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COST PERCEPTIONS AND THE SUPPORT FOR CARBON PRICING

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ABSTRACT

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Cost perceptions and the support for carbon pricing*

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Keywords: Carbon pricing, policy acceptance, perceptions, experiment

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1. Introduction

Limiting global warming requires effective climate mitigation policies. However, public opposition remains a major obstacle to implementing ambitious measures. Despite being widely endorsed by economists as a cost-effective tool for reducing emissions (Climate Leadership Council, 2019), carbon pricing has encountered particularly strong resistance. In earlier instances, public opposition - driven by concerns about rising consumer prices - has limited the scope of carbon pricing schemes and even led to their reversal (Douenne and Fabre, 2022; Crowley, 2021; Anderson et al., 2023). Increasing public acceptance has thus become a key challenge.

In Germany, a carbon pricing scheme for the building and transportation sectors was introduced in 2021 with fixed prices, yet public acceptance remains low. With the planned integration of the national emissions trading system into the European Union Emissions Trading System (EU ETS-II) by 2027, carbon prices are expected to rise substantially due to the transition to market-based pricing and a continuously decreasing cap on emission allowances. These anticipated price hikes will likely increase the financial burden on private households and risk intensifying concerns about personal costs. Understanding individual cost perceptions and how they shape public attitudes is therefore essential to designing effective communication strategies and policy measures that can ensure the long-term viability of carbon pricing.

This paper examines how beliefs about personal costs influence the acceptance of carbon pricing. Specifically, we address two key questions: First, how accurate are individuals' perceptions of their personal costs of carbon pricing, and do they correctly anticipate the financial implications of future price hikes for their own households? Second, does providing personalized information about the actual costs of carbon pricing affect attitudes toward the policy?

To this end, we conduct tailored information provision experiments to test for the causal effect of individual cost perceptions on carbon price acceptance. Our randomized experiments are embedded in an online survey on a large sample of 4,759 respondents that is representative of the adult German population. Data collection took place shortly after

an unanticipated price increase that received widespread media coverage, making personal costs especially salient. Our experiments proceed as follows: We first elicit people's acceptance of paying a carbon price. Subsequently, respondents are randomly assigned to one of two questions about their perceived additional costs of carbon pricing, based on their current energy consumption, and their uncertainty regarding this estimation, either for the current price of €45 or a projected price of €200 per ton of CO2. To generate exogenous variation in beliefs, we provide random subsamples of respondents with personalized information about their actual costs of carbon pricing, which we calculate based on previously reported household characteristics, including detailed information on their energy use. Finally, we re-elicit carbon price acceptance for all respondents.

We first document a series of stylized facts about people's attitudes toward carbon pricing and their cost perceptions: The majority of our respondents rejects the policy (54 percent) and acceptance is particularly low among those who perceive their costs to be high. At the same time, most individuals are not well informed about their current and projected future personal costs. Around 64 percent overestimate what they currently pay, while approximately 72 percent underestimate their projected future costs. On average, our respondents overestimate their current annual costs by €206.4 and underestimate future costs at the higher price by €296.4.

The main finding of our paper is that personalized information about the costs of carbon pricing significantly influences acceptance of the policy. On average, individuals who overestimate their personal costs increase their carbon price acceptance when receiving cost information, while those who underestimate their costs become less supportive. The effect is stronger for those with larger initial misperceptions and greater uncertainty about their cost estimates, which is consistent with the notion that the provided information may be more valuable for ex ante less informed respondents. The aggregate implications for policy acceptance differ markedly between the current and the projected price experiment. Since most individuals overestimate their current costs, the net effect of personalized cost information on acceptance is positive. In contrast, because the majority underestimate the financial impact of the projected price, information provision leads to a decline in

acceptance.

Importantly, we find that personalized information about current costs is particularly effective in increasing support among individuals who initially opposed carbon pricing. This highlights the potential to build broader public support by correcting current cost misperceptions. Overall, receiving personalized information about current costs increases the probability of finding carbon pricing acceptable by 4.5 percentage points. In contrast, information about projected future costs reduces support across the board, regardless of individuals' initial stance. This results in a 9.6 percentage point increase in the likelihood of rejecting carbon pricing, suggesting that future information shocks may reinforce public opposition.

We additionally identify demographic groups that drive these effects. While information about current costs increases acceptance across both government and opposition supporters, information about projected future costs disproportionately reduces support among those affiliated with the governing parties. This highlights the risk that future cost shocks may erode the political foundation of carbon pricing. Other than that, heterogeneity in treatment effects is largest based on respondents' financial situation and exposure to carbon pricing, which aligns with systematic variations in pre-treatment beliefs. The treatment increases acceptance particularly among less affected individuals who strongly overestimate their costs at current prices, while future cost information reduces support among the more affected who substantially underestimate the financial impact of projected price increases.

Lastly, we evaluate the external validity of our findings and demonstrate their robustness regarding survey-related response biases, such as experimenter demand, survey fatigue, or distrust in the provided information.

Our study contributes to a growing literature on the determinants of attitudes toward climate policy (Drews and Van den Bergh, 2016; Bergquist et al., 2022) and, more specifically, support for carbon pricing (Carattini, Carvalho and Fankhauser, 2018; Maestre-Andrés et al., 2019; Klenert et al., 2018). Among other factors, concerns about the specific design features, such as the effectiveness in reducing emissions, distributional fairness, and

personal costs are often cited as shaping public acceptance of carbon pricing (Maestre-Andrés et al., 2019; Carattini et al., 2017; Carattini, Carvalho and Fankhauser, 2018).[1]

There is mixed evidence on the (relative) importance of these factors in explaining public support for climate policy. Some studies emphasize financial self-interest, showing that support correlates with proxies for individual affectedness and exposure to costs (see, for example, Groh and Ziegler, 2018; Sommer et al., 2022). Others argue that environmental and fairness concerns matter more than personal costs (Kallbekken and Sælen, 2011; Bergquist et al., 2022). In Germany, where carbon price acceptance is relatively low, cross-country studies on hypothetical climate policies highlight the prominence of personal costs and beliefs about household-level impacts from tax-and-dividend schemes as strong correlates of opposition (Dabla-Norris et al., 2023; Dechezleprêtre et al., 2025). These findings align with experimental evidence that consistently shows how cost-related information can causally influence support for climate policy (Schwarz et al., 2024; Dabla-Norris et al., 2023; Dechezleprêtre et al., 2025; Douenne and Fabre, 2022).

Most prior experimental studies on the support for carbon pricing implicitly rely on information gaps or raising the salience of costs. In contrast, we explicitly document and account for individual cost misperceptions by providing personalized cost information to manipulate beliefs.[2] Therefore, our approach relates closely to recent work on hypothetical carbon tax-and-dividend schemes that examines how (incorrect) individual beliefs that the own household would be a net financial loser determines policy support (Douenne and Fabre, 2022) and evidence on the role of low public awareness and underestimation of climate rebate amounts for the support of carbon pricing (Mildenberger et al., 2022).

[1] A related strand of the literature additionally investigates the role of revenue use and earmarking for carbon price acceptance (Baranzini and Carattini, 2017; Sælen and Kallbekken, 2011; Sommer et al., 2022; Kaestner et al., 2023; Beiser-McGrath and Bernauer, 2019). Maestre-Andrés et al. (2019) and Klenert et al. (2018) provide reviews of the literature on the role of revenue use for policy support.

[2] Methodologically, our study is related to the literature that investigates the drivers of policy preferences by experimentally manipulating beliefs. For a comprehensive review of the literature utilizing information provision experiments, see Haaland et al. (2023). Our approach most closely resembles other tailored information provision experiments that provide participants with customized information based on their personal characteristics (Roth et al., 2022; Kuziemko et al., 2015; Cruces et al., 2013; Karadja et al., 2017; Hvidberg et al., 2023) or peer-group information (Card et al., 2012; Zimmermann, 2020). Thematically, we contribute to a broader literature that studies self-interested political preferences (Haaland and Roth, 2020; Kuziemko et al., 2015; Karadja et al., 2017; Stantcheva, 2021; Fanghella et al., 2023; Kaestner et al., 2025).

Prior work suggests that initial misperceptions may be corrected following policy implementation, potentially increasing public support over time (Konc et al., 2022).[3] However, in line with other studies on real-world climate policies (Mildenberger et al., 2022), we show that widespread misperceptions persist post implementation. Moreover, we find that prevalent cost overestimations at current prices cannot be extrapolated to future price developments. Instead, the substantial underestimation of costs at higher projected prices suggests that prospective information shocks may, if anything, strengthen opposition to carbon pricing. This aligns with prior evidence that higher price levels are associated with lower support (Sommer et al., 2023). Our results indicate that this negative effect may be further exacerbated by overly optimistic beliefs about future financial impacts. A key innovation of our study is this forward-looking perspective: While existing research on current or hypothetical policies consistently emphasizes that cost-related information can increase acceptance, we show that such information can also reduce support - raising concerns about the durability of climate policy under rising prices.

The remainder of this paper is organized as follows. In Section 2, we describe our survey and sample as well as the design of our information provision experiments. Section 3 documents our respondents' pre-treatment attitudes toward carbon pricing and their perceptions of personal costs. In Section 4, we present the results on the causal effect of tailored cost information on carbon price acceptance, including a heterogeneity analysis of our treatment effects, and several robustness checks. Section 5 concludes.

2. Data

We use data from a representative online panel of the German adult population, collected in collaboration with GapFish, a German market research company. The survey took place between 15 January 2024 and 7 February 2024, immediately after the CO2 price in Germany was increased from €30 to €45 per ton of CO2. This price increase exceeded

[3]For policies beyond carbon pricing, Schuitema et al. (2010) show that acceptance of a congestion charge in Stockholm increased post-implementation as cost concerns diminished. Similarly, Carattini, Baranzini and Lalive (2018) find that acceptance of a garbage tax in Switzerland rose after initial fairness and effectiveness concerns were corrected.

the originally announced €40 and received widespread media attention.

We use a quota sampling approach to ensure that the sample represents the adult German population in terms of age, gender, region, and household income. Table A1 in the Appendix shows that it closely resembles the German microcensus, an official, nationally representative dataset, across key characteristics.[4] Additional information on the microcensus is provided in Appendix B.1. Furthermore, our respondents' reported party affiliations are closely aligned with contemporaneous national polling data. This suggests that political preferences are well represented in our sample, minimizing concerns about political bias influencing attitudes toward climate policy.

In the following, we outline the structure of the survey, describe the sample restrictions, and present its main characteristics. We then detail the design of our information provision experiments and explain how we measure the key variables used in the empirical analysis.

2.1. Survey and sample

The survey begins with questions on respondents' age, gender, federal state of residence, and household income. We then collect information to estimate household-specific costs of carbon pricing, required to calculate the treatment information for our survey experiments. These variables include household size, homeowner status (owner vs. renter), living space, energy sources for space heating and hot water (i.e. electricity, gas, oil, solid fuels, or other renewables), the number of gasoline or diesel-run vehicles and annual mileage.

Our survey experiments start by asking all respondents about their acceptance of carbon pricing. Respondents are then randomly assigned to one of two questions that measure their ex ante informedness about their additional costs of carbon pricing, either for the current price of €45 per ton of CO2 or a projected price of €200 per ton of CO2. Subsequently, half of all respondents are randomly selected to receive personalized information on their actual costs of carbon pricing. Finally, we re-elicit carbon price acceptance for

[4]The sample closely matches the microcensus in terms of age, gender, and region. However, our respondents' household incomes are somewhat lower on average.

all respondents. A detailed description of the experimental design is provided in the next subsection.

After the experiments, we collect additional demographic and attitudinal information, including educational attainment and political party preferences. Following suggestions by Haaland et al. (2023), we also ask how credible respondents found the provided information on the costs of carbon pricing. To assess experimenter demand effects, we include a subset of items from the self-monitoring scale by Snyder (1974). The survey concludes with two feedback questions regarding respondents' overall survey experience. The exact wording of the main survey questions is shown in Appendix B.3.[5] In Appendix B.4, we provide screenshots of our main survey questions as implemented in the online survey.[6]

The initial sample comprises 4759 respondents. We exclude 218 individuals who completed the full survey in less than half the median time, as rushed completion may indicate inattentive responding.[7] To deal with outliers, we drop observations with the top and bottom 1 percent of values for living space and vehicle mileage, as well as the top 1 percent for perceived costs of carbon pricing. We also exclude a small number of cases with incompatible heating and hot water systems, as well as implausible values for household size and number of motor vehicles. Finally, we exclude 998 respondents who did not provide sufficient information to allow for reliable cost calculations within the framework of our experiments and therefore did not participate.[8] This leaves us with 3354 respondents. We further restrict the sample to respondents with complete data on the key covariates for our analysis, leaving us with a final sample of 3254 respondents.

Among these respondents, the average age is 50.5 years. 53 percent are male, 15 percent reside in East Germany, and 50 percent hold the Abitur (the German equivalent of a high school diploma). The average household size is 2.2 people. The median monthly net household income is €3,000, with 80 percent reporting a monthly household income of

[5]The full questionnaire is available at: `https://www.boeckler.de/pdf/imk_questionnaire_2024.pdf`.

[6]The survey also contains a module on the so-called Inflationsausgleichsprämie. This is a tax-exempt special payment to employees aimed at mitigating the effects of the energy crisis, which is not analyzed in this paper.

[7]We also implemented multiple attention checks in our survey, with the survey being automatically terminated in the event of incorrect answers.

[8]This includes about 200 individuals who use solid fuels for space heating or hot water, for whom cost estimation was not feasible within the scope of our survey design.

€1,800 or more. Compared to the initial sample, the final sample is slightly older and exhibits a somewhat higher proportion of male respondents, high income households (net household income of €4000 or more), and homeowners (Table A2 in the Appendix). In Appendix Table A3 and Table A4, we show that the treatment and control groups are balanced in terms of observables.

2.2. Experimental design

Our information provision experiments aim to generate exogenous variation in respondents' cost perception of carbon pricing to study causal effects on the acceptance of carbon pricing. The experiments consist of four steps, as illustrated in Figure 1.[9]

In the first step, all respondents are asked about their attitude toward carbon pricing. We explain that CO2 pricing for the building and transportation sectors was introduced in Germany in January 2021, which increases the costs of fossil fuel use to reduce greenhouse gas emissions. We then ask respondents to indicate their acceptance of carbon pricing based on the following question: "To what extent do you personally find it acceptable to pay a carbon price?" The response options are: "Very unacceptable", "Rather unacceptable", "Neither nor", "Rather acceptable", "Very acceptable", and "No answer". We refer to this as pre-treatment acceptance or baseline acceptance.

In the second step, we measure the perceived costs of carbon pricing for different price levels. Respondents are randomly assigned to one of two groups. One group is told that the current price is €45 per ton of CO2, while the other group is told that current projections suggest a rise to €200 per ton of CO2 by 2027.[10] We then ask respondents to estimate their household's additional annual costs compared to a situation without carbon pricing. In both groups, we clarify that these costs refer to the direct financial burden from higher fuel and heating expenses, assuming their current consumption. Finally, we ask respondents to rate their certainty about their estimate, using a five-point Likert

[9]We pre-registered our experiments in the AEA RCT Registry prior to the start of data collection. Additional information is available at: `https://www.socialscienceregistry.org/trials/12808`.

[10]See, for example, Kalkuhl et al. (2023), who project a carbon price of €200-300 per ton of CO2 by 2027, when the national carbon pricing system is replaced by the EU ETS-II.

scale.

In the third step, immediately after reporting their perceived costs of carbon pricing, half of the respondents in each group are randomly provided with personalized information about their actual costs. The treatment also includes a reminder of their own estimate. The treated respondents in the current price experiment receive the following information:

> *"Based on your responses regarding your housing situation and vehicle use, we can estimate your household's additional annual costs at a CO2 price of €45 per ton of CO2.*
>
> *Your household has additional annual costs of € [actual costs].*
>
> *As a reminder: You estimated that your household has additional annual costs of € [own estimate]."*

In the projected price experiment, treated respondents are informed that their additional costs are estimated based on a carbon price of €200 per ton of CO2. The remaining respondents serve as a pure control group and receive no information. This setup allows us to isolate the effect of personalized information relative to no information.

To generate these personalized cost estimates, we developed a CO2 cost calculation tool. It uses information on heat consumption and vehicle usage in the household, which was collected prior to the experiments. Specifically, we first approximate the heat consumption of households, which consists of energy use for water and space heating. The energy consumption for hot water is calculated by multiplying the number of household members by the average per capita energy consumption for hot water. The energy consumption for space heating is calculated by multiplying the living space by the average energy consumption per square meter. Emissions are calculated by applying energy-source-specific emission factors to the annual energy consumption. For tenants, the costs are adjusted according to the CO2 Cost Allocation Act, which imposes a share of the carbon costs onto landlords based on the building's energy efficiency. For transport emissions, we apportion total mileage across gasoline and diesel vehicles based on the household's fleet and apply average fuel consumption values. These fuel consumption figures are then multiplied by

fuel-specific emission coefficients. Finally, we obtain a household's total additional costs of carbon pricing by multiplying the sum of CO2 emissions in the building and transportation sectors by a price of €45 or €200 per ton of CO2. Appendix B.2 provides a detailed description of the calculation of CO2 costs.

In the fourth step, all respondents are asked again about their attitude toward carbon pricing, using the same question as in the first step. We refer to these responses as post-treatment acceptance.

This experimental design allows us to test whether personalized information on the costs of carbon pricing causally affects the acceptance of carbon pricing. Identifying such an effect presupposes that the perceived costs are a determinant of the policy acceptance, and that the information treatment generates exogenous variation in this perception. The latter, in turn, requires that respondents are not already fully informed about the true value of their additional costs and that they consider the provided information to be credible. We address the validity of these assumptions in the following sections.

3. Pre-treatment acceptance and cost perceptions

In this section, we examine the attitudes toward carbon pricing prior to the information provision experiments and explore how these attitudes relate to the perceived costs of carbon pricing. We also investigate whether respondents' perceived costs deviate from their actual costs of carbon pricing.

Figure 2 shows the baseline acceptance of carbon pricing in our final sample, before respondents are asked about their perceived costs of the policy. Support for carbon pricing in Germany is relatively low following the price increase at the beginning of 2024. Only about 27 percent find paying a carbon price acceptable, while around 20 percent of respondents express a neutral stance. However, the majority of respondents find the policy unacceptable, with approximately one third considering it very unacceptable. These findings are consistent with previous studies documenting low public support for carbon pricing in Germany (e.g., Dabla-Norris et al., 2023).

We also examine how the attitudes toward carbon pricing correlate with respondent

characteristics. Column 1 of Table A5 in the Appendix reports the results from OLS regressions of the baseline acceptance on different socio-demographic characteristics, the reliance on fossil fuels, and political party preferences. In line with prior research (Baranzini and Carattini, 2017; Schwarz et al., 2024; Sommer et al., 2023), support tends to be lower among older respondents, residents of East Germany, and those more reliant on fossil fuels for heating and transportation. In contrast, acceptance is higher among individuals with higher educational attainment, higher income, and homeowners. Moreover, acceptance is strongly correlated with political party affiliation. Compared to supporters of the Social Democratic Party (SPD), those affiliated with the Green Party (Bündnis90/Die Grünen) exhibit significantly higher support for carbon pricing, while supporters of other democratic parties and non-voters are less supportive. The lowest level of support is found among respondents affiliated with the far-right Alternative for Germany (AfD).

Next, we examine the correlation between carbon pricing acceptance and perceived costs. Column 2 of Appendix Table A5 reports results from regressing the baseline acceptance on perceived costs at the current price of €45 per ton of CO2 and the projected price of €200 per ton of CO2, controlling for the same set of respondent characteristics as in Column 1. Our findings suggest a significant negative relationship between cost perceptions and acceptance of carbon pricing, indicating that higher perceived costs are associated with lower acceptance of the policy.

We then turn to the question to what extent respondents have biased perceptions of their current and future costs of carbon pricing. To this end, we define the perception gap as the difference between the perceived and actual costs of carbon pricing. A positive value of the perception gap thus indicates that respondents overestimate their costs, whereas a negative value reflects an underestimation. Figure 3 presents histograms of the misperceptions regarding the annual costs of the current and projected carbon price. As can be seen from the histograms, respondents' perceptions of the current and future costs of carbon pricing are strongly biased.

The distribution of misperceptions regarding current costs is right-skewed, with a me-

dian of €59.7 and a mean of €206.4.[11] This suggests that most respondents overestimate their current annual costs of carbon pricing. In fact, 63.9 percent of respondents perceive their costs to be higher than they actually are, while 35.2 percent perceive them to be lower. Only 0.9 percent have an accurate perception of their costs, and all of these respondents have actual costs of zero.[12]

In contrast, perceptions of future annual carbon costs exhibit a substantial negative bias, as reflected in a median perception gap of €-289.4 and a mean of €-296.4.[13] Thus, most respondents underestimate their future costs of carbon pricing, with approximately 71.6 percent perceiving them to be lower than they actually are, when assuming current fossil fuel consumption. Only 0.7 percent have an accurate perception of their costs, while 27.8 percent overestimate them.[14] Thus, while individuals tend to overestimate the current costs of carbon pricing, they underestimate the future financial burden, indicating that perceived costs do not scale proportionally with the actual increase in the carbon price.

Taken together, our results show that public acceptance of carbon pricing in Germany is relatively low, particularly among those who perceive their costs of carbon pricing to be high. At the same time, most individuals are not well informed about their current and future personal costs of carbon pricing. These findings also inform the identification strategy of our survey experiments: The correlation between cost perception and acceptance implies that our treatment conveys relevant information. In addition, widespread cost misperceptions indicate that our treatment provides new information to the respondents.

[11] On average, respondents estimate that the current carbon price of €45 leads to additional annual costs of €402.9, yet the actual costs are €196.5.

[12] Even when allowing for a margin of error in perceived costs, the pattern remains similar. 57.1 percent overestimate their current costs by more than 20 percent, while 29.5 percent underestimate them by the same magnitude. 13.4 percent have an accurate perception of their current costs.

[13] For the projected carbon price of €200, the average perceived costs are €568, substantially below the actual costs of €864.4.

[14] This finding is robust to permitting some error in cost perceptions. 66.1 percent underestimate their future costs by more than 20 percent, while 23.8 percent overestimate them by the same magnitude. 10.2 percent have an accurate perception of their future costs.

4. The causal effect of tailored cost information

We now present results from the experiments, which provide respondents with personalized information about their household's current and projected costs of carbon pricing. We first preview key pre- and post-treatment variables relevant to understanding acceptance revisions and then formally estimate a linear model of carbon price acceptance, leveraging the exogenous variation in cost perceptions generated by our treatments. We explore various aspects of treatment heterogeneity and close with a discussion of the robustness of our findings.

4.1. Descriptive evidence

Table 1 presents summary statistics for key variables across treatment and control groups in the current price (Panel A) and projected price (Panel B) experiments. Prior to the information treatment there are no statistically significant differences in mean carbon price acceptance and other pre-treatment variables. Perceived costs, actual costs, perception gaps, and the share of individuals overestimating their costs are consistent across groups, confirming successful randomization in both experiments.

The lower part of each panel reports post-treatment outcomes. In the current price experiment, treated respondents exhibit significantly higher post-treatment acceptance levels than the control group, with a mean difference of 0.25 (significant at the 1 percent level). The positive effect of the information treatment is consistent with the widespread overestimation of current costs. The difference in mean acceptance revisions, which accounts for (insignificant) differences in pre-treatment acceptance, is slightly smaller but remains highly significant. Notably, the larger absolute acceptance revisions indicate significant updating behavior in both directions along the acceptance scale. The last row in Panel A shows that treated respondents are 17 percentage points more likely to revise their acceptance compared to the control group – yet a large fraction of respondents in both groups does not revise acceptance.

In contrast, in the projected price experiment, where respondents predominantly underestimate their future costs, post-treatment acceptance levels of carbon pricing are

significantly lower among treated respondents relative to the control group, with a mean difference of 0.34 (significant at the 1 percent level). Treated respondents decrease their acceptance level by 0.29 more than those in the control group on average (significant at the 1 percent level), when accounting for pre-existing differences. The absolute acceptance revisions are larger, indicating substantial updating behavior in both directions. Finally, the share of non-revisers is 18 percentage points lower in the treatment group.

Overall, these results suggest a causal effect of our treatments on carbon price acceptance. The direction of the average acceptance revision is consistent with the sign of the average perception gap. In the current price experiment, personalized information mainly corrects cost overestimation and boosts acceptance on average, whereas information about future costs reduces acceptance due to cost underestimation in the projected price experiment. We provide a more detailed analysis of the treatment effects below.

4.2. Regression evidence

4.2.1. Empirical approach

To formally identify the causal effect of personalized cost information on carbon price acceptance, we estimate the following regression model using OLS:

$$acc_i^{post} = \alpha_0 + \beta T_i + \alpha_1 acc_i^{prior} + \delta X_i + \epsilon_i \tag{1}$$

The dependent variable acc_i^{post} continuously measures the post-treatment acceptance of respondent i, ranging from 1 (very unacceptable) to 5 (very acceptable). T_i is a dummy variable taking the value 1 for respondents who receive the information treatment and 0 otherwise. We control for an indicator of pre-treatment acceptance acc_i^{prior}. This helps isolate treatment effects from pre-existing differences in acceptance, despite the measure not necessarily being interpersonally comparable. We also include a set of individual-level controls X_i to improve the precision of our estimates and to account for minor imbalances

between treatment and control groups.[15] ϵ_i is an individual-specific error term. The coefficient of interest, β, identifies the average change in carbon price acceptance among treated respondents relative to the control group.

However, the model in Equation (1) incompletely characterizes how the information treatments affect policy acceptance, as the average treatment effect may mask heterogeneity regarding the direction and magnitude of cost misperceptions. Genuine belief updating suggests that the effect size is larger for respondents with less accurate priors, as the value of the signal should increase with ex ante biasedness. Thus, we expand our model by interacting the treatment dummy with respondents' perception gap:

$$acc_i^{post} = \alpha_0 + \beta T_i + \theta_1 \Delta\phi_i + \gamma(T_i \times \Delta\phi_i) + \alpha_1 acc_i^{prior} + \delta X_i + \epsilon_i \tag{2}$$

The perception gap $\Delta\phi_i$ is the difference between estimated and actual costs in units of €100. Hence, positive values indicate an overestimation of costs and vice versa. β now identifies the treatment effect for participants with no bias in cost perceptions, whereas γ captures how the treatment effect scales with the size of the perception gap. We expect the estimates of γ to be positive if respondents change their policy acceptance as a result of updating their cost perceptions in the direction of the provided signal.

Lastly, we explore whether participants' responsiveness to the information treatment varies with their baseline uncertainty about the costs of carbon pricing. Prior to the information treatment, we measure uncertainty on a five-point Likert scale in the second step of the experiments, with larger values indicating higher uncertainty. Respondents with a higher cost uncertainty should place more weight on the provided signal, leading to larger revisions in policy acceptance. We test this by adding interactions with respondents'

[15] Specifically, we include dummies for being male, living in East Germany, holding a high school diploma, living in a high income household, homeownership, whether the respondent's household uses fossil fuels for heating (including hot water), owns any motor vehicles, and an indicator variable for the respondent's political party preference. We include a quadratic polynomial in the respondent's age, and continuously control for household size.

uncertainty about their costs of carbon pricing to our model:

$$\begin{aligned} acc_i^{post} = \alpha_0 + \beta T_i + \theta_1 \Delta\phi_i + \gamma(T_i \times \Delta\phi_i) + \theta_2 U_i + \beta_U(T_i \times U_i) \\ + \theta_3(\Delta\phi_i \times U_i) + \gamma_U(T_i \times \Delta\phi_i \times U_i) + \alpha_1 acc_i^{prior} + \delta X_i + \epsilon_i \end{aligned} \tag{3}$$

where U_i is a continuous measure of baseline uncertainty for respondent i. Notice that β now measures the average treatment effect for respondents with a zero perception gap and low uncertainty, whereas γ is an estimate of the treatment-induced change in acceptance with respect to perception gap size for high certainty respondents. β_U captures the change in treatment effect with increasing uncertainty at a zero perception gap. The coefficient of primary interest γ_U gives us the change in acceptance with respect to the perception gap and uncertainty of a treated respondent. We expect γ_U to be positive, if the informativeness of the provided signal is increasing with baseline uncertainty.

4.2.2. Main results

The results from the main regression analyses are presented in Table 2. We begin by discussing findings from the current price experiment in Columns 1 to 3. Column 1 shows results from the baseline specification that regresses post-treatment acceptance on a treatment dummy, pre-treatment acceptance, and a set of individual-level controls (Equation 1).[16] In the current price experiment, the information treatment increases respondents' acceptance level of carbon pricing by 0.161 on average (significant at the 1 percent level). The positive estimate of β is consistent with the widespread overestimation of current costs.

Supporting evidence reveals substantial heterogeneity in treatment effects based on the sign of the perception gap (Appendix Table A7). Respondents who overestimate their costs (including those with a zero perception gap) increase their acceptance level by 0.365 on average, while those who underestimate costs reduce their acceptance level by 0.228 (Column 1). These patterns highlight that the effect of information provision depends

[16] For completeness, we reproduce our baseline analysis from Table 2 without any additional controls in Table A6 of the Appendix, where we obtain virtually unchanged estimates.

critically on the direction of an individual's bias.

In Column 2 in Table 2, we examine whether the size of the treatment effect increases with the magnitude of cost misperceptions by interacting the treatment dummy with the perception gap (Equation 2). The estimated coefficient on the interaction term (γ) is positive and statistically significant at the 1 percent level, indicating that the effect of our treatment significantly increases in the size of a respondent's bias. Specifically, for each €100 increase in the perception gap, acceptance increases by an additional 0.033, on top of a baseline treatment effect of 0.086 (β). Larger acceptance revisions among more biased respondents support the notion of meaningful updating of cost perceptions.[17]

Interestingly, the estimate of β suggests that the treatment increases the acceptance of respondents with accurate prior beliefs.[18] This result is consistent with behavioral evidence suggesting that individuals respond positively to affirmation. For instance, loss aversion (Tversky and Kahneman, 1991) underscores the asymmetric emotional impact of perceived gains versus losses, which may reinforce positive responses to validated expectations. Relatedly, motivated reasoning implies that confirming individuals' beliefs or perceptions – such as their cost assessments – can elicit favorable reactions (Bénabou and Tirole, 2016).

Column 3 in Table 2 extends the analysis to include respondents' ex ante uncertainty about the perceived costs of carbon pricing (Equation 3). We find that treatment responsiveness increases with both higher uncertainty and larger misperceptions, as indicated by a positive and significant triple interaction coefficient (γ_U).[19] The significant estimate of

[17] The relevance of the perception gap may depend on how it relates to a respondent's ex-ante cost perception. That is, for the same absolute perception gap, the strength of the signal could vary across individuals with different baseline cost perceptions. To account for this, Appendix Table A8 re-estimates Equation (2) using a relative perception gap, defined as the log difference between perceived and actual costs. Results are consistent for both experiments.

[18] We further explore this finding by estimating heterogeneous treatment effects for respondents who overestimate, underestimate, or accurately estimate their costs of carbon pricing based on different perception accuracy thresholds. To this end, we apply two different definitions of unbiasedness. In Column 2 in Table A7 we classify respondents with a perception gap of up to 20 percent of their actual costs as unbiased. In Column 3 we allow for a deviation of €25, i.e. an absolute perception gap of up to €25, for a respondent's perception to be defined as accurate. The estimated marginal effects for unbiased respondents are similar in magnitude to our main specification yet noisily estimated (Table A7, Columns 2 and 3).

[19] To put our results into perspective, a respondent overestimating costs by €300 and reporting high uncertainty (uncertainty = 4) is predicted to increase acceptance by 0.29 points in response to the treatment ($0.001 + 0.003 \times 3 + 0.028 \times 4 + 0.014 \times 3 \times 4$).

γ_U confirms theoretical predictions about belief updating as the underlying causal mechanism.

Here, we find no treatment effect on acceptance among high-certainty respondents – regardless of whether their cost perceptions are biased – reflected in insignificant estimates of both β and γ. Hence, the previously observed positive treatment effect at zero perception gap (estimate of β in Column 2) disappears once accounting for uncertainty. Instead, the positive – though imprecisely estimated – coefficient on the interaction with uncertainty (β_U) suggests that the treatment effect among unbiased respondents is driven by uncertain respondents.

We conduct the same analyses for the projected price experiment, presented in Columns 4 to 6 in Table 2. Column 4 provides results from our baseline specification (Equation 1), showing that personalized information about future costs of carbon pricing leads to a decrease in acceptance levels by 0.307 on average (significant at the 1 percent level). This result reflects that respondents predominantly underestimate their future costs and thereby contrasts our findings from the current price experiment. Column 4 in Appendix Table A7 confirms the previously documented asymmetry in treatment effects based on the sign of the perception gap. Among those underestimating their costs, we find an average reduction in acceptance levels of 0.471, whereas the much smaller number of overestimators increase theirs by 0.103.

Column 5 in Table 2 shows that the treatment effect increases with the extent of respondents' misperceptions, as measured by the perception gap (Equation 2). The information treatment in the projected price experiment decreases acceptance by 0.229 at a zero perception gap (β), and changes by an additional 0.026 for every €100 difference in the perception gap (γ; both significant at the 1 percent level). These results are analogous in pattern, to the amplifying effect of cost misperceptions in the current cost experiment. However, the analysis in Appendix Table A7 shows that when classifying respondents by discrete perception accuracy thresholds, the estimated treatment effect for unbiased individuals is statistically insignificant and quantitatively close to zero. This suggests that the significant negative coefficient at a zero perception gap in Column 5 in Table 2 may

be an artifact of the linearity assumption and should be interpreted with caution.[20]

Column 6 in Table 2 incorporates respondents' ex ante uncertainty (Equation 3). We find that the effect of correcting misperceptions about future costs is driven by those with higher uncertainty. The estimated coefficient on the triple interaction term (γ_U) is positive and statistically significant at the 5 percent level, whereas the pairwise interaction between treatment and perception gap (γ) is not significantly different from zero.[21] This result again mirrors the mechanisms in the current cost experiment.

Overall, we find that respondents systematically revise their acceptance of carbon pricing in response to personalized information about either their current or future costs. Treatment responses are consistent across both experiments and align with theoretical expectations: They are larger among those with greater misperceptions and higher ex ante uncertainty about their costs. However, due to differing distributions of cost misperceptions across the two experiments, average treatment effects diverge. In the current price experiment, where most respondents overestimate their actual costs, the information treatment leads to a net increase in acceptance. By contrast, in the projected price experiment, where underestimation of future costs is more widespread, the personalized information results in a net decrease in acceptance. Our findings highlight how individual updating of policy preferences in response to personalized information depends crucially on the direction and magnitude of misperceptions, as well as individuals' uncertainty. Thus, while personalized information-interventions can shift public support, the direction ultimately depends on the informational background of the population.

[20] In Columns 5 and 6 in Table A7 in the Appendix we estimate heterogeneous treatment effects for respondents who overestimate, underestimate, or accurately estimate their future costs of carbon pricing. In Column 5, we allow for a relative error of up to 20 percent in perceived costs and in Column 6 for an absolute error of up to €100 for a respondent to be classified as unbiased. Both approaches yield treatment effects for unbiased respondents that are not statistically different from zero. This contrasts with the results in Column 5 of Table 2, where the significant negative effect at a zero perception gap (β = -0.229) likely stems from the linearity assumption of the specification. Specifically, it arises from extrapolating a linear relationship across the full range of perception gaps, while the specifications in Table A7 rely on discrete classifications. Accordingly, the interaction effect in Column 5 in Table 2 should be interpreted with caution, particularly around the zero perception gap region.

[21] While the results in Column 6 of Table 2 should be interpreted with caution due to the discussed limitations of the linear model specification, the estimates predict that a respondent underestimating future costs by €300 and reporting high uncertainty (uncertainty = 4) decreases acceptance by 0.334 points in response to the treatment (-0.187 + 0.009 × (-3) + (-0.009) × 4 + 0.007 × (-3) × 4).

4.2.3. Heterogeneity by pre-treatment acceptance

The previous analysis explores the average treatment effects and the underlying mechanisms. From a political perspective, the effectiveness of the information intervention also hinges on the ability to counteract or even reverse individuals' stance toward carbon pricing. For example, a higher average acceptance may stem from supporters becoming more positive toward carbon pricing or, more meaningfully, from individuals initially opposed to the policy lessening their opposition or even turning supportive. Only the latter has the capacity to shift public opinion toward majority support, whereas the former would leave a dichotomous distribution of preferences unchanged.

Therefore, we evaluate the intervention's potential to build broader support for carbon pricing by examining whether the size of the treatment effect differs based on ex-ante attitude toward carbon pricing. To this end, we interact the treatment dummy with respondents' pre-treatment acceptance (Appendix Table A9) and plot the marginal treatment effects in Figure 4.[22] In the current price experiment, marginal treatment effects are positive and statistically significant among respondents who found carbon pricing very unacceptable or rather unacceptable prior to the treatment (Figure 4a). In turn, the estimated effects for survey participants with an ex-ante neutral or positive stance are not significantly different from zero.[23] Hence, the positive treatment effect is driven by those with a low baseline acceptance, underscoring the political effectiveness of tailored information provision about current costs.

To better understand the implications of this result for moving toward majority sup-

[22]In Table A10 of the Appendix, we address the concern that heterogeneity in treatment effects potentially results from correlations between pre-treatment acceptance and other respondent characteristics. Following Haaland and Roth (2020), we decompose the total variation in pre-treatment acceptance into a component explained by observed respondent characteristics and an unrelated residual component. This is done by regressing pre-treatment acceptance on the same set of control variables used in our main analyses. We then examine treatment effect heterogeneity separately for each component. Consistent with the main results from both experiments, we find significant heterogeneity in treatment effects with respect to the residual variation (Columns 2 and 5), suggesting that pre-treatment acceptance is independently meaningful. In contrast, we do not observe treatment heterogeneity based on the predicted component linked to respondent characteristics (Columns 3 and 6).

[23]We previously identified perceived costs as a strong predictor of carbon price acceptance (Appendix Table A5). Panel A in Appendix Table A12 shows that perceived current costs are greatly inflated for respondents with lower baseline acceptance levels, despite similar actual costs across groups. Consequently, the heterogeneity of our results is driven by larger perception gaps (and a larger share of overestimators) among respondents with a low pre-treatment acceptance.

port, we additionally estimate treatment-induced changes in the probability of selecting each acceptance level using an ordered probit model. The marginal effects in Panel A in Appendix Table A11 indicate that the likelihood to consider carbon pricing very unacceptable drops by 5.1 percentage points for treated respondents. We find a corresponding increase in the probabilities to find carbon pricing acceptable (4.5 percentage points) or express neutrality (0.6 percentage points). Thus, providing tailored information on current costs can meaningfully broaden public support for carbon pricing.

An analogous analysis of the projected price experiment yields a less positive outlook. Here, we find large and statistically significant reductions in acceptance across almost all levels of pre-treatment acceptance, except for those least favorable toward carbon pricing at baseline (Figure 4b).[24] Marginal effects from the ordered probit model in Panel B of Table A11 show that the probability of finding carbon pricing very or somewhat unacceptable increases by 9.6 percentage points in response to the treatment, while the likelihoods of neutrality and policy acceptance decline by 1.7 and 7.9 percentage points, respectively. Hence, our results suggest that information shocks regarding the future costs of carbon pricing may reinforce opposition to the policy.

In sum, personalized information on current costs can build broader support by shifting views among those most critical of carbon pricing, yet information about future costs tends to reduce support across the board. Moreover, the adverse effects from informing about future costs exceed the increase in carbon price acceptance from personalized information on current costs.

4.2.4. Other heterogeneity

Identifying the populations that drive average treatment effects can inform more targeted and cost-effective communication strategies (Allcott, 2011). To better understand which groups are most responsive, we interact the treatment indicator with standard sociodemographic characteristics (dummies for age, education, gender, household size, region),

[24]This finding is consistent with limited differences in mean perceived costs, actual costs, and perception gaps by pre-treatment acceptance levels (Appendix Table A12, Panel B). Apart from those with the lowest baseline acceptance, who hold more accurate beliefs, all other survey participants tend to underestimate their future costs to a similar degree.

political affiliation (ruling party vs. opposition), and indicators of a respondent's financial situation and exposure to carbon pricing (income, homeownership, households' carbon price exposure in the building and transport sectors).[25,26]

When examining heterogeneity along standard sociodemographic dimensions, we find limited systematic variation. Most interaction effects are imprecisely estimated and close to zero. In the current price experiment (Panel A, Table 3), men show a significantly smaller increase in acceptance (Column 1), while respondents living in East Germany appear slightly more responsive (Column 3). However, the latter effect is not statistically significant. In the projected price experiment (Panel B), older individuals and supporters of the governing coalition become significantly more opposed following treatment (Columns 2 and 6). Overall, these patterns align with differences in pre-treatment beliefs, such as mean perception gaps or the share of respondents overestimating costs (Appendix Table A13 and Table A14).

The differential response by political affiliation is particularly notable. While supporters of both government and opposition parties respond positively to information about current costs, government supporters exhibit a stronger negative reaction when exposed to projected future costs. This divergence underscores the political risk that future cost shocks may disproportionately reduce support among those most likely to back carbon pricing politically, thereby weakening its support base.

Furthermore, we consistently observe pronounced heterogeneity based on financial characteristics and those directly related to carbon pricing exposure. Columns 7 to 10 in Panel A of Table 3 reveal that the positive treatment effect in the current price experiment is concentrated among lower-income individuals, renters and those not reliant on fossil fuels for heating and transportation. Appendix Table A13 shows that these respondents face significantly lower actual costs than their counterparts, whereas cost perceptions are more aligned across groups. This implies a significantly higher prevalence of cost over-

[25] We include homeowner status as a measure of financial exposure, as renters face substantially lower costs of carbon pricing due to regulations that impose a share of the costs on their landlords.

[26] The ruling coalition comprises the Social Democratic Party (SPD), the Green Party (Bündnis 90/Die Grünen), and the liberal Free Democratic Party (FDP), which introduced the carbon price in 2021 and was in power when we conducted the survey.

estimation which is, on average, larger in magnitude (Columns 13 to 20). Hence, the treatment conveys a more positive financial signal, driving the increase in carbon price acceptance. In contrast, those with higher incomes and greater exposure to carbon pricing hold more accurate beliefs about their current costs and thus respond less to the provided information.

The same groups that are less responsive to the information treatment in the current price experiment drive the reduction in acceptance in the projected price experiment. Negative treatment effects on acceptance are amplified among respondents with higher incomes and greater exposure to carbon pricing (Table 3, Panel B, Columns 7 to 10). This shift is consistent with a key finding previously discussed in Section 2, that is also visible in Appendix Table A14: Cost perceptions do not scale proportionally with the carbon price. Hence, while more affected respondents hold more accurate beliefs about current costs, they are more likely to substantially underestimate future costs. This applies to high income respondents, homeowners, and those reliant on fossil fuels for heating and transportation, for whom the negative information shock from the treatment results in a larger decline of policy acceptance.

These results are consistent with the interpretation that the treatment operates through a financial self-interest channel. We consistently find heterogeneity regarding respondents' financial situation or exposure to carbon pricing, that aligns with large and systematic differences in pre-treatment beliefs. The positive treatment effect in the current price experiment is driven by individuals with lower incomes and limited exposure to carbon pricing, who face lower current costs yet hold more biased cost perceptions. These findings point to a particularly large potential for personalized cost information to raise acceptance among the less affected. By contrast, in the projected price experiment, the decline in acceptance is driven by individuals with higher incomes and greater carbon price exposure. Although they hold more accurate beliefs about current costs, they underestimate future costs to a greater extent, as cost perceptions do not scale proportionally with the carbon price and actual cost increases. This suggests that future information shocks will severely depress their acceptance.

4.2.5. Robustness

We evaluate the external validity of our findings, their robustness regarding survey-related response biases, and the interpretation of our results.

External validity

Our initial sample is constructed to represent the adult German population in terms of age, gender, region, and household income. However, the sampling approach was based on one-dimensional quotas. Additionally, for the analysis, we impose several restrictions on our sample to ensure the validity of our results. We therefore test the external validity of our findings by reweighting our sample to make it representative of the general population. Adopting the approach of Haaland and Roth (2020) and Roth and Wohlfart (2020), we employ the German 2022 microsensus to create weights based on cross quotas that map into the following 72 cells: age (18-29; 30-49; 50-75) $\times$ gender $\times$ region (North; East; West; South) $\times$ household income (0-1999; 2000-3999; 4000+). The results in Appendix Table A15 (Column 2) show that our main findings are robust to reweighting our final sample.

Experimenter demand

Experimenter demand effects could be of particular concern, as our design relies on eliciting pre- and post-treatment carbon price acceptance (Haaland et al., 2023). Following Allcott and Taubinsky (2015), we approximate participants' susceptibility to experimenter demand effects utilizing self-assessments about their intuition regarding others' motives and their tendency to conform to expectations. Specifically, our questionnaire includes four items from the self-monitoring scale developed by Snyder (1974) and adapted to German by Schyns and Paul (2002). We average responses to these questions to construct a self-monitoring index. We test the sensitivity of our results to experimenter demand effects by replicating our baseline analyses while excluding respondents with the highest self-monitoring scores, defined as those in the top decile of the index.[27] The subsample

[27] Our results are robust to alternative cut-off points.

analyses in Column 3 of Appendix Table A15 yield virtually unchanged results for both experiments, suggesting no bias from experimenter demand effects.

Trust in the information

The treatments' effectiveness hinges on participants incorporating the provided information to update their cost perceptions. However, if individuals do not trust the information provided, they may disregard it, potentially introducing bias into the estimated treatment effects. This is especially likely when the information diverges substantially from prior beliefs (Gentzkow and Shapiro, 2006). To address this concern, we follow suggestions by Haaland et al. (2023) and ask treated participants to rate the plausibility of the provided information on a five-point Likert scale. Most respondents in both experiments perceive the provided information as "rather plausible" or "very plausible", whereas only 15 percent find the information "rather implausible" or "very implausible". Moreover, a subsample analysis that excludes respondents who perceive the information as implausible, as shown in Column 4 of Appendix Table A15, yields results that are consistent with our main findings.

Survey fatigue

Respondent fatigue over the course of the questionnaire may lead to lower-quality answers and induce response biases. The implementation of attention checks in our survey and the sample restrictions described in Section 2 are already aimed at mitigating such concerns. We additionally measure participants' engagement at the end of the survey. Specifically, we include two feedback questions asking respondents to rate the survey in terms of interestingness and length, on a five-point Likert scale. We receive predominantly positive feedback regarding our questionnaire. While 34.6 percent of participants found the survey quite lengthy, only 2.3 percent express little or no interest in the survey content. Using this information, we conduct subsample analyses in Appendix Table A15, where we either exclude respondents that consider the survey uninteresting (Column 5) or too long (Column 6). Our main findings remain robust, suggesting no bias due to survey fatigue

from inattentive or uninterested respondents.

5. Conclusion

In this paper, we document systematic misperceptions about current and future costs of carbon pricing among the German population. Most individuals overestimate their current personal costs while underestimating the financial burden they will face under a projected future carbon price. Correcting these misperceptions causally affects public support for climate policy: As people tend to overestimate current costs, providing personalized information leads to greater acceptance of carbon pricing. Conversely, with most individuals underestimating their future costs, learning about actual costs decreases support.

These findings have several policy implications. First, correcting current cost overestimations could meaningfully increase public support for carbon pricing in Germany. This suggests a clear role for personalized information campaigns that clarify current household-level impacts. Enhancing public understanding of the existing financial implications may help build broader support, which is critical for sustaining and potentially accelerating carbon price trajectories.

Second, as prices rise – especially with the upcoming integration of the national emissions trading system into the EU ETS-II – households may face unexpectedly high costs, increasing the risk of public backlash. To ensure policy durability, governments could combine carbon pricing with visible compensatory measures. For instance, using revenues to finance climate rebates can help preserve public support (Klenert et al., 2018).

Third, the widespread underestimation of future costs may impair the behavioral effectiveness of carbon pricing. Expected returns on investment are a key driver of private households' renewable technology adoption (Jacksohn et al., 2019). If consumers fail to anticipate rising costs, they may underinvest in low-emission technologies, thereby limiting the steering effect of carbon pricing (Nerini et al., 2017). Muted behavioral responses could, in turn, necessitate even higher prices to meet emission targets, further straining public acceptance. Avoiding such feedback effects requires transparent communication

about future price trajectories. In addition, complementary policies – such as subsidies or targeted investment incentives – can reduce financial barriers to adopting low-carbon technologies (Braito et al., 2017; Wasi and Carson, 2013).

Overall, our findings underline the importance of aligning perceptions with reality - not only to secure public support, but also to ensure the effectiveness and political feasibility of carbon pricing as a cornerstone of climate policy.

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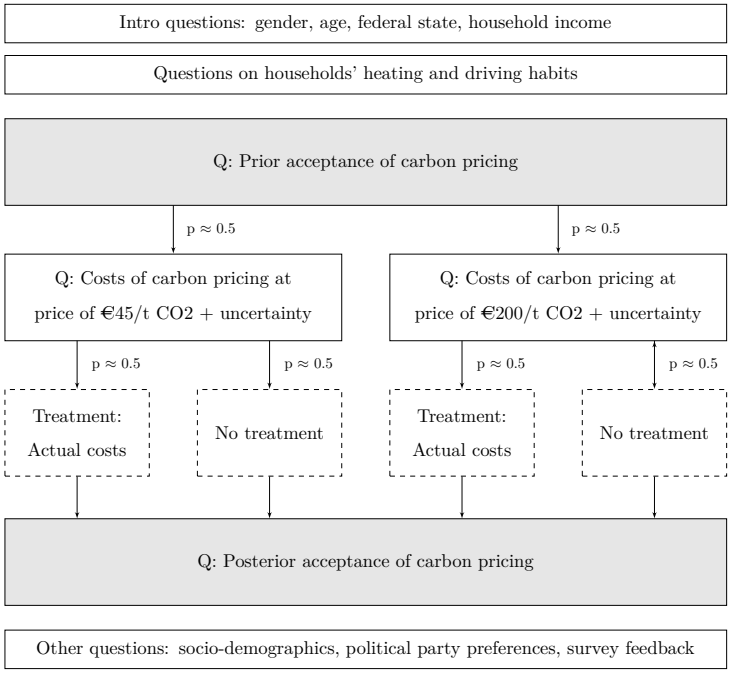
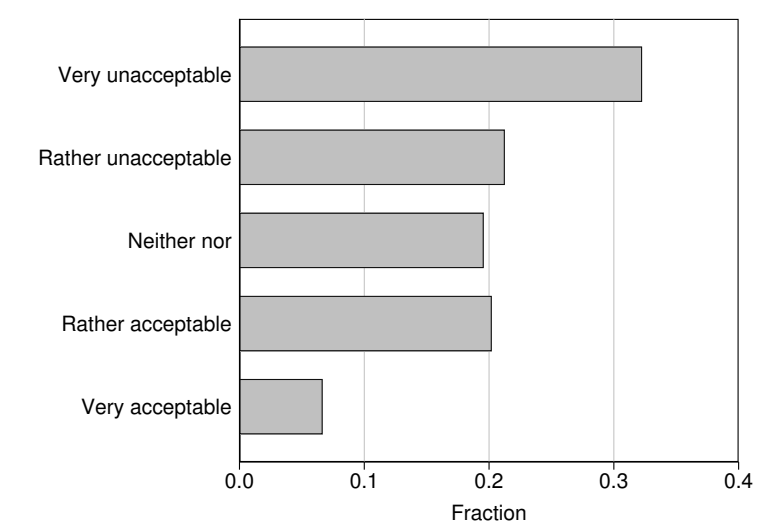


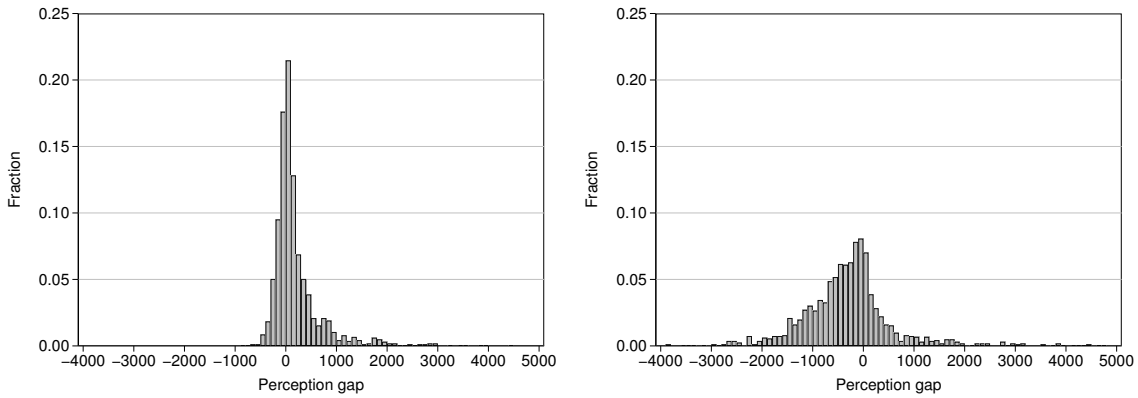
Notes: The figure provides an overview of the structure of the survey experiments.

Figure 1: Structure of the survey experiments



Notes: The figure shows the pre-treatment acceptance of carbon pricing for all respondents.

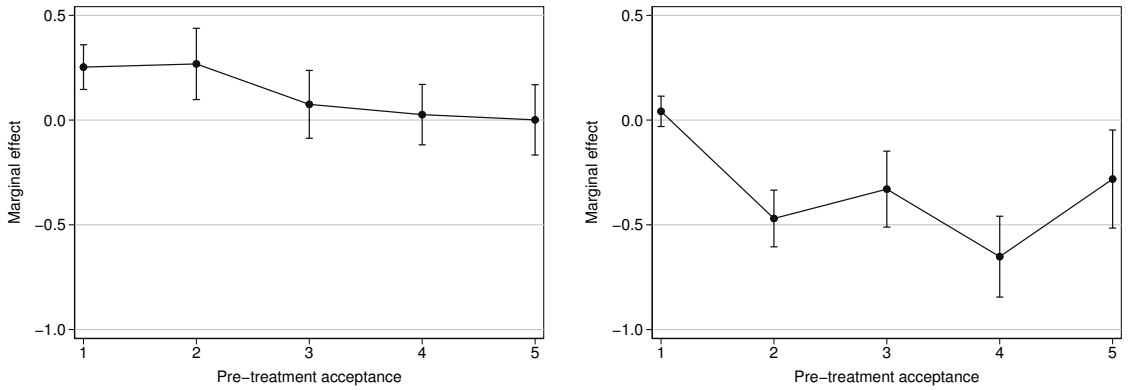
Figure 2: Pre-treatment acceptance of carbon pricing



(a) Current price (b) Projected price

Notes: The figure shows the distributions of the respondents' cost perception gaps (in bins of €100) for the current price of €45 per ton of CO2 (a) and the projected price of €200 per ton of CO2 (b). The perception gap is defined as the difference between perceived and actual costs. Positive (negative) values indicate overestimation (underestimation) of costs.

Figure 3: Distribution of cost perception gaps



(a) Current price (b) Projected price

Notes: The figure shows marginal treatment effects on respondents' post-treatment acceptance of carbon pricing by respondents' pre-treatment acceptance (1=very unacceptable to 5=very acceptable). The figure displays the marginal treatment effects with 95 percent confidence intervals. The corresponding estimates are presented in Appendix Table A9.

Figure 4: Heterogeneity by pre-treatment acceptance

Table 1: Average acceptance and cost perceptions by treatment

Panel A: 45 €/t CO2	Control (1)	Treated (2)	Diff. (1)-(2)
Pre-treatment acceptance	2.40	2.51	-0.11
Perceived costs	392.29	413.53	-21.24
Actual costs	199.99	193.00	6.99
Perception gap	192.30	220.53	-28.23
Overestimation	0.64	0.65	-0.01
Post-treatment acceptance	2.37	2.62	-0.25***
Acceptance revision	-0.03	0.11	-0.14***
Abs. acceptance revision	0.22	0.47	-0.25***
Non-reviser	0.81	0.64	0.17***
Observations	814	816	1630
Panel B: 200 €/t CO2	**Control (1)**	**Treated (2)**	**Diff. (1)-(2)**
Pre-treatment acceptance	2.53	2.48	0.05
Perceived costs	559.36	576.28	-16.91
Actual costs	864.11	864.65	-0.55
Perception gap	-304.74	-288.38	-16.37
Overestimation	0.28	0.29	-0.01
Post-treatment acceptance	2.43	2.08	0.34***
Acceptance revision	-0.10	-0.39	0.29***
Abs. acceptance revision	0.26	0.54	-0.29***
Non-reviser	0.80	0.61	0.18***
Observations	795	829	1624

Notes: The table presents summary statistics for key variables across treatment and control groups in the current price (Panel A) and projected price (Panel B) experiments. Columns 1 and 2 show means for the control and treatment groups, and Column 3 shows the difference in means between the two groups. Overestimation includes a small number of respondents with a zero perception gap. * $p<0.1$, ** $p<0.05$, *** $p<0.01$

Table 2: Treatment effects on carbon price acceptance

	45 €/t CO2			200 €/t CO2		
	(1)	(2)	(3)	(4)	(5)	(6)
T	0.161***	0.086**	0.001	-0.307***	-0.229***	-0.187**
	(0.034)	(0.037)	(0.099)	(0.035)	(0.036)	(0.090)
Perception gap		-0.004	0.009		-0.006***	-0.001
		(0.004)	(0.007)		(0.002)	(0.005)
T × Perception gap		0.033***	0.003		0.026***	0.009
		(0.008)	(0.016)		(0.004)	(0.009)
Uncertainty			-0.019			-0.026
			(0.018)			(0.019)
T × Unc.			0.028			-0.009
			(0.032)			(0.030)
Perception gap × Unc.			-0.006**			-0.002
			(0.003)			(0.002)
T × Perception gap × Unc.			0.014**			0.007**
			(0.006)			(0.003)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.741	0.747	0.749	0.712	0.724	0.725
Observations	1630	1630	1620	1624	1624	1609

Notes: The table presents estimation results from OLS regressions. Results for the current price experiment are shown in Columns 1 to 3 and results for the projected price experiment are shown in Columns 4 to 6. The dependent variable is the post-treatment acceptance of carbon pricing, measured on a five-point Likert scale (1=very unacceptable to 5=very acceptable). T is a dummy variable indicating that a respondent received personalized information about the costs of carbon pricing. The perception gap is defined as the difference between perceived and actual costs (divided by 100). Uncertainty regarding perceived costs is measured on a five-point Likert scale (0=very uncertain to 4=very certain). All regressions include the pre-treatment acceptance of carbon pricing and the set of controls described in Appendix Table A5. Robust standard errors are in parentheses. * p<0.1, ** p<0.05, *** p<0.01

Table 3: Heterogeneity by respondent characteristics

Panel A: 45 €/t CO2	(1) Male	(2) Aged 45+	(3) East	(4) High school	(5) Single	(6) Ruling party	(7) High income	(8) Homeowner	(9) Fossil heating	(10) Motor vehicles
T	0.262***	0.124**	0.138***	0.178***	0.151***	0.129***	0.233***	0.254***	0.412***	0.438***
	(0.052)	(0.057)	(0.036)	(0.049)	(0.040)	(0.045)	(0.042)	(0.047)	(0.079)	(0.087)
T × C	-0.191***	0.057	0.154	-0.034	0.037	0.033	-0.250***	-0.221***	-0.318***	-0.341***
	(0.068)	(0.068)	(0.108)	(0.067)	(0.067)	(0.078)	(0.071)	(0.067)	(0.087)	(0.094)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.742	0.741	0.741	0.741	0.741	0.765	0.742	0.742	0.743	0.743
Observations	1630	1630	1630	1630	1630	1334	1630	1630	1630	1630

Panel B: 200 €/t CO2	(1) Male	(2) Aged 45+	(3) East	(4) High school	(5) Single	(6) Ruling party	(7) High income	(8) Homeowner	(9) Fossil heating	(10) Motor vehicles
T	-0.261***	-0.229***	-0.312***	-0.294***	-0.325***	-0.220***	-0.265***	-0.201***	-0.115	-0.083
	(0.053)	(0.057)	(0.039)	(0.049)	(0.041)	(0.042)	(0.042)	(0.046)	(0.077)	(0.092)
T × C	-0.086	-0.121*	0.035	-0.026	0.056	-0.212**	-0.142*	-0.269***	-0.241***	-0.274***
	(0.069)	(0.067)	(0.085)	(0.069)	(0.067)	(0.085)	(0.075)	(0.069)	(0.087)	(0.099)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.713	0.713	0.712	0.712	0.712	0.729	0.713	0.715	0.714	0.714
Observations	1624	1624	1624	1624	1624	1344	1624	1624	1624	1624

Notes: The table presents estimation results from OLS regressions. Results for the current price experiment are shown in Panel A and results for the projected price experiment are shown in Panel B. The dependent variable is the post-treatment acceptance of carbon pricing, measured on a five-point Likert scale (1=very unacceptable to 5=very acceptable). T is a dummy variable indicating that a respondent received personalized information on the costs of carbon pricing. C is a dummy variable representing the following individual-level characteristics: Male (1=yes, 0=no), Aged 45+ (1=aged 45 or over, 0=otherwise), East (1=living in East Germany, 0=living in West Germany), High school (1=yes, 0=no), Single (1=Single household, 0=otherwise), Ruling party (1=supporters of SPD, B90/Die Grünen or FDP, 0=supporters of CDU/CSU, Linke, AfD, other parties), High income (1=household income of €4,000 or more, 0=less than €4,000), Homeowner (1=yes, 0=no), Fossil heating (1=yes, 0=no), Motor vehicles (1=yes, 0=no). All regressions include the pre-treatment acceptance of carbon pricing and the set of controls described in Appendix Table A5. Robust standard errors are in parentheses. * p<0.1, ** p<0.05, *** p<0.01

Online appendix: Cost perceptions and the support for carbon pricing

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Summary of the appendix

In Section A we show summary statistics, balance tests, and additional estimation results. Table A1 compares summary statistics of the initial sample with the German microcensus for key demographic variables. Table A2 contrasts the initial sample of our survey with the final sample on which we estimate our main results. Table A3 and Table A4 provide evidence of covariate balance in the treatment and control groups of our experiments. Table A5 examines determinants of pre-treatment acceptance. Table A6 replicates our main regression results without additional controls. Table A7 shows differential treatment effects for respondents who overestimate, underestimate, or accurately estimate their costs of carbon pricing. Table A8 shows how treatment effects vary with relative perception gaps. Table A9 examines heterogeneous treatment effects by pre-treatment acceptance. Table A10 shows that the estimated heterogeneous effects by pre-treatment acceptance are robust to using a residual component of pre-treatment acceptance. Table A11 provides ordered probit estimates of our main treatment effects. Table A12 shows cost perceptions by pre-treatment acceptance. Table A13 and Table A14 show cost perceptions by respondent characteristics. Table A15 evaluates the external validity of the main results by reweighting our sample to represent the general population and demonstrates the robustness of our main results regarding survey related response biases such as experimenter demand effects, distrust in the provided information, and survey fatigue.

Section B.1 provides background information on the 2022 microcensus. In Section B.2 we describe in detail the method for the calculation of respondents' CO2 costs. In Section B.3 we show English translations of our main survey questions. Section B.4 provides screenshots of the main experiment questions from the online survey.

A. Additional results

Table A1: Comparison of the initial sample with the microcensus

	(1) Initial sample	(2) Microcensus
Male	0.48	0.50
Age: 18-29	0.16	0.18
Age: 30-49	0.33	0.35
Age: 50-75	0.51	0.47
Region: North	0.17	0.16
Region: East	0.20	0.19
Region: West	0.36	0.35
Region: South	0.27	0.30
Household income: less than €2,000	0.29	0.21
Household income: €2,000-€3,999	0.44	0.40
Household income: €4000 or more	0.27	0.39

Notes: Column 1 shows summary statistics for the initial, pooled sample from both experiments and Column 2 shows summary statistics based on the German microcensus 2022.

Table A2: Comparison of the initial sample with the final sample

	Initial sample (1)	Final sample (2)	p-value (1)-(2)
Male	0.48	0.53	0.00
Age	48.28	50.54	0.00
East	0.16	0.15	0.55
High school	0.49	0.50	0.33
Household size	2.22	2.19	0.23
High income	0.27	0.29	0.06
Homeowner	0.39	0.41	0.06
Fossil heating	0.80	0.80	0.44
Motor vehicles	0.81	0.81	0.63
SPD	0.12	0.13	0.25
CDU/CSU	0.21	0.24	0.02
FDP	0.04	0.04	0.92
B90/Die Grünen	0.11	0.11	0.98
Die Linke	0.05	0.04	0.57
AfD	0.17	0.17	0.61
Other	0.08	0.09	0.58
Non-voter	0.10	0.08	0.09
NA	0.12	0.09	0.00

Notes: Columns 1 and 2 show the means of respondent characteristics in the initial and final sample, and Column 3 shows p-values from t-tests for differences in means between the two samples.

Table A3: Balance test (current price experiment)

	Control (1)	Treated (2)	p-value (1)-(2)
Male	0.53	0.53	0.88
Age	50.44	50.73	0.70
East	0.16	0.14	0.26
High school	0.49	0.50	0.88
Household size	2.26	2.18	0.14
High income	0.29	0.29	0.85
Homeowner	0.42	0.43	0.58
Fossil heating	0.79	0.79	0.83
Motor vehicles	0.80	0.83	0.19
SPD	0.13	0.12	0.64
CDU/CSU	0.25	0.22	0.11
FDP	0.04	0.04	0.44
B90/Die Grünen	0.10	0.13	0.09
Die Linke	0.05	0.04	0.71
AfD	0.16	0.17	0.57
Other	0.09	0.10	0.28
Non-voter	0.08	0.09	0.73
NA	0.10	0.10	0.73

Notes: Columns 1 and 2 show the means of respondent characteristics for the control and treatment groups in the current price experiment, and Column 3 shows p-values from t-tests for differences in means between the two groups. The statistics for the current price experiment are based on a final sample of 1630 observations.

Table A4: Balance test (projected price experiment)

	Control (1)	Treated (2)	p-value (1)-(2)
Male	0.53	0.53	0.96
Age	50.56	50.43	0.86
East	0.15	0.16	0.54
High school	0.50	0.50	0.88
Household size	2.17	2.15	0.60
High income	0.30	0.29	0.87
Homeowner	0.41	0.39	0.40
Fossil heating	0.80	0.80	0.99
Motor vehicles	0.82	0.82	0.99
SPD	0.14	0.14	0.87
CDU/CSU	0.24	0.24	0.82
FDP	0.05	0.04	0.76
B90/Die Grünen	0.12	0.10	0.06
Die Linke	0.04	0.05	0.29
AfD	0.18	0.17	0.74
Other	0.07	0.08	0.24
Non-voter	0.08	0.09	0.25
NA	0.09	0.08	0.43

Notes: Columns 1 and 2 show the means of respondent characteristics for the control and treatment groups in the projected price experiment, and Column 3 shows p-values from t-tests for differences in means between the two groups. The statistics for the projected price experiment are based on a final sample of 1624 observations.

Table A5: Determinants of pre-treatment acceptance

	(1)	(2)
Male	0.005	-0.005
	(0.040)	(0.040)
Age	-0.027***	-0.028***
	(0.010)	(0.010)
Age sq.	0.000**	0.000**
	(0.000)	(0.000)
East	-0.102*	-0.091*
	(0.053)	(0.053)
High school	0.183***	0.184***
	(0.042)	(0.042)
Household size	-0.031	-0.026
	(0.020)	(0.020)
High income	0.155***	0.171***
	(0.050)	(0.050)
Homeowner	0.148***	0.157***
	(0.044)	(0.044)
Fossil heating	-0.177***	-0.168***
	(0.050)	(0.050)
Motor vehicles	-0.316***	-0.284***
	(0.056)	(0.056)
CDU/CSU	-0.550***	-0.532***
	(0.072)	(0.072)
FDP	-0.243**	-0.235**
	(0.118)	(0.118)
B90/Die Grünen	0.766***	0.746***
	(0.079)	(0.079)
Die Linke	-0.289**	-0.277**
	(0.120)	(0.120)
AfD	-1.399***	-1.356***
	(0.071)	(0.072)
Other	-0.767***	-0.747***
	(0.093)	(0.092)
Non-voter	-0.802***	-0.787***
	(0.088)	(0.087)
NA	-0.609***	-0.593***
	(0.087)	(0.087)
Current price × Perceived costs		-0.023***
		(0.005)
Projected price × Perceived costs		-0.014***
		(0.003)
Constant	3.956***	3.996***
	(0.233)	(0.233)
R-squared	0.268	0.275
Observations	3254	3254

Notes: The table presents estimation results from OLS regressions for a pooled sample from both experiments. The dependent variable is the pre-treatment acceptance of carbon pricing, measured on a five-point Likert scale (1=very unacceptable to 5=very acceptable). The explanatory variables are Male (1=yes, 0=no), Age (measured in years), Age sq. (age squared), East (1=living in East Germany, 0=living in West Germany), High school (1=yes, 0=no), Household size (number of persons), High income (1=household income of €4,000 or more, 0=less than €4,000), Homeowner (1=yes, 0=no), Fossil heating (1=yes, 0=no), Motor vehicles (1=yes, 0=no), Party preferences (dummy variables with reference category SPD, NA=no answer). Perceived costs, either at the current price or at the projected price, are divided by 100 to reflect changes per €100. Robust standard errors are in parentheses. * p<0.1, ** p<0.05, *** p<0.01

Table A6: Treatment effects w/o controls

	45 €/t CO2			200 €/t CO2		
	(1)	(2)	(3)	(4)	(5)	(6)
T	0.152***	0.078**	0.025	-0.309***	-0.231***	-0.199**
	(0.035)	(0.037)	(0.099)	(0.035)	(0.036)	(0.094)
Perception gap		-0.004	0.007		-0.005**	0.000
		(0.003)	(0.007)		(0.002)	(0.005)
T × Perception gap		0.034***	0.003		0.027***	0.007
		(0.008)	(0.016)		(0.004)	(0.009)
Uncertainty			-0.004			-0.021
			(0.017)			(0.019)
T × Unc.			0.017			-0.005
			(0.032)			(0.031)
Perception gap × Unc.			-0.005*			-0.002
			(0.003)			(0.002)
T × Perception gap × Unc.			0.015**			0.007**
			(0.006)			(0.003)
R-squared	0.733	0.739	0.741	0.706	0.719	0.721
Observations	1630	1630	1620	1624	1624	1609

Notes: The table presents estimation results from OLS regressions. Results for the current price experiment are shown in Columns 1 to 3 and results for the projected price experiment are shown in Columns 4 to 6. The dependent variable is the post-treatment acceptance of carbon pricing, measured on a five-point Likert scale (1=very unacceptable to 5=very acceptable). T is a dummy variable indicating that a respondent received personalized information about the costs of carbon pricing. The perception gap is defined as the difference between perceived and actual costs (divided by 100). Uncertainty regarding perceived costs is measured on a five-point Likert scale (0=very uncertain to 4=very certain). All regressions include the pre-treatment acceptance of carbon pricing with no additional controls. Robust standard errors are in parentheses. * p<0.1, ** p<0.05, *** p<0.01

Table A7: Treatment effects by perception gap categories

	45 €/t CO2			200 €/t CO2		
	(1)	(2)	(3)	(4)	(5)	(6)
T	-0.228***	-0.289***	-0.258***	-0.471***	-0.516***	-0.506***
	(0.052)	(0.055)	(0.056)	(0.041)	(0.043)	(0.044)
Overestimation	-0.153***	-0.136***	-0.134***	-0.114**	-0.113**	-0.118**
	(0.041)	(0.043)	(0.044)	(0.051)	(0.054)	(0.056)
T × Overestimation	0.593***	0.678***	0.642***	0.574***	0.651***	0.631***
	(0.067)	(0.071)	(0.071)	(0.074)	(0.081)	(0.083)
Accurate est.		-0.080	-0.052		-0.167**	-0.103
		(0.064)	(0.069)		(0.077)	(0.068)
T × Accurate est.		0.417***	0.325***		0.524***	0.418***
		(0.105)	(0.113)		(0.100)	(0.096)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.754	0.756	0.755	0.725	0.729	0.726
Observations	1630	1630	1630	1624	1624	1624

Notes: The table presents estimation results from OLS regressions. Results for the current price experiment are shown in Columns 1 to 3 and results for the projected price experiment are shown in Columns 4 to 6. In Columns 1 and 4, we include a dummy variable indicating overestimation of costs (incl. zero perception gap). In Columns 2 and 5, we include an indicator variable for cost misperceptions in relative terms (defined as the logarithm of perceived costs plus one minus the logarithm of actual costs plus one). Overestimation (underestimation) indicates an overestimation (underestimation) of costs by more than 20 percent. Accurate estimation indicates misperceptions of up to 20 percent. In Columns 3 and 6, we include an indicator variable for cost misperceptions in absolute terms. Overestimation (underestimation) indicates an overestimation (underestimation) of costs by more than €25 or €100, respectively. Accurate estimation indicates misperceptions of up to €25 or €100, respectively. The dependent variable is the post-treatment acceptance of carbon pricing, measured on a five-point Likert scale (1=very unacceptable to 5=very acceptable). T is a dummy variable indicating that a respondent received personalized information about the costs of carbon pricing. All regressions include the pre-treatment acceptance of carbon pricing and the set of controls described in Appendix Table A5. Robust standard errors are in parentheses. * p<0.1, ** p<0.05, *** p<0.01

Table A8: Treatment effects with relative perception gaps

	45 €/t CO2		200 €/t CO2	
	(1)	(2)	(3)	(4)
T	0.086**	0.079**	-0.229***	-0.202***
	(0.037)	(0.035)	(0.036)	(0.036)
Perception gap	-0.004		-0.006***	
	(0.004)		(0.002)	
T × Perception gap	0.033***		0.026***	
	(0.008)		(0.004)	
Rel. perception gap		-0.019		-0.041***
		(0.015)		(0.013)
T × Rel. perception gap		0.149***		0.164***
		(0.026)		(0.021)
Controls	Yes	Yes	Yes	Yes
R-squared	0.747	0.751	0.724	0.727
Observations	1630	1630	1624	1624

Notes: The table presents estimation results from OLS regressions. Results for the current price experiment are shown in Columns 1 and 2 and results for the projected price experiment are shown in Columns 3 and 4. The dependent variable is the post-treatment acceptance of carbon pricing, measured on a five-point Likert scale (1=very unacceptable to 5=very acceptable). T is a dummy variable indicating that a respondent received personalized information about the costs of carbon pricing. The perception gap is defined as the difference between perceived and actual costs (divided by 100). The relative perception gap is defined as the log difference between perceived and actual costs (logarithm of perceived costs plus one minus logarithm of actual costs plus one). All regressions include the pre-treatment acceptance of carbon pricing and the set of controls described in Appendix Table A5. Robust standard errors are in parentheses. * p<0.1, ** p<0.05, *** p<0.01

Table A9: Heterogeneity by pre-treatment acceptance

	(1) 45 €/t CO2	(2) 200 €/t CO2
T	0.253***	0.042
	(0.054)	(0.037)
T × Acceptance=2	0.015	-0.511***
	(0.102)	(0.078)
T × Acceptance=3	-0.178*	-0.371***
	(0.099)	(0.099)
T × Acceptance=4	-0.227**	-0.694***
	(0.091)	(0.105)
T × Acceptance=5	-0.252**	-0.323***
	(0.100)	(0.125)
Controls	Yes	Yes
R-squared	0.742	0.722
Observations	1630	1624

Notes: The table presents estimation results from OLS regressions. Results for the current price experiment are shown in Column 1 and results for the projected price experiment are shown in Column 2. The dependent variable is the post-treatment acceptance of carbon pricing, measured on a five-point Likert scale (1=very unacceptable to 5=very acceptable). T is a dummy variable indicating that a respondent received personalized information about the costs of carbon pricing. All regressions include the set of controls described in Appendix Table A5. Robust standard errors are in parentheses. * p<0.1, ** p<0.05, *** p<0.01

Table A10: Heterogeneity by residual pre-treatment acceptance

	45 €/t CO2			200 €/t CO2		
	(1)	(2)	(3)	(4)	(5)	(6)
T	0.346***	0.160***	0.255	0.066	-0.299***	-0.209
	(0.067)	(0.034)	(0.199)	(0.058)	(0.035)	(0.190)
Acceptance	0.878***			0.865***		
	(0.017)			(0.018)		
T × Acceptance	-0.076***			-0.146***		
	(0.023)			(0.026)		
Res. acceptance		0.899***			0.867***	
		(0.020)			(0.020)	
T × Res. acceptance		-0.115***			-0.153***	
		(0.032)			(0.032)	
Pred. acceptance			1.188***			0.960***
			(0.206)			(0.236)
T × Pred. acceptance			-0.007			-0.040
			(0.080)			(0.077)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.742	0.743	0.250	0.711	0.710	0.246
Observations	1630	1630	1630	1624	1624	1624

Notes: The table presents estimation results from OLS regressions. Results for the current price experiment are shown in Columns 1 to 3 and results for the projected price experiment are shown in Columns 4 to 6. In Columns 1 and 4, we include the pre-treatment acceptance of carbon pricing. For the other regressions, we decompose the total variation in pre-treatment acceptance of carbon pricing into a component predicted by the set of control variables we use throughout the paper, and a residual component that is not explained by these variables. In Columns 2 and 5, we include the residual component of pre-treatment acceptance. In Columns 3 and 6, we include the predicted component of pre-treatment acceptance. The dependent variable is the post-treatment acceptance of carbon pricing, measured on a five-point Likert scale (1=very unacceptable to 5=very acceptable). T is a dummy variable indicating that a respondent received personalized information about the costs of carbon pricing. All regressions include the set of controls described in Appendix Table A5. Robust standard errors are in parentheses. * p<0.1, ** p<0.05, *** p<0.01

Table A11: Ordered probit estimations of treatment effects

Panel A: 45 €/t CO2	(1) Acc.=1	(2) Acc.=2	(3) Acc.=3	(4) Acc.=4	(5) Acc.=5
T	-0.051***	0.000	0.006***	0.028***	0.017***
	(0.011)	(0.002)	(0.002)	(0.006)	(0.004)
Controls	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.415	0.415	0.415	0.415	0.415
Observations	1630	1630	1630	1630	1630
Panel B: 200 €/t CO2	(1) Acc.=1	(2) Acc.=2	(3) Acc.=3	(4) Acc.=4	(5) Acc.=5
T	0.090***	0.006	-0.017***	-0.055***	-0.024***
	(0.011)	(0.004)	(0.003)	(0.007)	(0.004)
Controls	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.410	0.410	0.410	0.410	0.410
Observations	1624	1624	1624	1624	1624

Notes: The table presents average marginal treatment effects from ordered probit regressions. Results for the current price experiment are shown in Panel A and results for the projected price experiment are shown in Panel B. The dependent variable is the post-treatment acceptance of carbon pricing, measured on a five-point Likert scale (1=very unacceptable to 5=very acceptable). T is a dummy variable indicating that a respondent received personalized information about the costs of carbon pricing. All regressions include the pre-treatment acceptance of carbon pricing and the set of controls described in Appendix Table A5. Robust standard errors are in parentheses. * p<0.1, ** p<0.05, *** p<0.01

Table A12: Cost perceptions by pre-treatment acceptance

Panel A: 45 €/t CO2	(1) Acc.=1	(2) Acc.=2	(3) Acc.=3	(4) Acc.=4	(5) Acc.=5
Perceived costs	519.441	402.866	335.878	324.316	250.654
Actual costs	216.931	197.086	175.599	191.394	169.149
Perception gap	302.510	205.780	160.279	132.921	81.505
Overestimation	0.713	0.653	0.631	0.572	0.579
Observations	540	343	320	320	107
Panel B: 200 €/t CO2	(1) Acc.=1	(2) Acc.=2	(3) Acc.=3	(4) Acc.=4	(5) Acc.=5
Perceived costs	786.310	514.375	475.833	479.536	263.364
Actual costs	949.527	881.252	791.325	834.672	717.996
Perception gap	-163.217	-366.877	-315.492	-355.137	-454.632
Overestimation	0.349	0.266	0.274	0.243	0.200
Observations	510	349	317	338	110

Notes: The table presents summary statistics for key variables across different levels of pre-treatment acceptance in the current price (Panel A) and projected price (Panel B) experiments.

Table A13: Cost perceptions by respondent characteristics (current price experiment)

	(1) Female	(2) Male	(3) Aged <45	(4) Aged 45+	(5) West	(6) East	(7) No high school	(8) High school	(9) No single	(10) Single
Perceived costs	426.306	382.292*	436.879	384.215*	390.387	473.443**	396.723	409.229	450.504	279.670***
Actual costs	177.805	212.975***	195.151	197.229	197.977	188.127	182.214	211.014***	230.443	108.545***
Perception gap	248.501	169.317***	241.728	186.986**	192.410	285.316***	214.508	198.215	220.062	171.125*
Overestimation	0.688	0.612***	0.660	0.641	0.631	0.744***	0.674	0.621**	0.620	0.720***
Observations	764	866	579	1051	1384	246	822	808	1176	454
	(11) Non-ruling party	(12) Ruling party	(13) Low income	(14) High income	(15) No home-owner	(16) Home-owner	(17) No fossil heating	(18) Fossil heating	(19) No motor vehicles	(20) Motor vehicles
Perceived costs	460.318	288.309***	384.450	448.376**	369.389	448.836***	360.917	413.952	214.275	445.822***
Actual costs	213.217	176.362***	166.348	270.663***	130.297	287.122***	101.489	221.437***	49.449	229.929***
Perception gap	247.101	111.946***	218.102	177.713	239.092	161.714***	259.429	192.515**	164.826	215.893
Overestimation	0.663	0.589***	0.687	0.552***	0.743	0.517***	0.820	0.603***	0.808	0.611***
Observations	884	450	1159	471	942	688	339	1291	302	1328

Notes: The table presents summary statistics for key variables across respondent characteristics in the current price experiment. We conducted t-tests for equality of means within each demographic subgroup (e.g., female vs. male). * p<0.1, ** p<0.05, *** p<0.01

Table A14: Cost perceptions by respondent characteristics (projected price experiment)

	(1) Female	(2) Male	(3) Aged <45	(4) Aged 45+	(5) West	(6) East	(7) No high school	(8) High school	(9) No single	(10) Single
Perceived costs	574.255	562.479	699.578	493.911***	549.400	671.177**	544.967	590.914	640.437	403.732***
Actual costs	815.510	907.487***	918.554	833.889**	862.943	872.400	774.185	954.146***	1031.309	485.873***
Perception gap	-241.255	-345.009**	-218.976	-339.977**	-313.542	-201.222*	-229.218	-363.232***	-390.873	-82.141***
Overestimation	0.323	0.250***	0.333	0.257***	0.275	0.335*	0.295	0.274	0.254	0.354***
Observations	761	863	585	1039	1376	248	810	814	1127	497
	(11) Non-ruling party	(12) Ruling party	(13) Low income	(14) High income	(15) No home-owner	(16) Home-owner	(17) No fossil heating	(18) Fossil heating	(19) No motor vehicles	(20) Motor vehicles
Perceived costs	668.588	406.331***	485.687	765.920***	503.322	666.163***	526.930	578.351	304.220	627.765***
Actual costs	947.273	798.459***	690.612	1282.249***	580.431	1295.383***	471.656	963.402***	236.197	1006.726***
Perception gap	-278.685	-392.127**	-204.925	-516.329***	-77.110	-629.220***	55.273	-385.052***	68.023	-378.961***
Overestimation	0.296	0.229***	0.303	0.241**	0.346	0.191***	0.520	0.225***	0.503	0.235***
Observations	864	480	1147	477	979	645	327	1297	300	1324

Notes: The table presents summary statistics for key variables across respondent characteristics in the projected price experiment. We conducted t-tests for equality of means within each demographic subgroup (e.g., female vs. male). * p<0.1, ** p<0.05, *** p<0.01

Table A15: Robustness

Panel A: 45 €/t CO2	(1) Baseline	(2) Reweighting	(3) Self-monitoring	(4) Plausibility	(5) Feedback interest	(6) Feedback length
T	0.161***	0.123***	0.157***	0.158***	0.159***	0.176***
	(0.034)	(0.037)	(0.036)	(0.037)	(0.035)	(0.043)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.741	0.741	0.756	0.745	0.742	0.743
Observations	1630	1630	1453	1519	1596	1062
Panel B: 200 €/t CO2	(1) Baseline	(2) Reweighting	(3) Self-monitoring	(4) Plausibility	(5) Feedback interest	(6) Feedback length
T	-0.307***	-0.304***	-0.298***	-0.311***	-0.307***	-0.311***
	(0.035)	(0.038)	(0.036)	(0.036)	(0.035)	(0.044)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.712	0.712	0.720	0.720	0.712	0.702
Observations	1624	1624	1451	1497	1576	1058

Notes: The table presents estimation results from OLS regressions. Results for the current price experiment are shown in Panel A and results for the projected price experiment are shown in Panel B. Columns 1 and 2 show the results for the unweighted and reweighted sample and Columns 3 to 6 show the results for various subsamples. In Column 3, we exclude respondents with high levels of self-monitoring. For this purpose, we construct an index based on four items from the German version of the self-monitoring scale by Schyns and Paul (2002) and exclude the top decile. In Column 4, we exclude respondents that find the provided information unplausible. In Column 5, we exclude respondents that find the survey (rather) uninteresting. In Column 6, we exclude respondents that find the survey (rather) too long. The dependent variable is the post-treatment acceptance of carbon pricing, measured on a five-point Likert scale (1=very unacceptable to 5=very acceptable). T is a dummy variable indicating that a respondent received personalized information about the costs of carbon pricing. All regressions include the pre-treatment acceptance of carbon pricing and the set of controls described in Appendix Table A5. Robust standard errors are in parentheses. * p<0.1, ** p<0.05, *** p<0.01

B. Data appendix

B.1. Additional information on the 2022 microcensus

The microcensus is Germany's largest annual general population survey, conducted by the official statistical authorities. It employs a stratified cluster sampling design in which all members of households in randomly selected districts are legally required to participate. With approximately 810,000 respondents, the survey covers roughly 1 percent of Germany's total population. For our analysis we use the most recent available dataset from 2022. Due to data protection reasons, the Scientific Use File consists of a representative 70 percent subsample, totalling 683,588 individual observations. We restrict the sample to respondents aged 18 to 75, residing at their main residence to match our own survey. This leaves us with 488,363 individual observations in our final dataset. A detailed documentation of the 2022 microcensus is provided by the Federal Statistical Office (2023).

B.2. Cost calculation

To illustrate the cost calculation method, consider the following example: A family of four rents a 120 m^2 apartment with an oil heating system for both space heating and hot water supply. The family owns two cars - one with a gasoline engine and one with a diesel engine - and has driven 5,000 kilometers in the past twelve months. To determine total additional annual costs (H6), we first calculate several auxiliary variables (H1-H5). We start by estimating the family's emissions from space heating and hot water supply (H1). To approximate the family's energy use for space heating, we multiply the size of their dwelling by the average energy consumption per square meter, as provided by the Environmental-Economic Accounts of the Federal Statistical Office (2022). We obtain the family's energy use for hot water consumption by multiplying the household size by the average hot water consumption per person also sourced from the Environmental-Economic Accounts. Both values are then multiplied by an energy-source-specific emission coefficient for oil to translate consumption into CO2 emissions in tons. The family's total emissions

from heating and hot water use are therefore given by:

$$\text{H1} = 120\,\text{m}^2 \times (133 \times 0.000266)\frac{\text{t}\,\text{CO}_2}{\text{m}^2} + (4 \times 1,280 \times 0.000266)\text{t}\,\text{CO}_2 = 5.60728\,\text{t}\,\text{CO}_2$$

German law (CO2 Cost Allocation Act) dictates that the costs of carbon pricing for emissions from heat consumption in rental housing have to be shared between landlords and tenants. The share of carbon costs borne by the tenant is determined based on the dwelling's energy efficiency, measured in terms of CO2 emissions per square meter of living space. To adjust tenants' costs accordingly, we first determine the energy efficiency of each tenant's dwelling (H2) by dividing total emissions from space heating and hot water supply by the dwelling's size:

$$\text{H2} = \frac{5.60728\,\text{t}\,\text{CO}_2}{120\text{m}^2} = 0.046727\frac{\text{t}\,\text{CO}_2}{\text{m}^2}$$

As stated by the CO2 Cost Allocation Act, the tenant's share of CO2 costs (H3) is determined according to the following scale:

$$\text{H3} = \begin{cases} 1, & \text{if} \quad \text{H2} < 0.012 \\ 0.9, & \text{if } 0.012 \leq \text{H2} < 0.017 \\ 0.8, & \text{if } 0.017 \leq \text{H2} < 0.022 \\ 0.7, & \text{if } 0.022 \leq \text{H2} < 0.027 \\ 0.6, & \text{if } 0.027 \leq \text{H2} < 0.032 \\ 0.5, & \text{if } 0.032 \leq \text{H2} < 0.037 \\ 0.4, & \text{if } 0.037 \leq \text{H2} < 0.042 \\ 0.3, & \text{if } 0.042 \leq \text{H2} < 0.047 \\ 0.2, & \text{if } 0.047 \leq \text{H2} < 0.052 \\ 0.05, & \text{if} \quad \text{H2} \geq 0.052 \end{cases}$$

Because of the low energy efficiency of our exemplary family's housing, they only bear the costs for 30 percent of total emissions from space heating and hot water supply. Therefore, we calculate the CO2 emissions that the household has to effectively pay for

(H4) by multiplying household emissions by 0.3 (H3):

$$\text{H4} = 0.3 \times 5.60728\,\text{t}\,\text{CO}_2 = 1.682184\,\text{t}\,\text{CO}_2$$

Next, we calculate the family's carbon emission from transportation (H5). We begin by estimating the household's gasoline and diesel consumption in liters by apportioning total mileage across gasoline and diesel vehicles based on the household's fleet and applying average diesel and gasoline consumption per kilometer from the "Transport in Figures 2022/2023" report by the Federal Ministry for Digital and Transport (2022). We multiply these averages by fuel-specific CO2 emissions per liter, which are 0.00265 for diesel and 0.00237 for gasoline. For the family owning one diesel and one gasoline car, the formula for total transport emissions for a travelled distance of 5000 kilometers is:

$$\begin{aligned}\text{H5} &= 5000\,\text{km} \times (0.07\frac{\text{L}}{\text{km}} \times 0.00265\frac{\text{t}\,\text{CO}_2}{\text{L}} \times \frac{1}{2} + 0.077\frac{\text{L}}{\text{km}} \times 0.00237\frac{\text{t}\,\text{CO}_2}{\text{L}} \times \frac{1}{2}) \\ &= 0.919975\,\text{t}\,\text{CO}_2\end{aligned}$$

Finally, we compute total additional current costs of carbon pricing (H6) by aggregating emissions from household heating and transportation and multiplying total emissions by the current carbon price of €45/t CO2:[28]

$$\text{H6} = (0.919975\,\text{t}\,\text{CO}_2 + 1.682184\,\text{t}\,\text{CO}_2) \times \frac{€45}{\text{t}\,\text{CO}_2} = €117.097155$$

Thus, the family has current additional annual costs of carbon pricing of €117 (rounded to the nearest euro).

B.3. Main experiment: Survey questions

Q1. Age
How old are you?

_____ Age in years

[28] Alternatively, we calculate projected future costs by multiplying total emissions by the projected carbon price of €200/t CO2. Our example family would have future costs of €520.

Q2. Gender
Please enter your gender:

[ ] Male
[ ] Female
[ ] Diverse

Q3. State
In which federal state do you live?

[ ] Baden-Württemberg
[ ] Bavaria
[ ] Berlin
[ ] Brandenburg
[ ] Bremen
[ ] Hamburg
[ ] Hesse
[ ] Mecklenburg-Western Pomerania
[ ] Lower Saxony
[ ] North Rhine-Westphalia
[ ] Rhineland-Palatinate
[ ] Saarland
[ ] Saxony
[ ] Saxony-Anhalt
[ ] Schleswig-Holstein
[ ] Thuringia
[ ] I do not live in Germany

Q4. Household income
What is your household's current total monthly net income?

This refers to the total amount from wages, salaries, income from self-employment, retirement pensions or civil service pensions, each after deducting taxes and social security contributions. Please also include income from public assistance, rental or lease income, housing benefits, child benefits, and any other sources of income.

A household is defined as people who live together and share finances, that is, they cover daily living expenses together and do not account for their purchases separately.

If you don't know the exact amount, please provide an estimate.

[ ] Less than €500
[ ] €500 to less than €1,000
[ ] €1,000 to less than €1,500
[ ] €1,500 to less than €2,000
[ ] €2,000 to less than €2,500
[ ] €2,500 to less than €3,000
[ ] €3,000 to less than €3,500
[ ] €3,500 to less than €4,000
[ ] €4,000 to less than €4,500

[ ] €4,500 to less than €5,000
[ ] €5,000 to less than €5,500
[ ] €5,500 to less than €6,000
[ ] €6,000 or more
[ ] No answer

C5. Household size
How many people permanently live in your household, including yourself? Please also consider all children living in the household.

Please enter a value in each input field.

[ ] persons aged 18 and over: _____ person(s)
[ ] persons aged 14 to under 18: _____ person(s)
[ ] persons under 14 years of age: _____ person(s)

C6. Homeowner status
Does your household live in a rented or owned home, i.e. in your own apartment or house?

Please think of your primary residence. Please select one answer.

[ ] Rent, and do not own residential property elsewhere
[ ] Rent but own residential property elsewhere
[ ] Live in own apartment
[ ] Live in own house
[ ] Other
[ ] No answer

C7. Living space
How large is your apartment's living space?

Please enter a value in the input field. If you don't know the exact amount, please provide an estimate.

[ ] _____ square meters
[ ] Don't know

C8. Heating system - space heating
What type of energy do you primarily use to heat your home?

Please select one answer.

[ ] Electricity
[ ] Natural gas
[ ] Heating oil
[ ] Solid fuels (e.g. wood, coal, pellets)
[ ] Other (e.g. geothermal, solar energy)
[ ] Don't know

C9. Heating system - hot water
And what type of energy do you primarily use to heat water in your home?

Please select one answer.

[ ] Electricity
[ ] Natural gas
[ ] Heating oil
[ ] Solid fuels (e.g. wood, coal, pellets)
[ ] Other (e.g. geothermal, solar energy)
[ ] Don't know

C10. Vehicle fleet
How many motor vehicles with gasoline or diesel engines does your household have?

This refers to passenger vehicles and motorcycles. Passenger vehicles include caravans and company vehicles if they can be used privately. Motorcycles also include mopeds and motorized scooters.

Please enter a value in each input field. Enter the value "0" if your household does not have any vehicles of that type.

[ ] _____ passenger car(s) with gasoline engine
[ ] _____ passenger car(s) with diesel engine
[ ] _____ motorcycle(s) with combustion engine

C11. Vehicle mileage
How many kilometers did the members of your household drive in motor vehicles in total last year?

Please enter a value in the input field. If you don't know the exact amount, please provide an estimate.

[ ] _____ kilometers
[ ] Don't know

C12. Carbon price acceptance (baseline)
In January 2021, a CO2 price was introduced in Germany in the transport and building sectors to reduce greenhouse gas emissions. The CO2 price makes the consumption of fossil fuels such as gasoline, diesel, heating oil and natural gas more expensive.

To what extent do you personally find it acceptable to pay a CO2 price?

[ ] Very acceptable
[ ] Rather acceptable
[ ] Neither nor
[ ] Rather unacceptable
[ ] Very unacceptable
[ ] No answer

C13a. Estimation of additional costs at the current price of €45/t CO2
The CO2 price is currently €45 per ton of CO2 and and is levied on the consumption of fossil fuels such as gasoline, diesel, heating oil and natural gas.

What do you think, how high are the resulting additional annual costs for your household compared to a situation without the CO2 price?

This refers to the direct burden on your household due to higher fuel and heating costs, assuming your consumption remains unchanged. Please enter a value in the input field.

If you don't know the exact amount, please provide an estimate.

My household has additional annual costs of € _____

C13b. Estimation of additional costs at the projected price of €200/t CO2
According to current projections, the CO2 price will be €200 per ton of CO2 in 2027 and will be levied on the consumption of fossil fuels such as gasoline, diesel, heating oil and natural gas.

What do you think, how high are the resulting additional annual costs for your household compared to a situation without the CO2 price?

This refers to the direct burden on your household due to higher fuel and heating costs, assuming your consumption remains unchanged. Please enter a value in the input field. If you don't know the exact amount, please provide an estimate.

My household has additional annual costs of € _____

C14. Uncertainty regarding the cost estimation
How confident are you in your estimate of the additional annual costs for your household?

[ ] 1 = Very confident
[ ] 2
[ ] 3
[ ] 4
[ ] 5 = Very unconfident
[ ] No answer

T1. Info treatment (current price)
Based on your responses regarding your housing situation and vehicle use, we can estimate your household's additional annual costs at a CO2 price of €45 per ton of CO2.

Your household has additional annual costs of € [actual costs]

As a reminder: You estimated that your household has additional annual costs of € [own estimate]

T2. Info treatment (projected price)
Based on your responses regarding your housing situation and vehicle use, we can estimate your household's additional annual costs at a CO2 price of €200 per ton of CO2.

Your household has additional annual costs of € [actual costs]

As a reminder: You estimated that your household has additional annual costs of € [own estimate]

C15. Carbon price acceptance (final)
We would now like to ask you again about your opinion on the CO2 price.

To what extent do you personally find it acceptable to pay a CO2 price?

[ ] Very acceptable
[ ] Rather acceptable
[ ] Neither nor
[ ] Rather unacceptable
[ ] Very unacceptable
[ ] No answer

C19. Trust in information
We have informed you about the effects of CO2 pricing on the financial situation of your household based on current research. How plausible did you find this information?

[ ] Very plausible
[ ] Rather plausible
[ ] Neither nor
[ ] Rather implausible
[ ] Very implausible
[ ] Don't know

E3. Party preference
If the federal election were held next Sunday, which party would you vote for?

[ ] CDU/CSU
[ ] SPD
[ ] FDP
[ ] Bündnis 90/Die Grünen
[ ] Die Linke
[ ] AfD
[ ] Other party, namely: _____
[ ] Would not vote
[ ] Not eligible to vote as not a German citizen
[ ] No answer

E5a. Self-monitoring
To what extent do the following statements apply to you personally?

My behavior is often based on what I think others expect of me.

[ ] 1 = Does not apply at all
[ ] 2
[ ] 3
[ ] 4
[ ] 5
[ ] 6
[ ] 7 = Fully applies
[ ] No answer

E5b. Self-monitoring
To what extent do the following statements apply to you personally?

My intuition is quite good when it comes to understanding the feelings and motives of others.

[ ] 1 = Does not apply at all
[ ] 2
[ ] 3
[ ] 4
[ ] 5
[ ] 6
[ ] 7 = Fully applies
[ ] No answer

E5c. Self-monitoring
To what extent do the following statements apply to you personally?

My behavior is usually an expression of my true feelings, attitudes, and beliefs.

[ ] 1 = Does not apply at all
[ ] 2
[ ] 3
[ ] 4
[ ] 5
[ ] 6
[ ] 7 = Fully applies
[ ] No answer

E5d. Self-monitoring
To what extent do the following statements apply to you personally?

I would not change my opinion to please someone.

[ ] 1 = Does not apply at all
[ ] 2
[ ] 3
[ ] 4
[ ] 5
[ ] 6
[ ] 7 = Fully applies
[ ] No answer

F1. School education
What is your highest general school-leaving qualification?

Please select one answer.

[ ] Currently still a student
[ ] Lower secondary education
[ ] Intermediate secondary education
[ ] Higher secondary education
[ ] Other education
[ ] No school qualification (and currently not a student)
[ ] No answer

G1. Feedback - interest
How interesting did you find the survey overall?

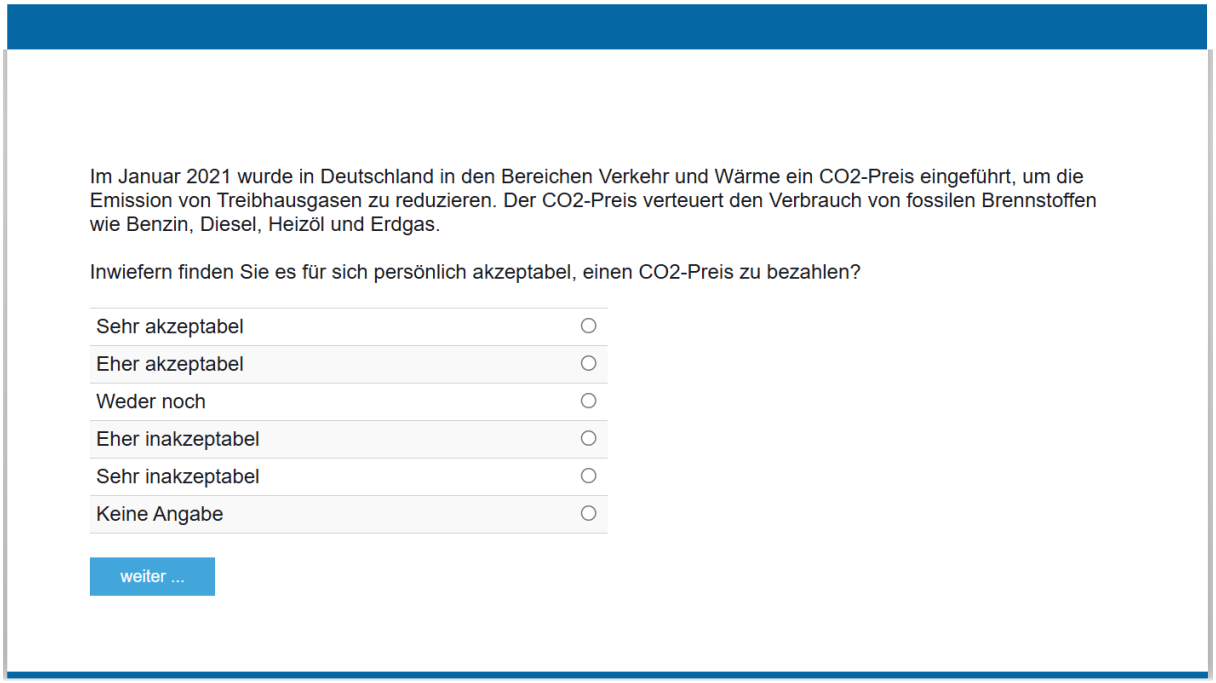
[ ] Very interesting
[ ] Interesting
[ ] Neither nor
[ ] Less interesting
[ ] Not interesting at all
[ ] No answer

G2. Feedback - length
How would you rate the length of the questionnaire?

[ ] Much too long
[ ] Rather too long
[ ] Just right
[ ] Rather too short
[ ] Much too short
[ ] No answer

B.4. Main experiment: Screenshots

B.4.1. Current price experiment



Der CO2-Preis liegt aktuell bei 45 Euro pro Tonne CO2 und wird auf den Verbrauch von fossilen Brennstoffen wie Benzin, Diesel, Heizöl und Erdgas erhoben.

Was denken Sie, wie hoch sind dadurch die zusätzlichen jährlichen Kosten Ihres Haushalts im Vergleich zu einer Situation ohne CO2-Preis?

Gemeint ist die direkte Belastung Ihres Haushalts durch höhere Sprit- und Heizkosten bei unverändertem Verbrauch. Bitte tippen Sie einen Wert in das Zahlenfeld ein. Wenn Sie es nicht genau wissen, schätzen Sie bitte.

Mein Haushalt hat zusätzliche jährliche Kosten von [ ] Euro

weiter ...

Wie sicher sind Sie sich bei Ihrer Schätzung der zusätzlichen jährlichen Kosten für Ihren Haushalt?

1 = Sehr sicher	2	3	4	5 = Sehr unsicher	Keine Angabe
○	○	○	○	○	○

weiter ...

Anhand Ihrer Angaben zu Wohnsituation und Fahrzeugnutzung lassen sich die zusätzlichen jährlichen Kosten Ihres Haushalts durch einen CO2-Preis von 45 Euro pro Tonne CO2 ermitteln.

Ihr Haushalt hat zusätzliche jährliche Kosten von 117 Euro.

Zur Erinnerung: Sie haben geschätzt, dass Ihr Haushalt zusätzliche jährliche Kosten von 300 Euro hat.

weiter ...

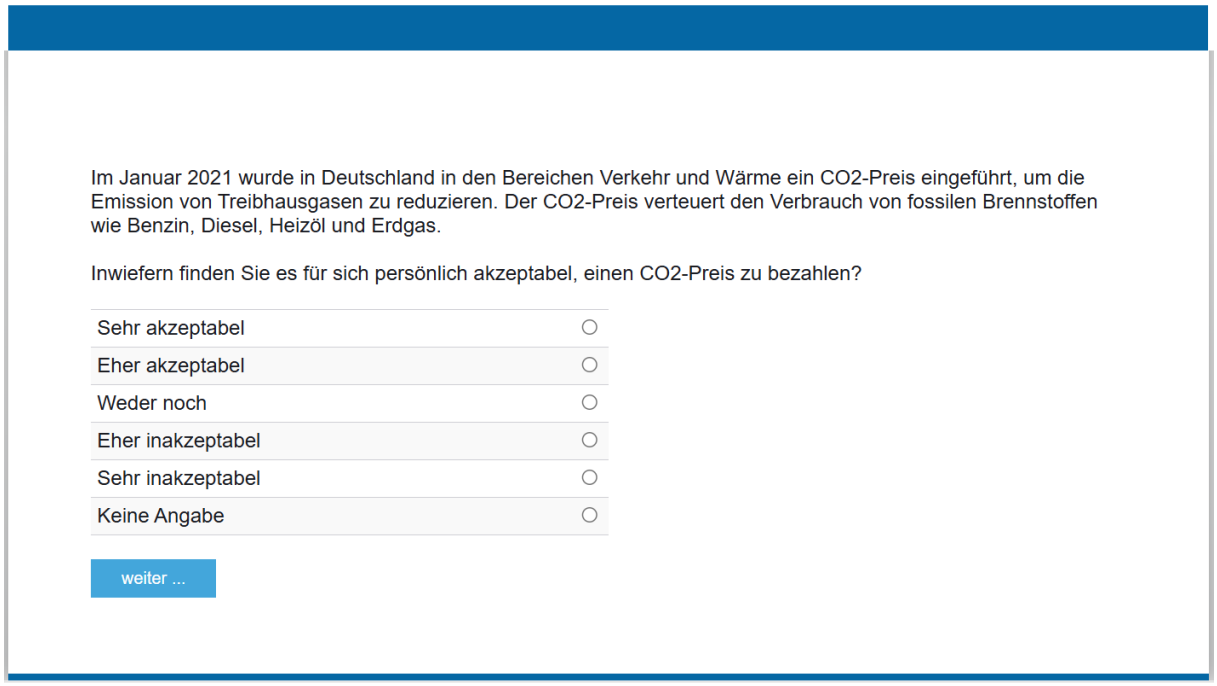
Wir würden Sie nun gerne erneut zu Ihrer Einstellung zum CO2-Preis befragen.

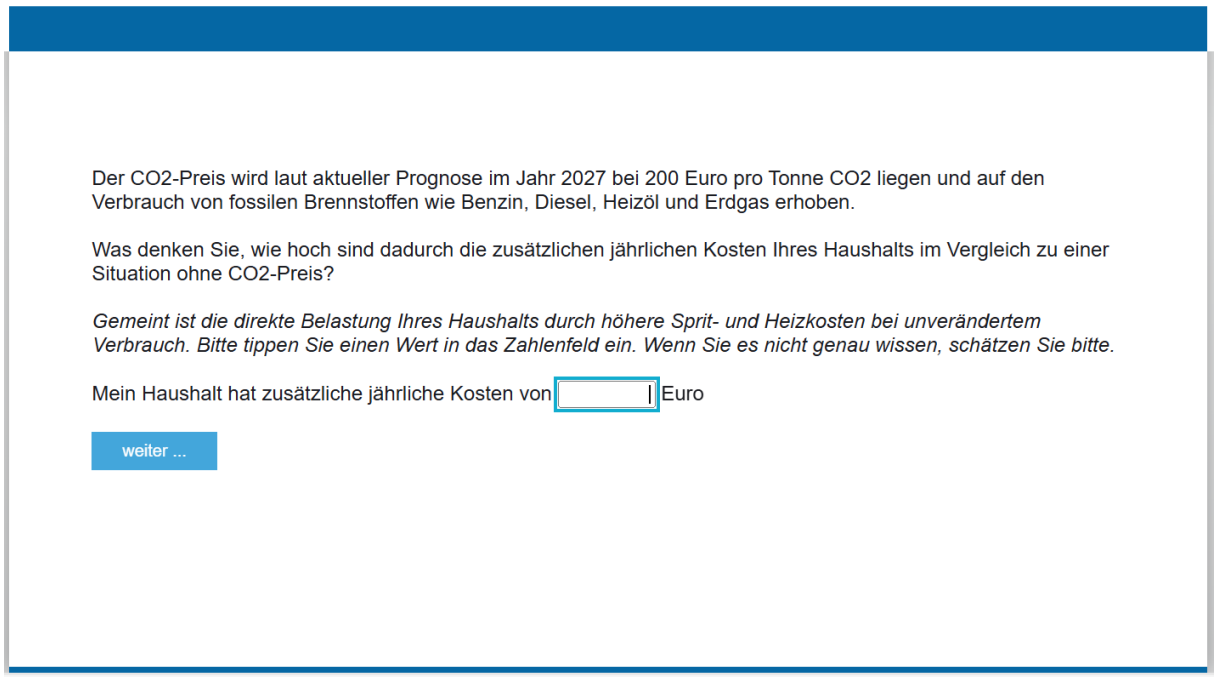
Inwiefern finden Sie es für sich persönlich akzeptabel, einen CO2-Preis zu bezahlen?

Sehr akzeptabel	○
Eher akzeptabel	○
Weder noch	○
Eher inakzeptabel	○
Sehr inakzeptabel	○
Keine Angabe	○

weiter ...

B.4.2. Projected price experiment





Wie sicher sind Sie sich bei Ihrer Schätzung der zusätzlichen jährlichen Kosten für Ihren Haushalt?

1 = Sehr sicher	2	3	4	5 = Sehr unsicher	Keine Angabe
○	○	○	○	○	○

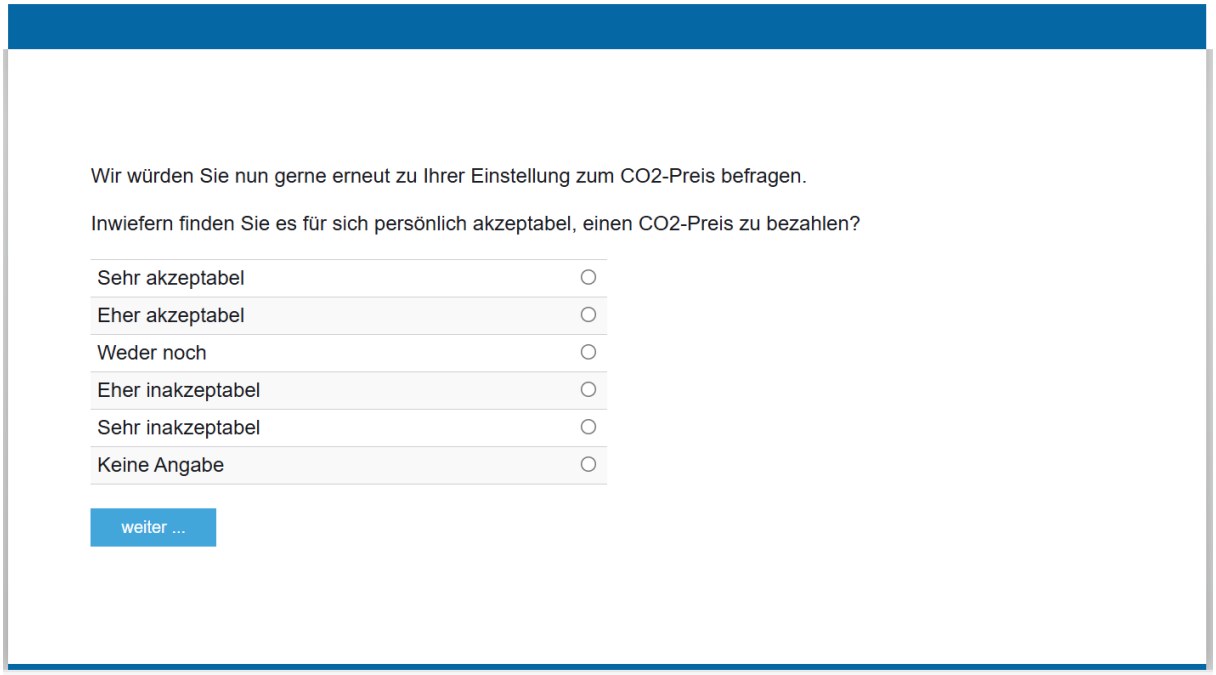
weiter ...

Anhand Ihrer Angaben zu Wohnsituation und Fahrzeugnutzung lassen sich die zusätzlichen jährlichen Kosten Ihres Haushalts durch einen CO2-Preis von 200 Euro pro Tonne CO2 ermitteln.

Ihr Haushalt hat zusätzliche jährliche Kosten von 520 Euro.

Zur Erinnerung: Sie haben geschätzt, dass Ihr Haushalt zusätzliche jährliche Kosten von 300 Euro hat.

weiter ...



References Appendix

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