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The Role of Fairness for Accepting Stricter Carbon Taxes in Sweden

Daniel Lindvall [1,*], Patrik Sörqvist [2,3,4], Sverker Carlsson Jagers [1,5], Mikael Karlsson [1], Stefan Sjöberg [3] and Stephan Barthel [2,6]

1 Department of Earth Sciences, Climate Change Leadership, Uppsala University, P.O. Box 256, 751 05 Uppsala, Sweden; sverker.jagers@pol.gu.se (S.C.J.); mikael.karlsson@geo.uu.se (M.K.)
2 Department of Building Engineering, Energy Systems and Sustainability Science, University of Gävle, Kungsbäcksvägen 47, 801 76 Gävle, Sweden; patrik.sorqvist@hig.se (P.S.); stephan.barthel@hig.se (S.B.)
3 Department of Social Work and Criminology, University of Gävle, Kungsbäcksvägen 47, 801 76 Gävle, Sweden; stefan.sjoberg@hig.se
4 Department of Health, Learning and Technology, Luleå University of Technology, 971 87 Luleå, Sweden
5 Department of Political Science, University of Gothenburg, Box 100, 405 30 Gothenburg, Sweden
6 Stockholm Resilience Centre, Stockholm University, 106 91 Stockholm, Sweden
* Correspondence: daniel.lindvall@geo.uu.se

Abstract: Carbon taxes are considered to be an efficient method to reduce greenhouse gas emissions; however, such taxes are generally unpopular, partly because they are seen as unfair. To explore if public acceptance of a stricter carbon tax in Sweden can be enhanced, this study investigates the effectiveness of three different policy designs, addressing collective and personal distributional consequences and promoting procedural aspects (democratic influence). A large-scale (n = 5200) survey is applied, combining a traditional multi-category answer format with a binary choice format. The results show that support for higher carbon taxation can be enhanced if tax revenues are redistributed to affected groups. Policies with collective justice framings can change the attitudes of individuals who express antagonistic attitudes to increased carbon taxation and influence groups comparably more affected by carbon taxes, such as rural residents, low-income groups, and people who are driving long distances. Policy designs addressing collective distributional consequences are, however, less effective on individuals expressing right-leaning ideological views and low environmental concern. Policies addressing personal distributional outcomes, or perceptions of procedural injustice, had no significant effect on policy acceptance.

Keywords: climate policy; climate governance; carbon tax; climate justice; fair transition; shifting policy aversion

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1. Introduction

Among the policy tools available for governments to tackle climate change, carbon pricing schemes, such as emission trading systems or carbon taxes, are seen by many scholars as the most efficient method to reduce emissions [1–4]. By putting a price on carbon, the external costs of emissions are assigned to the polluter, while a transfer away from fossil fuels is incentivised. Carbon taxation is, however, a generally unpopular measure among the public and could entail political costs for governments attempting to introduce carbon pricing or boost implemented policies [5]. If introduced without redistributive mechanisms, carbon taxes are regressive and can place a relatively high burden on low-income groups or rural dwellers [6–9]. As a result, carbon taxes are typically perceived to result in unfair distributional consequences, adding to public resistance.

1.1. Carbon Taxes, Fairness, and Public Acceptance

Reviews of the available literature have identified fairness as a compelling force for climate policy opposition in general [10], and for carbon pricing and taxation in partic-

ular [11–14]. A meta-analytic study on public opinion about climate change taxes and laws concluded that perceived (un)fairness, together with (in)effectiveness, are the most important determinants for climate policy acceptance [15]. It can thus be assumed that public acceptance of a carbon tax, and thereby also its political feasibility, is determined by how well social injustice and unfairness concerns are considered and built into the design of the policy. To enhance acceptance and overcome resistance, it has accordingly been suggested that different perceptions of unfairness can be addressed by carbon tax strategies with revenue recycling schemes, such as fee and dividend, lumpsum transfers, tax rebates, and social cushioning [11].

While several studies have explored factors influencing social acceptance for carbon taxes, highlighting the importance of perceived fairness, few have systematically compared different policy designs addressing various fairness considerations. Individuals may, for example, prioritize different distributive norms such as "equity", "equality", or "need" [16], and consequently, may prefer taxes designed to address either personal or collective distributional effects of a carbon tax. Moreover, research on climate policy acceptance has predominantly focused on distributional justice, with considerably less attention devoted to procedural justice, which pertains to the processes by which decisions are made or implemented [17,18].

However, there are reasons to believe that perceptions of procedural justice are relevant to explore, given that governmental and political trust has been shown to affect climate policy acceptance [19–23]. Trust and fairness perceptions can be fostered by participatory and inclusive decision-making processes [24], yet few studies have explored the significance of these factors for climate policy acceptance and especially on attitudes toward a carbon tax increase.

To unveil these uncertainties, this paper aims to explore attitudes towards carbon taxation policies in Sweden, designed to address these three different types of fairness considerations. To this end, we tested whether acceptance of a carbon tax increase would be enhanced with a model that addresses personal distributional effects, through tax reductions at the level of the carbon tax, or collective distributional effects, by redistributing revenues to vulnerable or affected groups. The study differs thereby from many other similar studies, as it specifically explores a carbon tax increase in a country with a tax in place, set at a relatively high level [18,19]. The study also tested whether a condition related to the decision-making procedure may affect acceptance, i.e., procedural justice, which makes the study unique.

The intention of the study was to explore fairness perceptions in particular, and therefore several policy options and aspects that might be relevant for acceptance were omitted. We chose not to explore the influence of environmental effectiveness, information provisions, or other aspects related to the implementation of the policy, which have been shown to be parameters that affect public attitudes [25–27]. We also decided not to explore earmarking revenues for environmental purposes since it is not a politically feasible option due to constitutional constraints in many countries, including Sweden, even though it can be a significant determinant for policy acceptance [28–30]. The article discusses climate policy acceptance, yet its specific study object is a carbon tax increase. The study is moreover contextual and limited in its scope, and the results should not be regarded as fully describing the most appropriate climate policy approach in general. Yet, the aim is to make a specific contribution with a focus on the relevance of different fairness considerations in Sweden.

1.2. The Case of the Swedish Carbon Tax

Sweden is an interesting case to study since it was one of the first countries in the world to adopt a carbon tax in 1991 [31]. In 2021, it was set at one of the highest levels in the world [32]. The Swedish carbon tax was introduced within a wider tax reform and was thereafter raised over time, and for a number of years political consensus was cultivated by the so-called "green tax shift", initially implemented in 2000, which implied a reduction of income taxes in parity with the carbon tax [33]. Sweden has also been known

to combine relatively generous welfare policies with ambitious climate policies, which could hypothetically influence fairness perceptions.

Previous studies have shown that the Swedish carbon tax is relatively well accepted in society and that the support is fairly good from a European perspective [34], although it is considered by many Swedes to be unfair to rural populations and low-income groups [35]. The question of fairness has become increasingly relevant in the climate policy debate in Sweden in recent years, partly due to the energy crisis following the corona pandemic and the Russian invasion of Ukraine in 2022. The argument of fairness has been utilized by movements protesting against fuel prices ("Bränsleupproret") [33], which has articulated discontent with carbon taxation and its perceived regressive effects, similarly to the French Yellow West Movement [36]. Another aspect that makes Sweden an interesting case is the decision of the coalition ruling after the 2022 parliamentary election to reduce energy and carbon taxes, referring to the need to alleviate the effects of inflation and the impact on family households and rural populations [37]. By conducting the study in the spring and summer of 2023, a period marked by relatively high fuel prices and the incomplete implementation of energy and carbon tax cuts by the government, we anticipated that respondents were fairly aware of carbon tax policies. Consequently, they may have been more inclined to be skeptical about a tax increase.

2. Previous Research, Theory, and Research Questions

2.1. Literature Review

The body of research exploring climate policy acceptance, and particularly public support of carbon taxation, has grown in recent years. Several elements are influencing public opinion, however, and there is emerging consensus regarding fairness perceptions as a pivotal determinant of policy acceptance [10,14]. Knowing that the opposition to carbon taxation is often motivated by perceived distributional injustice, support could likely be cultivated by redistributing tax revenues back to the citizens.

There is also scientific evidence suggesting that aversive attitudes toward carbon taxes can be alleviated by different revenue recycling schemes [17,24,25,27,38,39], yet there are uncertainties regarding what type of distributive principle is most effective in enhancing climate policy acceptance. Several studies have demonstrated that revenue redistribution to vulnerable groups is popular [40–42], yet other results indicate that progressive taxation and welfare-oriented policies are not associated with higher acceptance [27,43]. The most preferred use of revenues identified in a review of the relevant literature turned out to be earmarking revenues for environmental or green spending [10], which is a measure not necessarily addressing distributional effects. Moreover, research results demonstrate that the tax rate affects the appeal of progressive carbon taxation [27], while it is common that recipients lack knowledge of the redistributive aspects of the policies, and accordingly, information provisions or other aspects related to the implementation of the policy might affect public perception [24–26].

A particular challenge when it comes to redistributive carbon taxation is that public attitudes toward different policies and fairness preferences diverge between different segments of society. Generally speaking, low-income groups are often more skeptical about carbon taxation [44–46], and progressive taxes could arguably foster support in this group [27,28,47], while affluent individuals prefer neutral revenue transfers. Low-income and minority groups in the United States have been shown to be more supportive of climate policies that are combined with social welfare policies [48]. Other studies have failed to verify any association between low income and preference for progressive taxation [49], and in a study of the existing carbon tax in British Colombia, low-income earners expressed substantially weaker support for a tax increase, even though its revenues are redistributed back to households [50]. There are only two countries, Canada and Switzerland, that have actually adopted programmes that generate dividend payments to households, and studies show that these policies have only had marginal effects on policy acceptance [26].

Ideological orientations and personal values also influence climate policy acceptance and fairness preferences. Studies have repeatedly observed that individuals who express left-

leaning political standpoints are more supportive of progressive carbon taxes [20,51–53] than right-leaning individuals, whose policy aversion might even be strengthened by such proposals [27]. Right-leaning voters prefer to distribute revenues to citizens on an equal basis [27,45], or to reduce income taxes in parity with the carbon tax [17,37]. Earmarking revenues for environmental purposes is supported by individuals expressing strong environmental concerns, yet results on other ideological associations are inconsistent across different studies [27–29]. Climate awareness and climate concern have also been shown to be strong determinants for climate policy acceptance [14,34,43,54]. Studies have moreover found that values and worldviews influence climate policy preferences, suggesting that individuals who express self-transcending and egalitarian values tend to be more supportive of welfare-enhancing climate policies and progressive taxation than individuals who express self-enhancing values [27,55–57]. Individuals with hierarchical and individualistic worldviews have also been shown to be more likely to reject progressive taxation than those expressing egalitarian or communitarian worldviews [58].

Finally, research has demonstrated that perceptions of procedural justice are relevant for climate policy acceptance. Citizens are more likely to accept carbon taxation if they trust governmental institutions and politicians [18–22]. In analyses of open-ended survey responses of Spanish and American individuals, strong evidence has been found for trust to influence climate policy acceptance, together with perceived distributional injustice [59,60].

2.2. Theorising Fairness Preference and Policy Acceptance

As implied in the introduction and further elaborated in the section on previous research, there is strong evidence of the relevance of fairness for climate policy acceptance. Nevertheless, the social institutions and procedures underpinning fairness perceptions in the context of climate governance are not fully elucidated. Fairness is a multifaceted concept, including both perspectives on personal and collective distribution as well as procedural aspects, and is largely based on subjective judgments. Fairness preferences both shape and are influenced by a complex set of normative, political, and socioeconomic factors and other societal structures [61,62]. In the context of climate policy acceptance, several different aspects influence the understanding of fairness [63].

In general, the judgement of what is unfair can be based on the personal or collective consequences of a policy, aspects that Brinkmann and colleagues have defined as micro and macro justice [64]. Sara Maestre-Andrés and colleagues have a similar categorisation of personal and collective distributional effects, representing equity and equality principles, together with procedural aspects, in their review of perceived fairness of different carbon pricing schemes [10].

It can accordingly be assumed that an individual can make at least two different estimations about a carbon tax, each of which generates quite different expectations and thus views on how to compensate for perceived unfairness. First, the implementation of the tax can be expected to affect the individual per se, generating costs that he or she might or might not support. This is what Brinkmann and colleagues call micro justice calculations [62]. If this is a significant driver for public resistance, then a tax combined with a compensation instrument directed to the individual or the individual's household, e.g., a dividend directed specifically to those who have paid the tax, may increase the individual's acceptance of the pricing instrument or at least decrease its resistance against it.

Second, the implementation of the tax might instead be expected to affect certain or all groups of society in unwanted ways, e.g., generating macro-level (un)fairness perceptions [62]. If such perceptions are instead driving acceptance or resistance, then the intended tax should rather be combined with a more "broad-spectra" scheme aimed at compensating as many groups in society as possible, e.g., by a fee and dividend system or by lumpsum transfers to affected groups.

Finally, procedural fairness perceptions may also affect people's attitudes towards climate policy instruments. To generate acceptance or avoid public resistance, groups affected by a policy could be given an opportunity to influence its design and implementation.

There are several ways to construct such democratic opportunities, e.g., citizens' dialogues, consultations, or citizens' assemblies.

This reasoning motivates us to ask:

RQ1: To what extent does micro and macro distributional compensation, or procedural justice, influence acceptance of an increased carbon tax?

Previous research also suggests that sociodemographic aspects, such as income [42–44] and rural residency [36], influence attitudes toward climate policies. Value-based aspects, in particular environmental concern [14,34,43,52], ideological orientation [20,27,28,49–51], and governmental and political trust [19,20], have also been shown to be relevant for the acceptance and resistance of climate policies, in particular carbon taxes. Moreover, self-interests, such as car driving, have been found to influence attitudes toward carbon taxes [36]. While it is known that these aspects may predict general attitudes toward climate policies, it is not entirely clear to what extent these factors influence fairness preferences, thereby affecting the effectiveness of different policy designs in overcoming acceptance barriers.

This motivates us to also ask the following research question:

RQ2: To what extent are sociodemographic, self-interests, and value-based factors influencing the effect of micro and macro distributional compensation, or procedural justice, on acceptance or resistance to an increased carbon tax?

An illustration of the research questions and the correlation analysis is provided below in Figure 1.

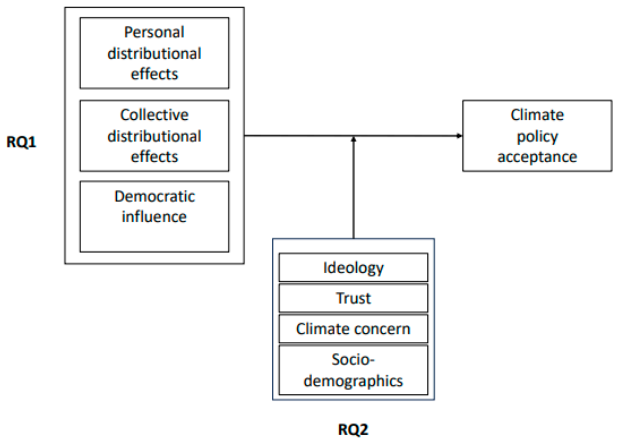

Figure 1. Chart of the correlation analysis.

3. Research Design and Data

3.1. Experimental Design and Analysis

This study applied a survey design wherein respondents were asked to rate statements regarding aspects related to climate change and climate policies on a scale ranging from one to seven, with four as a neutral category. The survey consisted of three main steps. In the first step, participants were asked to evaluate the following proposal: "To reduce emissions of greenhouse gases, the carbon tax on fossil fuels (diesel and petrol) needs to be increased", on a scale ranging from one to seven, with four being a neutral category. The proposal was thus a policy that the respondents were acquainted with.

Immediately after responding to the statement about their attitude toward higher carbon taxes (i.e., the baseline carbon tax attitude measure), the participants were, in step two, randomly assigned to one of three experimental conditions. In each condition, the participants were asked if they would be more supportive of an increase in carbon taxation if this would be associated with a specific consequence.

This consequence was different depending on the condition. In the macro justice condition, participants were asked if they would be more supportive of higher carbon taxes if the tax was progressive, compensating vulnerable groups (collective effects): "I would be more supportive of higher carbon taxes if low-income groups and rural inhabitants would

be compensated". In the micro justice condition, participants were asked if they would be more supportive of higher carbon taxes if personal costs were eased by a reduction in the income tax (personal effects): "I would be more supportive of higher carbon taxes if it was done together with a reduction of the income tax". Finally, in the procedural justice condition, participants were asked if they would be more supportive of higher carbon taxes if they were given a proper chance to influence the policy (procedural aspects): "I would be more supportive of higher carbon taxes if they would first have been given me a proper chance to influence the policy".

The objective of this methodological design was to enable a comparative analysis between the baseline attitude and the different policy designs, and more specifically, to test the assumption drawn from previous research on the relevance of different principles of justice for climate policy acceptance.

To analyse if the alternative "fairer" policy designs influence the propensity to accept carbon taxation, we conducted two sets of analysis. First, we assessed which of the three policy designs was most highly rated, or seen as most appealing, by conducting a comparative analysis between the average grades of the three policies. Thereafter, we assessed the effect of the alternative policy designs on acceptance by comparing the responses of sceptical respondents who rated the initial policy proposal on a scale of 1 to 3, thus less than neutral. This analysis indicated the effectiveness of a "fairer" policy design in enhancing acceptance.

We decided to employ a between-subjects design and not to present all conditional questions to all respondents because we wanted to test the influence of the alternative policy designs over the initial policy proposal. Another merit with the survey design was that the survey was kept short, which hopefully influenced the response rate positively. Each respondent was accordingly responding to a baseline question and one of the three conditional questions.

The survey did not include any specific questions regarding perceived fairness, and we could therefore not confirm that the respondents were negative to the initial questions on the basis of the perceptions of the proposal being unfair, yet we assumed that any of the three different types of fairness considerations were relevant if attitudes were shifted on the basis of the alterative policy designs.

In the third step of the questionnaire, we collected data on sociodemographic (income, rural/urban residence, gender, age), self-interest (car driving distance), and value-based factors (ideological orientation, environmental concern, and trust in governments and politicians).

To measure environmental concern, we used a set of questions adapted from a scale developed by Schultz (2001) [65]. Respondents were asked to assess their concerns about environmental impacts on themselves, all people, their lifestyle, people close to them, animals and plants, future generations, and children. Based on their responses, we constructed an index to quantify the level of environmental concern. For a full description of the survey design, see the Supplementary Materials.

The results were analysed using both descriptive and inferential statistics [66]. Multiple-regression analyses were used to explore how policy acceptability is underpinned by individual differences in sociodemographic variables, self-interest, and value-based factors.

3.2. Data Collection Procedure and Participants

This study was based on a postal survey aimed at Swedish residents aged 18 to 84, conducted between 25 April and 23 August 2023 [67]. This timeframe falls before the full implementation of energy and carbon tax cuts but after the announcement of these policy measures. The survey was carried out as part of the research project Fairtrans by the survey company Skop. While some questions were specifically designated for this article, other sections delved into car driving habits and opinions on various climate and energy policies. The survey was approved by the Swedish Ethical Review Authority (Dnr 2023-01099-01),

and all respondents were provided with relevant information regarding the research project prior to giving consent to participate in the survey.

The sample was drawn from the population register, ensuring a random selection from the entire population of Sweden rather than from a panel of respondents. It was distributed via postal format with the option for digital responses to 33,432 respondents aged 18 to 84 between 25 April and 23 August 2023. Data collection occurred in three waves: initially, 11,600 respondents were selected, followed by an additional 16,874 in a second wave, and 4958 in a final wave, each with a participation rate of 21%, 16%, and 16%, respectively. The additional waves were necessary to ensure a sufficient number of responses across all relevant demographic categories. In the first wave, only 9% of respondents were aged 18–34, compared to 28% in the age group above 65. To address the low response rate among younger respondents and ensure proportionality, the sample was stratified across three age categories (18–34 years, 36–64 years, 65–84 years) and municipality groups by size and sent out in additional waves.

Subsequently, a post-stratification methodology was employed to make the sample representative of the total population. After weighting the dataset on several core demographics to reflect the Swedish population, a total of 5280 respondents were included. A control question was included to validate respondents' attention. The number of respondents to some questions varied marginally due to incomplete responses and, in the case of car-driving, non-car ownership.

The dataset comprised 48.8% women and 50.6% men, with a slightly higher representation of respondents living in rural areas (51.3%), and the average age was 55 years (SD = 17.32), which was above the national average. Respondents reported an average driving distance slightly above the national average and a monthly income of 45,850 SEK (approximately 4000 Euros). While these demographic categories, except for high income, tend to be slightly more negative towards climate policies, the deviation from the national average was minimal and was not expected to impact the outcomes significantly. Additionally, responses on ideological orientation were well balanced between right-/left-leaning attitudes, with a mean of 4.2. Further details on the data collection and stratification methodology are provided in the Supplementary Materials accompanying this article.

4. Results

4.1. Descriptive Statistics

We begin by reporting the descriptive statistics of the variables in the analyses. The means and standard deviations are reported in Table 1, and the correlation coefficients for the relationships between the variables are reported in Table 2. As shown by Table 2, we can conclude that higher environmental concern is associated with a higher support for a carbon tax increase. Higher environmental concern is also associated with a stronger left-wing political orientation, and vice versa; the more right-wing leaning respondent, the less environmental concern.

Table 1. Means and standard deviations for main variables.

Variable	N	Mean	SD	Min	Max
Environmental concern	4940	5.04	1.36	1	7
Ideological orientation	5242	4.20	1.63	1	7
Trust in politicians	5244	3.72	1.55	1	7
Trust in governments	5240	4.33	1.57	1	7
Baseline attitude to higher CO_2 taxes	5225	3.63	2.03	1	7
Driving distance per year (km)	4877	19,640	193,510	0	9,499,490

Note: Ideological orientation is coded such that higher values are associated with left-wing political orientation and lower values are associated with right-wing political orientation.

Table 2. Correlation coefficients (Spearman's rho) across main variables.

Variable	1	2	3	4	5	6	7	8	9
1. Baseline attitudes to higher CO_2 taxes	-								
2. Environmental concern	0.42 *	-							
3. Ideological orientation	0.42 *	0.34 *	-						
4. Trust in politicians	0.19 *	0.10 *	0.01	-					
5. Trust in governments	0.32 *	0.18 *	0.16 *	0.61 *	-				
6. Gender	−0.12 *	−0.24 *	−0.13 *	−0.05 *	−0.05 *	-			
7. Age	−0.01	0.03 *	−0.01	0.07 *	0.01	0.01	-		
8. Urban/rural residency	−0.18 *	−0.08 *	−0.02	−0.05 *	−0.10 *	0.03 *	0.12 *	-	
9. Income	0.03	−0.05 *	−0.18 *	0.05 *	0.09 *	0.18 *	−0.17 *	−0.17 *	-
10. Driving distance per year	−0.24 *	−0.16 *	−0.22 *	−0.04 *	−0.07 *	0.19 *	−0.01	0.19 *	0.25 *

Note: Values marked with an asterisk are statistically significant at alpha = 0.05. Ideological orientation is coded such that higher values are associated with left-wing political orientation and lower values are associated with right-wing political orientation. For the Urban/rural residency variable, urban is coded as 1 and rural is coded as 2. For the Gender variable, women are coded as 1 and men are coded as 2.

4.2. Predictors of Carbon Tax Attitudes

As can be seen in Figure 2, the support for higher carbon taxes is fairly modest. A total of 2327 respondents (44.5%) gave an answer below 4 on the 7-point scale and were thus negative to higher carbon taxes. The survey moreover revealed that 26% of the respondents expressed antagonistic attitudes toward the proposal, ranking the baseline proposal as one, thus strongly against.

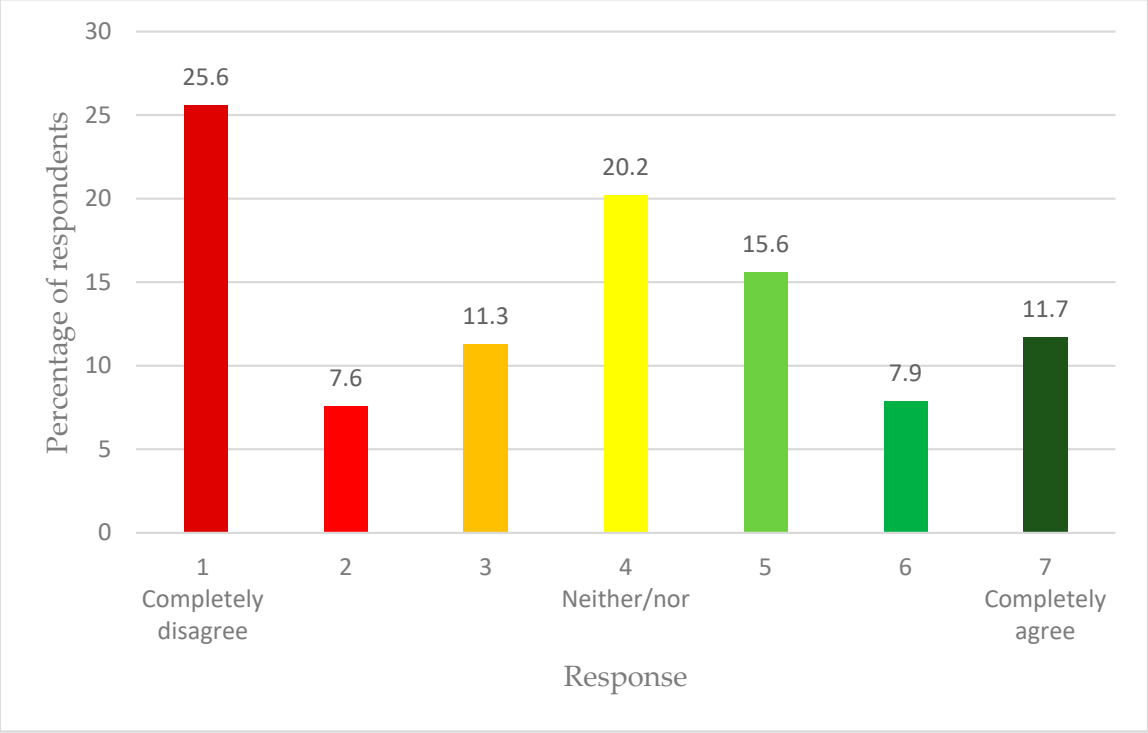

Figure 2. Attitudes toward the statement "To reduce emissions of greenhouse gases, the carbon dioxide taxes for fuels like petrol and diesel should be raised in Sweden". Note: Responses were made on a scale from 1 to 7, wherein lower numbers represented a negative attitude to the statement and higher numbers a positive attitude to the statement. (N = 5225 valid cases).

We developed an ordinal logistic multiple regression model [65] to compare predictors in their ability to account for variance in supportive attitudes to higher carbon taxes (Table 3). The results from the analysis show that environmental concern is the strongest predictor, followed by ideological orientation. Higher environmental concern and a stronger left-

wing orientation (weaker right-wing orientation) were associated with a higher support for the policy. Rural residency also influenced policy acceptance. The effect of car driving, measured by the self-reported annual driving distance, notable in the correlation coefficients reported in Table 2, was not significant in our multiple regression analysis since it lost explanatory power when variance was accounted for by the more powerful predictors. Salary, age, and trust in politicians were also unrelated to tax support. Altogether, the model reported a pseudo R^2 of 0.12.

Table 3. Variables predicting support for higher CO_2 taxes in an ordinal logistic multiple regression analysis.

Predictors	Coefficient	*Z*	*p*
Environmental concern	0.57	21.56	<0.001
Ideological orientation	0.39	19.58	<0.001
Trust in governments	0.30	11.96	<0.001
Urban/rural residency	−0.56	−9.74	<0.001
Trust in politicians	0.04	1.45	0.147
Self-reported driving distance	−0.001	−1.56	0.119
Self-reported salary	0.001	1.21	0.227
Age	−0.001	−0.85	0.398
Gender	0.11	1.86	0.063

Digging deeper into the social mechanisms behind a carbon tax increase rejection, we isolated the group of respondents with strongly antagonistic attitudes to carbon taxes and looked at their characteristics across the predictor variables (Table 4). This group comprised a high number of rural residents (61.6%) and men (62.1%) with right-leaning sympathies (54.8%), while very few left-leaning respondents were strongly antagonistic to higher carbon taxes (17.9%). Antagonistic respondents were less concerned about the environment than the average respondent and expressed a slightly lower trust in governments and politics.

Table 4. Characteristics of respondents with antagonistic attitudes to higher carbon taxes.

Variable	Mean	SD
Environmental concern	4.00	1.68
Ideological orientation	3.26	1.58
Trust in governments	3.47	1.76
Trust in politicians	3.06	1.69
Driving distance per year (km)	32,350 km	33,462

4.3. The Influence of Different Policy Designs on Carbon Tax Acceptance

Concluding that support for high carbon taxes is generally not strong, we tested the respondents' estimates of their increased support for a higher carbon tax rate if it was implemented as a policy offering collective, personal, or procedural justice consequences (Table 5). When looking at the whole sample, it is clear that the policy design addressing collective distributional effects can influence acceptance and has the greatest potential for increasing people's support for a higher tax. Presented with an alternative policy design with collective justice framing, the average respondent states that they would be more supportive of an increase in a carbon tax.

A similar pattern emerges for participants initially negative to higher carbon taxes. Among the three types of policy design, it is only the collective justice framing that has the potential to increase respondents' support for higher carbon taxes. The other policy designs, addressing personal distributional effects or procedural justice, have marginal effects on the support for higher carbon taxes, and none of these policy designs had the capacity to bring the average negative respondent to grade them above 4.

Table 5. Support for higher CO_2 taxes if the implementation of the policy would have collective, procedural, or personal justice consequences.

	Justice Type				
Sample	**Collective Mean (SD)**	**Procedural Mean (SD)**	**Personal Mean (SD)**	**F**	**η^2_p**
All participants	4.81 (1.93)	3.64 (1.71)	4.22 (1.81)	182.67	0.07
Only participants initially positive to higher CO_2 taxes	5.38 (1.53)	4.00 (1.60)	4.33 (1.80)	118.94	0.12
Only participants initially negative to higher CO_2 taxes	4.27 (2.21)	3.11 (1.86)	3.95 (1.98)	69.48	0.06
Only participants initially antagonistic to higher CO_2 taxes	3.89 (2.45)	2.67 (2.04)	3.37 (2.16)	35.27	0.05

Note: Increased policy acceptance estimates were made on a scale from 1 to 7, where 4 represented a "neutral" standpoint. Thus, means above 4 represent a positive evaluation of the policy, and means below 4 represent a negative evaluation of the policy.

It should be acknowledged that the increase in support for a carbon tax with collective redistribution mechanisms is small but still statistically significant. A one-sample *t*-test (with 4 as the comparison value) showed that the negative respondents' estimate of increasing the support for the policy if it had positive collective justice consequences was significantly above 4, $t(789) = 3.46$, $p < 0.001$, 95% CI [0.12–0.43], Cohen's d = 0.12.

Taking a closer look at respondents with strongly antagonistic attitudes to a carbon tax increase (i.e., respondents who assigned 1 at the baseline carbon tax acceptance measure), the results likewise demonstrate that a majority of respondents (52.4%) would be more supportive of an increase in a carbon tax policy addressing collective distributional effects. Every fifth antagonistic respondent expressed strong support for a policy proposal addressing collective distributional effects (see Figure 3, panel A), indicating that the perceived unfairness of a flat increase in the carbon taxation proposal is a strong determinant for resistance. The other two policy proposals had marginal impacts on acceptance attitudes (see Figure 3, panels B and C, respectively). The procedural justice framing was the least popular policy proposal, having a positive effect on about a fifth of the antagonistic respondents.

Panel A: Collective justice framing

Baseline response	Response after "fair" policy treatment				
	Still strongly against (1)	Still against (2-3)	Neutral/ no difference (4)	More supportive (5-7)	Much more supportive (7)
Negative (1-3)	34.1 %	8.1 %	14.3 %	16.0 %	27.5 %
Antagonistic (1)	21.8 %	11.4 %	14.4 %	28.7 %	23.7 %

Panel B: Personal justice framing

Baseline response	Response after "fair" policy treatment				
	Still strongly against (1)	Still against (2-3)	Neutral/ no difference (4)	More supportive (5-7)	Much more supportive (7)
Negative (1-3)	20.7 %	14.2 %	21.4 %	31.8 %	11.9 %
Antagonistic (1)	35.7 %	12.7 %	20.2 %	18.4 %	13.0 %

Figure 3. *Cont.*

Panel C: Procedural justice framing

Baseline response	Response after "fair" policy treatment				
	Still strongly against (1)	Still against (2-3)	Neutral/ no difference (4)	More supportive (5-7)	Much more supportive (7)
Negative (1-3)	51.5 %	10.6 %	19.6 %	9.6 %	8.7 %
Antagonistic (1)	33.2 %	18.7 %	26.0 %	16.2 %	5.8 %

Figure 3. Impact of justice framings on respondents expressing negative and antagonistic attitudes.

4.4. Drivers Behind Different Policy Preferences

Finally, we explored how individual differences in various variables contribute to people's support for climate policies across different designs. We developed a series of ordinal logistic multiple regression models with the same variables as shown in Table 2. Left-wing ideological orientation is associated with a preference for policies addressing collective justice (see Table A1 in Appendix A), while individuals with right-leaning attitudes and with self-reported high income are somewhat more predisposed to express support for policies addressing personal distributional effects, although these correlations are weak (Table A3 in Appendix A). Environmental concern is an important predictor for all policy designs. Individuals expressing high governmental trust were generally more positive to each policy than their mistrusting counterparts, while political trust was unrelated to the dependent variables (see Tables A1–A3 in Appendix A).

When zooming in on the groups expressing negative baseline attitudes to higher carbon taxes and the influence of policies with different justice framings, it becomes evident that ideological orientations and environmental concern are dominant determinants for both policy acceptance in general and preferences for policies with collective justice framing (Figure 4). Respondents with right-leaning political orientation (1–3) and low levels of environmental concern (1–3) are dominant among respondents with negative baseline attitudes, while less than half of them are influenced by policy proposals addressing collective distributional effects.

In a final analysis, we explore factors affecting individuals who express antagonistic attitudes and their support for a carbon policy with different justice framings. Out of the 284 antagonistic respondents who were exposed to collective justice framing treatment, 55.3% (157 respondents) remained strongly against the policy proposal (i.e., antagonistic-antagonistic; see Tables 6 and 7), while 44.7% said they would be more supportive (127 respondents) (i.e., antagonistic-supportive). The aspects determining why certain individuals remain antagonistic to carbon taxes, despite the treatment of collective justice framing, are of primarily right-leaning ideological orientation and a low level of environmental concern, while the variables political and governmental trust and driving distance did not predict stringent negative attitudes. In contrast, rural residents and individuals with left-leaning political views and environmental concern who were antagonistic to the initial proposal of a carbon tax implemented with an equal-pay principle, tend to be more positive about paying higher carbon taxes if collective distributional effects are addressed.

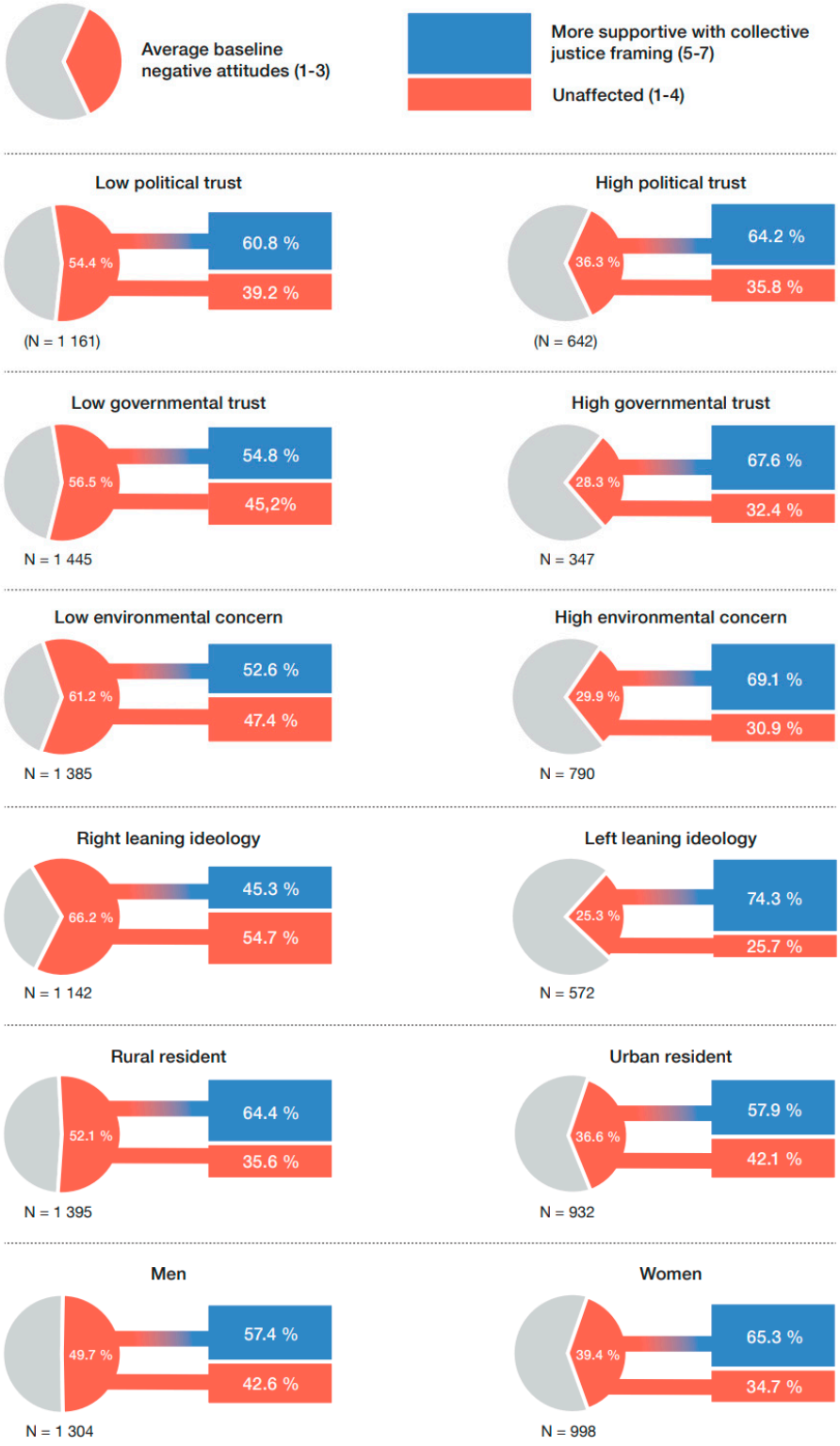

Figure 4. Impact of collective framings on different participant groups.

Table 6. Logistic regression model predicting whether respondents are antagonistic-antagonistic or antagonistic-supportive.

Model	B	*p*
Environmental concern	0.26	0.018
Ideological orientation	0.38	0.002
Trust in politicians	0.14	0.272
Trust in governments	0.15	0.205
Income	0.001	0.674
Driving distance	<0.001	0.262
Urban/rural residency	1.51	<0.001

Table 7. Means and standard deviations for main variables for respondents who were antagonistic to higher CO_2 taxes and were either antagonistic to higher CO_2 taxes with collective justice framing or very supportive of CO_2 taxes with collective justice framing.

	Antagonistic-Antagonistic			Antagonistic-Supportive		
Variable	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**
Environmental concern	146	3.66	1.75	119	4.79	1.47
Ideological orientation	156	2.84	1.40	125	3.86	1.71
Trust in politicians	156	2.89	1.84	127	3.17	1.73
Trust in governments	157	3.14	1.90	126	3.56	1.94
Income	137	56.72	82.23	116	49.45	88.47
Driving distance per year	144	6865	58,226	120	1887	172

5. Discussion

Sweden is one of the first countries to adopt a carbon tax, which in 2023 was set at circa 122 EUR per tonne of carbon dioxide [68]. Knowing that fuel and energy prices rose substantially after the relaxation of the COVID-19 restrictions and the Russian invasion of Ukraine, it can be expected that many Swedes were unenthusiastic about fiscal measures leading to higher fuel prices. While this study reveals low support for a further increase in the carbon tax, a majority of respondents in our survey did not oppose such an increase.

First, this support for a higher carbon tax is primarily driven by environmental concern, and in this respect the results of our study confirm previous findings but in a new context [34,69]. In line with previous findings, our results demonstrate that climate policy support is associated with left-leaning political views [50] and governmental and political trust [21,22,58].

Secondly, the survey reveals that value-based aspects, particularly environmental concern, ideological orientation, and trust in government, are more influential determinants of policy acceptance than factual circumstances such as car ownership, rural residence, and income. We find associations between the self-reported driving distance and sceptical views about a carbon tax increase. However, while other studies have suggested that such self-interests are significant predicaments for climate policy acceptance [36,70], the respondents in this study attributed only marginal importance to car driving, and in our stepwise regression, driving distance had no significant influence on attitudes. Similarly, while rural residents are more likely to oppose carbon taxes than urban dwellers, the place of residence had a relatively modest impact on attitudes compared to value-based factors.

It is also important to acknowledge that a significant minority expresses distinctly antagonistic attitudes toward higher carbon taxation. Policy proposals aiming to increase taxation may thus trigger political disputes, and, in this respect, the attitudes of antagonistic groups might be more relevant for political feasibility than the supportive attitudes of the wider public. In terms of climate policy acceptance research, several scholars have argued that the concept of policy acceptance often fails to capture the nuances between active support and resistance [71,72]. To that end, this study has striven to unpack resistance

attitudes, exploring factors of relevance and how concerns can be alleviated by different policy designs.

Responding to the question regarding what kind of policy design may influence the propensity to accept a carbon tax increase, this study concludes that the support for stricter carbon policies can be enhanced if the revenues of the taxation are redistributed to affected groups, such as low-income earners or rural residents. This conclusion is not entirely novel and coincides with research findings on preferences for progressive carbon taxation [17,27,36]. Nonetheless, it was quite remarkable to discover that over half of the respondents with initially antagonistic views toward this form of stricter climate policy turned favourable when the collective distributional impacts of a carbon tax were addressed. This is particularly striking given the high fuel prices and the policy-critical debate that was ongoing when the survey was conducted. While the study does not confirm that the perception of unfairness is a key determinant for policy acceptance and resistance, it is interesting to note that collective distribution of cost burdens for higher fuel prices influenced the attitudes of not only the affected groups, such as rural residents, but also of those who would not personally benefit from the policy, such as urban residents. This suggests that the norm of collective fairness is deeply seated in Swedish society.

The study fails, moreover, to find evidence for policy designs addressing personal distributional outcomes to have any significant impact on policy resistance and acceptance. This is interesting considering the green tax shifts have been carried out in Sweden previously. Such personal distributional policy proposals had little support across all social segments in the survey and were only marginally more effective than policies with collective justice framings in addressing ideologically motivated policy resistance. Aspects related to procedural justice, in terms of democratic participation and influence, had moreover no influence on policy acceptance. This finding suggests that scholars arguing for participatory approaches in climate policy-making [73] might have overestimated its relevance for policy acceptance, at least when it comes to taxation. It is, however, not unlikely that with a different methodological approach, we could have reached different results regarding the relevance of procedural justice.

6. Conclusions and Considerations for Policymakers

- Policymakers should consider fee and dividends or lump-sum transfers to affected groups.

The aim of this study was to explore the relevance of fairness perceptions for carbon pricing acceptance and to investigate whether different policy designs addressing various perceptions of unfairness can reduce aversion and enhance acceptance for a proposal of a carbon tax increase. Our findings indicate that by redistributing revenues to groups affected by the tax, a solid majority of the respondents in our survey sample became more positive toward an increase in the tax. Policymakers struggling to overcome resistance to carbon taxation should thus seriously consider progressive taxation or measures such as fees and dividends or lump-sum transfers to affected groups. Another important finding was the relevance of environmental concern, which was one of the main drivers for the acceptance of stricter carbon taxes.

- Alternative policy measures should also be considered, as it is difficult to convince individuals who express right-leaning political views and low-level environmental concern.

It should be acknowledged, however, that our analysis reveals that certain segments in society, especially individuals who express right-leaning political views and low-level environmental concern, are more difficult to reach with the policy design applying collective justice framings. Carbon taxation tends to activate moral aspects regarding equity among left-leaning individuals; however, in a society where climate policies are polarised, policies with collective justice framings might fail to gain support with groups at the other side of the political spectrum. Policymakers need accordingly to explore alternative policy measures or accept that the climate transformation will inevitable cause certain political tensions. It might also be relevant to conduct further research on the role of political identities for

climate policy acceptance, and particularly the correlations between ideological orientations and environmental concern.

On the other hand, the results of this study suggest that policies addressing collective distributional outcomes can have alleviating effects on the negative attitudes of individuals who are most likely to be burdened by carbon taxes, such as rural residents, low-income groups, and people who are driving long distances. These groups can indeed be supportive of stricter climate policies, or at least not strongly reject them, if the perceived distributional unfairness of such policies is addressed.

- The findings are subject to limitations, and further research on public acceptance of carbon taxes is needed.

As mentioned in the introduction, the findings of the study are subject to several limitations. We did not examine alternative policy approaches, such as earmarking funds for environmental purposes, nor did we study perceptions regarding policy implementation, including the dissemination of information to ensure widespread understanding of its merits. We did not specify the level of the tax increase, and it is thereby difficult to say if the respondents would be less supportive of a tax increase at a certain high rate. While carbon taxes with lump-sum transfers to affected groups have demonstrated theoretical effectiveness, real-world complexities underscore the multitude of factors influencing policy success, as demonstrated by [26]. Further research is thus needed to understand how carbon taxes can be designed and implemented to garner public support, particularly in the face of an energy crisis.

Another limitation of the study concerns the experimental manipulation of policy design. Three experimental policy designs were compared, in which all participants were initially asked about their policy acceptance and then whether they would be more willing to accept the policy given one of three possible conditions. This procedure allowed for an analysis of the differences between the three conditional policy designs and an analysis of the willingness to change the initial acceptance statement given a specific condition. However, the experimental setup did not include a no-policy (or neutral policy) design control condition. Thus, since such a control condition was not included, it is unclear to what extent the policy design conditions had an effect relative to a more neutral comparison point. The most central conclusion regarding the capacity of collective policy design to convince antagonists is, however, not constrained by this methodological limitation. The individual difference analyses address some of these concerns by highlighting that policy interventions will have different effects depending on the baseline attitudes in the target population. A population with strongly antagonistic individuals seems difficult to convince regardless of policy design. A related limitation concerns the geographically constrained sample (all participants were localised in Sweden), which could limit the generalisability of the results to other cultures and populations.

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Appendix A

Table A1. Ordinal logistic multiple regression analysis with estimates of increased support for higher CO_2 taxes if it had collective justice consequences as a dependent variable.

Predictors	Coefficient	*Z*	*p*
Environmental concern	0.31	7.67	<0.001
Ideological	0.27	8.11	<0.001
Trust in governments	0.12	2.73	0.006
Urban/rural residency	0.48	5.00	<0.001
Trust in politicians	−0.01	−0.14	0.890
Self-reported driving distance	−0.001	−1.53	0.125
Self-reported salary	−0.001	−1.01	0.310
Age	−0.001	−2.15	0.032

Table A2. Ordinal logistic multiple regression analysis with estimates of increased support for higher CO_2 taxes if it had procedural justice consequences as a dependent variable.

Predictors	Coefficient	*Z*	*p*
Environmental concern	0.36	8.80	<0.001
Ideological	0.06	1.71	0.087
Trust in governments	0.10	2.37	0.018
Urban/rural residency	0.27	2.74	0.006
Trust in politicians	0.03	0.62	0.536
Self-reported driving distance	−0.001	−0.55	0.581
Self-reported salary	−0.001	−0.52	0.607
Age	0.005	1.81	0.070

Table A3. Ordinal logistic multiple regression analysis with estimates of increased support for higher CO_2 taxes if it had personal justice consequences as a dependent variable.

Predictors	Coefficient	*Z*	*p*
Environmental concern	0.32	7.95	<0.001
Ideological	−0.10	−3.30	0.001
Trust in governments	0.21	5.05	<0.001
Urban/rural residency	0.05	0.56	0.572
Trust in politicians	−0.03	−0.84	0.400
Self-reported driving distance	0.001	1.60	0.110
Self-reported salary	0.002	2.24	0.025
Age	−0.004	−1.53	0.127

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