



## The impact of compensatory measures on public support for carbon taxation: an experimental study in Sweden

Sverker C. Jagers, Johan Martinsson & Simon Matti

To cite this article: Sverker C. Jagers, Johan Martinsson & Simon Matti (2019) The impact of compensatory measures on public support for carbon taxation: an experimental study in Sweden, *Climate Policy*, 19:2, 147-160, DOI: [10.1080/14693062.2018.1470963](https://doi.org/10.1080/14693062.2018.1470963)

To link to this article: <https://doi.org/10.1080/14693062.2018.1470963>



© 2018 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 09 May 2018.



[Submit your article to this journal](#)



Article views: 2594



[View related articles](#)



[View Crossmark data](#)



Citing articles: 14 [View citing articles](#)

# The impact of compensatory measures on public support for carbon taxation: an experimental study in Sweden

Sverker C. Jagers<sup>b,c</sup>, Johan Martinsson<sup>b</sup> and Simon Matti <sup>a,c</sup>

<sup>a</sup>Political Science Unit, Luleå University of Technology, Luleå, Sweden; <sup>b</sup>Department of Political Science, University of Gothenburg, Gothenburg, Sweden; <sup>c</sup>Centre for Collective Action Research (CeCAR), University of Gothenburg, Gothenburg, Sweden

## ABSTRACT

This study aims at better understanding how, and to what extent, perceptions of a policy instrument's distributional effects impact on policy support, focusing on the case of CO<sub>2</sub> taxes on petrol in Sweden. Through a large-scale ( $N=5000$ ) randomized survey experiment with a  $2 \times 3$  factorial design, the extent to which perceptions of fairness determine attitudes to a suggested increase of the Swedish CO<sub>2</sub> tax is explored. Furthermore, the study considers whether these effects change with the level of the suggested tax increase, as well as whether negative sentiments can be alleviated by combining it with a compensatory measure in the shape of a simultaneous income tax cut financed by the revenues from the tax increase. The results show that a higher tax increase is both viewed as more unfair and enjoys weaker support. Furthermore, compensatory measures can be a powerful policy design tool to increase perceptions of the policy as fair, but the effect of compensation on policy support is conditioned by the individual's left-right ideological position. Whereas people self-identifying to the right react favourably to compensatory measures, people self-identifying to the left become less supportive of a tax increase when combined with a simultaneous cut in income taxes.

## Key policy insights

- Perceptions of fairness are highly important for explaining public support for climate policy tools, specifically CO<sub>2</sub> taxes.
- Compensatory measures can be a powerful policy design tool to increase perceptions of the policy as less unfair.
- However, the effect of compensatory measures on policy support is conditioned by ideological position, and only successful among people to the ideological right.
- In contexts dominated by right-wing ideals, a combination of a tax and a compensatory scheme may be a successful route forward towards increased climate policy support.
- In left-oriented contexts the results imply that a CO<sub>2</sub> tax without compensation seems more likely to increase support.

## ARTICLE HISTORY

Received 14 September 2017  
Accepted 25 April 2018

## KEYWORDS

Attitudes; climate policy; CO<sub>2</sub>-tax; compensation; environment; experiment; fairness; policy specific beliefs; policy support

## Introduction

At the Paris Climate Conference (Conference of the Parties (COP) 21) in December 2015, the international community adopted a landmark global climate deal. This multilateral agreement sets out a global action plan to put the world on track to avoid harmful climate change and requires each party to prepare a Nationally Determined Contribution (NDC) to the global mitigation goal. For countries to succeed in meeting their individual

**CONTACT** Simon Matti  [simon.matti@ltu.se](mailto:simon.matti@ltu.se)  Political Science Unit, Luleå University of Technology, Luleå 97187, Sweden

© 2018 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

emission reducing targets under their NDCs, the possibilities of relying upon voluntary action and low-hanging fruits in terms of policy changes will steadily decrease as the NDCs are intended to become more rigorous over time. Rather, achieving greater GHG emission-cuts presupposes behavioural changes among a range of societal actors, and subsequently also that governments adopt increasingly more stringent domestic policies governing such changes. However, as established theories on the public opinion–public policy relationship suggest, a supportive public is crucial for the political viability of introducing rigorous policy measures. On high-salience issues, in particular, there is ample evidence that public opinion both constrains (Burstein, 2003; Wallner, 2008) and directs the actions of decision makers (Erikson, MacKuen, & Stimson, 2002; Soroka & Wlezien, 2010).

Public opinion seems to matter also on the specific issue of climate change mitigation, with several studies arguing that the introduction of effective policies to curb climate change is constrained by a lack in public support. For example, Jagers, Löfgren, and Stripple (2010) argue that low public acceptance was a major obstacle ultimately hindering the introduction of personal carbon allowances in Britain. Harrison (2010, 2012) demonstrates how the ups and downs in Canadian climate opinion has affected federal policy choice. Crowley (2017) suggests that the Australian repeal of its carbon tax in 2014 was at least partly due to public opposition, and several studies show how governmental attempts to implement sustainability transitions are slowed down due to a lack in public support (cf. Drews & van den Bergh, 2016). In an American context, both Feldman and Hart (2017), as well as Shwom, Bidwell, Dan, and Dietz (2010), contend that public support is key for motivating politicians to take climate action. Finally, Rabe and Borick (2012; see also Löfgren & Nordblom, 2009) point to the importance of reframing carbon pricing measures as neither a ‘tax’, nor on ‘carbon’, in response to unfavourable mass opinion.

In the endeavour of exploring the political feasibility of climate policy measures, a crucial issue is therefore the factors that generate public support for, or resistance against, climate policy measures. Even more relevant is the question of whether, and if so by which measures, policy resistance can be alleviated. In the current literature, a large number of factors are proposed to shape policy attitudes, spanning both individual motivation (Schleich, Schwirplies, & Ziegler, 2018; Steg, Dreijerink, & Abrahamse, 2005); political ideology (Feldman & Hart, 2017); institutional, political and interpersonal trust (cf. Dietz, Dan, & Shwom, 2007; Hammar & Jagers, 2006; Harring, 2014; Kallbekken, Garcia, & Korneliusen, 2013); and contextual variables such as degree of political polarization (Linde, 2018), economic conditions and dependencies (Jagers & Matti, *in press*; Kenny, 2018; Ščasný et al., 2017), political culture (Cherry, García, Kallbekken, & Torvanger, 2014) and quality of government (Harring, 2015).

The common features among these factors are their relative stability over time and defiance towards external pressure to change, making the outlook for raising policy support from low levels rather gloom. However, internal motivation and context is not all that matters. Another strand of literature suggest that policy attitudes are tied also to the characteristics of the proposed measure itself, and to perceptions of its consequences (cf. Drews & van den Bergh, 2016; Ščasný et al., 2017; Steg et al., 2005). Thus, policy attitudes might change as the design of the policy measure alters, for example when substituting a push-instrument for a pull-instrument, when lowering the level of a proposed tax, or when introducing compensatory measures to counteract distributive effects of a tax (Eriksson, Garvill, & Nordlund, 2006; Jagers & Matti, 2010; Poortinga, Steg, & Vlek, 2004; Steg & Vlek, 1997).

This article aims at contributing to the ongoing debate on the political feasibility of climate policy measures by examining four mechanisms behind attitudes towards a CO<sub>2</sub> tax, a measure widely regarded as one of the most cost-effective means of limiting emissions and changing public behaviour (e.g. IPCC, 2014; Sumner, Bird, & Dobos, 2011). More specifically, we consider if and how the inclusion of a compensatory measure (a tax rebate) would counteract negative attitudes towards a proposed CO<sub>2</sub> tax increase, and whether this effect is mediated through the perceived fairness of the proposed tax increase. We also consider whether these effects would vary depending on the level of the suggested tax increase, and if the effects of compensation are conditioned by the respondent’s ideological positioning. From a theoretical perspective, further understanding of the extent to which the design of a policy measure affects policy attitudes is certainly of interest. From a more applied policy perspective, it is equally relevant to investigate if, and how, negative perceptions can be alleviated, or even avoided, through compensatory schemes.

## Policy support and perceived fairness

A number of studies explore the mechanisms behind environmental sentiments and how they subsequently translate into policy attitudes on the individual level, equating policy support with other forms of low-cost pro-environmental behaviours (Stern, 2000). Here, explanations related to individual motivation dominates, focusing both on rational calculations of costs and benefits (e.g. Lubell, Zahran, & Vedlitz, 2007; Schuitema, Steg, & Forward, 2010) and values-based models of motivation (e.g. Berglund & Matti, 2006; Steg & Vlek, 2009). At the same time, several studies describe how people, although subscribing to strong environmental values, fail to take pro-environmental action in their day-to-day lives (Jagers, 2009; Martinsson & Lundqvist, 2010). Moreover, empirical studies also demonstrate a considerable variation in explanatory strength across specific features of a policy measure, both in terms of policy design and type of behaviour being targeted. For example, pull-instruments, aiming at increasing the attractiveness of pro-environmental behaviour, generally obtain more support than push-instruments that decrease the attractiveness of environmentally harmful activities. Likewise, suggestions for making new, more sustainable, alternatives available to the public tend to be received more positively than policies aimed at minimizing established high-carbon practices (Eriksson et al., 2006; Jagers & Matti, 2010; Poortinga et al., 2004; Steg et al., 2005; Steg & Vlek, 1997). These apparent variations suggest that, rather than merely an effect of values-based motivational factors, drivers behind public support for policy measures might be found in (a) the individual's perception of the individual and collective consequences of the proposed policy measure, and therefore also in (b) the design of the policy measure itself.

### Explanatory factors related to the policy measure

Evidence of the interplay between perceptions of possible policy consequences and internal motivation for shaping policy attitudes are plentiful in the literature on political behaviour. For example, several attempts have been made to incorporate perceptions of policy consequences into models of policy support (e.g. Eriksson, Garvill, & Nordlund, 2008). One relevant perception focuses on whether the measure is understood as *effective* or not, as few individuals will lend their support to a policy measure not perceived as being able to reach its aims (Jaensirisak, Wardman, & May, 2005; Kallbekken & Saelen, 2011; Lam, 2014; Rienstra, Rietveld, & Verhoef, 1999; Schuitema et al., 2010). For example, a recent study by Schleich and colleagues (2018) demonstrates that perceived effectiveness of international climate policy regimes is inductive also to voluntary engagement on the individual level. Furthermore, perceived *personal consequences*, both the extent to which a policy measure is expected to imply higher financial costs for the individual (Kallbekken et al., 2013; Lubell, Vedlitz, Zahran, & Alston, 2006; Lubell et al., 2007; Schuitema et al., 2010) and affect behaviour by curtailing personal *freedom* (Jagers & Matti, 2010; Rienstra et al., 1999; Steg & Vlek, 1997) have been demonstrated as determinants for policy attitudes. Based on experimental data, Kenny (2018) for instance argues that economic evaluations have a tangible effect on the support for climate policies. As a basic model for policy support, therefore, we should expect the public to react more unfavourably when faced with a large tax increase than with a small one, as a larger tax increase will imply more tangible implications for individual costs. Thus, and as shown in previous research (e.g. Eriksson et al., 2006; Hammar & Jagers, 2006), as the level of a proposed tax increase changes, so should also the level of support for this suggested policy. In order to validate our data in relation to previous findings in the literature, we therefore initially test the hypothesis that:

H<sub>1</sub>: A higher level of proposed tax increase (TI) affects the level of policy support for the proposed tax increase (PS(TI)) negatively.

This hypothesis is rather straightforward, as demonstrated both in theory and throughout empirical studies of carbon tax support. However, this study is more interested in exploring the mechanisms through which this expected reaction takes place. *Why* do people react more unfavourably to higher increases in CO<sub>2</sub> taxes, which, at their core, are aimed at addressing a collective problem?

In addition to the rational calculations of effectiveness and personal outcomes, attitudes towards new political objects are also based on their perceived *distributional effects*. Multiple studies have found that perceptions of fairness are significant for the degree of policy support (e.g. Eriksson et al., 2006; Fujii, Gärling, Jakobsson, &

Jou, 2004; Johansson-Stenman & Konow, 2010; Schade & Schlag, 2003; Schuitema, Steg, & Van Kruining, 2011). For example, studies on the introduction of climate taxes conclude that their distributional effects, and therefore also the level of support they enjoy, are clearly dependent on how the revenues from the tax are used (e.g. Bento, Franco, & Kaffine, 2009; Dresner, Dunne, Clinch, & Beuermann, 2006; Hammar & Jagers, 2006; Kallbekken & Saelen, 2011). Whereas an increased CO<sub>2</sub> tax in the transport sector might be perceived as highly unfair to those with limited options for alternative modes of transportation and a constrained personal economy, using the revenues to expand public-transportation or compensate low-income earners through a tax rebate could reasonably be expected to reduce this perception as it lessens the negative effects of making one mode of transportation more expensive.

Based on the above, it is assumed that support for a policy measure is conditioned by perceptions of fairness. That is, if the distributional effects of policy implementation are viewed as negative, the level of policy support will decrease. This theoretical expectation constitutes the second hypothesis:

H<sub>2</sub>: The effect of a proposed tax increase (TI) on policy support (PS(TI)) is mediated through the perceived fairness of the tax increase (F(TI)).

### ***The effects of compensatory schemes and ideological constraints***

To boost support for an increased CO<sub>2</sub> tax, addressing fairness perceptions might be a possible route ahead. One way of doing so is to earmark revenues for the purpose of simultaneously introducing a compensatory scheme in the form of a tax relief to avoid increases in the overall level of taxation, thereby alleviating undesired distributional consequences (cf Hsu, Walters, & Purgas, 2008; Sumner et al., 2011). The effects of combining different push and pull measures into policy packages has been studied elsewhere (cf. Eriksson et al., 2008). However, compared to the combinations previously researched (using revenues to pay for subsidies or improved infrastructure) a green tax shift, as suggested here, might have higher potential. In addition to its distributional effects, it also includes a 'double dividend' effect since the environmental benefits are combined with a reduction in taxes that have a distorting effect on the economy as a whole, thus increasing overall welfare (e.g. Goulder, 1995; Jorgenson, Goettle, Ho, & Wilcoxon, 2013). In political practice, the potential for compensatory measures to increase public support for CO<sub>2</sub> taxes has also led to green tax shifts being promoted by both NGOs and policy makers (see, for example Feldstein, Halstead, & Mankiw, 2017). Here, we acknowledge that compensation might affect support in different ways. First, compensation counteracts the real economic effects of a tax increase, thereby lowering behavioural and financial costs for the individual, and thus making the measure less coercive. We therefore suggest that:

H<sub>3</sub>: A compensatory scheme (Cs) affects support for a suggested tax increase (PS(TI)) positively.

Second, based on previous research demonstrating the strong significance of perceptions of distributional consequences for policy support (e.g. Drews & van den Bergh, 2016), we are here particularly interested in whether, and if so to what extent, the effects of a revenue-financed compensation is mediated through perceptions of fairness:

H<sub>4</sub>: The effect of a compensatory scheme (Cs) on policy support (PS(TI)) is mediated by the perceived fairness of the tax increase (F(TI))

Lastly, although it seems reasonable that compensatory schemes lessen negative perceptions of a tax's distributional effects, it is not certain that these effects lead all the way to increased policy support, at least not among all individuals. While earlier studies cast doubt on the assumption of an ideological constraint on policy attitudes (e.g. Converse, 1964), current research on environmental attitudes demonstrate significant left-right cleavages. This research has found that people positioning themselves to the ideological left tend to be more favourable towards environmental protection than those on the ideological right (Feldman & Hart, 2017; Greenhill, Leviston, Leonard, & Walker, 2014; Hamilton & Saito, 2015; Liu, Vedlitz, & Shi, 2014; McCright & Dunlap, 2013), and that this ideological cleavage is even growing larger over time (McCright, Xiao, & Dunlap, 2014; Smith & Leiserowitz, 2012). In part, the 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, Jost, & Goldsmith, 2010; Häkkinen & Akrami, 2014). This suggests that an ideological position to the left increases overall support for the introduction of pro-environmental policy measures. However, although the effect of ideology on policy attitudes has been established in a magnitude of studies, some recent research demonstrates that an ideological left–right cleavage only appears to be valid for some countries and contexts, and even runs in the opposite direction for others (Fairbrother, 2016; Haring & Sohlberg, 2017; McCright, Charters, Dentzman, & Dietz, 2016). In addition, while it is established that left-wing voters in general are more positive towards taxes, it is less obvious that they should be so when it comes to an increased CO<sub>2</sub> tax, since individuals with lower income may be more affected than individuals with higher income (cf. Jagers et al., 2010).

By the same token, ideological constraints might also affect the desirability of a compensatory scheme among the ideological left, at least if this compensation is framed as a tax cut. For example, publicly available data from the Swedish SOM-Institute demonstrate that preferences for tax relief in general is strongly connected to left–right positions. For example, among those placing themselves ‘clearly to the left’ only 18% state that it is a good idea to lower taxes while as many as 70% among those who placed themselves ‘clearly to the right’ think it is a good idea (Ohlsson, Oscarsson, & Solevid, 2016). Moreover, tax cuts have become less popular among the public during the last decades in Sweden. According to the Swedish National Election Studies 64% of voters said lowering taxes was a good proposal in 1998 while only 26% thought so in 2014 (Hedberg, 2015). Thus, exploring the effects of tax relief on policy support among different ideological camps is key to further understanding the mechanisms by which policy design affects policy attitudes. This study therefore also proposes that political ideological positioning determines the effect of the tax increase on policy support and perceived fairness, as well as the effect of compensatory schemes on these relationships. However, given the mixed results from previous studies on how left–right positioning impacts policy attitudes, we leave open for empirical testing the direction of these possible effects, merely hypothesizing that:

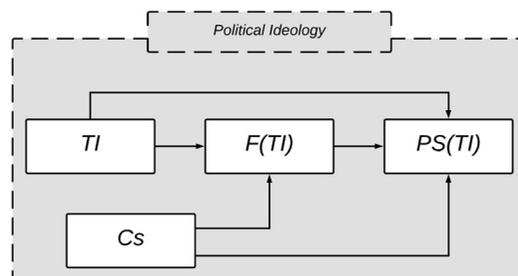
H<sub>5</sub>: An individual’s ideological left–right position affects the relationships proposed in H<sub>1</sub>–H<sub>4</sub>

Based on these five hypotheses, the overall theoretical argument of this article is illustrated in Figure 1.

## Case, methods and data

This article focuses on one particular type of policy measure, namely, a CO<sub>2</sub> tax. Such a tax was implemented in Sweden already in 1991, and since then, the tax level has been increased on several occasions, currently amounting to SEK 2,46/litre (approx. USD 1/gallon) of petrol. However, owing to ever more stringent climate pledges, Sweden, along with several other countries where such a tax is already implemented, will most likely be required to increase the tax level again. Thus, we are not concerned with public opinion on the current tax, but rather opinions about increasing the tax.

Comparing different countries’ use of climate policy measures, clear variations can be detected. Although system of government, path-dependency and economic entanglements can explain a certain amount of cross-country variation in policy choice (cf. Harrison & Sundstrom, 2010; Lachapelle & Paterson, 2013), previous research also points specifically towards the highly politicized nature of climate policy instruments and their sensitivity to



**Figure 1.** The proposed mechanisms of policy support.

Note: TI: Proposed tax increase, F(TI): Perceived fairness of proposed tax increase, PS(TI): Policy support for proposed tax increase, Cs: Compensatory scheme.

public support as explanatory factors for cross-country differences. For instance, although regarded as one of the most cost-effective – i.e. cheap to implement and basically self-administering – means of mitigating climate change, CO<sub>2</sub> taxes are not nearly as prevalent as might be expected, implemented only in a handful of major jurisdictions around the world and met with resistance in several others (Haites et al., 2018; Sumner et al., 2011).

Sweden has been highly profiled as a global environmental leader, going back to the Stockholm summit of 1972, with high scores on various environmental performance indices and a large range of successful implementation of environmental policies and policy measures, resulting from a strong cooperative relationship between business, environmentalists, science and government (e.g. Lundqvist, 2004; Scruggs, 1999). For example, Sweden was very active in creating an international regime for controlling air pollution and, setting a good example, also limiting domestic sulphur dioxide emissions (cf. Skou-Andersen & Lifferink, 1997). In light of the growing interest in environmental issues both politically and throughout Swedish society during the early 1990s, Sweden introduced a CO<sub>2</sub> tax directed towards private consumption of petrol, as part of a major tax reform. The revenues from the CO<sub>2</sub> tax are not earmarked for specific purposes but rather form part of the government's overall budget. Nonetheless, increases in the CO<sub>2</sub> tax over time have been combined with a reduction in other taxes as a means for addressing undesirable distributional consequences and stimulate job growth (cf. Åkerfeldt & Hammar, 2015).

Today, there remains a broad political consensus on the use of the CO<sub>2</sub> tax as the primary instrument for climate change mitigation in Sweden, and shifts in political power since 1991 have not led to any major alterations of the tax. Although studies (e.g. Jagers & Hammar, 2009) show that the Swedish CO<sub>2</sub> tax is a relatively unpopular climate policy measure, it is simultaneously one of the least unpopular taxes in Sweden. Furthermore, public support for the tax has been increasing slightly over time. In a set of national Swedish surveys with representative samples in the early 2000s, the general support for an increase in the CO<sub>2</sub> tax was 19%, compared with 23% in the 2012 national survey (cf. Jagers & Hammar, 2009; SOM, 2012).

### **Data and measurements**

The data in this study come from an online survey embedded experiment. Our experiment was included in wave 23 of the Swedish Citizen Panel run by the Laboratory of Opinion Research at the University of Gothenburg ([www.lore.gu.se](http://www.lore.gu.se)). The fieldwork lasted 27 days, from 9 December 2016 to 4 January 2017. For this study, a gross sample of 7500 respondents was used, stratified according to age, sex and education based on benchmark data from Statistics Sweden. Those who did not respond to the e-mail invitation were reminded twice. The participation rate in this specific study was 64%, and a total of 4,706 respondents participated. The participating sample is fairly representative of the Swedish adult population with a slight overrepresentation of men (53%). The age range of the sample is from 18 to 70 years with a mean of 47. The sample is also fairly representative in terms of education with 30% having completed three years or more of higher education. Further, 65% of participants have children, and in terms of ideology the sample is slightly left-leaning with a mean of 4.66 on a 0 to 10 scale.

The experimental design included six different treatment groups and constitutes a 3 × 2 factorial design. When entering the online survey, respondents were randomly assigned to one of the six experimental conditions, which resulted in the following number of respondents per condition: 814, 777, 825, 769, 756 and 765. Considering the demographic factors accounted for above (sex, age, education, children and ideology), there were no statistically significant differences between the participants in the different experimental conditions. The closest to statistical significance was having children ( $p = .0813$ ). The level of tax increase could either be SEK 1/litre (an increase of approx. 40%) or SEK 5/litre (an increase of approx. 200%). In addition, the tax increase could be proposed on its own, or together with either an equal compensatory scheme, taking the form of a general cut in income tax for all Swedes funded by the revenues from the increased CO<sub>2</sub> tax, or an individual compensatory scheme directing tax rebates only to those paying the CO<sub>2</sub> tax. **Figure 2** illustrates the experimental treatments. The text in bold, including either an equal or an individual compensatory measure to the suggested tax increase, were omitted for two of the six groups.

The main dependent variable, policy support, was measured through one item asking the respondents to state their attitude to the policy proposal ('If you consider the proposal as a whole, what is your attitude

In the public debate, the negative effects of traffic on the environment and the climate has been discussed. One suggestion that has been put forth is to *increase the carbon dioxide tax on petrol with [SEK 1/litre] [SEK 5/litre]* in order to reduce the negative effects of traffic on the climate.

**The revenues from the increased carbon dioxide 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 pays carbon dioxide tax)]**

**Figure 2.** Experimental treatment (translated from Swedish).

towards this proposal?) on a scale from 1 (very negative) to 7 (very positive), with 4 labelled as neither negative nor positive. For the independent variable capturing perceptions of fairness ('Do you think this proposal would be an unfair or fair measure?'), responses ranged from -3 (very unfair) to +3 (very fair), with 0 labelled as neither unfair nor fair. To facilitate analysis, this item was recoded into a 1–7 scale. Finally, ideological placement was measured by asking the respondents to indicate their 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?') on a scale from 0 (far to the left) to 10 (far to the right), with 5 labelled as neither to the left nor to the right. Our three main variables correlate as follows: policy support and perceived fairness ( $r = 0.785$ ,  $p < .001$ ,  $n = 4691$ ), policy support and left–right position ( $r = -0.325$ ,  $p < .001$ ,  $n = 4696$ ) and perceived fairness and left–right position ( $r = -0.271$ ,  $p < .001$ ,  $n = 4690$ ).

We employ ordinary least squares (OLS) regressions to explore the effects of a higher level of tax increase and the different compensatory schemes on both overall support and perceptions of fairness. In the regression models, a set of dummy variables indicates the different treatments the respondents were exposed to. For the level of the tax increase, a dummy variable indicating that respondents received a proposal to increase the CO<sub>2</sub> tax by 5 SEK/litre instead of 1 SEK/litre is employed. For the compensatory schemes, two dummy variables are included, indicating whether the respondents have been exposed to a proposal including a compensatory measure equal for all tax payers or not, and if the proposal they received included a compensatory measure related to the individual's CO<sub>2</sub> tax or not. Thus, the reference group for the two compensation dummies is those who read a proposal not including any compensatory measure at all. Although being an experimental study, and not an observational cross-sectional one, we nevertheless checked our main results in Tables 2 and 3 with additional control variables (sex, age, education, having children, income) and the main results remained unchanged, only very marginally affecting the model fit. Moreover, to compare how the effects of different levels of tax increase and the two compensatory measures are conditioned by ideology, the respondents are split into three groups depending on their self-reported positioning on the 11-point scale: left (0–3), middle (4–6) and right (7–10).

## Results

As a first step, before proceeding to significance testing through regression modelling, Table 1 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.

**Table 1.** Policy support and perceived fairness depending on level of tax increase and compensatory measure (mean / standard deviation,  $N$  in parentheses).

	Policy support	Perceived fairness
1 SEK tax increase & No compensation	3.46 / 2.07 (813)	2.93 / 1.80 (812)
1 SEK tax increase & Equal compensation	3.38 / 1.95 (773)	3.16 / 1.77 (773)
1 SEK tax increase & Individual compensation	3.42 / 1.93 (825)	3.43 / 1.74 (822)
5 SEK tax increase & No compensation	3.15 / 2.11 (769)	2.68 / 1.75 (769)
5 SEK tax increase & Equal compensation	3.13 / 1.96 (755)	2.83 / 1.78 (755)
5 SEK tax increase & Individual compensation	3.28 / 1.92 (762)	3.22 / 1.73 (760)

**Table 2.** OLS regression effects of level of tax increase and compensatory measures on perceived fairness and policy support (unstandardized OLS coefficients).

	Model 1 (DV: policy support)	Model 2 (DV: PSB – fairness)	Model 3 (DV: Policy support)	Model 4 (DV: Policy Support)
5 SEK tax increase	–0.24***	–0.27***	–	0.00
Equal compensation	–0.06	0.19***	–	–0.23***
Individual compensation	0.04	0.52***	–	–0.42***
Perceived fairness	–	–	0.88***	0.89***
Adjusted R <sup>2</sup>	0.003	0.020	0.616	0.623
N	4697	4691	4691	4691

\*\*\*= $p < .01$ , \*\*= $p < .05$ .

In general, [Table 1](#) shows that the proposal to increase the CO<sub>2</sub> tax is not very popular for any level of tax increase or when compensatory measures are included. The average rating from 1 to 7 is below the scale mid-point of 4 in all of the six groups. However, the smaller tax increase (1 SEK/litre) is less unpopular than the larger tax increase (5 SEK/litre): 3.46 compared to 3.15 in the no compensation condition. In terms of effects size, however, this difference is classified as fairly small with a Cohen's *d* of 0.15.

As can also be seen from [Table 1](#), policy support does not seem to improve much when including compensatory measures. For perceived fairness, however, compensatory measures seem to make more of a difference. For the proposal to increase the CO<sub>2</sub> tax with 1 SEK per litre the fairness rating increases from 2.93 without any compensation to 3.16 for equal compensation for all (Cohen's *d* = 0.13) and further to 3.43 (Cohen's *d* = 0.28) when an individual based compensation is included in the proposal. In terms of substantial effect sizes, these are all fairly small.

Next, to test whether the effects of receiving one treatment (level of tax increase as well as compensatory measure) over the others also are statistically significant, we examine the results of a set of regression models. In [Table 2](#), the relationship between level of tax increase, perceived fairness and policy support, as well as how these relationships are affected by the introduction of different compensatory schemes, are analysed for the entire sample. In model 1, the effect of different levels of tax increase (H1) as well as the inclusion of a

**Table 3.** OLS regression for effects of level of tax increase and compensatory measures on perceived fairness and policy support by left–right ideology (unstandardized OLS coefficients).

	Model 5 (DV: policy support)	Model 6 (DV: PSB – fairness)	Model 7 (DV: Policy support)	Model 8 (DV: Policy support)
<i>Ideological left</i>				
5 SEK tax increase	–0.15	–0.24***	–	0.06
Equal compensation	–0.55***	–0.03	–	–0.52***
Individual compensation	–0.59***	0.20	–	–0.76***
Perceived fairness	–	–	0.84***	0.85***
Adjusted R <sup>2</sup>	0.019	0.006	0.566	0.592
N	1706	1704	1704	1704
<i>Ideological middle</i>				
5 SEK tax increase	–0.35***	–0.33***	–	–0.06***
Equal compensation	0.16	0.33***	–	–0.13
Individual compensation	0.26**	0.64***	–	–0.29***
Perceived fairness	–	–	0.86***	0.87***
Adjusted R <sup>2</sup>	0.010	0.030	0.607	0.610
N	1685	1684	1684	1684
<i>Ideological right</i>				
5 SEK tax increase	–0.33***	–0.32***	–	–0.06
Equal compensation	0.39***	0.35***	–	0.10
Individual compensation	0.78***	0.93***	–	0.01
Perceived fairness	–	–	0.84***	0.83***
Adjusted R <sup>2</sup>	0.040	0.066	0.596	0.596
N	1305	1302	1302	1302

\*\*\*= $p < .01$ , \*\*= $p < .05$ .

compensatory measure (H3) on policy support, is examined. In models 2, 3 and 4, we then explore the extent to which policy support (H2) and compensation (H4) is mediated through the perceived fairness of the proposed tax increase.

From Table 2, it becomes clear that, as expected, a higher level of tax increase affects both policy support (model 1) and perceived fairness (model 2) negatively. Further considering the results of models 1 and 2, adding either of the two compensatory measures to the proposed policy affects the perceived fairness of an increased tax in a positive direction. In particular, individual compensation, i.e. a tax rebate only for those paying the CO<sub>2</sub> tax, has a strong positive effect on perceptions of fairness ( $B = 0.52, p < .001$ ), although it should be noted that the overall explained variance is rather low, as is the partial eta-squared<sup>1</sup> for the individual compensation (0.014). At the same time, including a compensatory measure to the policy proposal does not alleviate the negative effect of a higher level of tax increase. Moreover, model 1 shows that neither equal nor individual compensation have any noticeable effect on policy support, either directly or channelled via personal consequences.

In model 3, echoing previous studies, perceived fairness of the policy proposal affects the level of policy support both strongly and in a positive direction for both levels of the proposed tax increase, when tested on its own. In the full model (4), however, the negative effect of a higher tax increase demonstrated in model 1 disappears when including fairness perceptions, while perceived fairness itself sustains a strong significant effect on policy support (partial eta-squared = 0.622). Finally, both compensatory measures display significant negative effects on policy support when including them alongside perceived fairness (although being non-significant in model 1 where fairness is not included). Thus, respondents who were given a treatment where a tax increase was combined with either an equal or an individual compensation overall display lower levels of support than those who were not. This is particularly tangible for the individual compensatory measure.

In order to further scrutinize these results, and test our fifth hypothesis (H5), the possibility that ideological positioning might condition the relationships is accounted for in Table 3 (models 5–8). Opening up for an ideological constraint on policy attitudes is particularly relevant here, as the inclusion of a compensatory measure means that the complete policy proposal contains a simultaneous tax increase (generally favoured by the left) and tax cut (generally favoured by the right). In Table 3, the same regression models as presented for the full sample above are estimated, but this time for each ideological group (see Appendix for the descriptors for each ideological group). Doing so, the causal effects are somewhat nuanced.

Considering ideological effects on the relationship between the level of tax increase and policy support (model 5), the coefficient for a 5 SEK CO<sub>2</sub> tax increase, compared to a 1 SEK increase, is negative for all the three ideological groups. However, it is only statistically significant for people positioning themselves to the right and in the middle of the ideological spectrum, suggesting that for left-leaning individuals, the level of tax increase is of less importance for their inclination to support. As displayed in model 6, however, the effect of a higher tax increase is negative and significant in relation to perceived fairness for all three ideological groups. Another similarity is the effect of perceived fairness on support for the policy, which is almost identical across the three ideological groups (model 7).

When examining the effect of the two compensatory measures, the effects differ substantially between the ideological groups suggesting that political ideology indeed determines how compensation in the shape of a tax cut is received. Among people to the ideological right, the expected effects are found: a direct positive effect on policy support (model 5), and a positive effect on perceived fairness (model 6). In addition, the individual compensatory measure now has a stronger effect on policy support than for the two other ideological groups. This difference is also statistically significant. However, when including both fairness and compensation in the model (8), the main effects of the level of the tax increase as well as of the compensatory measures, disappears.

The results for the respondents placing themselves to the ideological left are in sharp contrast. Among this group of respondents, the main effect of the compensatory measures on policy support is negative as well as being clearly significant. In terms of effect size, the partial eta-squared for equal compensation is 0.029 and for the individual compensation 0.058, thus approaching medium sized effects. Thus, including the compensatory addition to the policy proposal, intended to increase support by mitigating costly side effects, actually makes the policy less popular. Simply put, the effect of the compensatory measures on policy support is highly conditional upon left–right ideology, which explains the non-significant results for the whole sample (model 1).

Furthermore, among people to the ideological left, individual compensation does not significantly increase perceived fairness of the policy, but it does decrease support ( $b = -0.59, p < .01$ ). Also, among people in the middle of the ideological spectrum, compensatory measures clearly increase perceived fairness, but have quite weak effects on support for the policy. Also, the mediation chain is not fully supported since, when controlling for perceived fairness, the remaining effects turn negative and significant (model 8). In sum, among people who are ideologically oriented to the right, the expected effects appear, while among those who are oriented to the left, and to some extent also those in the middle of the ideological scale, the two types of compensatory schemes being explored here do not seem to have the intended effects on support.

## Conclusion

The aim of this experimental study was to disentangle the interplay between perceptions of fairness and public support for one specific climate policy measure, widely regarded as one of the most cost-effective means of limiting emissions and changing public behaviour: a CO<sub>2</sub> tax. More specifically, we focus here on an increase in the already existing Swedish CO<sub>2</sub> tax on petrol. Of particular interest was, firstly, whether the introduction of a compensatory scheme addressing the distributive effects of a tax increase is a viable method of alleviating negative sentiments, as well as, secondly, how the relationships between tax increases, perceptions of fairness and compensatory schemes play out in different ideological categories. Reviewing the results in the light of the five hypotheses derived throughout the theory section, it is concluded that both H<sub>1</sub> (that policy support is sensitive to the level of tax increase) and H<sub>2</sub> (that perceived fairness mediates the tax increase-policy support relationship) were confirmed for the full sample. However, for the group in-between the left and right wings, a tax increase actually had a direct positive effect on policy support thus partly contradicting H<sub>2</sub>. In contrast, H<sub>3</sub> (that compensatory schemes to simultaneously lower income tax positively affect support for a suggested tax increase) was not confirmed for the full sample. Rather, the main effects on policy support turned out to be insignificant. Breaking up the sample into ideological groups, however, the effects of compensation follows in line with hypothesis 3 for people on the ideological right and partly also for people in the ideological middle. In the latter case, the effect of compensation was only confirmed in regard to the individual compensatory measure. Thus, it is concluded that the extent to which negative sentiments towards a CO<sub>2</sub> tax increase can be alleviated by combining it with a compensatory measure is conditioned by ideology. Furthermore, scrutinizing H<sub>4</sub> (that the effect of a compensatory scheme on policy support is mediated through the perceived fairness of the tax increase) it is evident, first, that although neither of the compensatory measures displayed any significant effects on policy support, both types of compensation have the expected positive effect on fairness perceptions. Nonetheless, in the full model (4), including both fairness and compensation, the effects of the latter turn out both significant and negative. That is, we see that the compensatory measure both increases perceptions of fairness, which in turn raises support, but also that compensatory measures display a negative impact on support when fairness is controlled for. As hypothesized, accounting for ideological positioning helps us nuance our results. Among the ideological right, where compensation has a direct and significant positive effect on policy support in the first model (5), full mediation through fairness perceptions is found in the full model (8). However, for people to the left and partly in the ideological middle category, compensation has negative effects on support also when controlling for fairness. Compensation measures seem to influence support directly and do not influence fairness perceptions among people to the ideological left at all. In regard to the final hypothesis, H<sub>5</sub>, stating that an individual's ideological positioning affects the relationships between tax increase levels, perceptions of fairness, compensatory measures, and policy support as proposed in H<sub>1</sub>-H<sub>4</sub>, the results from this experiment rather clearly indicate that political ideological positioning, at least in the context of Sweden, is an important factor when it comes to explaining people's support for a CO<sub>2</sub> tax increase, and in particular the possibilities for boosting support levels.

Turning to political practice, the overarching challenge of the Paris Agreement is the progressive component that demands increasingly rigorous NDCs over time. This, inevitably, implies significant behavioural changes among households, industry, transport and agriculture, most likely materialized through increasingly more stringent domestic policies.

Needless to say, these policies must be both effective and cost-efficient, and taking both these requirements into consideration, CO<sub>2</sub> taxes are often seen as the ultimate policy instrument fulfilling these criteria. However, although such taxes are popular instruments among environmental economists, they are simultaneously rather unpopular among those who are affected by them. And the less popular a policy is, the more difficult it tends to be to implement it. This dilemma is the reason why our findings are both important and potentially also rather promising. Most proposals to introduce or increase a CO<sub>2</sub> tax are met by resistance, in particular from people to the ideological right (e.g. Fairbrother, 2016; Harring & Sohlberg, 2017). However, what the results in this article suggest is that, in contexts dominated by right-wing ideals, a *combination of a tax and a compensatory scheme* may be a successful route forward and a way to increase public support for an effective climate policy tool. The reason for drawing this conclusion is that compensation has a significant positive effect on fairness, which in turn affects policy support in a positive direction. In more left-oriented contexts, on the other hand, the results at least imply that a CO<sub>2</sub> tax without compensation seems more likely to generate slightly higher support.

These results open up important avenues for future research. Further studies are needed both for better understanding the apparent moderation of compensatory measures by political ideology that is found here, as well as to further explore the effects of different types and levels of such compensatory schemes. At the same time, a note of caution should also be raised. First, there is a possibility for nuancing our results even further by including additional control variables such as car-ownership and car-use, which potentially might impact on attitudes to tax increases. Unfortunately, this information was not included in our data-set. Second, the findings are based on a study conducted in Sweden, a Scandinavian country deeply rooted in a social-democratic tradition where ideological sympathies to the right might stand for something different than in more republican or conservative contexts. Thus, the obvious way forward is to conduct similar experiments in other political contexts, in order to see how the findings resonate among people living in different political contexts where the ideological left–right scale may be skewed to either side of the spectrum, or more or less wide, than is the case in Sweden. However, if the same pattern emerges also there, then different forms of compensatory schemes might be a way for more conservatively oriented countries to develop and meet future, considerably more demanding and rigorous, NDCs, in line with the standards agreed upon in Paris 2015 and beyond.

## Note

1. Partial eta-squared is an estimate of the effect size, or the strength of the relationship between two variables, indicating the percentage of variance in the dependent variable attributable to a particular independent variable.

## Disclosure statement

No potential conflict of interest was reported by the authors.

## Funding

This work was supported by the Swedish Research Council (Vetenskapsrådet) [grants 2011-01844 and 2016-03058].

## ORCID

Simon Matti  <http://orcid.org/0000-0001-7646-1813>

## References

- Åkerfeldt, S., & Hammar, H. (2015, September 7). CO<sub>2</sub> taxation in Sweden experiences of the past and future challenges. *Revue Projet*.
- Bento, A., Franco, S., & Kaffine, D. (2009). Efficiency and spatial impacts of development taxes: The critical role of alternative revenue-recycling schemes. *American Journal of Agricultural Economics*, 91(5), 1304–1311.
- Berglund, C., & Matti, S. (2006). Citizen and consumer: The dual roles of individuals in environmental policy. *Environmental Politics*, 15(4), 550–571.
- Burstein, P. (2003). The impact of public opinion on public policy: A review and an agenda. *Political Studies Quarterly*, 56(1), 29–40.

- Campbell, T. H., & Kay, A. C. (2014). Solution aversion: On the relation between ideology and motivated disbelief. *Journal of Personality and Social Psychology*, 107(5), 809–824.
- Cherry, T. L., García, J. H., Kallbekken, S., & Torvanger, A. (2014). The development and deployment of low-carbon energy technologies: The role of economic interests and cultural worldviews on public support. *Energy Policy*, 68, 562–566.
- Converse, P. (1964). The nature of belief systems in mass publics. In D. Apter (Ed.), *Ideology and discontent* (pp. 206–261). New York, NY: Free Press.
- Crowley, K. (2017). Up and down with climate politics 2013–2016: The repeal of carbon pricing in Australia. *Wiley Interdisciplinary Reviews: Climate Change*, 8(3), e458.
- Dietz, T., Dan, A., & Shwom, R. (2007). Support for climate change policy: Social psychological and social structural influences. *Rural Sociology*, 72, 185–214.
- Dresner, S., Dunne, L., Clinch, P., & Beuermann, C. (2006). Social and political responses to ecological tax reform in Europe. *An Introduction to the Special Issue, Energy Policy*, 34, 895–904.
- Drews, S., & van den Bergh, J. C. J. M. (2016). What explains public support for climate policies? A review of empirical and experimental studies. *Climate Policy*, 16(7), 855–876.
- Erikson, R. S., MacKuen, M. B., & Stimson, J. A. (2002). *The macro polity*. Cambridge: Cambridge University Press.
- Eriksson, L., Garvill, J., & Nordlund, A. (2006). Acceptability of travel demand management measures: The importance of problem awareness, personal norm, freedom, and fairness. *Journal of Environmental Psychology*, 26, 15–26.
- Eriksson, L., Garvill, J., & Nordlund, A. (2008). Acceptability of single and combined transport policy measures: The importance of environmental and policy specific beliefs. *Transportation Research Part A: Policy and Practice*, 42(8), 1117–1128.
- Fairbrother, M. (2016). Trust and public support for environmental protection in diverse national contexts. *Sociological Science*, 3, 359–382.
- Feldman, L., & Hart, P. S. (2017). Is there any hope? How climate change news imagery and text influence audience emotions and support. *Risk Analysis*. doi:10.1111/risa.12868
- Feldstein, M. S., Halstead, T., & Mankiw, N. G. (2017, February 8). A conservative case for climate action. Op-Ed, *The New York Times*.
- Feygina, I., Jost, J. T., & Goldsmith, R. E. (2010). System justification, the denial of global warming, and the possibility of “system-sanctioned change”. *Personality and Social Psychology Bulletin*, 36(3), 326–338.
- Fujii, S., Gärling, T., Jakobsson, C., & Jou, R. C. (2004). A cross-country study of fairness and infringement on freedom as determinants of car owners’ acceptance of road pricing. *Transportation*, 31(3), 285–295.
- Goulder, L. H. (1995). *Environmental taxation and the “double dividend”* (NEBR Working Paper No. 4896). A Reader’s Guide.
- Greenhill, M., Leviston, Z., Leonard, R., & Walker, I. (2014). Assessing climate change beliefs: Response effects of question wording and response alternatives. *Public Understanding of Science*, 23(8), 947–965.
- Haites, E., Maosheng, D., Gallagher, K. S., Mascher, S., Narassimhan, E., Richards, K. R., Wakabayashi, M. (2018, January). *Experience with carbon taxes and greenhouse gas emissions trading systems*. SSRN. doi:10.2139/ssrn.3119241
- Hamilton, L. C., & Saito, K. (2015). A four-party view of US environmental concern. *Environmental Politics*, 24(2), 212–227.
- Hammar, H., & Jagers, S. C. (2006). Can trust in politicians explain individuals’ support for climate policy? The case of CO2 tax. *Climate Policy*, 5(6), 613–625.
- Harring, N. (2014). Corruption, inequalities and the perceived effectiveness of economic pro-environmental policy instruments: A European cross-national study. *Environmental Science and Policy*, 39, 119–128.
- Harring, N. (2015). Reward or punish? Understanding preferences toward economic or regulatory instruments in a cross-national perspective. *Political Studies*, 573–592.
- Harring, N., & Sohlberg, J. (2017). The varying effects of left–right ideology on support for the environment: Evidence from a Swedish survey experiment. *Environmental Politics*, 26(2), 278–300.
- Harrison, K. (2010). The comparative politics of carbon taxation. *Annual Review of Law and Social Science*, 6, 507–529.
- Harrison, K. (2012). A tale of two taxes: The fate of environmental tax reform in Canada. *Review of Policy Research*, 29(3), 383–407.
- Harrison, K., & Sundstrom, L. M. (2010). *Global commons, domestic decisions the comparative politics of climate change*. Cambridge: MIT Press.
- Häkkinen, K., & Akrami, N. (2014). Ideology and climate change denial. *Personality and Individual Differences*, 70, 62–65.
- Hedberg, P. (2015). *Väljarnas sakfrågeåsikter 1956–2014*. The Swedish National Election Studies Programme, University of Gothenburg, Department of Political Science.
- Hsu, S.-L., Walters, J., & Purgas, A. (2008). Pollution tax heuristics: An empirical study of willingness to pay higher gasoline taxes. *Energy Policy*, 36, 3612–3619.
- IPCC. (2014). *National and Sub-National Policies and Institutions* (Chapter 15). Intergovernmental Panel on Climate Change.
- Jaensirisak, S., Wardman, M., & May, A. D. (2005). Explaining variations in public acceptability of road pricing schemes. *Journal of Transport Economics and Policy*, 39, 127–153.
- Jagers, S. C. (2009). In search of the ecological citizen. *Environmental Politics*, 18(1), 18–36.
- Jagers, S. C., & Hammar, H. (2009). Environmental taxation for good and for bad: The efficiency and legitimacy of Sweden’s carbon tax. *Environmental Politics*, 18(2), 218–237.
- Jagers, S. C., Löfgren, Å, & Stripple, J. (2010). Attitudes to personal carbon allowances: Political trust, fairness and ideology. *Climate Policy*, 10(4), 410–431.
- Jagers, S. C., & Matti, S. (2010). Ecological citizens: Identifying values and beliefs that support individual environmental responsibility among Swedes. *Sustainability*, 2(4), 1055–1079.

- Jagers, S. C., & Matti, S. (in press). Climate policy support in a comparative perspective: Exploring the meaning and significance of political-economic contexts in Sweden and Norway. *Environmental Politics*.
- Johansson-Stenman, O., & Konow, J. (2010). Fair air: Distributive justice and environmental economics. *Environmental and Resource Economics*, 46(2), 147–166.
- Jorgenson, D. W., Goettle, R. J., Ho, M. S., & Wilcoxon, P. J. (2013). *Double dividend* (1st ed.). Cambridge: The MIT Press.
- Kallbekken, S., Garcia, J. H., & Korneliusson, K. (2013). Determinants of public support for transport taxes. *Transportation Research Part A*, 58, 67–75.
- Kallbekken, S., & Saelen, H. (2011). Public acceptance for environmental taxes: Self-interest, environmental and distributional concerns. *Energy Policy*, 39, 2966–2973.
- Kenny, J. (2018). The role of economic perceptions in influencing views on climate change: An experimental analysis with British respondents. *Climate Policy*, 18(5), 581–592.
- Lachapelle, E., & Paterson, M. (2013). Drivers of national climate policy. *Climate Policy*, 13, 547–571.
- Lam, S.-P. (2014). Predicting support of climate policies by using a protection motivation model. *Climate Policy*, 15, 321–338.
- Linde, S. (2018). Political communication and public support for climate mitigation policies: A country-comparative perspective. *Climate Policy*, 18(5), 543–555.
- Liu, X., Vedlitz, A., & Shi, L. (2014). Examining the determinants of public environmental concern: Evidence from national public surveys. *Environmental Science & Policy*, 39, 77–94.
- Löfgren, Å., & Nordblom, K. (2009). Puzzling tax attitudes and labels. *Applied Economics Letters*, 16(18), 1809–1812.
- Lubell, M., Vedlitz, A., Zahran, S., & Alston, L. T. (2006). Collective action, environmental activism, and air quality policy. *Political Research Quarterly*, 59(1), 149–160.
- Lubell, M., Zahran, S., & Vedlitz, A. (2007). Collective action and citizens responses to global warming. *Political Behavior*, 29(3), 391–413.
- Lundqvist, L. J. (2004). *Sweden and ecological governance: Straddling the fence*. Manchester: Manchester University Press.
- Martinsson, J., & Lundqvist, L. J. (2010). Ecological citizenship: Coming out 'clean' without turning 'green'? *Environmental Politics*, 19(4), 518–537.
- McCright, A. M., Charters, M., Dentzman, K., & Dietz, T. (2016). Examining the effectiveness of climate change frames in the face of a climate change denial counter-frame. *Topics in Cognitive Science*, 8, 76–97.
- McCright, A. M., & Dunlap, R. E. (2013). Bringing ideology in: The conservative white male effect on worry about environmental problems in the USA. *Journal of Risk Research*, 16(2), 211–226.
- McCright, A. M., Xiao, C., & Dunlap, R. E. (2014). Political polarization on support for government spending on environmental protection in the USA, 1974–2012. *Social Science Research*, 48(0), 251–260.
- Milbrath, L. W. (1986). Environmental beliefs and values. In M. G. Herrman (Ed.), *Political psychology* (pp. 97–138). San Francisco, CA: Jossey-Bass.
- Ohlsson, J., Oscarsson, H., & Solevid, M. (Eds.). (2016). *Ekvilibrium*. Gothenburg: The SOM Institute.
- Poortinga, W., Steg, L., & Vlek, C. (2004). Values, environmental concern and environmental behavior: A study into household energy use. *Environment and Behaviour*, 36(1), 70–93.
- Rabe, B. G., & Borick, C. P. (2012). Carbon taxation and policy labeling: Experience from American states and Canadian provinces. *Review of Policy Research*, 29(3), 358–382.
- Rienstra, S. A., Rietveld, P., & Verhoef, E. T. (1999). The social support for policy measures in passenger transport. A statistical analysis for the Netherlands. *Transportation Research Part D: Transport and Environment*, 4, 181–200.
- Ščasný, M., Zvěřinová, I., Czajkowski, M., Kyselá, E., & Zagórska, K. (2017). Public acceptability of climate change mitigation policies: A discrete choice experiment. *Climate Policy*, 17(1), 111–130.
- Schade, J., & Schlag, B. (2003). Acceptability of urban transport pricing strategies. *Transportation Research Part F: Traffic Psychology and Behaviour*, 6, 45–61.
- Schleich, J., Schwirplies, C., & Ziegler, A. (2018). Do perceptions of international climate policy stimulate or discourage voluntary climate protection activities? A study of German and US households. *Climate Policy*, 18(5), 568–580.
- Schuitema, G., Steg, L., & Forward, S. (2010). Explaining differences in acceptability before and acceptance after the implementation of a congestion charge in Stockholm. *Transportation Research Part A*, 44, 99–109.
- Schuitema, G., Steg, L., & Van Kruijning, M. (2011). When are transport pricing policies fair and acceptable? *Social Justice Research*, 24(1), 66–84.
- Scruggs, L. (1999). Institutions and environmental performance in Seventeen Western democracies. *British Journal of Political Science*, 29(1), 1–31.
- Shwom, R., Bidwell, D., Dan, A., & Dietz, T. (2010). Understanding U.S. Public support for domestic climate change policies. *Global Environmental Change*, 20, 472–482.
- Skou-Andersen, M., & Lifferink, D. (Eds.). (1997). *European environmental policy: The pioneers*. Manchester: Manchester University Press.
- Smith, N., & Leiserowitz, A. (2012). The rise of global warming skepticism: Exploring affective image associations in the United States over time. *Risk Analysis*, 32(6), 1021–1032.
- SOM. (2012). *The National Swedish SOM-survey*. The SOM-Institute at the University of Gothenburg. Retrieved from [www.som.gu.se](http://www.som.gu.se)
- Soroka, S., & Wlezién, C. (2010). *Degrees of democracy*. Cambridge: Cambridge University Press.
- Steg, L., Dreijerink, L., & Abrahamse, W. (2005). Factors influencing the acceptability of energy policies: A test of VBN theory. *Journal of Environmental Psychology*, 25, 415–425.

- Steg, L., & Vlek, C. (1997). The role of problem awareness in willingness-to-change car use and in evaluating relevant policy measures. In J. A. Rothengatter & E. C. Vaya (Eds.), *Traffic and transport psychology. Theory and application* (pp. 465–475). Elmsford, NY: Pergamon.
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology, 29*, 309–317.
- Stern, P. C. (2000). New environmental theories: Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues, 56*, 407–424.
- Sumner, J., Bird, L., & Dobos, H. (2011). Carbon taxes: A review of experience and policy design considerations. *Climate Policy, 11*(2), 922–943.
- Wallner, J. (2008). Legitimacy and public policy: Seeing beyond effectiveness, efficiency, and performance. *Policy Studies Journal, 36*(3), 421–443.

### Appendix. Policy support and perceived fairness in different experimental groups by left–right position (mean / standard deviation, N in parentheses).

	Policy support			Perceived fairness		
	Left	Middle	Right	Left	Middle	Right
1 SEK tax increase and No compensation	4.54 / 1.90 (301)	2.29 / 2.00 (298)	2.23 / 1.58 (221)	3.66 / 1.76 (300)	2.80 / 1.81 (298)	2.10 / 1.42 (221)
1 SEK tax increase and Equal compensation	3.90 / 2.01 (275)	3.37 / 1.89 (275)	2.72 / 1.76 (222)	3.57 / 1.78 (275)	3.20 / 1.71 (275)	2.59 / 1.69 (222)
1 SEK tax increase and Individual compensation	3.93 / 1.90 (273)	3.29 / 1.90 (295)	3.03 / 1.87 (257)	3.96 / 1.69 (272)	3.27 / 1.67 (295)	3.05 / 1.74 (255)
5 SEK tax increase and No compensation	4.32 / 2.01 (298)	2.71 / 1.95 (278)	1.99 / 1.51 (193)	3.45 / 1.71 (298)	2.40 / 1.71 (278)	1.89 / 1.34 (193)
5 SEK tax increase and Equal compensation	3.87 / 2.01 (288)	2.94 / 1.83 (280)	2.26 / 1.65 (187)	3.47 / 1.86 (288)	2.66 / 1.63 (280)	2.09 / 1.49 (187)
5 SEK tax increase and Individual compensation	3.74 / 1.85 (271)	3.25 / 1.93 (266)	2.75 / 1.84 (225)	3.54 / 1.72 (271)	3.23 / 1.76 (265)	2.80 / 1.62 (224)

*Comment:* Number of observations in parentheses. The policy support scale runs from 1 = 'Very negative' to 7 = 'Very positive' and the perceived fairness scale runs from 1 = 'Very unfair' to 7 = 'Very fair'.