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Decarbonization Politics for All: Means-Tested Social Assistance, Eco-Social Values, and Public Support for Increased Fossil Fuel Taxes in Europe

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ABSTRACT

Many climate change mitigation policies face public opposition, especially when they impose visible costs on households and are perceived as unfairly regressive. This country-comparative study examines specific social policy instruments that may help build public support for increasing fossil fuel taxes in Europe. Using multilevel modeling with data from the European Social Survey and the Social Policy Indicators database, we find that higher levels of means-tested social assistance are positively associated with greater public support for fossil fuel taxes. More specifically, means-tested social assistance appears to promote support by reducing self-experienced economic hardship and lessening value conflicts among individuals with strong eco-social values. Policies that raise the minimum income floor in society thus seem crucial for fostering eco-social synergies and strengthening public support for government-led climate action and decarbonization efforts.

1 | Introduction

The recently adopted European Green Deal sets the challenging goal of reaching climate neutrality in the European Union by 2050. As part of this initiative, the European Member States have agreed to reduce net greenhouse gas emissions by at least 55% by 2030, relative to 1990 levels. Meeting this ambitious target requires broad policy packages to promote the necessary changes in production, consumption, and investment (IPCC 2023). However, many climate mitigation policies face considerable public opposition, which must be addressed to be able to scale up the political action to the levels required (Gazmararian and Tingley 2023; Schwander and Fischer 2024). The purpose of this country-comparative study is to advance knowledge on which specific social policy instruments may help build public support for climate change mitigation policies. Particular focus is on means-tested social assistance.

Public opposition to government-led climate change mitigation is particularly pronounced for policies that impose visible costs on households (Klenert et al. 2018; Bergquist et al. 2022). This study examines public support for fossil fuel taxation as a primary example of such contentious policies. Fossil fuel taxes vary across European countries, although the European Commission has proposed revisions to the Energy Taxation Directive to match them with other climate policies such as the EU Emission Trading System, the Renewable Energy Directive, and the Energy Efficiency Directive (European Commission 2019). Regulating the price of coal, oil, and gas is an instrument widely considered effective for changing consumer behavior and mitigating carbon emissions (Stiglitz et al. 2017). Governments may also introduce or raise these taxes to generate general revenue or curb excessive profits in the industry. Regardless of policymakers' objectives, the sociopolitical challenge remains: fossil fuel

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taxes are unpopular in many countries, making them difficult to scale up. Previous research indicates that this public opposition is driven more by concerns about economic costs and distributive unfairness than by disregard for climate change as a pressing issue (Fairbrother et al. 2019; Maestre-Andrés et al. 2019; Umit and Schaffer 2020; Povitkina et al. 2021; Bergquist et al. 2022; Gaikwad et al. 2022; Rettig et al. 2023).

The focus of much of the previous research on compensatory policies aimed at increasing public support for carbon taxes lies on instruments that directly recycle tax revenues back to taxpayers, such as reductions in income or value-added taxes, or lump-sum transfers (Klenert et al. 2018). Several of these instruments have been tested through various survey experiments on hypothetical policy packages in one or a few countries, with some positive results (e.g., Carattini et al. 2017; Jagers et al. 2019). However, recent real-world policy evaluations suggest limited evidence that such tax rebates boost public support for carbon pricing (Mildenberger et al. 2022). This raises doubts about whether direct compensation measures linked to tax revenue recycling are sufficient to secure the necessary support for increased fossil fuel taxes and other carbon pricing initiatives.

In this study, we take a different approach by focusing on the income protection function of the welfare state as a well-established instrument for improving living standards and reducing inequalities on a broader societal scale. Even if citizens do not know all the details of specific social policies, they likely have a reasonable sense of their own and others' socioeconomic circumstances based on lived experience. These circumstances are shaped by, and therefore tend to vary between, different social policy contexts. Decades of research suggest that the welfare state, in this capacity, shapes policy preferences and attitudes to government interventions (Skocpol and Amenta 1986; Pierson 1993; Kumlin and Stadelmann-Steffen 2014; Béland and Schlager 2019; Lindh and McCall 2020).

While the burgeoning eco-social policy literature theorizes the welfare state as crucial for preventing political backlash against necessary climate action (Zimmermann and Graziano 2020; Mandelli 2022; Gugushvili and Otto 2023; Fritz and Lee 2023), knowledge remains limited regarding the role of specific social policy instruments. The welfare state has a variety of policy tools, all of which may not affect popular support for climate mitigation efforts in the same way or to the same extent. Nonetheless, comparative research on the welfare state–climate mitigation nexus has often relied on broad classifications of welfare state regimes or aggregate levels of social spending (Koch and Fritz 2014; Sivonen and Kukkonen 2021; Parth and Vlandas 2022; Büchs et al. 2024), providing limited insight into the role of different types of social policies.

For this reason, we argue for moving beyond broad system-level approaches toward adopting a programmatic focus that distinguishes between specific social policy instruments. Following such an approach, Nordbrandt et al. (2025) recently examined the role of contributory social insurance in shaping individual support for fossil fuel taxes, finding mixed results. One possible reason for the absence of clear-cut findings is that social insurance largely serves middle-class needs for income security, whereas the opposition to increased fossil fuel taxes largely seems

to be driven by concerns for the poor and economically most vulnerable households (Maestre-Andrés et al. 2019; Povitkina et al. 2021; Bergquist et al. 2022). This highlights the need to assess the welfare state based on its capacity to protect those at the lower end of the income distribution. In this study, we therefore focus on means-tested social assistance rather than on contributory social insurance. The primary objective of means-tested social assistance is to protect the economically most vulnerable households by providing an effective minimum income floor below which no household should fall (Marx et al. 2016; Bahle and Wendt 2021; Marchal and Marx 2024; Nelson et al. 2025).

We explore two specific macro–micro pathways through which social assistance may strengthen support for increased fossil fuel taxes. First, by raising the minimum income floor, social assistance has the capacity to reduce the incidence of economic hardship, which in turn may increase support for fossil fuel taxes among those who would otherwise oppose them due to personal financial strain. Second, we theorize that eco-social human values can function as a reservoir of support for climate mitigation policies, but that this relationship is conditional and may be institutionally moderated by social assistance. People with strong eco-social values are deeply committed to both environmental protection *and* poverty alleviation. However, their support for fossil fuel taxes cannot be taken for granted. In the absence of an effective social assistance system, economic hardship tends to be more widespread, severe, and visible throughout society. In such a context, individuals with strong eco-social values may hesitate to support fossil fuel taxes due to concerns about their negative impact on already economically vulnerable groups. We raise the possibility that social assistance may ease this perceived trade-off, thus making it less likely that social concerns “crowd out” ecological motives and thereby unlocking greater support for fossil fuel taxes particularly among those with strong eco-social values.

Empirically, we use multilevel modeling with individual-level data from the 2016 wave of the European Social Survey (ESS) and macro-level institutional data from the Social Policy Indicators Database (SPIN) to capture relationships between social assistance and attitudes to increased fossil fuel taxes across 20 European countries. The country-comparative approach is well motivated, as countries differ substantively not only in their attitudes to fossil fuel taxes but also in how they have organized social assistance.

The paper is structured as follows. We begin with a theoretical discussion and review of previous research, including an outline of the macro–micro relationships that may link social assistance to individual support for increased fossil fuel taxes. Next, we describe our data and analytical strategy before presenting our empirical results. We conclude with a discussion of our theoretical contribution to the eco-social debate and the broader policy implications of our findings.

2 | Theory and Previous Research

While environmental policy and social policy traditionally have been analyzed separately as detached policy areas, a growing cross-disciplinary literature highlights the welfare state as

a potential tool for making ecological societies both socially and politically sustainable (Meadowcroft 2005; Gough 2016). However, the theoretical arguments in this eco-social literature largely remain abstract, often broadly focusing on how social and environmental policies share the common objective of regulating the negative externalities of industrialism and market capitalism.

Expanding on such abstract arguments about the commonalities between social and ecological policies, a few studies have explored how public support for fossil fuel taxes varies across European countries according to patterns resembling Esping-Andersen's (1990) seminal three-fold classification of liberal, conservative, and social democratic welfare states. In liberal welfare states, public programs for income protection tend to have a limited role, as there is little ambition to crowd out private welfare. The conservative welfare state provides higher degrees of income protection, but primarily for labor market insiders, focusing on status preservation rather than vertical redistribution between the rich and poor. The social democratic welfare state emphasizes both status preservation and vertical redistribution, seeking to reduce income differences while also ensuring generous income protection for the middle classes (Nelson 2023).

Sivonen and Kukkonen (2021) find that, compared to other countries in Europe, support for fossil fuel taxes tends to be higher in the Nordic countries, which share strong historical traits with the social democratic welfare state (see also Koch and Fritz 2014). Several studies also highlight the potential for eco-social synergies in such contexts, as the share of the population that simultaneously supports both social and environmental government policies tends to be higher in the Nordic countries than in most other parts of Europe (Fritz and Koch 2019; Otto and Gugushvili 2020).

While categorizing countries into broad types of welfare state regimes sometimes can be useful as a heuristic, it obscures substantive policy variations and the specific instruments that may help explain cross-national differences in attitudes to fossil fuel taxes. Parth and Vlandas (2022) recently moved the field forward by analyzing the welfare state in more nuanced, quantitative terms, focusing primarily on social expenditure. While their country-comparative study found that economic hardship is a key obstacle to individual support for environmental policies, the association with social spending was weak.

However, social expenditure is a crude measure of welfare state generosity that often fails to accurately reflect how social policies serve the poor and economically insecure households. One reason for this is that levels of social expenditure (particularly when measured as a fraction of the Gross Domestic Product [GDP]) are highly sensitive to changing social needs (Clasen and Siegel 2007). For example, social expenditure typically increases during economic downturns or as the share of the older population grows, even if the institutional structure of social policy remains unchanged. In addition, Parth and Vlandas (2022) focused on public support for government investments in energy efficiency and renewable energy. It is unclear whether their findings apply to support for fossil fuel taxes, which tend to be less popular due to their tangible costs and perceived distributive unfairness.

In a more recent study, Nordbrandt et al. (2025) adopted a programmatic approach to the welfare state, focusing on the role of contributory social insurance.¹ They found a positive association between support for increased fossil fuel taxes and the broader coverage of social insurance, but there were no significant relationships between attitudes and the size or duration of income replacement. While their study makes an important contribution by focusing on specific policy instruments to unpack the role of the welfare state, the findings remain somewhat ambiguous, partly because the substantive meaning of benefit coverage is difficult to interpret. There are often significant gaps between the share of the population insured for certain contingencies (e.g., sickness or unemployment), as measured in Nordbrandt et al. (2025), and the share of the target population (e.g., sick or unemployed individuals) that is either eligible for such benefits or currently receiving them. The Swedish unemployment insurance illustrates this issue. Although the entire labor force is formally insured (thus with 100% coverage), fewer than half of unemployed individuals actually receive earnings-related unemployment benefits (Nelson and Nieuwenhuis 2021). Coverage rates in terms of the share of formally insured persons are thus crude indicators of the inclusiveness of income protection policies.²

Partly for these reasons, we take a different approach and focus on social assistance benefits to assess the basic income protection provided by the welfare state. Unlike social insurance, which typically protects wage earners higher up the income distribution against income loss during critical periods in life, social assistance specifically targets those at the lower end of the income distribution. By setting an effective minimum income floor, it serves as an essential welfare state tool in addressing poverty and low incomes (Marx et al. 2016; Marchal and Marx 2024). In this capacity, it may be particularly relevant in shaping attitudes to fossil fuel taxes.

Since eligibility for social insurance often depends on past contributions or stable employment, low-income households are often excluded from compensation even if they are formally covered by the program, as noted above. Social assistance is generally regarded as the last economic safety net of the welfare state, stepping in when social insurance falls short (Bahle and Wendt 2021). It provides subsistence based on means-testing and typically excludes those with higher incomes from receiving benefits. Unlike social insurance, social assistance is financed through general tax revenue rather than wage contributions (Nelson 2004).

The generosity of social assistance varies extensively across Europe (Bahle et al. 2011; Marx and Nelson 2013; Marchal and Marx 2024). In their European cross-national study, Nelson et al. (2025) found that both social insurance and social assistance protect households from economic hardships associated with environmental taxes, albeit in different ways. Social insurance mostly protects households in the middle and higher end of the income distribution, while social assistance fulfills a similar function at the lower end. Nelson et al.'s study does not, however, examine how different social policy instruments shape public support for climate change mitigation policies. This leads us to our first hypothesis, which posits a general positive association between social assistance and support for increased fossil fuel taxes:

H1. *Public support for increased fossil fuel taxes is higher in countries with more generous social assistance.*

2.1 | Macro–Micro Pathways

Below, we discuss and hypothesize how the anticipated positive impact of social assistance may be mediated by self-experienced economic hardship, as well as how social assistance carries the potential to moderate the relationship between eco-social values and support for increased fossil fuel taxes.

2.1.1 | Self-Experienced Economic Hardship

In the eco-social literature, it is often assumed that opposition to regressive climate mitigation policies such as fossil fuel taxes largely stems from disproportionate exposure to direct costs and social risks faced by vulnerable households (Gugushvili and Otto 2023; Mandelli 2022). As noted above, there seems to be a robust relationship between self-experienced economic hardship and individual opposition to fossil fuel taxes (Parth and Vlandas 2022; Nordbrandt et al. 2025). However, less is known about how self-experienced economic hardship structures the relationship between social policy and support for climate policy.

We contribute to addressing this gap by proposing that a generous welfare state may reduce the overall incidence of economic hardship in society, thereby indirectly boosting support for climate mitigation policies. By raising the minimum income floor, generous social assistance likely decreases the number of households that self-experience economic hardship (Marx et al. 2016; Nelson et al. 2025), which, in turn, should increase support for fossil fuel taxes among individuals who would otherwise oppose them due to personal financial strain. From this perspective, we suggest that self-experienced economic hardship primarily serves as a mediator of the relationship between social policy and individual support for fossil fuel taxes.³ Our second hypothesis, centered on social policy *mediation*, is thus formulated as follows:

H2. *The positive association between social assistance and support for increased fossil fuel taxes is partially accounted for by a lower incidence of self-experienced economic hardship.*

2.1.2 | Eco-Social Values

The capacity of social assistance to reduce economic hardship may also have broader societal spillover effects on the support for fossil fuel taxes. The importance of basic human values that serve as motivational principles shaping individual attitudes and behaviors has been analyzed in a large body of cross-disciplinary literature. Values reflect what people prioritize in life, and individuals typically subscribe to multiple values, albeit to varying degrees. When specific attitudinal objects or behaviors trigger conflicts between different values, an individual's value hierarchy is expected to guide their preferences and actions (Rokeach 1973; Schwartz 1992).

Echoing discussions in the eco-social policy literature about possible synergies across policy fields, social and ecological values are often considered adjacent and mutually reinforcing, as both involve other-regarding and socio-tropic concerns. In Schwartz's theory of basic human values, concern for the natural environment and the welfare of others are both core components of the concept of self-transcendence values (Schwartz 1992, 2012). Drawing a further connection to the literature on welfare deservingness (van Oorschot et al. 2017), eco-social values thus encompass not only ecological protection but also the belief that economically vulnerable groups deserve social protection and a decent standard of living. From this perspective, it is unsurprising that many people who generally support climate policies are also supportive of social policies (Fritz and Koch 2019; Otto and Gugushvili 2020; Rettig et al. 2023).

Theoretically, eco-social values can be conceptualized as a reservoir of support for climate mitigation policies. As a baseline, we thus anticipate a positive association between eco-social values and support for fossil fuel taxes at the individual level (Dietz et al. 2005; Haring et al. 2017; Bergquist et al. 2022). However, when climate policies impose burdens on low-income households facing severe economic hardship, they may trigger a value conflict between social and ecological priorities. Individuals with strong eco-social values may hesitate to support fossil fuel taxes—not due to self-centered financial reasons, but out of concern for their negative impact on economically vulnerable groups.

We propose that social policy may dampen such tensions between ecological and social values. By raising the minimum living standards for low-income households, generous social assistance can help alleviate—or at least ease—this perceived trade-off between the need for ecological protection and the economic burden it imposes on disadvantaged households. As a result, support for fossil fuel taxes may be higher among those with strong eco-social values in contexts where social assistance is more generous. Conversely, the generosity of social assistance is likely to have a weaker impact on individuals who prioritize neither ecological protection nor social equality (i.e., those with weak eco-social values). Based on this reasoning, we formulate the following third hypothesis regarding the potential *moderating* role of social policy:

H3. *Social assistance is associated with higher support for fossil fuel taxes particularly among those with strong eco-social values.*

3 | Data and Methods

We use the eighth round of the European Social Survey (ESS8), conducted in 2016, which is notable for its extensive coverage of attitudes to climate change and, to a lesser extent, climate policy. ESS8 uses strict random probability sampling of all individuals aged 15 years and older in each participating country, with data collected through face-to-face interviews. Response rates vary across countries, ranging from 31% in Germany to 70% in Poland, with an average of 55% for the 20 countries covered in this study. Our analyses are based on 34,932 respondents who provided complete information for all variables in the main regression analysis.

The countries included in the study are Austria (AT), Belgium (BE), the Czech Republic (CZ), Estonia (EE), Finland (FI), France (FR), Germany (DE), Hungary (HU), Ireland (IE), Italy (IT), Lithuania (LT), the Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), and the United Kingdom (UK). Although Iceland, Israel, and Russia also participated in the survey, we had to exclude them from our analysis because the necessary social assistance data was not available.

3.1 | Dependent Variable

To assess the level of support for increasing taxes on fossil fuels, we use a single item in the survey that explicitly covers this issue: “To what extent are you in favor of or against the following policies in [country] to reduce climate change? ... Increasing taxes on fossil fuels such as oil, gas, and coal.” The respondent can choose between the following five response options on a 5-point Likert scale: “Strongly in favor” (which we code as 4), “Somewhat in favor” (3), “Neither in favor nor against” (2), “Somewhat against” (1), and “Strongly against” (0). The distribution of responses is discussed in the results section and also illustrated in Figure A1 (upper panel). Descriptive statistics for all variables included in the analysis are presented in Table A1.

3.2 | Main Individual-Level Covariates

Self-experienced economic hardship is measured using an index based on responses to two questions. The first question is: “How do you feel about your household’s income nowadays?” The respondent can choose from four response options on a 4-point Likert scale: “Living comfortably on present income” (which we code as 0), “Coping on current income” (1), “Finding it difficult on present income” (2), and “Finding it very difficult on current income” (3). The second question asks: “During the next 12 months, how likely is it that there will be some periods when you don’t have enough money to cover your household necessities?” The response options are: “Not at all likely” (which we code as 0), “Not very likely” (1), “Likely” (2), and “Very likely” (3).

The responses to these two questions are positively correlated, with correlations ranging from 0.40 in Estonia to 0.58 in the UK. These two items are added together into a composite index, ranging from 0 to 6, where a higher score indicates greater economic hardship.⁴ As illustrated in Figure A1 (middle panel), a majority of respondents fall within the lower half of the scale. The average score in the analytical sample is 1.82, although slightly more than 26% of respondents score three or higher on the index.

Eco-social values are operationalized using the self-transcendence dimension of the Schwartz basic human values scale, using the 21-item version of this measuring instrument included in the ESS. This measurement has demonstrated satisfactory validity in prior comparative research (Schwartz 2007; Davidov et al. 2008). The self-transcendence dimension consists of two empirically interrelated subdimensions: benevolence, which involves caring for family and friends, and universalism, which concerns the welfare of all people and the natural

environment (Schwartz 1992, 2012). While the universalism dimension more directly reflects our definition of eco-social values, prior research suggests that benevolence and universalism are not empirically distinguishable in the ESS (Davidov et al. 2008), leading us to include both dimensions in our measure.

The benevolence subdimension is measured through two items: “Now I will briefly describe some people. Please listen to each description and tell me how much each person is or is not like you.” (i) “... It’s very important to her to help the people around her. She wants to care for their well-being” and (ii) “... It is important to her to be loyal to her friends. She wants to devote herself to people close to her.” The universalism subdimension is covered with three items: (iii) “... She thinks it is important that every person in the world should be treated equally. She believes everyone should have equal opportunities in life”; (iv) “...It is important to her to listen to people who are different from her. Even when she disagrees with them, she still wants to understand them”; and (v) “... She strongly believes that people should care for nature. Looking after the environment is important to her.” All items are gender-matched with the respondent and use a 6-point Likert-type scale ranging from “Very much like me” to “Not like me at all.”

Following common procedures (Schwartz 2007), raw average scores for benevolence and universalism are computed separately and then combined with equal weight. To account for individual differences in the use of the response scale, we followed ESS guidelines and adjusted the scores by subtracting the average rating across all 21 items in the survey battery. The resulting measurement thus reflects the relative importance of eco-social (self-transcendence) values compared to other values, where higher scores indicate a stronger priority of eco-social values.

The response distribution, shown in Figure A1 (bottom panel), is relatively bell-shaped. Most respondents score a positive value (mean=0.64), indicating that they on average prioritize eco-social values more than other values. However, there is considerable variation between respondents in the degree to which they prioritize these values.

3.3 | Social Assistance

The SPIN database offers detailed information about the generosity of social assistance, based on benefit scale rates and other legislation that determines how entitlements are calculated. The indicator used in this study captures the amount people would receive if they had no income from paid employment, lacked access to social insurance, and relied solely on social assistance for their livelihood (Nelson et al. 2020).

To measure this, SPIN uses model family data collection techniques (Bradshaw et al. 1993). The measure used is based on the benefit package for two family types: a single person and a two-parent family with two children. In addition to the standard rates of means-tested social assistance, these packages include housing-related benefits, child benefits, and any refundable tax credits for which the model families are eligible. Although national coordination of social assistance has become stronger in Europe, benefit scale rates remain regionally or locally

determined in a few countries, although within-country differences tend to be small. For countries with regional or local policy frameworks, SPIN data is based on the capital area. Lump-sum payments for occasional or special needs are not considered.

The social assistance benefit packages of the two different model families are averaged and calculated for a whole year. For each country, the benefit amounts are expressed as percentages of an average production worker's net wage. All data used in our analyses are from 2015.⁵

3.4 | Control Variables

We control for standard sociodemographic background variables including gender (man/woman), age (years), education (university degree/no university degree), and place of residence (big city area/small city or countryside). Descriptive statistics are provided in Table A1. Additional macro- and micro-level controls are considered in the sensitivity analyses section.

3.5 | Estimation Strategy

As individuals are nested in countries, we use linear multilevel modeling with random intercepts (Steenbergen and Jones 2002). When testing for cross-level interactions between the generosity of social assistance and eco-social values, we introduce country-level random slopes for the lower-level variable (eco-social values) to prevent anti-conservative inferences (Barr et al. 2013; Heisig and Schaeffer 2019).

To facilitate the interpretation of regression coefficients within the multilevel models, all independent variables are z-standardized (mean = 0, st. dev. = 1). As a result, the regression coefficients indicate the estimated change in the dependent variable, on a 0–4 scale, following a one-standard-deviation increase in the independent variable.

The multilevel regression models are supplemented with illustrative figures, including a plot diagram and a figure showing predictive values. In these illustrations, we use an unstandardized version of social assistance to provide a clearer understanding based on its substantive operationalization.

It should be noted that the cross-sectional design of the ESS precludes interpretation of observed correlations as exogenous causal effects. Nevertheless, the analyses carried out in this study represent an important first step in advancing the eco-social debate by examining how specific social policy instruments may shape public support of increased fossil fuel taxes.

4 | Results

Before testing our main hypotheses using multivariate multilevel regression models, a crucial first step is to establish whether there is a bivariate correlation between social assistance and attitudes to fossil fuel taxes at the country level. Figure 1 plots the average support for increased fossil fuel taxes (0–4 scale) in each country against the generosity of social assistance. The support

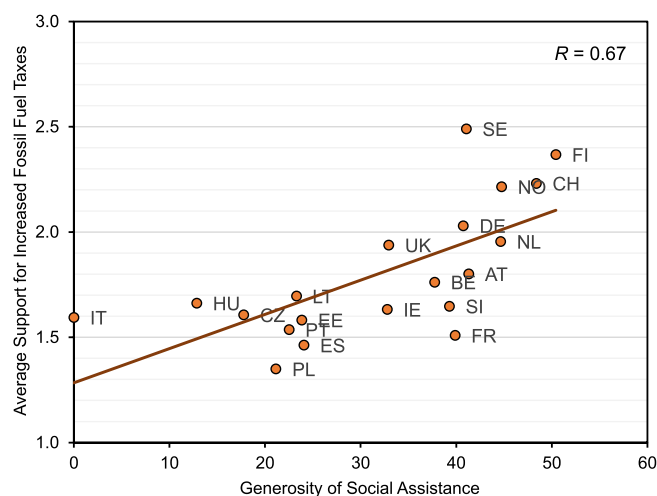


FIGURE 1 | Average support for increased fossil fuel taxes (0–4 scale) by the generosity of social assistance in 20 European countries. AT, Austria; BE, Belgium; CZ, the Czech Republic; EE, Estonia; FI, Finland; FR, France; DE, Germany; HU, Hungary; IE, Ireland; IT, Italy; LT, Lithuania; NL, the Netherlands; NO, Norway; PL, Poland; PT, Portugal; SI, Slovenia; ES, Spain; SE, Sweden; CH, Switzerland; UK, the United Kingdom.

for increased fossil fuel taxes varies extensively across countries. It exceeds the midpoint (2) of the scale in only five countries (Finland, Germany, Norway, Sweden, and Switzerland), indicating more support than opposition.

Public support for increased fossil fuel taxes tends to be higher in countries with more generous social assistance (Pearson's $R=0.67$). Although a few countries, most notably Italy and Sweden, deviate slightly from this overall pattern, the positive country-level correlation between social assistance and attitudes is not inflated by any single country. The country-level correlation increases marginally when Italy or Sweden (or both) are excluded from the analysis.

This bivariate country-level correlation provides initial support for our overarching proposition that more generous social assistance, which raises the minimum income floor, is associated with higher levels of support for increased fossil fuel taxes. However, to rigorously test this hypothesis (H1) and to examine possible mediating (self-experienced economic hardship, H2) and moderating (eco-social values, H3) factors at the individual level, we next proceed with multilevel regression modeling.

4.1 | Multilevel Regressions

Table 1 shows the results from six multilevel models. The first, “empty,” model (0) provides information about the composition of variance in the dependent variable. The interclass correlation coefficient (ICC) reveals that 6% of the total variance in attitudes toward increased fossil fuel taxes is between countries, while the remaining 94% of the variation is between individuals. This high proportion of individual-level variation is typical in comparative research on policy attitudes across European countries (see, e.g., Schmidt-Catran 2016 on public support for government redistribution).

TABLE 1 | Support for increased fossil fuel taxes by self-experienced economic hardship, eco-social values, and generosity of social assistance in 20 European countries.

	Model 0		Model 1		Model 2		Model 3		Model 4		Model 5	
	<i>b</i>	s.e	<i>b</i>	s.e	<i>b</i>	s.e	<i>b</i>	s.e	<i>b</i>	s.e	<i>b</i>	s.e
<i>Fixed coefficients</i>												
Country level												
Social assistance generosity			0.191***	(0.053)	0.159**	(0.050)	0.145**	(0.049)	0.152***	(0.045)		
Main individual-level variables												
Self-experienced economic hardship					-0.123***	(0.007)	-0.123***	(0.007)	-0.120***	(0.007)		
Eco-social values							0.067***	(0.007)	0.071***	(0.018)		
Cross-level interactions												
Social assistance*Eco-social values									0.065***	(0.019)		
Individual-level controls												
University degree			0.168***	(0.007)	0.168***	(0.007)	0.144***	(0.007)	0.140***	(0.007)	0.138***	(0.007)
Woman			0.025***	(0.006)	0.025***	(0.006)	0.032***	(0.006)	0.021**	(0.006)	0.019***	(0.006)
Age			-0.089***	(0.006)	-0.089***	(0.006)	-0.092***	(0.006)	-0.101***	(0.006)	-0.099***	(0.006)
Small town/countryside			-0.069***	(0.006)	-0.069***	(0.006)	-0.071***	(0.006)	-0.072***	(0.006)	-0.071***	(0.006)
Intercept	1.794***	(0.069)	1.797***	(0.067)	1.797***	(0.052)	1.800***	(0.048)	1.801***	(0.048)	1.778***	(0.044)
<i>Random effects: country level</i>												
Country intercepts	0.093	(0.030)	0.088	(0.028)	0.053	(0.017)	0.046	(0.015)	0.046	(0.015)	0.038	(0.012)
Eco-social values (slopes)											0.006	(0.002)
ICC	0.060		0.059		0.036		0.032		0.032		0.027	
BIC	112,306		111,202		111,202		110,891		110,811		110,678	
<i>N</i> individuals	34,932		34,932		34,932		34,932		34,932		34,932	
<i>N</i> countries	20		20		20		20		20		20	

Note: Linear multilevel regression analysis. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. The dependent variable is measured on a 0–4 scale. All independent variables are z-standardized (mean = 0, st. dev. = 1). Coefficients are rounded to the third decimal.

Model 1 incorporates the individual-level control variables. The results show that respondents with a university degree tend to be more positive toward increased fossil fuel taxes than those with lower educational attainment. Women, younger respondents, and those living in urban areas also tend to be more supportive. The ICC remains similar to the empty model, suggesting that cross-national differences in fossil fuel tax support are not driven by variations in sociodemographic composition across countries.

Model 2 introduces social assistance as a country-level variable. The results confirm the positive correlation between social assistance and tax support previously observed in the bivariate plot in Figure 1. A one-standard-deviation increase in social assistance generosity is associated with a statistically significant increase of 0.191 ($p < 0.001$) in tax support. The ICC drops to 0.036, suggesting that the fixed coefficient of social assistance accounts for a substantial part, or about 40% ($1 - [0.036/0.059]$), of the cross-national variation in attitudes toward increased fossil fuel taxes, providing initial support for our first hypothesis, which posits a general positive association between social assistance and support for increased fossil fuel taxes.

In Model 3, self-experienced economic hardship is added to the analysis. The coefficient for self-experienced economic hardship ($b = -0.123$, $p < 0.001$) is statistically significant and in the expected negative direction, indicating that respondents self-experiencing more economic hardship are less supportive of increasing fossil fuel taxes. Including this variable reduces the coefficient for social assistance by about 17%, from 0.191 in Model 2 to 0.159 in Model 3. This reduction is statistically significant, as confirmed by a bootstrapped Wald test ($z = 16.27$, $p < 0.000$, 399 bootstrap replications). These findings support our second hypothesis, indicating that part of the positive association between social assistance and support for increased fossil fuel taxes is mediated by lower levels of self-experienced economic hardship.

Model 4 incorporates eco-social values, showing a positive and statistically significant fixed coefficient ($b = 0.067$, $p < 0.000$). This indicates that respondents with stronger eco-social values are, on average, more in favor of increasing fossil fuel taxes. However, the inclusion of eco-social values only marginally reduces the fixed coefficient for social assistance, and the ICC remains intact. This suggests that neither cross-national differences in support for fossil fuel taxes nor the relationship between social assistance and public support are accounted for by controlling for between-country variations in the prevalence of eco-social values.

Model 5 tests our third hypothesis involving institutional *moderation* by including a cross-level interaction between eco-social values at the individual level and social assistance at the country level, along with a random slope for eco-social values. The model reveals a positive and statistically significant cross-level interaction ($b = 0.065$, $p < 0.001$), indicating that as social assistance becomes more generous, the positive association between eco-social values and support for increased fossil fuel taxes becomes stronger. Including this interaction term also further reduces the ICC to 0.027, suggesting that the full model accounts

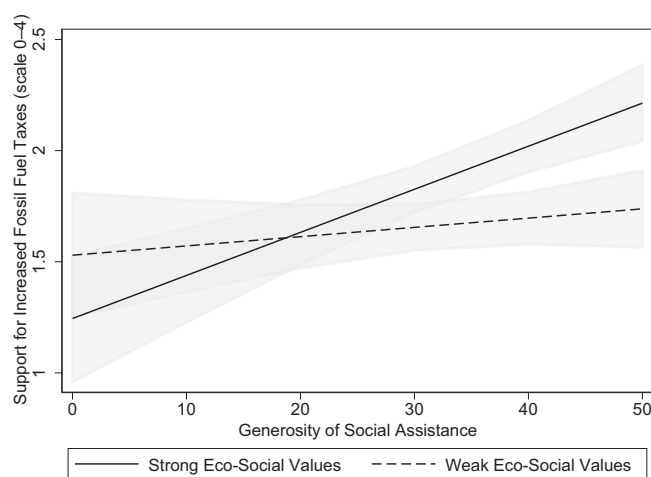


FIGURE 2 | Predicted support for increased fossil fuel taxes (vertical axis, 0–4 scale) among individuals with strong (solid line) and weak (dotted line) eco-social values, by social assistance generosity. All controls are held at their sample means. Shaded areas around each line represent 95% confidence intervals. Strong (weak) eco-social values are here defined in relative terms as an index score at 1.5 standard deviations above (below) the sample average.

for a majority—55% ($1 - [0.027/0.060]$)—of the cross-national variation in attitudes toward increased fossil fuel taxes.

To illustrate this relationship, Figure 2 shows the predicted levels of support for increased fossil fuel taxes among respondents with strong (solid line) and weak (dotted line) eco-social values, across the range of social assistance generosity. Social assistance is shown on its original scale for more intuitive interpretation, and predictions are made only within the observed range of scores. For individuals with weak eco-social values, attitudes toward increased fossil fuel taxes remain similar regardless of social assistance generosity. In contrast, among those with strong eco-social values, the support for increased fossil fuel taxes is substantially higher in countries with more generous social assistance. These findings support the third hypothesis, suggesting that social assistance is associated with greater support for fossil fuel taxes, particularly among individuals with strong eco-social values.

4.2 | Sensitivity Analyses

A series of sensitivity analyses were conducted to assess the robustness of the main results. The main findings remain consistent when attitudes to increased fossil fuel taxes are measured on an ordinal scale using a multilevel probit model or when recoded as a dichotomous variable using logistic models. Similarly, the results remain substantively unchanged when the two items in the index of self-experienced economic hardship are analyzed separately.

Given the limited number of country-level units, hierarchical regressions may yield unreliable parameters for the macro-level variables (Bryan and Jenkins 2016). While this issue cannot be fully resolved due to data constraints, we re-ran our main models using 399 bootstraps, as recommended for statistical significance

testing at the 0.05 level (Davidson and MacKinnon 2000). As shown in Table A2, these sensitivity analyses do not substantially change the main results.

With only 20 country-level units, our ability to control for other contextual explanatory factors is limited. However, we conducted several additional sensitivity tests, recognizing that these should be interpreted as tentative rather than definite. Concerning alternative social policy instruments, Table A3 includes social insurance *generosity* and *coverage*, which are added separately to models otherwise identical to those in Table 1. Models 6–9 show that attitudes to increased fossil fuel taxes seem to be unrelated to the level of income replacement in social insurance, while the association with social assistance generosity remains.

Social insurance *coverage* is added in Models 10–13, and its inclusion does not eliminate the association between social assistance and support for increased fossil fuel taxes, although the size of the fixed coefficient for social assistance is reduced. The mediating role of self-experienced economic hardship also appears less pronounced for social insurance coverage than for social assistance. Once self-experienced economic hardship is added to the regression, the coefficient for social assistance declines by around 24% (from 0.114 in Model 10 to 0.087 in Model 11), whereas the coefficient for social insurance coverage declines by only about 5% (from 0.134 to 0.127).

Furthermore, the cross-level interaction between social assistance and eco-social values remains positive and statistically significant, even when controlling for social insurance coverage (Model 12). Unlike social assistance, social insurance coverage does not moderate the relationship between eco-social values and support for increased fossil fuel taxes (Model 13). These comparisons suggest that social assistance has a distinctive explanatory value that goes beyond social insurance systems, thus reinforcing our theoretical argument that support for fossil fuel taxes is especially linked to social policies geared toward providing income protection for those at the lower end of the socioeconomic spectrum.

Beyond social policy, the concept of Quality of Government (QoG) is arguably the most extensively examined aspect of “good governance” in comparative research on support for environmental policies (e.g., Davidovic and Harring 2020). Much of this research builds on theories developed by scholars at the QoG Institute at Gothenburg University, who argue that “the content of public policies should not be included in the definition of QoG. Instead, it is impartiality in the exercise of power (the ‘ought to treat equally’ principle) that is the central component of QoG” (Rothstein and Teorell 2012, 25).

There is an ongoing debate about how to best measure QoG while keeping it analytically distinct from substantive policy content (Charron 2021), including the generosity of social policies. To reflect the diversity of measurement approaches, we compare three different QoG indicators in our sensitivity analyses. First, we use the aggregated indicator produced by the *International Country Risk Guide* (ICRG), a private company. While widely used, this measure has a relatively fluid conceptual foundation and lacks methodological transparency, as its

detailed methodology and underlying data are behind a paywall. This makes it difficult to assess whether it strictly measures QoG as defined above, or the extent to which it also captures policy content. Second, we use the *European Quality of Government Index* (EQI) from Charron et al. (2015). Being based on a survey of the general population, its key advantage is its ability to measure publicly perceived QoG at the sub-national regional level. However, since it is only available for EU countries, the indicator excludes Norway and Switzerland. Third, we use the *index of impartial public administration*, taken from the QoG expert survey dataset (Dahlström et al. 2015), which relies on expert assessments and is explicitly designed to operationalize the government impartiality theory of QoG.

Table A4 presents models in which each of the three QoG indicators is included separately. Each QoG indicator is tested in two models: the first excludes the theorized individual-level mediating variable (self-experienced economic hardship) whereas the second includes it. Models 14 and 15 show that the ICRG indicator is significantly positively related to tax support and absorbs most of the fixed coefficient for social assistance. However, the interaction between social assistance and eco-social values remains substantive and statistically significant. An additional regression model (not reported in the table) confirms that this interaction remains statistically significant even when an interaction term between the ICRG indicator and eco-social values is included (which, notably, is not statistically significant).

The EQI indicator is included in Models 16 and 17. In both models, the fixed coefficient for social assistance and its interaction with eco-social values remain substantive and significant. Similarly, social assistance retains most of its predictive power in Models 18 and 19, which include the expert-based impartiality index. Interestingly, neither EQI nor the impartiality index is significantly related to attitudes when controlling for social assistance. In sum, the sensitivity tests comparing these three different QoG indicators suggest that social assistance seems to have distinct explanatory value in understanding how the institutional context shapes public support for increased fossil fuel taxes—particularly when contrasted with QoG indicators explicitly designed to capture government impartiality independent of policy content.

Lastly, in Table A5, we introduce additional individual-level controls that we are hesitant to include in the main models, as they may be conceptually endogenous to our key explanatory variables: climate beliefs, left–right ideology, political trust, and general tax skepticism (see the Appendix A for variable constructions). All these additional individual-level covariates are related to fossil fuel tax attitudes, but they do not substantially change our main results (Model 20). Table A5 also includes additional country-level controls (Models 21–26): GDP per capita, fossil fuel consumption per capita, and a dichotomous variable indicating whether the country had a national carbon tax in place at the time of data collection (see the Appendix A for variable sources). Again, given the limited number of countries, these country-level controls are introduced separately in distinct model pairs. None of them are significantly related to the support for increased fossil fuel taxes. While the inclusion of GDP per capita reduces the fixed effect of social assistance, the coefficient remains statistically significant, as does the interaction between social assistance and eco-social values (Models

21 and 22). Thus, our main results remain consistent after accounting for these additional macro-level controls.

5 | Concluding Discussion

This study began from the premise that previous research has neglected or struggled to identify through which specific social policies the welfare state may increase public support for fossil fuel taxes and other climate change mitigation measures that impose visible costs on households. To meaningfully advance the eco-social policy debate, it is not enough to demonstrate that the welfare state matters. For both theoretical development and policy relevance, it is essential to pinpoint the specific instruments through which it operates. Existing studies relying on welfare regime typologies or aggregate social spending do not provide sufficient insight in this regard. We also argued that previous research focusing on social insurance falls short by omitting social assistance, the welfare state instrument most directly aimed at protecting the economically most vulnerable households.

Our findings suggest that countries with more generous social assistance—which raises the minimum income floor below which no household should fall—tend to have higher public support for increased fossil fuel taxes (supporting our first hypothesis, H1). Combined with the finding that income replacement rates in social insurance are unrelated to attitudes, this supports our argument that social policies targeting the lower end of the income distribution likely do much of the heavy lifting in enhancing the welfare state's capacity to strengthen support for increased fossil fuel taxes.

We analyzed two macro-micro pathways linking social assistance to support for increased fossil fuel taxes. In line with classical theories of the welfare state and policy feedback, we argue that the welfare state matters largely because it shapes the level and distribution of living conditions. Empirically, we find that individuals in countries with more generous social assistance tend to report lower levels of self-experienced economic hardship, which partially mediates the relationship between social assistance and support for increased fossil fuel taxes (supporting our second hypothesis, H2).

We further considered whether the ability of social assistance to reduce economic hardship might generate broader societal spill-over effects. Specifically, our results indicate that social assistance carries the possibility to unlock greater support for fossil fuel taxes among those with strong eco-social values—a sizable group that prioritizes both the ecological environment and decent living conditions for low-income groups. In countries with meager social assistance, even people with strong eco-social values tend to hesitate in supporting increased fossil fuel taxes, likely out of concern about their negative impact on households already facing economic hardship. In contrast, in countries with more generous social assistance, support for increased fossil fuel taxes is notably higher among those with strong eco-social values (supporting our third hypothesis, H3). We interpret this form of institutional moderation as indicative that social assistance can help ease value conflicts that otherwise might arise from perceived trade-offs between ecological and social objectives within European welfare states.

The cross-sectional design of the data limits our capacity to draw causal inferences, underscoring the need for the continued development of comparative databases and refined methods to establish causal evidence in relation to the eco-social debate. The relatively small number of countries analyzed also constrains our ability to control for alternative institutional explanations. Given prior research and our mixed results in the sensitivity analyses, we particularly encourage future work aimed at disentangling the impact and possible overlaps between social policy and various aspects of “good governance” more generally, such as government impartiality. Expanding the number and diversity of countries studied, including those outside Europe, would allow scholars to better compare the importance of social policy to other government functions while considering how these interplay with socioeconomic conditions and human values in shaping climate policy support.

This study contributes to the growing eco-social debate by highlighting the enduring importance of established welfare state institutions and redistributive instruments. While much of the current research searches for new compensation mechanisms to cushion the adverse social impacts of necessary but often regressive climate policies, our findings suggest that traditional forms of income protection remain a vital foundation for fostering eco-social synergies. Future research should examine how these longstanding redistributive instruments compare to newer direct compensation schemes, such as recycling carbon tax revenues through lump-sum payments. A tentative overarching proposition emerging from this study is that strengthening the generosity of existing and proven social policies—particularly those like social assistance that raise the income floor—may be just as effective, if not more so, in preventing public backlash against government-led climate action and decarbonization efforts than direct compensation schemes.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are openly available in ESS Data Portal at <https://www.europeansocialsurvey.org/data>.

Endnotes

¹Sjöstrand (2025) adopted a similar explanatory focus on contributory social insurance but did not examine policy attitudes related to climate change mitigation but rather a general willingness to accept material sacrifices for the sake of environmental protection.

- ²As an indicator of the basic protection offered by the welfare state, it may be more appropriate to focus on the number of actual beneficiaries, sometimes referred to as pseudo-coverage (Immervoll et al. 2014) or effective coverage (European Council 2019). However, pseudo-coverage rates are only available for programs with clearly defined target populations, such as unemployment benefits or old-age pensions. Moreover, data on actual beneficiaries face measurement issues that reduce their validity in comparative research, including differences between countries in how benefit programs are categorized in administrative data or social surveys, double counting of beneficiaries, and other inconsistencies (De Deken and Clasen 2013).
- ³Nordbrandt et al. (2025) found no empirical support for the idea that social insurance has a stronger positive impact on support for fossil fuel taxes among those with self-experienced economic hardships. However, focusing on this form of potential *moderation* of social policy overlooks the more fundamental dynamic that welfare states may reduce the overall incidence of economic hardship, suggesting that self-experienced economic hardship primarily serves as a *mediator* of the relationship between social policy and support for fossil fuel taxes.
- ⁴Since the second item was not fielded in Austria, the index scores for Austrian respondents are calculated by doubling the value of the first item.
- ⁵This approach is consistent with the method Nordbrandt et al. (2025) use to measure the generosity of social insurance. Italy lacked national social assistance frameworks in 2015 and is thus coded to zero in the statistical analyses.

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Appendix A

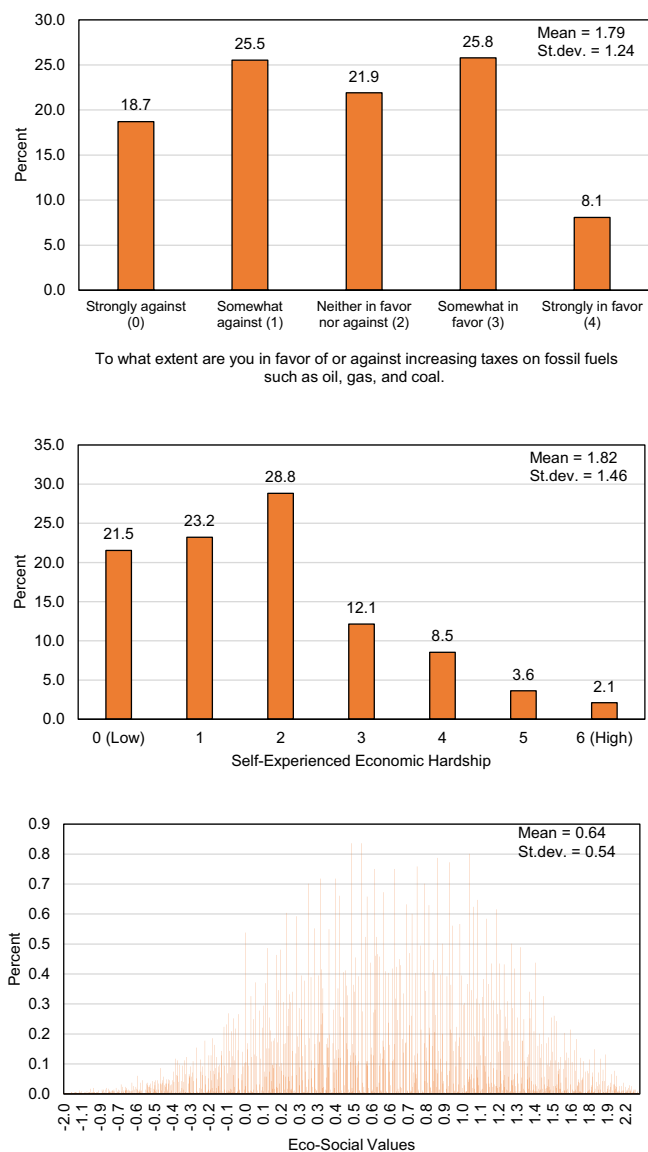


FIGURE A1 | Response distribution for main individual-level variables. Based on regression sample.

Variable Coding and Sources for the Sensitivity Analyses

Note that all variables below are included in their z-standardized form (mean = 0, st. dev. = 1) in the regression models. Country-level variables cover the year 2015 unless stated otherwise.

Climate belief: Following Fairbrother et al. (2019), we measure beliefs about climate change using three items combined into an index ranging from 0 to 10. Beliefs about trends are measured with the item: “Do you think the earth’s climate is changing?”, with possible responses ranging from “Definitely changing” to “Definitely not changing.” Attribution beliefs are captured by the item: “Do you think climate change is caused by natural processes, human activity, or both?” Responses range from “Entirely by natural processes” to “Entirely by human processes.” For impact beliefs, we use the item “How good or bad do you think the impacts of climate change will be across the world?” Responses range from “Extremely bad” to “Extremely good.” All three items are coded so that a higher score on the composite index indicates a stronger belief in human-induced climate change with negative consequences.

Left-right scale: Measured with the single standard item: “In politics people sometimes talk of ‘left’ and ‘right’. Using this card, where would you place yourself on this scale, where 0 means the left and 10 means the right?”

Political trust: An additive index based on three standard items: “On a scale of 0–10, how much do you personally trust [country]’s: ‘... parliament?”, ‘... politicians?”, and ‘... political parties?” A higher score indicates more political trust.

General tax skepticism: While an ideal item asking exclusively about taxes is not included in this round of the ESS, we use the following item: “To what extent do you agree or disagree that social benefits and services in [country] cost businesses too much in taxes and charges?” Responses on a 5-point Likert-type scale are coded so that a higher score indicates more tax skepticism in general.

Social insurance generosity and coverage: These indicators are drawn from the SPIN database (Nelson et al. 2020), as in Nordbrandt et al. (2025), and cover the average generosity (income replacement level) and coverage across three major social insurance programs: unemployment, sickness, and pensions.

ICRG indicator: This indicator is produced by the private company International Country Risk Guide (ICRG). We use the aggregated index of “Quality of Government,” sourced from Teorell et al. (2021).

EQI index: We use the 2013 *European Quality of Government Index* data from Charron et al. (2015), which aims to measure publicly perceived QoG at the sub-national regional level. Since this indicator is available only for EU countries, the analytical sample is smaller, as data is not available for Norway and Switzerland.

Expert-based impartiality index: Taken from the 2015 QoG expert survey dataset II (Dahlström et al. 2015), we use the country-average score from the expert-based “Index of impartiality” (impartial public administration), where a higher score signifies greater QoG.

GDP per capita: Expressed in constant 2021 international dollars (at purchasing power parity), taken from the World Bank’s World Development Indicators, <https://databank.worldbank.org/source/world-development-indicators>.

Fossil fuel consumption per capita: The average consumption of energy from coal, oil, and gas in kilowatt-hours. From the Energy Institute, sourced via the World in Data, <https://ourworldindata.org/grapher/fossil-fuels-per-capita?tab=table&time=2015>.

National carbon tax: Information about whether each country had a national carbon tax in place at the time of data collection, obtained from the World Bank (2024).

TABLE A1 | Descriptive statistics for regression sample.

	<i>N</i>	Minimum	Maximum	Mean	St.dev.
Main analysis					
Support fossil fuel taxes	34,932	0.00	4.00	1.79	1.24
Self-experienced economic hardship	34,932	0.00	6.00	1.82	1.46
Eco-social values	34,932	-1.98	2.71	0.64	0.54
Woman	34,932	0.00	1.00	0.52	0.50
Age	34,932	15.00	99.00	49.39	18.21
Small town/Countryside	34,932	0.00	1.00	0.71	0.46
University degree	34,932	0.00	1.00	0.24	0.43
Social assistance	34,932	0.00	52.28	32.72	12.59
Sensitivity analyses					
Climate belief	33,083	1.10	10.00	5.93	1.03
Left-right scale	31,439	0.00	10.00	5.10	2.18
Political trust	34,237	0.00	10.00	4.04	2.23
General tax skepticism	33,273	0.00	4.00	1.98	1.04
Social insurance replacement rate	34,932	31.53	79.17	63.01	11.44
Social insurance coverage	34,932	50.80	99.14	79.24	14.37
ICRG indicator	34,932	0.57	0.97	0.81	0.13
European Quality of Government index (EQI)	31,991	-2.21	2.82	0.33	0.80
QoG Expert index of impartiality	34,932	4.21	6.20	5.54	0.61
GDP per capita	34,932	31665.23	85766.61	53362.00	15037.02
Fossil fuel consumption per capita	34,932	19319.00	57538.00	30941.77	10202.60
National carbon tax	34,932	0.00	1.00	0.57	0.49

Note: Unstandardized variables.

TABLE A2 | *Bootstrapped models of support for increased fossil fuel taxes by self-experienced economic hardship, eco-social values, and the generosity of social assistance.*

	Bootstrapped models									
	Model 1		Model 2		Model 3		Model 4		Model 5	
	<i>b</i>	s.e.	<i>b</i>	s.e.	<i>b</i>	s.e.	<i>b</i>	s.e.	<i>b</i>	s.e.
<i>Fixed coefficients</i>										
Country level										
Social assistance generosity			0.191***	(0.006)	0.159***	(0.007)	0.145***	(0.007)	0.152***	(0.008)
Main individual-level variables										
Self-experienced economic hardship					-0.123***	(0.007)	-0.123***	(0.007)	-0.120***	(0.007)
Eco-social values					0.067***	(0.008)	0.067***	(0.008)	0.071***	(0.008)
Cross-level interactions										
Social assistance*Eco-social values							0.065***	(0.008)	0.065***	(0.008)
Individual-level controls										
University degree	0.168***	(0.007)	0.191***	(0.006)	0.144***	(0.007)	0.140***	(0.007)	0.138***	(0.007)
Woman	0.025***	(0.006)	0.025***	(0.006)	0.032***	(0.006)	0.021**	(0.006)	0.019**	(0.006)
Age	-0.089***	(0.006)	-0.089***	(0.006)	-0.092***	(0.006)	-0.101***	(0.006)	-0.099***	(0.006)
Small town/countryside	-0.069***	(0.007)	-0.069***	(0.006)	-0.071***	(0.006)	-0.072***	(0.006)	-0.071***	(0.006)
Intercept	1.797***	(0.007)	1.797***	(0.006)	1.800***	(0.007)	1.801***	(0.007)	1.778***	(0.007)
<i>Random effects: country level</i>										
Country intercepts	0.088	(0.004)	0.053	(0.003)	0.046	(0.003)	0.046	(0.003)	0.038	(0.003)
Eco-social values (slopes)									0.006	(0.001)
ICC	0.059		0.036		0.032		0.032		0.027	
BIC	111,202		111,202		110,891		110,811		110,678	
<i>N</i> individuals	34,932		34,932		34,932		34,932		34,932	
<i>N</i> countries	20		20		20		20		20	

Note: Linear multilevel regression analysis. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. The dependent variable is measured on a 0–4 scale. All independent variables are z-standardized (mean = 0, st. dev. = 1). Coefficients are rounded to the third decimal. Bootstraps $n = 399$.

TABLE A3 | Support for increased fossil fuel taxes by self-experienced economic hardship, eco-social values, generosity of social assistance, and the generosity and coverage of social insurance.

	Model 6		Model 7		Model 8		Model 9		Model 10		Model 11		Model 12		Model 13		
	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.	
<i>Fixed coefficients</i>																	
Country level																	
Social assistance generosity	0.190**	(0.055)	0.158**	(0.052)	0.150	(0.047)	0.151**	(0.047)	0.114*	(0.058)	0.087	(0.054)	0.083	(0.048)	0.083	(0.048)	
Social insurance generosity	0.003	(0.055)	0.005	(0.052)	0.005	(0.047)	0.005	(0.047)									
Social insurance coverage									0.134*	(0.058)	0.127*	(0.054)	0.120*	(0.048)	0.120*	(0.048)	
Main individual-level variables																	
Self-experienced economic hardship			-0.123***	(0.007)	-0.120***	(0.007)	-0.120***	(0.007)			-0.123***	(0.007)	-0.120***	(0.007)	-0.120***	(0.007)	
Eco-social values					0.071***	(0.018)	0.071***	(0.018)					0.071***	(0.018)	0.071***	(0.018)	
Cross-level interactions																	
Social assistance*Eco-social values					0.065***	(0.019)	0.063***	(0.019)					0.065***	(0.019)	0.056*	(0.022)	
Insurance generosity*Eco-social values							0.009	(0.019)							0.017	(0.022)	
Insurance coverage*Eco-social values																	
Main individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
<i>Random effects: country level</i>																	
Country intercepts	0.053	(0.017)	0.046	(0.015)	0.038	(0.012)	0.038	(0.012)	0.042	(0.013)	0.036	(0.012)	0.029	(0.009)	0.028	(0.009)	
Eco-social values (slopes)					0.006	(0.002)	0.005	(0.002)					0.005	(0.002)	0.005	(0.002)	
ICC	0.036		0.032		0.027		0.027		0.029		0.025		0.020		0.020		
BIC	111,203		110,902		110,688		110,699		111,208		110,897		110,683		110,693		
N individuals	34,932		34,932		34,932		34,932		34,932		34,932		34,932		34,932		
N countries	20		20		20		20		20		20		20		20		

Note: Linear multilevel regression analysis. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. The dependent variable is measured on a 0–4 scale. All independent variables are z-standardized (mean = 0, st. dev. = 1). Coefficients are rounded to the third decimal.

TABLE A4 | Support for increased fossil fuel taxes by self-experienced economic hardship, eco-social values, generosity of social assistance, and three *quality of government* indicators.

	Model 14		Model 15		Model 16		Model 17		Model 18		Model 19	
	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>
<i>Fixed coefficients</i>												
Country level												
Social assistance generosity	0.043	(0.076)	0.036	(0.072)	0.121*	(0.055)	0.120*	(0.054)	0.180*	(0.091)	0.157	(0.085)
ICRG indicator	0.173*	(0.076)	0.141	(0.072)								
EQI index			0.038	(0.020)	0.007	(0.020)						
Expert-based impartiality index									0.006	(0.136)	-0.006	(0.085)
Main individual-level variables												
Self-experienced economic hardship			-0.120***	(0.007)			-0.120***	(0.007)			-0.120***	(0.007)
Eco-social values	0.070***	(0.019)	0.070***	(0.019)	0.063**	(0.020)	0.063**	(0.019)	0.070***	(0.019)	0.071***	(0.018)
Cross-level interactions												
Social assistance*Eco-social values	0.069***	(0.019)	0.066***	(0.019)	0.056**	(0.021)	0.053*	(0.020)	0.069***	(0.019)	0.065***	(0.019)
Main individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Random effects: country level</i>												
Country intercepts	0.035	(0.011)	0.032	(0.010)	0.041	(0.014)	0.038	(0.013)	0.044	(0.014)	0.038	(0.012)
Eco-social values (slopes)	0.006	(0.002)	0.006	(0.002)	0.006	(0.002)	0.005	(0.002)	0.006	(0.002)	0.006	(0.002)
ICC	0.024		0.022		0.028		0.027		0.031		0.027	
BIC	110,985		110,685		101,743		101,468		110,988		110,688	
<i>N</i> individuals	34,932		34,932		31,991		31,991		34,932		34,932	
<i>N</i> countries	20		20		18		18		20		20	

Note: Linear multilevel regression analysis. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. The dependent variable is measured on a 0–4 scale. All independent variables are z-standardized (mean = 0, st. dev. = 1). Coefficients are rounded to the third decimal.

TABLE A5 | Support for increased fossil fuel taxes by self-experienced economic hardship, eco-social values, and generosity of social assistance, with additional controls.

	Model 20		Model 21		Model 22		Model 23		Model 24		Model 25		Model 26	
	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>	<i>b</i>	<i>s.e.</i>
<i>Fixed coefficients</i>														
Country level														
Social assistance generosity	0.096*	(0.038)	0.127*	(0.060)	0.107	(0.057)	0.190***	(0.047)	0.159***	(0.045)	0.191***	(0.051)	0.159**	(0.047)
GDP per capita	0.091	(0.060)	0.070	(0.057)										
Fossil fuel consumption per capita							-0.033	(0.049)	-0.039	(0.045)				
Implemented carbon tax in 2016											-0.021	(0.051)	-0.023	(0.047)
<i>Main individual-level variables</i>														
Self-experienced economic hardship	-0.095***	(0.008)			-0.120***	(0.007)								
Eco-social values	0.057**	(0.018)	0.070***	(0.019)	0.071***	(0.018)	0.070***	(0.019)	0.071***	(0.018)	0.070***	(0.019)	0.071***	(0.018)
<i>Cross-level interactions</i>														
Social assistance*Eco-social values	0.049**	(0.018)	0.069***	(0.019)	0.065***	(0.019)	0.069***	(0.019)	0.065***	(0.019)	0.069***	(0.019)	0.065***	(0.019)
<i>Individual-level control variables</i>														
Main controls	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Climate belief (index)	0.100***	(0.007)												
Right ideology (left-right scale)	-0.092***	(0.007)												
Political trust (index)	0.194***	(0.008)												
General tax skepticism	-0.047***	(0.007)												
<i>Random effects: country level</i>														
Country intercepts	0.026	(0.009)	0.039	(0.013)	0.035	(0.011)	0.043	(0.014)	0.036	(0.012)	0.044	(0.014)	0.037	(0.012)
Eco-social values (slopes)	0.005	(0.002)	0.006	(0.002)	0.006	(0.002)	0.006	(0.002)	0.005	(0.002)	0.005	(0.002)	0.006	(0.002)
ICC	0.019		0.028		0.025		0.030		0.026		0.030		0.026	
BIC	89,734		110,987		110,687		110,989		110,688		110,989		110,688	
N individuals	28,743		34,932		34,932		34,932		34,932		34,932		34,932	
N countries	20		20		20		20		20		20		20	

Note: Linear multilevel regression analysis. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. The dependent variable is measured on a 0–4 scale. All independent variables are z-standardized (mean = 0, st. dev. = 1). Coefficients are rounded to the third decimal.