDP and unemployment rate. Source: Marginal effects derived from Models M5 and M6 in Table 2. Note: Shaded areas indicate 95% confidence intervals. Left-hand y-axis indicates marginal effect, right-hand y-axis indicates relative frequencies of regions.

Robustness checks

To test the validity of our findings, we ran several robustness checks for our main models and report the detailed results in the Online Appendix. First, we accounted for the clustering of regions in the 14 countries in our data and provide additional models with fixed effects for countries for our multilevel models with 186 regions as context variable (see Online Appendix, Tables A5-A10). These models yield substantially similar conclusions and underpin the robustness of our findings. We provide further discussions on regional coal production as moderator variable in the Online Appendix, Part B.

Second, to address potential endogeneity issues caused by already high energy prices and party identification as driver of climate policy attitudes (Wolsko *et al.* 2016), we included two further controls for energy costs in 2016 (Euro/kWk) and far right voting in the models (see models reported in Online Appendix, Tables B6-B8 and Figures B1-B6).

Third, we ran the models with different specifications of the income variable (feeling about income and proxies for absolute income) instead of our decile measure from the ESS. We did the same for attitudes towards inequality by using different items attitudes towards inequality. These appear in the Online Appendix, part C, Tables B4-B5.

Fourth, we ran all models as ordinal logit or ordinal probit multilevel regression as robustness checks which did not alter our findings (results reported in the Online Appendix, part C, Tables B1-B3).

In sum, none of these robustness checks altered our findings. We arrived at similar conclusions as in the models from the main analysis when adding further control variables, using different operationalisations of some of core variables (e.g. income or egalitarianism) or applying different model specifications.

Discussion

Findings

Commencing from the observation that there is little comparative work on the spatial dimension of attitudes towards climate change measures, this article has examined a range of individual and regional-level factors that may trigger opposition to environmental policies. In sum, our results suggest that economic insecurity is a key driver of the reluctance to support (costly) environmental policies.

At the individual level, we find that the likelihood to support climate change measures increases with income. At the regional level, our findings support the presence of a centre-periphery divide as individuals in small towns and rural areas are also more likely to oppose climate change measures. In addition, attitudinal characteristics are moderated by income: those individuals with egalitarian attitudes who reside in poor regions, or regions with higher unemployment rates are more reluctant to support costly environmental policies. The regional economic context matters significantly as poorer regions are more sceptical of climate change measures, as are those with the highest unemployment rates and coal production.

Overall, our conclusions support the affluence hypothesis about the relationship between rising standards of living and environmental protectionism (see e.g. Inglehart 1995, Franzen and Meyer 2010, Fairbrother 2013). We identify an economic insecurity mechanism behind the lack of willingness to pay for green politics at the regional level: poorer citizens and residents of poorer regions are less willing to pay to protect the environment compared to their more well-off counterparts.

Theoretical contributions and practical implications

Our contribution is both theoretical and empirical and has significant practical implications. Theoretically, we add value to debates about climate attitudes by systematising the distinction made in public policy literature between policy tools with diffuse benefits and concentrated local costs. Empirically, we test this theoretical framework by merging regional with ESS data, and confirm the significance of the prosperity hypothesis at the meso (i.e. regional) level. In doing so, we highlight the importance of the centre-periphery divide for our understanding of green attitudes and respond to calls for analytically relevant comparative public opinion research (Prakash and Bernauer 2020). Our findings are in line with the theoretical expectations from the public policy literature about the consequences of the concentrated costs of climate policies which local communities incur (see Stokes 2016). In this regard, our models containing the placebo tests demonstrate that the structural components in attitudes towards climate change measures are only existent and virulent if climate change measures have concentrated costs, and thus socially defined losers and winners (low-income groups and rural dwellers). If the costs of climate change measures remain diffuse (as for subsidies of renewables), then income and residence effects remain weak and insignificant predictors of climate change attitudes.

Our findings are relevant to salient debates about the prioritisation of climate change measures in the political agenda (Prakash and Bernauer 2020). To be politically successful, ecological policies need to align private and social benefits. The consequences of local resistance can be detrimental for political stability, leading to accountability failures as citizens may punish incumbents for controversial costly policies (Stokes 2016). Local opposition could divide progressive agendas and even undermine coalition efforts and as debates in Germany between the Greens and the left about increasing fuel prices illustrate; or it could prevent the implementation of green policies- a good example is the result of the 2021 referendum in Switzerland where rural cantons including Wallis, Schwyz or Graubünden rejected certain climate change measures. In turn, such developments may fuel the rise of anti-establishment politics, as climate scepticism may be mobilised by right-wing populist actors (e.g. Kulin *et al.* 2021).

Limitations and future research

Our article has merged regional with ESS data to understand the spatial dimension of attitudes towards certain policy tools in Western European regions. Future research can extend these findings by examining a range of issues we do not tap into. First, our focus on Western Europe limits the generalisability of our argument. Research could examine the extent to

which our results are transferable to other regions where the environment has lower salience such as Eastern Europe. It would also be interesting to examine how they apply to, and compare with, regions elsewhere in West, for example the US and Canada. Second, while our correlational analysis of ESS data has yielded interesting results about local resistance to climate change measures, our methods do not allow us to draw causal inferences. Experimental research can tackle causality issues in more detail to identify why and under what circumstances people in poorer regions oppose climate policies.

Third, future research can examine in greater detail when and how local resistance channels into electoral behaviour. One avenue is to investigate whether those who are negatively affected align with political forces opposing climate change measures or whether parties adjust their political platforms to mobilise new voter segments that have decoupled from other parties. Another route is to examine the extent to which emerging centre-periphery cleavages can divide left-wing electorates. Parties increasingly attempt to mobilise on green politics (Spoon *et al.* 2014), capitalising on voters' concerns about climate change, global warming and overall environmental decline. Recent European elections, for example in Germany, Scandinavian countries and the European Parliament reveal the emergence of anti-establishment dynamics as voters have become increasingly polarised between radical right and green parties. On the one hand, the progressive, egalitarian, metropolitan wealthy middle classes concerned about climate change and the environment are likely to abandon traditional left parties and opt green. On the other hand, the 'left behind' low-income individuals residing in poorer regions have no incentive to support policies that hurt them financially. Thus, they may opt for radical alternatives such as populist right-wing parties or far left parties concerned with equity, fairness and distribution.

Overall climate change is an increasingly salient, but also divisive issue. As addressing it requires sustained political support, the knowledge that resistance is likely to be concentrated in specific local communities is an important tool for governments and policymakers. If, as we show, the backlash against environmental protectionism is triggered at the local level by the potential 'losers' of these processes, then emerging centre-periphery divides on climate issues are key to understanding new political alliances where populist right-wing parties increasingly align with the periphery and the country-side and green parties with the metropolitan centres. These developments are already visible in a series of European elections and deserve further attention by scholars of voting behaviour and cleavage structures.

Notes

1. We develop a range of hypotheses about support for climate change measures. We understand support for climate change measures in terms of favourable attitudes towards specific climate change mitigating tools including raising taxes on fossil fuels, abandoning coal as an energy source, or banning diesel cars with high emissions. We use 'support for climate change measures' in the wording of our hypotheses to ensure consistency and avoid convoluted phrasing.
2. The full list of regions appears in the Online Appendix, part A.
3. The coefficient of egalitarianism in Model 2 shows that the effect of this variable is stronger than the effect of income on the support for tax on fossil fuels.
4. The coefficients do not differ substantially from models without controlling for left-right self-placement.
5. We report further analysis to inspect the average support for coal production in regions/countries without any coal jobs vs. all other regions in the Online Appendix, Table B9 and Figure B7.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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