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Bridging the ideological gap? How fairness perceptions mediate the effect of revenue recycling on public support for carbon taxes in the United States, Canada and Germany

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Abstract

Carbon taxes are frequently advocated as a means of reducing greenhouse gas (GHG) emissions, yet their political feasibility remains a challenge. To enhance their political appeal, carbon tax proponents have proposed revenue recycling as a means of alleviating public concern with this instrument's visible costs. Analyzing data from identical survey-experiments administered in the United States, Canada, and Germany, we examine the extent to which returning revenues to the public has the potential to broaden the political acceptability of carbon taxes across ideological and national contexts. While public opinion is sensitive to the cost attributes of carbon taxes, we find that in some cases, opposition to carbon taxes can be offset by a reduction in income taxes. However, these effects tend to be modest in size, limited to some ideological groups, and varied across countries. Moreover, we demonstrate that fairness perceptions are a crucial mechanism linking revenue recycling to carbon tax support in all countries examined.

INTRODUCTION

Carbon taxes have long been advocated by environmental economists and climate advocates as one of the most cost-effective ways of reducing greenhouse gas (GHG) emissions and changing public behavior (e.g., Intergovernmental Panel on Climate Change [IPCC], 2014; Sumner et al., 2011). Yet, only about 20% of global emissions are covered by some form of carbon pricing to date, while relatively few carbon taxes, if implemented at all, have been set at a level high enough (i.e., US $40–80 in 2020 and rising to $50–100 per ton of CO_2 by 2030) to meet the goals of the Paris Agreement (Klenert et al., 2018). One reason for this gap is rooted in the saliency of carbon tax costs for citizens, which tends to make them less popular than alternative climate policies (Douenne & Fabre, 2020; Rhodes et al., 2017). In fact, the distributional consequences of carbon pricing schemes more generally has been the subject of controversy in a number of contexts, raising important questions around the role of partisanship, ideology, and perceptions of policy fairness in the formulation of public preferences (Hammar & Jagers, 2007; Maestre-Andrés et al., 2019). For instance, elites and members of the public with market liberal values or those on the political right tend to be especially averse to carbon pricing, reflecting both an ideological aversion to government intervention in the economy as well as the politicized nature of climate policy and politics in different contexts (Campbell & Kay, 2014; Levi, 2021). As a result, politicians have generally been averse to implementing carbon pricing, fearing the electoral consequences of imposing immediate and visible costs on citizens in exchange for avoided climate damages that will primarily accrue at a later date (Lachapelle, 2017; Mildenberger, 2020; Rabe, 2018).

To enhance their political feasibility, carbon tax advocates have proposed a multitude of revenue recycling options as a means of alleviating public concern over the private costs of carbon taxes as well as their distributional effects (Hansen, 2014; Klenert et al., 2018). While politically feasible policy design ultimately depends on political economic context (Klenert et al., 2018), the general assumption is that returning some of the proceeds from carbon taxation back to society can enhance public support by generating immediate and tangible policy benefits for citizens (e.g., through green investments, lump-sum transfers, or tax cuts, to name a few). The current preoccupation with revenue recycling is thus similar to earlier interest in the potential for carbon taxes to produce a "double dividend" in the form of realizing added gains (e.g., a more efficient tax system) that are additional to the environmental benefits of a carbon tax (Goulder, 1995), though the latest focus is more about enhancing political feasibility rather than on economic efficiency more narrowly (cf. Klenert et al., 2018).

Existing research has examined public acceptance of carbon taxes as a function of individual-level factors, such as values, beliefs, and norms, as well as the extent to which policy design characteristics affect levels of public support (Drews & van den Bergh, 2016). Much of this research has found that the politicization of climate change has led to ideological polarization around solutions to this policy problem (Birch, 2019; Campbell & Kay, 2014). As a result, a challenge for most[1] governments is to convince people across the political spectrum to support environmental protection measures, including taxation schemes. For example, our analysis of data from the environmental module of the 2010 International Social Survey Program (ISSP) finds greater

willingness to pay higher taxes to protect the environment among those on the left, relative to those self-identifying as being supportive of the ideological right in no less than 70% of countries included in the 2010 ISSP dataset (i.e., in twenty four of thirty countries for which data are available).[2] Consistent with this general tendency, Jagers et al. (2019) find that relative to those on the left, people on the right in Sweden are more likely to oppose proposals that would increase the existing Swedish CO_2-tax. However, they also find that right-leaning Swedes react more positively than those on the left toward a carbon tax increase on transportation fuels that simultaneously reduces income taxes. This finding is echoed in Dharshing et al. (2017) study of how political orientation moderates framing effects in the area of energy conservation programs in Switzerland. Here too, it was found that, relative to those on the left, right-wing voters were more likely to perceive policy benefits from a policy that delivered "tax rebates." While instructive, these single-country studies run the risk of potentially obfuscating the importance of political context in moderating the relationship between political left-right ideology and climate change attitudes and preferences (Hornsey et al., 2018).

Other studies examine how the public reacts to different policy designs across countries (Beiser-McGrath & Bernauer, 2019; Carattini et al., 2019), though this work considers the effect of policy attributes and revenue use on *overall* levels of public support across entire populations, leaving aside the politicized nature of the issue and the potential for heterogeneous effects across different subgroups. As a result, we know less about how the effects of revenue recycling might be moderated differently by ideology across different national contexts. For instance, while we know that ideologies help explain variation in the acceptability of climate policies at the individual level (Drews & van den Bergh, 2016), the effects of ideology are not necessarily uniform across countries (Fairbrother, 2016; McCright et al., 2016). It is therefore important to consider *both* how carbon tax design characteristics interact with ideology, and how these ideological effects may differ across countries.

In this study, we experimentally manipulate the cost and revenue recycling aspects of carbon taxes in order to examine the extent to which rebating proceeds back to households in the form of tax cuts has the potential to broaden the base of political support—and in particular, among the ideological right—across national contexts. Specifically, we examine the extent to which carbon price stringency affects people's attitudes toward a CO_2 tax, whether or not this price effect can be mitigated via revenue recycling, and the extent to which these effects work through enhanced perceptions of policy fairness. In particular, we are interested in whether the effects of ideological orientation follow a similar pattern across cases with very different political cultures and experience with carbon tax debates, and thus, seek to answer the broader question of whether revenue recycling might provide a way forward in convincing those on the ideological right to support a CO_2-tax across various political contexts.

From a theoretical perspective, understanding why a certain measure generates negative perceptions, and the extent to which a design of a policy measure affects mass policy attitudes, is certainly of interest as it speaks to the mechanisms influencing climate policy support. It is also important because past research has found that experience with carbon pricing tends to be associated with greater overall support (Jagers et al., 2017, 2019; Lachapelle et al., 2012; Mildenberger et al., 2016), suggesting that it is important to analyze dynamics across cases with varying levels of experience with this policy idea. In a more applied perspective, our approach also has relevance in terms of learning how the general aversion to the costs of climate policy can be alleviated across different countries.

THEORIZING POLICY SUPPORT, FAIRNESS, AND IDEOLOGY

A large body of research has examined the role of public opinion in policy (Burnstein, 2003, 2020; Page & Shapiro, 1983; Soroka & Wlezian, 2009). In the area of climate policy, public opinion is often thought to play an important role in constraining the ability of governments to enact and maintain climate policies, especially carbon pricing, given the costs involved (cf. Harrison, 2010; Jagers & Matti, 2010; Shwom et al., 2010). Yet, with some recent exceptions (e.g., Beiser-McGrath & Bernauer, 2019; Carattini et al., 2019) much of this research has concentrated on single country studies while examining individual characteristics that are stable over time. For example, by focusing on personal motivation (cf. Steg et al., 2005; Stern et al., 1995) or individual levels of trust (cf. Braithwaite & Levi, 1998; Dietz et al., 2007; Hammar & Jagers, 2006; Harring, 2014; Jakobsson et al., 2000; Kallbekken et al., 2013; Scholz & Lubell, 1998). Here, we instead attempt to further explore if and how political-ideological orientation interacts with policy attributes (i.e., cost and revenue recycling), as well as how variations in country context conditions these effects.

Although a more general, motivations-driven propensity to favor environmental protection is certainly important, the literature also suggests that perceptions of overall policy consequences is highly decisive for public support. For instance, a number of studies show that personal outcome expectancies matter, either in terms of balancing direct monetary costs and benefits (e.g., Gevrek & Uyduranoglu, 2015; Guagnano et al., 1995; Lubell & Vedlitz, 2006; Lubell et al., 2007; Schuitema et al., 2010), or by considering the negative effects on personal freedom indirectly arising as a consequences of attaching a higher price to a behavior or good (Bamberg & Rölle, 2003; Eriksson et al., 2006; Jagers & Matti, 2010; Rienstra et al., 1999; Steg & Vlek, 1997). As such, we expect that a proposal to introduce carbon pricing, that is, making gasoline and thus certain forms of private transportation more expensive will, overall, be less positively received the more tangible its price effect is

> H1: The higher the private cost imposed by a specific carbon tax proposal, the less support it will receive.

The suggested effect of price on support thus raises the question of whether, and to what extent, negative sentiments toward a tax proposal can be alleviated by combining the policy with revenue recycling. As discussed earlier, the idea is that using the revenues to compensate the public for higher prices on energy reduces the financial sting from a tax, removing one of the main obstacles to carbon price support (cf. Carattini et al., 2018). Thus, we propose that combining a proposal for a CO_2-tax with revenue recycling alleviates some of the opposition from the perceived cost of such a policy, thus positively affecting levels of public support.

> H2: The introduction of a revenue recycling scheme increases support for a CO_2-tax.

In part, both the price and revenue recycling effects are directly related to policy support by affecting the perceived costs (either monetary or behavioral choices) for the individual. Several studies suggest that negative sentiments toward various policy tools are to a significant extent affected by the perceived distributional effects of a policy, for example, whether they are viewed as fair or not (Bamberg & Rölle, 2003; Eriksson et al., 2006; Jakobsson et al., 2000; Johansson-Stenman & Konow, 2010; Joireman et al., 2001; Schade & Schlag, 2003; Schuitema et al., 2011). Furthermore, specific to carbon taxes, several studies conclude that the perceived distributional effects of this policy, and

therefore also the level of support it enjoys, is affected by revenue use (e.g., Bento et al., 2009; Gevrek & Uyduranoglu, 2015; Hammar & Jagers, 2006; Kallbekken & Saelen, 2011). To the extent that higher carbon taxes might be perceived as unfair to those with limited options for alternative modes of transportation and/or to those concerned with private costs, recycling the revenue to compensate the public through a tax-cut is likely to be seen as fair and thus lead to greater support. Thus, we expect that fairness perceptions mediate the price effect, as well as the effect of revenue recycling, on support.

> H3a: The effect of a higher rate on support is mediated by perceptions of fairness; higher tax levels are seen as less fair and thus garner less support.

> H3b: The effect of revenue recycling measures are mediated by perceptions of fairness; revenue recycling measures enhance fairness perceptions and thus increase support.

Although it would seem reasonable to investigate if a revenue recycling scheme reduces negative perceptions of a tax's distributional consequences, it is not certain that these effects uniformly lead to increased policy support, at least not among all individuals. While early studies reject the effects of ideological constraint on policy attitudes (e.g., Converse, 1964), current research on environmental attitudes demonstrate significant left-right cleavages as people self-identifying with the ideological left tend to be more favorable toward environmental protection than those on the ideological right (Dunlap et al., 2001; Krosnick et al., 2000; Tranter, 2011). Further research has demonstrated that this ideological cleavage has grown larger over time (Dunlap & McCright, 2008; McCright et al., 2014).[3] In part, left-right differences in policy attitudes are suggested to be a result of the ideological right's desire to limit governmental interference (Milbrath, 1986), protect free-market capitalism (Campbell & Kay, 2014), and preserve the current economic and political system (Feygina et al., 2010; Häkkinen & Akrami, 2014). This implies that an ideological position to the left may increase overall support for the introduction of pro-environmental policy measures such as a CO_2-tax. While the relationship between political ideology and climate attitudes differs across countries (Hornsey et al., 2018), people on the right tend to be more averse to taxes and government intervention (Sussman & Olivola, 2011). We thus expect that this general dislike of income taxes among those on the ideological right will make them more accepting of a carbon tax proposal that includes a scheme that recycles revenue back to tax payers.

> H4: Opposition to carbon taxes will be attenuated by compensation schemes that reduce income taxes, especially among those on the right.

CASES, METHODS, AND DATA

To test these conjectures and examine the impact of prices and compensation schemes on policy beliefs and attitudes, we administered identical survey experiments in three countries: the United States, Germany, and Canada. These cases were only selected based on the general criteria of diversity (Gerring & Cojocaru, 2016) but also were given their importance for the global problem of climate change (cf. Beiser-McGrath & Bernauer, 2019). Germany and the United States represent two of the most important countries for global climate negotiations while also reflecting two ideologically different federations on different continents, each with its own unique history

of discussing carbon tax proposals but where efforts to implement comprehensive, national-level carbon tax reforms failed (Harrison, 2010; Rabe, 2018). In the United States, the debate over carbon pricing has been heavily politicized, contributing to the ideological and partisan polarization observed on the issue of climate change (Campbell & Kay, 2014; Dunlap et al., 2016). In Germany, at the time our data were collected, carbon pricing had been contested even among the ideological left, which was less supportive of a CO_2 tax because of its potential to encourage nuclear energy as a low-emitting source of electricity (Harrison, 2010). We compared these cases to Canada, which is itself culturally distinct from the United States (Lipset, 1990), and where carbon price proposals had been somewhat more successful (we note that some provinces had at some point implemented a form of carbon tax or price, e.g., Alberta, British Columbia, and Quebec, while the federal government implemented a minimum carbon price backstop as of April 2019 for the whole country). Thus, in Canada, we were concerned with investigating if fairness perceptions affected public opinion about the diffusion of a CO_2-tax across provinces, and whether or not a revenue recycling scheme (similar but not identical to the one eventually adopted by the Canadian federal government) played any role in shaping these attitudes. Meanwhile, in both the United States and Germany, we were concerned with investigating if perceived fairness affects the public's appetite for the introduction of a CO_2-tax where none existed, and if a compensation scheme had any impact on levels of public support. Adding to this, our three-country design also allowed us to differentiate between a North American and European political culture and tradition, where the attitudes toward, and indeed history of, active governmental steering differs.

The data used in our study are drawn from three embedded survey experiments. In the United States, data were collected by YouGov via an online survey conducted over 12 days in the period from March 13 to March 25, 2018, based on the YouGov Panel. The target population of the survey was American citizens aged 18 and older. To ensure a representative cross-section of the American population, quotas on age, gender, region, education, and race were employed. The total number of people invited to the survey was 5645 and the number of completes was 3072, resulting in a participation rate of 54%. The unweighted sample consists of 53% females, the mean age is 49, the share with 4 years of college or with post-graduate studies is 29%, 70% are whites, 10% blacks and 12% Hispanics. In terms of ideology, the sample mean is .53 on the liberal-conservative ideology scale (rescaled to 0–1 for the purposes of comparison).

The Canadian data ($n = 3005$) were collected using a hybrid (Telephone and Web) approach to data collection by Leger, a professional research firm in Canada. First, 1503 interviews were conducted by telephone, using Computer Assisted Telephone Interviewing (CATI) technology. At the same time, 1502 respondents were reached using a self-administered Computer-Assisted Web Interface approach. Respondents from the Web portion of the survey were randomly selected from LegerWeb's Internet panel, which includes more than 400,000 Canadian households, 60% of which were recruited from random digit dialing. Fieldwork for the telephone portion started on May 4th and continued until May 30th 2017. The Web portion of the fieldwork began on May 5th and continued until May 25th, 2017. The target population of the survey was adult Canadian citizens aged 18 and older. A regionally stratified approach was taken for data collection, resulting in at least 500 survey completes in each of six major Canadian regions, including British Columbia, Alberta, the Prairies, Ontario, Quebec, and the Atlantic provinces. The data provide a representative cross-section of the Canadian population as quotas were set on age, gender, and region. The number of people invited to the online survey was 4523 and the number of survey completes from this method was 1502, yielding a participation rate of 33%. For the telephone portion of the Canadian survey, the response rate was 10% (computed in accordance with AAPOR's

RR3 response rate), which is typical for data collection using this mode (Kohut et al., 2012). The unweighted sample from Leger consists of 52% female, the mean age is 49, and the share of the sample that is university educated is 39%. Ideologically, the sample mean is 0.51 on the rescaled left-right ideology measure.

In Germany, the data were collected by YouGov and the survey was carried out via an online survey during 24 days from January 21 to February 13, 2019, based on the YouGov Panel. The target population of the survey was German citizens aged at least 18. In order to provide a representative cross-section of the German population, quotas on age, gender, region, and education were used. The total number of people invited to the survey was 4683 and the number of completes was 3011. Thus, the participation rate was 64%. The unweighted sample from the German survey consists of 51% females and 50% of the responding sample is 18 to 52 years old (unlike the Canadian and American data, the age variable was measured categorically). The share with a university degree is 29% and in terms of ideology the German sample is slightly left leaning with a mean of .46 on the rescaled (0–1) ideology metric.

In each of the three surveys, we replicated the same experimental protocol, which included six different treatment groups constituting a 3x2 factorial design. In Canada, participants were asked for their opinion on the introduction of a carbon tax that would increase the price of gasoline by either a low (CDN 2 cents/litre) or a high (CDN 11 cents/litre) amount. These tax amounts represent the federal government's carbon tax policy discussed at that time (pre-implementation), which consisted of a $10 per ton of $CO_{2\,eq}$ tax to be applied in 2018, rising $10 each year to $50 per ton of $CO_{2\,eq}$ in 2022. For the US experiment, respondents were presented with a proposed introduction of a CO_2-tax at either a low (USD 10 cents/gallon) or a high (USD 40 cents/gallon) level.[4] Finally, the experiment in Germany asked respondents for their opinion about the introduction of a CO_2 tax on gasoline at either a low (Euro 5 cents/litre) or a high (Euro 20 cents/litre) tax level. This constitutes the first dimension of our survey experiment: the level of the tax.[5]

The second dimension manipulated whether the tax introduction was proposed on its own, or together with one of two different revenue recycling mechanisms: a collective scheme that took the form of a general income tax cut for *all* tax payers funded by the revenues from the CO_2-tax, or a revenue recycling scheme tying tax cuts to the amount an individual pays into the tax. Thus, we included a compensation scheme that is commonly featured in carbon tax proposals (i.e., income tax cuts for taxpayers) and another that was purposefully designed to suggest to respondents that they would be fully compensated, thus potentially removing one important barrier to carbon tax support—self-interest. While designed for this theoretical purpose, we note that the steering effect of this latter scheme would in practice be influenced by how frequently the revenues were refunded: the more seldom (e.g., once per year), the more of a steering effect would remain. However, we did not manipulate this latter attribute, and were interested primarily in exploring how a carbon tax imposing net null costs on an individual might affect their level of support. This design thus tests a revenue recycling scheme with relatively high external validity, with another that taps into one of the core mechanisms commonly thought to explain opposition to higher carbon taxes (i.e., material self-interest).

Figure 1 summarizes the experimental treatments. The text in bold, including either a collective (i.e., "... lower income tax for all taxpayers") or an individual (i.e., "... lower your personal income tax...") revenue recycling measure, were omitted for two of the six groups (i.e., the no compensation conditions). The treatments were identical for the three country-experiments save for the slightly different price levels that were deemed most appropriate to the prevailing context in each country.

> In the public debate, the negative effects of vehicle use on the climate and the environment have been discussed. One suggestion is to *introduce a carbon dioxide tax that would raise the price on gasoline by [low] [high]*, in order to reduce the negative effects that vehicle use has on the climate and the environment. **The revenues from this carbon tax will be used to** *[simultaneously lower income tax for all taxpayers] [simultaneously lower your personal income tax with the same amount as you pay in carbon dioxide tax (and similar for others that pay the carbon dioxide tax).]*

FIGURE 1   Experimental treatments

TABLE 1   Respondents per treatment

	Canada		United States		Germany	
	Tax increase	**N**	**Tax increase**	**N**	**Tax increase**	**N**
Low, no comp.	2 cents/liter	501	10 cents/gallon	516	5 cents/liter	504
Low, coll. comp.	2 cents/liter	502	10 cents/gallon	511	5 cents/liter	501
Low, ind. comp.	2cents/liter	504	10 cents/gallon	507	5 cents/liter	506
High, no comp.	11 cents/liter	500	40 cents/gallon	515	20 cents/liter	503
High, coll. comp.	11 cents/liter	499	40 cents/gallon	513	20 cents/liter	504
High, ind. comp.	11 cents/liter	499	40 cents/gallon	510	20 cents/liter	493

When entering the survey, respondents were randomly assigned to one out of the six experimental conditions. The distribution of respondents across the different treatments is shown in Table 1.

Following the treatment, the main dependent variable, policy support, was measured through one item asking the respondents to state their general attitude toward the specific carbon tax proposal, on a 0–10 scale, where the extremes were labelled as "Very negative" and "Very positive" and the midpoint was labeled "Neutral." The question capturing perceptions of fairness read as follows: "Do you think this proposal would be an unfair or a fair measure?" A similar eleven-point response scale from 0 to 10 was used for this question, with extremes labeled as "Very unfair" and "Very fair," and the mid-point labeled as "Neither unfair nor fair." Finally, Canadian and German ideological placement was measured by asking respondents to indicate their ideological position ("It is sometimes said that political opinions can be placed on a left-right scale. Where would you place yourself on such a left-right scale?"). The response scale ranged from 0 (far to the left) to 10 (far to the right), with 5 labeled as neither to the left nor to the right. In the United States, respondents were asked to indicate their own ideological position with the following question: "The political views that people might hold are sometimes arranged on a scale going from extremely liberal to extremely conservative. Where would you place yourself on this scale?"[6] For the analysis, we subsequently rescaled all items on a 0–1 scale for comparison.

The mediation model shown in Figure 2 informs our approach to testing the hypotheses above. We illustrate the first series of theoretical expectations through three sets of relationships *a*, *b*, *c*, and *c′*. The *a* path represents the experimental conditions' effect on the hypothesized psychological mechanism, fairness. In turn, the *b* path represents the mediator's effect on policy
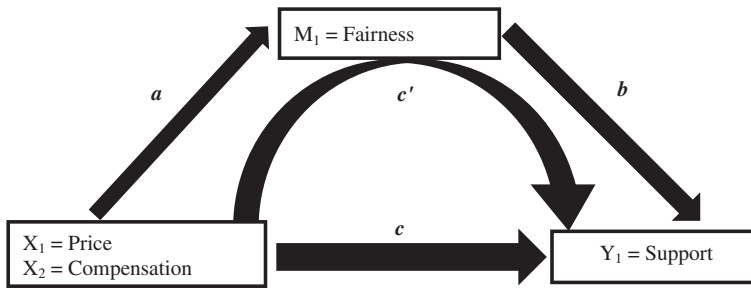
FIGURE 2 Mediation model

support. Finally, the c' path represents the average causal mediation effect (ACME) while the c path estimates the direct effect of the experimental conditions on policy support.

We estimated all models to examine the effects of varying the tax level (low vs. high), as well of as the different compensatory schemes on both overall policy support and perceptions of fairness after pooling the data and separately for the three countries. Thus, we test the direct effects of policy design (H1 and H2) by looking at the effect of the experimental treatments on overall support (path c). To examine whether or not the effects of the experimental treatments are mediated through perceptions of fairness (as hypothesized in H3a and H3b in paths a and b), we use the mediation package developed by Tingley and colleagues (2014). We thus examine results from two general regression models:

$$fair = \alpha_0 + \alpha_1 HighTax + \alpha_2 EqualComp + \alpha_3 IndividualComp + \pi$$

$$policy = \beta_0 + \beta_1 Fair + \beta_2 HighTax + \beta_3 EqualComp + \beta_4 IndividualComp + \varepsilon$$

The idea behind these two regressions is to decompose the total effect (c) to assess the ACME (c'). More specifically, this theory uses the potential outcomes framework. Thus, the model generates two sets of predictions for the mediator (when treated and untreated). The outcome is then predicted under the treated condition, but is also compared with the predicted mediated outcome under the control condition. Finally, the ACME is computed as "... the average difference between the outcome predictions using the two different values of the mediator" (Imai et al., 2011, pp. 773–774).

We test our fourth hypothesis by estimating a series of OLS regression models with robust standard errors separately for each ideological group, for each country, as well as pooling all the country data. Specifically, we regressed cost and compensation treatments on both dependent variables (perceived fairness and policy support), running separate regressions for those self-identifying on the ideological left, center, and right. This modeling strategy allows us to verify our hypothesis that revenue recycling schemes are most likely to increase support among those respondents who self-identify as being on the ideological right. When estimating all models, we used a set of dummy variables indicating treatment assignment. For instance, a "high tax" variable was coded as "1" if respondents received a high tax proposal, and "0" if the proposed tax was set at the lower level. For the revenue recycling schemes, two dummy variables were included, indicating whether or not respondents were exposed to a proposal including a collective compensation measure directed toward all tax payers, or to a proposal suggesting to the respondent that they personally would be fully compensated. Thus, the reference group for the two compensation

TABLE 2 Policy support and perceived fairness in four countries depending on level of tax increase and compensatory measure (mean/standard deviation, *N* in parentheses)

	Canada		United States		Germany	
	Policy support	**Perceived fairness**	**Policy support**	**Perceived fairness**	**Policy support**	**Perceived fairness**
Low, no comp.	.474/.356 (477)	.476/.355 (476)	.335/.333 (516)	.327/.328 (516)	.297/.315 (504)	.299/.314 (504)
Low, coll. comp.	.499/.352 (481)	.508/.334 (487)	.376/.328 (511)	.361/.319 (511)	.318/.294 (501)	.319/.290 (501)
Low, ind. comp.	.543/.352 (470)	.557/.339 (472)	.392/.332 (507)	.380/.318 (507)	.362/.301 (506)	.365/.293 (506)
High, no comp.	.435/.349 (482)	.438/.343 (479)	.291/.317 (515)	.288/.305 (515)	.257/.308 (503)	.255/.296 (503)
High, coll. comp.	.464/.335 (471)	.461/.324 (468)	.297/.304 (513)	.293/.292 (513)	.300/.306 (504)	.290/.298 (504)
High, ind. comp.	.488/.351 (466)	.495/.342 (459)	.338/.320 (510)	.342/.314 (510)	.319/.298 (493)	.309/.283 (493)

dummies was those who read a proposal consisting *only* of a low or high tax, without reference to any sort of compensation measure.

RESULTS

Table 2 presents descriptive statistics with mean value comparisons of the level of policy support and the level of perceived fairness in order to provide an overview of the overall levels in each of the six treatment groups. As suggested by looking at Table 2, there appear to be modest differences in terms of perceived fairness and policy support across countries and experimental conditions.

Next, we test our hypotheses by examining results from a series of regression models. The first set of models are summarized in Table 3.

We find support for H1 and H2 in Table 3. Looking first at the pooled results, support is about 5 percentage points lower (on the 0–1 scale) among those exposed to the high cost treatment, relative to those in the low-cost condition. This is true across all country-specific models and in the pooled model, offering consistent support for our hypothesis that public opinion on carbon taxation is sensitive to costs (H1). Results for H2 are somewhat mixed. In the collective compensation condition, that is, a uniform tax-cut for all, we find a modest but statistically significant increase in support of 3 percentage points (on the 0–1 support scale) in Germany and when data are pooled. Although the coefficients for the collective compensation treatment are similarly positive in the North American countries, however, results are statistically nonsignificant in the United States and Canada. Meanwhile, information provided to respondents indicating that revenues from the carbon tax will be used to lower their own personal income tax (i.e., individual compensation) increased support. This difference in the effect of a collective compensation mechanism over an individual one suggests that self-interest remains an

TABLE 3   Regression results for policy support

	Canada	**USA**	**Germany**	**Pooled**
High tax	−.04***	−.06***	−.03**	−.05***
	(.01)	(.01)	(.01)	(.01)
Collective comp.	.03	.02	.03*	.03***
	(.02)	(.01)	(.01)	(.01)
Individual comp.	.06***	.05***	.06***	.06***
	(.02)	(.01)	(.01)	(.01)
USA	–	–	–	−.15***
				(.01)
Germany	–	–	–	−.18***
				(.01)
CONS	.48***	.34***	.29***	.48***
	(.01)	(.01)	(.01)	(.01)
N	2847	3072	3011	8930
Adj R^2	.01	.01	.01	.06

*$p < .1$; **$p < .05$; ***$p < .01$.

important challenge to carbon price support in North American countries. Indeed, we find a consistently positive and significant effect of individual compensation on support across all countries and when data are pooled, and these effects are consistently of the same size (roughly 5 to 6 percentage points). This positive effect of the individual compensation treatment is as large as the negative effect of being exposed to a "high cost" proposal, suggesting that the negative effect of cost on support may be offset by informing respondents about the tax's limited financial impact on them. It should also be noted that baseline support is higher in Canada, represented by the significantly lower intercepts in the United States and Germany. These differences are also substantively large. This is in line with previous studies that show experience with carbon pricing policies is associated with greater support (Jagers et al., 2019; Lachapelle et al., 2012). We also note that the overall explained variance of tax level and compensation on support is rather low (adjusted R-squared value ranging between .01 and .06) in all models (this increases substantially when fairness perceptions are included in the model, as shown in Table A1 in the Appendix).

To examine whether or not the effects of the experimental treatments are mediated through perceptions of fairness (as hypothesized in H3a and H3b), we now turn to the results of our mediation analysis, summarized in Table 4.

Table 4 presents results from our mediation analysis. The rows provide information associated with each of the treatments' estimated effects on the dependable variable (relative to the control of no compensation). The columns represent each element of the theoretical framework summarized in Figure 2. Hence, the column ACME estimates path c' (average causal mediated effect), ADE path c (average direct effect) and total effect $= c + c'$. Because these estimates are not coefficients, our interpretation is limited to two pieces of information: the level of significance and the sign of the relationship. Looking at Table 4, we find strong evidence to support H3a and H3b. Specifically, all estimates of the ACME and total effect are significant, while estimates of the direct effect are not. Moreover, all variables are significantly signed in the appropriate direction,

TABLE 4 Mediation model analysis

	ACME	ADE	Total effect	Prop. mediated	Rho at which ACME = 0
MODEL POOL N = 8142					
High tax	−.04255***	−.00459	−.04714***	90.3***	.9
Collective comp.	.01983*	.00459	.02442**	80.9**	.9
Individual comp.	.05275***	.00554	.05829***	90.3***	.9
MODEL Canada [1] N = 2335					
High tax	−.0377**	−.0026	−.0403**	93%*	.9
Collective comp.	.022423	−.000704	.021719	95.7%	.9
Individual comp.	.05577***	.00227	.05804**	96.2%**	.9
MODEL US [2] N = 2796					
High tax	−.0474***	−.0168***	−.0642***	73.8%***	.85
Collective comp.	.01065	.00617	.01682	67.7%	.85
Individual comp.	.04914***	.00435	.05349***	92.3%***	.85
MODEL Germany [3] N = 3011					
High tax	−.03862**	.00431	−.03430**	112%**	.85
Collective comp.	.02431*	.00761	.03193**	76.1%*	.85
Individual comp.	.05385***	.01044	.06429***	83.8%***	.85

Note: Simulations (*bootstraps*): 1000

***$p < .001$; **$p < .01$; *$p < .05$.

with cost decreasing support, and the individual compensation treatment offsetting this negative effect. Meanwhile, the collective compensation treatment is only significant in the German case.

Results further indicate that fairness mediates about 90% of the relationship ($p < .001$) between high tax and individual compensation on policy support, while fairness mediates about 80% of the relationship between collective compensation and carbon tax support ($p < .05$). At the country level, however, perceived fairness mediates the effect of the collective compensation treatment only in Germany, while the proportion of the high tax treatment that is mediated through fairness is considerably lower in the United States (73.8%) relative to the other countries. These results are robust when we estimate this mediation via regression models—following Baron and Kenny (1986)—that include both treatments and fairness perceptions (the hypothesized mediator) in the models, in which case the fairness variable "soaks up" the explanatory power of the experimental treatments when it is included (see Model 3 in Table A1 of the Appendix).

Finally, we test the idea that ideological positioning conditions the relationship between compensation and policy support. For this portion of the analysis, we ran a total of 48 regression models for each dependent variable (perceived fairness and policy support). These models were run for each ideological group (left, center, and right) for each country as well as pooling all the country data together. Results for all of these models are reported in Tables A2 and A3 of the Appendix. Here, we focus our interpretation on the estimated effects of cost and compensation schemes, conditional upon ideology and country, which we plot in Figure 3.

Figure 3 plots the estimated coefficients for the cost and compensation treatments in each of the 96 regression models (48 for each dependent variable) we estimated for this portion of the analysis. This required the generation of multiple tables estimating treatment effects from
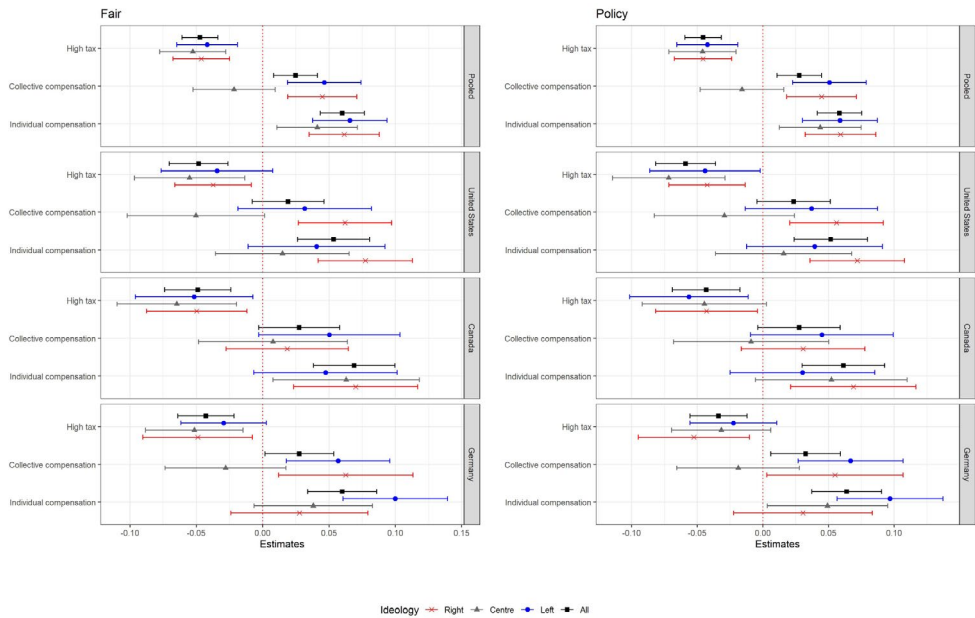
FIGURE 3 Effects of cost and revenue recycling treatments, conditional on ideology

separate regression models for each ideological orientation. After splitting respondents into three groups depending on their self-reported ideological positioning, we ran regressions on the left (0 to 0.4), middle (.5), and right (.6 to 1). The plots show the estimated effect of the cost and revenue recycling treatments on perceived fairness (left panel) and policy support (right panel), across ideological categories, as well as for all ideological groups combined (i.e., "All"). As shown in Figure 3, the high tax condition is systematically associated with lower fairness perceptions as well as lower policy support in all countries and across all ideologies, with very few exceptions (e.g., among Left respondents in Germany and the United States). On average, carbon tax proposals with a higher specified cost are associated with a decrease in support of about 5 percentage points.

We find some support for our fourth hypothesis concerning the potential for revenue recycling schemes to mitigate opposition to carbon taxes by reducing taxes on income, especially among those respondents self-identifying as on the right. For instance, the collective compensation treatment increases the perceived fairness (6 percentage points) and overall policy support (6 percentage points) among conservatives in the United States. A similar effect is found for the individual compensation treatment among respondents self-identifying as conservative, with an estimated positive effect of about 8 (perceived fairness) and 6 (policy support) percentage points. The effect of both treatments are non-significant for all other ideological groups, except for the negative effect of collective compensation among those at the ideological center.

In Canada, the effect of compensation measures on right-leaning respondents is limited. A collective compensation scheme (i.e., a simultaneous tax cut for all tax payers financed via the carbon tax) increases perceptions of policy fairness among the left, but not among those at the political center or on the right. In terms of policy support, the effect of the collective compensation scheme is non-significant for each ideological group in Canada. Conversely, the individual compensation scheme increases fairness perceptions across all ideological groups, with the

TABLE 5 Summary of findings

	H1	H2	H3A/B	H4
	Price effect (Table 3)	**Compensation effect (Table 3)**	**Mediation (Table 4 and Appendix A1)**	**Effects conditioned by right ideology (Figure 3 and Appendix A2)**
Pooled	Supported	Supported	Supported	Supported
United States	Supported	Partially supported (Individual comp. only)	Partially supported (Individual comp. only)	Supported
Canada	Supported	Partially supported (Individual comp. only)	Partially supported (Individual comp. only)	Partially supported (Individual comp. only)
Germany	Supported	Supported	Supported	Partially supported (Collective comp. only)

largest effects among those self-identifying as being on the right (7 percentage points) and center (6 percentage points). This latter compensation scheme also increases policy support among the right (7 percentage points) and center (5 percentage points). The better performance of the individual compensation scheme relative to the individual one suggests that self-interest continues to be an important challenge to support for a carbon tax in Canada.

The effects are substantively larger in Germany, where the impact of revenue recycling via tax cuts is found among respondents on both the left and right. For instance, using carbon tax revenue to finance uniform tax cuts for all taxpayers in Germany increases the perceived fairness of the policy by about 6 percentage points among respondents on both the left and on the right. The individual compensation treatment in Germany is only effective at increasing fairness perceptions among the left (10 percentage points). In terms of policy support, the collective compensation scheme increases overall support for carbon taxation by about 6 and 7 percentage points among those self-identifying on the right and left, respectively. Meanwhile, the individual compensation scheme increases perceived fairness and policy support among the left in Germany by about 10 percentage points, however, no similar effect is found for respondents self-identifying on the right.

Overall, we find that individuals of all political stripes tend to not like higher carbon taxes, that the collective compensation scheme can have a modest effect on mitigating carbon tax opposition, and that these effects are conditioned by ideology. Moreover, our results suggest that—with the exception of Canada, where collective compensation does not seem to move the needle—universal tax cuts seem to be as effective at building support for carbon taxes as the hypothetical treatment we devised that minimizes the net costs for individuals, though again, these effects are modest. The cross-country differences we find suggest that the effects of ideology as a moderator of policy design is itself conditioned by national context. For instance, while we find the largest effects of compensation measures among left-leaning respondents in Germany, conservatives in the United States are more sensitive than liberals and moderates to such revenue recycling options in the United States.

DISCUSSION

Based on the four hypotheses derived in the theory section, we analyzed public reactions to carbon tax design characteristics through a three-case comparative study spanning different political contexts. We summarize our findings in Table 5.

A few key results are worth noting. First, we find a systematic decrease in support among the public in all three countries when faced with a higher carbon tax. This result echoes previous work showing an increase in opposition at higher carbon tax prices (Beiser-McGrath & Bernauer, 2019; Jagers et al., 2019). Second, we find that in some (e.g., conservatives in the United States) but not all (e.g., right-leaning individuals in Canada) cases, this negative price effect can be offset by collective compensation measures. This result is also consistent with previous work that finds positive shifts in support for carbon taxes among conservatives and Republicans when revenues are rebated back through the tax system in the United States (Nowlin et al., 2020). However, these ideological effects are far from uniform, and the contextual characteristics of cases is something which deserves more careful attention in future research. Moreover, to the extent that we find smaller (or null) effects of the collective compensation treatment relative to the individual one, our results suggest that in some cases and for certain ideological groups, self-interest pocketbook considerations remain a key challenge for carbon taxes. Finally, we found considerable evidence

suggesting that, when revenue recycling schemes do generate increased support, this effect is mediated through improving perceptions that the policy proposal is fair. This too is consistent with prior research (e.g., Jagers et al., 2019), but here, we show this mediation is consistently found across countries. To the extent that fairness perceptions are thought to play an important role in motivating support and opposition to carbon taxes (Maestre-Andrés et al., 2019), this finding is particularly important, as it points to the need for more research into this mechanism, and how different fairness principles may be used as a lever to help broaden support for carbon taxation across various subgroups on the left and right. It also suggests that appeals to a particular carbon tax proposal's attention to fairness might play an important role in the policy narratives developed by supporters of carbon pricing (Jones, 2014; Marshall et al., 2018).

CONCLUSIONS

The aim of this study was to disentangle the interplay between policy design, perceptions of fairness, and public support for a specific climate policy measure widely regarded as one of the most cost-effective means of limiting GHG emissions and changing public behavior: a carbon dioxide tax. More specifically, we focus on the mechanisms that link policy stringency (i.e., tax level) and policy design (i.e., revenue use) to carbon tax attitudes in the United States, Canada, and Germany. We contribute to the growing literature on carbon tax acceptability by highlighting the role of perceived fairness, which mediates the effect of policy stringency and design on levels of public support across countries. We show that the introduction of revenue recycling scheme addressing the distributive effects of a CO_2-tax is a potentially viable method of increasing fairness perceptions thereby building support for carbon taxes, and that this is particularly (though not always exclusively) true for conservatives in some contexts (e.g., the United States). Finally, our comparative study allows us to comment on how the relationships between the level of the tax (increase), perceptions of fairness, and compensatory schemes play out across different subgroups within different country contexts.

Our results show that the level of the tax does indeed play a role in shaping attitudes. As expected, lower proposed tax levels consistently have an easier time achieving support. This has implications for policy, as it suggests that higher prices generate distributional concerns. When it comes to the compensatory measures, the story is more complex. We find modest, positive effects of compensation, and that these effects vary in size by ideological group and across countries. Considering the large differences between our three political contexts, the results are surprisingly consistent, while also pointing to case-specific idiosyncrasies that likely reflect differences in political culture and partisan communication, which have important implications for the design of these compensatory schemes. Indeed, our study highlights the necessity of conducting careful analyses of policy attitudes in varying political and cultural contexts, rather than relying on the assumption that all findings travel well across borders.

We also show that citizens who self-identify as belonging to the political right/conservative end of the spectrum tend to react more favorably to compensatory measures in the form of an income tax cut. Consistent with other research examining the effects of tax rebates on different subgroups in such contexts as the United States (cf. Nowlin et al., 2020), however, these effects are modest and unlikely to fundamentally alter patterns of support for carbon taxes on their own. While revenue recycling is no panacea, and unlikely to fundamentally reshape the domestic politics of carbon taxes, we take our results as suggestive and substantively meaningful. Indeed, finding ways to limit climate policy reversals resulting from the election of new governments is

especially important as countries deal with implementing lasting and durable climate policies that respect the Paris Accord. Bridging the attitudinal gap between the two ends of the ideological spectrum is thus a key challenge for carbon tax design. Introducing compensatory measures is a small step in that direction.

Our study is however limited in a number of important respects. First, we tested only two compensation schemes among many possibilities, of which one is considered in current policy debates (e.g., uniform tax cuts). While our second treatment (i.e., net null cost for individual taxpayers) lacks a similar level of external validity, our intent was to probe the limits of material self-interest as a constraint on carbon taxes. However, it is important to note that respondents might react to this treatment in other ways. For instance, more sophisticated respondents might view the individual compensation scheme as a subsidy for high energy users, or believe that full compensation defeats the purpose of a carbon tax, while others who are mistrustful of carbon taxes might view the rebates as "shell games" or "vote buying" schemes. Moreover, we designed this study several years before current proposals of lump-sum transfers and equal per capita dividends that are just now being discussed in several jurisdictions (Klenert et al., 2018). While our results suggest that net-costs for the individual remain a crucial barrier, much more remains to be done both in terms of examining how different groups understand these mechanisms, as well as how different (e.g., progressive) compensation schemes are best designed to appeal to particular segments in different contexts—in order to fully understand how these interactions and conditionalities actually work. For instance, future research might test the public's reaction to alternative compensation schemes, including targeted benefits for the least well off to see what might be more attractive to those on the left in a cross-national context (cf. Dolšak et al., 2020).

A second limit to our study relates to the experimental setting, which itself might have implications for our results. For instance, individuals in our survey experiment were simultaneously exposed to information on costs and benefits, which differs from a real life setting where costs are experienced in relatively short intervals while rebates occur much less frequently. Consistent with general concerns around the external validity of survey experiments (Barabas & Jerit, 2010), some studies find that actual support for revenue-neutral carbon tax proposals (as measured using referendum outcomes) is considerably lower than what opinion polls suggest (Anderson et al., 2018). Future studies might pay greater attention to designs that are better able to capture real-world settings and tease out how different compensation strategies and delivery mechanisms affect attitudes and behavior.

Third, our examination of cross-country differences remains exploratory. It is by now well known that overall policy attitudes may vary substantially with a range of contextual factors such as history, culture, and system as well as quality of government and policy-making (e.g., Cherry et al., 2014; Harring, 2016; Kenny, 2018; Ščasný et al., 2017). For policy-makers attempting to introduce novel policy measures, accounting for contextual differences in their design should be key. Our three cases differ in terms of how ideological positioning conditions the effect of compensation measures on fairness perceptions and policy support, but also in terms of timing. For instance, the German data were collected later than in the other two countries, and so the possibility remains that cross-national differences are due to differences in survey timing. These differences are rather small in our study, but they highlight the importance of considering how specific contexts might condition the relationship between revenue recycling and ideology. Moreover, it is reasonable to expect that the overall attitudinal implications of one's ideological positioning differs considerably between, for example, left and right in continental Europe, and between liberals and conservatives in the United States. Although we might expect left-leaning individuals to be more supportive of governmental intervention, this is not necessarily the case

in all contexts (e.g., Fairbrother, 2016; Harring & Sohlberg, 2017; McCright et al., 2016) and does not account for the possibility that tax rebates may be received differently by the left and the right when moving across contexts. These contextual differences should be the subject of further cross-national research, particularly as the drive toward introducing carbon pricing intensifies in contexts beyond the global north, where both political-cultural and ideological contexts are clearly dissimilar from those in the majority of studies conducted so far.

Despite these limits, the fact that our results point to perceived fairness as a powerful mediator of the effects of the different policy design choices, across three distinct political contexts, strongly suggests that the perceived fairness is a key feature of carbon tax support. If carbon taxes are to gain acceptance among the public as a means of implementing national GHG reduction commitments, policy-makers would do well to consider how design characteristics influence fairness perceptions across ideological groups, and include such considerations in broad narratives justifying these policies in ways that enhance acceptability and durability over time.

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ENDNOTES

1 Most, though not all. Some recent research suggests that such a left-right cleavage only appears to be valid for some countries and some contexts, and even runs in the opposite direction for others (Fairbrother, 2016; Harring & Sohlberg, 2017; McCright et al., 2016).

2 The exact question wording was "how willing would you be to pay much higher taxes in order to protect the environment?" Response options ranged from "very willing" to "very unwilling." Ideology was operationalized using the "Political party affiliation: left/right placement" that allowed respondents to identify on the left-right ideological spectrum. Israel and Taiwan are excluded due to lack of comparable ideological data in the 2010 ISSP data set.

3 However, some recent research suggests that such a left-right cleavage only appears to be valid for some countries and some contexts, and even runs in the opposite direction for others (Fairbrother, 2016; Harring & Sohlberg, 2017; McCright et al., 2016).

4 For comparison, thefederal carbon price initially set by the Liberal government of Canada at CDN $10 per ton roughly corresponds to approximately USD 7 cents/gallon, while the CDN $50/ton tax expected in 2022 roughly corresponds to USD 33 cents/gallon.

5 Harmonizing these tax levels into Euro cents/liter (exchange rates as per March 2018), we get for the US 3.4 (low) and 13.6 (high), and for Canada 1.6 (low) and 6.9 (high). Comparing with existing gasoline prices as of October 2019 in the three countries the proposals imply a price increase in Germany of 3.57 or 14.29%, in the United States of 4.80 or 19.20%, and in Canada of 1.37 or 7.34%. For contextual reasons, we used an actual proposal for the Canadian case, whereas in the United States and Germany we wanted to use rounded numbers that seemed to make sense to people. Furthermore, we considered it more important to keep the percent increase in existing gasoline prices relatively similar between cases (United States and Germany) rather than keeping the actual monetary increase similar.

6 Labeling for the US ideological scale was: 1 = Extremely liberal, 2 = Liberal, 3 = Slightly liberal, 4 = Moderate, middle of the road, 5 = Slightly conservative, 6 = Conservative, 7 = Extremely conservative. 8 = Have not thought much about it. Respondents that selected response option number 8 were removed from the analyses concerning ideology (about 9%).

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APPENDIX

TABLE A1   Full models showing mediation—Hypotheses H1 to H3

	Model 1 (Support)				Model 2 (Fairness)				Model 3 (Support)			
	Canada	USA	Germany	Pooled	Canada	USA	Germany	Pooled	Canada	USA	Germany	Pooled
High tax	−.04***	−.06***	−.03**	−.05***	−.05***	−.05***	−.04***	−.05***	.00	−.02**	.00	.00
	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.00)
Collective comp	.03	.02	.03*	.03***	.03	.02	.03*	.02**	.01	.01	.01	.01
	(.02)	(.01)	(.01)	(.01)	(.02)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.00)
Ind comp	.06***	.05***	.06***	.06***	.07***	.05***	.06***	.06***	.00	.00	.01	.01
	(.02)	(.01)	(.01)	(.01)	(.02)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.00)
Canada (Ref.)	–	–	–	–	–	–	–	–	–	–	–	–
USA	–	–	–	−.15***	–	–	–	−.16***	–	–	–	−.01
				(.01)				(.01)				(.00)
Germany	–	–	–	−.18***	–	–	–	−.18***	–	–	–	−.01**
				(.01)				(.01)				(.00)
Fair	–	–	–	–	–	–	–	–	.91***	.90***	.90***	.90***
									(.01)	(.01)	(.01)	(.01)
CONS	.48***	.34***	.29***	.48***	.48***	.33***	.30***	.48***	.04***	.04***	.03***	.04***
	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.00)
N	2847	3072	3011	8930	2841	3072	3011	8924	2807	3072	3011	8890
Adj R²	.01	.01	.01	.06	.01	.01	.01	.07	.78	.76	.76	.78

*p < .1; **p < .05; ***p < .01.

TABLE A2   Models used to estimate heterogenous treatment effects on fairness perceptions (Figure 3 left panel)—Hypothesis H4

	United States				Canada				Germany				Pooled			
	Left	Centre	Right	All	Left	Centre	Right	All	Left	Centre	Right	All	Left	Centre	Right	All
High tax	−.034	−.055***	−.037**	−.048***	−.052**	−.065***	−.050**	−.049***	−.029*	−.052***	−.049**	−.043***	−.042***	−.053***	−.046***	−.047***
	(.021)	(.021)	(.015)	(.011)	(.023)	(.023)	(.019)	(.013)	(.016)	(.019)	(.021)	(.011)	(.012)	(.013)	(.011)	(.007)
Collective	.032	−.050*	.062***	.019	.050*	.008	.018	.027*	.057***	−.028	.063**	.028**	.046***	−.022	.045***	.025***
	(.026)	(.026)	(.018)	(.014)	(.027)	(.029)	(.023)	(.016)	(.020)	(.023)	(.026)	(.013)	(.014)	(.016)	(.013)	(.008)
Individual	.041	.015	.077***	.053***	.047*	.063**	.070***	.069***	.100***	.038*	.028	.060***	.066***	.041**	.061***	.060***
	(.026)	(.026)	(.018)	(.014)	(.028)	(.028)	(.024)	(.016)	(.020)	(.023)	(.026)	(.013)	(.014)	(.015)	(.013)	(.008)
Cons	.338***	.523***	.200***	.332***	.452***	.638***	.428***	.482***	.251***	.374***	.262***	.298***	.340***	.489***	.300***	.369***
	(.021)	(.021)	(.015)	(.011)	(.022)	(.024)	(.019)	(.013)	(.016)	(.019)	(.022)	(.011)	(.011)	(.013)	(.011)	(.007)
N	772	891	1409	3072	860	708	1279	2847	1154	1091	766	3011	2779	2692	3453	8924
Adj R²	.003	.012	.017	.010	.008	.016	.010	.011	.022	.012	.011	.011	.013	.013	.012	.011

Note: Standard errors in parentheses.

*p < .05; **p < .01; ***p < .001.

TABLE A3 Models used to estimate heterogenous treatment effects on policy support (Figure 3 right panel)—Hypothesis H4

	United States				Canada				Germany				Pooled			
	Left	Centre	Right	All	Left	Centre	Right	All	Left	Centre	Right	All	Left	Centre	Right	All
High tax	−.044**	−.072***	−.043***	−.059***	−.056**	−.045*	−.043**	−.043**	−.023	−.032*	−.053**	−.034***	−.042***	−.046***	−.046***	−.046***
	(.021)	(.015)	(.022)	(.012)	(.023)	(.024)	(.020)	(.013)	(.017)	(.019)	(.022)	(.011)	(.012)	(.013)	(.011)	(.007)
Collective	.037	−.029	.056***	.023	.045	−.009	.031	.027*	.067***	−.019	.055**	.032**	.051***	−.016	.045***	.028**
	(.026)	(.027)	(.018)	(.014)	(.028)	(.030)	(.024)	(.016)	(.020)	(.024)	(.026)	(.014)	(.014)	(.016)	(.014)	(.009)
Individual	.039	.016	.072***	.052***	.030	.052*	.069***	.061***	.097***	.049**	.030	.064***	.059***	.044***	.059***	.058***
	(.026)	(.026)	(.018)	(.014)	(.028)	(.029)	(.024)	(.016)	(.021)	(.023)	(.027)	(.014)	(.015)	(.016)	(.014)	(.009)
Cons	.344***	.554***	.200***	.343***	.454***	.633***	.416***	.476***	.246***	.364***	.265***	.294***	.340***	.494***	.296***	.369***
	(.021)	(.015)	(.022)	(.012)	(.022)	(.025)	(.020)	(.013)	(.017)	(.019)	(.022)	(.011)	(.012)	(.013)	(.011)	(.007)
N	772	1409	891	3072	860	708	1279	2847	1154	1091	766	3011	2786	2690	3454	8930
Adj R^2	.005	.015	.012	.012	.007	.008	.008	.008	.019	.008	.009	.009	.012	.010	.011	.010

Note: Standard errors in parentheses.

*$p < .05$; **$p < .01$; ***$p < .001$.