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Hohenzollernstraße 1–3 | 45128 Essen, Germany

Fon: +49 201 8149-0 | email: rwi@rwi-essen.de

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Hohenzollernstr. 1-3, 45128 Essen, Germany

Ruhr-Universität Bochum (RUB), Department of Economics
Universitätsstr. 150, 44801 Bochum, Germany

Technische Universität Dortmund, Department of Economic and Social Sciences
Vogelpothsweg 87, 44227 Dortmund, Germany

Universität Duisburg-Essen, Department of Economics
Universitätsstr. 12, 45117 Essen, Germany

Bergische Universität Wuppertal, Schumpeter School of Business and Economics
Gaußstraße 20, 42119 Wuppertal

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Let your choice be your voice: Eliciting popular climate policy preferences from decisions with real consequences *

Daniela Flörchinger[†] Grischa Perino[‡] Manuel Frondel[§]
Johannes Jarke-Neuert[¶]

Abstract

Decommissioning of coal-fired power plants is a widely known emission abatement option, but one with a limited effect due to the EU Emissions Trading System (ETS). In contrast, tightening the cap in the EU ETS is a highly effective, but less known mitigation option. This article empirically analyzes whether informing individuals about the effectiveness of these abatement options increases support for more effective climate policies. The analysis is based on an online survey experiment involving actual cancellation of emission allowances and curbing the output of a coal-fired power plant. We find that preferences over abatement options are driven by their perceived effectiveness. Moreover, we provide causal evidence that voters update their preference rankings when exposed to relevant information.

Keywords: coal phase-out; information provision; motivated reasoning; policy mix

JEL classification: C93, D02, D83, D91, Q54, Q58

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[†]RWI - Leibniz Institute for Economic Research

[‡]Department of Socioeconomics and Center of Earth System Research and Sustainability (CEN) at Universität Hamburg

[§]RWI – Leibniz Institute for Economic Research and Ruhr University Bochum

[¶]Institute of Climate and Energy Systems – Jülich Systems Analysis (ICE-2) at Forschungszentrum Jülich, and Center of Earth System Research and Sustainability (CEN) at Universität Hamburg

1 Introduction

There is an implementation gap in European climate policy: The policy instruments currently in place are not sufficient to achieve emission targets, neither at the national nor global level (Fransen et al., 2023; Lecocq et al., 2022; Liu and Raftery, 2021; Perino et al., 2022a; Rogelj et al., 2023; UNEP, 2023). Given the regulatory framework with a number of overlapping climate policy instruments, the current policy mix lacks stringency and coherence (Willner and Perino, 2022). As a result, the marginal impacts of increasing the stringency of any of the measures in place are difficult to anticipate for laymen and experts alike (Gerstenberg et al., 2024). Moreover, implementing more ambitious policies can be difficult because policy makers fear strong opposition due to a lack of public support (Carattini et al., 2019; Douenne and Fabre, 2022; Le Yaouanq, 2023). To foster the implementation of effective climate policies, it is therefore essential to understand how the support for such policies can be increased.

This paper addresses this challenge by answering three research questions: First, does the provision of information on the effectiveness of abatement options favor the choice of the more effective options? Second, can the framing of abatement options, such as highlighting contribution of coal- fired power plants to greenhouse gas emissions, increase the support for the more effective options? Third, do motivated beliefs among supporters of climate action impede the choice of effective abatement options?

In a consequential online survey experiment with a sample of 1,161 members of the German Socio-Ecological Panel (Frondel et al., 2023; Klick et al., 2021), this article provides evidence on the choice between three individual abatement options that are miniature versions of climate policy instruments being discussed or implemented in 2022, when the survey was conducted. These climate policy instruments include (1) the tightening of the emissions cap in the European Union's Emission Trading System ETS (option *ETS*), (2) curbing emissions by regulating down coal-fired power plants, as demanded by climate activists (option *COAL*), and (3) the mandated reduction in emissions from coal-fired power plants alongside the cancellation of emission allowances from the EU ETS, as is stipulated by Germany's coal phase-out law of 2020 (option *MIX*).

The novelty of our research is that a random subset of these choices were actually

implemented in the aftermath of the experiment: We canceled emissions allowances from the EU ETS in cooperation with ForTomorrow gGmbH and we regulated down a coal-fired power plant of the German utility STEAG. While the experimental setting is tailored to European and German climate policies, the results are relevant for all countries with overlapping climate policies, such as other member states of the European Union, the United States, and China (Perino et al., 2025).

Our empirical analysis proceeds in three steps that correspond to our three research questions. First, we investigate individuals' choices when they receive no information about the impact of the three mitigation options on aggregate greenhouse gas emissions at the EU level, and we ask how different framings of the abatement options impact their choice. Second, we analyze how decisions are impacted by information about the effectiveness of these abatement options. Finally, focusing on motivated reasoning (Kunda, 1990), we explore whether individuals are less likely to follow the information that we provide if it contradicts the beliefs and attitudes that respondents expressed prior to the treatment interventions. If so, voters and politicians might choose ineffective measures, thereby widening the implementation gap in climate policy.

Our study contributes to two strands of the literature. First, in recent decades, an increasing number of studies have investigated the determinants of voter support for climate policies, mainly in stated preference experiments. While some studies focus specifically on the support for carbon taxation (see, e.g. Douenne and Fabre, 2022; Maestre-Andrés et al., 2019), others simultaneously consider a variety of policies, such as subsidies, regulation, and taxation (see, e.g. Bergquist et al., 2022; Drews and Van den Bergh, 2016; Huber et al., 2020; Simon, 2023; Tobler et al., 2012). For instance, Dechezleprêtre et al. (2025) investigate the support for a ban of combustion-engine cars, investment in green infrastructure, and a carbon tax with lump-sum redistribution across 20 countries. All of these studies identify perceived policy effectiveness, distributional impacts, and policy costs as important drivers of climate policy preferences. We contribute to this strand of the literature by investigating whether specific framings of climate policies and a simple expert assessment of their effectiveness can increase the support for more effective measures in a discrete-choice setting with real consequences.

Second, a growing strand of the literature in economics, political science, social psy-

chology, and neuroscience provides empirical evidence that people tend towards motivated reasoning. Most closely related to this paper are studies that investigate motivated reasoning among policy makers, motivated reasoning on climate change, and, in particular, on climate policy. The empirical evidence is inconclusive: While Banuri et al. (2019) document motivated reasoning among development agency employees, Hjort et al. (2021) find no evidence among Brazilian mayors. Kahan (2013), Zhou (2016), Fryer Jr. et al. (2019), and Zappalà (2023) find evidence for motivated reasoning about climate change, whereas Bago et al. (2023) and Ripberger et al. (2017) do not. With regard to climate policies, Bolsen et al. (2014) and Douenne and Fabre (2022) report motivated reasoning. By contrast, Jarke-Neuert et al. (2025) document behavior that is inconsistent with motivated reasoning on climate policy. However, these authors do so in a context that is relatively alien to individuals, and hence strongly motivated beliefs might have been less likely to form. Interestingly, the two studies in which the respondents' decisions had real consequences (i. e. Hjort et al., 2021; Jarke-Neuert et al., 2025) fail to find evidence for motivated reasoning. Adding to this line of inquiry, our paper provides evidence on motivated reasoning in the context of support for existing climate policy instruments.

Our results indicate that individuals make choices that are consistent with rationality: They prefer mitigation options that they consider to be more effective, although their perception of effectiveness is largely inconsistent with the actual effectiveness ranking. Individuals clearly respond to information about the options' effectiveness in reducing aggregate emissions. These results imply that information provision can increase the support for effective climate policies even within a policy mix that – in the eyes of the general public – induces counter-intuitive rankings of instrument effectiveness. Lastly, we find no evidence for motivated reasoning.

The subsequent section presents the experimental design. Section 3 outlines our hypotheses. Section 4 describes the data. Sections 5, 6, and 7 present the empirical analysis. The last section summarizes and concludes.

2 Experimental Design

The experiment consisted of two consecutive choices, $c = 1$ and $c = 2$, between three abatement options and one outside option, with an information treatment between the first and second choice. Upon eliciting respondents' attitude towards large firms and the market economy, as well as their participation in protests for climate protection and coal phase-out during the last five years (see Appendix D for the exact wording of the experiment), the experiment started with a detailed explanation of the choice task with the following choice options:

- Option *ETS*: Retiring 10 emission allowances of the EU ETS, being equivalent to abating 10 tons of carbon dioxide (CO_2), which roughly equals the annual carbon footprint of an average German citizen (Our World in Data, 2023).
- Option *COAL*: Reducing the emissions from a coal-fired power plant in Germany by 10 tons by diminishing the electricity production of the plant.
- Option *MIX*: Retiring 5 emission allowances, equivalent to abating 5 tons of CO_2, and reducing the emissions from a coal-fired power plant in Germany by 5 tons.
- Option *NONE*: No climate action.

In line with common survey standards, the response option "Don't know / No answer" was also available.

The first abatement option, labeled *ETS*, is hardly known by the general public (Jarke-Neuert et al., 2025) and reduces emissions through the cancellation of emission allowances of the EU ETS, using the 'buy, bank, burn' procedure (Gerlagh and Heijmans, 2019). As the EU ETS imposes a binding cap on the greenhouse gas emissions of the EU's industry and power sectors, the retirement of emissions allowances, implemented by the non-profit NGO ForTomorrow in the aftermath of the survey, is equivalent to a marginal tightening of the cap on emissions by the regulator. It is worth noting that, at the time the experiment was conducted in summer 2022, a strong tightening of the cap had been discussed in the context of the EU's 'Fit for 55' package.

The second abatement option, labeled *COAL*, was implemented by STEAG, a German utility that reduced the electricity output of its coal-fired power plant Herne IV on September 2, 2022. At a very small scale, this option reflects the phase-out of coal-fired power plants, which is demanded by climate activists such as Fridays for Future (2023). A third option, labeled *MIX*, was conceived to mimic Germany's coal phase-out in practice. It is a combination of the abatement options *ETS* and *COAL* and corresponds to a law passed in 2020, called the Coal Phase-Out Law. According to this law, the regular coal phase-out is set to be completed by 2038 at the latest. To ensure a reduction in aggregate emissions at the EU level, the government has committed to cancel emission allowances in line with the abatement that is induced by the mandatory phase-out. In addition to these three abatement options, the outside option of no mitigation, labeled *NONE*, was offered. Altogether, the abatement options *ETS*, *COAL*, and *MIX*, match – on a small scale – real-world climate policies that were discussed in Germany and the European Union at the time of the survey.

Participants were randomly assigned to one of four experimental groups that differed in the framing of the abatement choice: *BASE*, *MARKET*, *EMISSIONS*, and *REFORM*. The *REFORM* condition aimed to test the correlation between choices of abatement options and preferences for co-benefits. Since the experimental design was not suitable for measuring preferences for co-benefits, the *REFORM* condition is excluded from the the analysis in the main part of this paper. For completeness, we test the pre-registered hypothesis for this condition in Appendix B, using the best available measure of preferences for co-benefits. The assignment process resulted in approximately equal group sizes – see Table 2.

The experimental design is illustrated in Figure 1. In the baseline condition *BASE*, subjects made their first choice without any further information. Directly thereafter, they were asked to rank the four options according to their belief about each option's effectiveness in reducing carbon emissions. The next sequence of the experiment presented subjects with an information treatment. They were exposed to an expert assessment by researchers of the University of Hamburg[1] on the expected effectiveness of the options in reducing carbon emissions under the EU ETS rules that were valid at the time of the

[1]One of which is a co-author of this article and an expert in the field.

BASE condition	MARKET condition	EMISSIONS condition
Questions on attitude towards large firms and market economy, participation in protests for climate protection and coal phase-out		
	Treatment: Framing of ETS as government intervention in the market	Treatment: Highlighting contribution of coal-fired power plants to CO_2 emissions
First choice (c=1): Respondents choose single most preferred abatement option.		
Ranking: Respondents rank abatement options according to their beliefs about effectiveness.		
Expert assessment: Info on impact of abatement options on total CO_2 emissions in EU under current rules		
Second choice (c=2): Respondents choose single most preferred abatement option.		

Figure 1: Experimental Design

experiment. These subjects learned that *COAL* was the least effective of the three abatement options, with 10 tons of emissions reductions from curbing the output of coal plants in Germany resulting in only about 4.2 tons of emissions reductions at the EU level. This discrepancy is due to the so-called waterbed effect (Perino, 2018), whereby emission reductions from one plant are offset by emission increases by other plants within the European Union that use the obsolete emission allowances. Option *MIX* was presented as the next most effective, resulting in 7.1 tons of emissions reductions. *ETS* was presented as the most effective option, where canceling ten allowances induces a corresponding emissions reduction of 10 tons at the EU level (Table 1). The experiment concluded with subjects being asked a second time to select their single most preferred option ($c = 2$).

Table 1: Impact on Carbon Emissions in Germany and the EU at the Time of the Experiment (Summer 2022).

	Reduction of emissions in tons of CO_2	
Option	Nominal	Real
ETS	10.0 tons	10.0 tons
COAL	10.0 tons	4.2 tons
MIX	10.0 tons	7.1 tons

Treatment conditions *MARKET* and *EMISSIONS* were identical to the baseline condition, except that, prior to their first choice, respondents were exposed to the following framings: The *MARKET* framing stressed that, although the ETS is often called a "market-based instrument", it entails a government intervention to reduce emissions: "Emission rights represent a political intervention in the market, as the policy sets binding requirements for companies on the amount of climate protection they must undertake" (see Appendix D.5). The *EMISSIONS* framing stated that a substantial share of Germany's carbon emissions are due to coal-fired power plants and that these emissions had increased in the year prior to the survey according to information provided by the German Environment Agency (see Appendix D.3).

To obtain incentive-compatible responses, one out of sixty choices was implemented with the help of STEAG, the operator of the coal-fired power plant that was curbed, and ForTomorrow, the NGO that retired ETS allowances.[2] Subjects were informed about the potential implementation of their choices prior to making any choice. Since the experiment was funded by a government grant, respondents were informed that their choices would be implemented using taxpayers' money and that the funds would be used for other purposes if they did not choose an abatement option. Individual choices hence reflected actual policy choices made by the government.

3 Hypotheses

With our experimental design, we test four hypotheses and thereby provide answers to the three research questions outlined in the introduction.[3] By framing the EU ETS as an instrument by which the government limits the amount of emissions in the European Union, the *MARKET* condition addresses concerns of market skeptics. Therefore, we hypothesize that

[2]In total, 170 emissions allowances were retired by the non-profit NGO ForTomorrow gGmbH, Berlin, and the output of a coal-fired power plant was reduced to avoid 100 tons of CO_2 by STEAG GmbH, Essen, at their Herne IV plant on September 2, 2022. In a cognitive pretest, there was no indication that participants had doubts about the measures to be implemented.

[3]We pre-registered three main hypotheses and seven auxiliary hypotheses. Unfortunately, the data is not suitable for testing all pre-registered hypotheses. The hypotheses are re-ordered in this manuscript and some auxiliary hypotheses are not explicitly labeled as hypotheses. Further, we slightly deviate from some pre-registered hypotheses if warranted. Deviations from the pre-analysis plan are discussed in footnotes to the hypotheses and summarized for reviewers in Table E.9.

Hypothesis 1 A larger share of respondents that state to have a negative attitude towards the market economy choose to reduce emissions either via the retirement of allowances from the EU ETS or via the combined option *MIX* in their first choice ($c = 1$) in the *MARKET* condition than in the *BASE* condition.[4]

For individuals who care about climate change mitigation, the information about the effectiveness of mitigation options provided before their second choice is relevant and should induce at least some individuals to adjust their choices in line with the information received. Thus, we hypothesize that

Hypothesis 2 In the *BASE* condition, more respondents choose option *ETS* – the most effective option – in their second choice, $c = 2$, than in their first choice and the share of those choosing option *COAL* – the least effective option – is reduced in $c = 2$ compared to $c = 1$.

Further, we are interested in whether motivated reasoning among supporters of climate change can lead to the choice of ineffective abatement options. The statement in the *EMISSIONS* condition emphasizing the relevance of coal combustion for CO_2 emissions may lead to the perception that, because of their large contribution, the reduction of emissions from a coal-fired power plant is a particularly fair or effective approach for climate change mitigation. This impression then conflicts with the information provided before the second choice that reducing the cap in the EU ETS is the most effective measure. Therefore, our first hypothesis on motivated reasoning is that

Hypothesis 3 In the *EMISSIONS* condition, provision of information on the effectiveness of mitigation options is less likely than in the baseline condition to induce an adjustment of choices in line with the information provided. Specifically, providing information induces a smaller reduction in *EMISSIONS* than in *BASE* in the probability that the least effective option (*COAL*) is chosen relative to all mitigation options.

In a next step, we focus on identification with the anti-coal movement as a potential source of motivated reasoning. Identification with the anti-coal movement is measured

[4]The pre-registered hypothesis is slightly different in that it does not mention that the effect of the *MARKET* treatment should depend on the respondents' attitude towards the market economy. The results for the pre-registered hypothesis can be found in Table C.6 in Appendix C.

by self-reported participation in protests against coal combustion and coal mining during the last five years. For respondents who participated in protests related to phasing out coal, the information that reducing emissions from a coal-fired power plant is the least effective mitigation option is likely to conflict with their prior beliefs. According to the theory of motivated reasoning, this should impede belief updating. Thus, we hypothesize that

Hypothesis 4 Within the *BASE* condition, respondents that state to have participated in protests related to phasing out coal or extracting coal respond less to information on the relative ineffectiveness of directly reducing emissions by coal-fired power plants. In particular, the reduction in the probability of choosing option *COAL* or option *MIX* from $c = 1$ to $c = 2$ is smaller for respondents who participated in protests.[5]

4 Data

The data for our experiment is drawn from the German Socio-Ecological Panel (Frondel et al., 2023; Klick et al., 2021) and was collected in the summer of 2022 in collaboration with forsa (`www.forsa.com`), a survey institute that maintains a panel of more than 150,000 individuals who are representative of the German-speaking internet users aged 14 and older in Germany. Panel members are recruited offline, with each individual of the population having the same probability to become a panel member.

In total, 6,583 adults participated in the survey, of which a random sub-sample of 2,001 individuals was drawn to participate in our experiment (see Table 2). These participants were randomly assigned to the experimental groups *MARKET*, *EMISSIONS*, *REFORM* and *BASE*, the latter serving as the control group. The *REFORM* condition is discussed in Appendix B, but excluded from the analyses in the main part of the paper. As prespecified, we retained only individuals who chose an abatement option in both discrete choice tasks, $c = 1$ and $c = 2$, yielding a sample size of 1,161.

Randomization across experimental conditions was successful, as there are hardly

[5] To increase power, we deviate slightly from the pre-registered hypothesis. While the pre-registered hypothesis only considers individuals who chose *COAL* or *MIX* in $c = 1$, we also include respondents who did not choose *COAL* or *MIX* in $c = 1$ in the analysis.

Table 2: Planned and Sampled Number of Individuals by Experimental Condition, and the Respective Number of Completed Answers.

Condition	Planned	Sampled	Completed survey	Chose abatement in $c = 1$ and $c = 2$
BASE	600	644	595	484
MARKET	400	446	397	331
EMISSIONS	400	459	405	346
Total	1,400	1,549	1,397	1,161

Note: Column 3 lists the counts net of individuals who refused to participate or dropped out at some point of the survey. Column 4 lists only individuals who chose an abatement option in both discrete choice tasks, $c = 1$ and $c = 2$.

any significant differences for the socio-demographic characteristics (see Table C.1 in the appendix). The sample is a broad cross-section of the German population, but it is not representative: Our sample tends to be older and better educated than the population (see Table C.2). This is partly due to the sampling strategy, as we sampled only adults.

Prior to the discrete choice tasks, we elicited respondents' attitudes towards the market economy. Almost 60 % of the respondents had a very or rather positive attitude towards the market economy (Table 3), only 13.4 % of the respondents were critical.

Table 3: Respondents' Attitudes Towards Market Economy.

	Very negative	Rather negative	Neutral	Rather positive	Very positive	n/a	Total
Number	10	145	316	567	119	4	1161
Share	0.9	12.5	27.2	48.8	10.2	0.3	100.0

Pre-experimentally, we also elicited participation in protests against coal combustion and coal mining during the five years prior to the survey, along with participation in general protests for climate protection. Table 4 shows that 11.0 % of the respondents engaged in climate protests during the preceding five years. Participation in protests against coal was lower: 4.3 % of the respondents participated in such protests.

Table 4: Participation in Climate Protests and Protest against Coal during the 5 Years prior to the Survey.

	Never	Once or twice	More than twice	n/a	Total
Climate protests	1,031 (88.8 %)	81 (7.0 %)	47 (4.0 %)	2 (0.2 %)	1,161 (100.0 %)
Protests against Coal	1,109 (95.5 %)	36 (3.1 %)	14 (1.2 %)	2 (0.2 %)	1,161 (100.0 %)

Regarding the respondents' beliefs about the options' effectiveness, which we elicited

after the first discrete choice task, a large majority of 71.3 % has single-peaked beliefs, while some rank two or all three instruments as equally effective and 8.4 % refused to indicate any ranking (Table 5). Among *BASE* and *EMISSIONS*, there is a clear statistically significant confidence in option *MIX*, the combination of retirement of allowances from the ETS and the reduction of emissions from a coal-fired power plant: 29.5 % of the *BASE* group and 30.3 % of the *EMISSIONS* group rank this option as single most effective. It bears noting that the effectiveness ranking in Table 5 is inconsistent with the options' actual effectiveness. Only between 11.4 and 15.6 % of respondents rank all options correctly (see Table C.3). This implies that there is scope for learning, which is important for our experiment.

Table 5: Beliefs about the Effectiveness of the Mitigation Options *ETS*, *COAL*, and *MIX*.

Belief shape	Description	BASE	MARKET	EMISSIONS	Total
Flat	Instruments ranked equally	13.2%	10.6%	12.1%	12.1%
Single-peaked	*ETS ranked first*	19.0%	24.2%	21.1%	21.1%
	COAL ranked first	22.7%	23.6%	20.8%	22.4%
	MIX ranked first	29.5%	22.7%	30.3%	27.8%
	One instrument ranked first	71.2%	70.5%	72.2%	71.3%
Double-peaked	*ETS+COAL ranked first*	4.1%	4.5%	2.9%	3.9%
	ETS+MIX ranked first	1.7%	3.0%	2.3%	2.2%
	COAL+MIX ranked first	1.9%	2.7%	1.7%	2.1%
	Two instruments ranked first	7.7%	10.2%	6.9%	8.2%
None	Question not answered	7.9%	8.8%	8.7%	8.4%
Total		100.0%	100.0%	100.0%	100.0%%

The large majority of the population is not familiar with the EU ETS (Jarke-Neuert et al., 2025) and previous research has pointed towards a preference for command-and-control over market-based environmental policies (Kirchgässner and Schneider, 2003; Stadelmann-Steffen, 2011). Therefore, we expect that without any additional information on abatement effectiveness, most respondents would prefer either option *COAL* – reducing emissions by diminishing the production of a coal-fired power plant – or option *MIX*, i.e. the combination of retirement of allowances and reduction of emissions from a coal-fired power plant. Thus, in condition *BASE*, the share of respondents choosing option *ETS* could be expected to be rather low.[6] Indeed, with less than 20%, the share

[6]In the pre-analysis plan, we specified the hypothesis that in condition *BASE*, the share of respondents

of subjects of the *BASE* group who chose the option *ETS* is much lower than those who opted for *MIX* (Table 6), but it also deserves noting that the share of respondents who voted for the *COAL* option was even lower, though only slightly.

Table 6: Descriptive Statistics on Emission Abatement Choices in both Discrete Choice Tasks.

	ETS	COAL	MIX	NONE	No Answer	Total
First choice, $\mathbf{c} = \mathbf{1}$:						
BASE	114 (19.2%)	112 (18.8%)	270 (45.4%)	56 (9.4%)	43 (7.2%)	595 (100.0%)
MARKET	98 (24.7%)	71 (17.9%)	172 (43.3%)	26 (6.5%)	30 (7.6%)	397 (100.0%)
EMISSIONS	77 (19.0%)	70 (17.3%)	206 (50.9%)	28 (6.9%)	24 (5.9%)	405 (100.0%)
Total	**289 (20.7%)**	**253 (18.1%)**	**648 (46.4%)**	**110 (7.9%)**	**97 (6.9%)**	**1,397 (100.0%)**
Second choice, $\mathbf{c} = \mathbf{2}$:						
BASE	220 (37.0%)	60 (10.1%)	212 (35.6%)	44 (7.4%)	59 (9.9%)	595 (100.0%)
MARKET	174 (43.8%)	38 (9.6%)	121 (30.5%)	23 (5.8%)	41 (10.3%)	397 (100.0%)
EMISSIONS	168 (41.5%)	28 (6.9%)	146 (36.0%)	23 (5.7%)	40 (9.9%)	405 (100.0%)
Total	**562 (40.2%)**	**126 (9.0%)**	**479 (34.3%)**	**90 (6.4%)**	**140 (10.0%)**	**1,397 (100.0%)**

5 Decision-Making Without Expert Advice

In this section, we analyze the abatement choices of participants who have not been exposed to the expert assessment on the effectiveness of the mitigation options. Because our primary interest is in how individuals choose between the three mitigation options, as pre-registered, we exclude those respondents from the analysis who did not choose a mitigation option.[7] For each of the three mitigation options, we define a dummy variable that is equal to one if and only if the respective option was chosen.

Beliefs about the effects of an environmental policy have been found to be crucial determinants of voter support (Bergquist et al., 2022; Dechezleprêtre et al., 2025; Douenne and Fabre, 2022; Drews and Van den Bergh, 2016; Huber et al., 2020; Millner and Ollivier, 2016; Rinscheid and Wüstenhagen, 2018). Thus, we first assess whether there is a correlation between prior beliefs about the effectiveness of mitigation options and abatement choices.

choosing option *ETS* should be below one third. The descriptive results reported in Table 6 indicate that this hypothesis appears to hold true, while Table C.4 of the appendix confirms statistical significance ($p < 0.001$).

[7] Including respondents who chose option *NONE* in the analyses does not significantly change our results. Results are reported in Appendix E.1 for reviewers, but not intended for publication.

When deciding on mitigation options that are of no cost to the respondents, we expect individuals to choose the option that they believe to be most effective. This is investigated with a single multinomial logit model, the results of which are presented in Table 7 and indicate that there is indeed a positive and statistically significant relationship between beliefs about effectiveness, elicited from the ranking, and the probability of choosing an option. Respondents who believe that an abatement option is the single most effective in reducing carbon emissions are 35.8 to 51.6 percentage points more likely to choose this option than respondents with double-peaked or flat beliefs, both of which build the reference category of the multinomial logit estimation. Each column of Table 7 shows the marginal effects of considering an option as single most effective, captured by a dummy variable, on the probability of choosing the respective mitigation option.

Turning now to Hypothesis 1, which states that framing the EU ETS as an instrument that entails a government intervention in the market should increase its acceptance among respondents with an aversion against the market economy, a larger share of respondents with a negative attitude towards the market economy should choose to reduce emissions either via the retirement of allowances from the EU ETS or via the combined option *MIX* in their first choice ($c = 1$) in the *MARKET* than in the *BASE* condition.

Table 7: Correlation of Choices with Beliefs about Effectiveness in *BASE*, *MARKET*, *EMISSIONS* on $c = 1$. Average Marginal Effects from a Multinomial Logit Estimation with Option *MIX* as Base Outcome.

Dependent variable	*ETS*		*COAL*		*MIX*	
Effect of belief about single most effective option						
Option *ETS*	0.516***	(0.041)	-0.144***	(0.032)	-0.372***	(0.043)
Option *COAL*	-0.168***	(0.032)	0.402***	(0.043)	-0.234***	(0.046)
Option *MIX*	-0.196***	(0.030)	-0.162***	(0.031)	0.358***	(0.037)

Regression controlling for gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms. The reference category for effectiveness beliefs summarizes double-peaked and flat beliefs. Reference margin is the predicted share of study participants with double-peaked and flat beliefs who chose the respective option. $n = 945$, $\log \mathscr{L} = -609.79$, Wald $\chi = 456.93$, Wald $p = 0.000$, pseudo $R^2 = 0.364$. Robust standard errors in parentheses. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$).

We investigate this hypothesis by regressing the probability of choosing *ETS* and the combined probability of choosing either *ETS* or *MIX* on a dummy for having a very or rather negative attitude towards the market economy, a dummy for the *MARKET* treatment, and their interaction. Since marginal effects from nonlinear models with interac-

tion terms are difficult to present in tabular form, we plot marginal effects in Figure 2 and show the coefficient estimates in Table C.5. Figure 2 shows that framing the ETS as an instrument that restricts markets increases the probability that respondents who have a negative attitude towards the market economy choose this option by 15.5 percentage points. However, this effect is only significant at the 10%-level and based on only 72 individuals in condition *BASE* who have a negative attitude towards the market economy. Furthermore, there is no significant effect on the combined probability of choosing either *ETS* or *MIX*. Hence, Hypothesis 1 receives only weak support by our experiment.

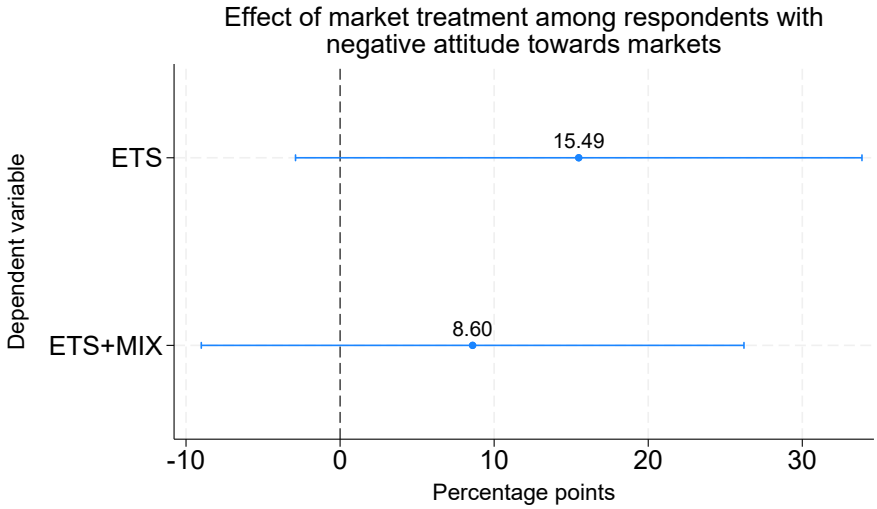

Figure 2: Impact of *MARKET* Condition on $c = 1$ among Respondents with a Negative Attitude towards the Market. Average Marginal Effects from Maximum Likelihood Logit Estimations.

In the *EMISSIONS* condition, participants were exposed to a short statement noting the contribution of coal combustion to carbon emissions and the increase in emissions from coal-fired power plants in Germany in the year before the survey. We expect this framing to induce an urge to hold operators of coal-fired power plants responsible for climate protection and hence a higher share of individuals in *EMISSIONS* choosing options *COAL* or *MIX* in their first choice as compared to the *BASE* condition. Table 8 shows that the effect of *EMISSIONS* on neither *COAL* nor on *COAL* and *MIX* is statistically significant.

One reason why our expectation was not confirmed might be that it is irrelevant for climate change mitigation in which sector emissions are saved. Hence, it is rational to not respond to the framing in condition *EMISSIONS*. Moreover, the experiment was de-

Table 8: Impact of *EMISSIONS* Condition in the first discrete choice task, $c = 1$. Average Marginal Effects from Maximum Likelihood Logit Estimations.

Dep. variable	*COAL*		*COAL + MIX*		*COAL*		*COAL + MIX*	
EMISSIONS effect	−0.030	(0.029)	0.018	(0.029)	−0.016	(0.031)	0.016	(0.031)
Covariates	No		No		Yes		Yes	
Observations	830		830		733		733	
$\log \mathscr{L}$	-433.48		-441.42		-372.27		-376.14	
Wald χ^2	1.06		0.36		19.91		38.70	
Wald p	0.303		0.551		0.133		0.000	
Pseudo R^2	0.001		0.000		0.026		0.053	

Robust standard errors in parentheses. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

signed in January 2022, i.e. before the Russian invasion of Ukraine. However, the survey was run in summer 2022. In between, coal-fired power plants experienced a drastic and sudden shift in public perception: they turned from being the culprit for climate change to being the safety net in a severe shortage of oil and gas. The German government, which in 2021 had promised to accelerate the coal phase-out by several years, passed a law in early July 2022 that temporally suspended and partially reversed the mandatory coal phase-out.

6 The Impact of Providing Expert Assessment

The impact of providing expert assessment about the effectiveness of abatement options on the choice is addressed by Hypothesis 2, stating that in Condition *BASE*, compared to their first choice, more respondents would choose option *ETS* in their second choice, and less respondents would choose option *COAL*. Hypothesis 2 is clearly confirmed by the results reported in Table C.7, where the probability of choosing option *ETS* or *COAL* is regressed on the indicator variable $\mathbb{1}(c = 2)$ for the second choice among respondents of the *BASE* condition: After the expert assessment on instrument effectiveness is presented to this group, the share of respondents who choose the most effective option *ETS* is significantly higher than in the first discrete choice task, by 21.7 percentage points. By contrast, the share of respondents who voted for the least effective option *COAL* is significantly reduced, by 10.3 percentage points. These results are robust to the inclusion

of sociodemographic characteristics (see Table E.4) and are consistent with rational-belief updating.

Table 9: Causal Effect of Information Provision in Condition *BASE*. Average Marginal Effects from Maximum Likelihood Logit Estimations.

Dependent variable	*ETS*		*COAL*	
$\mathbb{1}(c=2)$	0.217^{***}	(0.022)	-0.103^{***}	(0.018)
Covariates	Yes		Yes	
Observations	856		856	
$\log \mathscr{L}$	-503.48		-374.50	
Wald χ^2	126.97		44.51	
Wald p	0.000		0.000	
Pseudo R^2	0.091		0.050	

In parentheses are the standard errors clustered at the individual level. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

7 The Role of Motivated Reasoning in Decisions About Climate Policy

In this section, we investigate whether motivated reasoning among supporters of climate action impedes the choice of effective abatement options. Hypothesis 3 states that providing information should induce a smaller reduction in *EMISSIONS* than in *BASE* in the probability that the least effective option (*COAL*) is chosen relative to all mitigation options. This hypothesis is examined by regressing the probability of choosing option *COAL* on a treatment dummy for *EMISSIONS*, a dummy for the second choice $c = 2$, and their interaction. Figure 3 shows the average marginal effects originating from the corresponding maximum likelihood logit estimation. In contrast to what was hypothesized, information provision at $c = 2$ appears to generate larger reductions in the probability of choosing the least effective option in the *EMISSIONS* condition (13.2 percentage points) than in the baseline condition (10.2 percentage points). Although this difference is not statistically significant (see Table C.11), this implies that the hypothesis is clearly rejected.

While Hypothesis 3 investigated the prevalence of motivated reasoning induced by an exogenous treatment, Hypothesis 4 focuses on the identification with the anti-coal movement as a potential source of motivated reasoning. We examine Hypothesis 4 by regressing the probability of choosing option *COAL* or option *MIX* on the dummy $c = 2$

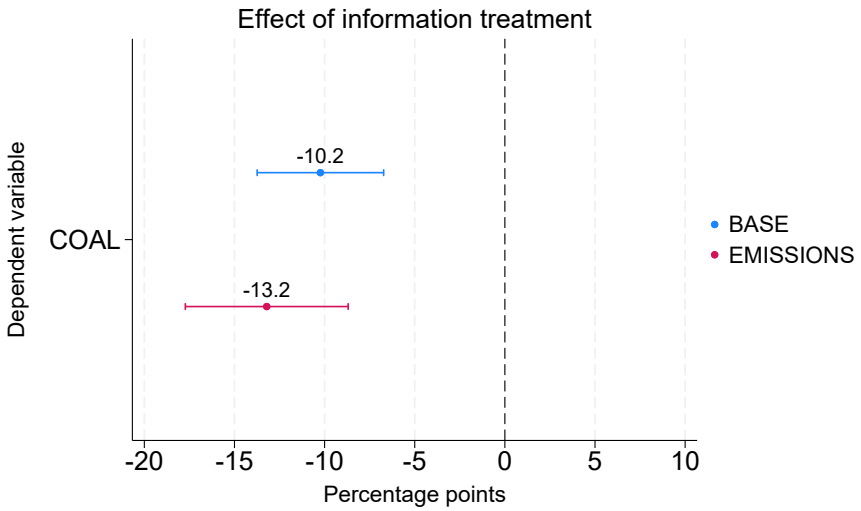

Figure 3: Effect of Information Treatment in the *EMISSIONS* Condition. Average Marginal Effects from Maximum Likelihood Logit Estimations. Coefficient Estimates from Maximum Likelihood Logit Estimations Are Shown in Table C.10.

for the second discrete choice task, a binary indicator for having participated in protests related to phasing out coal, and their interaction. Average marginal effects from the maximum likelihood logit estimation among respondents from condition *BASE* are displayed in Figure 4. Contrary to what was hypothesized, the reduction in the probability of choosing to reduce emissions from a coal-fired power plant (*COAL*) is significantly larger (see Table C.13) for individuals who state to have participated in anti-coal protests. While respondents who had participated in protests are 35.6 percentage points less likely to choose option *COAL* after being informed that this option is least effective, the reduction is only 9.1 percentage points among those who did not participate in protests.

Similarly, the reduction in the probability of choosing the combined mitigation option (*MIX*) is 15.7 percentage points for individuals who participated in protests and only 11.3 percentage points for those who did not. These coefficients, however, are not different from each other in statistical terms (see Table C.13). Although the results for this hypothesis have to be interpreted with caution, as only 24 respondents in *BASE* participated in protests against coal, they can again be taken as evidence against motivated reasoning.[8]

[8]We further pre-registered heterogeneity analyses of hypotheses 3 and 4 with respect to residency in active and recently abandoned coal/lignite mining regions or the primary trading area of STEAG GmbH. As STEAG GmbH does not supply electricity to private customers, less than 15 respondents lived in active or recently abandoned mining regions, and the analysis of the main hypotheses did not show the expected effects, we abstain from those heterogeneity analyses.

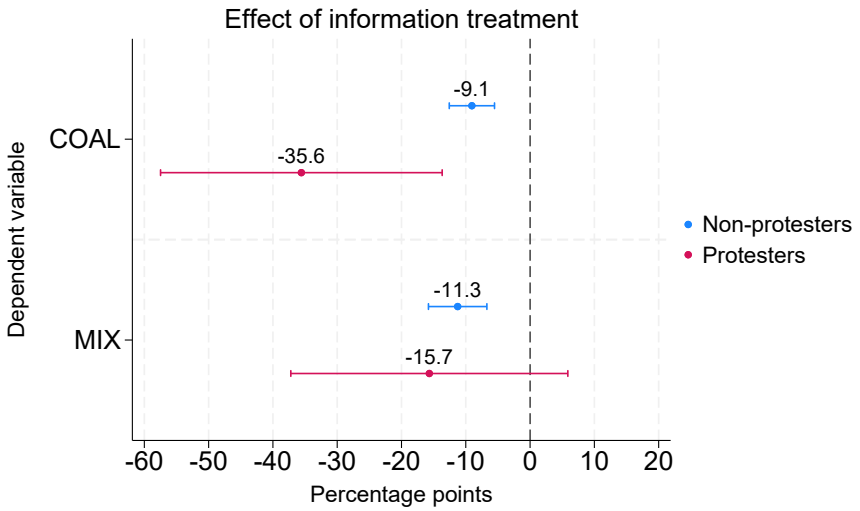

Figure 4: Effect of Information Treatment by Participation in Protests Against Coal. Average Marginal Effects from Maximum Likelihood Logit Estimations. Coefficient Estimates from Maximum Likelihood Logit Estimations Are Shown in Table C.12.

For respondents who have an aversion against the market economy, the information that option *ETS* is most effective is likely to conflict with this attitude and – according to motivated reasoning theory – should hinder belief updating. Therefore, the increase in the probability of choosing option *ETS* and the decrease in the probability of choosing option *COAL* in condition *BASE* should be smaller for respondents who have a negative attitude towards the market economy than for respondents with a positive or neutral attitude. However, while this exploratory analysis was not pre-registered, results from logit estimations presented in Figure 5 suggest the opposite: Respondents with a negative attitude towards the market economy seem to be more likely to react to the information treatment, although the differences are not statistically significant (see Table C.15). Again, this is evidence against motivated reasoning.

All of this confirms the findings of Jarke-Neuert et al. (2025), who found no evidence for motivated reasoning about climate policy. Thus, our results strengthen the assumption that motivated reasoning is less likely in the political realm when decisions are consequential (Hjort et al., 2021; Jarke-Neuert et al., 2025), rather than expressive (Banuri et al., 2019; Bolsen et al., 2014; Douenne and Fabre, 2022).

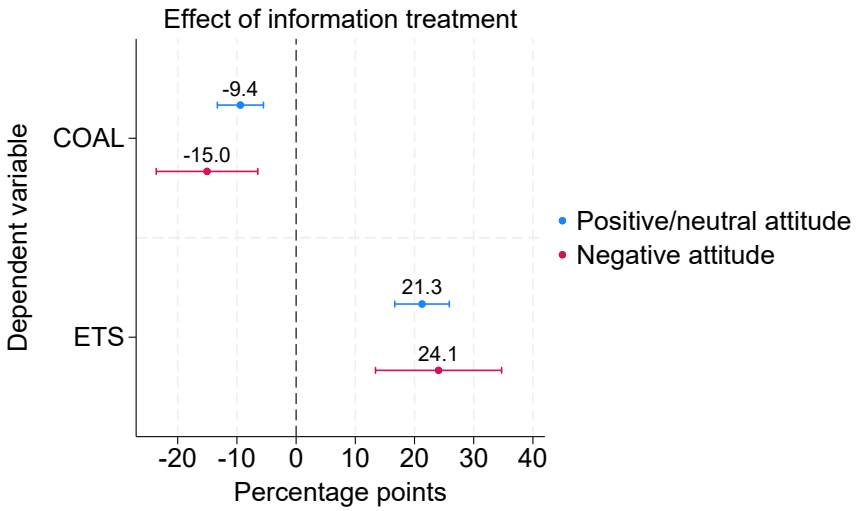

Figure 5: Effect of Information Treatment by Attitude Towards the Market. Average Marginal Effects from Maximum Likelihood Logit Estimations. Coefficient Estimates from Maximum Likelihood Logit Estimations Are Shown in Table C.14.

8 Summary and Conclusion

Based on a consequential online experiment, in this paper, we have analyzed individuals' choice between three emission abatement options that are miniature versions of actual German climate policies and we have asked how more effective policies can be favored. Among these three options was, first, the abstract option of canceling emission allowances from the European Union's Emission Trading System ETS, second, the concrete measure of reducing emissions from a coal-fired power plant, and, third, a mix of these two options.

We find that, without any information on the effectiveness of these options, individuals largely misperceive their effects, but make choices consistent with rationality in that they tend to choose abatement options that they consider more effective. Most notably, according to our results, individuals respond to expert assessments about the effectiveness of these abatement options.

In addition to carbon emissions, respondents seem also concerned about local externalities, such as local air pollution by coal-fired power plants. Finally, we find no evidence for motivated reasoning in the choice of abatement options.

Our findings suggest that educating individuals on the relative effectiveness of climate policies can foster the support for effective policies, such as a cap-and-trade system.

Furthermore, the support for effective policies may be enhanced if the choice is framed such that it addresses individual concerns, such as skepticism toward the market economy.

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Appendices

A Impact of our Abatement Options on Aggregate CO_2 Emissions in the EU

Despite a reduction at the smokestack of the STEAG power plant by 10 tons, diminishing the production of a coal-fired power plant reduces emissions at the EU level by only 4.2 tons of CO_2. The difference between the emission reductions at the level of an individual power plant and the EU level is due to the interaction with the EU ETS. The ultimate reason for this difference is that emission allowances that are not used by plant operators are largely used by other firms that participate in the ETS. Abatement at the plant level only translates into a drop in aggregate emissions at the EU level if allowances are canceled, either automatically by the Market Stability Reserve of the EU ETS (Borghesi et al., 2023) or by dedicated cancelations, as was part of our experiment.[9]

Table A.1: Effectiveness of Options in Reducing Aggregate CO_2 Emissions in the EU.

Options	Description	Expected Effectiveness	Effectiveness if European Commission proposal ('Fit for 55') is adopted
ETS	Retire 10 EUAs using the "buy, bank burn" strategy	100%; 10 tons reduction	100%; 10 tons reduction
COAL	Reduce emissions of a coal-fired power plant by 10 tons of CO_2	$100 - W\% = 42\%$; 4.2 tons reduction	100%; 10 tons reduction
MIX	Reduce emissions of a coal-fired power plant by 5 tons of CO_2 and retire 5 EUAS using the "buy, bank, burn" strategy.	7.1 tons reduction (average of *ETS* and *COAL*	100%; 10 tons reduction

W is the waterbed effect and is strictly between $0 - 100\%$ under the regulatory setting that was in place in 2022.

Underlying assumptions:

- We assume that the total number of allowances in circulation (TNAC) drops below 833 million during 2024 (see European Commission, 2021, Figure 3), i.e. after the experimental intervention in 2022 there are two more years the TNAC triggers au-

[9]The Market Stability Reserve takes in and later cancels allowances based on the 'total number of allowances in circulation' (TNAC), that is the number transferred by firms from one calendar year to the next (Perino, 2018). Using the same scenario regarding the active period of the Market Stability Reserve as used by the European Commission in its impact assessment for the then ongoing EU ETS reform, we calculated the share of allowances that would be automatically canceled in response to reductions at a specific source in 2022.

tomatic cancelations of allowances at 24% of the TNAC. Under the rules that were in place in 2022, the intake rate would drop to 12% thereafter.

$$1 - W = 1 - (1 - 0.24)^2 = 0.4224 \text{ (Perino, 2018).}$$

- For cancelations, we use the "buy, bank, burn" strategy proposed by Gerlagh and Heijmans (2019). Allowances are purchased immediately, but cancelation only occurs once the TNAC has dropped below 833 million, i.e. once the MSR has stopped taking in allowances. Cancelations therefore occur "once the cap has become exogeneous again" (Gerlagh and Heijmans, 2019) and cancelations translate 1:1 into cap reductions.

- We assume that if the European Commission (EC) proposal for MSR adjustment (fit-for-55 package) is adopted, it enters into force before the TNAC drops below 833 million and the TNAC lies between 833 million and $1,096$ million in at least one year. In this range, the cumulative intake rate of the MSR is 100% (Perino et al., 2022b). This means that the waterbed effect vanishes and all three options have the same impact on total emissions in the EU ETS. The effectiveness of the "buy, bank, burn" strategy is unaffected by the EC proposal.

B Preferences over Financial Impact

Table B.1: Planned and Sampled Number of Individuals by Experimental Condition, and the Respective Number of Completed Answers – including *REFORM* condition.

Condition	Planned	Sampled	Completed survey	Chose abatement in $c = 1$ and $c = 2$
BASE	600	644	595	484
MARKET	400	446	397	331
EMISSIONS	400	459	405	346
REFORM	400	452	404	330
Total	1,800	2,001	1,801	1,491

Note: Column 3 lists the counts net of individuals who refused to participate or dropped out at some point of the survey. Column 4 lists only individuals who chose an abatement option in both discrete choice tasks, $c = 1$ and $c = 2$.

Before their first choice $c = 1$, subjects of the *REFORM* condition were exposed to an expert assessment by researchers of the University of Hamburg[10] on the expected effectiveness of the options in reducing carbon emissions under the EU ETS rules that were valid at the time of the experiment. These subjects learned that *COAL* was the least effective of the three abatement options, with 10 tons of emissions reductions from curbing the output of a coal-fired plant in Germany resulting in only about 4.2 tons of emissions reductions at the EU level. This discrepancy owes to the so-called waterbed effect (Perino, 2018), according to which emission reductions from an individual plant will be offset by emission increases by other plants within the European Union because the obsolete emission allowances are used by other plant operators. Option *MIX* was presented as the next most effective, resulting in 7.1 tons of emissions reductions. *ETS* was presented as the most effective option, where canceling ten allowances induces a corresponding emissions reduction of 10 tons at the EU level (Table 1). Before their second choice $c = 2$, the *REFORM* group saw a revised expert assessment that described the emissions reductions that would occur under a reform of the EU ETS proposed in 2022 (Borghesi et al., 2023). Contrasting with the status quo, subjects were told that the reform would render all options equally effective and would reduce aggregate emissions in the EU by 10 tons of CO_2 (see Appendix A). Actually, this reform of the EU ETS entered into force in 2023 (Borghesi et al., 2023).

[10] One of them is a co-author of this article and an expert in the field.

After the second choice $c = 2$, that is, after subjects of conditions *BASE*, *MARKET*, and *EMISSIONS* had been informed about the effectiveness of each option and subjects of condition *REFORM* had been informed about the effectiveness of the options under a proposed reform, participants were asked to rank all options according to their preferences over their financial impacts (see question D.14 in Appendix D). We deliberately abstained from providing information on actual financial impacts to mimic real-world decisions, where voters are usually not informed about actual impacts. The downside of this approach is that the question is vague and leaves a lot of room for interpretations. Our major concern is that respondents' answers to this question may have been influenced by the information treatment on options' effectiveness. This concern is strengthened by the fact that 34 to 40 % of respondents in conditions *BASE*, *MARKET*, and *EMISSIONS*, in which respondents had been informed that *ETS* is the single most effective in reducing total CO_2 emissions, rank it as the single most preferred option in terms of financial impacts (see Table B.2). By contrast, in condition *REFORM*, in which respondents received the information that all options would be equally effective under a proposed reform, only 28 % rank *ETS* as the single most preferred.

We therefore decided not to use preferences over financial impacts in our main analyses. For completeness, we report the results of the pre-specified hypotheses on correlations between policy choices and preferences over financial impacts in Tables B.3 and B.4.

Table B.2: Preferences over Financial Impacts of Options.

Belief Shape	Description	BASE	MARKET	EMISSIONS	REFORM	Total
Flat	All instruments ranked equally	8.1%	8.2%	8.2%	8.9%	8.3%
Single-peaked	*ETS single most preferred*	34.2%	40.1%	34.7%	28.5%	34.4%
	COAL single most preferred	13.1%	12.8%	11.4%	15.3%	13.1%
	MIX single most preferred	25.3%	20.4%	25.4%	30.4%	25.3%
	Single instrument ranked first	72.6%	73.3%	71.5%	74.2%	72.8%
Double-peaked	*ETS+COAL most preferred*	2.5%	2.7%	5.5%	2.8%	3.3%
	ETS+MIX most preferred	4.8%	3.0%	2.9%	3.4%	3.6%
	COAL+MIX most preferred	2.3%	3.0%	0.9%	2.5%	2.2%
	Two instruments ranked first	9.6%	8.7%	9.3%	8.7%	9.1%
None	Question not answered	9.8%	9.7%	11.1%	8.3%	9.7%
Total		100%	100%	100%	100%	100%

We hypothesized that, when deciding between different mitigation options that are of no cost to them, individuals would choose the instrument that they believe to be most effective or whose financial impact they find most appealing. This assumption is investigated in Table B.3, where we use a multinomial logit model to test the correlation between the probability of choosing a specific mitigation option in their first choice for subjects in conditions *BASE*, *MARKET*, and *EMISSIONS*, and their ranking of these options in terms of effectiveness and preferences over financial impact. The independent variables are dummy variables for considering a given option as the single most effective or the single most preferred. All columns originate from the same multinomial logit estimation and each column shows the marginal effects on the probability of choosing a given policy option. The positive and statistically significant relationship between beliefs about effectiveness and the probability of choosing a specific climate policy presented in Table 7 survives when additionally controlling for preferences over financial impacts. The marginal effects of effectiveness ranking are always significantly larger than those of financial impact and the correlation with preferred financial impact is not always statistically significant. This might either be because respondents value effectiveness more than financial impact or because our measure of preferences over financial impact is confounded by the information treatment on effectiveness.

Table B.3: Correlation of Choices with Beliefs about Effectiveness and Preferences over Financial Impacts in *BASE*, *MARKET*, *EMISSIONS* on $c = 1$. Average Marginal Effects from a Multinomial Logit Estimation with Option *MIX* as Base Outcome.

Dependent variable	*ETS*		*COAL*		*MIX*	
Effect of belief about single most effective option:						
Option *ETS*	0.430^{***}	(0.049)	-0.131^{***}	(0.037)	-0.298^{***}	(0.052)
Option *COAL*	-0.166^{***}	(0.036)	0.351^{***}	(0.049)	-0.185^{***}	(0.053)
Option *MIX*	-0.196^{***}	(0.032)	-0.156^{***}	(0.033)	0.351^{***}	(0.040)
Effect of being considered single financially most preferred option:						
Option *ETS*	0.123^{***}	(0.031)	-0.049	(0.032)	-0.074^{*}	(0.038)
Option *COAL*	-0.021	(0.045)	0.085^{*}	(0.047)	-0.064	(0.054)
Option *MIX*	-0.018	(0.040)	-0.032	(0.037)	0.051	(0.049)

Regression controlling for gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms. The reference category for effectiveness beliefs summarizes double-peaked and flat beliefs. The reference category for preferences over financial impacts summarizes double-peaked and flat preferences. $n = 893$, $\log \mathscr{L} = -555.45$, Wald $\chi = 411.96$, Wald $p = 0.000$, pseudo $R^2 = 0.386$. In parentheses are the standard errors clustered at the individual level. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$).

The *REFORM* condition differs from all other experimental conditions in the sense that respondents receive information on the effect of each abatement option on CO_2 emissions under the current rules of the EU ETS before making their first choice ($c = 1$). Before their second choice, $c = 2$, respondents in this condition are informed that under a proposed reform of the EU ETS all options would be equally effective in reducing CO_2 emissions. One hypothesis was that when all three policies are equally effective, choices should be more strongly correlated with preferences over financial impacts. Table B.4 uses a multinomial logit estimation to investigate whether choices of respondents in the *REFORM* condition are more strongly correlated with preferences over financial impacts after being informed about the proposed reform. The hypothesis is only partially confirmed by our data. The correlation with preferences over financial impacts is significantly stronger for option *COAL* in the second choice, but significantly weaker for option *MIX* and not statistically different for *ETS*.

Table B.4: Correlation of Choices with Preferences over Financial Impacts Under Different Information about Effectiveness in *REFORM*. Average Marginal Effects from a Multinomial Logit Estimation with Option *MIX* as Base Outcome.

Dependent variable	*ETS*		*COAL*		*MIX*	
$c = 2$ effect at double-peaked or flat preferences	-0.092^{*}	(0.053)	0.074	(0.046)	0.017	(0.056)
Effect of being considered single financially most preferred option at $c = 1$:						
Option *ETS*	0.152^{*}	(0.083)	-0.019	(0.044)	-0.133	(0.085)
Option *COAL*	-0.043	(0.084)	0.262^{***}	(0.083)	-0.220^{**}	(0.090)
Option *MIX*	-0.256^{***}	(0.070)	0.055	(0.050)	0.200^{**}	(0.083)
Effect of being considered single financially most preferred option at $c = 2$:						
Option *ETS*	0.138	(0.085)	-0.078	(0.059)	-0.060	(0.093)
Option *COAL*	-0.199^{**}	(0.078)	0.409^{***}	(0.103)	-0.210^{**}	(0.106)
Option *MIX*	-0.144^{*}	(0.077)	-0.034	(0.060)	0.179^{**}	(0.089)

Estimates derived from a maximum likelihood logit estimation controlling for gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, beliefs about effectiveness, attitude towards the market economy, and attitude towards big firms. The reference category for preferences over financial impacts summarizes double-peaked and flat preferences. $n = 528$, $\log \mathscr{L} = -329.85$, Wald $\chi = 495.89$, Wald $p = 0.000$, pseudo $R^2 = 0.385$. In parentheses are the standard errors clustered at the individual level. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$).

C Tables

Table C.1: Summary Statistics by Experimental Condition for Respondents Who Chose a Climate Policy in $c = 1$ and $c = 2$.

	BASE	*MARKET*	*EMISSIONS*	χ^2	p-value
Female	0.4235	0.4489	0.4256	0.5838	0.9001
Age	58.3103	58.4241	58.2202	0.3733	0.9457
Qual. for university entrance	0.5853	0.5950	0.5030	9.8219	0.0201
Employed	0.5346	0.5342	0.4970	1.6773	0.6420
Income < 1,200 Euro	0.0530	0.0514	0.0621	8.0137	0.0457
Income 1,200 - 2,700 Euro	0.2719	0.2877	0.2647	7.7978	0.0504
Income 2,700 - 4,200 Euro	0.3341	0.3390	0.3562	7.2900	0.0632
Income $\geq$ 4,200	0.3410	0.3219	0.3170	1.9939	0.5737
1 person	0.2712	0.2705	0.2667	0.0308	0.9986
2 persons	0.4948	0.5076	0.4725	0.8619	0.8346
3 persons	0.0932	0.1337	0.1159	3.9701	0.2647
4+ persons	0.1408	0.0881	0.1449	7.4442	0.0590
Support for coal phase-out	0.6522	0.6152	0.6261	1.2999	0.7292
Neg. att. towards big firms	0.8157	0.8182	0.7977	0.5812	0.7478
Neg. att. towards markets	0.1497	0.1208	0.1246	1.7734	0.4120
Protest for climate	0.1097	0.1061	0.1156	0.1604	0.9229
Protest against coal	0.0497	0.0394	0.0376	0.8730	0.6463

Note: $N = 1,161$. χ^2-statistics and p-values for a Kruskal-Wallis equality-of-populations rank test.

Table C.2: Comparison of the Sample with the German Population.

	Sample	Population
Male	56.8%	49.4%
Qualification for university entrance	53.2%	31.3%
Employed	51.3%	51.2%
High net monthly household income	31.4%	26.9%
Age $<$ 25 years	0.9%	24.4%
Age 25 - 64 years	60.0%	54.2%
Age $\geq$ 65 years	39.2%	21.4%
Household size:		
1 person	26.5%	20.2%
2 persons	49.5%	33.2%
3 persons	11.9%	17.7%
4 and more persons	12.1%	28.9%

Note: Data for the German population in 2022 is taken from Statistisches Bundesamt (2024). In that survey, the threshold for high income is €4,000, whereas we set it at €4,200.

Table C.3: Correct Answers in Effectiveness Ranking of Mitigation Options.

Ranked all options correctly	BASE	MARKET	EMISSIONS	Total
No	393	255	280	928
Yes	53	47	36	136
Total	446	302	316	1,064
No	88.1%	84.4%	88.6%	87.2%
Yes	11.9%	15.6%	11.4%	12.8%
Total	100%	100%	100%	100%

Table C.4: Decision-Making in the Baseline Condition *BASE* Without Information Provision.

Dependent variable	*ETS*		*COAL*	
$c = 1$ margin	0.231^{***}	(0.019)	0.229^{***}	(0.019)
Covariates	No		No	
Observations	484		484	
$\log \mathscr{L}$	-261.83		-260.62	
Pseudo R^2	0.000		0.000	

Predictive margins for $c = 1$. Robust standard errors in parentheses. Stars indicate that a Wald test rejects the null that the respective margin is uniform at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$).

Table C.5: Impact of *MARKET* Condition on $c = 1$. Coefficient Estimates from Maximum Likelihood Logit Estimations.

Dependent Variable	*ETS*		*ETS + MIX*	
MARKET effect	0.191	(0.196)	0.083	(0.208)
Negative attitude towards market	0.043	(0.321)	-0.493	(0.321)
MARKET effect * Negative attitude towards market	0.562	(0.492)	0.385	(0.549)
Constant	-0.187	(0.582)	0.300	(0.559)
Covariates	Yes		Yes	
Observations	716		716	
$\log \mathscr{L}$	-392.655		-360.400	
Wald χ^2	34.415		21.845	
Wald p	0.003		0.112	
Pseudo R^2	0.043		0.030	

Note: Stars indicate that a Wald test rejects the null that the respective coefficient is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

Table C.6: Impact of *MARKET* Condition on $c = 1$. Average Marginal Effects from Maximum Likelihood Logit Estimations.

Dependent variable	*ETS*		*ETS + MIX*		*ETS*		*ETS + MIX*	
MARKET effect	0.053*	(0.031)	0.024	(0.029)	0.052	(0.033)	0.023	(0.031)
Covariates	No		No		Yes		Yes	
Observations	815		815		716		716	
$\log \mathscr{L}$	−459.33		−428.72		−393.31		-360.66	
Wald χ^2	2.87		0.65		32.83		21.44	
Wald p	0.091		0.419		0.003		0.091	
Pseudo R^2	0.003		0.001		0.041		0.029	

In parentheses are the standard errors clustered at the individual level. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$). Covariates are gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

Table C.7: Causal Effect of Information Provision in *BASE*. Average Marginal Effects from Maximum Likelihood Logit Estimations with Covariates.

	Option *ETS*		Option *COAL*	
$c = 2$ effect	0.217***	(0.022)	−0.103***	(0.018)
Covariates	Yes		Yes	
Observations	856		856	
$\log \mathscr{L}$	−503.48		−374.50	
Wald χ^2	126.97		44.51	
Wald p	0.000		0.000	
Pseudo R^2	0.091		0.050	

Note: Average marginal effects of the respective discrete change of c relative to $c = 1$. In parentheses are the standard errors clustered at the individual level. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

Table C.8: Heterogeneous Treatment Effects in *BASE* by Residency in the Ruhr Area. Coefficient Estimates from Maximum Likelihood Logit Estimations with Covariates.

Dependent Variable	*COAL*		*COAL + MIX*	
Second decision	-0.781^{***}	(0.143)	-1.074^{***}	(0.111)
Ruhr area	-0.300	(0.567)	0.805	(0.637)
Second decision * Ruhr area	0.434	(0.370)	0.435	(0.452)
Constant	-0.385	(0.642)	0.169	(0.608)
Covariates	Yes		Yes	
Observations	856		856	
$\log \mathscr{L}$	-374.336		-499.413	
Wald χ^2	45.829		132.964	
Wald p	0.000		0.000	
Pseudo R^2	0.050		0.098	

Note: Average marginal effects of the respective discrete change of c relative to $c = 1$. In parentheses are the standard errors clustered at the individual level. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

Table C.9: Test of Heterogeneous Treatment Effects of Information Treatment by Residency in the Ruhr Area (Based on Estimation Results from Table C.8).

Dependent variable	Difference between treatment effects by residency in the Ruhr Area	Standard error	Covariates
COAL	0.061	(0.048)	Yes
COAL + MIX	0.138^{**}	(0.062)	Yes

Stars indicate that a t test rejects the null that the difference between the effects is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$).

Table C.10: Heterogeneous Treatment Effects of Information Treatment Between Conditions *BASE* and *EMISSIONS*. Coefficient Estimates from Maximum Likelihood Logit Estimations.

Dependent Variable	COAL		COAL	
Second decision	-0.743^{***}	(0.125)	-0.749^{***}	(0.134)
EMISSIONS	-0.178	(0.173)	-0.110	(0.188)
Second decision * *EMISSIONS*	-0.297	(0.229)	-0.454^{*}	(0.260)
Covariates	No		Yes	
Observations	1,660		1,466	
$\log \mathscr{L}$	-712.099		-608.995	
Wald χ^2	66.689		76.269	
Wald p	0.000		0.000	
Pseudo R^2	0.030		0.049	

Note: Average marginal effects of the respective discrete change of c relative to $c = 1$. In parentheses are the standard errors clustered at the individual level. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

Table C.11: Test of Heterogeneous Treatment Effects of Information Treatment Between Conditions *BASE* and *EMISSIONS* (Based on Estimation Results from Table C.10).

Dependent variable	Difference between treatment effects in conditions *BASE* and *EMISSIONS*	Standard error	Covariates
COAL	−0.013	(0.027)	No
COAL	−0.030	(0.029)	Yes

Stars indicate that a t test rejects the null that the difference between the effects is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$).

Table C.12: Heterogeneous Treatment Effects of Information Treatment by Participation in Protests. Coefficient Estimates from Maximum Likelihood Logit Estimations.

Dependent Variable	*COAL*		*MIX*	
Second decision	-0.681^{***}	(0.137)	-0.480^{***}	(0.099)
Protesters	1.201^{**}	(0.535)	−0.793	(0.525)
Second decision * Protesters	-1.362^{*}	(0.735)	−0.346	(0.605)
Constant	−0.419	(0.650)	-1.428^{**}	(0.620)
Covariates	Yes		Yes	
Observations	856		856	
$\log \mathscr{L}$	−373.182		−558.139	
Wald χ^2	49.724		57.801	
Wald p	0.000		0.000	
Pseudo R^2	0.053		0.058	

Robust standard errors in parentheses. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels ($*$ at $p < 0.1$, $**$ at $p < 0.05$, and $***$ at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

Table C.13: Test of Heterogeneous Treatment Effects of Information Treatment by Participation in Protests (Based on Estimation Results from Table C.12).

Dependent variable	Difference between treatment effects by participation in protests	Standard error	Covariates
COAL	-0.265^{**}	(0.113)	Yes
MIX	−0.044	(0.112)	Yes

Stars indicate that a t test rejects the null that the difference between the effects is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$).

Table C.14: Heterogeneous Treatment Effects of Information Treatment by Attitude Towards the Market Economy. Coefficient Estimates from Maximum Likelihood Logit Estimations.

Dependent Variable	*COAL*		*ETS*	
Second decision	-0.731^{***}	(0.157)	1.027^{***}	(0.116)
Negative attitude towards market	0.578^{*}	(0.328)	-0.074	(0.323)
Second decision * Negative attitude towards market	-0.142	(0.304)	0.140	(0.297)
Covariates	Yes		Yes	
Observations	856		856	
$\log \mathscr{L}$	-374.458		-503.420	
Wald χ^2	47.187		127.450	
Wald p	0.000		0.000	
Pseudo R^2	0.050		0.091	

Robust standard errors in parentheses. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels ($*$ at $p < 0.1$, $**$ at $p < 0.05$, and $***$ at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

Table C.15: Test of Heterogeneous Treatment Effects of Information Treatment by Attitude Towards the Market Economy (Based on Estimation Results from Table C.14).

Dependent variable	Difference between treatment effects by attitude towards market	Standard error	Covariates
COAL	-0.061	(0.049)	Yes
ETS	0.032	(0.060)	Yes

Stars indicate that a t test rejects the null that the difference between the effects is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$).

D The Experiment in the Questionnaire

D.1 Pre-Experimental Items

Question ExpB_1: Do you have a rather negative or rather positive attitude towards large companies?

- Very negative
- Rather negative
- Neutral
- Rather positive
- Very positive
- Don't know / No answer

Question ExpB_2: Do you have a rather negative or rather positive attitude towards a market economy as an economic system?

- Very negative
- Rather negative
- Neutral
- Rather positive
- Very positive
- Don't know / No answer

Question ExpB_3: Have you participated in climate protests in the last five years?

- Yes, more than twice
- Yes, once or twice
- No
- Don't know / No answer

Question ExpB_4: Have you ever participated in protests against coal-fired power plants or coal mining?

- Yes, more than twice
- Yes, once or twice
- No
- Don't know / No answer

Question U1: In connection with the problem of climate change, there is currently a lot of discussion about the energy transition. The energy transition includes a number of energy policy objectives. Please indicate how you personally feel about this. Please use the scale from 1 to 5.

Scale:

- I strictly reject (=1)
- I rather reject (=2)
- Neither (=3)
- I rather support (=4)
- I strongly support (=5)
- don't know / no answer

Items (in randomized order):

(a) Phasing out nuclear energy
(b) Expansion of renewable energies
(c) Phasing out coal
(d) Expansion of supra-regional electricity grids

D.2 General Introduction for Conditions *BASE, MARKET, REFORM*

In the context of this study, you can decide on climate protection measures that will actually be implemented.

You will now have the opportunity to prevent the emission of 10 tons of carbon dioxide (CO2). For reference: This is the amount that one person in Germany causes within a year through consumption, electricity consumption, heating, and mobility.
On the following pages we will present three measures with which you can avoid CO2 emissions. You will make your decisions afterwards.
No matter how you decide, there will be no costs for you in the context of this study. All measures are financed by public funds.
We will now explain the three different measures A, B, and C that you can choose from to prevent CO2 emissions. You can also choose not to select any of the three measures (option D). You will make your decisions afterwards.
In order to implement your decisions, we have made contracts with two companies. These companies are able and allowed to implement the measures without requiring further approvals.
As you make your decision on the following pages, you can have the following information displayed at any time via links.

D.3 General Introduction for Condition *EMISSIONS*

In the context of this study, you can decide on climate protection measures that will actually be implemented.
You will now have the opportunity to prevent the emission of 10 tons of carbon dioxide (CO2). For reference: This is the amount that one person in Germany causes within a year through consumption, electricity consumption, heating, and mobility.
On the following pages we will present three measures with which you can avoid CO2 emissions. You will make your decisions afterwards.
No matter how you decide, there will be no costs for you in the context of this study. All measures are financed by public funds.
The emissions from electricity generation alone have increased significantly in Germany in 2021. According to the Federal Environment Agency, CO2 emissions from coal-fired power plants have increased by 17 percent compared to 2020.
We will now explain the three different measures A, B, and C that you can choose from to prevent CO2 emissions. You can also choose not to select any of the three measures (option D). You will make your decisions afterwards.
In order to implement your decisions, we have made contracts with two companies. These companies are able and allowed to implement the measures without requiring further approvals.
As you make your decision on the following pages, you can have the following information displayed at any time via links.

D.4 Introduction of Option *ETS* for Conditions *BASE*, *EMISSIONS*, *REFORM*

A: Reduce Emission Rights in Emissions Trading
The European Union (EU) aims to rapidly and significantly reduce greenhouse gas emissions (e.g., CO2) and achieve climate neutrality by 2050. To effectively control the emissions of these gases, large power plants and industrial facilities must acquire and surrender emission rights for each ton of CO2 they emit. Once the emission right is used, it is permanently canceled and cannot be used again. The quantity of emission rights issued by the EU is strictly limited.
By selecting Measure A, we will irreversibly withdraw emission rights for ten tons of CO2 from circulation. This means that power plants will have ten fewer emission rights available. The implementation will be carried out by ForTomorrow gGmbH.
Measure A reduces the number of emission rights available to power plants by 10 tons of CO2.
You can view this information at any time on the following pages by clicking the "Explanation" link.

D.5 Introduction of Option *ETS* for Condition *MARKET*

A: Reduce Emission Rights in Emissions Trading

The European Union (EU) aims to rapidly and significantly reduce greenhouse gas emissions (e.g., CO2) and achieve climate neutrality by 2050. To effectively control the emissions of these gases, large power plants and industrial facilities must acquire and surrender emission rights for each ton of CO2 they emit. Once the emission right is used, it is permanently canceled and cannot be used again. The quantity of emission rights issued by the EU is strictly limited.

Emission rights represent a political intervention in the market, as the policy sets binding requirements for companies on the amount of climate protection they must undertake.

By selecting Measure A, we will irreversibly withdraw emission rights for ten tons of CO2 from circulation. This means that power plants will have ten fewer emission rights available. The implementation will be carried out by ForTomorrow gGmbH.

Measure A reduces the number of emission rights available to power plants by 10 tons of CO2.

You can view this information at any time on the following pages by clicking the "Explanation" link.

D.6 Introduction of Option *COAL* for all Conditions

B: Reduce Production of a Coal-Fired Power Plant

The German Bundestag has decided to phase out coal-fired power generation ("coal phase-out") by the year 2038. Until then, coal-fired power plants are allowed to continue operating.

By selecting Measure B, you can advance a small part of the coal phase-out. The production of a coal-fired power plant operated by STEAG GmbH will be temporarily reduced so that exactly ten tons less of CO2 will be emitted.

Measure B reduces the emissions of a coal-fired power plant in Germany by 10 tons of CO2.

You can view this information at any time on the following pages by clicking the "Explanation" link.

D.7 Introduction of Option *MIX* for all Conditions

C: Combination of A and B

Measure C is a combination of measures A and B: The number of emission rights will be reduced by five tons of CO2, and the production of the coal-fired power plant will be temporarily reduced so that exactly five tons less of CO2 will be emitted.

Measure C reduces the emission rights available to power plants by 5 tons and directly reduces the emissions of a coal-fired power plant in Germany by 5 tons of CO2. In total, Measure C covers 10 tons of CO2.

You can view this information at any time on the following pages by clicking the "Explanation" link.

D.8 Introduction of Option D for all Conditions

D: None of the Measures A-C

By selecting D, none of the climate protection measures A-C will be implemented. This means that neither the number of emission rights nor the production of the coal-fired power plant will be reduced. The reserved tax funds will be spent elsewhere.

You can view this information at any time on the following pages by clicking the "Explanation" link.

D.9 Specific Introduction for all Conditions

In the following, you will be asked to make two decisions. You can choose one of the measures described above for each decision. Each of your decisions has an equal chance of being implemented, regardless of which measure you choose each time.

Infobox: As a reminder, some decisions will be randomly selected and implemented.

> **How We Select Which Decisions Are Implemented**
> Each participant makes two decisions. All decisions are collected in a pool, from which the decisions to be implemented by STEAG GmbH and ForTomorrow gGmbH are drawn. Each decision has an equal chance of being implemented. The probability of implementation is approximately 1 in 60.
> All participants will receive proof via email of the climate protection measures that are implemented as part of this study by the end of the year.

On the following pages, you can always display this information by clicking on the "How we select" button.

D.10 First Choice ($c = 1$) for Conditions *BASE*, *MARKET*, *EMISSIONS*

Info button: "Just a reminder, some decisions will be randomly selected and implemented."
You now have the opportunity to avoid 10 tons of CO2 by choosing one of the three measures A, B, or C, or explicitly choosing none of the three measures and therefore not avoiding any CO2 (measure D). You will incur no costs, no matter how you decide.
As a reminder: 10 tons are the amount of CO2 that a person in Germany generates within one year (through consumption, electricity consumption, heating, and mobility).
How do you decide?

- A: Measure "Reduce emission allowances in emissions trading": I want the number of **emission allowances** to be reduced by 10 tons of CO2.
- B: Measure "Reduce production of a coal-fired power plant": I want the emissions of a **coal-fired power plant** to be reduced by 10 tons of CO2.
- C: Measure "Combination of A and B": I want the number of **emission allowances** to be reduced by 5 tons of CO2 and the emissions of a **coal-fired power plant** to be reduced by 5 tons of CO2.
- D: None of the measures A-C: I want no CO2 to be avoided.
- Don't know / No answer

D.11 Elicitation of Beliefs about Effectiveness for all Conditions

We would like to learn more about the reasons for your decision.
Please only consider the effect of the measures on the **reduction of CO2**. Do you consider the three measures **equally effective** in reducing CO2, or do you believe that certain measures are **more effective** in reducing CO2 than others?
Please rank the three measures in terms of their effectiveness. Assign a value between 1 and 3 to each of the three measures.
The most effective measure will receive 1, the second most effective will receive 2, and the least effective will receive 3. You can also assign equal ranks.
If all three measures are equally effective, assign a rank of 1 to all of them.
If two measures are equally effective but more effective than the remaining measure, assign a rank of 1 to the two equally effective measures and a rank of 2 to the less effective measure.
If two measures are equally effective but less effective than the remaining measure, assign a rank of 1 to the most effective measure and a rank of 2 to the two equally effective measures.

A: Measure "Reduce emission allowances in emissions trading."
B: Measure "Reduce production of a coal-fired power plant."
C: Measure "Combination of A and B."
Don't know / No answer

D.12 Second Choice ($c = 2$) for Conditions *BASE*, *MARKET*, *EMISSIONS* / First Choice ($c = 1$) for Condition *REFORM*

The three climate protection measures A, B, and C differ in how much they reduce total emissions. There are various interactions between the emissions of a coal-fired power plant, the electricity market, and emissions trading. If the production of a coal-fired power plant is reduced, the electricity is instead produced by other power plants, and the unused emission allowances are partially sold to other power plants. Both of these interactions counteract the original reduction in emissions. The reduction in total emissions is the result of the initial reduction from the measure, minus the increase in emissions from other power plants. According to calculations by scientists from the University of Hamburg, the following reductions in total emissions can be expected from measures A-C:

Climate Protection Measure	**Original Reduction**	**Expected Reduction of Total Emissions**
A: Measure "Reduce Emissions Allowances in Emission Trading"	10 tons of CO2	10 tons of CO2
B: Measure "Reduce Production of a Coal-Fired Power Plant"	10 tons of CO2	4.2 tons of CO2
C: Measure "Combination of A and B"	10 tons of CO2	7.1 tons of CO2

Against this background, you now have the opportunity to choose once again from the same three measures A, B and C or to explicitly choose none of the three measures (D). There are no costs associated with your decision, regardless of which option you choose.
Reminder: Ten tons are the amount of CO2 emitted by a person in Germany (through consumption, electricity consumption, heating, and mobility) within one year.

How do you decide?

- A: Measure "Reduce Emissions Allowances in Emission Trading": I want the number of **emissions allowances** to be reduced by 10 tons of CO2.
- B: Measure "Reduce Production of a Coal-Fired Power Plant": I want the emissions of a **coal-fired power plant** to be reduced by 10 tons of CO2.
- C: Measure "Combination of A and B": I want the number of **emissions allowances** to be reduced by 5 tons of CO2, **and** the emissions of a **coal-fired power plant** to be reduced by 5 tons of CO2.
- D: None of the Measures A-C: I want no CO2 to be avoided.
- Don't know / No answer

D.13 Second Choice ($c = 2$) for Condition *REFORM*

The legal framework for the provision of emissions allowances for power plants and industry is currently being revised:
The European Commission has made a **proposal**. If accepted, all three measures A, B, and C will lead to the same reduction in total emissions. **In this case**, all three climate protection measures would actually reduce total emissions by **10 tons of CO2**. The reductions in total emissions would be as follows:

Climate Protection Measure	**Original Reduction**	**Expected Reduction of Total Emissions**
A: Measure "Reduce Emissions Allowances in Emission Trading"	10 tons of CO2	10 tons of CO2
B: Measure "Reduce Production of a Coal-Fired Power Plant"	10 tons of CO2	10 tons of CO2
C: Measure "Combination of A and B"	10 tons of CO2	10 tons of CO2

However, it is **currently uncertain** whether the Commission's proposal will be implemented. Approval from the European Parliament and the Council of the European Union is still required.
Against this background, you now have the opportunity to choose once again from the same three measures A, B and C or to explicitly choose none of the three measures (D). There are no costs associated with your decision, regardless of which option you choose.
As a reminder, 10 tons is the amount of CO2 that an individual in Germany generates within one year through consumption, electricity usage, heating, and mobility.
How do you decide?

- A: Measure "Reduce Emissions Allowances in Emission Trading": I want the number of **emissions allowances** to be reduced by 10 tons of CO2.
- B: Measure "Reduce Production of a Coal-Fired Power Plant": I want the emissions of a **coal-fired power plant** to be reduced by 10 tons of CO2.
- C: Measure "Combination of A and B": I want the number of **emissions allowances** to be reduced by 5 tons of CO2, **and** the emissions of a **coal-fired power plant** to be reduced by 5 tons of CO2.
- D: None of the Measures A-C: I want no CO2 to be avoided.
- Don't know / No answer

D.14 Elicitation of Preferences about Financial Impact for all Conditions

We would like to learn more about the reasons behind your decisions once again. Besides the climate impact, measures A to C can also differ in terms of who is **financially burdened or relieved**. Please think about the perceived financial effects for this question, **not** the climate impact:
Which measure appeals to you the most in terms of its financial impact?
Please rank the three measures in terms of their financial impact, assigning a value of 1 to 3 for each of them. The measure you find most appealing in terms of financial impact will receive the value 1, the second most appealing will receive 2, and the third will receive 3.
You can also assign equal ranks.
If you find all measures equally appealing, assign a rank of 1 to all.
If you find two measures equally appealing, but more than the remaining measure, assign the value 1 to the two best measures and 2 to the less appealing measure.
If you find two measures equally appealing, but less appealing than the remaining measure, assign the value 1 to the best measure and 2 to the other two measures.

A: Measure "Reducing Emissions Allowances in Emissions Trading".
B: Measure "Reducing Production of a Coal-fired Power Plant".
C: Measure "Combination of A and B".
Don't know / No answer

E Appendix for Reviewers

E.1 Hypothesis testing without excluding respondents that chose option *NONE*

Table E.1: Correlation of Choices with Beliefs about Effectiveness in *BASE*, *MARKET*, *EMISSIONS* on $c = 1$ when including Respondents that chose *NONE*. Average Marginal Effects from a Multinomial Logit Estimation with Option *MIX* as Base Outcome.

Dependent variable	*ETS*		*COAL*		*MIX*		*NONE*	
Effect of belief about single most effective option								
Option *ETS*	0.504***	(0.040)	-0.130***	(0.029)	-0.343***	(0.042)	-0.031	(0.022)
Option *COAL*	-0.153***	(0.030)	0.391***	(0.041)	-0.213***	(0.044)	-0.025	(0.021)
Option *MIX*	-0.179***	(0.028)	-0.147***	(0.028)	0.333***	(0.038)	-0.007	(0.022)

Regression controlling for gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms. The reference category for effectiveness beliefs summarizes double-peaked and flat beliefs. Reference margin is the predicted share of study participants with double-peaked and flat beliefs who chose the respective option. $n = 1{,}014$, $\log \mathscr{L} = -803.99$, Wald $\chi = 5{,}734.79$, Wald $p = 0.000$, pseudo $R^2 = 0.318$. Robust standard errors in parentheses. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$).

Table E.2: Impact of *MARKET* Condition on $c = 1$ when including Respondents that chose *NONE* in $c = 2$. Coefficient Estimates from Maximum Likelihood Logit Estimations.

Dependent Variable	ETS		ETS + MIX	
MARKET	0.196	(0.191)	0.098	(0.206)
Negative attitude towards market	-0.007	(0.316)	-0.558*	(0.314)
MARKET * Negative attitude towards market	0.485	(0.483)	0.448	(0.527)
Constant	-0.246	(0.556)	0.244	(0.555)
Covariates	Yes		Yes	
Observations	744		744	
$\log \mathscr{L}$	-411.10		-371.59	
Wald χ^2	33.13		25.52	
Wald p	0.005		0.043	
Pseudo R^2	0.039		0.034	

Note: Stars indicate that a Wald test rejects the null that the respective coefficient is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

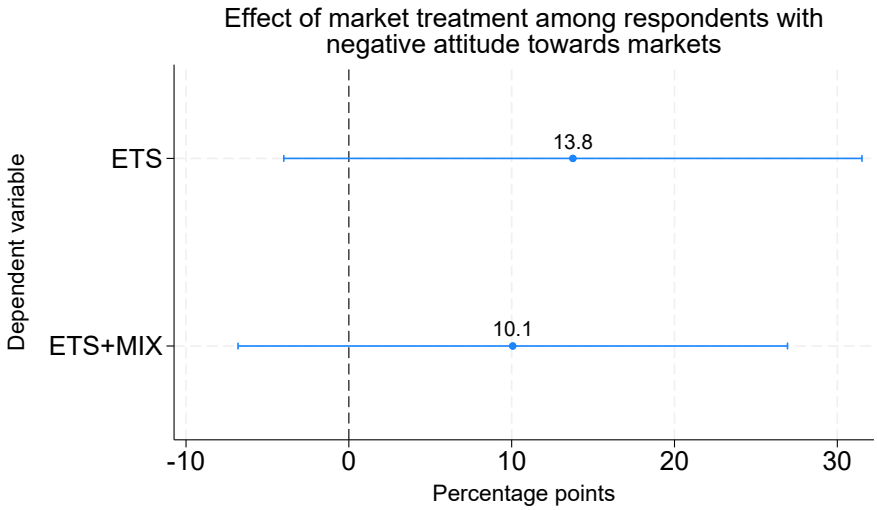

Figure E.1: Impact of *MARKET* Condition on $c = 1$ among Respondents with a Negative Attitude towards the Market including Respondents that chose *NONE* in $c = 2$. Average Marginal Effects from Maximum Likelihood Logit Estimations.

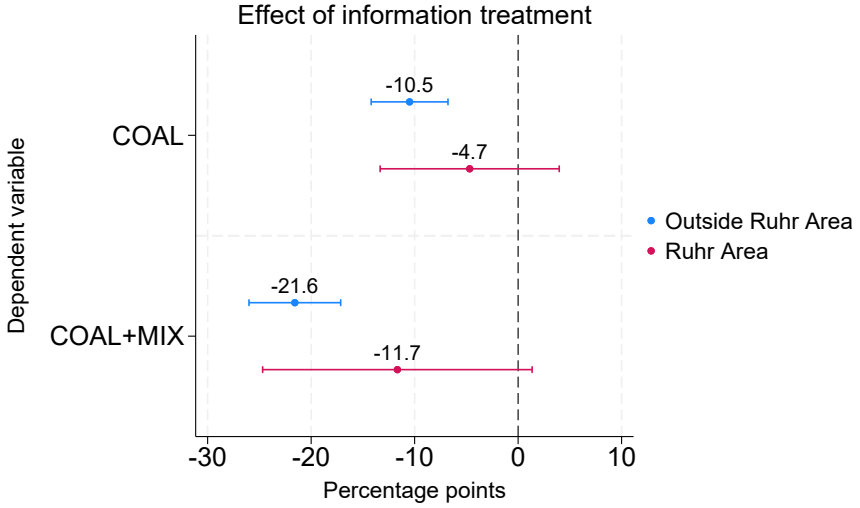

Figure E.2: Heterogeneous Impact of Information Treatment by Residency in the Ruhr Area including Respondents that chose *NONE* in one of their Choices. Coefficient Estimates from Maximum Likelihood Logit Estimations Are Shown in Table E.5.

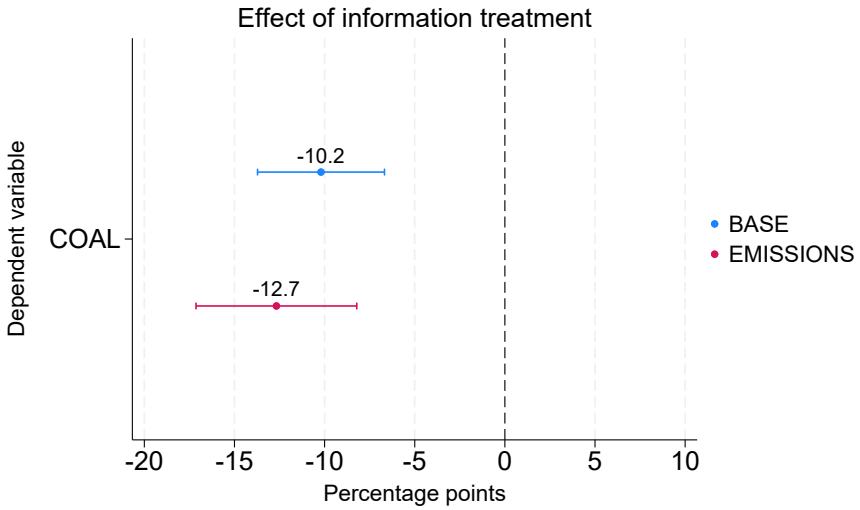

Figure E.3: Effect of Information Treatment in the *EMISSIONS* Condition including Respondents that chose *NONE* in one of their Choices. Average Marginal Effects from Maximum Likelihood Logit Estimations. Coefficient Estimates from Maximum Likelihood Logit Estimations Are Shown in Table E.6.

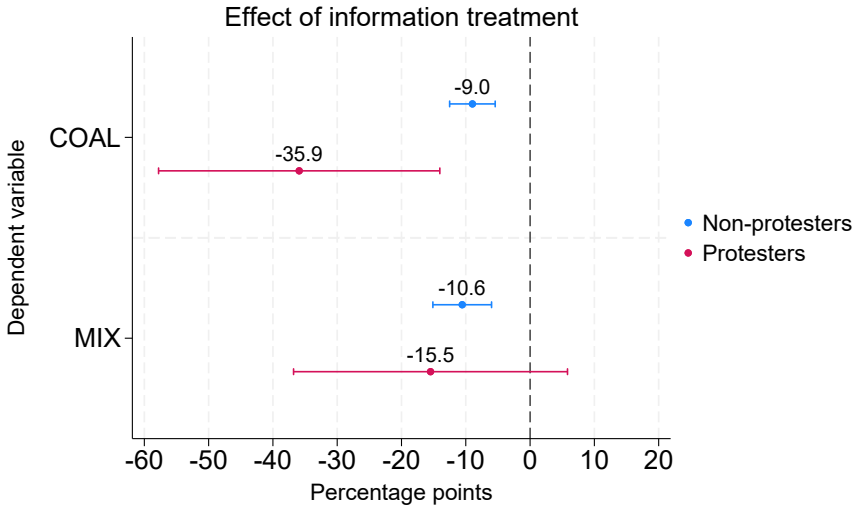

Figure E.4: Effect of Information Treatment by Participation in Protests Against Coal including Respondents that chose *NONE* in one of their Choices. Average Marginal Effects from Maximum Likelihood Logit Estimations. Coefficient Estimates from Maximum Likelihood Logit Estimations Are Shown in Table E.7.

Table E.3: Impact of *EMISSIONS* Condition in the first discrete choice task, $c = 1$, including Respondents that chose *NONE* in $c = 2$. Average Marginal Effects from Maximum Likelihood Logit Estimations.

Dep. variable	*COAL*		*COAL+MIX*		*COAL*		*COAL+MIX*	
EMISSIONS effect	−0.037	(0.027)	0.021	(0.028)	−0.021	(0.030)	0.014	(0.030)
Covariates	No		No		Yes		Yes	
Observations	909		909		761		761	
$\log \mathscr{L}$	-467.71		-487.41		-384.31		-394.07	
Wald χ^2	1.87		0.56		21.95		37.58	
Wald p	0.172		0.455		0.080		0.001	
Pseudo R^2	0.002		0.001		0.028		0.048	

Robust standard errors in parentheses. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

Table E.4: Causal Effect of Information Provision in Condition *BASE* including Respondents that chose *NONE* in one of their Choices. Average Marginal Effects from Maximum Likelihood Logit Estimations.

Dependent variable	*ETS*		*COAL*	
$\mathbb{1}(c = 2)$	0.210^{***}	(0.022)	-0.102^{***}	(0.018)
Covariates	Yes		Yes	
Observations	881		881	
$\log \mathscr{L}$	-520.32		-386.48	
Wald χ^2	119.17		43.47	
Wald p	0.000		0.000	
Pseudo R^2	0.085		0.050	

In parentheses are the standard errors clustered at the individual level. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

Table E.5: Heterogeneous Treatment Effects in *BASE* by Residency in the Ruhr Area including Respondents that chose *NONE* in one of their Choices. Coefficient Estimates from Maximum Likelihood Logit Estimations with Covariates.

Dependent Variable	COAL		COAL + MIX	
Second decision	-0.767***	(0.143)	-1.026***	(0.111)
Ruhr area	-0.381	(0.563)	0.850	(0.631)
Second decision * Ruhr area	0.379	(0.383)	0.199	(0.494)
Constant	-0.282	(0.620)	0.257	(0.586)
Covariates	Yes		Yes	
Observations	881		881	
$\log \mathscr{L}$	-386.25		-516.76	
χ^2	45.23		124.42	
Wald p	0.000		0.000	
Pseudo R^2	0.050		0.092	

Note: Average marginal effects of the respective discrete change of c relative to $c = 1$. In parentheses are the standard errors clustered at the individual level. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

Table E.6: Heterogeneous Treatment Effects of Information Treatment Between Conditions *BASE* and *EMISSIONS* including Respondents that chose *NONE* in one of their Choices. Coefficient Estimates from Maximum Likelihood Logit Estimations

Dependent Variable	COAL		COAL	
Second decision	-0.712***	(0.125)	-0.744***	(0.135)
EMISSIONS	-0.228	(0.167)	-0.133	(0.184)
Second decision * EMISSIONS	-0.209	(0.226)	-0.407	(0.257)
Covariates	No		Yes	
Observations	1,761		1,511	
$\log \mathscr{L}$	-759.62		-630.19	
χ^2	58.88		73.19	
Wald p	0.000		0.000	
Pseudo R^2	0.026		0.047	

Note: Average marginal effects of the respective discrete change of c relative to $c = 1$. In parentheses are the standard errors clustered at the individual level. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels (* at $p < 0.1$, ** at $p < 0.05$, and *** at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

Table E.7: Heterogeneous Treatment Effects of Information Treatment by Participation in Protests including Respondents that chose *NONE* in one of their Choices. Coefficient Estimates from Maximum Likelihood Logit Estimations.

Dependent Variable	COAL		MIX	
Second decision	-0.672***	(0.138)	-0.449***	(0.099)
Protesters	1.220**	(0.534)	-0.807	(0.523)
Second decision * Protesters	-1.375*	(0.736)	-0.374	(0.602)
Constant	-0.311	(0.627)	-1.398**	(0.592)
Covariates	Yes		Yes	
Observations	881		881	
$\log \mathscr{L}$	-385.14		-575.77	
χ^2	48.71		56.023	
Wald p	0.000		0.000	
Pseudo R^2	0.053		0.056	

Robust standard errors in parentheses. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels ($*$ at $p < 0.1$, $**$ at $p < 0.05$, and $***$ at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

Table E.8: Heterogeneous Treatment Effects of Information Treatment by Attitude Towards the Market Economy including Respondents that chose *NONE* in one of their Choices. Coefficient Estimates from Maximum Likelihood Logit Estimations.

Dependent Variable	COAL		ETS	
Second decision	-0.698***	(0.157)	0.985***	(0.117)
Negative attitude towards market	0.623**	(0.318)	-0.092	(0.318)
Second decision * Negative attitude towards market	-0.257	(0.306)	0.150	(0.295)
Covariates	Yes		Yes	
Observations	881		881	
$\log \mathscr{L}$	-386.33		-520.258	
χ^2	47.80		119.63	
Wald p	0.000		0.000	
Pseudo R^2	0.050		0.086	

Robust standard errors in parentheses. Stars indicate that a Wald test rejects the null that the respective effect is equal to zero at conventional significance levels ($*$ at $p < 0.1$, $**$ at $p < 0.05$, and $***$ at $p < 0.01$). Covariates include gender, age, education, net monthly household income, household size, participation in climate protests and protests against coal, attitude towards the market economy, and attitude towards big firms.

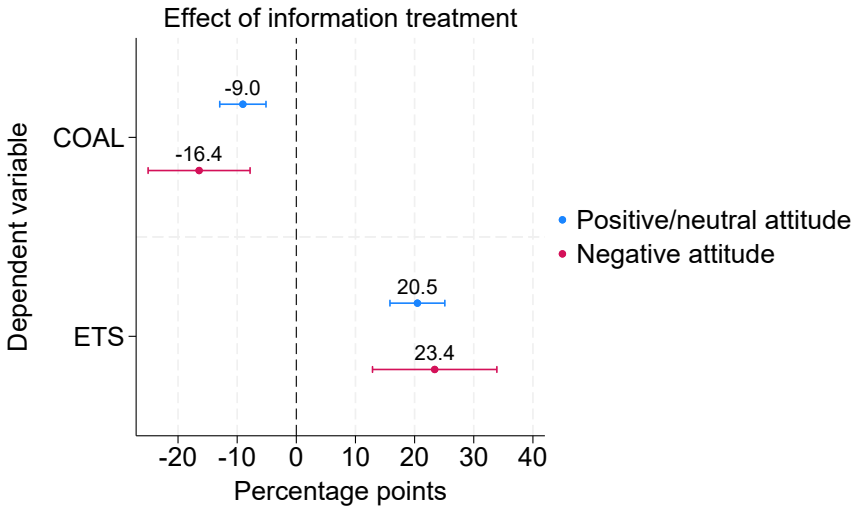

Figure E.5: Effect of Information Treatment by Attitude Towards the Market including Respondents that chose *NONE* in one of their Choices. Average Marginal Effects from Maximum Likelihood Logit Estimations. Coefficient Estimates from Maximum Likelihood Logit Estimations Are Shown in Table E.8.

E.2 Comparison of Pre-Analysis Plan and Actual Analyses

Table E.9: Comparison Pre-Analysis Plan and Actual Analyses

Pre-Analysis Plan	Article	Difference
H1: Provision of information on the effectiveness of mitigation options induces participants to adjust their choices in the second decision in line with the information received: $\frac{\Pr(B_2^0)}{\Pr(A_2^0+B_2^0+C_2^0)} < \frac{\Pr(B_1^0)}{\Pr(A_1^0+B_1^0+C_1^0)}$ and $\frac{\Pr(A_2^0)}{\Pr(A_2^0+B_2^0+C_2^0)} > \frac{\Pr(A_1^0)}{\Pr(A_1^0+B_1^0+C_1^0)}$.	**H2:** In the *BASE* condition, more respondents choose option *ETS* – the most effective option – in their second choice, $c = 2$, than in their first choice and the share of those choosing option *COAL* – the least effective option – is reduced in $c = 2$ compared to $c = 1$.	Since we are interested in how respondents switch between mitigation options, we exclude respondents that chose *NONE* in one of their choices, not just those that chose *NONE* in both choices. Only excluding those that chose *NONE* in both choices only marginally changes the results (Table E.4).
H2: Within *BASE*, those participants that state to have participated in protests relating to phasing-out coal or extracting coal (prior to making any decision on mitigation options) – denoted by binary indicator $x = 1$ vs. $x = 0$ – are expected to respond less to information on the relative ineffectiveness of directly reducing emissions by coal-fired power plants: $\Pr\left(B_2^0 \mid B_1^0, x = 1\right) > \Pr\left(B_2^0 \mid B_1^0, x = 0\right)$ and $\Pr\left(C_2^0 \mid C_1^0, x = 1\right) > \Pr\left(C_2^0 \mid C_1^0, x = 0\right)$.	**H4:** Within the *BASE* condition, respondents that state to have participated in protests related to phasing out coal or extracting coal respond less to information on the relative ineffectiveness of directly reducing emissions by coal-fired power plants. In particular, the reduction in the probability of choosing option *COAL* or option *MIX* from $c = 1$ to $c = 2$ is smaller for respondents who participated in protests.	To increase power, we also include respondents in the analysis that did not choose *COAL* or *MIX* in $c = 1$.
H3: In treatment *EMISSIONS*, provision of information on climate effectiveness is less likely than in *BASE* to induce participants to adjust choices in line with the information provided. Specifically, providing information induces a smaller reduction in *EMISSIONS* than in *BASE* in the probability that the least effective option *COAL* is chosen relative to all mitigation options (A, B, C): $\frac{\Pr(B_2^2)}{\Pr(B_1^2)} \cdot \frac{\Pr(A_1^2+B_1^2+C_1^2)}{\Pr(A_2^2+B_2^2+C_2^2)} > \frac{\Pr(B_2^0)}{\Pr(B_1^0)} \cdot \frac{\Pr(A_1^0+B_1^0+C_1^0)}{\Pr(A_2^0+B_2^0+C_2^0)}$.	**H3:** In the *EMISSIONS* condition, provision of information on the effectiveness of mitigation options is less likely than in the baseline condition to induce an adjustment of choices in line with the information provided. Specifically, providing information induces a smaller reduction in *EMISSIONS* than in *BASE* in the probability that the least effective option (*COAL*) is chosen relative to all mitigation options.	None.
H4: Ordinal rankings of first-order beliefs about climate effectiveness and co-benefits contribute to explaining first choice in *BASE*, *MARKET*, and *EMISSIONS*.	When deciding on mitigation options that are of no cost to the respondents, we expect individuals to choose the option that they believe to be most effective (see Section 5).	We do not analyze the role of co-benefits, because perception of co-benefits was not measured reliably. The pre-registered hypothesis is tested in Appendix B.

H5: In condition *MARKET*, *ETS* and *ETS + MIX* are chosen more frequently in the first choice compared to *BASE*.	**H1:** A larger share of respondents with a negative attitude towards the market economy choose to reduce emissions either via the retirement of allowances from the EU ETS or via the combined option *MIX* in their first choice ($c = 1$) in the *MARKET* condition than in the *BASE* condition.	We only focus on respondents that state to have a negative attitude towards the market. The pre-registered hypothesis is tested in Table C.6.
H6: In condition *EMISSIONS*, *COAL* and *COAL + MIX* are chosen more frequently in the first choice compared to *BASE*.	We expect [...] a higher share of individuals in *EMISSIONS* choosing options *COAL* or *MIX* in their first choice as compared to the *BASE* condition (see Section 5).	None.
H7: In condition *REFORM*, providing information that reduces the expected difference in climate effectiveness between options increases the role of expected co-benefits. In *REFORM*, the correlation between the probability that an alternative is chosen and the alternative's rank w.r.t beliefs about co-benefits is stronger in the second than in the first choice.	—	The hypothesis is not analyzed in the main part of the paper, because perception of co-benefits was not measured reliably. The analysis can be found in Appendix B.
H8: Without additional information on the climate effectiveness of options, i.e. in the first choice in treatment *BASE*, more than two-thirds of those participants that choose any of the climate actions, choose either the concrete option (coal phase-out) or the "safe" option, i.e. a linear combination of all available options: $\frac{\Pr(B_1^0+C_1^0)}{\Pr(A_2^0+B_2^0+C_2^0)} > \frac{2}{3}$.	We expect that without any additional information on abatement effectiveness, most respondents would prefer either option *COAL* – reducing emissions by diminishing the production of a coal-fired power plant – or option *MIX*, i.e. the combination of retirement of allowances and reduction of emissions from a coal-fired power plant. Thus, in condition *BASE*, the share of respondents choosing option *ETS* could be expected to be rather low (see Section 4).	In the main text, we do not explicitly test whether the share of respondents who choose *ETS* is below one third. The test for the pre-registered hypothesis is provided in Table C.4.

H9: For participants from active as well as recently abandoned coal/lignite-mining regions as well as from the primary trading area of STEAG GmbH , denoted by binary indicator $c = 1$ vs. $c = 0$, the relative ineffectiveness of phasing-out coal is less likely to be news that is counter to their prior attitude (Rinscheid and Wüstenhagen, 2019). Hence, participants from these regions exhibit a lower degree of this particular type of motivated reasoning. Participants from active mining regions as well as those living in the primary trading area of STEAG GmbH could receive direct economic benefits from not reducing the output of coal-fired power stations. For recently abandoned mining areas, the effect would in contrast be based on beliefs and attitudes acquired in the past: $\frac{\Pr\left(B_2^0 \middle| B_1^0, x=1, c=1\right)}{\Pr\left(B_2^0 \middle| B_1^0, x=1, c=0\right)} > \frac{\Pr\left(B_2^0 \middle| B_1^0, x=0, c=1\right)}{\Pr\left(B_2^0 \middle| B_1^0, x=0, c=0\right)}$ and $\frac{\Pr\left(C_2^0 \middle| C_1^0, x=1, c=1\right)}{\Pr\left(C_2^0 \middle| C_1^0, x=1, c=0\right)} > \frac{\Pr\left(C_2^0 \middle| C_1^0, x=0, c=1\right)}{\Pr\left(C_2^0 \middle| C_1^0, x=0, c=0\right)}$.	—	Since STEAG GmbH does not supply electricity to private customers, less than 15 respondents lived in active or recently abandoned mining regions, and the analysis of hypothesis 2 did not show the expected effects, we abstain from those heterogeneity analyses.
H10: The effect of Hypothesis 3 is smaller (closer to zero) for subjects from coal-mining regions ($c = 1$) compared to the other subjects ($c = 0$).	—	Since STEAG GmbH does not supply electricity to private customers, less than 15 respondents lived in active or recently abandoned mining regions, and the analysis of hypothesis 3 did not show the expected effects, we abstain from those heterogeneity analyses.