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# **Increasing the acceptability of carbon taxation:**

## **The role of social norms and economic reasoning**

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# Increasing the acceptability of carbon taxation: The role of social norms and economic reasoning\*

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## Abstract

Green transitions require ambitious policy. This poses a political economy challenge. We study how social norms and economic reasoning jointly shape public views towards carbon taxation with uniform redistribution, using a representative survey experiment in the U.S. ( $N=2,688$ ). Video interventions that correct misperceived norms about climate action and/or explain the policy lead to an initial boost in support that fades away after several months and does not increase environmental donations. However, the combined intervention persistently reduces strong opposition by over 20%, pointing towards the joint roles of different motives in shifting the Overton window for climate policy.

*JEL classification:* Q54, Q58, D78, D91

*Keywords:* climate policy, carbon pricing, policy understanding, social norms, pluralistic ignorance, information intervention, survey experiment

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# 1. Introduction

Mitigating the worst effects of climate change requires the transition to a decarbonized economy by mid-century (IPCC, 2023). This poses a political economy challenge, as widespread public acceptance of critical policies is key to enabling green transitions. For example, Pigouvian policies such as carbon taxation are viewed as a cornerstone of effective climate policy mixes by many economists (Blanchard et al., 2023). Yet, in most countries to date, carbon pricing has not been implemented on an economy-wide scale, often due to fear of popular backlash (“greenlash”). Indeed, attempts to implement ambitious green policies can trigger opposition and protest by groups who feel economically harmed or disrupted in their way of life.<sup>1</sup>

Public sentiment toward a policy – e.g., carbon taxation – can be influenced, first, by whether the policy is seen as an appropriate and fair way to accomplish a social goal – e.g., become carbon neutral by 2050 – and, second, by whether the goal itself is seen as desirable or acceptable.

In this paper, we combine both perspectives. In particular, we investigate how acceptability of carbon taxes is jointly influenced by economic reasoning on the policy’s functioning as well as societal norms toward pursuing carbon neutrality. We do so by conducting a representative survey experiment in the U.S. and testing how different combinations of information videos affect individual policy preferences, both immediately after exposure and several months later, in an obfuscated follow-up survey.

In one of the video interventions, we briefly explain carbon taxation in layman’s terms, including how it can help the economy transition to carbon neutrality through Pigouvian mechanisms, and how redistribution of revenues (via uniform cash transfers) can ease the burden on vulnerable households. While attitudes toward carbon pricing policies tend to be somewhat amenable to its specific design and framing, such as how revenues are recycled and whether it is called a “tax” (e.g., Kallbekken et al., 2011; Baranzini and Carattini, 2017; Klenert et al., 2018; Beiser-McGrath and Bernauer, 2019; Maestre-Andrés et al., 2019), individuals have been shown to exhibit limited understanding and flawed reasoning about how (Pigouvian) economic policies work (e.g., Carattini et al., 2018; Savin et al., 2020; Maestre-Andrés et al., 2021; Stantcheva, 2021). Thus, clear and transparent policy communication may be essential to dispel misconceptions and doubts about its effectiveness and distributional impacts.

At the same time, climate policy support is strongly related to general climate-related beliefs and concerns (e.g., Goldberg et al., 2021). Thus, growing political polarization over climate issues may undermine broad acceptability of carbon taxation. In fact, salient rep-

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<sup>1</sup>One prominent case study is the yellow vests movement in France that was sparked by the government’s plans to raise carbon taxes on fuel (e.g., Douenne and Fabre, 2022). Plans to increase fuel taxes (or to abolish fuel price subsidies), expand wind and solar projects, mandate switching to renewable heating, et cetera, have also been accompanied by vocal public resistance in other countries (e.g., Ewald et al., 2022; Jarvis, 2022; Patterson, 2023; The Economist, 2023). Implementing green policies could lead to electoral backlash and rising populist party support among negatively affected citizens (Colantone et al., 2023).

resentations of partisan divides – for example in the media (Gustafson et al., 2019; Chinn et al., 2020; Falkenberg et al., 2022) – can cause the public to systematically underestimate the level of climate concern and policy support in the general population by large margins (Geiger and Swim, 2016; Sparkman et al., 2022). This presents a challenge but also an opportunity. While it is difficult to alter the fundamental (moral) values and worldviews that guide how much importance people give to different societal goals, second-order beliefs (i.e., beliefs about other people’s beliefs) have been shown to be both malleable and highly relevant for opinion-formation and behavior (e.g., Nyborg et al., 2016; Miltenberger and Tingley, 2019; Goldberg, 2020; Andre et al., 2022; Bursztyn and Yang, 2022). One might therefore argue that “[c]orrecting misperceived norms of opposition and decoupling policy evaluation from identity concerns would help overcome [...] seemingly insurmountable barriers to bipartisan support for climate policy” (Van Boven et al., 2018). Thus, our second video intervention highlights the remarkably broad societal consensus on climate action by truthfully informing individuals that, according to a recent poll, a clear majority of American adults (69%) support the country’s efforts to achieve carbon neutrality by 2050.<sup>2</sup>

Finally, we include an experimental condition that combines the norm-based and the policy-centred information videos, as these two perspectives may be intricately linked. For instance, stressing the societal agreement on carbon neutrality may also increase people’s receptivity to further information on specific policy proposals, in our case carbon taxation. Firstly, weakening perceived norms of opposition could at least temporarily expand the range of acceptable discourse (aka the Overton window) among individuals who would otherwise feel instinctively compelled to dismiss any climate mitigation proposal – e.g. due to (Republican) partisan identity. This may be particularly relevant given that Pigouvian taxation as a market-based policy approach should in principle be more appealing to Conservatives than command-and-control approaches (see, e.g., Baker III et al., 2017). Second, by mitigating motivated reasoning or enhancing the perceived accuracy or “resonance” of the information, norm-based information may also aid in depolarizing cognitive reactions to climate policy information (see, e.g., Kahan et al., 2012; Druckman and McGrath, 2019; Malmendier and Veldkamp, 2022).<sup>3</sup> To the best of our knowledge, we are the first to study the joint causal effects of economic reasoning and

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<sup>2</sup>The poll was conducted by the Pew Research Center (2022) in a representative sample of 10,237 U.S. adults about half a year before our initial survey. There are two reasons why we focus on norms regarding general support for climate action rather than regarding specific support for carbon taxation. First, people may question the significance of figures on support for carbon taxes if they (correctly) perceive that the policy is poorly understood by fellow citizens. Second, and more importantly, the much-lamented polarization on climate issues in the U.S. is usually regarded as being more broad, revolving around whether human-made climate change exists and whether climate change mitigation is worthwhile to pursue.

<sup>3</sup>Similar predictions can be drawn from canonical dual-process theories of persuasion in social psychology, e.g., the elaboration likelihood model (Petty and Briñol, 2011), whereby information on social norms could shift motivation, perceived relevance, and prior attitudes through the peripheral route of persuasion (fast thinking), which would then increase the level of cognitive engagement with policy evaluation arguments for carbon taxation through the central route of persuasion (slow thinking).

social norm perceptions on policy acceptance.

Our study design proceeds in three steps. In the first step, we conducted an initial survey experiment in August 2022 with a representative sample of 2,688 U.S. adults on the survey platform Prolific. Subjects were randomly assigned to be exposed to different information videos in a  $2 \times 2$  design, focusing either on explaining how carbon taxation works (*Policy*), informing about climate action support in the U.S. (*Norm*), the combination of both (*Norm+Policy*), or a placebo video of similar length but on an unrelated topic (*Control*). We then investigate the effects of different information conditions on attitudes toward carbon taxation after video exposure, focusing on stated policy support, strong opposition against the policy, as well as incentivized donations to an environmental organization advocating for the implementation of carbon taxes in the United States. These outcome variables were pre-registered. In a second step, we collected expert predictions on the initial treatment effects via the Social Science Prediction Platform (SSPP), before any results were disseminated. Finally, in the third step, we tested for persistence of effects (on the same outcome measures) over time through an obfuscated follow-up survey that we conducted in February and March 2023, about four to six months after initial exposure to the video interventions. In total, we managed to recruit over 80% of the initial sample ( $N = 2,167$ ), balanced across all experimental conditions.

Several findings emerge from our study. First, we confirm that, prior to receiving any information, most individuals underestimated general support for carbon neutrality in the U.S. – consistent with previous studies that document pluralistic ignorance in the climate domain (Andre et al., 2022; Sparkman et al., 2022) – and that most subjects displayed considerable knowledge gaps about carbon taxation as a policy tool. Second, providing information through video interventions resulted in a significant increase in the share of participants who support carbon taxation (with uniform redistribution) by around 5%p, corresponding to an 8% increase relative to 63% in the control group. We find similar positive effects no matter whether information focused more on explaining the policy or on norms toward carbon neutrality, although point estimates are highest in the combined treatment. These effect sizes are remarkably close to the average prediction made by the panel of academic experts. Contrary to these experts’ predictions, we find no evidence that any of the interventions increased environmental donations. This may be due to low baseline donation desire, possibly a byproduct of inflation concerns and the cost of living crisis at that time. However, we detect significant reductions in strong opposition against carbon taxation by around 4%p (corresponding to 20% of baseline) in the Norm+Policy group.

Finally, we observe nuanced patterns when investigating effects in the follow-up survey, four to six months after initial exposure to the interventions. While most of the differences in favorable support for carbon taxation across groups fade away, this seems to be mostly driven by catch-up effects in the control group rather than by lack of persistent support in the treated groups. This suggests that the initial effects were concentrated

among the “most amenable” of the amenable, i.e., those who were close to the margin and would have shifted sooner or later regardless of our intervention (see, e.g., Blake et al., 2015). In line with this interpretation, results from heterogeneity analyses show that the initial increases in policy support were driven mostly by those who self-identify politically as Democrats or Independents. Interestingly, we also find a significant *decrease* in average environmental donations, although this is driven by the top of the distribution. Importantly, we observe that the Norm+Policy treatment continues to be associated with higher perceived policy efficacy as well as a sustained drop in strong opposition toward carbon taxation by more than 5%*p* (corresponding to 24% of baseline). This effect is driven mostly by Independents and Republicans. Furthermore, it holds despite lack of evidence for any explicit recollection of content from the intervention videos – or in many cases even of participating in the initial carbon taxation survey in the first place –, thus pointing toward something akin to a mere exposure effect (Fang et al., 2007).

Overall, our study finds that policy-specific economic reasoning and general social norms can play a joint role in fostering public acceptability for ambitious climate measures like carbon taxes. In particular, the considerable reduction in strong opposition toward carbon taxation (both initially and in the follow-up) – representing an upward shift in the lower end of the policy preference distribution – could be interpreted as shift in the Overton window, i.e., the range of acceptable discourse. This suggests that combining policy explanations and norm information may be useful in averting public resistance and backlash, thereby potentially facilitating depolarization of climate issues and a more constructive policy debate. Moreover, this underscores the importance of viewing policy opposition and acceptance as a dynamic process involving heterogeneous agents (see, e.g., Ehret et al., 2022; Schmelz and Bowles, 2022). In our case, it may have been necessary to first establish the perceived acceptability of the overall societal aim (attaining carbon neutrality) before starting a conversation on whether and how a particular policy (carbon taxation) would be the appropriate way to achieve it (see also Zhou, 2016; Mildemberger et al., 2022). In line with this explanation, we provide additional evidence that stressing the social consensus on climate action in the United States causally affected how our information videos were perceived more generally. Specifically, subjects who were exposed to the norm information (Norm+Policy group) were significantly less likely to rate the carbon tax explainer video as politically biased than those who did not (Policy group).

Our study builds on and contributes to several strands of the literature. First, we contribute to a growing body of research that seeks to uncover individual-level determinants of public support for (and opposition to) climate policy and carbon taxation in particular, thereby providing empirical foundations for political economy dimensions of green transition policies (Besley and Persson, 2023). For example, acceptance of carbon taxation have been shown to be affected by perceived distributional costs (Brannlund and Persson, 2012; Dietz and Atkinson, 2010; Sommer et al., 2022; Douenne and Fabre, 2022), revenue use (Maestre-Andrés et al., 2021), trust in governments (Rafaty, 2018;

Klenert et al., 2018), perceived effectiveness (Kallbekken and Sælen, 2011; Carattini et al., 2017; Douenne and Fabre, 2022), knowledge (Savin et al., 2020) and competitiveness concerns (Carattini et al., 2018).<sup>4</sup> This literature is large but mostly correlational. Fewer studies have tested whether providing detailed information about the policy principles and mechanisms can causally affect policy acceptability (e.g., Dechezleprêtre et al., 2022; Maestre-Andrés et al., 2021). The policy explainer intervention designed for our study distills insights from previous literature by attempting to address and correct most of the commonly found concerns about carbon taxation held by the general public (e.g., Carattini et al., 2018).

Second, we contribute to the growing literature which studies the role of second-order beliefs and social norms in the environmental context (Westley et al., 2011; Nyborg et al., 2016; Nyborg, 2020; Otto et al., 2020). A plethora of studies discuss the opportunities and challenges for the application of social norm interventions to promote pro-environmental behavior (Bolsen et al., 2014; Mildenerger and Tingley, 2019; Goldberg, 2020; Andre et al., 2022; Constantino et al., 2022; Drews et al., 2022; Sparkman et al., 2022), including water and energy conservation (Allcott, 2011), residential recycling (Brekke et al., 2010), demand for environmental goods (Ho et al., 2022), carbon offsetting (Huber et al., 2018).<sup>5</sup> While some studies use simple norm-based information intervention to foster individual general intentions to combat climate change (e.g., Andre et al., 2022; Engler et al., 2022), fewer studies focus on the effect of social norms on support for specific policies like carbon taxation Drews et al. (2022).<sup>6</sup>

Crucially, these two streams of literature have remained largely separate to date. To the best of our knowledge, our study is one of the first to combine these two streams and evaluate how well norm-based interventions work alone and in combination with interventions focusing more on factual policy explanation outlining the rationale behind carbon prices. One crucial insight is that social and policy considerations go hand in hand. Firstly, individuals' perception of factual or policy-focused messaging is causally affected by their perceptions of social norms: subjects who were exposed to information on the level of support for carbon neutrality in the general population were less likely to view our information videos as politically biased, suggesting that an emphasis on social consensus may have the potential to induce a virtuous cycle that reduces polarization and enable a more constructive political discourse. Second, we show that only the combined Norm+Policy intervention resulted in a persistent reduction in strong policy opposition

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<sup>4</sup>See also Fairbrother (2022) for a comprehensive review of public opinion about various climate policies, as well as Bergquist et al. (2022) for a recent meta-analysis on determinants of attitudes toward climate change taxes and laws.

<sup>5</sup>A large literature also demonstrates the importance of misperceptions and social norms in other domains (e.g., Bicchieri, 2016; Bursztyn et al., 2020; Bursztyn and Yang, 2022).

<sup>6</sup>Behavioral interventions focusing mostly on individual pro-environmental behavior ("i-frame" interventions) have been criticized by Chater and Loewenstein (2022) for their potential to crowd out much-needed systemic reforms ("s-frame" interventions). Our study demonstrates how individual-level interventions can be used to enable the implementation of systemic policies like carbon taxation by building and fostering public acceptance.

several months after exposure.

Surveys are essential for examining important but otherwise concealed factors such as policy reasoning, attitudes and views. Information provision experiments allow researchers to test economic theories and answer policy-relevant questions by varying the information set available to respondents (e.g., Stantcheva, 2021; Haaland et al., 2023). However, there are common concerns that treatment effects could reflect short-lived emotional responses or experimenter demand rather than true changes in beliefs and policy views. We carefully address these concerns by running an obfuscated follow up study four to six months after the information interventions were delivered to evaluate their persistent effect on climate policy support (see, e.g., Haaland et al., 2023; Stantcheva, 2022). Furthermore, we systematically collect predictions of academic experts (DellaVigna and Pope, 2018) to evaluate the discrepancy between the wisdom of the crowd and the actual effectiveness of specific information interventions in the climate policy domain.

The remainder of the paper is organized as follows. Section 2 describes the study design, including the interventions. Section 3 presents baseline beliefs and knowledge while section 4 illustrates the short-term results. In section 5 we present the persistence of the effects generated by the video interventions in the follow-up survey. Section 6 concludes by discussing the relevance of our main results.

## 2. Study design

The study is composed of three parts. First, we ran an initial survey to collect baseline information, implement the information interventions, and test the short-run effects on views toward carbon taxation ( $N = 2,688$ ). Subjects were randomly assigned to be exposed to different information videos in a  $2 \times 2$  design, focusing either on explaining how carbon taxation works (*Policy*), informing about climate action support in the U.S. (*Norm*), the combination of both (*Norm+Policy*), or a placebo video of similar length but on an unrelated topic (*Control*). Second, we collected predictions of the initial treatment effects through a survey of academic experts (DellaVigna and Pope, 2018) which was circulated via the Social Science Prediction Platform (SSPP) before any results were made public. Thirds, we evaluate the longer-term effects of our interventions (four to six months after the initial survey) by running an obfuscated *follow-up* survey, in which we managed to recontact over 80% of the initial sample.

### 2.1. Initial survey

We conducted our initial survey between 12 and 21 August, 2022. Participants were recruited from the general U.S. adult subject pool of the online survey company Prolific, with quotas on age, gender, and ethnicity to achieve national representativeness along these dimensions. To create exogenous variation necessary to test the causal effect of

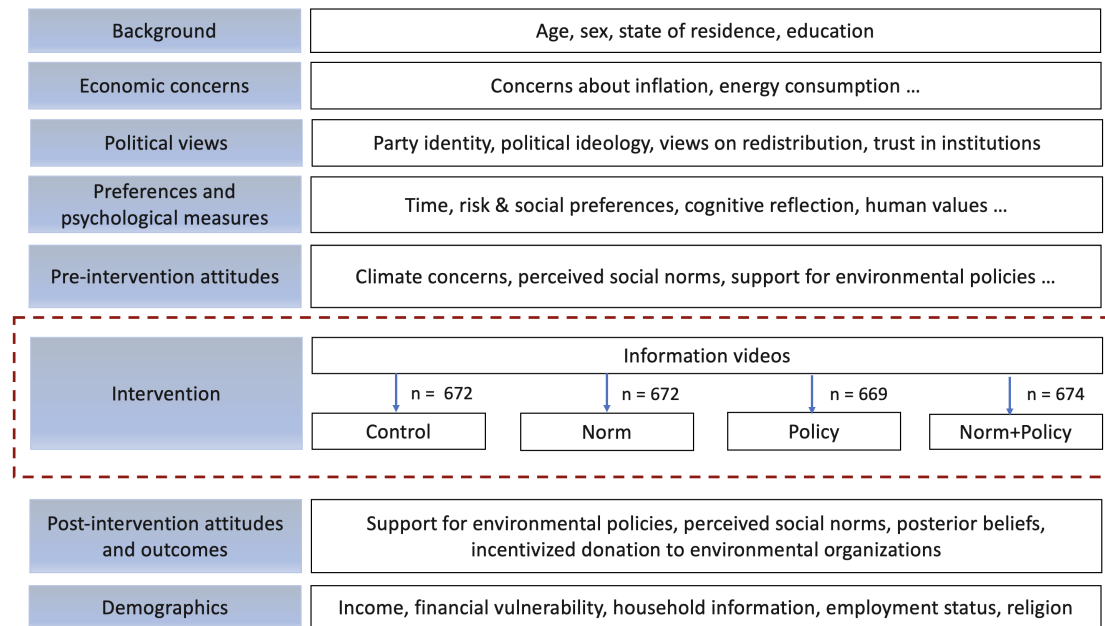


Figure 1: Initial survey structure

social norms and economic reasoning on views toward carbon taxation, we designed and created different information videos that were embedded into the survey and randomly assigned to participants. The survey was described to participants as a study that aims at understanding policy views in the United States, without explicit reference to climate change, carbon taxation, information videos in the description. The median completion time was approximately 27 minutes. Figure 1) provides an overview of the survey flow. Details on the questionnaire items and variable descriptions can be found in Appendix C.

**Pre-intervention block** In the first block, before any information videos were shown, we collected information on respondents' personal characteristics and on their baseline beliefs and attitudes. This includes questions on socio-demographic characteristics (e.g., age, gender, education), economic concerns (i.e., energy dependence, inflation concerns), and a range of questions regarding political views and identity, such as political party affiliation (as well as strength of identity), political ideology (on the left-right spectrum as well as regarding redistribution and taxation), affect toward different partisan groups and individuals, and trust in institutions. We also included survey modules on time, risk, and social preferences (Falk et al., 2018), on cognitive reflection, and on values and personality traits (e.g., Schwartz human values scale, conspiracy mentality). Finally, we elicited participants' baseline beliefs and attitudes about climate change – adapted from Leiserowitz et al. (2019); Ballew et al. (2020) –, second-order beliefs (i.e. perceived norms toward carbon neutrality goals) as well as their views on carbon taxation with uniform redistribution and four other environmental policies (fuel efficiency standard, green in-

infrastructure programs, R&D in renewable energy, and wildlife conservation). These policies were adapted from the Pew Research Center survey. Carbon taxation was described as requiring fossil fuel companies to pay a fee on carbon emissions and redistribute the payment to Americans through lump-sum cash transfers. Furthermore, we elicited baseline beliefs about potential impacts of this policy on carbon emission, households, the economy overall, as well as questions asking participants to state how (un)certain they are about their responses (Enke and Graeber, 2023).

**Intervention block** The second block contained the information treatments. Respondents were exposed to one of four possible combinations of information video sequences, depending on which experimental condition they were exogenously assigned to. The videos were professionally animated and included a voice-over by a freelance American female voice actor. Climate policy and communication experts reviewed the video scripts certifying they were correct and easy to understand. Figure 2 provides a visual summary of the video treatments for each condition.

Each subject in our study, including those assigned to the *Control* condition, started by watching a brief animated video that explains the concept of (anthropogenic) climate change, potential consequences (e.g., extreme weather events), and introduced the concept of carbon neutrality.<sup>7</sup> In addition, subjects assigned to the *Norm* and *Norm+Policy* treatments received an extended version of the climate change video that further informed participants about the descriptive social norm in America after carbon neutrality is introduced. More specifically, an additional 30-second segment explained that, according to a recent survey by the Pew Research Centre, 69% of adults in the U.S support the country taking steps to become carbon neutral by 2050. The script described the Pew Research Center as a nonpartisan research institute and emphasized that the poll was conducted in a representative sample that included participants from all across America and holding a diversity of political views (including Republicans, Democrats, and Independents).

After watching the first information video on climate change – either including or not including norm-based information –, all subjects saw a second video that was about 3:30 minutes in length. Subjects assigned to the *Policy* and the *Norm + Policy* treatments saw a policy explainer video which described, in simple terms, the economic mechanisms through which carbon taxation (labeled as “carbon pricing”) could reduce greenhouse gas emissions, as well as its economic and distributional effects when revenues are redistributed uniformly to households through lump-sum cash transfers. The purpose of

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<sup>7</sup>Differently from previous studies (Dechezleprêtre et al., 2022), our control group was invited to watch a short video. This design choice was motivated by two reasons. First, we wanted to minimize differential attrition and fatigue, since respondents who spend time watching videos may be more likely to drop out (or become fatigued) due to longer overall survey duration (Stantcheva, 2021). Second, we wanted to keep knowledge and priming effects on climate change and carbon neutrality homogeneous across experimental groups.

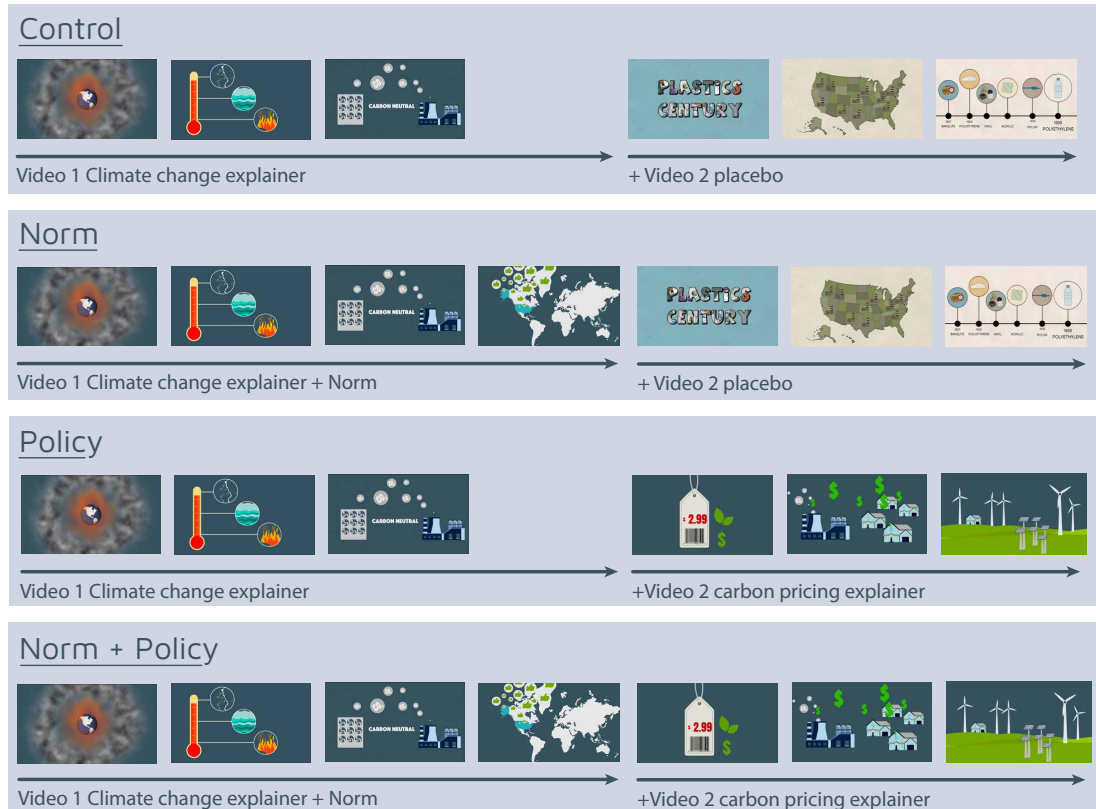


Figure 2: Video interventions by treatment condition

*Notes:* Selected frames from each information video by condition. Video 1 had a duration of 1:24 minutes in the Control and Policy groups, and 1:56 minutes in the Norm and Norm+Policy groups. Both the placebo video and the carbon pricing explainer video had a duration of about 3:30 minutes. The placebo video was an excerpt on the history of plastic created by TED-Ed. Links to each video intervention can be found in Appendix B.

this video was to increase knowledge and understanding by explaining the economic reasoning behind carbon taxation.

To hold survey engagement, fatigue, and wage rates roughly constant across groups, subjects in the Control and Norm groups were asked to watch a placebo video whose length was approximately the same as that of the carbon pricing explainer. The placebo video was an animated explainer on the history of plastic; thus, the topic is loosely environmentally-related but it does not convey any explicit information on climate change or climate policies.<sup>8</sup> While we cannot rule out that the information from the placebo video may nevertheless have an effect in its own, we note that this would, if anything, lead to an underestimation of our treatment effects. However, to mitigate concerns about potential placebo effects, we showed an extremely condensed (30 seconds) version of the placebo video to all subjects before the first video on climate change, including those in

<sup>8</sup>The video was designed by Sharon Colman and the footage is courtesy of TED-Ed. We edited the video slightly by cutting it to the same length as our carbon tax explainer video.

the Policy and the Norm+Policy groups. We framed this as test run to participants so that they could test whether the video and audio settings on their devices were correct functioning.

Immediately after each of the two information videos, subjects were asked for direct feedback on the video they just watched by rating it with regard to five statements on 4-point Likert scales: whether it was (1) interesting, (2) informative, (3) surprising, (4) politically biased, and (5) too long. We also asked subjects whether they experienced any technical problems. 98.6% reported having no trouble watching the videos.

**Post-intervention block** In the third block (post-intervention), we measured our main outcome variables to assess whether the different intervention videos affected participants' beliefs and attitudes. First, people were asked to report again their stated support for environmental policies. We specifically elicit participants' stated level of support for introducing carbon taxation (with uniform cash transfers) as a policy in the United States on a 4-point Likert scale (strongly support, somewhat support, somewhat oppose, strongly oppose). This constitutes our main outcome variable. For political economy considerations, the full distribution of views in the population matters, so we examine the effects of the video interventions not only on the share of individuals who support the policy, but also on the share of individuals who strongly oppose it.

Support for carbon taxation was further measured through an incentivized donation decision. Participants were told that by completing the survey, they were automatically enrolled in a lottery to win 100\$. We then gave them the choice to divide their hypothetical lottery prize between themselves and two environmental organizations. Decision were incentivized by implementing the choices of a random subset of participants. One of the organizations was the Climate Leadership Council (CLC), a bipartisan group that advocates for the implementation of a carbon tax in the United States. The amount donated to CLC can take values between \$0 and \$100 with increments of \$0.01 to provide an incentivized and fine-grained measure of the intervention's impact on pro-environmental behavior and support for carbon taxes. The other environmental organization was the National Wildlife Federation (NWF), whose core aims are not directly related to pricing carbon. We included this second donation option to reduce demand effects and to be able to assess extensive margin (i.e., general pro-environmental attitudes) versus intensive margin (i.e., specific support for carbon pricing) effects of our interventions. Participants had to commit to donating the chosen amount before they knew whether they had won the lottery. We stated explicitly that we would match (1:1) the donation amount that participants allocated within the survey to reduce wait-and-see motives for donating outside of the survey.

Furthermore, we assess the effects of our video interventions on potential intermediary outcomes such as subjects' reasoning about carbon pricing (mechanisms, effectiveness, distributional effects, economic impacts, etc.) through Likert scale questions, two covert

Table 1: Basic sample characteristics

|                                      | (1)<br><i>Unweighted sample</i> | (2)<br><i>Weighted sample</i> |
|--------------------------------------|---------------------------------|-------------------------------|
| Average age [years]                  | 43.69                           | 44.47                         |
| Female share [%]                     | 51.10                           | 48.26                         |
| Ethnic minority (excl. Hispanic) [%] | 20.82                           | 18.70                         |
| College degree [%]                   | 53.26                           | 52.31                         |
| Republican / Lean Rep. [%]           | 26.67                           | 45.00                         |
| Observations                         | 2688                            | 2688                          |

Column (1) shows sample shares based on the raw data. Column (2) weights observations to improve representativeness by political party. Note that we did not directly include a question on ethnic background in our survey, but used information from Prolific on respondents' demographic characteristics, which does not include an explicit category for Hispanic or Latino.

knowledge questions that elicited agreement to deliberately incorrect statements about the policy, estimates about carbon footprints, and posterior beliefs about social norms about carbon neutrality in the United States on continuous scales. For an overview of the outcome variables, see Appendix Table A1.

The survey concluded with additional demographic and socio-economic questions that are unlikely to be influenced by the treatments (e.g., employment, income, religion, financial distress). Participants were also given the opportunity to leave open-ended feedback in a text-entry box.

## 2.2. Sample characteristics and randomization checks

As described above, participants were recruited from the Prolific general U.S. adult subject pool, with quotas on age, gender, and ethnicity. In total 2,801 individuals opened the survey and 2,706 consented to participation, although 18 respondents dropped out before reaching the intervention block. Thus, our main sample consists of 2,688 U.S. adults. The median completion time was about 27 minutes. Participants were paid 2.80 on average. We included two attention check questions to verify the quality of responses. 37 subjects failed one attention check, and only 2 subjects failed both checks. Our main analyses include these subjects, as the number of fails is extremely low and as we did not pre-register any exclusion criteria.

Table 1 presents basic characteristics of our initial survey sample. While approximately representative of the overall U.S. adult population along multiple demographic characteristics. This is true by construction for the targeted dimensions of age, gender, and ethnicity. However, the sample is slightly more educated and severely skewed to the left regarding political attitudes, which could bias our effect sizes given the strong partisan divide on environmental topics in the United States (although note that treatments were

still randomized within this sample). Therefore, we calculate sampling weights based on the latest Gallup poll to adjust for the under-representation of Republicans in our survey.<sup>9</sup> Weighting has minor impact on the composition of other characteristics – for instance, the share of female participants drops slightly from 51.1% to 48%. However, Republicans and those leaning Republican are now suitably represented as compared to the unweighted sample, which is paramount in our context. For example, the share of respondents who believe that climate change is either not happening or mostly due to natural causes is 13.9% in the unweighted sample, but increases to 20.4% when we apply sampling weights. All our main analyses will therefore be based on the weighted sample.

To ascertain that our experimental conditions are balanced in terms of observable characteristics we also conduct randomization checks on age, education, political party affiliation, general climate change attitudes, and baseline support for carbon pricing in Appendix Table A3. We find no evidence of significant systematic differences across conditions, suggesting that the comparison between different groups will allow us to empirically identify the impact of the different information regimes. We note that subjects in the Norm and Norm+Policy groups seem to have slightly higher average baseline concern for climate change and support for carbon taxation – although these differences are not statistically significant. We include controls for baseline attitudes in all our formal analyses in Section 4.

### 2.3. Expert predictions

Expert predictions are increasingly used in social science research (DellaVigna et al., 2019), as independent predictions of experts are of value to maximize policy impact and assess the discrepancy between study’s findings and the profession’s priors, especially in light of potential null results (Chopra et al., 2022). Therefore, prior to disclosing any of our findings, we collected expert predictions for average treatment effects of our video interventions on policy support and donations in the initial survey. The survey was distributed via the Social Science Prediction Platform between October and November 2022. All platform users could make predictions, while a number of experts was also contacted directly by the authors and sent an anonymous link. Forecasters were provided with information about experimental instructions as well as reference values for support for carbon taxation and average donations to the CLC (as well as standard deviation) in our control group. As it is common, predictions were not incentivized. Our prediction survey was completed by a total of 25 forecasters. Most respondents (67%) identified themselves as graduate (Ph.D. or Master’s) students. Economics (65%) is the discipline with the most

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<sup>9</sup>Specifically, we split the sample into 5 groups: Democrat, leaning Democrat, Independent, leaning Republican, and Republican. For each group, we calculate a weight so that the weighted share of each group in our sample corresponds to the population share according to the Gallup world poll. Democrats in our sample receive the lowest weight (0.6123) given that they are most over-represented in our survey, and Republicans receive the highest weight (2.3288).

representation, and 48% of forecasters identify behavioral and experimental economics as their primary area of competence.<sup>10</sup>

## 2.4. Follow-up survey

To examine the persistence of treatment effects on views toward carbon taxation over time, we conducted an obfuscated follow-up survey between February and March 2023 – more than four months after the completion of the initial survey. All individuals who had completed our initial survey and were still active on Prolific were invited to participants. To reduce attrition, we kept the survey length at a minimum and incentivized participation through an usually high hourly payment rate. The median completion time was 5:20 minutes, implying an hourly wage of 9.90 Pounds per hour, which is relatively high for Prolific standards. In total, we 2,167 participants completed the follow-up survey, representing over 80% of the original sample. To avoid potential demand and consistency effects, we obfuscated the nature of the follow-up survey through several measures. First, we did not mention any connection to the initial survey. Second, we used a different researcher identity, a new study title, and a stylistically different survey description. Third, we also included a set of decoy questions on another policy (universal basic income) to distract participants from the true purpose of the study. As an additional check, we asked subjects at the end of the follow-up survey whether they had previously participated in studies about carbon pricing. About 65% of subjects answered they had not, and no one explicitly voiced any suspicion that the surveys were connected in an open text box.

The follow-up survey started with a few questions on demographic characteristics to mimic a standalone survey. We then briefly described two policies and elicited self-perceived knowledge, attitudes, and support for these policies. As the first policy, we used universal basic income, which mainly served as a decoy, and the second policy was carbon taxation with uniform cash transfers, which was described in the exact same way as in the initial survey. The carbon taxation module also included a covert understanding question that we already used in the initial survey. Furthermore, we elicited perceptions of social norms toward reaching carbon neutrality in the United States by 2050. No additional information on norms or any of the policies was included. At the end of the survey, we included an incentivized lottery similar to the one used in the initial survey. Participants had the opportunity to donate a share of the potential \$100 prize to the Climate Leadership Council and to the UBI Center, a nonpartisan organization that conducts research on universal basic income policies. Finally, we included questions on the 15-item Big Five personality index, overall life satisfaction, and whether subjects had previously participated in studies on the topic of carbon pricing and/or universal basic income.

To keep the analysis comparable, we use the same sampling weights for each sub-

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<sup>10</sup>The composition of our sample of experts is in line with previous studies. Furthermore, (DellaVigna and Pope, 2018) and (Otis, 2021) found that, if anything, graduate students are more accurate than faculty members.

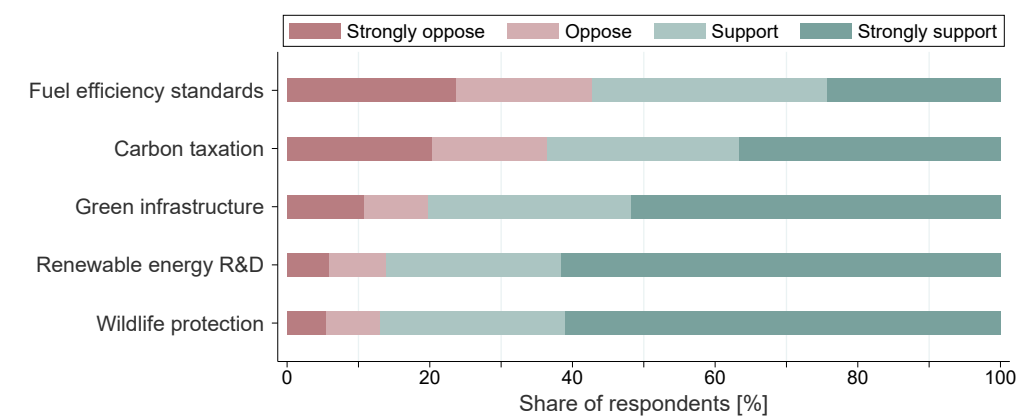


Figure 3: Baseline support for environmental policies

*Notes:* Share of respondents who strongly support, support oppose or strongly oppose different environmental policies before the video interventions. Observations (N=2688) are weighted to improve representativeness by political identity.

ject as in the initial survey. Appendix Table A20 gives an overview of the number of participants by experimental condition. There is no evidence for differential attrition. Although recontact rates vary slightly by experimental condition, this is most likely the result of pure chance, as we cannot reject the null-hypothesis of equal rates across all groups ( $p = 0.4287$ ). Appendix Table A21 shows that the experimental groups remain balanced with regard to observable characteristics when conditioning on the subsample who completed the follow-up survey. Hence, we conclude that the follow-up sample is suitable to investigate whether the video intervention had persistent impacts on individuals' beliefs and attitudes toward carbon taxation.

### 3. Baseline attitudes and beliefs

#### 3.1. Baseline climate policy views

Prior to being exposed to the video interventions, we asked respondents about their baseline support levels toward various environmental policies. Apart from carbon taxation (with uniform lump-sum redistribution), these policies include wildlife conservation, investments and research into renewable energy, green infrastructure programs, and tighter fuel-efficiency standards for vehicles. Carbon taxation was described as requiring fossil fuel companies to pay a fee on carbon emissions and redistribute the payment to Americans uniformly through lump-sum cash transfers.

Figure 3 provides an overview of baseline views toward these climate policies. While each policy under examination receives majority support among U.S. adults, there are notable differences. Wildlife protections and research into renewable energy receive almost unanimous support. In contrast, fuel-efficiency standards (so that only electric or hydrogen vehicles can be sold after 2030) proved to be the least popular policy in our study.

Carbon taxation with lump-sum redistribution was supported by about 63% of our respondents, but a sizable share of around 20% is firmly opposed to this policy – twice as high as compared to, for example, green infrastructure programs –, which may hint at a potentially vociferous minority that would be roused by attempts to implement carbon taxation.<sup>11</sup> As to be expected in the U.S., there is a strong partisan divide. Appendix Figure A1 presents support for each policy separately by political identity and documents considerable gaps in average policy support between Democrats and Republicans (with Independents sitting in between). Notably, carbon taxation faces some opposition even among self-identified Democrats, a group that is overwhelmingly supportive of most other environmental policies.

### 3.2. Baseline beliefs and knowledge

Prior to the intervention, we also elicit norms toward climate action by asking participants to estimate which percentage of people stated that they are in favor of the 2050 U.S. carbon neutrality targets. We document that most individuals hold erroneous beliefs about how many others support carbon neutrality objectives, thus providing yet another case study of pluralistic ignorance and failed crowd wisdom regarding perceptions about others (Andre et al., 2022; Drews et al., 2022; Sparkman et al., 2022; Bursztyn and Yang, 2022). The actual share of U.S. adults in favor of reaching carbon neutrality by 2050 is 69% according to a poll conducted by the Pew Research Center in January 2022, with a representative sample of more than 10,236 American adults (Pew Research Center, 2022). However, about two-thirds of our respondents underestimate this number, with the average estimate being 57.5% and the median estimate being 60%.<sup>12</sup> This general tendency can be explained, for example, by outsized visibility of contrarian views and partisan polarization on climate issues in traditional mass media (e.g., Gustafson et al., 2019; Chinn et al., 2020; Falkenberg et al., 2022), or by anchoring of beliefs on more conservative historic levels of political attitudes, failing to update estimates to match current public opinion.<sup>13</sup>

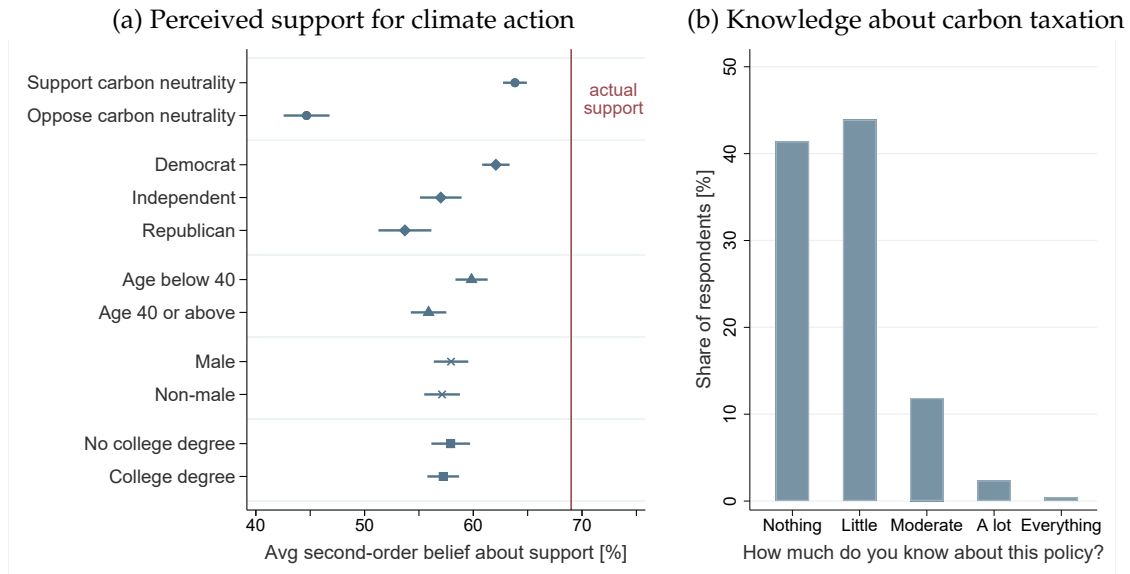
Furthermore, Figure 4a shows that, while there is some variation in beliefs across background characteristics, the average estimate remains below the actual number for all sub-

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<sup>11</sup>Baseline views in our sample are in line with previous studies. For example, Dechezleprêtre et al. (2022) find that a carbon tax with homogeneous cash transfers to all households is supported by 55% of American citizens. Carattini et al. (2019) show that 57% of Americans support the implementation of a tax if its proceeds are shared domestically to each citizens. Similarly Drews et al. (2022) find that a carbon tax with unspecified revenue use is accepted by 43% and opposed by 39% of Spanish respondents, with the rest being undecided.

<sup>12</sup>In our own sample, the share of respondents in favor of carbon neutrality was 67.3%. We used the exact same wording as the Pew Research Center.

<sup>13</sup>We suspect that part of the frequently documented pattern for pluralistic ignorance may also be driven by uncertainty that anchors estimates at 50 as mental shortcut (De Bruin et al., 2000; Enke and Graeber, 2023). In our own sample, we find evidence that beliefs are biased toward 50 for respondents who are very uncertain about their guess, but converge toward the true number as certainty increases (see Appendix Figure A2).



**Figure 4: Baseline beliefs about carbon neutrality support and knowledge of carbon taxation**

*Notes:* Panel a) shows the average guess about the share of Americans in favor of the U.S. carbon neutrality target in different subgroups. Error bars represent 99% confidence intervals. The red vertical line identifies the actual prevalence of support for carbon neutrality goals according to a poll conducted by the Pew Research Center in January 2022. Panel b) shows the distribution of self-assessed knowledge about carbon tax with lump-sum redistribution.

groups. Notably, we see that people who are in favor of the U.S. carbon neutrality goals on average estimate the proportion of the population to be significantly higher than those who are not in favor. This is reminiscent of an underlying false consensus effect, where opponents of climate action severely overestimate the prevalence of their own opinion. However, even those who support the carbon neutrality themselves underestimate support in the general population, on average, although they are closer to the actual share. In line with this pattern, Republicans' estimates are on average lower than Democrats' by 5 to 12%, with Independents falling in between. Younger people tend to give slightly higher estimates. There is little difference in average norm perceptions by gender and education.

Figure 4b shows that, when asked to self-assess their knowledge of the policy, more than 80% of respondents declare to know either little or nothing at all about carbon taxation. This is in line with previous studies (Maestre-Andrés et al., 2021) documenting that many people lack an understanding about Pigouvian taxation and its economic merits. When asked about perceptions of whether the policy would be effective in reducing carbon emissions and how it would affect households and the economy, more people tend to view carbon taxation favorably than unfavorably. However, there is substantial uncertainty (see Appendix Figure A3). For example, while about 29% of subjects believe that carbon taxation would be ineffective in reducing emission, almost the same share of subjects are undecided.

### 3.3. Predictors of baseline attitudes toward carbon taxation

Correlational results on potential determinants of baseline views toward carbon taxation with uniform redistribution are presented in Appendix Table A4. Both perceived support for climate action in the general U.S. population and self-perceived knowledge about carbon pricing are significantly positively correlated with policy acceptance (conditional on political identity, financial concerns, and demographic characteristics). Higher concerns about inflation and prices for fuel and energy are associated with less positive views toward carbon taxes, while daily car use has no predictive power. Interestingly, self-reported financial fragility – defined as whether subjects are confident they could come up \$2,000 if an unexpected need arose (Lusardi et al., 2011) – is positively associated with policy acceptance, potentially due to the mention of uniform revenue redistribution in the policy description. Political party identity is a strong predictor of policy support, with Democrats are significantly more favorable toward carbon taxation than Republicans, and Independents in-between. However, this partisan gap disappears almost completely once controlling for general climate change attitudes and political ideology (progressive vs. conservative), whereas the coefficients for perceived norms and self-assessed knowledge remain significant at first. This changes only once additionally including personal attitudes toward taking steps toward carbon neutrality, which may be endogenous to perceived norms and policy knowledge. Ultimately, these correlations cannot cleanly establish any causal relationship, which is why we move on to investigating the impacts of our exogenous video interventions in the next step.

## 4. Short-term effects of the information interventions

In this section, we present treatment effects of the different interventions on individuals' beliefs and attitudes toward carbon taxation in the initial survey, i.e., shortly after exposure to the video interventions.

### 4.1. Effect on perceptions, beliefs, and reasoning

**Perception of the information videos** Immediately after each information video, we asked participants whether they had any problems playing the clip as well as for their honest feedback on whether they found the video interesting, informative, surprising, politically biased, or too long. These immediate reactions help us shed light on how well each video was received and whether there were systematic differences depending on its content.

Figure 5a provides an overview of perceptions for the first video, i.e., the climate video, by plotting for each of the five statements the share of subjects who agreed (or strongly agreed) with it. In addition, we split the sample by whether the subject watched the version with norm information (Norm and Norm+Policy group) or without (Policy and

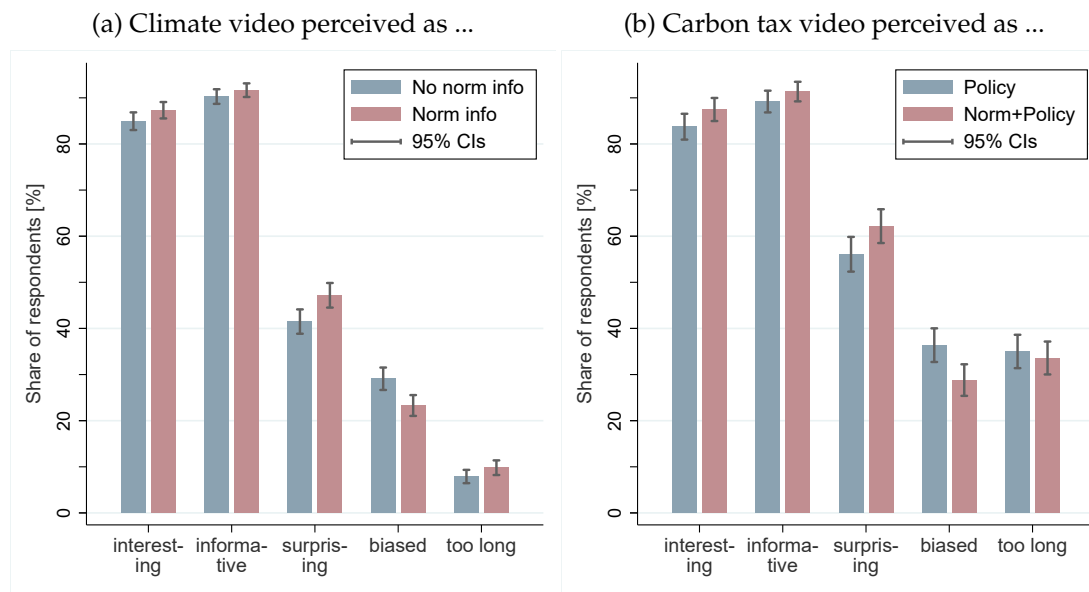


Figure 5: Perception of the information videos

*Notes:* Bars indicate the share of respondents who agree or strongly agree to specific statements about the videos we have shown them. Perceptions of the policy video (i.e., the carbon tax explainer) only includes subjects in the Policy and Norm+Policy groups, as the other subjects watched a placebo video instead. Error bars indicate 95% confidence intervals.

Control group) – recall that the versions were otherwise identical. Overall, it seems that the climate video was well-received. A vast majority rated the video as interesting and informative; less than half of the sample thought it was surprising and less than 30% perceived it as politically biased; only around 9% said the video was too long. Furthermore, we document that being informed about the fact that 69% of Americans support the U.S. carbon neutrality goals led to a more favorable evaluation of the video as a whole. Notably, subjects were 6%*p* more likely to rate the video as surprising and 5% less likely to perceive it as politically biased. These effects are statistically significant at the 1% level, robust to controlling for socio-demographic characteristics and baseline attitudes, and they hold for Democrats as well as Republicans (see Appendix Tables A5 and A6).<sup>14</sup> This is in line with the idea that a stronger perception of social consensus can bridge ideological divides on climate issues (e.g., Goldberg, 2020)

Figure 5b provides an overview of perceptions for the carbon tax explainer video. Note that this only includes subjects in the Policy and Norm+Policy groups, as the other subjects watched the placebo video on the history of plastic instead.<sup>15</sup> Compared to the cli-

<sup>14</sup>We also detect a weakly significant increase in the share of respondents saying the video was too long, which is perhaps unsurprising given that the video with norm info was indeed about half a minute longer. This effect was driven by Democrats, who may have felt like sitting in a choir that was being preached to.

<sup>15</sup>We compare perceptions of the policy explainer video with the placebo in Appendix Table A9. Most importantly, only around 7% of subjects perceived the placebo video as politically biased, compared to more than 30% for the carbon tax video, which is in line with our goal of choosing an uncontroversial topic for the placebo. The placebo was also more likely to be perceived as interesting and informative and less likely to

mate video, the policy video was perceived on average as more surprising, slightly more biased, and more people thought it was too long – which probably reflects that it was indeed about twice as long. However, the general patterns are similar to Figure 5a. Most subjects rated the video as interesting and informative. The norm information yields similar effects too. Importantly, respondents were more than 5%*p* less likely to perceive the carbon tax explainer video as politically biased when they were previously informed about the share of Americans in favor of the U.S. taking steps to become carbon neutral by 2050. Appendix Tables A7 and A8 shows that this effect is statistically significant and largely concentrated among Republicans and individuals leaning Republican.

Overall, we find that our information videos were generally well-received. Moreover, we document that the inclusion of the social norm information causally affects whether the climate change and policy explainer videos are viewed as politically biased, suggesting a double dividend of overcoming pluralistic ignorance for building broad support for political action against climate change. In particular, a stronger perceived social consensus can mitigate polarizing responses to news that are related to motivated cognition as well accuracy motives in the sense of what is considered credible evidence (see, e.g., Kahan et al., 2012; Druckman and McGrath, 2019; Chopra et al., 2023).

**Perceived norms toward climate action** Next, we explore the effects of receiving norm information in the climate video on second-order beliefs and perception of social norms. For this purpose, we first compare individuals’ estimates for the share of Americans in favor of the U.S. carbon neutrality goals before and after watching the information videos. Figure 6a shows that, absent norm information, there is a strong stickiness in beliefs. Apart from regression-to-the-mean at the boundaries and some scattered outliers, most posterior estimates for the share of Americans who support carbon neutrality are distributed closely around the prior estimate, with 72% of subjects in the Control or Policy group stating a posterior within a range of 10 points around the prior, and 29% giving the identical number. However, there is visible belief updating toward the actual share of 69% in the Norm and Norm+Policy group. On average, individuals who previously underestimated this number move their posterior estimate upward, whereas (a smaller number of) individuals who previously overestimated the number revise their estimates downwards. There is clear bunching at “69” and “70”, with about 45% of subjects who received the norm information giving one of these estimates, compared to 8% of subjects who did not. As most individuals underestimate climate action support in the general population, providing norm information leads to an increase in in posterior estimates by around 7%*p* ( $p < 0.001$ ) on average in the full sample, and the effect size increases to around 11%*p* ( $p < 0.001$ ) when excluding subjects whose prior belief was above the actual number (see Appendix Table A10, columns 1 and 2).

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be perceived as too long, which is a reflection of the placebo video being less controversial. There were no significant differences in average perceptions between the Norm group and the Control group.

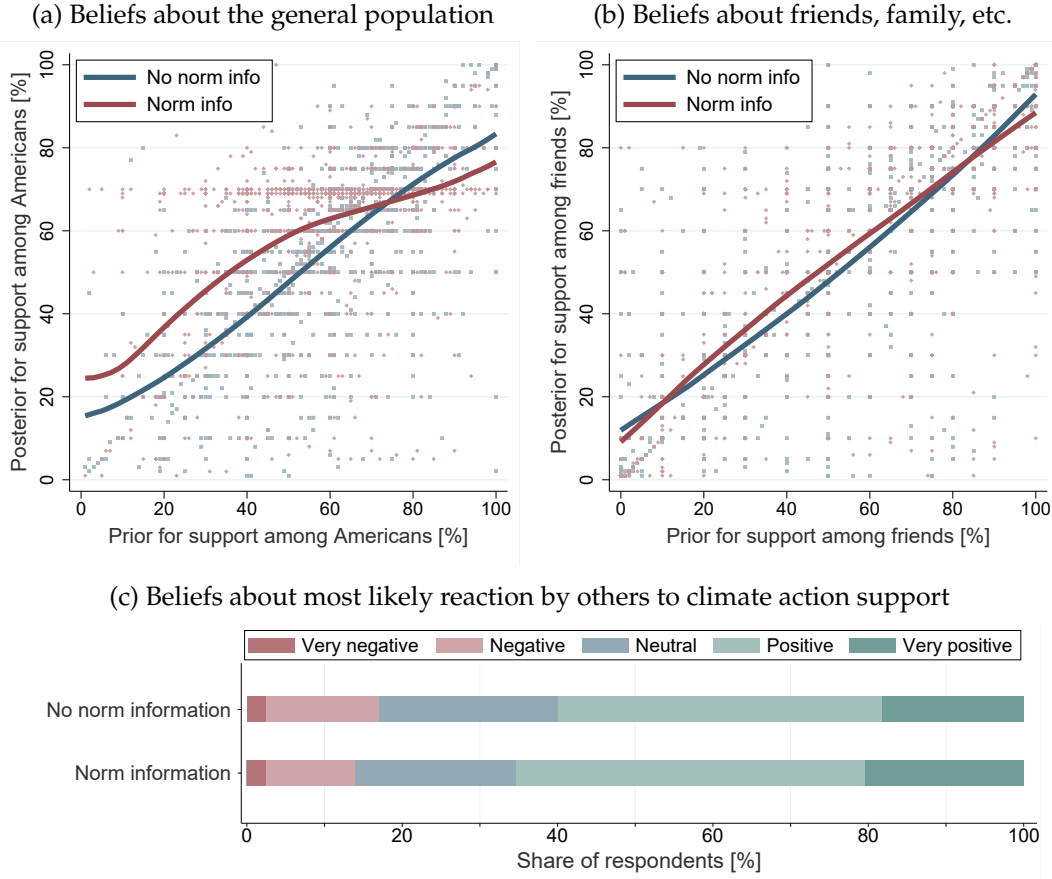


Figure 6: Manipulation checks for the norm video

*Notes:* Panel a) shows a scatter plot of prior and posterior perceptions of social norms in the general U.S. population, with fitted lines estimated from local linear regressions with Epanechnikov kernel and bandwidth of 15. Panel b) shows the same relationship for beliefs about friends or family members. Panel c) shows the the distribution of responses on what individuals think the most likely reaction of their friends and acquaintances would be if in a casual conversation someone said that the U.S. should be doing much more to fight climate change.

Thus, the norm treatment was successful in reducing pluralistic ignorance about climate views in the U.S. by aligning peoples' perceptions more closely to the true opinions of their peers. At the same time, we observe some degree of conservatism in belief updating, which could be due to skepticism about the information we provided, general belief stickiness, and possibly inattention.

Moreover, one could argue that what is relevant for behavior are not just the perceptions of general norms in a population, but also of the "local" norms among people with whom individuals interact regularly, such as friends, family members, or colleagues (see, e.g., Bicchieri, 2016). Figure 6b plots the posterior beliefs about support for carbon neutrality among people they know. The belief updating effects for local norms are substantially weaker, suggesting that individuals are hesitant in making inferences about private views of their friends and acquaintances based on knowledge about views in the broader population. However, the norm information was able to induce a small (around 3 points)

statistically significant increase in posterior beliefs among individuals who previously underestimated support in the general population (see Appendix Table A10, column 3).

Finally, all the results above focus on people's perceptions of descriptive frequencies. Yet, the definition of social norms usually also embeds an injunctive element, i.e., what people think others should or should not do or say in a given situation. To shed more light on perceptions of injunctive norms, we included a post-intervention question on whether subjects think that their friends and acquaintances would react positively, negatively, or indifferently in a casual conversation if someone said that the U.S. should be doing much more to fight climate change. Figure 6c and Appendix Table A10 show that, while even without norm information about 6 out of 10 subjects think that the reaction would be more positive, receiving the norm information increases the share by around 6%p ( $p < 0.05$ ).

**Knowledge and economic reasoning about carbon taxation** To examine how the carbon tax explainer video affected beliefs and economic reasoning about this policy, we included a post-intervention survey module in which we elicited subject's level of agreement to various statements. These included questions about likely behavioral responses by consumers and firms to the tax, whether it would effectively reduce carbon emissions, and its impacts on households and the economy. The module also included two obfuscated quiz questions with factually incorrect statements that we use to test if the explainer improves knowledge and corrects common misconceptions about carbon taxation.<sup>16</sup> Appendix Figure A4 and Table A11 show that subjects who are randomly assigned to watch the policy video explainer are subsequently more likely to disagree with the incorrect statements.<sup>17</sup>

This improvement in knowledge about carbon taxation also translates into changes in economic reasoning about the mechanisms and likely impacts of the policy. Figure 7 shows that subjects who watched the policy explainer on average perceived carbon taxes to be more effective in reducing carbon emissions, more progressive (i.e., benefiting the poor more than the rich), and more likely to benefit oneself financially. Quantitatively, these effects correspond to about 15% of a standard deviation. The policy explainer however does not appear to significantly reduce the beliefs that carbon taxation harms the overall economy. While we collapsed the experimental conditions into those with and without policy information for simplicity, Appendix Table A12 shows that the Norm

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<sup>16</sup>The two quiz questions asked people to express their agreement with statements declaring that "The main purpose of carbon pricing is to collect revenues to fund other environmental policies like green infrastructure programs" and "Carbon pricing would lead to high-emissions technologies being banned". Previous studies have documented that a substantial share of the population holds erroneous beliefs about these two aspects when asked about carbon pricing (Carattini et al., 2018). In our own study, more than half of the subjects in the Control and Norm groups agree to the banning statement and more than 7 out of 10 subjects agree to the funding statement.

<sup>17</sup>Quantitatively, these effects correspond to 10% of a standard deviation for the funding question and 20% of a standard deviation for the banning question.

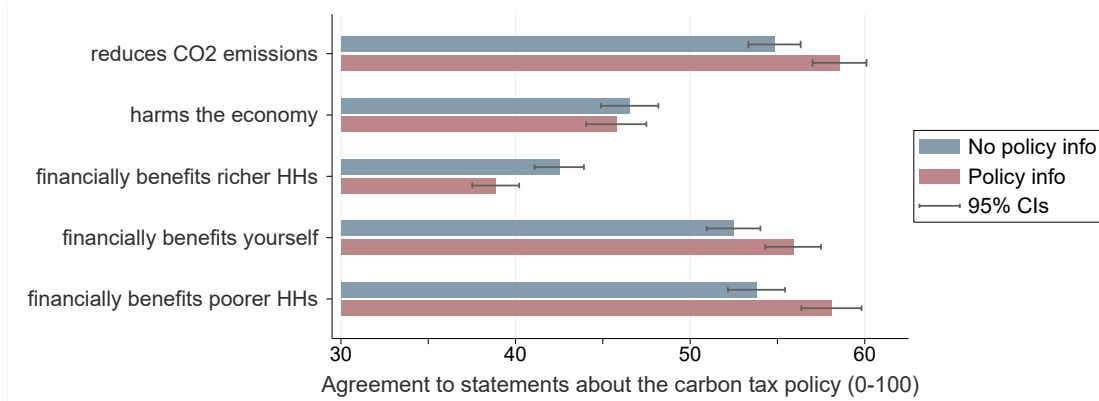


Figure 7: Impact of policy explanation on reasoning about carbon taxation

*Notes:* Bars indicate the average level of agreement to the potential impacts of carbon taxation with uniform redistribution on a scale from 0 (fully disagree) to 100 (fully agree).

information video alone had no significant effects on perceptions about the impact of carbon taxation. However, there is some suggestive evidence that combining norm and policy information lead into more optimism regarding the potential to reduce carbon emissions than policy information in isolation ( $p = 0.065$ ). Furthermore, higher perceived impacts on carbon emissions are mostly driven by beliefs about firms adopting less carbon-intensive technologies rather than more low-carbon innovation activities or households adjusting their consumption behavior (see Appendix Table A13). Consistent with the causal effect of norm information on perceptions of the policy explainer video, we find that effects on economic reasoning are strongest in the Norm+Policy group.

#### 4.2. Effects on stated policy attitudes

The previous subsections suggest that our exogenous manipulations were successful. The norm information shifted subjects' estimates about norms toward climate action in the general population, while the the policy explainer improved subjects' understanding and reasoning about carbon taxation. The next step of our analysis evaluates whether belief updating about social norms and improved knowledge about carbon taxation translate into overall higher stated support for the policy immediately after the interventions. We focus on two outcome variables. First, we look at whether individuals are in favor of implementing carbon taxation with uniform redistribution in the U.S., indicated by stating to either somewhat support or strongly support this policy. However, as even minorities can receive broad media attention and have an outsized impact on political processes if they are well-organized and vocal (see, e.g., Douenne and Fabre, 2022; Ewald et al., 2022), we further investigate effects on strong opposition toward the policy, as also specified in our pre-analysis plan.

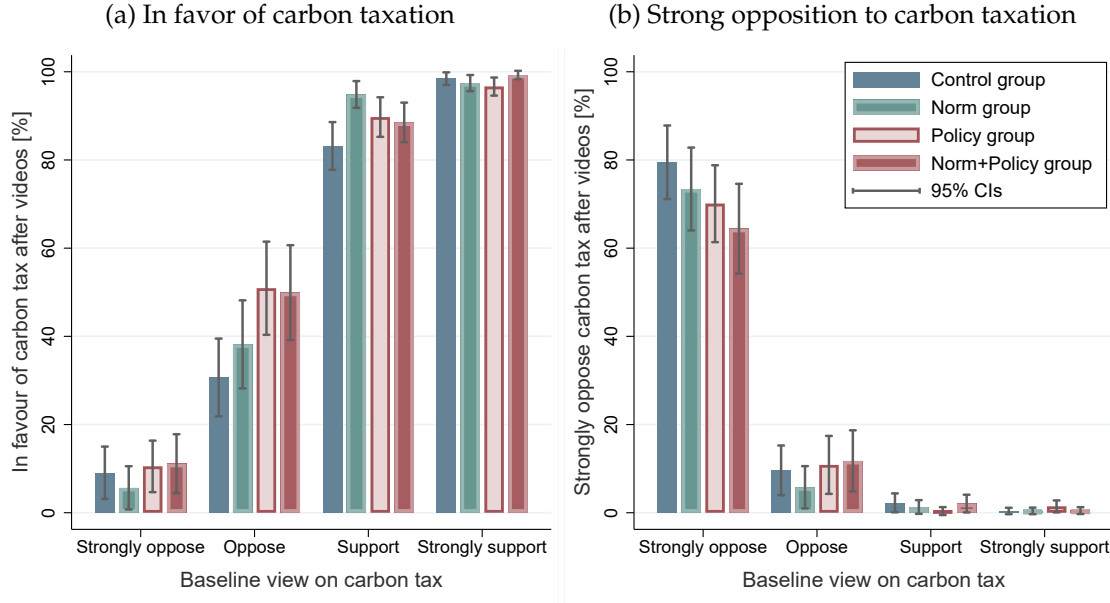


Figure 8: Descriptive evidence on changes in policy support after the videos

Notes: All observations are weighted.

**Descriptive evidence** Figure 8 provides a raw data overview of the probabilities of supporting or strongly opposing carbon taxation immediately after the video interventions, conditional on baseline views toward the policy. In general, post-intervention support is consistent with baseline support: prior supporters are very likely to keep supporting the policy, and prior opposers are likely to keep opposing the policy. The individual level Spearman correlation coefficient is 0.785 in the Control group. However, we observe a meaningful movement at the margin even without norm information or the policy explainer, with an almost 20% downward transition probability among “weak” prior supporters and an approximately 30% upward transition probability among “weak” prior opposers. The overall level of support increased by about 2.4% $p$  in the Control group – from 61.6% to 64.0% – which could be due to all subjects being exposed to the short climate video (to hold priming effects constant), although we cannot rule out a statistical fluke ( $p = 0.284$ ).<sup>18</sup> All three video interventions were effective in increasing the conditional probabilities of supporting carbon taxation, but only among people at the margin. Interestingly, the Norm intervention seems to be more effective in preventing weak prior supports from switching to opposition. Conversely, people who had previously leaned toward opposing the policy appear to be persuaded by the carbon tax video, with the transition probability among weak prior opposers increasing by a staggering 20% $p$ , from

<sup>18</sup>Note that, even absent of any information video or random noise, one would not necessarily expect responses by individuals to be exactly the same when asked the same question twice. Some individuals may genuinely change their minds when simply given an additional chance to deliberate, especially those that were somewhat on the fence, generally uncertain about the policy, or did not think much about their initial responses.

Table 2: Average treatment effects on stated support in the initial survey

|                                      | <i>Support carbon tax</i> |                     |                     | <i>Strongly oppose carbon tax</i> |                     |                     |
|--------------------------------------|---------------------------|---------------------|---------------------|-----------------------------------|---------------------|---------------------|
|                                      | (1)                       | (2)                 | (3)                 | (4)                               | (5)                 | (6)                 |
| Norm group                           | 0.039**<br>(0.019)        | 0.043**<br>(0.019)  | 0.061**<br>(0.028)  | -0.020<br>(0.015)                 | -0.023<br>(0.016)   | -0.035<br>(0.024)   |
| Policy group                         | 0.049**<br>(0.019)        | 0.043**<br>(0.019)  | 0.077***<br>(0.028) | -0.020<br>(0.017)                 | -0.017<br>(0.017)   | -0.030<br>(0.026)   |
| Norm+Policy group                    | 0.064***<br>(0.019)       | 0.064***<br>(0.019) | 0.085***<br>(0.029) | -0.037**<br>(0.016)               | -0.039**<br>(0.016) | -0.057**<br>(0.025) |
| <i>Excl. strong prior supporters</i> |                           |                     | ✓                   |                                   |                     | ✓                   |
| Additional controls                  |                           | Yes                 | Yes                 |                                   | Yes                 | Yes                 |
| Baseline attitudes                   | Yes                       | Yes                 | Yes                 | Yes                               | Yes                 | Yes                 |
| $p$ -value for $H_0: N = P = NP$     | 0.361                     | 0.390               | 0.644               | 0.492                             | 0.348               | 0.511               |
| Control group mean                   | 0.640                     | 0.640               | 0.452               | 0.187                             | 0.187               | 0.287               |
| Observations                         | 2688                      | 2688                | 1501                | 2688                              | 2688                | 1501                |
| $R^2$                                | 0.620                     | 0.647               | 0.578               | 0.600                             | 0.624               | 0.605               |

In all regressions, observations are weighted for better representativeness of political parties. Demographic controls include age, age squared, gender, race, education, and household income. Baseline attitude controls include indicator variables for pre-intervention support for carbon taxation, a factor variable for pre-intervention support of other (non-carbon pricing) climate policies, a factor variable for general environmental attitudes, political affiliation, and prior perception of social norms toward carbon neutrality. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

30.7% in Control to about 50% in the Policy and Norm+Policy groups.

Compared to those who held a positive view of the policy, there seems to be generally less fluidity at the negative end of the distribution (see Figure 8b). In absence of an intervention, the majority of those who disapproved of the policy in baseline do not change their views (around 80%). Yet, it is relatively rare even for someone who previously stated weak opposition to express more opposition when asked again in the post-intervention phase. Chances that prior support for the policy turns into strong opposition are near zero. Importantly, there is some evidence that the combined treatment Norm+Policy convinces some people to soften their views.

**Average treatment effects** Table 2 presents estimates for the average treatment effect (ATE) of our interventions on these three outcome variables. In all regressions, we include controls for baseline beliefs and attitudes (including pre-intervention views on carbon taxation, baseline climate change attitudes, baseline support of carbon neutrality goals, perceived social norms), and additional controls capture basic demographic and socio-economic characteristics (age, gender, race, education, household income), economic situation, and political attitudes.<sup>19</sup> Column 2 of Table 2 shows that, in the full

<sup>19</sup>These sets of covariates were pre-registered. We deviate from the pre-analysis plan by additionally including specifications that also exclude strong prior supporters, and by presenting marginal effects for each treatment condition (i.e., indicator variables for Norm group, Policy group, and Norm+Policy group) rather than interactions of the Norm video and the Policy video treatment (in place of the Norm+Policy group dummy). Needless to say, both specifications result in identical ATE estimates, but interpretation is

sample, the share of respondents who declared to support (or strongly support) carbon taxation increased significantly by around 5-6%*p* relative to the control group, with remarkably little difference between the Norm treatment and the Policy treatment. The combined intervention seems to most effective based on the point coefficient of 6.2%*p* ( $p = 0.001$ ) – which corresponds to about 10% of the baseline mean. Yet, we cannot reject the hypothesis that all three information regimes have an equal ATE relative to the control group ( $F = 0.38$ ,  $p = 0.686$ ). In column 3, we restrict our analysis to participants who did not already express strong support for the policy in baseline, as this arguably represents the most policy-relevant group of individuals who are not already (fully) convinced of the policy. In this subsample, the information videos lead to a increase of around 7-9%*p* in the share of people who would support carbon taxation. This is a sizable increase given the baseline share of 45.1% in the control group.

In columns 5 and 6 of Table 2 we investigate whether our information treatments influence extreme resistance toward carbon pricing. While the results are statistically less clear-cut, the general direction points toward slightly reduced resistance, with roughly a 3%*p* decline in the the share of respondents who state that they “strongly oppose” carbon pricing. The effect is significant at the 5% level only for the combined Norm+Policy group ( $p = 0.033$ ), although we again cannot reject the hypothesis of equality of treatment groups ( $p = 0.747$ ). Quantitatively, this amounts to a reduction in the number of resisters by almost a fifth, which is not enormous but reasonable given how hard it is often to overcome basic opposition (see, e.g., Douenne and Fabre, 2022).

**Other environmental policies** In principle, our information videos could have spillover effects on attitudes toward other environmental policies as well. This holds particularly for the norm-based intervention. Appendix Tables A14 presents an overview of treatment effects on views toward each climate policy included in our initial survey. We find that subjects in the Norm and the Norm+Policy groups indeed exhibit a significant upward shift also in views toward green infrastructure programs, with effects that are quantitatively similar to those detected for carbon taxation views. However, there is little evidence of any effect on support for other environmental policies, i.e., fuel efficiency standards, renewable energy R&D, or wildlife protection.

### 4.3. Effects on environmental donations

We also test the short-term effects of the video interventions on donations to the Carbon Leadership Council, which constitutes a “harder” outcome measure to avoid potential experimenter demand effects. Donations were generally low. In the control group, subjects chose to donate on average about \$10.08 to the CLC (out of \$100), with a standard deviation of \$15.03. A histogram of donation amounts in the control group (see Figure

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slightly less straightforward in the interaction specification, which we present in Appendix Tables A16 and A17.

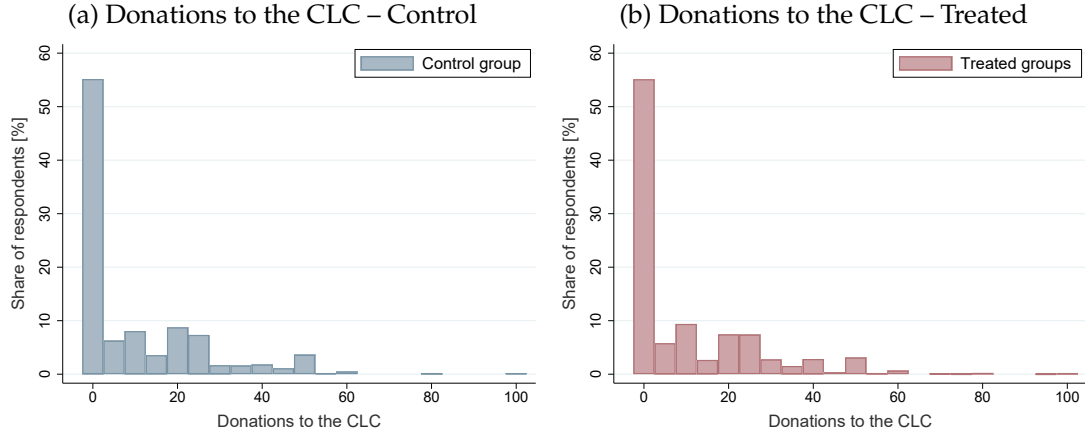


Figure 9: Histograms of donations in the initial survey

9a) reveals a significant mass at zero, with over 50% of subjects donating nothing at all to the CLC. Furthermore, a bare-eye inspection of the histogram for the treated groups (see Figure 9b) reveals that the distributions are virtually identical and the video interventions appear to have had no discernible effect on donation choices. Thus, despite the observed increase in stated support to the policy, respondents were not willing to part with their potential lottery prize to financially support a non-profit organization that advocates for carbon taxation.

Appendix Table A15 confirms that, conditional on other observables, neither the Norm nor the Policy intervention nor the combined videos have any meaningful and significant effect on the average donation amount. This finding stands in contrast with the results by Andre et al. (2022), but is consistent with some other related studies which find at most small effects of information interventions on environmental donations (e.g. Pompeo and Serdarevic, 2021; Dechezleprêtre et al., 2022; Engler et al., 2022).<sup>20</sup>

This result seems to suggest that, while one-shot policy explainers and simple norm information may have the potential to start a conversation and improve “soft” measures of support, they are insufficient to sparkle interest and induce people to act. Another possible explanation for the observed result is that subjects felt they had not enough income to spare, in particular since the costs of living had been rising, with the monthly inflation rate in the U.S. being about 8.3% in August 2022, when our experiment was conducted. Indeed, more than 37% of subjects allocated the entire potential lottery prize of \$100 to themselves. To rule out this explanation, we included a second donation option to another environmental organization, the National Wildlife Federation (NWF), which fo-

<sup>20</sup> Andre et al. observe much higher baseline willingness to donate, with participants in control willing to donate on average over 50% of their hypothetical lottery prize to a carbon offsetting scheme. The observed difference with our study could be due to multiple reasons. First, Andre et al. (2022) asked participants to divide a potential lottery prize of \$450 between themselves and a charitable organization that fights global warming and offsets CO2 emissions. The proposed donation purpose, in combination with the large sum, might have been particularly appealing to subjects. Furthermore, the timing of our study (August 2022) might have played a role due to inflation concerns and increasing energy prices.

cuses on wildlife preservation rather than advocating for specific emissions-related policies such as carbon taxation. On average, subjects in the control group allocated \$16.26 to the NWF. Thus, there would still have been ample room to shift donations at the intensive margin, from NWF to the CLC, without increasing the total donation amount. Note that we also find no significant average treatment effects on donations to the NWF. We also find no heterogeneous effects on donations by income level or perceived financial fragility. Therefore, while it is plausible that financial concerns reduced the scope for any treatment effect, it cannot quantitatively explain the null effects that we observe. Finally, the observed null effect could be explained by the fact that subjects did not trust the CLC enough, or believed that their donation cannot actually make a difference in whether carbon taxation is actually implemented in the U.S. or not.

#### **4.4. Expert predictions**

Appendix Figure A5 shows that, on average, forecasters were highly accurate in estimating treatment effects of the video interventions on stated support for carbon taxation. However, experts appear to be overoptimistic with regard to the effects on donations to the CLC. In fact, although as mentioned above our videos were not effective in increasing incentivized donations to environmental organizations, experts were convinced that they would.

#### **4.5. Heterogeneous treatment effects**

The effectiveness of our interventions could depend on individuals' previous ideological views on climate change and environmental policy. In particular, given the deep partisan divide on climate-related issues in the U.S., we check whether Republicans and Democrats responded differently to our interventions. There are at least two opposing forces that could be at work. On the one hand, as Republicans are more skeptical of climate policy in general, they may be less likely to respond to our interventions due to fundamental resistance. On the other hand, this also implies that there is more room for them to change their views since Democrats are more likely to be in favor of carbon taxation already in baseline. Figure 10 provides an overview of treatment effects separately for Democrats, Independents, and Republicans.

**Support for carbon taxation** The left panel shows that the norm information about general climate action support alone has no significant effect on carbon taxation support for Democrats, although the policy explainer video does lead to an approximately 5%p increase. This is consistent with the intuition that, among Democrats, the first-order concern about carbon taxation is less about whether climate change mitigation in general should be a policy objective, but rather whether it is a suitable means to achieve the objective. For Republicans, we observe no statistically significant effects on positive support,

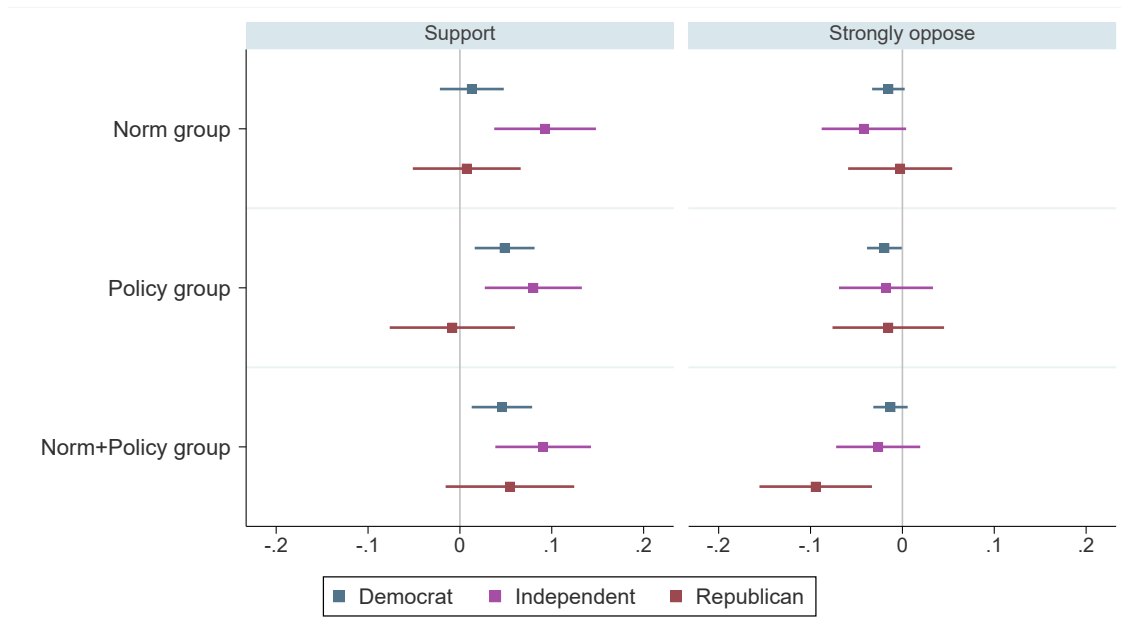


Figure 10: Heterogeneity by political subgroups in the initial survey

*Notes:* This figure plots estimates for the conditional average treatment effects of the information videos by political identity. Coefficients are obtained using the specifications in Table 2 columns (2) and (5), respectively, and additionally interacting treatment group indicators with political identity indicators. Error bars indicate 90% confidence intervals.

and the point estimates are almost exactly zero for the Norm group and the Policy group. The Norm+Policy group generally seems to inherit the best of both interventions, with even a hint of potential positive effects among Republicans. Interestingly, the effects on positive support tend to be largest among Independents, suggesting that these individuals are generally more amenable to information campaigns on carbon taxation compared to Republicans, but also less likely to be “infra-marginal” compared to Democrats. Appendix Table A18 confirms that the difference in treatment effects between Independents and Democrats is statistically significant ( $p = 0.038$ ).

**Opposition against carbon taxation** The right panel of Figure 10 provides an overview of heterogeneous effects on strong opposition against carbon taxation by political identity. The pattern is noticeably different from positive support. It is in fact key to recall that, unsurprisingly, the largest share of opposers in the U.S. identifies as Republican. Thus, we can see that the treatment effects on policy resistance documented in Table 2 in the Norm+Policy group is driven by a considerable decrease in strong opposition among Republicans by almost 10%p, and the difference to Democrats is statistically significant (see Appendix Table A18). This suggests that combined social and policy information may have the potential to reduce polarization on climate policy issues.

**Environmental donations** For the lottery prize on environmental donations, there is little evidence of heterogeneity by political identity (see Appendix Table A19). While

the unconditional average of donations is highest among Democrats and lowest among Republicans, there is no significant average treatment effect on donations to the CLC (and total donations including donations to the NWF) in any treatment group.

## 5. Persistence of information effects

About four months after the initial survey, we invited our original sample to participate to a follow-up survey to investigate whether our one-shot information interventions had lasting impacts on the acceptability of carbon taxation, or whether any effects dissipated over time. To avoid potential consistency or experimenter demand effects, we obfuscated the purpose of the follow-up survey to participants (Roth et al., 2022). In total, we managed to recruit more than 80% of the initial sample. We find no evidence for differential attrition (Table A20), differential selection on baseline characteristics across groups (Table A21), or selection on initial treatment effects (see Tables A22 and A23).

### 5.1. Beliefs and reasoning in the follow-up survey

In a first step, we investigate to which extent the effects of the randomly assigned information videos documented in Section 4.1 persisted after the initial survey.

Figure 11 shows that the norm information on support for carbon neutrality in the U.S. had no impact on second-order beliefs that subjects stated in the follow-up survey. While there is generally a certain degree of persistence in beliefs over several months – as indicated by the positive relation between prior perceptions reported in the initial survey (before the information videos) and perceptions reported in the follow-up survey – the initial effect appears to have vanished over this time span. The initial impact of our one-shot information video may have been drowned out by the sheer amount of signals regarding climate action norms people receive in social interactions and through the media, or it may simply have been forgotten owing to its irrelevance in everyday life.<sup>21</sup>

However, we find in Figure 11b that subjects in the Norm+Policy group were about 6%p more likely than subjects in the Control group to believe that carbon taxation would be at least somewhat effective in reducing carbon emissions. Interestingly, we observe a general increase even in the Control group, from about 38% in baseline to about 47% in the follow-up survey, which could be driven partly by a genuine trend and partly by a change in the response scale (from 3-point to 5-point). The policy explainer video in isolation seemed to have no lasting impact on effectiveness beliefs. When examining persistence of knowledge about carbon taxation in the follow-up survey (see Appendix

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<sup>21</sup>It is worth noting that our measure of norm perceptions was not incentivized. As a result, we cannot rule out the possibility that with additional incentives, participants may have been able to recollect the information they had previously received more precisely. However, in most real-world settings, people are not confronted with such incentives.

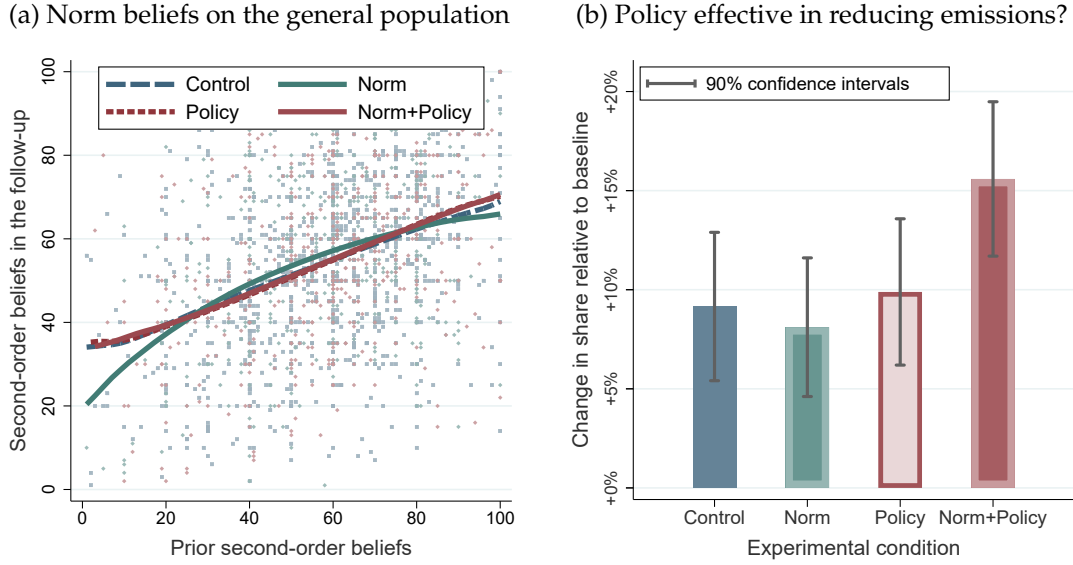


Figure 11: Change in beliefs and perceptions in the follow-up survey

Notes: 11a shows the relationship between prior perceptions of social norms on carbon neutrality in the general U.S. population versus posterior perceptions over 4 months after the information intervention. Fitted lines are estimated from local linear regressions with Epanechnikov kernel and bandwidth of 25. 11b shows the change in the share of respondents who believe that a carbon tax with lump-sum redistribution would be effective in reducing carbon emissions compared to baseline. Observations are weighted for better representativeness of political parties.

Figure A7), the evidence suggests a complete decay of factual knowledge from policy explanation, based on responses to an incorrect statement about whether carbon taxation would lead to a ban of dirty technologies. Interestingly, there is evidence that, nonetheless, subjects in the Policy and Norm+Policy groups were slightly more confident in their self-assessed knowledge about the policy.<sup>22</sup>

## 5.2. Effects on attitudes toward carbon taxation in the follow-up survey

**Descriptive evidence on persistence** To assess the persistence of effects on stated support on carbon taxation with lump-sum redistribution, we start by plotting the transition probabilities to support or strong opposition in the follow-up survey, conditional on the immediate *post-intervention* response in the initial survey. If the initial positive effects of the information videos faded away, we would anticipate a decline in the share of subjects who continue to support carbon taxation four months later – relative to the Control group –, and an increase in the share of subjects who shift (back) to strong opposition.

This is not what we see in Figure 12a. The first observation is that policy views are highly stable even after several months have passed between assessments, demonstrat-

<sup>22</sup>This pattern might speak to the dynamic formation of overconfidence (see, e.g., Zimmermann, 2020). One could imagine that once justified boosts in self-confidence about one's own knowledge/skill remain persistent even once they are not justified any longer, for example if semantic memory or skills depreciate at a faster rate than one expects.

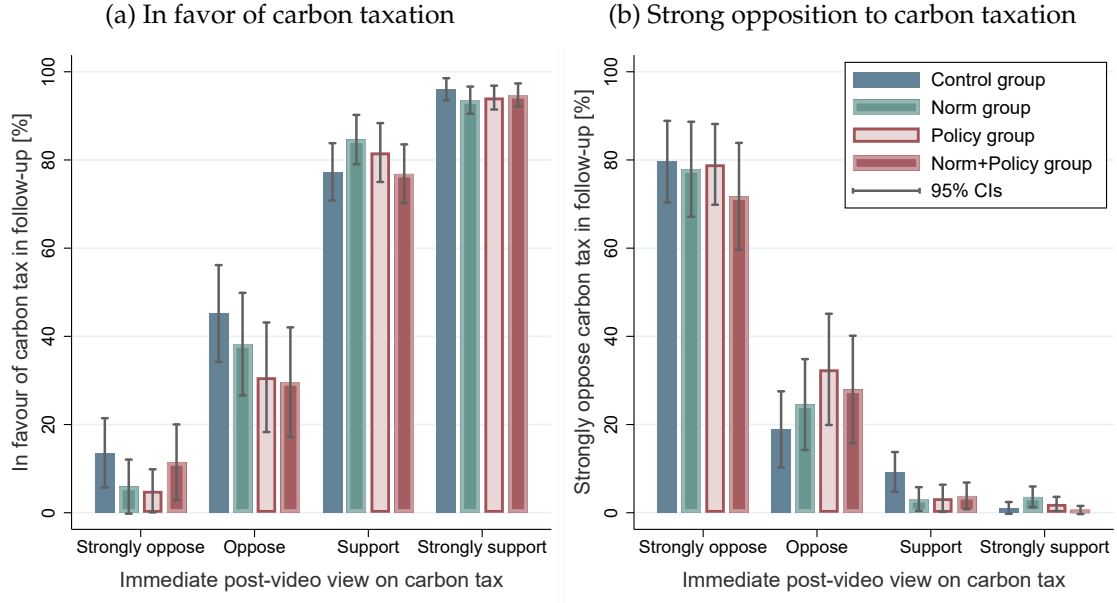


Figure 12: Descriptive evidence on the persistence of information effects

Notes: Caution, this is not a histogram. Bars represent transition probabilities to being in favor of carbon taxation (subfigure a) or strongly opposed to carbon taxation (subfigure b), conditional on the immediate post-intervention attitude in the initial survey. All observations are weighted.

ing that survey responses provide meaningful information about people's policy preferences. The second observation is that participants in treated groups are not more inclined to retract their support for carbon taxes on average, despite the fact that the pool now includes those who chose to support the policy as a result of our video interventions. Nevertheless, trends across groups are not parallel. Our third and crucial observation is that the pattern of how many weak opponents change their opinions across experimental conditions is virtually exactly the inverse of the starting pattern in Figure 8a. The upward transition probability in the policy groups is around 30%, whereas in the Control group it is 45.2%, with the Norm group sitting in between (at 38.2%). Thus, the initial increase we documented in Section 4 was non-incremental, suggesting that it merely accelerated a process among those who would have become supportive of carbon taxes anyhow (i.e., the "infra-marginal").<sup>23</sup> This is consistent with our previous finding that initial increases in policy support were driven by Democrats and Independents.

Lastly, Figure 12b plots the conditional transition probabilities toward strong opposition. The comparison to Figure 8b suggests that the excess proportion of people in the Norm and Policy groups who shifted to weak opposition immediately after watching the videos reverted in the follow-up survey, although the initial reductions in opposition were not statistically significant. In contrast, for the combined intervention – the only one where the initial effect was significant – there is no clear evidence of differential transi-

<sup>23</sup>Similar arguments can be found in previous studies about the causal effect of online advertisement on website traffic (see, e.g., Blake et al., 2015)

Table 3: Average treatment effects in follow-up survey

|                                       | <i>Support carbon tax</i> |                   |                   | <i>Strongly oppose carbon tax</i> |                      |                      |
|---------------------------------------|---------------------------|-------------------|-------------------|-----------------------------------|----------------------|----------------------|
|                                       | (1)                       | (2)               | (3)               | (4)                               | (5)                  | (6)                  |
| Norm group                            | -0.000<br>(0.024)         | 0.003<br>(0.023)  | 0.009<br>(0.032)  | -0.014<br>(0.020)                 | -0.013<br>(0.019)    | -0.031<br>(0.029)    |
| Policy group                          | -0.011<br>(0.023)         | -0.015<br>(0.022) | -0.026<br>(0.032) | -0.008<br>(0.021)                 | -0.005<br>(0.019)    | -0.023<br>(0.029)    |
| Norm+Policy group                     | 0.008<br>(0.025)          | 0.001<br>(0.024)  | -0.005<br>(0.034) | -0.053**<br>(0.021)               | -0.054***<br>(0.021) | -0.089***<br>(0.031) |
| <i>Excl. strong prior supporters</i>  |                           |                   | ✓                 |                                   |                      | ✓                    |
| Additional controls                   |                           | Yes               | Yes               |                                   | Yes                  | Yes                  |
| Baseline attitudes                    | Yes                       | Yes               | Yes               | Yes                               | Yes                  | Yes                  |
| <i>p</i> -value for $H_0: N = P = NP$ | 0.708                     | 0.662             | 0.519             | 0.067                             | 0.036                | 0.071                |
| Control group mean                    | 0.654                     | 0.654             | 0.512             | 0.222                             | 0.222                | 0.327                |
| Observations                          | 2171                      | 2171              | 1228              | 2171                              | 2171                 | 1228                 |
| $R^2$                                 | 0.510                     | 0.567             | 0.527             | 0.527                             | 0.586                | 0.570                |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

tions in one direction relative to control, suggesting that the average treatment effect may have persisted.

**Persistence of average treatment effects** We also follow the same steps as in Section 4 to estimate the average treatment effects on stated policy views more than four months after exposure to the video interventions. Table 3 confirms that the initial 5%p increase in stated support among treated individuals – relative to the control group – seems to have all but faded away. There is no significant incremental effect in any treatment groups in the follow-up survey, although this, as suggested above, might be driven by a catching-up effect in the Control group.<sup>24</sup> However, we find in columns (4) and (5) that the combined treatment is still associated with a significant reduction in strong opposition toward carbon taxation by more than 5%p (about 24%) in the full sample and almost 9%p (about 27%) in the subsample excluding strong prior supporters. We can further weakly reject the hypothesis that there was no difference across treated groups.<sup>25</sup>

Overall, the results from the follow-up survey seem to indicate that our one-shot information interventions were insufficient to build robust and persistent support for carbon taxation among people who are hard to convince. However, we find evidence that the policy explainer combined with information on norms toward climate action can help reduce antagonism toward carbon taxation in a lasting way, thus potentially shifting the

<sup>24</sup>Note that the share of those in favor of carbon taxation in the Control group is indeed slightly higher compared to the initial survey. In addition, the follow-up sample is slightly more politically right-leaning, suggesting that this increase is even understated when simply comparing raw means across samples.

<sup>25</sup>As before, we also report the pre-registered treatment interaction specification of average treatment effects in Appendix Tables A25 and A26.

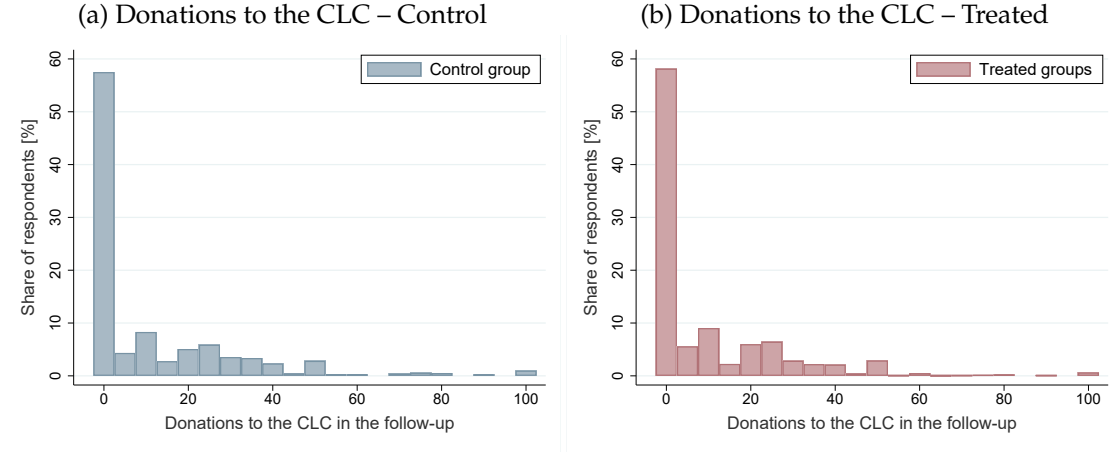


Figure 13: Histograms of donations in the follow-up survey

Overton window and facilitating future public communication and debate. This might be indicative of the need for a stepping-stone strategy to win over the public, where the initial phase consists in gradually introducing a policy idea and propose options that are open for discussion. In particular, Figure 8a shows that even in the short term, an information intervention like ours may only convince people who are previously at least somewhat amenable, but not those holding strong unfavorable views. Future research on behavioral interventions meant to shift support for climate policies should more precisely identify the optimal frequency and targeting of interventions.

### 5.3. Effects on environmental donations

Finally, we show in Figure 13 that there is again no striking difference in the distribution of donations to the Climate Leadership Council between the treated groups and the control group. However, when comparing average donations across each group, using the usual regression model, we document the somewhat puzzling finding that previous exposure to the carbon taxation explainer is associated with significantly *lower* average donations to the Climate Leadership Council in the follow-up survey, by around 2.20 Dollars on average in the Policy and Norm+Policy groups. This contrasts with the null effects on donations immediately after the intervention, and the lasting effects of the combined intervention on reduced opposition. However, when excluding strong prior supporters of carbon taxation in column (2), the coefficients become slightly smaller and statistically insignificant, hinting at the negative effects occurring mostly at the upper end of the distribution, i.e., among individuals who would be expected to donate a larger share of the lottery prize to the CLC.

The decrease in donations to the CLC among the group of major donors seems to indicate dynamic backfiring effects. For example, people may feel less pressure to fervently support a cause if they anticipate less opposition. To further explore this conjecture, we separately investigate effects at the extensive margin, i.e., on the choice to donate any

positive amount at all. Appendix Table A27 shows that there are no significant effects on the probability to donate zero to the CLC, implying that the negative effect on average is driven by the high end of the distribution – especially since over half of all subjects chose to keep the potential lottery prize in full for themselves.

## 6. Discussion

By combining two streams of literature that have remained separate to date, we uncover a novel finding: we show that, when preceded by a simple half-minute video segment emphasizing the social consensus for climate action, information interventions explaining the economic rationale for carbon taxation can reduce policy resistance persistently even after several months. Our study could provide helpful insights for climate communication beyond its immediate controlled setting. In fact, scaling up information videos like ours from a limited pool of online study participants to a larger population, would not entail low marginal costs (List, 2020). While our study considers climate policy in the United States as an example of an issue that is perceived as particularly polarizing, it could be interesting to test the effectiveness of similar interventions in other contexts and samples.

Furthermore, future research needs to validate the relevance and meaningfulness of shifts in stated policy preferences induced through information interventions. In our experiment, we simply exposed people to information videos and asked them whether they agreed or disagreed with the introduction of a carbon tax in their country. Compared to, e.g., the donation task, in which we find no positive effects, stated policy preference questions have some drawbacks regarding their lower stakes, but also advantages regarding their naturalness. In particular, they mimic opinion polls that are frequently conducted by politicians and observers to gauge public appetite for various policies, thus reflecting the core feature of democracy that policymakers need to respond to voters' preferences (Dahl, 1971). Although it is possible that opinions change in the media and discussion fora prior to formal elections or referenda (e.g., Anderson et al., 2023), there is some evidence suggesting that informally stated public opinions may influence climate policy (Anderson et al., 2017; Schaffer et al., 2022).

Finally, our study highlights the dynamic and heterogeneous nature of policy preference formation. Public opinions and social norms can seemingly stall for a long time before changing unexpectedly and abruptly (Ehret et al., 2022). Upward shifts in the bottom end of the opinion distribution could signal an expansion of the Overton window, i.e., the spectrum of acceptable discourse. Although it might not translate immediately in open support (and therefore stay below the surface), this constitutes a necessary first step in the process of social tipping. For example, earnest discussion about policies like carbon taxation and their merits may only be possible once instinctive reactance among certain groups (e.g., due to perceived norms of opposition) is overcome. This can in turn

catalyze transitions to broader public acceptability. In line with this, we document in our study that providing information about majority support for carbon neutrality also causally affects whether subsequent information about carbon taxation as a policy is perceived as politically biased. However, to stabilize policy preferences and build sustained engagement, more efforts and timely follow-up campaigns may be required. Thus, future research should take a dynamic perspective and investigate how multi-staged behavioral interventions can be used to facilitate the adoption of critical climate policies by fostering widespread support and avoiding fatal backlash.

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# For online publication

## Appendix A Supplementary figures and tables

Table A1: Variable definitions and coding: outcomes

| Variable name                                             | Definition                                                                                                                                                                                                                     |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Outcomes in the initial survey (post-intervention)</b> |                                                                                                                                                                                                                                |
| Support for carbon taxes                                  | Dummy = 1 if “somewhat support” or “strongly support” carbon taxation with uniform redistribution                                                                                                                              |
| Resistance to carbon taxes                                | Dummy = 1 if “strongly oppose” carbon taxation with uniform redistribution                                                                                                                                                     |
| Donation to CLC                                           | Dollar values between 0 and 100.                                                                                                                                                                                               |
| Donation to NWF                                           | Dollar values between 0 and 100.                                                                                                                                                                                               |
| Total donation                                            | Sum of donations to CLC and NWF.                                                                                                                                                                                               |
| <b>Outcomes in the follow-up survey</b>                   |                                                                                                                                                                                                                                |
| Support for carbon taxes                                  | Dummy = 1 if “somewhat support” or “strongly support” carbon taxation with uniform redistribution                                                                                                                              |
| Resistance to carbon taxes                                | Dummy = 1 if “strongly oppose” carbon taxation with uniform redistribution                                                                                                                                                     |
| Donation to CLC                                           | Dollar values between 0 and 100.                                                                                                                                                                                               |
| <b>Potential intermediary outcome</b>                     |                                                                                                                                                                                                                                |
| Perceptions of the videos                                 | Dummy = 1 if “agree” or “strongly agree” to statements about the video being ...: informative, interesting, surprising, politically biased, too long                                                                           |
| Second-order beliefs: general                             | Estimate (in percentage – 0-100) of American adults who are in favor of US taking steps to reach carbon neutrality by 2050                                                                                                     |
| Second-order beliefs: friends                             | Estimate (in percentage – 0-100) of friends/family who are in favor of US taking steps to reach carbon neutrality by 2050                                                                                                      |
| Injunctive norm beliefs                                   | 5-point Likert scale response to how a statement about climate action in the U.S. would be received by friends in a casual conversation                                                                                        |
| Injunctive norm beliefs                                   | 5-point Likert scale response to how a statement about climate action in the U.S. would be received by friends in a casual conversation                                                                                        |
| Beliefs about carbon tax impacts                          | Continuous variables from 0 (completely disagree) to 100 (completely agree) about whether carbon tax policy would ...: reduce CO2 emissions, harm the economy, financially benefit richer households/poorer households/oneself |

Table A2: Variable definitions and coding: controls for main specification

| Variable name                            | Definition                                                                                                                                                                                        |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Socio-demographic characteristics</b> |                                                                                                                                                                                                   |
| Age                                      | Age of individual in years (+ age squared)                                                                                                                                                        |
| Gender                                   | Dummy = 1 if female                                                                                                                                                                               |
| Education                                | Dummy = 1 if individual attended college                                                                                                                                                          |
| Ethnicity                                | Categorical with 5 groups: Asian, Black, Mixed, White, and Other                                                                                                                                  |
| Religion                                 | Categorical with 3 groups: not Christian, Christian – evangelical or born-again, Christian – other                                                                                                |
| Number of children                       | Categorical with 4 levels: 0, 1, 2, 3 or more                                                                                                                                                     |
| <b>Economic factors</b>                  |                                                                                                                                                                                                   |
| Household income                         | Categorical with 12 levels: less than \$15k, ..., \$200k or more per year                                                                                                                         |
| Employment status                        | Categorical with 7 groups: full-time, part-time, self-employed, retired, student, unemployed, inactive                                                                                            |
| Financial vulnerability                  | Categorical with 4 levels wrt. whether individual would be able to cover unexpected expenditure of \$2000 in 30 days                                                                              |
| Car use frequency                        | Categorical with 6 levels: never, < once a month, few times a month, few time a week, once a day, > once a day                                                                                    |
| Concerns about inflation                 | Continuous on 7-point Likert scale                                                                                                                                                                |
| <b>Political attitudes</b>               |                                                                                                                                                                                                   |
| Party identity                           | Categorical with 7 groups: Democrat – strong, Democrat, Independent – lean Democrats, Independent – no lean, Independent – lean Republican, Republican, Republican – strong                       |
| Political ideology                       | 2 continuous index variables obtained from PCA on ideology on left-right spectrum, economic liberalism, inequality perceptions, and taxation preferences (personal, progressivity, corporate tax) |
| Partisan affect                          | 2 continuous index variables obtained from PCA on feeling thermometer questions for Democrats, Republicans, Joe Biden, Donald Trump                                                               |
| Inflation Reduction Act                  | Categorical with 4 groups: support, no opinion, oppose, have not heard about it                                                                                                                   |
| <b>Baseline climate-related beliefs</b>  |                                                                                                                                                                                                   |
| Views on carbon taxation                 | Categorical with 4 levels: strongly oppose, somewhat oppose, somewhat support, strongly support                                                                                                   |
| Environmental attitudes                  | Continuous index variable obtained from PCA on 6 climate change questions (personal importance, worry, beliefs about harm for oneself/future generations, experience, and discussion frequency).  |
| Carbon neutrality views                  | Categorical with 3 levels: in favor, don't know, oppose                                                                                                                                           |
| Second-order beliefs: general            | Estimate (in percentage – 0-100) of American adults who are in favor of US taking steps to reach carbon neutrality by 2050                                                                        |
| Second-order beliefs: friends            | Estimate (in percentage – 0-100) of friends/family who are in favor of US taking steps to reach carbon neutrality by 2050                                                                         |

Table A3: Randomization checks for the initial survey

|                   | (1)<br>Age<br>in years | (2)<br>College<br>degree | (3)<br>(Lean)<br>Republican | (4)<br>Climate<br>attitude | (5)<br>Support<br>carbon taxation |
|-------------------|------------------------|--------------------------|-----------------------------|----------------------------|-----------------------------------|
| Norm group        | -0.234<br>(0.927)      | 0.004<br>(0.030)         | 0.034<br>(0.031)            | -0.031<br>(0.066)          | 0.037<br>(0.031)                  |
| Policy group      | 1.079<br>(0.948)       | 0.034<br>(0.030)         | 0.006<br>(0.031)            | -0.017<br>(0.067)          | -0.007<br>(0.031)                 |
| Norm+Policy group | 0.021<br>(0.930)       | 0.001<br>(0.030)         | -0.033<br>(0.032)           | -0.006<br>(0.066)          | 0.046<br>(0.031)                  |
| Constant          | 44.255***<br>(0.667)   | 0.513***<br>(0.022)      | 0.448***<br>(0.022)         | -0.222***<br>(0.047)       | 0.617***<br>(0.022)               |
| Observations      | 2687                   | 2685                     | 2687                        | 2687                       | 2687                              |
| $R^2$             | 0.001                  | 0.001                    | 0.002                       | 0.000                      | 0.002                             |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

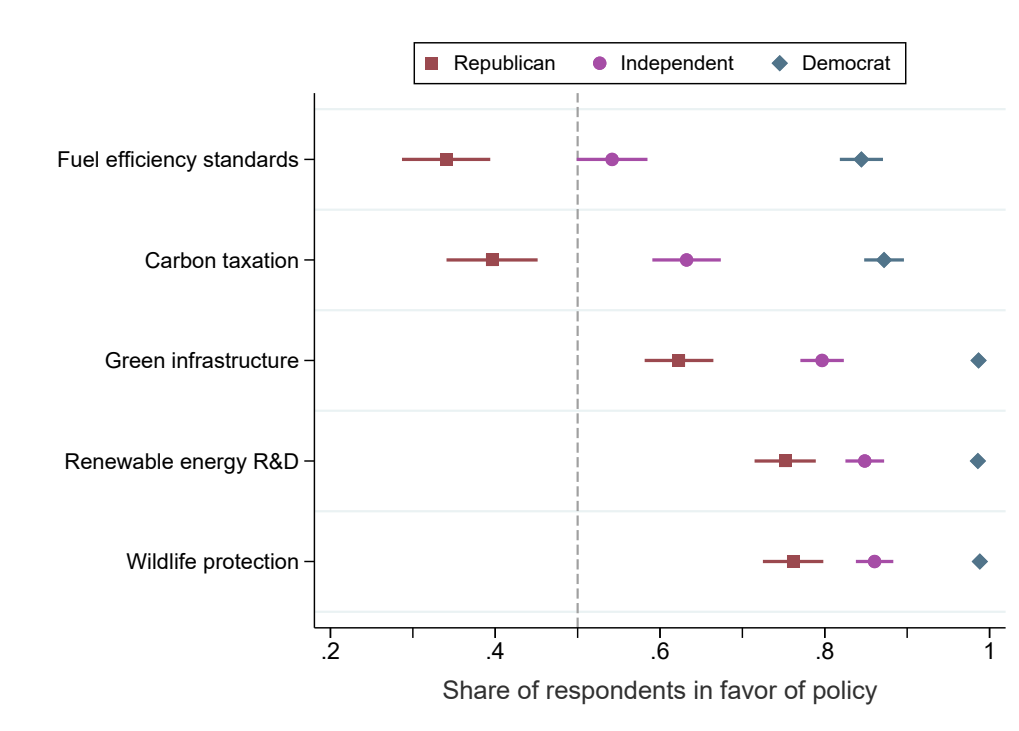


Figure A1: Baseline support for environmental policies by political affiliation

Notes: Average baseline support for different environmental policies before the video interventions by political identity. Observations are weighted to improve representativeness by political identity.

Table A4: Predictors of baseline views on carbon taxation with uniform redistribution

|                                           | Support or strongly support |                      |                     | Strongly oppose      |                      |                      |
|-------------------------------------------|-----------------------------|----------------------|---------------------|----------------------|----------------------|----------------------|
|                                           | (1)                         | (2)                  | (3)                 | (4)                  | (5)                  | (6)                  |
| Perceived support for carb. neutr. [10%p] | 0.048***<br>(0.005)         | 0.013***<br>(0.004)  | 0.000<br>(0.004)    | -0.043***<br>(0.004) | -0.014***<br>(0.004) | -0.005<br>(0.004)    |
| Know nothing about CP                     | -0.042**<br>(0.020)         | -0.039**<br>(0.017)  | -0.017<br>(0.017)   | 0.062***<br>(0.018)  | 0.060***<br>(0.016)  | 0.029*<br>(0.016)    |
| Climate attitude index (std.)             |                             | 0.084***<br>(0.006)  | 0.052***<br>(0.007) |                      | -0.066***<br>(0.005) | -0.040***<br>(0.006) |
| Carb. neutr. views: undecided             |                             |                      | 0.168***<br>(0.036) |                      |                      | -0.312***<br>(0.039) |
| Carb. neutr. views: in favor              |                             |                      | 0.330***<br>(0.039) |                      |                      | -0.302***<br>(0.040) |
| Political ideology progressive (std.)     |                             | 0.079***<br>(0.007)  | 0.064***<br>(0.007) |                      | -0.070***<br>(0.007) | -0.057***<br>(0.007) |
| Personal taxes too high                   |                             | 0.057***<br>(0.018)  | 0.061***<br>(0.018) |                      | -0.014<br>(0.016)    | -0.016<br>(0.016)    |
| Democrat                                  | 0.353***<br>(0.026)         | 0.037<br>(0.027)     | 0.034<br>(0.026)    | -0.228***<br>(0.023) | 0.042*<br>(0.023)    | 0.030<br>(0.022)     |
| Independent                               | 0.164***<br>(0.028)         | 0.025<br>(0.025)     | 0.028<br>(0.025)    | -0.108***<br>(0.027) | 0.008<br>(0.024)     | 0.000<br>(0.023)     |
| Financially vulnerable                    | 0.074***<br>(0.021)         | 0.026<br>(0.018)     | 0.034*<br>(0.018)   | -0.052***<br>(0.018) | -0.012<br>(0.016)    | -0.020<br>(0.015)    |
| Concern about prices and inflation (std.) | -0.020**<br>(0.008)         | -0.022***<br>(0.007) | -0.012<br>(0.007)   | 0.033***<br>(0.007)  | 0.031***<br>(0.006)  | 0.022***<br>(0.006)  |
| Daily car use                             | -0.007<br>(0.020)           | -0.001<br>(0.018)    | -0.002<br>(0.017)   | -0.012<br>(0.017)    | -0.019<br>(0.015)    | -0.015<br>(0.015)    |
| Demographic controls                      | Yes                         | Yes                  | Yes                 | Yes                  | Yes                  | Yes                  |
| Baseline share                            | 0.636                       | 0.636                | 0.636               | 0.202                | 0.202                | 0.202                |
| Observations                              | 2688                        | 2688                 | 2688                | 2688                 | 2688                 | 2688                 |
| R <sup>2</sup>                            | 0.242                       | 0.423                | 0.450               | 0.243                | 0.424                | 0.468                |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A5: Perceptions of the climate change video

|                     | Perceived the climate video as ... |                    |                     |                      |                   |
|---------------------|------------------------------------|--------------------|---------------------|----------------------|-------------------|
|                     | interesting<br>(1)                 | informative<br>(2) | surprising<br>(3)   | biased<br>(4)        | too long<br>(5)   |
| Norm information    | 0.022<br>(0.014)                   | 0.007<br>(0.012)   | 0.061***<br>(0.020) | -0.050***<br>(0.015) | 0.024*<br>(0.012) |
| Additional controls | Yes                                | Yes                | Yes                 | Yes                  | Yes               |
| Baseline attitudes  | Yes                                | Yes                | Yes                 | Yes                  | Yes               |
| Control group mean  | 0.849                              | 0.903              | 0.415               | 0.291                | 0.079             |
| Observations        | 2688                               | 2688               | 2688                | 2688                 | 2688              |
| R <sup>2</sup>      | 0.297                              | 0.305              | 0.140               | 0.439                | 0.116             |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

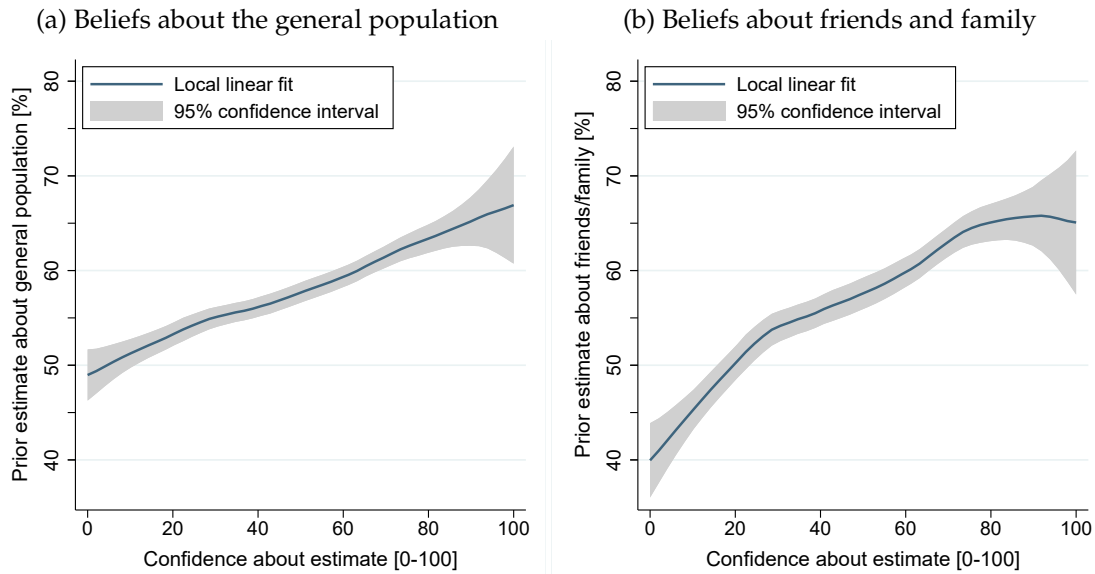


Figure A2: Uncertainty and second-order beliefs about climate action support

*Notes:* Relationship between prior perceptions of social norms on carbon neutrality by degree of confidence about the estimate. Confidence is elicited directly after eliciting estimates about the share of people in favor of carbon neutrality in the U.S. on a scale from 0 to 100, with 0 indicating complete uncertainty and 100 indicating complete certainty. Fitted lines are estimated from local linear regressions with Epanechnikov kernel and bandwidth = 10. Observations are weighted to improve representativeness by political identity.

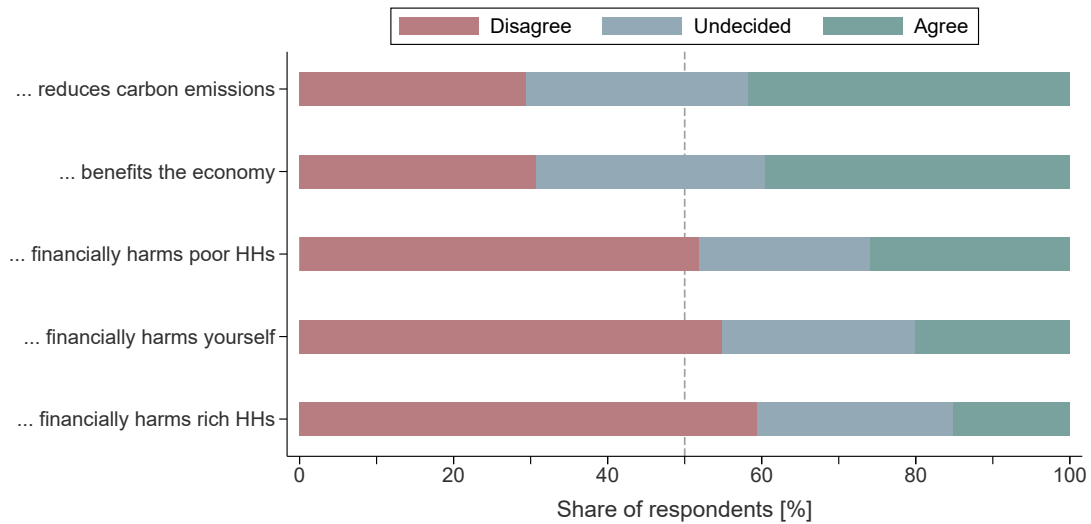


Figure A3: Baseline reasoning about carbon taxation with redistribution

*Notes:* Share of participants who agree, disagree, or are undecided about different statements about carbon taxation with lump-sum redistribution prior to the information videos. Observations are weighted to improve representativeness by political identity.

Table A6: Perceptions of the climate change video

|                                 | Perceived the climate video as ... |                    |                     |                      |                     |
|---------------------------------|------------------------------------|--------------------|---------------------|----------------------|---------------------|
|                                 | interesting<br>(1)                 | informative<br>(2) | surprising<br>(3)   | biased<br>(4)        | too long<br>(5)     |
| Norm information                | 0.011<br>(0.012)                   | -0.003<br>(0.008)  | 0.067***<br>(0.023) | -0.053***<br>(0.014) | 0.041***<br>(0.011) |
| Norm info $\times$ Rep/lean Rep | 0.025<br>(0.030)                   | 0.022<br>(0.026)   | -0.014<br>(0.041)   | 0.005<br>(0.032)     | -0.037<br>(0.027)   |
| Additional controls             | Yes                                | Yes                | Yes                 | Yes                  | Yes                 |
| Baseline attitudes              | Yes                                | Yes                | Yes                 | Yes                  | Yes                 |
| Control group mean              | 0.849                              | 0.903              | 0.415               | 0.291                | 0.079               |
| Observations                    | 2688                               | 2688               | 2688                | 2688                 | 2688                |
| R <sup>2</sup>                  | 0.298                              | 0.306              | 0.140               | 0.439                | 0.117               |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A7: Perceptions of the carbon tax explainer video

|                     | Perceived the policy video as ... |                    |                    |                     |                   |
|---------------------|-----------------------------------|--------------------|--------------------|---------------------|-------------------|
|                     | interesting<br>(1)                | informative<br>(2) | surprising<br>(3)  | biased<br>(4)       | too long<br>(5)   |
| Norm information    | 0.030<br>(0.019)                  | 0.009<br>(0.016)   | 0.059**<br>(0.028) | -0.053**<br>(0.022) | -0.008<br>(0.028) |
| Additional controls | Yes                               | Yes                | Yes                | Yes                 | Yes               |
| Baseline attitudes  | Yes                               | Yes                | Yes                | Yes                 | Yes               |
| Policy group mean   | 0.837                             | 0.892              | 0.561              | 0.364               | 0.350             |
| Observations        | 1343                              | 1343               | 1343               | 1343                | 1343              |
| R <sup>2</sup>      | 0.336                             | 0.389              | 0.220              | 0.459               | 0.181             |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A8: Perceptions of the carbon tax explainer video

|                                 | Perceived the policy video as ... |                    |                    |                     |                   |
|---------------------------------|-----------------------------------|--------------------|--------------------|---------------------|-------------------|
|                                 | interesting<br>(1)                | informative<br>(2) | surprising<br>(3)  | biased<br>(4)       | too long<br>(5)   |
| Norm information                | -0.019<br>(0.017)                 | -0.004<br>(0.012)  | 0.062**<br>(0.031) | -0.013<br>(0.023)   | 0.002<br>(0.029)  |
| Norm info $\times$ Rep/lean Rep | 0.118***<br>(0.044)               | 0.031<br>(0.038)   | -0.007<br>(0.060)  | -0.097**<br>(0.048) | -0.025<br>(0.061) |
| Additional controls             | Yes                               | Yes                | Yes                | Yes                 | Yes               |
| Baseline attitudes              | Yes                               | Yes                | Yes                | Yes                 | Yes               |
| Policy group mean               | 0.837                             | 0.892              | 0.561              | 0.364               | 0.350             |
| Observations                    | 1343                              | 1343               | 1343               | 1343                | 1343              |
| R <sup>2</sup>                  | 0.343                             | 0.390              | 0.220              | 0.462               | 0.181             |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A9: Perceptions of the placebo versus the carbon tax video

|                     | Perceived the second video as ... |                      |                    |                     |                     |
|---------------------|-----------------------------------|----------------------|--------------------|---------------------|---------------------|
|                     | interesting<br>(1)                | informative<br>(2)   | surprising<br>(3)  | biased<br>(4)       | too long<br>(5)     |
| Norm group          | -0.008<br>(0.016)                 | 0.006<br>(0.011)     | -0.039<br>(0.028)  | -0.011<br>(0.019)   | 0.016<br>(0.027)    |
| Policy group        | -0.091***<br>(0.019)              | -0.072***<br>(0.015) | 0.002<br>(0.028)   | 0.278***<br>(0.022) | 0.094***<br>(0.027) |
| Norm+Policy group   | -0.055***<br>(0.018)              | -0.057***<br>(0.014) | 0.059**<br>(0.028) | 0.216***<br>(0.021) | 0.079***<br>(0.027) |
| Additional controls | Yes                               | Yes                  | Yes                | Yes                 | Yes                 |
| Baseline attitudes  | Yes                               | Yes                  | Yes                | Yes                 | Yes                 |
| Control group mean  | 0.935                             | 0.975                | 0.581              | 0.075               | 0.254               |
| Observations        | 2688                              | 2688                 | 2688               | 2688                | 2688                |
| R <sup>2</sup>      | 0.170                             | 0.229                | 0.163              | 0.323               | 0.094               |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A10: Effect video interventions on perceptions of social norms toward climate action

|                                    | Posterior estimate of climate action support |                       |                            |                     | Injunctive norm           |                     |
|------------------------------------|----------------------------------------------|-----------------------|----------------------------|---------------------|---------------------------|---------------------|
|                                    | Among Americans<br>(1)                       | (2)                   | Among friends, etc.<br>(3) | (4)                 | Positive reaction?<br>(5) | (6)                 |
| Norm group                         | 5.463***<br>(0.927)                          | 9.242***<br>(1.115)   | 1.136<br>(1.073)           | 2.993**<br>(1.281)  | 0.057**<br>(0.025)        | 0.063*<br>(0.032)   |
| Policy group                       | -0.496<br>(0.872)                            | -1.403<br>(1.022)     | -0.889<br>(1.058)          | -1.076<br>(1.341)   | -0.002<br>(0.025)         | 0.015<br>(0.031)    |
| Norm+Policy group                  | 7.376***<br>(0.950)                          | 11.657***<br>(1.150)  | 1.111<br>(1.067)           | 2.554*<br>(1.331)   | 0.059**<br>(0.025)        | 0.079***<br>(0.031) |
| Overestimated                      |                                              | 3.725**<br>(1.559)    |                            | 4.618***<br>(1.692) |                           | 0.078*<br>(0.042)   |
| Norm $\times$ overestimated        |                                              | -11.840***<br>(1.893) |                            | -5.828**<br>(2.301) |                           | -0.020<br>(0.050)   |
| Policy $\times$ overestimated      |                                              | 2.612<br>(1.832)      |                            | 0.293<br>(2.189)    |                           | -0.058<br>(0.052)   |
| Norm+Policy $\times$ overestimated |                                              | -13.877***<br>(1.917) |                            | -4.680**<br>(2.085) |                           | -0.063<br>(0.051)   |
| Additional controls                | Yes                                          | Yes                   | Yes                        | Yes                 | Yes                       | Yes                 |
| Baseline attitudes and beliefs     | Yes                                          | Yes                   | Yes                        | Yes                 | Yes                       | Yes                 |
| Control group mean                 | 54.223                                       | 54.223                | 55.022                     | 55.022              | 0.609                     | 0.609               |
| Observations                       | 2687                                         | 2687                  | 2687                       | 2687                | 2687                      | 2687                |
| R <sup>2</sup>                     | 0.474                                        | 0.502                 | 0.679                      | 0.682               | 0.367                     | 0.368               |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

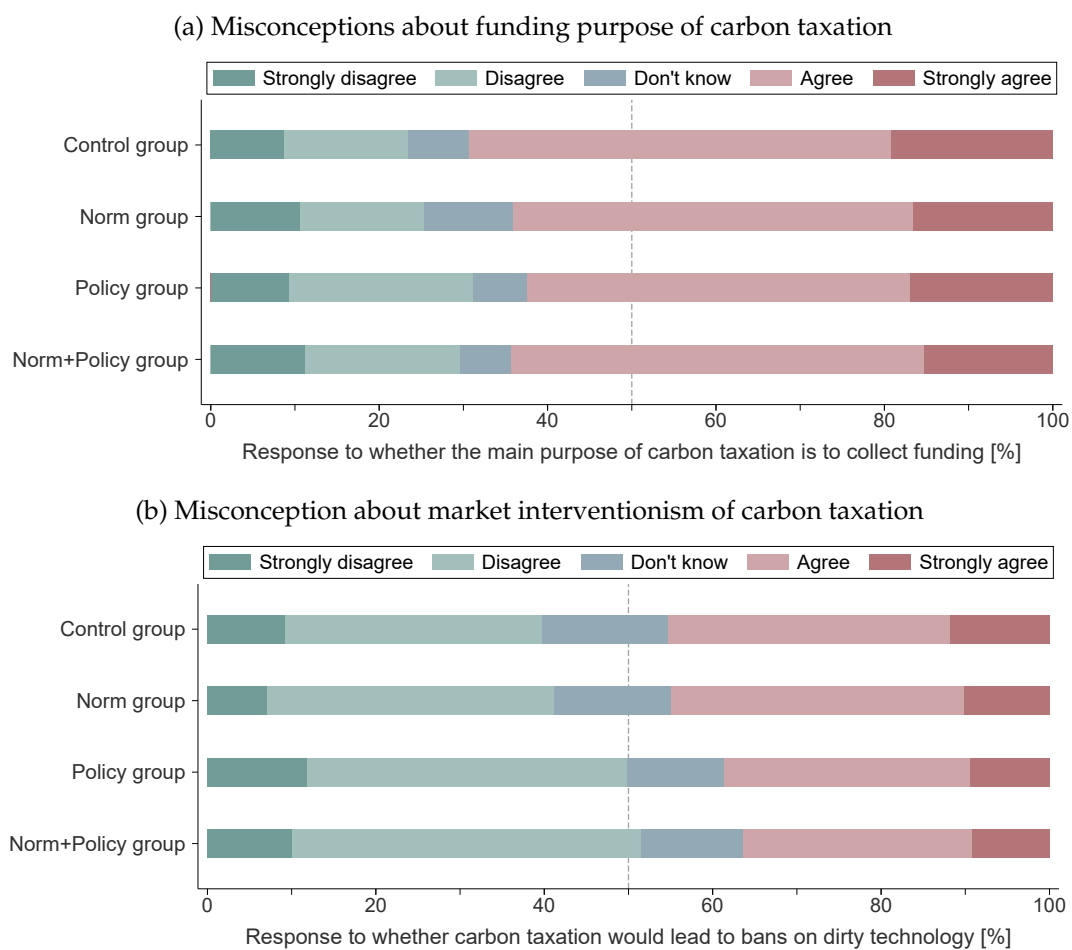


Figure A4: Effects on policy understanding in the initial survey

*Notes:* Subfigures (a) and (b) shows misconceptions about carbon taxation based on responses to two obfuscated quiz questions about how carbon taxation works, both of which ask for subjects' level of agreement to incorrect statements about carbon taxation.

Table A11: Impact on misconceptions about carbon pricing in the initial survey

|                              | <i>1 if mistakenly agree</i> |                      | <i>Ordered Logit</i> |                      |
|------------------------------|------------------------------|----------------------|----------------------|----------------------|
|                              | Funding<br>(1)               | Banning<br>(2)       | Funding<br>(3)       | Banning<br>(4)       |
| Norm group                   | -0.031<br>(0.026)            | -0.018<br>(0.029)    | -0.166<br>(0.119)    | -0.019<br>(0.115)    |
| Policy group                 | -0.068**<br>(0.026)          | -0.105***<br>(0.029) | -0.227*<br>(0.123)   | -0.344***<br>(0.120) |
| Norm+Policy group            | -0.066**<br>(0.027)          | -0.110***<br>(0.029) | -0.265**<br>(0.124)  | -0.343***<br>(0.120) |
| Additional controls          | Yes                          | Yes                  | Yes                  | Yes                  |
| Baseline attitudes           | Yes                          | Yes                  | Yes                  | Yes                  |
| $p$ -value for $H_0: P = NP$ | 0.926                        | 0.864                | 0.755                | 0.989                |
| Control group mean           | 0.766                        | 0.603                |                      |                      |
| Observations                 | 2688                         | 2688                 | 2688                 | 2688                 |
| $R^2$                        | 0.131                        | 0.105                |                      |                      |
| Pseudo $R^2$                 |                              |                      | 0.056                | 0.048                |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A12: Beliefs about impacts of carbon taxation in the initial survey

|                              | <i>Post-intervention agreement to statements about carbon pricing (0-100)</i> |                      |                      |                      |                      |
|------------------------------|-------------------------------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|
|                              | Reduces CO2<br>(1)                                                            | Harms economy<br>(2) | Benefits rich<br>(3) | Benefits self<br>(4) | Benefits poor<br>(5) |
| Norm group                   | 1.911<br>(1.270)                                                              | 0.778<br>(1.426)     | 0.991<br>(1.537)     | 1.977<br>(1.290)     | 1.331<br>(1.357)     |
| Policy group                 | 4.527***<br>(1.240)                                                           | 0.214<br>(1.499)     | -3.406**<br>(1.564)  | 4.776***<br>(1.252)  | 5.404***<br>(1.328)  |
| Norm+Policy group            | 6.634***<br>(1.226)                                                           | -1.017<br>(1.475)    | -2.207<br>(1.512)    | 4.844***<br>(1.258)  | 5.426***<br>(1.357)  |
| Additional controls          | Yes                                                                           | Yes                  | Yes                  | Yes                  | Yes                  |
| Baseline attitudes           | Yes                                                                           | Yes                  | Yes                  | Yes                  | Yes                  |
| $p$ -value for $H_0: P = NP$ | 0.065                                                                         | 0.387                | 0.422                | 0.957                | 0.987                |
| Control group mean           | 53.347                                                                        | 46.383               | 41.890               | 51.145               | 52.611               |
| Observations                 | 2687                                                                          | 2687                 | 2687                 | 2687                 | 2687                 |
| $R^2$                        | 0.563                                                                         | 0.484                | 0.130                | 0.531                | 0.539                |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A13: Impact on beliefs about mechanisms in the initial survey

|                                           | <i>Agree or strongly agree (LPM)</i> |                     |                   | <i>Ordered Logit</i> |                     |                   |
|-------------------------------------------|--------------------------------------|---------------------|-------------------|----------------------|---------------------|-------------------|
|                                           | Consumers<br>(1)                     | Firms<br>(2)        | Innovation<br>(3) | Consumers<br>(4)     | Firms<br>(5)        | Innovation<br>(6) |
| Norm group                                | -0.009<br>(0.024)                    | 0.039<br>(0.029)    | -0.024<br>(0.019) | 0.137<br>(0.125)     | 0.168<br>(0.120)    | -0.123<br>(0.131) |
| Policy group                              | -0.015<br>(0.024)                    | 0.138***<br>(0.028) | -0.011<br>(0.020) | 0.136<br>(0.130)     | 0.674***<br>(0.126) | -0.033<br>(0.134) |
| Norm+Policy group                         | 0.044*<br>(0.023)                    | 0.201***<br>(0.028) | -0.012<br>(0.019) | 0.335***<br>(0.124)  | 0.845***<br>(0.120) | 0.047<br>(0.131)  |
| Additional controls                       | Yes                                  | Yes                 | Yes               | Yes                  | Yes                 | Yes               |
| Baseline attitudes                        | Yes                                  | Yes                 | Yes               | Yes                  | Yes                 | Yes               |
| $p$ -value for $H_0: P = NP$ <sup>a</sup> | 0.007                                | 0.019               | 0.979             | 0.097                | 0.143               | 0.518             |
| Control group mean                        | 0.753                                | 0.432               | 0.886             |                      |                     |                   |
| Observations                              | 2688                                 | 2688                | 2688              | 2688                 | 2688                | 2688              |
| $R^2$                                     | 0.332                                | 0.190               | 0.237             |                      |                     |                   |
| Pseudo $R^2$                              |                                      |                     |                   | 0.168                | 0.095               | 0.165             |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

<sup>a</sup>No, not *that* P versus NP. We are not mathematical geniuses, unfortunately.

Table A14: Impact on attitudes toward all environmental policies (Ordered Logit)

|                                  | Carbon<br>taxation<br>(1) | Fuel<br>efficiency<br>(2) | Green<br>infrastructure<br>(3) | Renewable<br>energy R&D<br>(4) | Wildlife<br>protection<br>(5) |
|----------------------------------|---------------------------|---------------------------|--------------------------------|--------------------------------|-------------------------------|
| Norm group                       | 0.428***<br>(0.134)       | 0.104<br>(0.136)          | 0.554***<br>(0.177)            | -0.077<br>(0.199)              | -0.243<br>(0.184)             |
| Policy group                     | 0.543***<br>(0.145)       | 0.163<br>(0.142)          | 0.239<br>(0.173)               | 0.034<br>(0.197)               | -0.226<br>(0.184)             |
| Norm+Policy group                | 0.698***<br>(0.145)       | 0.054<br>(0.143)          | 0.551***<br>(0.175)            | 0.180<br>(0.208)               | -0.080<br>(0.206)             |
| Additional controls              | Yes                       | Yes                       | Yes                            | Yes                            | Yes                           |
| Baseline attitudes               | Yes                       | Yes                       | Yes                            | Yes                            | Yes                           |
| $p$ -value for $H_0: N = P = NP$ | 0.145                     | 0.752                     | 0.100                          | 0.433                          | 0.681                         |
| Observations                     | 2688                      | 2688                      | 2688                           | 2688                           | 2688                          |
| Pseudo- $R^2$                    | 0.433                     | 0.507                     | 0.558                          | 0.570                          | 0.574                         |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A15: Average treatment effects on donations immediately after interventions

|                                       | Donation to CLC |                 | Donation to NWF |                 | Total donation  |                 |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                       | (1)             | (2)             | (3)             | (4)             | (5)             | (6)             |
| Norm group                            | -0.46<br>(0.82) | 0.90<br>(1.01)  | -1.74<br>(1.08) | -0.53<br>(1.43) | -2.19<br>(1.53) | 0.37<br>(1.92)  |
| Policy group                          | -0.07<br>(0.80) | -0.51<br>(0.94) | -1.28<br>(1.10) | 0.04<br>(1.52)  | -1.35<br>(1.56) | -0.47<br>(1.96) |
| Norm+Policy group                     | 0.61<br>(0.82)  | 0.18<br>(0.97)  | -0.08<br>(1.21) | 1.46<br>(1.72)  | 0.53<br>(1.65)  | 1.64<br>(2.16)  |
| <i>Excl. strong prior supporters</i>  |                 | ✓               |                 | ✓               |                 | ✓               |
| Baseline attitudes                    | Yes             | Yes             | Yes             | Yes             | Yes             | Yes             |
| Demographic controls                  | Yes             | Yes             | Yes             | Yes             | Yes             | Yes             |
| <i>p</i> -value for $H_0: N = P = NP$ | 0.426           | 0.379           | 0.322           | 0.462           | 0.220           | 0.622           |
| Control group mean                    | 10.08           | 7.69            | 16.27           | 15.49           | 26.35           | 23.18           |
| Observations                          | 2685            | 1499            | 2685            | 1499            | 2685            | 1499            |
| $R^2$                                 | 0.199           | 0.233           | 0.170           | 0.215           | 0.209           | 0.264           |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A16: ATEs on stated support in the initial survey: interaction specification

|                                      | Support carbon tax |                    |                     | Strongly oppose carbon tax |                   |                   |
|--------------------------------------|--------------------|--------------------|---------------------|----------------------------|-------------------|-------------------|
|                                      | (1)                | (2)                | (3)                 | (4)                        | (5)               | (6)               |
| Norm video                           | 0.039**<br>(0.019) | 0.043**<br>(0.019) | 0.061**<br>(0.028)  | -0.020<br>(0.015)          | -0.023<br>(0.016) | -0.035<br>(0.024) |
| Policy video                         | 0.049**<br>(0.019) | 0.043**<br>(0.019) | 0.077***<br>(0.028) | -0.020<br>(0.017)          | -0.017<br>(0.017) | -0.030<br>(0.026) |
| Norm video $\times$ Policy video     | -0.023<br>(0.026)  | -0.023<br>(0.025)  | -0.053<br>(0.038)   | 0.004<br>(0.023)           | 0.001<br>(0.023)  | 0.007<br>(0.035)  |
| <i>Excl. strong prior supporters</i> |                    |                    | ✓                   |                            |                   | ✓                 |
| Additional controls                  |                    | Yes                | Yes                 |                            | Yes               | Yes               |
| Baseline attitudes                   | Yes                | Yes                | Yes                 | Yes                        | Yes               | Yes               |
| Observations                         | 2688               | 2688               | 1501                | 2688                       | 2688              | 1501              |
| $R^2$                                | 0.620              | 0.647              | 0.578               | 0.600                      | 0.624             | 0.605             |

In all regressions, observations are weighted for better representativeness of political parties. Demographic controls include age, age squared, gender, race, education, and household income. Baseline attitude controls include indicator variables for pre-intervention support for carbon pricing, a factor variable for pre-intervention support of other (non-carbon pricing) climate policies, a factor variable for general environmental attitudes, political affiliation, and prior perception of social norms toward carbon neutrality. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A17: ATEs on donations in the initial survey: interaction specification

|                                      | Donation to CLC |                 | Donation to NWF |                 | Total donation  |                 |
|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                      | (1)             | (2)             | (3)             | (4)             | (5)             | (6)             |
| Norm video                           | -0.46<br>(0.82) | 0.90<br>(1.01)  | -1.74<br>(1.08) | -0.53<br>(1.43) | -2.19<br>(1.53) | 0.37<br>(1.92)  |
| Policy video                         | -0.07<br>(0.80) | -0.51<br>(0.94) | -1.28<br>(1.10) | 0.04<br>(1.52)  | -1.35<br>(1.56) | -0.47<br>(1.96) |
| Norm video $\times$ Policy video     | 1.14<br>(1.14)  | -0.21<br>(1.36) | 2.94*<br>(1.58) | 1.95<br>(2.22)  | 4.08*<br>(2.23) | 1.74<br>(2.88)  |
| <i>Excl. strong prior supporters</i> |                 | ✓               |                 | ✓               |                 | ✓               |
| Baseline attitudes                   | Yes             | Yes             | Yes             | Yes             | Yes             | Yes             |
| Demographic controls                 | Yes             | Yes             | Yes             | Yes             | Yes             | Yes             |
| Observations                         | 2685            | 1499            | 2685            | 1499            | 2685            | 1499            |
| $R^2$                                | 0.199           | 0.233           | 0.170           | 0.215           | 0.209           | 0.264           |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

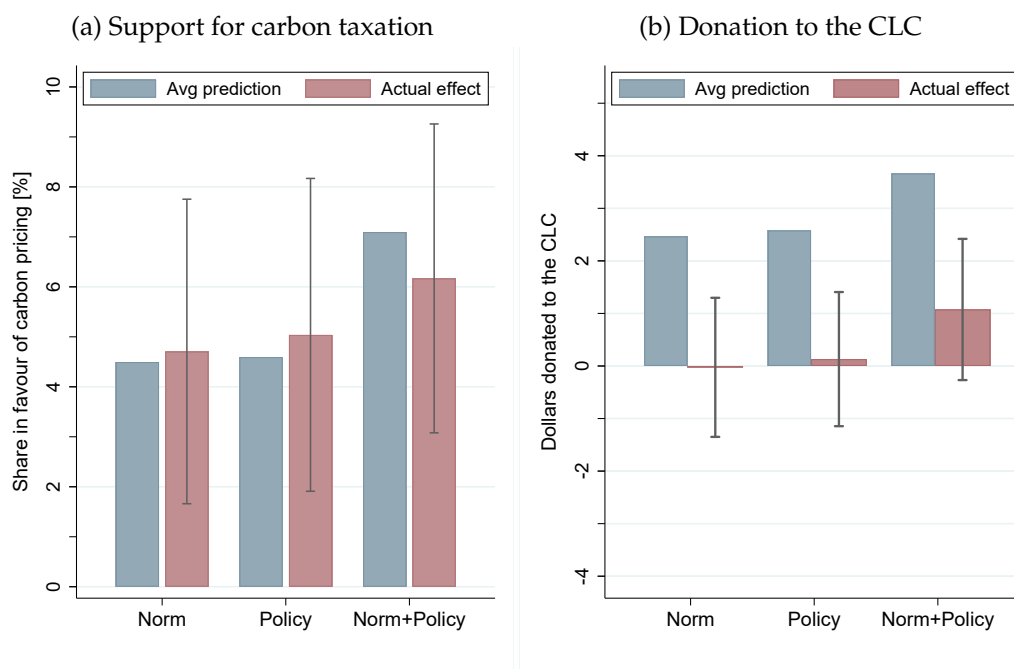


Figure A5: Expert predictions and actual treatment effects

Notes: Average expert prediction compared to the actual estimated treatment effects. Whiskers indicate 90% confidence intervals.

Table A18: Heterogenous effects on carbon taxation views in the initial survey by political affiliation

|                                        | Post-intervention views on carbon taxation |                    |                     |                    |
|----------------------------------------|--------------------------------------------|--------------------|---------------------|--------------------|
|                                        | Support CT                                 |                    | Strongly oppose CT  |                    |
|                                        | (1)                                        | (2)                | (3)                 | (4)                |
| Norm group                             | 0.011<br>(0.021)                           | 0.016<br>(0.046)   | -0.015<br>(0.011)   | -0.034<br>(0.024)  |
| Policy group                           | 0.047**<br>(0.020)                         | 0.104**<br>(0.045) | -0.019*<br>(0.011)  | -0.050*<br>(0.026) |
| Norm+Policy group                      | 0.044**<br>(0.020)                         | 0.107**<br>(0.045) | -0.013<br>(0.011)   | -0.043*<br>(0.025) |
| Independent                            | -0.085*<br>(0.049)                         | -0.092<br>(0.075)  | -0.016<br>(0.036)   | -0.054<br>(0.057)  |
| Independent $\times$ Norm group        | 0.081**<br>(0.039)                         | 0.134**<br>(0.067) | -0.027<br>(0.030)   | -0.027<br>(0.049)  |
| Independent $\times$ Policy group      | 0.033<br>(0.038)                           | 0.035<br>(0.066)   | 0.001<br>(0.034)    | 0.029<br>(0.055)   |
| Independent $\times$ Norm+Policy group | 0.047<br>(0.037)                           | 0.015<br>(0.066)   | -0.014<br>(0.030)   | 0.020<br>(0.050)   |
| Republican                             | -0.028<br>(0.051)                          | 0.014<br>(0.073)   | 0.003<br>(0.043)    | -0.030<br>(0.060)  |
| Republican $\times$ Norm group         | -0.004<br>(0.041)                          | -0.024<br>(0.063)  | 0.013<br>(0.036)    | 0.032<br>(0.048)   |
| Republican $\times$ Policy group       | -0.055<br>(0.046)                          | -0.100<br>(0.065)  | 0.004<br>(0.039)    | 0.021<br>(0.049)   |
| Republican $\times$ Norm+Policy group  | 0.011<br>(0.047)                           | -0.060<br>(0.066)  | -0.082**<br>(0.039) | -0.063<br>(0.049)  |
| <i>Excl. strong prior supporters</i>   |                                            | ✓                  |                     | ✓                  |
| Baseline attitudes                     | Yes                                        | Yes                | Yes                 | Yes                |
| Demographic controls                   | Yes                                        | Yes                | Yes                 | Yes                |
| Observations                           | 2688                                       | 1501               | 2688                | 1501               |
| $R^2$                                  | 0.648                                      | 0.582              | 0.626               | 0.607              |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A19: Heterogenous effects on donations in the initial survey by political affiliation

|                                        | Environmental donations |                   |                   |                   |
|----------------------------------------|-------------------------|-------------------|-------------------|-------------------|
|                                        | Donation to CLC         |                   | Total donations   |                   |
|                                        | (1)                     | (2)               | (3)               | (4)               |
| Norm group                             | 0.213<br>(1.297)        | 0.730<br>(1.945)  | -0.148<br>(2.347) | 2.297<br>(3.523)  |
| Policy group                           | -0.131<br>(1.236)       | -0.050<br>(1.829) | -2.405<br>(2.316) | -2.103<br>(3.592) |
| Norm+Policy group                      | 0.243<br>(1.270)        | -0.476<br>(1.769) | -0.689<br>(2.338) | -2.637<br>(3.251) |
| Independent                            | 0.450<br>(2.061)        | 0.550<br>(2.545)  | 2.637<br>(3.944)  | 0.013<br>(5.080)  |
| Independent $\times$ Norm group        | -1.667<br>(1.869)       | 0.566<br>(2.526)  | -5.291<br>(3.517) | -3.357<br>(4.810) |
| Independent $\times$ Policy group      | 0.832<br>(1.832)        | 1.116<br>(2.436)  | 0.718<br>(3.595)  | 2.108<br>(4.968)  |
| Independent $\times$ Norm+Policy group | 1.090<br>(1.877)        | 1.535<br>(2.341)  | 1.059<br>(3.672)  | 5.400<br>(4.851)  |
| Republican                             | -0.049<br>(2.420)       | 2.092<br>(2.873)  | -0.727<br>(4.660) | 1.042<br>(5.734)  |
| Republican $\times$ Norm group         | 0.141<br>(1.985)        | -0.167<br>(2.526) | 0.128<br>(3.826)  | -2.495<br>(4.826) |
| Republican $\times$ Policy group       | -1.263<br>(1.930)       | -2.581<br>(2.298) | 1.738<br>(3.917)  | 1.502<br>(4.918)  |
| Republican $\times$ Norm+Policy group  | -0.573<br>(1.950)       | -0.018<br>(2.322) | 2.040<br>(4.121)  | 4.759<br>(4.935)  |
| <i>Excl. strong prior supporters</i>   |                         | ✓                 |                   | ✓                 |
| Baseline attitudes                     | Yes                     | Yes               | Yes               | Yes               |
| Demographic controls                   | Yes                     | Yes               | Yes               | Yes               |
| Observations                           | 2685                    | 1499              | 2685              | 1499              |
| $R^2$                                  | 0.199                   | 0.234             | 0.198             | 0.249             |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

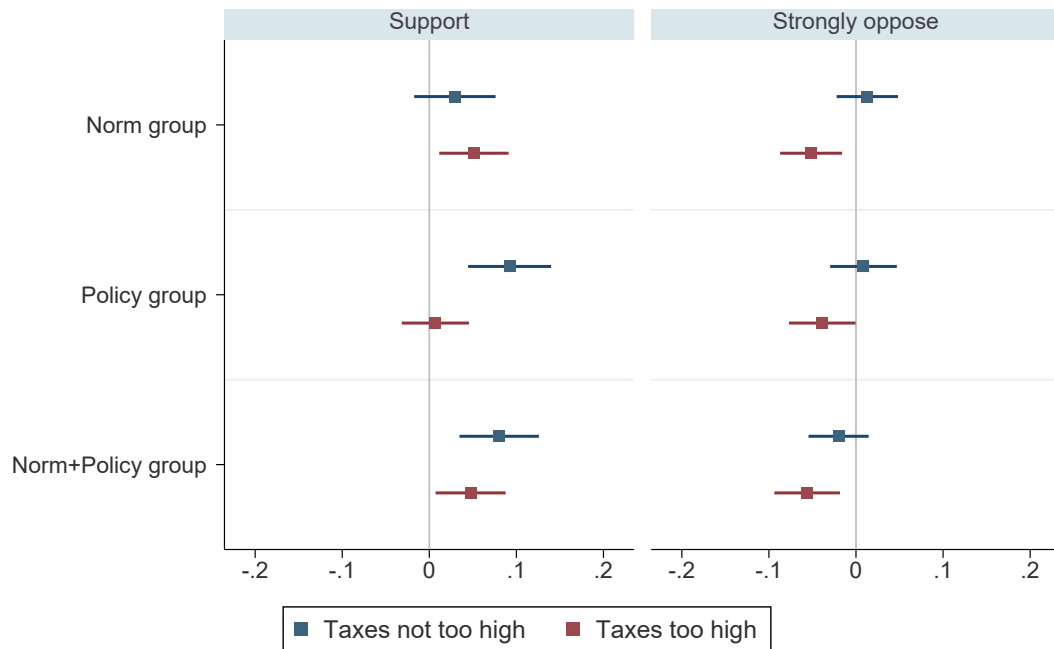


Figure A6: Effects by 'tax aversion'

*Notes:* This figure plots estimates for the conditional average treatment effects of the information videos by 'tax aversion'. Coefficients are obtained using the specifications in Table 2 columns (3) and (6), respectively, and additionally interacting treatment group indicators with an indicator variable that takes value one if the respondents believes that taxes are too high or much too high and zero otherwise. Error bars indicate 90% confidence intervals.

Table A20: Number of observations by experimental condition in the initial and follow-up survey

| Condition         | Initial survey | Follow-up survey | Follow-up share |
|-------------------|----------------|------------------|-----------------|
| Control group     | 672            | 545              | 81.1%           |
| Norm group        | 672            | 530              | 78.9%           |
| Policy group      | 669            | 551              | 82.4%           |
| Norm+Policy group | 674            | 541              | 80.3%           |
| Total             | 2,687          | 2,167            | 80.6%           |

Table A21: Randomization checks for the follow-up survey

|                   | (1)<br>Age<br>in years | (2)<br>College<br>degree | (3)<br>(Lean)<br>Republican | (4)<br>Climate<br>attitude | (5)<br>Support<br>carbon taxation |
|-------------------|------------------------|--------------------------|-----------------------------|----------------------------|-----------------------------------|
| Norm group        | -0.119<br>(1.013)      | -0.005<br>(0.034)        | 0.026<br>(0.035)            | 0.010<br>(0.074)           | 0.052<br>(0.035)                  |
| Policy group      | 1.510<br>(1.021)       | 0.055<br>(0.034)         | -0.017<br>(0.035)           | -0.014<br>(0.076)          | 0.007<br>(0.035)                  |
| Norm+Policy group | -0.122<br>(1.001)      | 0.010<br>(0.034)         | -0.032<br>(0.035)           | 0.012<br>(0.074)           | 0.050<br>(0.035)                  |
| Constant          | 45.472***<br>(0.710)   | 0.511***<br>(0.024)      | 0.475***<br>(0.025)         | -0.281***<br>(0.053)       | 0.591***<br>(0.025)               |
| Observations      | 2135                   | 2135                     | 2135                        | 2135                       | 2135                              |
| $R^2$             | 0.001                  | 0.001                    | 0.002                       | 0.000                      | 0.002                             |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A22: ATEs on support in the initial survey using only the follow-up sample

|                                      | <i>Support</i>      |                     | <i>Strongly oppose</i> |                    | <i>Donation to CLC</i> |                   |
|--------------------------------------|---------------------|---------------------|------------------------|--------------------|------------------------|-------------------|
|                                      | (1)                 | (2)                 | (3)                    | (4)                | (5)                    | (6)               |
| Norm group                           | 0.036*<br>(0.021)   | 0.055*<br>(0.031)   | -0.027<br>(0.017)      | -0.042*<br>(0.025) | -0.449<br>(0.865)      | 0.442<br>(1.067)  |
| Policy group                         | 0.038*<br>(0.021)   | 0.065**<br>(0.030)  | -0.003<br>(0.018)      | -0.007<br>(0.027)  | -0.185<br>(0.800)      | -0.682<br>(0.938) |
| Norm+Policy group                    | 0.062***<br>(0.021) | 0.084***<br>(0.032) | -0.030*<br>(0.018)     | -0.047*<br>(0.027) | 0.907<br>(0.862)       | -0.529<br>(0.970) |
| <i>Excl. strong prior supporters</i> |                     | ✓                   |                        | ✓                  |                        | ✓                 |
| Baseline attitudes                   | Yes                 | Yes                 | Yes                    | Yes                | Yes                    | Yes               |
| Demographic controls                 | Yes                 | Yes                 | Yes                    | Yes                | Yes                    | Yes               |
| Control group mean                   | 0.625               | 0.447               | 0.196                  | 0.291              | 9.547                  | 7.495             |
| Observations                         | 2140                | 1210                | 2140                   | 1210               | 2136                   | 1208              |
| $R^2$                                | 0.638               | 0.569               | 0.634                  | 0.615              | 0.181                  | 0.208             |

All analyses are identical to those in Table 2 with the only difference that we are including only subjects who also completed the corresponding question in the follow-up survey. In all regressions, observations are weighted for better representativeness of political parties. Demographic controls include age, age squared, gender, race, education, and household income. Baseline attitude controls include indicator variables for pre-intervention support for carbon taxation, a factor variable for pre-intervention support of other (non-carbon taxation) climate policies, a factor variable for general environmental attitudes, political affiliation, and prior perception of social norms toward carbon neutrality. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A23: ATEs on donations in the initial survey using only the follow-up sample

|                                      | Donation to CLC |                 | Donation to NWF  |                 | Total donation  |                 |
|--------------------------------------|-----------------|-----------------|------------------|-----------------|-----------------|-----------------|
|                                      | (1)             | (2)             | (3)              | (4)             | (5)             | (6)             |
| Norm group                           | -0.75<br>(0.87) | 0.50<br>(1.08)  | -2.00*<br>(1.21) | -0.35<br>(1.61) | -2.76<br>(1.68) | 0.15<br>(2.13)  |
| Policy group                         | -0.38<br>(0.82) | -0.80<br>(1.00) | -1.56<br>(1.26)  | 0.34<br>(1.73)  | -1.94<br>(1.71) | -0.46<br>(2.20) |
| Norm+Policy group                    | 0.48<br>(0.87)  | -0.75<br>(1.03) | -0.48<br>(1.39)  | 1.35<br>(1.95)  | 0.01<br>(1.83)  | 0.61<br>(2.42)  |
| <i>Excl. strong prior supporters</i> |                 | ✓               |                  | ✓               |                 | ✓               |
| Baseline attitudes                   | Yes             | Yes             | Yes              | Yes             | Yes             | Yes             |
| Demographic controls                 | Yes             | Yes             | Yes              | Yes             | Yes             | Yes             |
| $p$ -value for $H_0: N = P = NP$     | 0.389           | 0.457           | 0.493            | 0.655           | 0.300           | 0.907           |
| Control group mean                   | 9.62            | 7.54            | 16.40            | 15.37           | 26.02           | 22.91           |
| Observations                         | 2170            | 1228            | 2170             | 1228            | 2170            | 1228            |
| $R^2$                                | 0.213           | 0.247           | 0.175            | 0.214           | 0.216           | 0.262           |

All analyses are identical to those in Table A15 with the only difference that we are including only subjects who also completed the corresponding question in the follow-up survey. Observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A24: Average treatment effects on donations in the follow-up survey

|                                      | Donation to CLC     |                   | Donation to UBI   |                   | Total donation     |                   |
|--------------------------------------|---------------------|-------------------|-------------------|-------------------|--------------------|-------------------|
|                                      | (1)                 | (2)               | (3)               | (4)               | (5)                | (6)               |
| Norm group                           | -0.811<br>(1.132)   | 0.959<br>(1.422)  | -0.249<br>(0.880) | 0.447<br>(1.099)  | -1.059<br>(1.664)  | 1.406<br>(2.045)  |
| Policy group                         | -2.270**<br>(1.035) | -1.721<br>(1.233) | -0.648<br>(0.840) | -0.605<br>(1.031) | -2.918*<br>(1.586) | -2.326<br>(1.944) |
| Norm+Policy group                    | -2.189**<br>(1.047) | -1.759<br>(1.247) | -0.330<br>(0.905) | -1.155<br>(1.187) | -2.519<br>(1.620)  | -2.914<br>(1.994) |
| <i>Excl. strong prior supporters</i> |                     | ✓                 |                   | ✓                 |                    | ✓                 |
| Baseline attitudes                   | Yes                 | Yes               | Yes               | Yes               | Yes                | Yes               |
| Demographic controls                 | Yes                 | Yes               | Yes               | Yes               | Yes                | Yes               |
| $p$ -value for $H_0: N = P = NP$     | 0.329               | 0.118             | 0.894             | 0.410             | 0.484              | 0.082             |
| Control group mean                   | 11.54               | 9.06              | 8.91              | 8.91              | 20.44              | 20.44             |
| Observations                         | 2168                | 1227              | 2168              | 1227              | 2168               | 1227              |
| $R^2$                                | 0.195               | 0.226             | 0.172             | 0.204             | 0.216              | 0.245             |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A25: ATEs on stated support in the follow-up survey: interaction specification

|                                      | <i>Support carbon tax</i> |                   |                   | <i>Strongly oppose carbon tax</i> |                   |                   |
|--------------------------------------|---------------------------|-------------------|-------------------|-----------------------------------|-------------------|-------------------|
|                                      | (1)                       | (2)               | (3)               | (4)                               | (5)               | (6)               |
| Norm video                           | 0.000<br>(0.024)          | 0.004<br>(0.023)  | 0.011<br>(0.032)  | -0.014<br>(0.020)                 | -0.013<br>(0.019) | -0.031<br>(0.029) |
| Policy video                         | -0.011<br>(0.023)         | -0.014<br>(0.022) | -0.024<br>(0.032) | -0.008<br>(0.021)                 | -0.005<br>(0.019) | -0.022<br>(0.029) |
| Norm video $\times$ Policy video     | 0.019<br>(0.033)          | 0.011<br>(0.032)  | 0.011<br>(0.046)  | -0.031<br>(0.029)                 | -0.036<br>(0.027) | -0.035<br>(0.041) |
| <i>Excl. strong prior supporters</i> |                           |                   | ✓                 |                                   |                   | ✓                 |
| Additional controls                  |                           | Yes               | Yes               |                                   | Yes               | Yes               |
| Baseline attitudes                   | Yes                       | Yes               | Yes               | Yes                               | Yes               | Yes               |
| Observations                         | 2172                      | 2172              | 1229              | 2172                              | 2172              | 1229              |
| $R^2$                                | 0.510                     | 0.567             | 0.526             | 0.527                             | 0.587             | 0.570             |

In all regressions, observations are weighted for better representativeness of political parties. Demographic controls include age, age squared, gender, race, education, and household income. Baseline attitude controls include indicator variables for pre-intervention support for carbon pricing, a factor variable for pre-intervention support of other (non-carbon pricing) climate policies, a factor variable for general environmental attitudes, political affiliation, and prior perception of social norms toward carbon neutrality. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A26: ATEs on donations in the follow-up survey: interaction specification

|                                      | <i>Donation to CLC</i> |                   | <i>Donation to NWF</i> |                   | <i>Total donation</i> |                   |
|--------------------------------------|------------------------|-------------------|------------------------|-------------------|-----------------------|-------------------|
|                                      | (1)                    | (2)               | (3)                    | (4)               | (5)                   | (6)               |
| Norm video                           | -0.811<br>(1.132)      | 0.959<br>(1.422)  | -0.249<br>(0.880)      | 0.447<br>(1.099)  | -1.059<br>(1.664)     | 1.406<br>(2.045)  |
| Policy video                         | -2.270**<br>(1.035)    | -1.721<br>(1.233) | -0.648<br>(0.840)      | -0.605<br>(1.031) | -2.918*<br>(1.586)    | -2.326<br>(1.944) |
| Norm video $\times$ Policy video     | 0.892<br>(1.487)       | -0.997<br>(1.898) | 0.566<br>(1.255)       | -0.997<br>(1.567) | 1.458<br>(2.278)      | -1.994<br>(2.830) |
| <i>Excl. strong prior supporters</i> |                        | ✓                 |                        | ✓                 |                       | ✓                 |
| Baseline attitudes                   | Yes                    | Yes               | Yes                    | Yes               | Yes                   | Yes               |
| Demographic controls                 | Yes                    | Yes               | Yes                    | Yes               | Yes                   | Yes               |
| Observations                         | 2168                   | 1227              | 2168                   | 1227              | 2168                  | 1227              |
| $R^2$                                | 0.195                  | 0.226             | 0.172                  | 0.204             | 0.216                 | 0.245             |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A27: ATEs on zero donations in the follow-up survey

|                                      | No donation to CLC |                   | No donation at all |                   |
|--------------------------------------|--------------------|-------------------|--------------------|-------------------|
|                                      | (1)                | (2)               | (3)                | (4)               |
| Norm group                           | 0.003<br>(0.028)   | -0.011<br>(0.034) | -0.003<br>(0.028)  | -0.017<br>(0.036) |
| Policy group                         | 0.003<br>(0.028)   | -0.006<br>(0.035) | 0.001<br>(0.029)   | -0.004<br>(0.036) |
| Norm+Policy group                    | 0.020<br>(0.028)   | 0.045<br>(0.035)  | 0.026<br>(0.029)   | 0.055<br>(0.037)  |
| <i>Excl. strong prior supporters</i> |                    | ✓                 |                    | ✓                 |
| Baseline attitudes                   | Yes                | Yes               | Yes                | Yes               |
| Demographic controls                 | Yes                | Yes               | Yes                | Yes               |
| $p$ -value for $H_0: N = P = NP$     | 0.778              | 0.213             | 0.545              | 0.114             |
| Control group mean                   | 0.558              | 0.627             | 0.511              | 0.576             |
| Observations                         | 2168               | 1227              | 2168               | 1227              |
| $R^2$                                | 0.299              | 0.353             | 0.288              | 0.343             |

In all regressions, observations are weighted for better representativeness of political parties. Robust standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

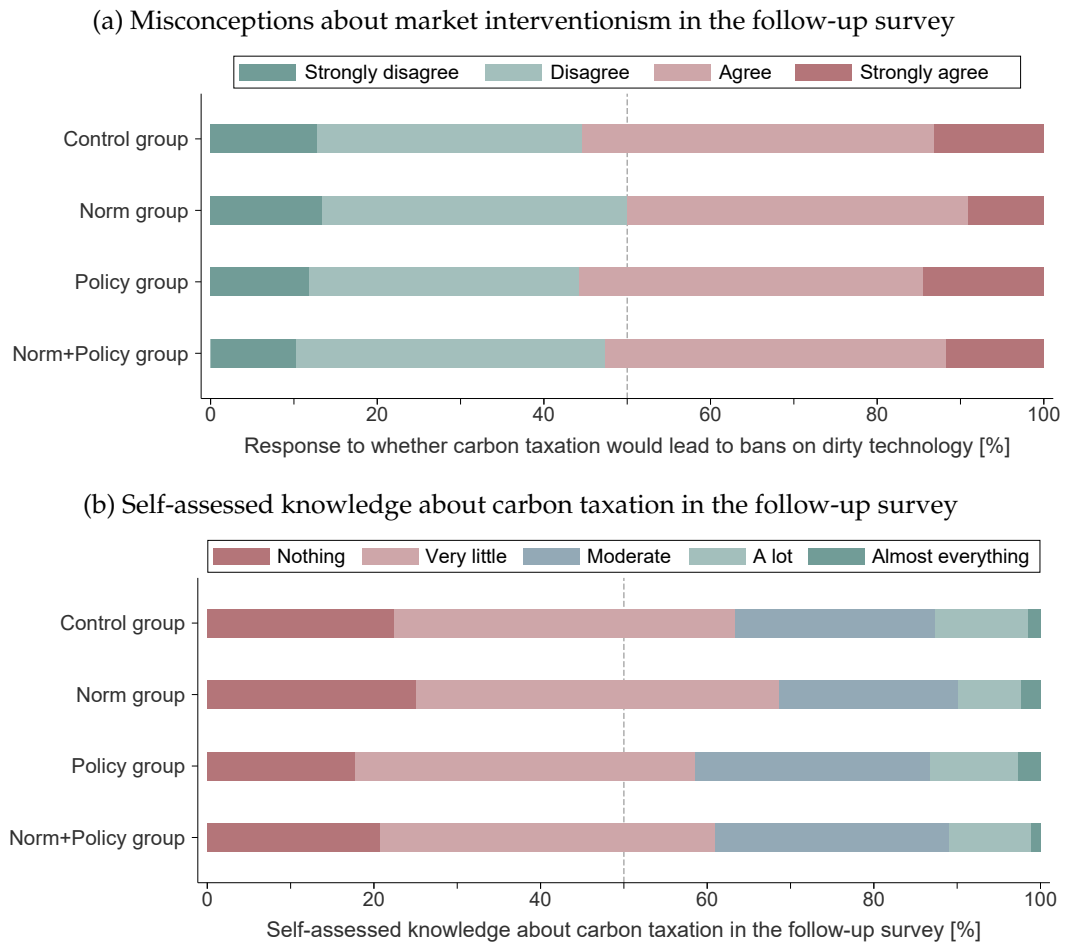


Figure A7: Policy understanding about carbon taxation in the follow-up survey

Notes: Misconceptions about carbon taxation based on responses to an obfuscated quiz questions in the follow-up survey, asking for subjects' level of agreement to an incorrect statements about carbon taxation.

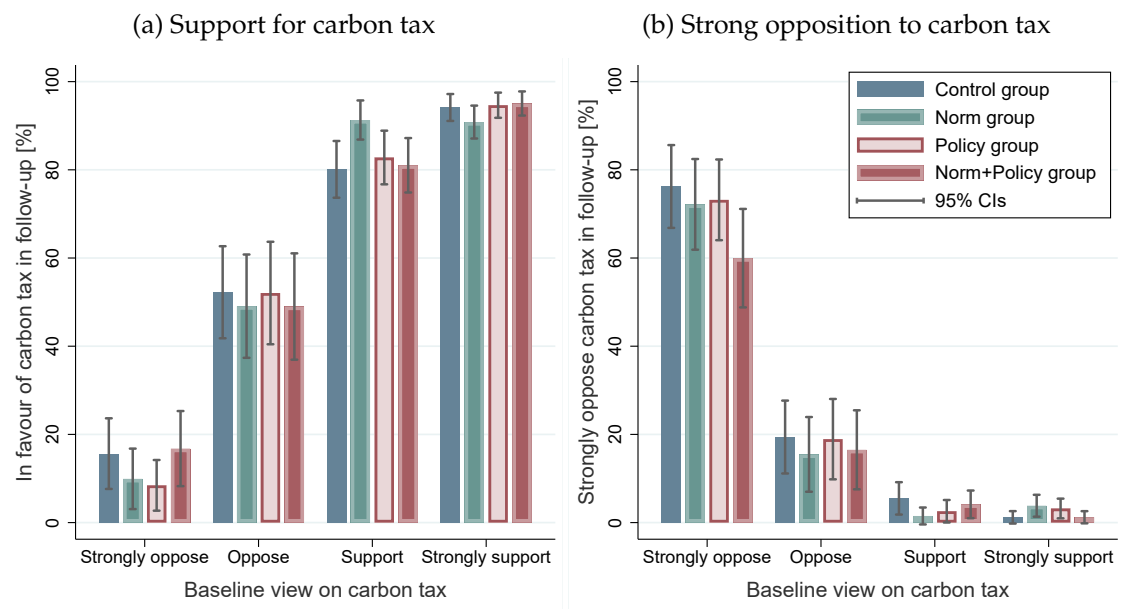


Figure A8: Descriptive evidence on the persistence of information effects

Notes: All observations are weighted.

## **Appendix B   Links to video interventions**

### **B.1   Control group videos**

video 1: <https://vimeo.com/736228811/7cc3940f71?share=copy>

video 2: <https://vimeo.com/736235744/c4b62621aa?share=copy>

### **B.2   Norm group videos**

video 1: <https://vimeo.com/737930543/45e3096853?share=copy>

video 2: <https://vimeo.com/736235744/c4b62621aa?share=copy>

### **B.3   Policy group videos**

video 1: <https://vimeo.com/736228811/7cc3940f71?share=copy>

video 2: <https://vimeo.com/737510131/47d8d6a66e?share=copy>

### **B.4   Norm+Policy group videos**

video 1: <https://vimeo.com/737930543/45e3096853?share=copy>

video 2: <https://vimeo.com/737510131/47d8d6a66e?share=copy>

## **Appendix C   Survey questions**

### **C.1   Outcomes**

**Post-intervention support for carbon taxes:** How much do you support or oppose a policy that requires fossil fuel companies to pay a fee on carbon emissions, and distribute the money collected to all U.S. citizens, in equal amounts, through monthly dividend checks.[ Strongly support, Somewhat support, Somewhat oppose, Strongly oppose]

**Post-intervention donation to CLC or NWF:** By completing this survey, you will automatically be enrolled in a lottery for one of several \$100 prizes, in addition to your regular survey pay! Every participant has the same chance to win, but can win at most one prize. In case you win one of the \$100 prizes, you can split a donation between two nonprofit non-government organizations. We will double your donation amount through matching donations of our own. Please be assured that we are not directly involved with any of the organizations and receive no financial benefits from them.

- The National Wildlife Federation (NWF): a nonpartisan organization that is dedicated to protecting wild species threatened by loss of habitat due to climate change. Their strategic plan aims to increase America's fish and wildlife populations and enhance their capacity to thrive in a rapidly changing environment. Learn more about the NWF at <https://www.nwf.org/>.
- The Climate Leadership Council (CLC): a bipartisan organization that advocates for carbon pricing in the United States. They propose a legislative plan that would require fossil fuel companies to pay a fee of \$40 per ton of CO2 emissions, with the collected money being distributed equally to every American citizen through carbon dividend checks. Learn more about the CLC at <https://clcouncil.org/>.

Remember that every dollar you choose to donate will be worth two dollars for the organization(s) of your choice. Please adjust the sliders to decide how to split the \$100 in case you win in the lottery: Donate to the CLC, Donate to the NWF, Keep for yourself.

**Support for carbon taxes in follow-up:** In the next few pages, we are interested in your views on two novel but regularly debated policy ideas for the United States. One of the policies is called carbon pricing with uniform cash transfers. This policy would require fossil fuel companies to pay a fee on carbon dioxide (CO2) emissions, and distribute the collected money to all U.S. citizens, in equal amounts, through monthly dividend checks. The aim is to give firms an incentive to reduce carbon emissions, while ensuring that ordinary households can afford the transition away from fossil fuels. How much do you support or oppose this policy? [ Strongly support, Somewhat support, Somewhat oppose, Strongly oppose]

**Donation to CLC in follow-up:** Attention! Your choices on this page can have real monetary consequences. By completing the survey, you will automatically be enrolled in a lottery for several prizes of \$100 bonus pay. Everyone has the same chance to win. You can also choose to donate part of the prize in case you are one of the winners. Donations can be split between two nonprofit organizations:

- The UBI Center: a nonpartisan organization that conducts research into understanding the effects of universal basic income policies and how to design them. Their mission is to make universal basic income the world's most thoroughly researched economic policy. Learn more about the UBI Center at <https://ubicenter.org>.
- The Climate Leadership Council (CLC): a bipartisan organization that promotes carbon pricing policies in the United States. They propose a plan that would require fossil fuel companies to pay a fee for each ton of CO2 emissions, with the collected money being distributed equally to every American citizen. Learn more about the CLC at <https://clcouncil.org>.

We are not directly involved with any of these organizations and receive no financial benefits from them. For all donation choices you make on this page, we will double the amount by matching it with an equal donation of our own. How would you like to split the \$100 in case you win the lottery? [ Donate to the UBI center, Donate to the CLC, Keep for yourself.]

## **C.2 Socio-economic characteristics**

**Age:** What is your year of birth?

**Gender:** Retrieved from Prolific background data

**Ethnicity:** Retrieved from Prolific background data

**Religion:** How religious do you consider yourself to be? [ Not religious, Only slightly religious, Moderately religious, Very religious, Don't know]

**Children:** How many children do you have, if any? [ I do not have any children, 1 child, 2 children, 3 children, 4 children or more]

**Education:** What is the highest level of education you have completed? [ Less than high school degree, High school graduate (high school diploma or equivalent including GED), Some college but no degree, Associate degree in college (2-year), Bachelor's degree in college (4-year), Master's degree, Doctoral degree, Professional degree (JD, MD) ]

## **C.3 Political attitudes**

**Political identity:** What do you consider to be your political affiliation, as of today?[ Republican, Democrat, Independent, Something else]

**Political Affiliation:** Where would you place yourself on this 7-point scale ranging from extremely liberal (left) to extremely conservative (right)?[ 1- liberal, ..., 7- conservative]

**Inflation Reduction Act:** Have you heard of the Inflation Reduction Act, and if yes, do you have an opinion on it? [ Have not heard about it, Heard about it, but no clear opinion, Heard about it and support it, Heard about it and oppose it ]

## **C.4 Economic factors**

**Household Income:** What was your total household income in 2021 from all sources, before taxes? [ less than \$40,000; \$40,000 to less than \$100,000; \$100,000 or more; Refuse to answer]

**Employment status:** What is your current employment status? [ Full-time employee, Part-time employee, Self-employed or small business owner, Unemployed and looking for work, Not working and not looking for work, Student, Retired, None of the above ]

**Financial Vulnerability:** How confident are you that you could come up with \$2,000 if an unexpected need arose within the next month? [ very confident; somewhat confident, not very confident, not confident at all, don't know/prefer not to say]

**Car frequency use:** How often do you typically use a car? [ Never, Less than once a month, Few times a month, Few times a week, Once a day, Multiple times a day]

**Concerns about inflation:** Which option best describes how frequently you thought about inflation in the last 3 months?[ Never, Once a month, Once every other week, Once a week, Multiple times a week, Daily]

## **C.5 Baseline climate-related beliefs**

**Pre-intervention support for carbon taxes:** How much do you support or oppose requiring fossil fuel companies to pay a fee on carbon emissions, and distribute the money collected to all U.S. citizens, in equal amounts, through monthly dividend checks. [ Strongly support, Somewhat support, Somewhat oppose, Strongly oppose]

**Pre-intervention support for other environmental policies:** Many different climate-related policies have been proposed, and some of them are listed below. How much do you support or oppose each of the following policies?

- Set tougher fuel-efficiency standards for automobiles and trucks so that only electric or hydrogen vehicles can be sold after 2030. [ Strongly support, Somewhat support, Somewhat oppose, Strongly oppose]
- Fund more research into renewable energy sources, such as solar and wind power. [ Strongly support, Somewhat support, Somewhat oppose, Strongly oppose]
- Expand national wildlife refuge areas to protect habitats of wild species endangered by climate change. [ Strongly support, Somewhat support, Somewhat oppose, Strongly oppose]
- Fund a green infrastructure program consisting of clean-energy subsidies and investments into renewable power, public transport, and thermal renovation of buildings. [ Strongly support, Somewhat support, Somewhat oppose, Strongly oppose]

**Pre-intervention knowledge of carbon taxes:** A policy that requires fossil fuel companies to pay a fee on carbon emissions is called carbon pricing. How much do you know about this policy? [ Know nothing about it, Know a little, Know a moderate amount, Know a lot, Know almost everything ]

**Pre-intervention perceptions of carbon neutrality norms:**

- Out of 100 people from the general U.S. adult population, how many do you think favor the U.S. taking steps to become carbon neutral by 2050? Please guess
- Out of 100 people you know (e.g. friends, family, colleagues, ...), how many do you think would favor the U.S. taking steps to become carbon neutral by 2050? Please guess.

**Environmental attitudes:**

- How important is the issue of global warming to you personally? [ Extremely important, Very important, Somewhat important, Not too important, Not at all important]
- How worried are you about global warming?[ Very worried, Somewhat worried, Not very worried, Not at all worried]
- How much do you think global warming will harm you personally?[ A great deal, A moderate amount, Only a little, Not at all, Don't know]
- How much do you think global warming will harm future generations of people?[ A great deal, A moderate amount, Only a little, Not at all, Don't know]