Climate Change and Individual Behavior

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Abstract

We study the causal effect of providing information about climate change on individuals' willingness to pay (WTP) to offset carbon emissions of flights. Receiving truthful information about ways to reduce CO2 emissions increases individuals' WTP for CO2 offsetting. In a first follow-up survey, we study the endogenous information acquisition of respondents. Individuals choose information that aligns with their views. In a second follow-up survey, we document individuals increase their portfolio share in green stocks when learning about the possible benefits for the environment but only if the information is not paired with the possible cost of lower expected returns.

Keywords: Climate change, information treatment, willingness to pay, CO2 compensation, information acquisition, portfolio choice, expectations.

JEL classification: D10, D83, D84, D91, G11, Q54

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1 Introduction

Climate change is one of the most pressing challenges of our times and has the potential to affect the life and livelihood of virtually every individual, with large economic costs to governments and societies (IPCC, 2014). Reducing carbon dioxide (CO2) emissions is necessary to mitigate climate change (Nordhaus, 2019) and household consumption contributes a substantial fraction to CO2 emissions (Hertwich and Peters, 2009). Hence, individuals can help mitigate climate change directly by changing their everyday activities and consumption behavior and also indirectly by supporting policies aimed at reducing CO2 emissions. The extent to which individuals take actions to contain climate change may depend on their information on climate change and the ways to mitigate it, their views towards society, their own financial circumstances, their experience with extreme climate events, the behavior of their peers or moral pressure to adhere to social norms. Yet, so far little causal evidence exists on how individuals change their behavior in response to the provision of information about climate change and whether different framings of identical information are differentially effective in changing individuals' behavior.

In this paper, we examine the effect of providing information about ways to combat climate change on individuals' willingness to take action to fight climate change in two different settings: first, in the context of offsetting CO2 emissions of flights, and second, in the context of investing in green assets. Additionally, we examine individuals' willingness to acquire information about climate change. We first study how information about ways to reduce carbon emissions induces survey participants to increase their willingness to pay (WTP) for voluntary offsetting CO2 emissions of flights. Our analysis is based on a large representative survey of the German population, the Bundesbank Online Panel of Households (BOP-HH). In the first part of our study, we administer a survey experiment which aims to activate personal norms by providing information on ways to reduce individuals' CO2 emissions and find individuals increase their WTP for offsetting CO2 emissions of flights after the information provision. In a follow-up survey, we study how individuals actively acquire infor-

mation and find their prior views on important topics for society largely determines their information choice. In a second follow-up survey, we provide information on the possible environmental benefits of investing in green stocks, that is, stocks of companies that operate in a climate-friendly way and find in a hypothetical portfolio choice experiments that survey participants increase their portfolio share in green stocks but only if they do not learn about possible costs in the form of lower expected returns.

In the first experiment, we randomly assign individuals to four treatment groups and one control group. The treatment groups receive identical, truthful information on ways to reduce CO2 emissions. The treatments refer to individuals' actions to fight climate change and therefore also inherently appeal to personal norms. We vary the framing of the treatments to test whether some formulations are more effective in increasing individuals' WTP. Two groups receive information framed as scientific research, either general research or research by the federal government *(scientific* framing). The other two groups receive information framed as the behavior of people similar to them, either Germans in their age cohort or Germans in general (*peer* framing). The individuals in the control group do not receive any information. We elicit individuals' WTP for carbon offsets both before and after the information provision to study whether subjects in the treatment groups adjust their WTP compared to survey participants in the control group and whether the change depends on the framing of the information. To avoid asking the same question twice, we elicit prior and posterior WTP in different formats, for intra-European flights for the prior and for transatlantic flights for the posterior.

Unconditionally, we find that providing information on actions to fight climate change increases individuals' WTP for voluntary carbon offsetting by €15 compared to the control group. The effect corresponds to about 40% of the increase in WTP for carbon offsetting in the control group. Looking at the post-treatment flight, the WTP for offsetting the carbon emissions of a direct flight (round trip) from Frankfurt am Main to the US amounts to €51.1 and €67.7 for the control group and treatment groups (combined), respectively, corresponding to €14.0 and €18.5 per tCO2. Thus,

the WTP of the treatment group is €4.5 per tCO2 higher than the WTP of the control group.[1] The finding suggests that informing individuals can motivate people to pay more for carbon offsetting.

We then study heterogeneity across different treatment arms. All four treatments result in an economically and statistically significant increase in the WTP relative to the control group. Across treatment arms, the *peer* framing increases the WTP on average by €18, whereas the *scientific* framing increases the average WTP by €11. No notable differences between the different formulations within the two arms arise. The differences in point estimates between the two arms are economically sizable, but we cannot reject the null hypothesis that all four treatments result in identical point estimates likely due to power issues. When examining the intensive and extensive margins of the adjustments in WTP between the *scientific* and the *peer* framing, we find a similar fraction of respondents adjusting their WTP across the two treatment types and the intensive margin driving the difference in point estimates across framings.

So far, we have documented that providing information to individuals has the potential to change their WTP for climate change mitigation but we do not know whether individuals would actively acquire this type of information in real life. In a follow-up survey, we administer an endogenous information experiment to study whether people are interested in acquiring information about climate change. In the first step of the experiment, survey participants face an information selection choice.[2] To resemble a real world situation, respondents have a choice between one article about climate change and one about population aging, but they can also choose not to see any piece of information. We find about half of the sample is interested in reading and learning more about climate change, whereas only one third selects the article about population aging. Studying the source of this heterogeneity in information selection, we find that individuals choose information that aligns

[1] The carbon emissions of round-trip flights from Frankfurt to Mallorca and New York are 568 kg CO2 and 3,652 kg CO2, respectively. The costs to offset the emissions are €14 and €84, respectively, according to `https://www.atmosfair.de` (last accessed February 2, 2022).

[2] Capozza, Haaland, Roth, and Wohlfart (2021) provide an excellent overview of the literature on endogenous information acquisition in finance and economics.

with their prior stance towards a topic and disregard information that might challenge their existing beliefs: Individuals with more positive environmental attitudes are more likely to select the article about climate change. Overall, our results demonstrate that individuals largely choose to acquire information that confirms their prior views. This confirmation bias has the potential to amplify differences in beliefs about climate change and further polarize the debate about climate change.

In the second step of the endogenous information experiment, we study whether making physical risks from climate change salient increases individuals' WTP. We randomly split the sample of respondents selecting the climate change article in half and provide each of the two subsamples with one article with either a "positive" or a "negative" spin on climate change.[3] The article with the positive spin discusses the physical consequences and risks of climate change, whereas the article with the negative spin questions the human-made origin of climate change. We find no significant difference in WTP between these two groups, on average. This average non-response largely reflects the strong priors of those choosing the climate change article. Studying the heterogeneity of the treatment effects across respondents, we find that respondents who have strong negative or positive priors toward climate change do not react at all to the different spins similar to other settings in which individuals with strong political views do not update their views on election outcomes when receiving objective polling data (Coibion, Gorodnichenko, and Weber, 2020). Yet, respondents who do not have strong priors about climate change react when climate change risk is made salient and have a €3.5 higher WTP if they read the article with the positive spin.

Finally, we fielded a second follow-up survey in which we provide survey participants information on how investment in green stocks can contribute to climate change mitigation. Similar to our first survey module, we framed the treatment information as evidence from scientific studies (*scientific* framing) or as investment behavior of peers (*peer* framing). All treatments contained information on the positive contribution on climate change mitigation of investing in green stocks, because

[3]We use the terms "positive" and "negative" to reflect consistency or inconsistency with the scientific consensus that climate change is anthropogenic and poses risks to the environment.

it lowers the cost of capital for these firms and can stimulate green investment. In two of the treatments, we also provided the information that green assets have lower expected returns. The treatment that did not include this information resulted in a higher investment in green assets in the hypothetical portfolio choice experiment. The green asset share of the treated group increases by 11% relative to the control group, whereas the identical treatment that includes the information on lower expected returns results in survey participants allocating the identical amount into green assets as survey participants in the control condition. When we added a *peer* component to the treatment information but also have the cost in form of lower expected returns as part of the treatment, we find the *peer* pressure component can partially offset the cost component and survey participants allocate a higher share of their endowment into green assets. We show that individuals in all three treatment arms and the control condition invest identical shares in the risk-free assets and the higher shares invested in green stocks arise because treated individuals allocate smaller shares into the German stock market overall.

To study whether return expectations for green stocks can rationalize the differential allocation into green assets in the treatments, we study individuals' posterior return expectations for green stocks after the information provision. The scientific framing that does not mention the lower expected returns, results in posterior expected returns that are identical to those of survey participants in the control group. Instead, individuals in the other two treatment groups, which receive information on the lower expected returns, expect lower expected returns of around 0.50% for green stocks compared to the control group. As a placebo test, we show that all individuals independent of which treatment group they are in or whether they are in the control group expect identical returns for the overall German stock market. Hence, individuals are willing to invest in green stocks to help mitigate climate change but only if they do not face costs in terms of lower expected returns or if these costs are paired with a peer pressure component in which survey respondents learn that many others already do invest in green stocks.

Our paper contributes to several strands of the literature. First, we build on the lit-

erature studying the role of information and norms in motivating individuals to fight climate change. Steg (2016) reviews the literature on factors influencing and encouraging pro-environmental actions by individuals and households and discusses the psychological mechanisms behind them. In contemporaneous work, Andre, Boneva, Chopra, and Falk (2021) examine the role of values and norms in fighting climate change. Bolsen, Leeper, and Shapiro (2014) study the role of pro and con norms in affecting beliefs and intended behavior with respect to global warming.[4]

Our paper is also closely related to a growing literature that estimates the WTP for voluntary offsetting carbon emissions in the context of air travel (Brouwer, Brander, and van Beukering, 2008; MacKerron, Egerton, Gaskell, Parpia, and Mourato, 2009; Sonnenschein and Mundaca, 2019), car usage (Hulshof and Mulder, 2020), and emission trading schemes (Diederich and Goeschl, 2014; Löschel, Sturm, and Uehleke, 2017). These studies primarily aim to estimate the WTP for carbon emissions per se and typically concentrate on particular user groups.[5] We, on the other hand, use a large representative survey that allows us to estimate causal effects and to study both exogenous and endogenous information acquisition and their effects on behavior.[6]

Methodologically, we build on recent literature that studies the role of providing information in influencing individuals' expectations and decisions. Many of these studies use information provision experiments in surveys to establish causality, e.g., Coibion, Gorodnichenko, and Weber (2022), Armona, Fuster, and Zafar (2019), and D'Acunto, Fuster, and Weber (2021).[7] A growing body of work provides evidence that such information interventions included in surveys have the power to change individuals' actual choices such as their consumption and savings decisions (Coibion et al., 2022), their investment allocations (Schnorpfeil, Weber, and Hackethal, 2024),

[4]This literature is also related to studies examining interventions in motivating individuals to conserve energy, for example, Allcott (2011).

[5]Hulshof and Mulder (2020) use samples of potential car buyers, Brouwer et al. (2008) survey air travelers, Löschel et al. (2017) samples citizens of a single city, and MacKerron et al. (2009) focuses on higher-educated individuals from a specific age group, respectively, whereas Sonnenschein and Mundaca (2019) rely on population-representative but small samples (n=500).

[6]Diederich and Goeschl (2014) also use a larger sample (n=2,440) that is representative of the internet-using population of voting-aged Germans to estimate the WTP per ton of abated carbon emissions and correlate it to observed covariates.

[7]Haaland, Roth, and Wohlfart provide an excellent review of this fast-growing body of work.

or their dividend reinvestments (Hackethal, Hanspal, Hartzmark, and Bräuer, 2024).

Most studies exogenously provide information to a random subset of the sample. Following Fuster, Perez-Truglia, Wiederholt, and Zafar (2020) we also endogenize the process of information acquisition to better understand whether individuals might actively acquire information in real life. Our finding that individuals select information in line with their priors shows the importance of addressing motivated beliefs in the design of information-provision campaigns.

We also contribute to the growing body of work in finance that studies climate change. [8] Theoretical papers show that the arrivals of major climate disasters change household perceived risk and WTP for mitigation (Hong, Wang, and Yang, 2020). Investors value sustainability (Bauer, Ruof, and Smeets, 2021; Hartzmark and Sussman, 2019), though they do not care about the impact of their sustainable investments (Heeb, Kölbel, Paetzold, and Zeisberger, 2022). Growing attention to regulatory and physical climate risk affects beliefs of investors and firms (Krueger, Sautner, and Starks, 2020), and hence asset prices in equity (Alok, Kumar, and Wermers, 2020; Bolton and Kacperczyk, 2021; Choi, Gao, and Jiang, 2020; Engle, Giglio, Kelly, Lee, and Stroebel, 2020) and bond markets (Baker, Bergstresser, Serafeim, and Wurgler, 2018; Painter, 2020; Huynh and Xia, 2021). Moreover, increased salience of physical climate risks reduces prices of properties more exposed to rising sea levels, hurricanes, or wildfires (Bernstein, Gustafson, and Lewis, 2019; Giglio, Maggiori, Stroebel, and Weber, 2021; Baldauf, Garlappi, and Yannelis, 2020; Gibson and Mullins, 2020; McCoy and Walsh, 2018). Anderson and Robinson (2019) find investors who became more concerned about climate catastrophes following extreme weather conditions in Sweden in 2014, rebalanced their portfolios towards ESG funds, are more likely to think green investments outperform, and they also state they are willing to pay higher fees for funds that adhere to ESG guidelines. Anderson and Robinson (2022), however, find households with stronger pro-environmental values do not hold greener portfolios, because they are largely disengaged from financial decisions. While they are more willing to pay more for environmentally friendly products, they do not have

[8] Giglio, Kelly, and Stroebel (2021) and Hong, Karolyi, and Scheinkman (2020) label this emerging literature “Climate Finance" and provide excellent reviews of it.

a higher willingness to pay higher fees for "green" investments. Anderson and Robinson (2024) further show political beliefs and financial sophistication play an important role in translating climate beliefs into financial actions. Using survey data from Germany, Aron-Dine, Beutel, Piazzesi, and Schneider (2024) show sustainable investing has become popular and households' tastes for safe and risky green assets are large but heterogeneous in Germany. Finally, Degryse, Di Giuli, Sekerci, and Stradi (2023) characterize two groups of sustainable investors, financial sustainable investors and social sustainable investors in that some investors invest in sustainable assets primarily for social reasons whereas others only invest in green assets in the expectation of high returns.

We add and complement this literature by documenting how information on the beneficial effect of investing in green stocks to climate change mitigation can trigger individuals to invest in green stocks. Our evidence on how individuals increase their portfolio share of green assets, but only when the treatment adds a *peer* component or does not include possible costs in terms of lower expected returns suggests a trade off between the willingness to mitigate climate change and the willingness to bear costs in terms of lower expected returns and highlights the presence of financial sustainable investors as in Degryse et al. (2023).

2 Data and Survey Design

In this section we describe the survey, the various treatments, and provide descriptive statistics for the pre-treatment WTP and its relation to covariates.

2.1 Bundesbank Online Panel Households

We use data from the BOP-HH. The monthly survey focuses on eliciting individuals' perceptions and expectations. The structure and focus are similar to the New York Fed Survey of Consumer Expectations. Besides recurring core questions, the BOP-HH allows researchers to include special-purpose modules.[9]

[9] For a detailed description of the survey, see Beckmann and Schmidt (2020).

The BOP-HH typically surveys around 4,000 individuals in each wave, with a panel component. A leading European survey company, Forsa, administers the survey and selects the gross sample using random sampling from the forsa.omninet database, with quotas for age, gender, and level of educational attainment. The sampling frame of the forsa.onminet database is individuals aged 16 years or older with internet access living in Germany.[10] Weights are provided to make the sample representative of this population, which we use for descriptive statistics and for our main regression analysis to make the results representative.

For our main experiment we designed a special module that includes a randomized control trial (RCT) consisting of four information treatments and one control group, questions on the WTP for voluntary offsetting CO2 emissions elicited before and after the treatment, as well as questions on environmental and societal attitudes and values. This survey module was administered in August 2020. We also administered a follow-up survey module in March 2021 to study endogenous information acquisition and another survey module in April 2024, which focused on the role of information for investing in green assets. Below, we describe the August 2020 survey module and describe the follow-up survey modules in Section 5 and Section 6.

2.2 Eliciting pre-Treatment WTP

We use the WTP for offsetting CO2 emissions as outcome variable. At the beginning of the questionnaire we elicit respondents' WTP for carbon offsets (pre-treatment WTP):

When traveling by air, there is the option to offset the CO2 emissions of a flight with a voluntary payment to climate protection projects - e.g., 6 to 18 euros for a return flight from Germany to Mallorca. What amount would you be willing to pay for CO2 compensation for such a flight?

[10] The forsa.omninet database consists of 75,000 individuals that were recruited by telephone. This offline recruitment allows respondents who are less internet-savvy to be included in the sample and thus reduces a potential online selection bias. Participants of the BOP-HH receive 100 bonus points for the forsa reward system as an incentive for their participation in the survey. The bonus points can be redeemed for various small items similar to an airline award catalog.

Voluntary paying for CO2 emissions is by definition a costly action an individual can take to mitigate climate change. The wording of the question serves several purposes. First, it yields a direct quantitative estimate of the WTP. Second, it refers to a realistic setting - Mallorca is the most popular holiday destination among Germans. Third, it also provides a typical price range for voluntary carbon offsetting, thus reducing survey noise and random answering because most survey participants are likely unaware of a typical price for carbon offsetting.[11] Fourth, the setting of a flight to an island rules out viable transport alternatives with lower emissions and hence the WTP estimate is not affected by cross-price elasticities between air and alternative travel options. Last, the hypothetical setting allows us to also elicit the WTP for those survey participants that do not travel to Mallorca or do not travel by plane at all.

2.3 Treatments

After respondents answered additional questions unrelated to climate change from the core BOP-HH survey, we randomly assign them to one of five equally-sized groups: a control group and four treatment groups. All treatment groups receive identical, truthful information about measures to reduce CO2 emissions. Because the treatments refer to individuals' efforts to reduce CO2 emissions, an implicit call for individual action against climate change is present in all treatments. In order to test potential framing effects, we vary the wording of the information between groups (*scientific* vs. *peer* framing). Additionally, we vary a) the specific source of the information within the *scientific* framing groups, and b) the social context within the *peer* framing groups. The information treatments (T) read as follows:

- ***Scientific* framings: General Research (T1) / Government Research (T2)**
  Carbon emissions are commonly regarded as the main cause of climate change. [Studies / Studies by the Federal Government] show that an individual's carbon

[11] Note our within-subjects design that we detail below and our comparison to a control group that receives the same question ensure that a pure anchoring to the provided value cannot drive our estimated treatment effects.

emissions can be reduced by avoiding excessive meat consumption as well as unnecessary flights and journeys by car.

- ***Peer framings*: Other People (T3) / Own Age Cohort (T4)**
  Carbon emissions are commonly regarded as the main cause of climate change. [Many people in Germany / Many people aged between [X & Y]] are therefore trying to reduce their individual carbon emissions by avoiding excessive meat consumption as well as unnecessary flights and journeys by car.[12]

Several theoretical and practical considerations gave rise to the design of our treatments. Standard economic theory predicts that rational actors might not pay for a public goods, such as mitigating climate change, due to the free-rider problem. Yet, empirical evidence shows people cooperate in social dilemma situations and are willing to pay for voluntary carbon offsetting (Brouwer et al., 2008). Internalized norms may explain why individuals contribute to a public good. The norm activation model of Schwartz (1977) and Schwartz and J. Howard (1981) suggests climate-friendly behavior is encouraged by the activation of internalized personal norms, referring to feelings of moral obligation to perform actions. Personal norms are activated if individuals become aware of the environmental consequences of their actions and ascribe responsibility for these consequences to themselves. We would, therefore, expect individuals who receive information that their own actions affect the climate to increase their WTP to mitigate climate change.

The aim of the different framings is to test whether some formulations are more effective than others in invoking these mechanisms. In the *scientific* framing groups we make respondents aware of climate-damaging emissions and inform them about *research studies* showing that individuals can effectively reduce their emissions *by avoiding excessive meat consumption as well as unnecessary flights and journeys by car.* By presenting the information as a result of *research studies*, we enhance the credibility of this information, inherently raising the individual responsibility and the value of individual action, and thus the activation of personal norms. We further vary the reliability of the source. Coibion et al. (2022) show the credibility of news sources

[12] The age brackets encompass the age of the survey respondent.

can modulate the effect of information treatments on household beliefs. We would thus expect respondents' WTP to be higher if they perceive the source of the *scientific* information more trustworthy. To investigate this possibility, we quote in the first group the German Federal government - an institution that is widely seen as credible and trustworthy - as the source of the *scientific* information, whereas we only refer to research studies in general in the second group.

In the *peer* framing groups we test the effectiveness of social norms and frame the individual actions as descriptive norms. Descriptive norms refer to the perception of the prevalence of a certain behavior, that is, what the majority does (Demarque, Charalambides, Hilton, and Waroquier, 2015). Individuals conform to descriptive norms as they desire to be correct and they expect that following the majority will lead to a correct outcome. Such informational social influence may also affect people's willingness to fight climate change.[13] Moreover, the influence of social norms can be stronger if people can identify with the social norm group (Cialdini, Reno, and Kallgren, 1990).

Furthermore, adherence to social norms like reciprocity may explain why individuals are willing to pay for voluntary carbon offsetting. If an individual has reciprocal preferences, they reward cooperation and punish free-riding of others (Falk and Fischbacher, 2006). Thus, if they learn that others contribute to the mitigation of climate change, they should be more likely to do so as well. To test these predictions, we provide in one of the *peer* framing groups the information that *many people in Germany* engage in actions aimed at reducing individual carbon emissions. In the other *peer* group we attempt to enhance this effect by specifying a closer set of peers and provide the information that many people in the respondent's age group engage in actions aimed at reducing individual carbon emissions.[14] The information is based on a pilot study administered in April 2020, showing that across age groups many

[13] Allcott (2011) shows that providing people with information on their neighbors' energy consumption causally affects their own energy demand.

[14] We implicitly assume that respondents' reference group overlaps with their own age cohort on average, making use of the fact that people's personal networks are homogeneous with regard to many sociodemographic characteristics including, among others, age (D'Acunto, Rossi, and Weber, 2019).

people indeed try to limit their carbon footprint in their everyday lives.[15]

The information is likely new to a large part of the survey population. First, most Germans are unaware that human activity is the main cause of climate change: In 2019, only less than half of a representative sample agreed with the statement *"The climate is changing and human activity is mainly responsible"* (40%), according to a poll conducted by YouGov (2019). Second, individuals are not well aware of how changes in personal habits can contribute to climate protection.[16] A study by Ipsos (2021) finds Germans overestimate the climate impact of actions like recycling and hang-drying clothes, whereas they underestimate the effectiveness of high-impact carbon abatement actions such as eating a plant-based diet and not having a car.

In our control group, we provide some sentences unrelated to climate change to ensure that all respondents spend about the same time reading texts before moving on in the survey. We report the treatments as part of the questionnaire in Appendix A and provide a summary in Table F.1 in Appendix F. Table F.2 in Appendix F shows the different treatment groups are comparable along observable household and individual characteristics.

2.4 Eliciting post-Treatment WTP

Following the treatments, we ask respondents again about their WTP, but this time for an intercontinental return flight from Germany to the USA instead of a flight to Mallorca:

Imagine that you are taking a return flight from Germany to the United States for €400. How much would you be willing to pay to offset the carbon emissions of the flight?

Eliciting the WTP both before and after the treatment in different ways has three advantages. First, it allows us to observe how the treated subjects instantaneously

[15] In April 2020, we asked participants of the BOP-HH survey whether they have personally taken actions to protect the climate in their everyday lives over the past six months prior to the coronavirus pandemic. See Figure E.1 in Appendix E.

[16] For a literature review on misperceptions about the mitigation potential of pro-environmental behaviors, see Cologna, Berthold, and Siegrist (2022).

update their WTP in response to the information provision by measuring the within-individual change in the WTP after the information treatments relative to the control group. Second, it enables us to eliminate potential biases inherent to stated preference methods. Stated preference studies generally find higher WTP estimates than revealed preference studies, possibly due to hypothetical, strategic or social desirability bias in surveys.[17] We difference out this potential upward bias affecting the level of the WTP by using the within-individual change in the WTP as outcome variable, i.e., the difference between the pre- and post-treatment WTP. Third, asking for the post-treatment WTP in a different way than the pre-treatment WTP avoids asking the same question twice and hence reduces survey fatigue.[18] The survey question allows us to measure the instantaneous change in the WTP after the information treatments relative to the control group and this comparison is the focus of our analysis.

A common criticism of survey experiments is that participants might infer the purpose of the study and respond in a way to please the experimenter instead of reporting their "natural" choice. Such survey demand effects, however, tend to be small in online survey experiments like ours (de Quidt, Haushofer, and Roth, 2018; Mummolo and Peterson, 2019). A related criticism is that our survey questions are not incentivized. However, Hackethal, Kirchler, Laudenbach, Razen, and Weber (2023) compare incentivized and non-incentivized elicitations for risk preferences and find no significant differences across methods. To further alleviate concerns about survey demand effects, we obfuscate the purpose of the information provision in two ways: first, we pose a question about a topic unrelated to climate change directly after the information treatment and before eliciting the outcome variable.[19] Second, we do not elicit views on meat consumption or other information that we provide in the

[17] In Appendix C we further investigate how survey-elicited WTPs are related to actual choices of individuals to fight climate change. Furthermore, a revealed preference approach would yield WTPs only for a selected sample, e.g. only for those who book a flight. In contrast, our stated preference approach allows us to elicit the WTP for a representative sample of the overall population.

[18] In contrast to the survey question on the prior WTP, we do not provide a price range when asking about the posterior WTP. However, the difference in the question format should not contaminate the treatment effect as both the treatment and the control group answer the same questions.

[19] We ask respondents about their marginal propensity to consume out of income shocks directly after the treatment.

treatments but rather ask about a more general way of mitigating climate change, their WTP for carbon offset. Moreover, as we report later, the effects of treatments vary between groups and certain groups display no effects, alleviating concerns that responses to the treatment may be due to demand effects. Finally, Appendix D shows that the information treatments have a lasting effect as they significantly alter spending intentions one month after the intervention, further alleviating concerns about demand effects.

2.5 Additional Variables

To study possible heterogeneity in the treatment effects, we ask additional questions related to respondents' attitudes and values towards climate change, the environment, and society. We elicit these directly after the question on the pre-treatment WTP. Other questions of the core BOP-HH survey unrelated to climate change were elicited between the questions on attitudes and values and the information treatments, ensuring responses to these questions are not affected by the information treatments and vice versa.

Environmental friendliness We elicit respondents' stance towards the climate and the environment using eight items that express attitudes and values related to climate change or the environment on five-point Likert scales. We extract the first principal component from these answers, which we label "environmental friendliness". Table F.3 in Appendix F reports the loadings. For ease of interpretation, we standardize the corresponding environmental friendliness scale to have a mean of zero and a standard deviation of one.

Concerns about the climate and the coronavirus To separate the importance of climate change from other social problems during the period our survey was in the field, we ask respondents about their perception of climate change and other current economic and political issues (e.g., coronavirus, Brexit, the economy), again on a Likert scale.

Household and individual-specific characteristics At the end of questionnaire, we elicited information on demographic characteristics such as age, gender, employment status, education, home-ownership status, household income, and household size.

2.6 Descriptive Statistics

Pre-treatment WTP Table 1 reports summary statistics of the WTP for voluntary C02 compensation for a continental flight before any information treatment, the WTP for C02 compensation for an intercontinental flight after information treatments, and the difference between the two, as well as sociodemographics. To minimize the impact of outliers we truncate both pre and post WTP at the 95^{th} percentile. The resulting unconditional average pre-treatment WTP for carbon offsetting for a return flight from Germany to Mallorca is €14 - corresponding to an average WTP of about €25 per tCO2.[20]

The post-treatment WTP for an intercontinental return flight from Germany to the USA is €64 for the full sample. By comparison, the costs to offset the climate impact of a direct flight (round trip) from Frankfurt am Main to Palma de Mallorca (568 kg CO2) and to New York (3,652 kg CO2) are €14 and €84, respectively, according to Atmosfair.[21] The WTP of €64 corresponds to a WTP of around €18 per tCO2 for a return flight from Frankfurt to New York.

These averages mask substantial heterogeneity in WTP across respondents. Figure 1 plots the distribution of the prior WTP (upper left), the posterior WTP (upper right) and the difference between the two (lower panel). Around 23% of respondents are not willing to pay anything, whereas 28% of respondents are willing to pay €20 or more (before any information treatments). The distribution exhibits bunching at multiples of five, which is common in surveys (D'Acunto, Hoang, Paloviita, and Weber, 2022). The distribution of the pre-treatment WTP (upper left panel) also exhibits

[20] Figure E.4 plots the unconditional WTP for carbon offsetting for a return flight from Germany to Mallorca across survey waves and shows that the WTP remains fairly stable at around €14.

[21] Atmosfair is a German non-profit organization with the aim of offsetting emissions from air travel via the organization's website `https://www.atmosfair.de` (last accessed on 16.02.2022).

some bunching at values of €6 and €18, which we provided as bounds of the range of a typical voluntary payment for a flight from Frankfurt to Mallorca. The bunching at these values, though, is less pronounced than the bunching at multiples of five. Anchoring responses in this price range, or the bunching of values observed should not have large effects on estimated treatment effects due to our within subject design and the comparison to a control group: first, any potential anchoring effect on the level of the WTP would not contaminate the treatment effect as both the treatment and the control groups answer the same questions. Second, our outcome variable refers to the change in the WTP not the level. Thus, any potential anchoring effect on the level of the WTP is differenced out by considering the change in WTP.

Determinants of pre-treatment WTP Table 2 documents how respondents' climate concerns, values, pro-environmental attitudes, and climate actions are associated with their pre-treatment WTP. The table reports results from an OLS regression of the WTP on respondents' sociodemographic characteristics (column 1) and on the scales and indices related to climate concerns, pro-environmental values, and climate actions (columns 2 to 5).

The pre-treatment WTP correlates significantly with several sociodemographic characteristics (column 1). However, most of them lose significance once we include measures for respondents' values and attitudes (columns 2 to 5). In line with findings in the literature, women have a significantly higher WTP for voluntary carbon offsetting in our sample. The gender effect vanishes, though, once we control for attitudes and values, possibly because women typically exhibit higher environmental concerns (Franzen and Meyer, 2010).

The WTP also increases with education but neither income, proxies for wealth (housing status), employment status, nor household structure explain variation in the WTP. Among the sociodemographics, only the place of residence has a robust effect. Individuals living in large cities exhibit a significantly higher WTP, even after controlling for attitudes and values.

The WTP for voluntary offsetting strongly correlates with climate concerns. A

one-standard-deviation increase in climate concerns is associated with a €4 increase in the WTP (column 2). Individuals' stance towards the environment also matters: A one-standard-deviation increase in the environmental friendliness scale is associated with a €4 increase in the WTP. Lastly, reported climate-friendly behavior correlates positively with the WTP for carbon offsetting (column 4). Hence, environmentally -oriented individuals generally do not reject the idea of compensating for carbon emissions.[22] In sum, our survey results on the pre-treatment WTP are broadly consistent with those of other studies. Yet, the prior WTP and its associations with observables are difficult to interpret because they are jointly determined and we cannot interpret these associations causally.

3 Econometric Framework

To test for the causal effect of different information treatments on individuals' WTP for voluntary carbon offsetting, we estimate the following equation:

$$WTP_i^{post} - WTP_i^{pre} = \alpha + \sum_{s=1}^{S} \beta_s \times Treatment_{s,i} + \boldsymbol{\delta} \boldsymbol{X_i} + error, \tag{1}$$

where i indexes respondents and WTP_i^{post} and WTP_i^{pre} are the post- and pre-treatment WTP for voluntary carbon offsetting of respondent i, respectively. $Treatment_{s,i}$ is an indicator variable equal to one if respondent i received information treatment s and zero otherwise. The β_s coefficients provide an estimate of the average effect of each treatment on the change in the WTP relative to the change in the control group. $\boldsymbol{X_i}$ is a vector of household/individual-specific characteristics.[23] Given the randomized

[22] One concern about the WTP for carbon offsetting as a measure for peoples' willingness to mitigate climate change might be that environmentally-friendly people denounce the idea of carbon offsetting as a sale of indulgences, since they might think that paying for emissions from flights is no substitute for not flying in the first place. The strong correlations between the environmental friendliness scale and the pre-treatment WTP for carbon offsetting rules out this concern.

[23] Individual characteristics are gender, age, employment status and education (indicators for each category of the respective variables). Household characteristics are home-ownership status, household income (indicator variable for each category), household size (indicator variable for each size), indicator for living in former East Germany and city size (indicator variable for each category).

nature of the treatments, control variables are not necessary to estimate consistent treatment effects but they may reduce estimation uncertainty.

4 Willingness to Pay for CO2 offsetting

This section studies how different information treatments affect the WTP for voluntary carbon offsetting of individuals.

4.1 Average Treatment Effects on WTP

We first examine the average treatment effect on the WTP for voluntary carbon offsetting. Table 3 reports regression results for different specifications of Equation 1. For each panel, the first column reports the average treatment effects (the β_s coefficient) without including covariates. The second column reports the average treatment effects when controlling for household and individual-specific characteristics. We report robust standard errors in parentheses.

In Panel A, we pool all treatment groups. Informing respondents about effective measures to reduce CO2 emissions significantly increases their WTP by about €15 on average relative to the control group. This effect is large in economic terms as it corresponds to an increase of about one third relative to the overall difference between the pre- and post-treatment WTP or more than 40% of the increase in the control group. Looking at the post-treatment flight, the WTP for offsetting the carbon emissions of a direct flight (round trip) from Frankfurt am Main to the US amounts to €51.1 and €67.7 for the control group and treatment groups (combined), respectively, corresponding to €14.0 and €18.5 per tCO2.[24] Thus, the WTP of the treatment group is €4.5 per tCO2 higher than the WTP of the control group.

In Panel B, we separate the *scientific* (T1+T2) and *peer* treatments (T3+T4) to analyze how the framing of information affects the WTP. Framing the information on ways to reduce CO2 emission as research findings increases respondents WTP by

[24]The carbon emissions of a round-trip flight from Frankfurt to New York are 3.652kg tCO2, according to https://atmosfair.de (last accessed February 2, 2022).

about €11. When we instead frame the treatment as actions others undertake, we find that respondents increase their WTP by about €18. While the point estimate is larger by 67%, we cannot reject the null hypothesis that the two treatment coefficients are equal.[25]

These results suggest individuals increase their willingness to engage in voluntary carbon offsetting in the context of flights when they receive information on ways to reduce their carbon footprint. Survey participants increase their WTP independent of whether we present the information as *scientific* evidence and stressing the effectiveness of these actions (T1+T2) or if we frame the information as ways in which others in their social environment engage in such actions and also contribute to climate-change mitigation (T3+T4). Our preferred interpretation of these results is that providing information about climate change on average increases individuals' WTP as the information activates internalized personal norms. The larger point estimates for the *peer* framing begets additional research on whether such a framing adds a *peer* pressure component in addition to the information effect (Charles, Hurst, and Roussanov, 2009; Bailey, Cao, Kuchler, and Stroebel, 2018; D'Acunto et al., 2019).

In panel C, we report the effect of each treatment separately. We find the *Government Research* (T2) framing has similar effects as the *General Research* (T1) treatment. Comparing the *peer* treatments (T3 & T4), we find that respondents react very similarly to information on climate-friendly behavior of people in their age cohort (T4) and to information on climate-friendly behavior of the general population (T3).[26]

4.2 Heterogeneity in Treatment Effects

Sample splits We next study the heterogeneity in the response across different subsamples and present detailed results in Appendix B. Substantial variation in esti-

[25] p-value=0.25 of the respective t-test.

[26] The differences in treatment effects across treatment arms also suggests that survey demand effects are unlikely to drive the results. Each survey participants only observes one treatment and is not aware of the other treatments arms. Hence, simple experimenter demand effects cannot explain why those receiving the *peer* framing react more strongly than those receiving the *scientific* framing, at least in terms of point estimates that differ quite substantially in economic terms.

mated effects exists across sociodemographic characteristics, though most estimates are imprecisely estimated, so that differences are not statistically significant. Moreover, those who were ex ante already more likely to be positively disposed towards taking actions to fight climate change display a larger reaction to the information treatments. Specifically, individuals with a higher degree of climate concerns, as well as environmentally-oriented and left-leaning voters are more responsive. In contrast, individuals with a high degree of coronavirus concerns react slightly less to the information treatments.

These results might suggest that increasing people's WTP by informing them about ways to fight climate change is contingent on people's ideological orientation and prior stance towards the environment. However, we want to stress that the standard errors of several point estimates are large, likely due to the limited number of observations of the respective subsamples, which hinders us from making precise statistical statements.

Intensive and Extensive Margin Table 3 shows that the point estimates differ across different treatment arms. This heterogeneity might reflect differences in the number of treated individuals reacting (extensive margin) or differences in the reaction conditional on reacting (intensive margin). We identify the extensive margin through a positive change in the WTP after treatments, that is, we create a dummy variable that equals one if the post-treatment WTP is larger than the pre-treatment WTP.[27]

Around 63% of respondents in the control group exhibit a positive change in WTP. Columns (3) and (4) in Table 4 report marginal effects from a logistic regression of the probability of having a positive change in WTP on the pooled *peer* and *scientific* information treatments.[28] Receiving information on climate change with either a scientific or a peer framing increases the probability of a positive change in WTP by 10 percentage points compared to the control group. The extensive margin is almost identical across both treatment groups suggesting any difference in the average

[27] Table F.6 in Appendix F shows the results are qualitatively similar when we create a dummy variable that equals one if the change between the pre- and post-treatment WTP is larger than the change in the control group.

[28] Columns (1) and (2) in Table 4 replicate the baseline results from Table 3 for comparison.

change in the WTP across the two groups must originate from a different average change in the WTP conditional on updating the WTP.

To study the intensive margin, we regress the change in WTP on the treatments conditional on a positive change in the WTP. Columns (5) and (6) illustrate the intensive margin is economically significant as well, albeit less precisely estimated.[29] The intensive margin for the *peer* information about climate change is relatively stronger than for the *scientific* information. Hence, the intensive margin drives the stronger overall treatment effect of the *peer* information compared to the *scientific* information in columns (1) and (2). These results suggest the framing matters for how much people react to the information but it does not result in a different fraction of the population reacting to the information.

5 Information Acquisition and Salience of Climate Risks

So far, we have studied how individuals react to information that we provide in a survey. Yet, it is unclear whether people in real life would actually choose to acquire and read information about climate change. To explore this issue, we administer an endogenous information experiment in the spirit of D'Acunto et al. (2021) and Fuster et al. (2020) in which we study whether people are interested in acquiring information about climate change. A secondary goal of the experiment is to test whether simply raising the salience of physical climate risk induces a treatment effect comparable to providing information on effective actions to mitigate climate change.

We fielded a follow-up survey module in the March 2021 wave of the BOP-HH. In the first step of the experiment, we offer survey participants a choice between different pieces of information: a short introduction informs participants that they would see an excerpt from a newspaper article on a frequently discussed topic and that they would receive a few questions about the article subsequently. We offer them the choice between articles about climate change and population aging, but they could also choose not to see any information.

[29] The effect is statistically significant at the 10 percent level for the *peer* information on climate change, but not for the *scientific* information when controlling for sociodemographics.

In the second step, we generate exogenous variation in the salience of climate change risks. For those that chose the climate change topic, we randomly split the sample in half and provide each of the two subsamples with an article on climate change with a different spin: One half received an article discussing the threats that climate change poses to the population in Europe. The article makes climate change risks particularly salient by stating that *"around 350 million Europeans could be exposed to harmful extremes of climate each year"*. We refer to this article as the positive spin article. The other half, instead, received an article discussing claims by academics that climate change had been observed before in history and is caused by natural processes and cosmic influences, thereby inherently disputing the associated climate change risks. We refer to this article as the negative spin one, as it is intended to downplay the problem of climate change. The population aging article discusses the overall aging of the German society over the next decades.

All texts are excerpts of about 120 words from articles published in the same newspaper, the Frankfurter Allgemeine Zeitung (FAZ), one of the most well-regarded newspapers in Germany, ensuring that any differences across treatments could not be attributed to differences in the credibility of the source of the article (Coibion et al., 2022). In the third step, we elicit respondents' interest in the article on a Likert scale and their WTP for carbon offsetting of a return flight to Mallorca in the same way as in the August 2020 wave.

In addition, we elicit individuals' attitudes towards the environment but also population aging at the very beginning of the survey.[30] We create principal components summarizing individuals' attitudes as in the August 2020 wave.[31] One month later, in the April wave of the BOP-HH, we again elicit the WTP for carbon offsetting of a return flight to Mallorca to test for a possible longer-lasting effects of the treatment.[32]

[30] We ask the question on attitudes at the very beginning of the survey, whereas we offer respondents the choice between different sources of information at the very end of the questionnaire to alleviate concerns that the former influences individuals' information choice.

[31] Table F.7 in the Online Appendix reports descriptive statistics for this survey wave. Table F.8 in Appendix F reports the loadings from the principal component analysis of the items measuring attitudes towards the environment or climate change and an aging society. We again standardize the attitudes scales.

[32] Appendix A.2 and Appendix A.3 provide the questionnaire of our survey modules that we fielded

5.1 Endogenous Information Selection

Figure 2 depicts the article choice of respondents. 47% of the sample chose the climate change article, 36% chose the article about aging, and 17% did not want to read any article.[33] Hence, survey participants display a widespread interest in climate change with about half of the survey population interested in reading about it. However, the other half of the population does not want to acquire further information on climate change, illustrating that respondents differ in their information choices.

To explore the source of this heterogeneity in information selection, we study multivariate relationships between the choice of a certain topic, such as climate change and sociodemographics, attitudes, political leaning, as well as prior WTP for voluntary carbon offsetting. Each column of Table 5 reports regression results from a linear probability model using a dummy equal to one if individual i selected the topic indicated in the column header as dependent variable.[34]

Individuals' attitudes towards the environment and population aging significantly predict their article choices: A one-standard-deviation increase in the environmental attitudes scale is associated with a 9 percentage point increase in the probability of choosing the climate change article, whereas a corresponding increase in the attitudes towards aging is associated with a 9 percentage point decrease in the same probability (Panel A). These effects are statistically and economically significant given that about half of the sample selects the climate article. For a small subset of respondents that participated in previous waves, in particular in September and October 2020, we also observe their political leaning and their prior WTP for voluntary carbon offsetting (Panel B). Relative to supporters of the Green party, all others tend to be less likely to choose the article about climate change. Finally, the prior WTP is also a strong predictor of choosing this article (Panel C).

These correlations suggest individuals choose articles that largely align with their prior stance towards certain topics and avoid information that might challenge their existing beliefs, in line with motivated beliefs and dissonance avoidance in particular

in March and April 2021.

[33] A test on the equality of proportions rejects the null hypothesis of no difference at the 1% level.

[34] Table F.10 in Appendix F shows that multinomial logit regressions yield similar results.

(Festinger, 1957).[35]

5.2 Salience of Climate Risk and WTP for CO2 offsetting

The previous subsection indicates individuals choose articles whose content largely align with their predisposition towards certain topics. We now want to understand whether simply changing the tone and spin regarding a certain topic has the potential to affect individuals' views on it. To that end, we compare the WTP for voluntary carbon offsetting elicited immediately after but also one month after the intervention between those who read the climate change article with the positive spin highlighting the risk of climate change for people in the European Union and those who read the article with the negative spin questioning human-made climate change.[36]

Panel A in Table 6 reports results from a regression of the WTP on a dummy equal to one if individual i reads the positive spin article using the sample restricted to those who selected the climate change topic. The immediate WTP is higher by about €0.9 for those who received the article with the positive spin compared to the negative spin. The difference is not statistically significant and vanishes after one month.

The small reaction to the article with the positive spin might seem puzzling at first, given that climate-friendly individuals, who are more likely to select themselves into the endogenous information provision, react more strongly in the exogenous information experiment, as we discuss in Appendix B. The insignificant result, however, is consistent with the idea that individuals with strong priors towards climate change, i.e. scoring high on the environmental attitudes scale, do not change their view when reading a single article questioning the human-made nature of climate change.

To test whether this mechanism is plausible, we investigate whether those that have a weaker stance towards climate change have a higher WTP after reading the article with the positive spin compared to reading the article with the negative spin. Ex-

[35] The theory of cognitive dissonance suggests that people feel uncomfortable if they are exposed to information that is inconsistent with their existing beliefs (Festinger, 1957). See also the discussion on motivated beliefs in Bénabou and Tirole (2016) and Faia, Fuster, Pezone, and Zafar (2021).

[36] Table F.11 in Appendix F shows the covariates do not differ significantly across the two samples.

ploiting the variation in the extent to which people support fighting climate change, we split the sample of survey participants choosing the climate change article along tertiles of the environmental attitudes scale in Panel B of Table 6. Reading the article with the positive spin increases the WTP of those in the middle third of the environmental attitudes scale by €3.5, which is statistically significant. For respondents in the bottom and top third of the scale, we do not find an effect of reading the positive article compared to reading the article with the negative spin. Hence, although those who have strong negative or positive priors towards climate change do not react to information making human-made climate change risks salient, those with a weaker stance towards the topic do react.

Finally, Table 7 shows in another way that individuals digest the same piece of information in opposite ways if they differ in their priors. Within the sample of survey participants choosing the climate change article, we compare peoples' attitudes towards the environment across groups rating the same article either as interesting or not.[37] Among those who read the article with the positive spin, the respondents that report that they found the article interesting have higher scores on the environmental attitudes scale than those that did not find the article interesting.[38] Conversely, among those who read the article with the negative spin, respondents who have a high interest in the article score significantly lower on the environmental attitudes scale than those that reported no interest. These results suggest people prefer information that reinforces their views towards climate change and dismiss information conflicting with their views.[39]

[37] We define being interested in the article as dummy variable that takes the value of 1 if an individual rates the article as 4 or higher on a Likert scale from 1 ("not interesting at all") to 8 ("very interesting").

[38] Recall that we elicited the environmental attitudes before providing the articles.

[39] The finding that the same piece of information is given diametrically opposite ratings if individuals have opposing priors can be interpreted as example of *asymmetric Bayesianism* (Glaeser and Sunstein, 2013).

6 Willingness to Invest into Green Assets

The previous sections have studied how information about climate change affects individuals' WTP for CO2 offsets. One might wonder to what extent these findings also apply to financial outcomes. To shed light on this question, we study how informing people about the positive contribution of green investments to combating climate change can influence their beliefs and investment choices and motivate them to invest in 'green assets', that is, in stocks of companies that operate in a climate-friendly way and thus contribute to combating climate change.

We designed another information experiment and fielded it in the April 2024 wave of the BOP-HH. The experimental setup contains four steps: i) prior elicitation of return expectations, ii) information treatment, iii) posterior elicitation of return expectations, iv) hypothetical portfolio choice that includes the opportunity to allocate funds into green assets.[40] Respondents are randomly assigned to one of four groups.[41] The first group does not receive any substantive information and serves as the control group. The other groups receive information related to investing in green assets. The treatments (T) read as follows:[42]

- **T1 (*Scientific framing*)**
  Financial studies show that investing in "green" shares and investment funds can make an important contribution to climate change mitigation. This is because investing in such shares and investment funds can help "green" enterprises to obtain financing at more favourable conditions and thus promote climate-friendly investment.

- **T2 (*Scientific framing + expected returns*):**
  Financial studies show that investing in "green" shares and investment funds can

[40] We do not incentivize answers in the survey module as Hackethal et al. (2023) find no systematic differences in behavior in incentivized and non-incentivized experimental setups.

[41] Table F.15 in Appendix F shows the different treatment groups are comparable along observable household and individual characteristics.

[42] Appendix A.4 provides the corresponding questionnaire for the survey module fielded in April 2024.

make an important contribution to climate change mitigation. This is because investing in such shares and investment funds can help "green" enterprises to obtain financing at more favourable conditions and thus promote climate-friendly investment. However, the expected return on these "green" investments is lower than the return on conventional investments.

- **T3 (*Peer framing* + *expected returns*):**
  Many [X to Y]-year-olds in Germany have started investing their money in "green" shares and investment funds. In doing so, they can make an important contribution to climate change mitigation. This is because investing in such shares and investment funds can help "green" enterprises to obtain financing at more favourable conditions and thus promote climate-friendly investment. However, the expected return on these "green" investments is lower than the return on conventional investments.[43]

Treatments T1 to T3 inform respondents that investing into green assets can help fighting climate change by lowering the cost of capital of green firms.[44] Thereby, the statement implicitly presents a way in which individuals can contribute to mitigating climate change and appeals to personal norms, similarly to our first experiment on WTP for carbon offsetting in Section 2. Furthermore, similar to our first experiment, we vary the framing between the treatments: respondents in treatments T1 and T2 receive the information framed as *scientific* research, whereas respondents in T3 receive the information as the behavior of Germans in their age cohort (*peer* framing).[45] We also vary whether we mention the cost of investing in green assets in the form of lower expected returns: [46] treatments T2 and T3 additionally add the information that investing in green assets comes at the cost of lower expected returns compared to conventional assets.[47]

[43] The age brackets encompass the age of the survey respondent.

[44] After the term "green", an info box with the following text is displayed in the survey: *Firms are referred to as "green" if they operate in a comparatively environmentally- and climate-friendly manner.*

[45] Aron-Dine et al. (2024) show that investing into green assets is popular in Germany across all age cohorts, though different age groups invest in different forms of green investments.

[46] To ensure enough statistical power, we decided to only have three treatment groups.

[47] Ľuboš Pástor, Stambaugh, and Taylor (2021) show theoretically that green assets have lower ex-

Before the treatments, we elicit respondents' prior return expectations, asking them about the minimum, maximum, and most likely expected percentage change in the value of the following two investments over the next twelve months: i) investment A, which has the same expected return and the same risk as the German stock index (DAX 40); ii) investment B ('green asset'), which contains only "green" enterprises from the German stock index (DAX 40) and has the same risk as the DAX 40.

After the treatments, we elicit posterior return expectations in the form of a point forecast of the expected percentage change in investment A (DAX 40) and investment B ('green asset'), respectively, over the next twelve months. We retrieve posterior expectations using a different question format, i.e. asking for a point forecast, to avoid repeating the same questions and to lessen survey fatigue.

At the end of the survey module, respondents face a hypothetical portfolio choice problem. We ask them how they would allocate an endowment of €10,000 across the following three investment opportunities: (i) financial investment A, which has the same expected return and the same risk as the German stock index (DAX 40), ii) financial investment B, which contains only "green" enterprises from the German stock index (DAX 40) and has the same risk as the DAX 40, and iii) financial investment C, a risk-free investment whose value will increase by 1.5% over the next twelve months.

6.1 Portfolio choice

Respondents in the control group invest 27% of their endowment into the green assets on average, 30% into the assets tied to the DAX 40, and 43% into the riskless asset, see Table F.15.[48]

To test how the different information treatments causally affect respondents' green investment behavior, we estimate the following equation:

$$Inv.Share_i^j = \alpha + \sum_{s=1}^{S} \beta_s \times Treatment_{s,i} + \delta \boldsymbol{X_i} + error, \tag{2}$$

pected returns because investors enjoy holding them and because green assets hedge climate risk.

[48] Table F.14 reports further descriptive statistics for the survey module fielded in April 2024.

where i indexes respondents and $Inv.Share_i^j$ is the share of respondent i's endowment invested into investment j. $Treatment_{s,i}$ is an indicator variable equal to one if respondent i received information treatment s and zero otherwise. The β_s coefficients provide an estimate of the average effect of each treatment on investing into investment j relative to the control group. $\boldsymbol{X_i}$ is a vector comprising the same household/individual-specific characteristics we used in Equation 1.

Panel A of Table 8 reports regression results for different specifications of Equation 2 for the green investment. Column (1) reports the effect of each treatment without including covariates. Column (2) reports the treatment effect when controlling for household and individual-specific characteristics. We report robust standard errors in parentheses.

Respondents receiving the information that investing in "green" shares and investment funds can make an important contribution to climate change mitigation (T1) exhibit a three percentage point higher green investment share on average compared to the control group. The effect is statistically significant and also economically meaningful, as it corresponds to an increase in the green investment share of 11% relative to the control group. The effect becomes economically weaker and loses statistical significance once we add the information that the expected return of green assets is lower than the return of conventional investments (T2). Framing the information as reflecting the behavior of people in their age group but also informing survey participants about the costs in terms of lower expected returns (T3) results in a treatment effect similar in magnitude to treatment T1, even though statistical significance is weaker. However, we cannot reject the null hypothesis that the two treatment coefficients are equal.[49]

Panel B shows that the higher share of respondents investing in green assets in T1 comes at the expense of the investment share in the DAX 40. In contrast, respondents in T2 and T3 have shares invested in the DAX 40 that are similar to respondents in the control group. Finally, Panel C serves as a placebo and indicates that all respondents invest identical shares in the riskless assets. The letter evidence suggest

[49] p-value= 0.39 of the respective t-test.

our information treatments do not shift other expectations of respondents or their risk preferences.

6.2 Expectation formation

To study whether heterogeneous posterior return expectations can at least in part rationalize the different shares allocated into the green investment, we now study how respondents instantaneously update their return expectations in response to the information provision.

In the analysis, we use the most likely expected change as measure for individuals' prior return expectations. We trim prior and posterior return expectations at 5% of the distribution to avoid results being influenced by outliers. Table F.15 shows individuals' pre-treatment and post-treatment expectations for the return of the green asset and the DAX 40 over the next 12 months. Individuals in the control group expect the DAX 40 to increase by 8.8% over the next 12 months consistent with the average annual realized return since 1950 (Schnorpfeil et al., 2024).[50]

We regress the difference between the posterior and prior return expectations on the treatment indicator, using the following regression equation:

$$E[R_j]_i^{post} - E[R_j]_i^{prior} = \alpha + \sum_{s=1}^{S} \beta_s \times Treatment_{s,i} + \boldsymbol{\delta X_i} + error, \tag{3}$$

where $E[R_j]_i^{post}$ and $E[R_j]_i^{prior}$ is respondent i's posterior and prior return expectation, respectively, for asset j. α controls for a potential expectations revision even in the control group due to different elicitation methods before and after the information provision.[51] The treatment indicator variable $Treatment_{s,i}$ is equal to one if respondent i received information treatment s and zero otherwise. The coeffi-

[50] Figure E.5 shows the distribution of the prior and posterior return expectations for the green assets and the assets tied to the DAX 40.

[51] In the control group the mean of the most likely expected return of the DAX 40 and the green assets, respectively, is lower than the return expectations elicited as point forecast, as shown in Table F.15. Importantly, this effect in the control group that likely arises due to different elicitation methods, noise, and mean reversion in answers does not affect our regression results as our econometric approach exploits the difference in the updating behavior between treatment and control groups.

cient of interest is β_s which tells us whether respondents in treatment group s revise their return expectations upward or downward relative to the control group. $\boldsymbol{X_i}$ is a control vector comprising the same household/individual-specific characteristics used in Equation 1.

Table 9 shows individuals revise their return expectations for the green assets downward once they are informed that the return of green investments is lower than the return of conventional investments: Respondents in treatment groups T2 and T3 exhibit a significant, negative change in their expectations about the returns of the green assets relative to the control group. The effect amounts to about 50bps, which corresponds to about 11 % of the average posterior return expectation in the control group. In contrast, treatment T1, which does contain information about costs of investing in green assets results in similar updates of expected returns for the green assets as the control condition. We find no differential return updating of any of the treatment groups relative to the control group for the DAX 40 (column (3) and (4) of Table 9). This result is important because it allows us to rule out that our treatments shift other aspects of individuals mental models of investment in green assets. It suggests the treatment effects we document for portfolio shares in green assets operate through individuals' return expectations for green assets and their willingness to contribute to climate change mitigation.

Taken together, our survey participants become more willing to increase their portfolio share into green assets once they learn about their positive impact on mitigating climate change. However, this willingness fades once they also learn that green assets have lower expected returns, unless the information is paired with a description that already many others similar to them also invest into them. The treated individuals update their return expectations downwards but only in the treatment groups that learn about the lower expected returns, indicating the treatment largely operates through return expectations in addition to doing something good for the environment. This updating behavior is consistent with the behavior of so called *financial sustainable investors* (Degryse et al., 2023). These investors primarily invest into green assets because they a priori expect higher returns for them. If they learn

that returns are actually lower, they revise their return expectations for green assets and reduce their investments in them.

7 Conclusion

We examine how information on actions to mitigate climate change affects the willingness to pay for offsetting CO2 emissions. We implement a randomized information provision experiment on a large, representative sample of German households. Providing information on ways to reduce CO2 emissions causally increases the willingness to pay for voluntary carbon offsetting in a hypothetical setting. Individuals receiving information framed as behavior of peers react economically stronger compared to those receiving information framed as *scientific* research.

In a subsequent endogenous information acquisition experiment, we find about half of the sample is interested in reading and learning more about climate change, whereas only one-third selects an article about population aging. Individuals with more positive environmental attitudes are more likely to select the article about climate change, suggesting that individuals choose information that largely aligns with their prior stance towards a topic and disregard information that might challenge their existing beliefs. Conditional on choosing an article on climate change, varying the content of the article with respect to the salience of climate change does not result in differences in the average WTP across groups. Yet, respondents who do not hold strong prior opinions about climate change do increase their WTP when climate change risk is made salient.

Finally, we study whether individuals are willing to allocate funds into green assets, that is, stocks of companies that operate in a climate-friendly way, to mitigate climate change. We find that survey participants increase their share allocated to green funds by 11% once they learn they can do something good for the environment. The effect vanishes if we do inform them that these stocks have lower expected returns, unless the lower expected return information is paired with information that many other investors already invest in green assets, likely adding a *peer*

pressure component.

Overall, our results suggest that informing individuals of ways to combat climate change can be a powerful tool in persuading them to reduce their carbon footprint. Beyond the information content, appealing to internalized personal norms, or invoking adherence to social norms, can effectively motivate individuals towards more climate-friendly behavior.

Further research is needed to understand how the insights from this paper translate into equivalent behavior using revealed preference data and how the willingness to pay for offsetting carbon emissions from a single flight translates into a broader reduction in climate emissions in the aggregate, as well as how individuals change their actual portfolio allocation in response to information on how this action can contribute to mitigate climate change.

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Tables and Figures

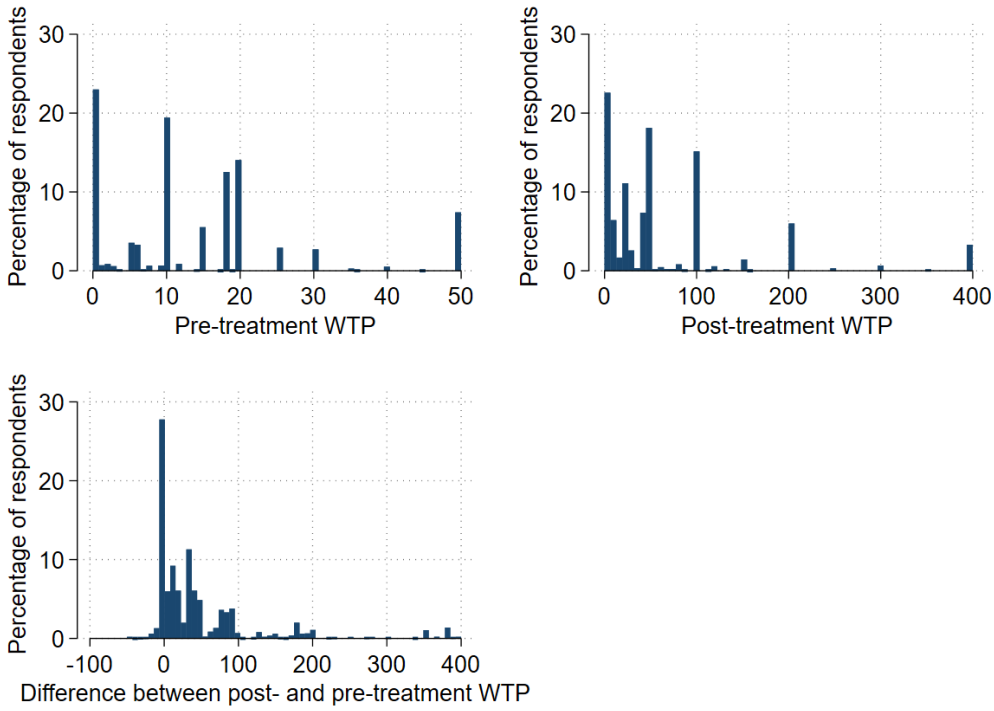

Figure 1: Distribution of the willingness to pay for CO2 compensation

Source: BOP-HH, August 2020

Note: This figure plots the distribution of the willingness to pay for voluntary CO2 compensation for a continental flight before any information treatment (upper left), the willingness to pay for voluntary CO2 compensation for an intercontinental flight after information treatments (upper right) and the difference between these two (lower panel). Data are weighted.

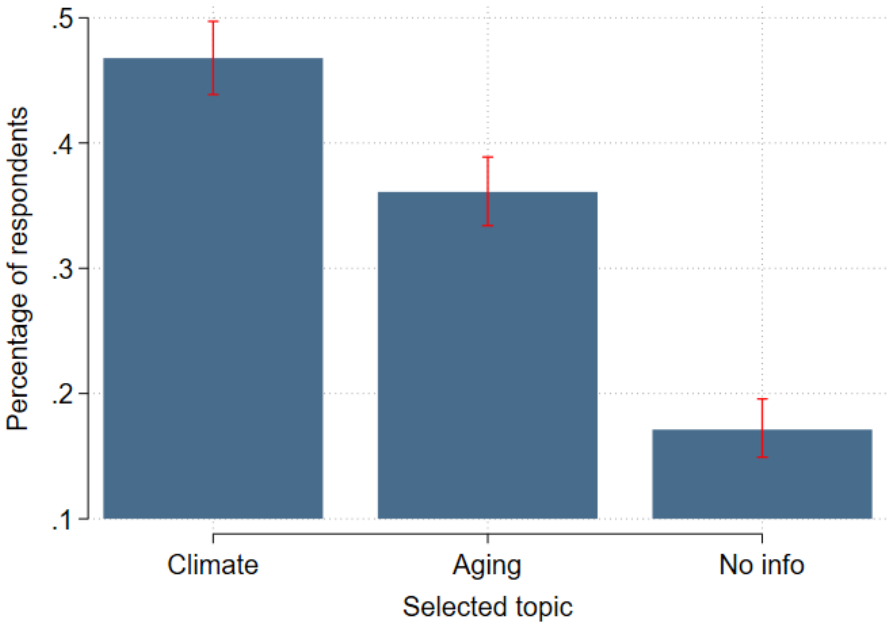

Figure 2: Article choices of respondents

Source: BOP-HH, March 2021.
Note: This figure reports the percentage of respondents that chose to read information on climate change, aging of society, and no information, respectively. Red bars indicate 95% confidence intervals. Data are weighted.

Table 1: Summary statistics, BOP-HH August 2020 wave

	Mean	SD	Median	Min	Max	Obs.
Pre-treatment WTP	14.08	13.26	10.00	0.00	50.00	1916
Post-treatment WTP	64.44	84.95	40.00	0.00	400.00	1886
Δ WTP (post-pre)	47.27	76.42	20.00	-50.00	400.00	1818
Age	47.01	17.81	48.00	16.00	80.00	2023
Female	0.48	0.50	0.00	0.00	1.00	2023
Working	0.63	0.48	1.00	0.00	1.00	2023
Not working	0.12	0.33	0.00	0.00	1.00	2023
Retired	0.25	0.43	0.00	0.00	1.00	2023
High school or less	0.70	0.46	1.00	0.00	1.00	1996
Bachelor or equivalent	0.15	0.36	0.00	0.00	1.00	1996
Higher than bachelor	0.15	0.36	0.00	0.00	1.00	1996
Homeowner	0.55	0.50	1.00	0.00	1.00	2022
HHinc <€1500	0.12	0.32	0.00	0.00	1.00	1945
HHinc €1500-3000	0.35	0.48	0.00	0.00	1.00	1945
HHinc €3000-5000	0.36	0.48	0.00	0.00	1.00	1945
HHinc €5000+	0.17	0.37	0.00	0.00	1.00	1945
HHsize 1	0.25	0.43	0.00	0.00	1.00	2019
HHsize 2	0.38	0.49	0.00	0.00	1.00	2019
HHsize 3+	0.37	0.48	0.00	0.00	1.00	2019
East Germany	0.19	0.39	0.00	0.00	1.00	2023
City size < 20k	0.37	0.48	0.00	0.00	1.00	2023
City size 20k-100k	0.29	0.45	0.00	0.00	1.00	2023
City size 100k+	0.34	0.47	0.00	0.00	1.00	2023
Income declined	0.09	0.28	0.00	0.00	1.00	2022
Expect declining income	0.10	0.31	0.00	0.00	1.00	2022
Climate concerns	8.05	2.27	9.00	1.00	10.00	2021
Corona concerns	8.29	2.01	9.00	1.00	10.00	2022
Environmental friendliness	-0.00	1.02	0.17	-4.42	1.23	2019
Climate actions	-0.06	1.02	0.14	-2.28	3.36	2022

Source: BOP-HH wave 8, August 2020.

Notes: Cases with pre- or post-treatment WTP larger than the 95th percentile (i.e. €50 and €400, respectively) are set to missing. Income declined and expect declining income refer to individuals who report they have reduced their consumption during the coronavirus crisis due to realized or expected income losses. Variables measuring environmental friendliness and climate actions are standardized to have a mean of zero and a standard deviation of one. Results are weighted.

Table 2: Determinants of pre-treatment WTP

	(1)	(2)	(3)	(4)	(5)
Age 35-44	−1.77	−1.25	−1.31	−1.71	−1.26
	(1.43)	(1.34)	(1.41)	(1.37)	(1.35)
Age 45-54	−0.45	−0.05	−0.34	−0.68	−0.28
	(1.44)	(1.33)	(1.36)	(1.36)	(1.30)
Age 55-64	−0.17	−0.75	−0.76	−0.74	−1.05
	(1.56)	(1.49)	(1.49)	(1.47)	(1.46)
Age 65-74	1.34	0.33	0.85	0.84	0.22
	(1.94)	(1.88)	(1.89)	(1.87)	(1.85)
Age 75+	3.17	1.63	2.39	1.99	1.34
	(2.42)	(2.34)	(2.35)	(2.38)	(2.34)
Female	1.90**	0.39	0.23	0.89	−0.17
	(0.84)	(0.81)	(0.80)	(0.81)	(0.77)
Bachelor or equivalent	1.27	0.70	1.36	0.75	0.67
	(1.47)	(1.57)	(1.60)	(1.60)	(1.63)
Higher than bachelor	3.68***	2.50**	2.64**	2.43**	1.95*
	(1.10)	(1.05)	(1.09)	(1.13)	(1.09)
Not working	−1.39	−1.54	−1.89	−2.14	−2.06
	(1.61)	(1.50)	(1.55)	(1.54)	(1.49)
Retired	−1.99	−1.31	−2.03	−2.65*	−1.91
	(1.54)	(1.48)	(1.51)	(1.55)	(1.51)
HHinc €1500-3000	−1.72	−1.12	−1.86	−1.78	−1.42
	(1.71)	(1.63)	(1.65)	(1.69)	(1.64)
HHinc €3000-5000	−0.94	−0.80	−1.35	−1.01	−1.05
	(1.82)	(1.72)	(1.72)	(1.77)	(1.70)
HHinc €5000+	−0.61	−0.38	−0.93	−0.84	−0.71
	(2.10)	(1.97)	(2.03)	(2.01)	(1.94)
Homeowner	−0.49	0.11	0.22	−0.49	0.12
	(0.94)	(0.90)	(0.93)	(0.90)	(0.89)
HHsize 2	−0.46	−0.06	−0.30	−0.77	−0.29
	(1.30)	(1.23)	(1.23)	(1.24)	(1.22)
HHsize 3+	1.00	1.19	0.67	0.71	0.87
	(1.74)	(1.74)	(1.83)	(1.76)	(1.83)
East Germany	−1.34	−0.62	−0.88	−1.25	−0.71
	(1.25)	(1.23)	(1.25)	(1.20)	(1.21)
City size 20k-100k	0.15	0.15	0.81	0.12	0.34
	(0.94)	(0.90)	(0.91)	(0.89)	(0.90)
City size 100k+	1.99*	2.09*	2.13*	2.25**	2.21**
	(1.11)	(1.08)	(1.13)	(1.11)	(1.10)
Income declined	−1.73	−1.72	−2.07	−2.38	−2.18
	(1.67)	(1.44)	(1.59)	(1.57)	(1.43)
Expect declining income	0.97	0.78	0.54	−0.05	0.20
	(1.48)	(1.43)	(1.39)	(1.41)	(1.37)
Climate concerns		4.14***			2.63***
		(0.44)			(0.49)
Environmental friendliness			3.86***		1.34**
			(0.57)		(0.64)
Climate actions				3.16***	1.62***
				(0.56)	(0.51)
Constant	13.77***	13.88***	14.75***	15.69***	15.20***
	(2.03)	(1.91)	(1.95)	(2.05)	(1.93)
Adjusted R^2	0.02	0.11	0.10	0.07	0.13
Observations	1827	1826	1823	1826	1821

Source: BOP-HH wave 8, August 2020.

Notes: The table reports results from OLS regressions of the pre-treatment WTP on covariates. Column (1) only considers individual and household characteristics, while the remaining columns additionally take into account respondents' concerns about climate change (column 2), environmental friendliness (column 3), and actions to fight climate change (column 4), as well as all covariates jointly (column 5). Income declined and expect declining income refer to individuals who report they have reduced their consumption during the coronavirus crisis due to realized or expected income losses. Variables measuring concerns, environmental friendliness and actions to fight climate change are standardized to have a mean of zero and a standard deviation of one. Results are weighted. Robust standard errors are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Average treatment effect on ΔWTP_i

	(1)		(2)	
	β	SE	β	SE
Panel A:				
Treatment (T1-T4)	14.61**	(6.58)	16.38***	(6.26)
Adjusted R^2	0.01		0.04	
Panel B:				
Scientific framing (T1+T2)	10.89*	(6.59)	13.38**	(6.14)
Peer framing (T3+T4)	18.23**	(7.91)	19.27**	(7.59)
Adjusted R^2	0.01		0.04	
Panel C:				
T1: General research	10.86	(7.42)	13.31*	(7.05)
T2: Government research	10.92	(7.27)	13.46**	(6.76)
T3: Other people in Germany	18.26**	(8.38)	19.66**	(8.04)
T4: Own age cohort	18.20*	(10.51)	18.90**	(9.58)
Adjusted R^2	0.01		0.04	
Sociodemographics	No		Yes	
Observations	1737		1737	

Source: BOP-HH wave 8, August 2020.

Notes: The table reports average effects of different information treatments on the change in WTP relative to the control group. Panel A pools all treatment groups (T1-T4). Panel B compares the *scientific* (T1+T2) and the *peer* information framing (T3+T4). Panel C considers all treatments groups separately. Even columns control for socio-demographics. Results are weighted. Robust standard errors are reported in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 4: Extensive and intensive margins

	ΔWTP_i		I(ΔWTP_i >0)		$\Delta WTP_i \mid \Delta WTP_i$ >0	
	(1)	(2)	(3)	(4)	(5)	(6)
Scientific framing (T1+T2)	10.89*	13.38**	0.10**	0.10**	6.68	10.08
	(6.59)	(6.14)	(0.04)	(0.04)	(9.02)	(8.51)
Peer framing (T3+T4)	18.23**	19.27**	0.10**	0.11**	16.59	17.28*
	(7.91)	(7.59)	(0.04)	(0.04)	(10.67)	(10.05)
Sociodemographics	No	Yes	No	Yes	No	Yes
Observations	1737	1737	1737	1737	1201	1201

Source: BOP-HH wave 8, August 2020.

Notes: Columns (1) and (2) report average effects of different information treatments on the change in WTP relative to the control group. Columns (3) and (4) report the extensive margin of treatment effects defined as the probability of a positive change in WTP (marginal effects from a logistic regression of a dummy equal to one if the change in WTP is positive on the treatments). Columns (5) and (6) report the intensive margin of treatment effects (OLS regression), defined as the size of the change in a respondent's WTP conditional on a positive change in WTP. Even columns control for sociodemographics. Results are weighted. Robust standard errors are reported in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 5: Determinants of information selection

	Climate (1)	Aging (2)	No info (3)
Panel A: Attitudes			
Environmental attitudes	0.09***	−0.03**	−0.06***
	(0.01)	(0.01)	(0.01)
Aging attitudes	−0.09***	0.10***	−0.00
	(0.01)	(0.01)	(0.01)
Sociodemographics	Yes	Yes	Yes
Adjusted R^2	0.10	0.05	0.05
Observations	2424	2424	2424
Unconditional average	0.49	0.37	0.14
Panel B: Party affiliation			
SPD/The Left	−0.08	0.10	−0.02
	(0.09)	(0.08)	(0.05)
CDU/CSU	−0.26**	0.20*	0.06
	(0.09)	(0.08)	(0.05)
Other	−0.35***	0.27**	0.08
	(0.09)	(0.09)	(0.06)
Sociodemographics	Yes	Yes	Yes
Adjusted R^2	0.07	0.08	0.03
Observations	261	261	261
Unconditional average	0.52	0.38	0.10
Panel C: Prior WTP			
WTP (€10)	0.04**	−0.04**	−0.00
	(0.01)	(0.01)	(0.01)
Sociodemographics	Yes	Yes	Yes
Adjusted R^2	0.03	0.02	0.03
Observations	616	616	616
Unconditional average	0.51	0.39	0.10

Source: BOP-HH waves 9, 10, and 15.

Notes: This table reports results from an OLS regression using a dummy variable as outcome variable that equals one if information on climate change, population aging, and no information was selected, respectively. Panel A reports coefficients from a multivariate regression on environmental attitudes and attitudes towards population aging using the BOP-HH wave 15 data set. For ease of interpretation, the attitudes scales are standardized to have a mean of zero and a standard deviation of one. Panel B reports coefficients from a multivariate regression on party affiliation (Greens as base level) and using the matched BOP-HH wave 9 and 15 data set. Panel C reports coefficients from a multivariate regression on WTP (units are €10) using the matched BOP-HH wave 10 and 15 data set. All regressions control for sociodemographics. The full list of regressors is reported in Table F.9 in the Online Appendix. Robust standard errors are reported in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 6: Effect of the positive spin article, making climate risks salient, on WTP

Panel A: Average spinning effect

	Immediate WTP		WTP after one month	
	(1)	(2)	(3)	(4)
Positive spin	0.89	0.90	0.25	0.31
	(0.89)	(0.89)	(1.17)	(1.17)
Sociodemographics	No	Yes	No	Yes
Adjusted R^2	0.00	0.02	-0.00	0.02
Observations	1103	1103	562	562
Unconditional average	16.81	16.81	15.41	15.41

Panel B: Spinning effect by environmental attitudes

	Lowest third	Middle third	Upper third
Positive spin	–0.56	3.52**	–0.73
	(1.65)	(1.51)	(1.35)
Sociodemographics	Yes	Yes	Yes
Adjusted R^2	0.00	0.05	0.01
Observations	282	355	464
Unconditional average	9.48	18.18	20.23

Source: BOP-HH waves 15 and 16.

Notes: Panel A reports the average treatment effect of reading an article about climate change with a positive spin on WTP for voluntary CO2 compensation using negative spinning as the control group. Columns (1) and (2) report the immediate responses (wave 15). Columns (3) and (4) report the responses of panel households after one month (wave 16). Even columns control for sociodemographics.

Panel B reports the treatment effect of reading an article about climate change with a positive spin on WTP for voluntary CO2 compensation for the lowest third, middle third and upper third of the pro-environmental attitudes scale, as compared to those who read an article about climate change with a negative spin. All regressions include controls for sociodemographics. Robust standard errors are reported in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 7: Environmental attitudes by spinning and interest in climate change article

	Interested in article			
	Yes	No	Difference	P-value
Positive spin	0.40	-0.19	0.59	0.00
Negative spin	0.00	0.24	-0.24	0.00

Source: BOP-HH wave 15, March 2021.

Notes: This table reports the average of the environmental attitudes scale for the different treatment groups (positive and negative spinning of climate change article) split by whether respondents rated the provided article as interesting. Column (3) reports the row-wise difference in means. Column (4) reports a p-value from a t-test on the equality of means. The environmental attitudes scale is standardized to have a mean of zero and a standard deviation of one. Being interested in the article is defined as rating the article as 4 or higher on a Likert scale from 1 ('not interesting at all') to 8 ('very interesting'). The sample is restricted to those respondents who choose to read information about climate change.

Table 8: Average treatment effect on portfolio choice

Panel A: Green investment				
	(1)		(2)	
	β	SE	β	SE
T1: Scientific framing	0.03**	(0.02)	0.03**	(0.02)
T2: Scientific framing + expected returns	0.01	(0.02)	0.01	(0.01)
T3: Peer framing + expected returns	0.03	(0.02)	0.03*	(0.02)
Sociodemographics	No		Yes	
Adjusted R^2	0.00		0.04	
Observations	3376		3376	
Unconditional average	0.28		0.28	
Panel B: DAX 40				
	(1)		(2)	
	β	SE	β	SE
T1: Scientific framing	–0.03*	(0.02)	–0.03*	(0.02)
T2: Scientific framing + expected returns	0.00	(0.02)	0.01	(0.02)
T3: Peer framing + expected returns	–0.00	(0.02)	–0.00	(0.02)
Sociodemographics	No		Yes	
Adjusted R^2	0.00		0.07	
Observations	3376		3376	
Unconditional average	0.28		0.28	
Panel C: Risk free investment				
	(1)		(2)	
	β	SE	β	SE
T1: Scientific framing	–0.00	(0.02)	–0.00	(0.02)
T2: Scientific framing + expected returns	–0.02	(0.02)	–0.02	(0.02)
T3: Peer framing + expected returns	–0.02	(0.02)	–0.02	(0.02)
Sociodemographics	No		Yes	
Adjusted R^2	-0.00		0.09	
Observations	3376		3376	
Unconditional average	0.39		0.39	

Source: BOP-HH wave 52, April 2024.

Notes: The table reports average effects of different information treatments on the share of respondents' endowment invested into green assets (Panel A), the DAX 40 (Panel B) and the risk-free asset (Panel C). Column (2) controls for socio-demographics. Results are weighted. Robust standard errors are reported in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 9: Average treatment effect on return expectations

	Green asset		DAX 40	
	(1)	(2)	(3)	(4)
T1: Scientific framing	0.26	0.22	−0.60	−0.57
	(1.22)	(1.04)	(−0.96)	(−0.94)
T2: Scientific framing + expected returns	−0.48**	−0.55**	−0.47	−0.44
	(−2.01)	(−2.33)	(−0.72)	(−0.72)
T3: Peer framing + expected returns	−0.43**	−0.50***	0.16	0.26
	(−2.29)	(−2.67)	(0.24)	(0.39)
Sociodemographics	No	Yes	No	Yes
Adjusted R^2	0.01	0.02	0.00	0.01
Observations	2335	2335	2547	2547
Unconditional average	−0.13	−0.13	4.01	4.01

Source: BOP-HH, April 2024.

Notes: The table reports the average treatment effect of different information treatments on the change in return expectations for the green asset and the asset tied to the DAX 40, respectively. Column (1) and (2) use the difference between the posterior and prior return expectation for the green asset as outcome variable. Column (3) and (4) use the difference between the posterior and prior return expectation for the asset tied to the DAX 40 as outcome variable. Even columns control for socio-demographics. Results are weighted. Robust standard errors are reported in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Online Appendix

Appendix A Questionnaires

Below we provide the original survey questions translated into English.

A.1 Main questionnaire (BOP-HH August 2020 wave)

Q1. WTP (pre-treatment)

When traveling by air, there is the option to offset the CO2 emissions of a flight with a voluntary payment to climate protection projects - e.g., 6 to 18 euros for a return flight from Germany to Mallorca. What amount would you be willing to pay for CO2 compensation for such a flight?

[Input field] euro

Q2. Attitudes and intentions

Below you will see some statements on various subjects. How far do you agree or disagree with the following statements? Please select an answer for each row.

1 = Strongly agree, 2 Generally agree, 3 = Neither agree nor disagree, 4 = Generally disagree, 5 = Strongly disagree

a *Priority should be given to economic growth and creating jobs, even if this is sometimes harmful for the environment.*
b *Many of the things said about climate change posing a threat to humanity and the natural world are exaggerations.*
c *Even as an individual member of the public, I can play a part in climate protection in Germany.*

Q3. Personal importance of different topics

Please state below how important the various points are for you personally and for society at large. Please state first how important the following points are for you personally: Please select an answer for each row.

1 = Not at all important, 2 = Generally not important, 3 = Neither important nor unimportant, 4 = Generally important, 5 = Very important

a *Combating climate change*
b *Protecting endangered animal and plant species*
c *Climate-friendly production of clothing*
d *Climate-friendly food production*

Q5. Perceived problems

To what extent do you think the following developments/matters are a serious problem at present? Please select the answers that apply.
1 = No problem at all 2 -> 9 [no label], 10 = An extremely serious problem

a *Climate change*
b *Brexit*
c *Coronavirus pandemic*
d *Refugee situation in Greece, Syria and Turkey*
e *The economy*

Q6. Information Treatments

Group A and group B are split randomly into five groups each.
[AGE_TEXT] will take the following values:

IF age <30 "Many people below 30"
IF age >=30 AND age <40 > "Many 30 to 39-year-olds"
IF age >=40 AND age <50 > "Many 40 to 49-year-olds"
IF age >=50 AND age <60 > "Many 50 to 59-year-olds”
IF age >=60 AND age <70 > "Many 60 to 69-year-olds"
IF age >=70 > "Many people older than 70"

CONTROL GROUP (T0): *Now let's move on to another topic. Next we would like to ask you a few more questions about how you view your spending and consumption behaviour. Please answer the following questions.*

TREATMENT GROUP RESEARCH GENERAL (T1): *Now let's move on to another topic. Carbon emissions are commonly regarded as the main cause of climate change. Studies show that an individual's carbon emissions can be effectively reduced by avoiding excessive meat consumption as well as unnecessary flights and journeys by car.*

TREATMENT GROUP RESEARCH GOVERNMENT (T2): *Now let's move on to another topic. Carbon emissions are commonly regarded as the main cause of climate change. Studies by the Federal Government show that an individual's carbon emissions can be effectively reduced by avoiding excessive meat consumption as well as unnecessary flights and journeys by car.*

TREATMENT GROUP PEOPLE IN GERMANY (T3): *Now let's move on to another topic. Carbon emissions are commonly regarded as the main cause of climate change. Many people in Germany are therefore trying to reduce their individual carbon emissions by avoiding excessive meat consumption as well as unnecessary flights and journeys by car.*

TREATMENT GROUP OWN AGE COHORT (T4): *Now let's move on to another topic. Carbon emissions are commonly regarded as the main cause of climate change. [AGE_TEXT] in Germany are therefore trying to reduce their individual carbon emissions by avoiding excessive meat consumption as well as unnecessary flights and journeys by car.*

Q7. Marginal propensity to consume

Imagine that you unexpectedly receive a one-off payment from the government, with no repayment obligation, in the amount of your monthly household income. What proportion of this amount would you use for each of the following purposes over the next twelve months? Note: Please allocate 100 points among the five specified uses.

a *Saving for future expenditure* [Input field]
b *Repaying debt* [Input field]
c *Purchasing durable goods (e.g., cars, furniture, TV, etc.)* [Input field]
d *Modernising your house / apartment* [Input field]
e *Purchasing short-lived consumer goods and services (e.g., food, clothing, holiday, etc.)* [Input field]

Q8. WTP (post-treatment)

Imagine that you are taking a return flight from Germany to the United States for €400. How much more would you be prepared to pay to offset the carbon emissions of the flight?

[Input field] euro

A.2 Questionnaire Follow Up I (BOP-HH March 2021 wave)

Q1. Attitudes

In the following, you will see several statements on various topics. To what extent do you agree or disagree with the following statements? Please select one answer for each row.

1 = Strongly agree, 2 = Generally agree, 3 = Neither agree nor disagree 4 = Generally disagree 5 = Strongly disagree

a *Priority should be given to economic growth and creating jobs, even if this is sometimes at the expense of the environment.*
b *Many of the things said about climate change posing a threat to humanity and the environment are exaggerations.*
c *Even as an individual member of the public, I can play a part in climate protection in Germany.*
d *Carbon offsetting makes an important contribution to climate protection.*
e *Population aging in Germany means that the pension system will have to be reformed.*
f *There is a connection between environmental destruction and the spread of contagious diseases.*
g *Population aging will represent a considerable challenge for Germany in the near future.*

Q2. Info selection

We will now show you a short extract from a newspaper article about a frequently discussed issue. We will then ask you some more questions. You can decide whether you would rather receive information about climate change or population aging.

a *Climate change*
b *Population aging*
c *Neither topic – I don't want to see any information.*

Q3. Info provision

IF Q2 = a OR b

TREATMENT POSITIVE SPIN (50% of respondents who select "climate change")

Risk of sharp rise in deaths resulting from extreme weather conditions? (Frankfurter Allgemeine Zeitung (FAZ), 5 August 2017)
A study shows that, by the end of this century, extreme weather in Europe could claim fifty times as many lives as it does today. [...] Unless we take urgent action in the fight against global warming, by the end of the century, "around 350 million Europeans could be exposed to harmful extremes of climate each year," the researchers write. This would be two-thirds of the total projected population for the continent in 2100. The research shows that in the reference period from 1981 to 2010, around 25 million Europeans per year were affected by extreme weather events such as heatwaves, cold snaps, forest fires or flooding – i.e. around 5% of the population.

TREATMENT NEGATIVE SPIN (50% of respondents who select "climate change")

Climate change – in the words of the deniers (Frankfurter Allgemeine Zeitung (FAZ), 1 March 2015)

There are, in fact, a number of academics with publications in peer-reviewed journals who do not believe that climate change is caused by humans. [...] An article published in 2003 in Climate Research claimed that the rise in temperature witnessed in the 20th century was similar to periods of warming in the pre-industrial era, and that it was therefore the result of natural processes. Even Nicola Scafetta, who was adjunct assistant professor at Duke University for a time, attributes the warming process that took place in the 20th century to cosmic influences. According to Scafetta the two large planets Jupiter and Saturn may cause oscillations in the solar interior that affect the sun's luminosity, and thus the Earth's climate.

TREATMENT POPULATION AGING (respondents selecting "population aging")
Germany no longer shrinking (Frankfurter Allgemeine Zeitung (FAZ), 1 February 2017)
Besides immigration, rising birth rates will also offset the decline in the population in the future. [...] But there is one thing population researchers are not expecting to change – the significant ageing of the population. This is shown by the old-age dependency ratio, which describes how many people over 65 there are in relation to 100 people of working age (between 20 and 64). While this ratio stood at 35 in 2015, projections for 2035 alone put it at between 40 and 50. These assumptions have a major impact on developments in the statutory pension insurance scheme.

Q4. Interest in article

How interesting did you find the article?
1 = Not interesting at all, 2-7 [no label], 8 = Very interesting

Q5. WTP for carbon offsetting	*When traveling by air, there is the option to offset the CO2 emissions of a flight with a voluntary payment to climate protection projects - e.g., 6 to 18 euros for a return flight from Germany to Mallorca.* *What amount would you be willing to pay for CO2 compensation for such a flight?* *Note: Please enter the amount as a whole figure in euro (no figure for cents).* [Input field] euro

A.3 Questionnaire Follow Up II (BOP-HH April 2021 wave)

Q1. WTP for carbon offsetting

In the air travel sector, passengers can offset the CO2 emissions of a flight by making a voluntary payment to climate protection projects – between €6 and €18 for a flight from Germany to Mallorca and back, for example. How much would you be prepared to pay to offset your CO2 emissions for a flight like this?

[Input field] euro

Q2. Flights in the past

How many flights did you take in 2019?

a *1 to 2 flights*
b *3 to 6 flights*
c *More than 6 flights*
d *No flights at all*

Q3. Offsetting in the past

IF Q4 = a OR b OR c

For how many of these flights did you pay to offset your CO2 emissions?

a *No flights*
b *One flight*
c *Several flights*

A.4 Questionnaire Follow Up III (BOP-HH April 2024 wave)

Q1. Prior return expectations

By what percentage do you think the value of the following financial investments will change over the next twelve months?
Please indicate what you think will be the most likely change and what you think will be the minimum and maximum change.
Note: Please use positive values if you expect an increase and negative values if you expect a decrease. Values may have a maximum of one decimal place. If you are not sure, please give an estimate.

1. *Financial investment A, which has the same expected return and the same risk as the German stock index (DAX 40).*
2. *Financial investment B, which contains only "green" enterprises from the German stock index (DAX 40) and has the same risk as the DAX 40.*

a *Most likely change:* [Input field] percent
b *Minimum expected change:* [Input field] percent
c *Maximum expected change:* [Input field] percent

Infobox i): After the term "green", an info box with the following text is shown: *Enterprises are referred to as "green" if they operate in a comparatively environmentally friendly and climate-friendly manner.*

Infobox ii): After the term "return", an info box with the following text is shown: *Return is the profit you make on an investment in relation to the amount invested within a certain period of time.*

Q2. Information Treatments

The sample is split randomly into four groups. [AGE_TEXT] will take the following values:

IF age <30 "Many under-30s"

IF age >=30 AND age <40 > "Many 30 to 39-year-olds"
IF age >=40 AND age <50 > "Many 40 to 49-year-olds"
IF age >=50 AND age <60 > "Many 50 to 59-year-olds"
IF age >=60 AND age <70 > "Many 60 to 69-year-olds"
IF age >=70 > "Many people over-70s"

T0 (Control Group): *Next, we would like to ask you a few questions about how you assess your investment behaviour. We therefore kindly ask you to answer the following questions.*

T1 (*Scientific framing*): *Financial studies show that investing in "green" shares and investment funds can make an important contribution to climate change mitigation. This is because investing in such shares and investment funds can help "green" enterprises to obtain financing at more favourable conditions and thus promote climate-friendly investment.*

T2 (*Scientific framing + expected returns*): *Financial studies show that investing in "green" shares and investment funds can make an important contribution to climate change mitigation. This is because investing in such shares and investment funds can help "green" enterprises to obtain financing at more favourable conditions and thus promote climate-friendly investment. However, the expected return on these "green" investments is lower than the return on conventional investments.*

T3 (*Peer framing + expected returns*): *Many [AGE_TEXT] in Germany have started investing their money in "green" shares and investment funds. In doing so, they can make an important contribution to climate change mitigation. This is because investing in such shares and investment funds can help "green" enterprises to obtain financing at more favourable conditions and thus promote climate-friendly investment. However, the expected return on these "green" investments is lower than the return on conventional investments.*

Q3. Post return expectations

By what percentage do you think the value of the following financial investments will change over the next twelve months?
Note: Please use positive values if you expect an increase and negative values if you expect a decrease. Values may have a maximum of one decimal place. If you are not sure, please give an estimate.

a *Financial investment A, which has the same expected return (i) and the same risk as the German stock index (DAX 40):* [Input field] percent

b *Financial investment B, which contains only "green" (i) enterprises from the German stock index (DAX 40) and has the same risk as the DAX 40:* [Input field] percent

Infobox i): After the term "green", an info box with the following text is shown: *Enterprises are referred to as "green" if they operate in a comparatively environmentally friendly and climate-friendly manner.*

Infobox ii): After the term "return", an info box with the following text is shown: *Return is the profit you make on an investment in relation to the amount invested within a certain period of time.*

Q4. Investment choice

Now imagine that you could invest €10,000 over a period of twelve months. You would be able to allocate this amount across the three following investment opportunities:

- *Financial investment A, which has the same expected return and the same risk as the German stock index (DAX 40).*
- *Financial investment B, which contains only "green" enterprises from the German stock index (DAX 40) and has the same risk as the DAX 40.*
- *Financial investment C, a risk-free investment whose value will increase by 1.5% over the next twelve months.*

How would you allocate the €10,000 across the three types of investment?
Note: The amounts you enter have to add up to €10,000.

a *Financial investment A:* [Input field] euro
b *Financial investment B:* [Input field] euro
c *Financial investment C:* [Input field] euro

Infobox i): After the term "green", an info box with the following text is shown: *Enterprises are referred to as "green" if they operate in a comparatively environmentally friendly and climate-friendly manner.*
Infobox ii): After the term "return", an info box with the following text is shown: *Return is the profit you make on an investment in relation to the amount invested within a certain period of time.*

Appendix B Heterogeneity in Treatment Effects on the WTP

In this section we study possible heterogeneity in the treatment effect on the WTP across different subsamples.

Table 2 shows the pre-treatment WTP varies substantially with age, gender and education, as well as with values and attitudes towards climate change. In this section, we analyze whether the reaction to information treatments is heterogeneous as well. To this end, we compare point estimates of the treatment effects on the change in WTP across different subsamples in Figure E.2.[52] We pool all treatment groups in the following analysis to increase statistical power.

The point estimates of the treatment effect vary systematically across sociodemographic groups (Panel A) even though not all differences are statistically significant in the subsample tests given the smaller sample sizes. In the following we explicitly report p-values if the treatment coefficients are statistically different from each other across sub-samples.

Women exhibit a higher pre-treatment WTP and also react more strongly to information treatments than men.[53] Individuals with at most a secondary school degree but no tertiary education (general education), or vocational secondary education, react up to two times more to information on climate change than university graduates (bachelors degree and above).

Further, the elderly react more than twice as strongly compared to young and middle-aged individuals. The estimated treatment effect is also statistically different for the middle-aged and the elderly (p-value < 0.05). We also find systematic differences in responses to information depending on individuals' economic means. Lower-income individuals (with a household income below €2000) exhibit a very low WTP, much lower than individuals with a household income of €2000, though this is very imprecisely estimated. Estimates are more price for individuals who report they

[52] Table F.4 and Table F.5 in Appendix F report regression results corresponding to Figure E.2. In each regression, we control for household- and individual-specific characteristics.

[53] Respondents' pre-treatment WTP is reported in Table F.4 and Table F.5 in Appendix F.

have reduced their consumption during the Covid-19 pandemic due to realized or expected income losses: these individual do not respond at all, whereas thosed who did not report a decline do respond. The treatment coefficients are also statistically different from each other across these sub-samples (p-values < 0.05). Fiancial resources seem thus to be important in deciding to pay for carbon offsetting.

The lack of treatment effects for low-income and constrained individuals also alleviates concerns for demand effects, because demand effects would not vary by the level of constrainedness.

In Panel B, we explore whether the treatment effect varies with respondents' pre-treatment WTP, their environmental friendliness, their concerns about climate change and the coronavirus pandemic, as well as their political leaning. Respondents in the middle and upper third of the pre-treatment WTP distribution show a strong response to the treatment, whereas those in the lowest third do not react at all. Environmental friendliness also matters for how individuals react to information about climate change: respondents in the middle and top of the environmental friendliness scale exhibit a higher pre-treatment WTP and react more strongly to information, whereas those at the bottom of the scale hardly react.[54] Similarly, concerns about climate change amplify the effect of informing individuals about effective ways to reduce carbon emissions. Individuals who consider climate change a very serious problem exhibit a higher pre-treatment WTP and react three times more than others (p-value < 0.05).[55] In contrast, splitting respondents by their concerns about the Covid-19 pandemic, we find those who are highly concerned respond slightly less to the provided information.

Finally, we differentiate respondents by their political preferences.[56] Environ-

[54]The difference in the treatment coefficients between the bottom and top third is significant at the 10% level (p-value=0.08).

[55]We differentiate between individuals who rate the seriousness of climate change as 10 on a scale from 1 to 10 and individuals who give a lower rating. Results are similar for alternative splits.

[56]For a small subset of the sample of panelists that also participated in a follow-up wave in September 2020, we observe their stated political party preferences, that is, which party they would vote for if there was a general election on the following Sunday. To avoid problems with small samples we pool supporters of the Social Democratic Party (*SPD*) and the Left Party (*Die Linke*) as well as supporters of the liberal, Free Democratic Party (*FDP*), the far-right Alternative for Germany (*AFD*), other small parties and non-voters.

mentally-oriented voters (*Green Party*) and left-leaning voters (*SPD*/ *The Left*) have a significantly higher pre-treatment WTP and react strongly to information on climate change, whereas conservative voters (*CDU*/ *CSU*) and supporters of other parties do not react at all. The point estimates are imprecisely estimated, likely because of the limited number of observations, but the treatment coefficients for left-leaning and conservative voters are statistically different from each other (p-value < 0.05).[57]

To sum up, these results might indicate that increasing people's WTP by informing them about how to fight climate change is contingent on people's ideological orientation and prior stance towards the environment. However, we would like to point out that the standard errors of the estimators in the heterogeneity analysis are relatively large.

[57] Due to the small sample size we do not control for climate friendliness when splitting the sample by respondents' political leaning. The treatment heterogeneity observed for political leaning and climate friendliness might thus partially capture similar aspects as political leaning and climate friendliness are correlated.

Appendix C Compensation of Flights in the Past

In the main analysis we only elicit survey respondents' WTP in surveys and we do not have direct evidence on whether individuals indeed take actions in their actual lives. Previous research using German survey data indicates that stated consumption propensities in surveys closely line up with actual consumption choices (D'Acunto, Hoang, and Weber, 2022). To shed some direct light on whether heterogeneity in individuals' WTP lines up with their actual decisions to limit their own carbon footprint, we elicited in the April 2021 BOP-HH wave whether individuals offset their emissions by paying for CO2 compensation in 2019, that is, before travel restrictions were put in place because of the COVID-19 pandemic.

Figure E.3 shows that more than 40% of our sample flew at least once in 2019. Table F.12 conditions on those survey respondents that flew at least once in 2019 and shows that more than 17% of them already compensated for the CO2 emissions of at least one of their flights in 2019 (column 1). Consequently, a considerable fraction of the German population was familiar with the concept of carbon compensation at least as of 2019. Still, the implementation of having this option when buying a ticket was not so common, or straightforward, which can explain, at least in part, the deviation from larger percentage of individuals stating a WTP for offsetting emissions.[58] But these results do correlate with the stated WTP: the average WTP for carbon compensation of a hypothetical return flight from Germany to Mallorca in March 2021 is significantly higher by almost €9 for those who did compensate in 2019 compared to those who did not (column 2). Finally, column (3) shows that only 3% of survey participants that compensated CO2 emissions in 2019 have a WTP equal to zero in March 2021, whereas it is 32% in the complementary sample. Taken together, these results show that survey-elicited WTPs to offet for CO2 are strong predictors of actual choices of individuals to compensate for CO2 offsets.

[58] For example, the compensation option was offered separately from the flight, if at all, at the time of booking the ticket , whereas it progressively got to be one of the options offered within flight booking itself.

Appendix D Spending Intentions for Travel and Holidays

Section 4.1 shows that informing individuals about the consequences of certain actions such as meat consumption, journeys by car, and flights can alter individuals' WTP for climate change mitigation. One might wonder whether the information also affects their spending intentions for these actions.

For a subset of respondents that participated in the wave directly following the wave with the exogenous information provision, we observe their spending plans for travel and holidays for the next 12 months. Participants of the September 2020 wave of the BOP-HH were asked whether they *"plan to spend more"*, *"roughly the same"*, *"or less"* on *"travel and holidays over the next 12 months than in the last 12 months"*.[59] We take the reported spending plans as a proxy for individuals' intention to spend on flights and journeys by car. Unconditionally, around 44% of the panelists plan to spend less on travel and holidays over the next 12 months than in the last 12, 40% plan to spend about the same, and 16% plan to spend less. We employ an ordered logistic regression to study the effect of the climate information on spending intentions. Table F.13 reports the average marginal effect computed from the ordered logistic regressions. In all columns, we pool all treatment groups and report the marginal effect of receiving information about climate change on the likelihood that individuals respond that they plan to spend less on travel and holidays over the next twelve months than over the past twelve months. In column (1), the information treatment dummy is the only explanatory variable. Column (2) augments the specification by adding a controls for household and individual-specific characteristics. We report robust standard errors in parentheses.

One month after receiving information about climate change, the information treatment groups exhibit a roughly 10 percentage points higher probability to plan to spend less on travel and holidays than the control group, as shown in column (2). The effect is statistically significant and large in economic terms as it corresponds to an increase in the likelihood to restrict spending by about a quarter relative to the

[59] The survey question is adapted from Bachmann, Born, Goldfayn-Frank, Kocharkov, Luetticke, and Weber (2021).

control group. The result suggests informing respondents about the climate consequences of meat consumption, journeys by car, and flights, the latter two being directly related to holiday spending, has a persistent effect on their intention to cut spending on travel and holidays in the next 12 months.

What is more, the finding that the information treatment influences individuals' spending intention one month after the intervention further indicates that survey demand effects are negligible in our study.

Appendix E Additional Figures

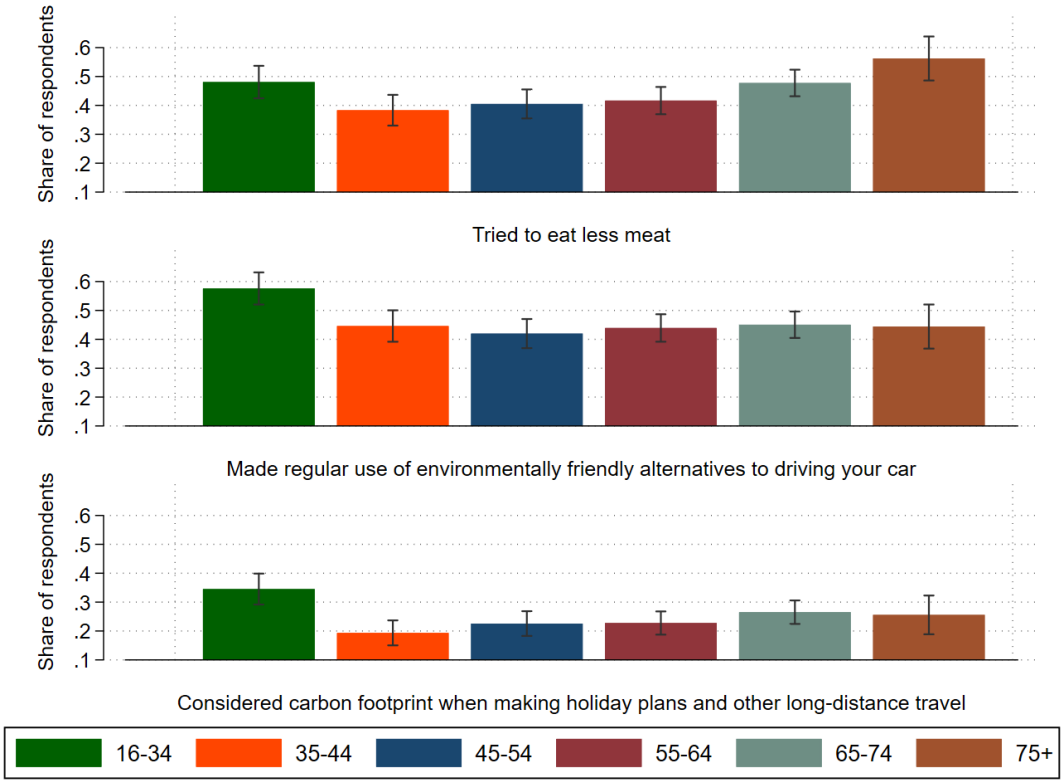

Figure E.1: Actions to fight climate change by age group

Source: BOP-HH, April 2020.
Note: This figure shows respondents' actions to protect the climate in their everyday lives across age groups. The exact survey question was as follows: "Did you personally do one or more of the following things to protect the climate in the six months prior to the coronavirus pandemic?" Respondents could select multiple items. These included, inter alia, "Made regular use of environmentally friendly alternatives to driving your car, e.g., walking, cycling, public transport or car sharing" (upper panel), "When making your holiday plans and for other long-distance travel, taken into account the carbon footprint of the mode of transport" (middle panel), "Tried to eat less meat" (lower panel). Data are weighted.

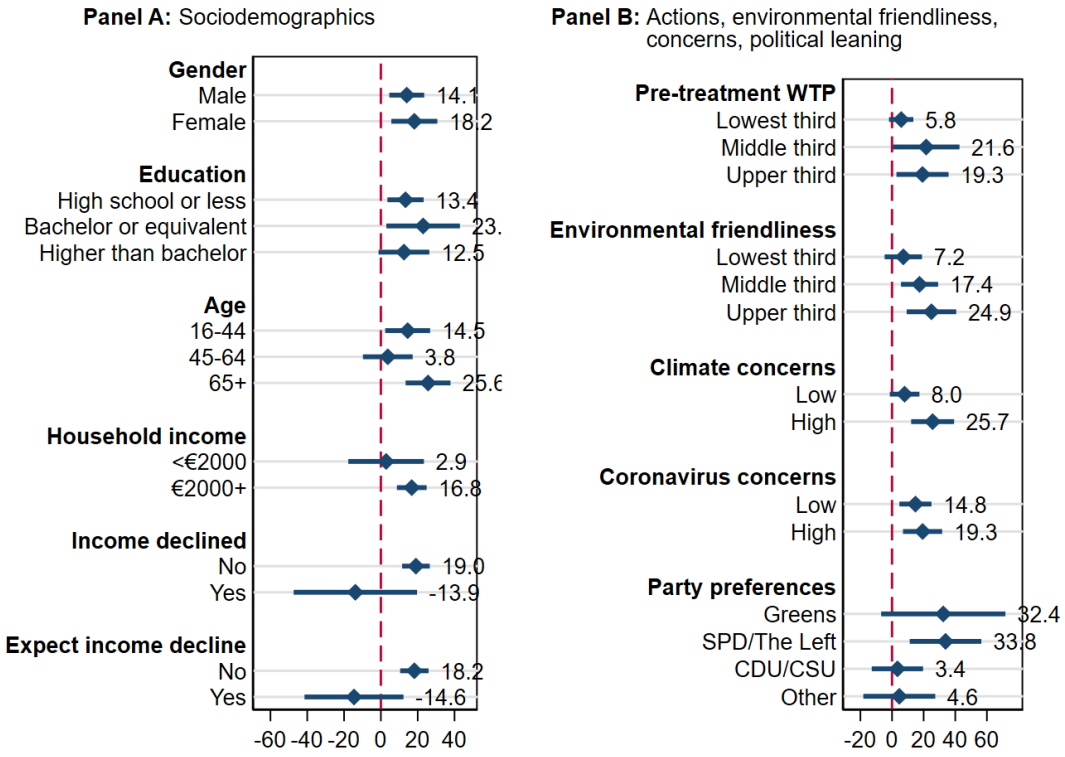

Figure E.2: Treatment effect heterogeneity

Source: BOP-HH, August and September 2020.
Note: This figure shows point estimates of the pooled treatment effect (T1-T4) for different subsamples. Solid lines indicate 95% confidence intervals. "Income declined" and "expect declining income" refer to individuals who report they have reduced their consumption during the coronavirus crisis due to realized or expected income losses. Table F.4 and Table F.5 in Appendix F report the corresponding regression results. The point estimates of the treatment coefficients are statistically different from each other across subgroups for the following variables: Age (45-64 vs. 65+), income declined, expect declining income, environmental friendliness (bottom vs. top third), climate concerns, party preferences (SPD/The Left vs. CDU/CSU & Other).

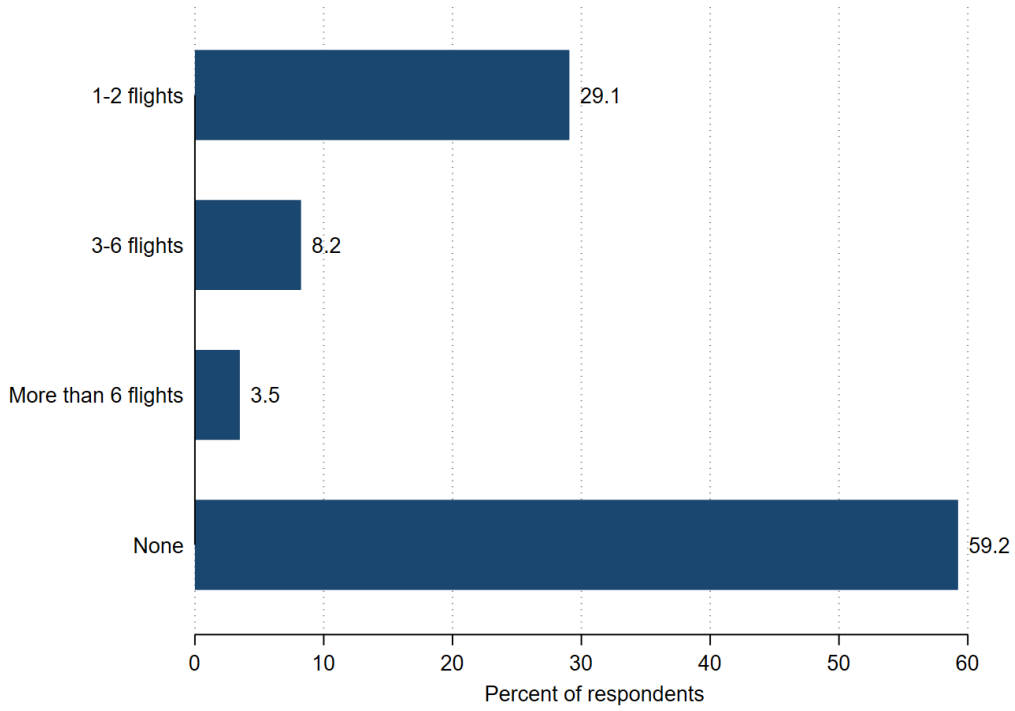

Figure E.3: Number of flights per individual in 2019

Source: BOP-HH, April 2021.
Note: This figure reports survey responses to the question: *"How many flights did you take in 2019?"*. Data are weighted.

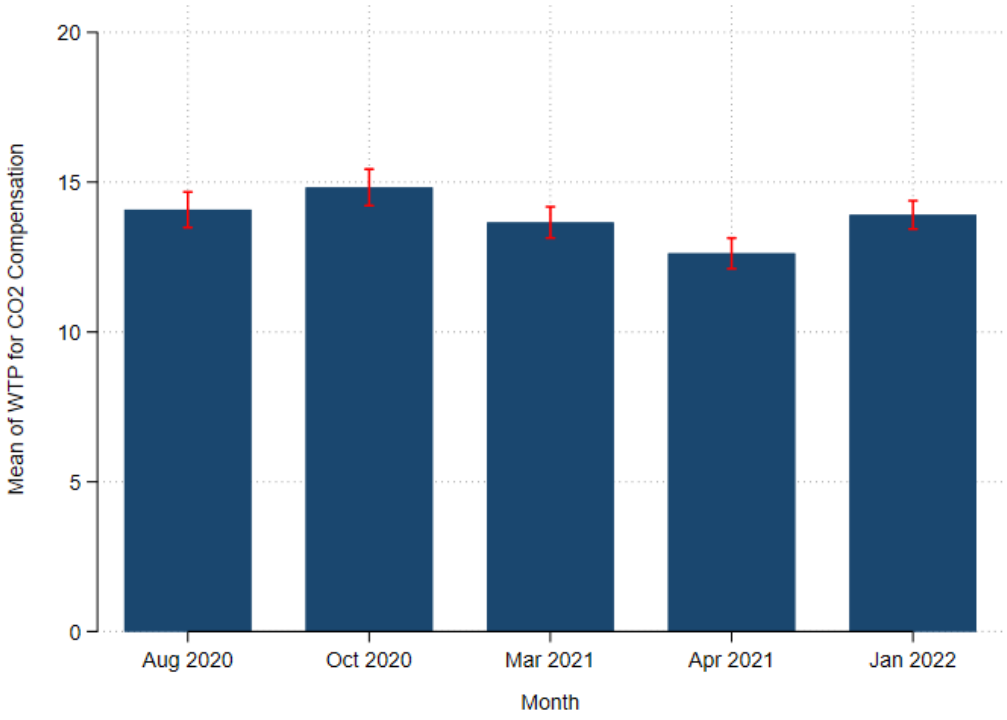

Figure E.4: WTP across time

Source: BOP-HH, August and October 2020, March and April 2021, January 2022.
Note: This figure shows the WTP for carbon offsetting for a return flight from Germany to Mallorca in different survey waves. Participants in each wave were asked the following question: *When traveling by air, there is the option to offset the CO2 emissions of a flight with a voluntary payment to climate protection projects - e.g., 6 to 18 euros for a return flight from Germany to Mallorca. What amount would you be willing to pay for CO2 compensation for such a flight?* For each survey wave the unconditional average WTP is reported. Red bars indicate indicate 95% confidence intervals. Results are weighted.

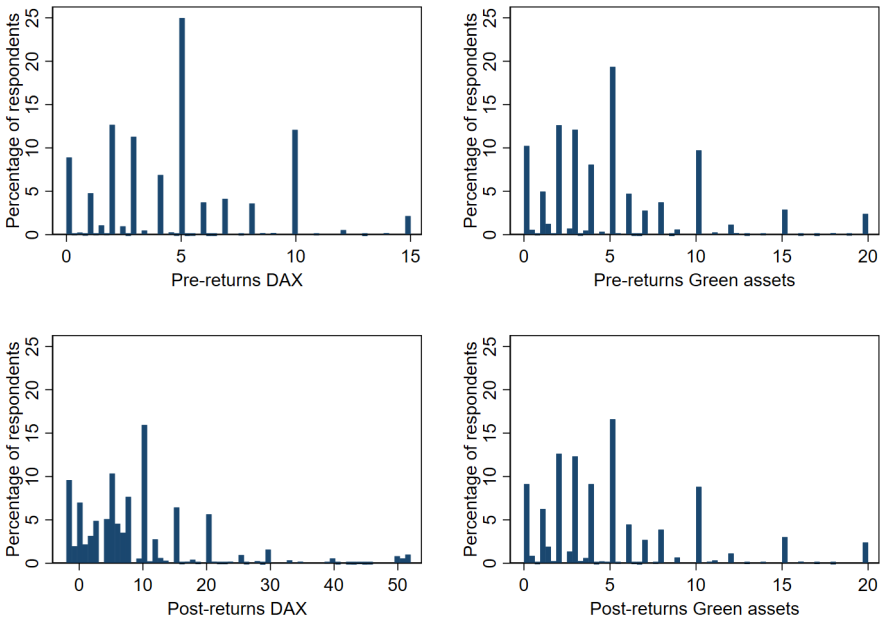

Figure E.5: Expected returns for the asset tied to the DAX 40 and the green asset

Source: BOP-HH, April 2024.
Note: This figure plots the distribution of the expected returns for different assets. The top row shows the expected return for the asset tied to the DAX 40 and the green asset, respectively, before any information treatment ('pre-returns'). The bottom row shows the expected return for the asset tied to the DAX 40 and the green asset, respectively, after the information treatment ('post-returns'). Results are weighted.

Appendix F Additional Tables

Table F.1: Description of treatments

Treatment	Info on climate	Framing	Source of information
T0 (Control group)	no	-	-
T1 (General research)	yes	*scientific*	research studies
T2 (Government research)	yes	*scientific*	studies by the government
T3 (People in Germany)	yes	*peer*	people in Germany
T4 (Own age cohort)	yes	*peer*	respondent's age cohort

Notes: This table gives an overview of the information provided in each treatment.

Table F.2: Balance of treatment groups, BOP-HH August 2020

	Full sample	Control	T1	T2	T3	T4
Pre-treatment WTP	14.08	12.76	13.79	13.21	15.73	14.85
Post-treatment WTP	64.44	51.14	61.89	65.50	71.17	71.91
Δ WTP (post-pre)	47.27	35.37	45.38	48.46	54.11	52.60
Age	47.01	47.24	46.30	48.05	48.69	45.02
Female	0.48	0.40	0.50	0.48	0.50	0.53
Working	0.63	0.64	0.66	0.65	0.56	0.62
Not working	0.12	0.11	0.10	0.14	0.14	0.13
Retired	0.25	0.25	0.23	0.21	0.30	0.25
High school or less	0.70	0.67	0.69	0.70	0.76	0.68
Bachelor or equivalent	0.15	0.17	0.13	0.14	0.12	0.20
Higher than bachelor	0.15	0.16	0.18	0.16	0.13	0.12
Homeowner	0.55	0.54	0.55	0.56	0.59	0.51
HHinc <€1500	0.12	0.14	0.07	0.14	0.11	0.12
HHinc €1500-3000	0.35	0.31	0.37	0.34	0.35	0.39
HHinc €3000-5000	0.36	0.35	0.38	0.37	0.35	0.37
HHinc €5000+	0.17	0.19	0.18	0.15	0.19	0.12
HHsize 1	0.25	0.26	0.24	0.22	0.24	0.29
HHsize 2	0.38	0.35	0.37	0.39	0.42	0.36
HHsize 3+	0.37	0.39	0.40	0.39	0.34	0.35
East Germany	0.19	0.17	0.22	0.18	0.17	0.19
City size < 20k	0.37	0.31	0.42	0.36	0.38	0.39
City size 20k-100k	0.29	0.33	0.27	0.27	0.26	0.31
City size 100k+	0.34	0.35	0.31	0.37	0.35	0.31
Observations	2023.00	406.00	405.00	400.00	406.00	406.00
F-statistic	.	1.04	1.22	1.34	1.19	1.43
p-value	.	0.40	0.23	0.15	0.26	0.10

Source: BOP-HH wave 8, August 2020.

Notes: Columns (1) to (6) report sample averages for the full sample (column 1) , the control group (column 2), treatment group *T1: General research* (column 3), treatment group *T2: Government research* (column 4), treatment group *T3: People in Germany* (column 5), and treatment group *T4: Own age cohort* (column 6). The last two rows report F-statistic for the joint statistical significance of b from estimating the following linear-probability regression for each group k indicated in the column header separately: $Group_i^{(k)} = \boldsymbol{X_i} b^{(k)} + \epsilon$, where i indexes respondents, $Group_i^{(k)}$ is a dummy variable equal to one if household i is a member of group k indicated in the column header and zero otherwise, and $\boldsymbol{X}$ is a vector of household/individual characteristics. Individual characteristics are gender, age, age squared, retired indicator, unemployment indicator, and education (indicator variable for each group). Household characteristics are homeowner, household income (indicator variable for each category), household size (indicator variable for each size), indicator for living in the former East Germany and city size (indicator variable for each category). Results are weighted.

Table F.3: Principal component analysis for environmental friendliness scale

	Component loadings
Jobs before climate	0.33
Climate change exaggerated	0.35
Individual role for climate	0.31
Fight climate change	0.44
Protect animals and plants	0.35
Climate-friendly fashion production	0.42
Climate-friendly food production	0.43

Source: BOP-HH Wave 8, August 2020.

Notes: Principal components with eigenvalue below 1 not shown. The scale of the first two items is inverted such that a high value indicates higher environmental friendliness.

Table F.4: Heterogeneity in treatment effect: Sociodemographics

	By gender		By education			By age			By income		Consume less since income declined		Consume less since expect declining income	
	Male	Female	High school or less	Bachelor or equivalent	Higher than bachelor	16-44	45-64	65+	< €2000	>= €2000	No	Yes	No	Yes
Treatment (T1-T4)	14.05***	18.18***	13.40***	22.96**	12.53*	14.55**	3.77	25.63***	2.85	16.78***	19.04***	−13.87	18.20***	−14.59
	(4.83)	(6.37)	(5.01)	(10.16)	(7.01)	(6.21)	(6.88)	(6.21)	(10.43)	(4.12)	(3.83)	(16.92)	(3.93)	(13.60)
Sociodemographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1035	702	1067	295	375	501	679	557	289	1448	1600	137	1576	161
Adjusted R^2	0.02	0.02	0.04	0.03	0.01	0.02	0.02	0.07	0.04	0.03	0.03	0.07	0.03	0.06
Pre-treatment WTP	13.58	15.43	13.38	15.17	16.35	14.23	14.19	14.59	13.37	14.52	14.44	13.06	14.41	13.52

Source: BOP-HH wave 8, August 2020.

Notes: This table reports regression results corresponding to Panel A in Figure E.2. The last row reports the average pre-treatment WTP for the sample indicated in the column header. Robust standard errors are reported in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table F.5: Heterogeneity in treatment effect: Actions, concerns, political leaning

	Pre-treatment WTP			Environmental friendliness			Climate concerns		Coronavirus concerns		Party preferences			
	Lowest third	Middle third	Upper third	Lowest third	Middle third	Upper third	Low	High	Low	High	Greens	SPD/The Left	CDU/CSU	Other
Treatment (T1-T4)	5.79	21.60**	19.28**	7.16	17.40***	24.93***	7.96*	25.69***	14.80***	19.34***	32.40	33.84***	3.41	4.60
	(3.92)	(10.71)	(8.38)	(6.02)	(5.98)	(7.98)	(4.77)	(6.91)	(5.17)	(6.32)	(19.86)	(11.46)	(8.23)	(11.52)
Sociodemographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	884	362	491	599	584	552	1088	648	1087	650	146	164	209	164
Adjusted R^2	0.03	0.00	0.02	0.02	0.03	0.02	0.03	0.03	0.02	0.03	-0.03	0.10	0.01	0.02
Pre-treatment WTP	4.60	16.89	29.95	8.76	15.43	19.20	11.57	18.99	13.86	15.10	19.19	14.73	13.11	10.59

Source: BOP-HH wave 8, August 2020.

Notes: This table reports regression results corresponding to Panel B in Figure E.2. The last row reports the average pre-treatment WTP for the sample indicated in the column header. Robust standard errors are reported in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table F.6: Robustness: Alternative definition of extensive margin

	ΔWTP_i		I(ΔWTP_i >0)		$\Delta WTP_i \mid \Delta WTP_i$ >0	
	(1)	(2)	(3)	(4)	(5)	(6)
Scientific info	10.89*	13.38**	0.08*	0.09**	4.35	6.54
	(6.59)	(6.14)	(0.04)	(0.04)	(13.74)	(12.99)
Peer info	18.23**	19.27**	0.12***	0.12***	13.02	14.24
	(7.91)	(7.59)	(0.04)	(0.04)	(16.08)	(14.59)
Sociodemographics	No	Yes	No	Yes	No	Yes
Observations	1737	1737	1737	1737	652	652

Source: BOP-HH wave 8, August 2020.

Notes: This table replicates results from Table 4 using an alternative definition of the extensive margin. Column (1) and (2) report average effects of different information treatments on the change in WTP relative to the control group. Column (3) and (4) report the extensive margin of treatment effects defined as the probability of a change in WTP larger than the average change in WTP of the control group (marginal effects from a logistic regression of a dummy equal to one if the change in WTP is larger than €34). Columns (5) and (6) report the intensive margin of treatment effects (OLS regression), defined as the size of the change in a respondent's WTP conditional on a change in WTP larger than the average change in WTP for the control group (€34). Even columns control for socio-demographics. Results are weighted. Robust standard errors are reported in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table F.7: Summary statistics, BOP-HH March 2021

	Mean	SD	Median	Min	Max	Obs.
WTP CO2	13.66	13.01	10.00	0.00	50.00	2383
Info on climate change selected	0.47	0.50	0.00	0.00	1.00	2541
Info on aging selected	0.36	0.48	0.00	0.00	1.00	2541
No info selected	0.17	0.38	0.00	0.00	1.00	2541
Positive spin	0.49	0.50	0.00	0.00	1.00	1230
Interested in article	0.66	0.47	1.00	0.00	1.00	2158
Age	47.66	17.50	49.00	16.00	80.00	2541
Female	0.49	0.50	0.00	0.00	1.00	2541
Working	0.63	0.48	1.00	0.00	1.00	2541
Not working	0.12	0.32	0.00	0.00	1.00	2541
Retired	0.26	0.44	0.00	0.00	1.00	2541
High school or less	0.70	0.46	1.00	0.00	1.00	2524
Bachelor or equivalent	0.15	0.36	0.00	0.00	1.00	2524
Higher than bachelor	0.15	0.36	0.00	0.00	1.00	2524
Homeowner	0.58	0.49	1.00	0.00	1.00	2539
HHinc <€1500	0.12	0.33	0.00	0.00	1.00	2446
HHinc €1500-3000	0.35	0.48	0.00	0.00	1.00	2446
HHinc €3000-5000	0.37	0.48	0.00	0.00	1.00	2446
HHinc €5000+	0.17	0.37	0.00	0.00	1.00	2446
HHsize 1	0.24	0.43	0.00	0.00	1.00	2533
HHsize 2	0.42	0.49	0.00	0.00	1.00	2533
HHsize 3+	0.35	0.48	0.00	0.00	1.00	2533
East Germany	0.19	0.39	0.00	0.00	1.00	2541
City size < 20k	0.38	0.49	0.00	0.00	1.00	2541
City size 20k-100k	0.30	0.46	0.00	0.00	1.00	2541
City size 100k+	0.32	0.47	0.00	0.00	1.00	2541
Environmental attitudes	-0.02	0.99	0.14	-4.24	1.69	2532
Aging attitudes	-0.01	0.98	0.11	-4.35	2.38	2532

Source: BOP-HH wave 15.

Notes: This table reports summary statistics for the sample from BOP-HH wave 15. Figures are weighted.

Table F.8: Principal component analysis for statements on attitudes

	Environmental attitudes	Attitudes towards population aging
Jobs before climate	0.43	–0.38
Climate change exaggerated	0.51	–0.27
Individual role for climate	0.49	–0.05
CO2 compensation important	0.42	0.03
Pension reform required	0.24	0.62
Population aging is a challenge	0.27	0.63

Source: BOP-HH wave 15, March 2021.

Notes: Components with Eigenvalue below one are not shown. The scale of the first two items is inverted such that a high value indicates higher environmental attitudes.

Table F.9: OLS regression of information selection

	Climate				Aging				No info			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Age 35-44	–0.10*	–0.08*	–0.28*	–0.20*	0.04	0.04	0.23*	0.18*	0.05	0.04	0.05	0.02
	(0.04)	(0.04)	(0.12)	(0.09)	(0.04)	(0.04)	(0.11)	(0.08)	(0.03)	(0.03)	(0.07)	(0.05)
Age 45-54	–0.10*	–0.09*	–0.16	–0.15	0.07	0.06	0.13	0.15	0.03	0.03	0.02	–0.00
	(0.04)	(0.04)	(0.12)	(0.08)	(0.04)	(0.04)	(0.11)	(0.08)	(0.03)	(0.03)	(0.06)	(0.04)
Age 55-64	–0.06	–0.06	–0.26*	–0.14	0.05	0.05	0.24*	0.16*	0.01	0.01	0.02	–0.02
	(0.04)	(0.04)	(0.11)	(0.08)	(0.04)	(0.04)	(0.10)	(0.08)	(0.03)	(0.03)	(0.06)	(0.04)
Age 65-74	–0.08	–0.06	–0.13	–0.20	0.04	0.04	–0.03	0.14	0.03	0.03	0.16*	0.06
	(0.05)	(0.05)	(0.16)	(0.10)	(0.05)	(0.05)	(0.16)	(0.10)	(0.04)	(0.04)	(0.08)	(0.06)
Age 75+	–0.11	–0.08	–0.23	–0.27*	0.07	0.05	–0.03	0.07	0.04	0.03	0.26*	0.19*
	(0.06)	(0.06)	(0.19)	(0.12)	(0.06)	(0.06)	(0.18)	(0.11)	(0.04)	(0.04)	(0.11)	(0.08)
Female	–0.08***	–0.11***	0.05	–0.01	0.05**	0.07***	–0.06	0.00	0.03	0.04**	0.01	0.00
	(0.02)	(0.02)	(0.07)	(0.04)	(0.02)	(0.02)	(0.06)	(0.04)	(0.01)	(0.01)	(0.04)	(0.03)
Bachelor or equivalent	0.04	0.02	0.06	0.06	–0.02	–0.01	–0.20*	–0.11	–0.02	–0.01	0.14*	0.05
	(0.03)	(0.03)	(0.08)	(0.06)	(0.03)	(0.03)	(0.08)	(0.05)	(0.02)	(0.02)	(0.06)	(0.04)
Higher than bachelor	0.15***	0.12***	0.07	0.15**	–0.07**	–0.06*	–0.10	–0.10*	–0.08***	–0.06***	0.03	–0.04
	(0.03)	(0.03)	(0.08)	(0.05)	(0.02)	(0.02)	(0.08)	(0.05)	(0.02)	(0.02)	(0.05)	(0.03)
Not working	0.12*	0.10	–0.26	–0.01	–0.08	–0.08	0.43*	0.07	–0.04	–0.02	–0.18	–0.07*
	(0.05)	(0.05)	(0.22)	(0.13)	(0.05)	(0.05)	(0.22)	(0.12)	(0.04)	(0.04)	(0.10)	(0.03)
Retired	–0.02	–0.03	–0.08	0.05	0.00	0.01	0.20	–0.00	0.02	0.02	–0.11	–0.05
	(0.04)	(0.04)	(0.13)	(0.07)	(0.04)	(0.04)	(0.13)	(0.07)	(0.03)	(0.03)	(0.06)	(0.05)
HHincome €1500-3000	0.01	0.00	–0.24	–0.11	0.08*	0.07	0.36**	0.09	–0.09*	–0.07*	–0.12	0.02
	(0.04)	(0.04)	(0.12)	(0.09)	(0.04)	(0.04)	(0.12)	(0.09)	(0.03)	(0.03)	(0.12)	(0.05)
HHincome €3000-5000	0.05	0.03	–0.17	–0.13	0.05	0.05	0.25*	0.09	–0.10**	–0.08*	–0.08	0.04
	(0.04)	(0.04)	(0.13)	(0.09)	(0.04)	(0.04)	(0.12)	(0.09)	(0.04)	(0.04)	(0.12)	(0.05)
HHincome €5000+	0.10*	0.09	–0.09	–0.08	0.04	0.04	0.25	0.10	–0.14***	–0.12**	–0.16	–0.02
	(0.05)	(0.05)	(0.15)	(0.10)	(0.05)	(0.05)	(0.14)	(0.10)	(0.04)	(0.04)	(0.14)	(0.06)
Homeowner	–0.01	0.00	0.05	–0.03	0.01	0.00	–0.03	0.03	–0.00	–0.01	–0.02	0.00
	(0.02)	(0.02)	(0.08)	(0.05)	(0.02)	(0.02)	(0.07)	(0.05)	(0.02)	(0.02)	(0.05)	(0.03)
HHsize 2	–0.04	–0.03	–0.03	–0.00	0.02	0.02	0.00	–0.04	0.02	0.01	0.03	0.04
	(0.03)	(0.03)	(0.08)	(0.05)	(0.03)	(0.03)	(0.08)	(0.05)	(0.02)	(0.02)	(0.06)	(0.03)
HHsize 3+	–0.00	–0.00	–0.09	0.05	–0.03	–0.03	0.12	–0.06	0.03	0.03	–0.03	0.02
	(0.03)	(0.03)	(0.10)	(0.07)	(0.03)	(0.03)	(0.09)	(0.06)	(0.03)	(0.02)	(0.06)	(0.04)
East Germany	–0.06*	–0.03	–0.06	–0.03	0.03	0.02	0.01	–0.01	0.03	0.01	0.05	0.04
	(0.03)	(0.03)	(0.08)	(0.05)	(0.03)	(0.03)	(0.08)	(0.05)	(0.02)	(0.02)	(0.06)	(0.03)
City size: 20-100k	0.02	0.02	–0.08	–0.06	–0.01	–0.01	0.10	0.08	–0.01	–0.01	–0.02	–0.02
	(0.02)	(0.02)	(0.08)	(0.05)	(0.02)	(0.02)	(0.07)	(0.05)	(0.02)	(0.02)	(0.05)	(0.03)
City size: 100k+	–0.00	–0.02	–0.19*	–0.11*	0.02	0.04	0.22**	0.13**	–0.02	–0.02	–0.03	–0.02
	(0.03)	(0.02)	(0.08)	(0.05)	(0.02)	(0.02)	(0.07)	(0.05)	(0.02)	(0.02)	(0.05)	(0.03)
Environmental attitudes		0.09***				–0.03**				–0.06***		
		(0.01)				(0.01)				(0.01)		
Aging attitudes		–0.09***				0.10***				–0.00		
		(0.01)				(0.01)				(0.01)		
SPD/The Left			–0.08				0.10				–0.02	
			(0.09)				(0.08)				(0.05)	
CDU/CSU			–0.26**				0.20*				0.06	
			(0.09)				(0.08)				(0.05)	
Other			–0.35***				0.27**				0.08	
			(0.09)				(0.09)				(0.06)	
WTP (€10)				0.04**				–0.04**				–0.00
				(0.01)				(0.01)				(0.01)
Constant	0.54***	0.56***	1.14***	0.71***	0.25***	0.25***	–0.25	0.23*	0.21***	0.19***	0.11	0.05
	(0.05)	(0.05)	(0.15)	(0.11)	(0.05)	(0.05)	(0.14)	(0.11)	(0.04)	(0.04)	(0.12)	(0.06)

Table F.10: Robustness: Marginal effects from multinomial logit model of information selection

	Attitudes scores			Party affiliation (wave 9)			Prior WTP (wave 10)		
	Climate	Aging	No info	Climate	Aging	No info	Climate	Aging	No info
Age 35-44	−0.09*	0.05	0.04	−0.33*	0.31*	0.02	−0.21*	0.21*	0.01
	(0.05)	(0.04)	(0.03)	(0.14)	(0.14)	(0.03)	(0.09)	(0.09)	(0.03)
Age 45-54	−0.10*	0.07	0.02	−0.18	0.17	0.01	−0.16	0.16*	−0.00
	(0.04)	(0.04)	(0.03)	(0.14)	(0.14)	(0.03)	(0.08)	(0.08)	(0.03)
Age 55-64	−0.06	0.05	0.01	−0.31*	0.31**	0.00	−0.16	0.17*	−0.01
	(0.04)	(0.04)	(0.03)	(0.12)	(0.12)	(0.03)	(0.08)	(0.08)	(0.03)
Age 65-74	−0.07	0.04	0.03	−0.18	−0.00	0.18	−0.21*	0.16	0.05
	(0.06)	(0.05)	(0.03)	(0.16)	(0.15)	(0.10)	(0.10)	(0.10)	(0.05)
Age 75+	−0.09	0.06	0.03	−0.32	−0.01	0.33*	−0.27*	0.10	0.17
	(0.06)	(0.06)	(0.04)	(0.19)	(0.17)	(0.16)	(0.12)	(0.11)	(0.10)
Female	−0.13***	0.08***	0.05***	0.05	−0.07	0.02	−0.01	0.00	0.01
	(0.02)	(0.02)	(0.01)	(0.08)	(0.08)	(0.04)	(0.05)	(0.05)	(0.02)
Bachelor or equivalent	0.02	−0.01	−0.01	0.10	−0.21*	0.11	0.07	−0.11	0.03
	(0.03)	(0.03)	(0.02)	(0.09)	(0.09)	(0.06)	(0.06)	(0.06)	(0.03)
Higher than bachelor	0.13***	−0.06*	−0.07***	0.09	−0.10	0.01	0.15**	−0.12*	−0.03
	(0.03)	(0.03)	(0.02)	(0.09)	(0.09)	(0.03)	(0.05)	(0.05)	(0.02)
Not working	0.11	−0.09	−0.01	−0.35	0.51**	−0.16**	−0.00	0.11	−0.10**
	(0.06)	(0.05)	(0.03)	(0.19)	(0.19)	(0.05)	(0.14)	(0.14)	(0.03)
Retired	−0.03	0.02	0.02	−0.11	0.24	−0.13*	0.05	−0.01	−0.05
	(0.04)	(0.04)	(0.02)	(0.15)	(0.15)	(0.06)	(0.08)	(0.08)	(0.05)
HHincome €1500-3000	0.00	0.06	−0.06	−0.29*	0.36***	−0.07	−0.12	0.10	0.02
	(0.05)	(0.04)	(0.03)	(0.12)	(0.11)	(0.10)	(0.09)	(0.08)	(0.03)
HHincome €3000-5000	0.03	0.04	−0.07	−0.19	0.23*	−0.04	−0.14	0.10	0.04
	(0.05)	(0.04)	(0.03)	(0.13)	(0.10)	(0.11)	(0.09)	(0.09)	(0.04)
HHincome €5000+	0.09	0.02	−0.12**	−0.11	0.20	−0.08	−0.09	0.10	−0.01
	(0.05)	(0.05)	(0.04)	(0.14)	(0.12)	(0.11)	(0.10)	(0.10)	(0.04)
Homeowner	0.00	0.00	−0.00	0.05	−0.04	−0.01	−0.03	0.03	0.00
	(0.03)	(0.02)	(0.02)	(0.08)	(0.08)	(0.03)	(0.05)	(0.05)	(0.02)
HHsize 2	−0.03	0.02	0.01	−0.02	0.01	0.01	0.01	−0.03	0.02
	(0.03)	(0.03)	(0.02)	(0.08)	(0.08)	(0.04)	(0.06)	(0.05)	(0.02)
HHsize 3+	−0.00	−0.03	0.03	−0.12	0.15	−0.03	0.05	−0.06	0.01
	(0.04)	(0.03)	(0.02)	(0.11)	(0.11)	(0.04)	(0.07)	(0.07)	(0.03)
East Germany	−0.04	0.02	0.02	−0.06	0.03	0.03	−0.02	−0.01	0.02
	(0.03)	(0.03)	(0.02)	(0.09)	(0.09)	(0.04)	(0.06)	(0.05)	(0.02)
City size: 20-100k	0.02	−0.01	−0.01	−0.10	0.11	−0.01	−0.07	0.08	−0.01
	(0.03)	(0.03)	(0.02)	(0.08)	(0.08)	(0.04)	(0.05)	(0.05)	(0.02)
City size: 100k+	−0.03	0.04	−0.02	−0.23**	0.25**	−0.02	−0.13*	0.14**	−0.01
	(0.03)	(0.03)	(0.02)	(0.08)	(0.08)	(0.04)	(0.05)	(0.05)	(0.02)
Environmental attitudes	0.10***	−0.04***	−0.06***						
	(0.01)	(0.01)	(0.01)						
Aging attitudes	−0.11***	0.11***	0.00						
	(0.01)	(0.01)	(0.01)						
Party preference (Greens = base category):									
SPD/The Left				−0.09	0.10	−0.00			
				(0.08)	(0.08)	(0.03)			
CDU/CSU				−0.28**	0.24**	0.04			
				(0.09)	(0.09)	(0.04)			
Other				−0.38***	0.33***	0.06			
				(0.09)	(0.10)	(0.04)			
WTP (€10)							0.05**	−0.05**	−0.00
							(0.02)	(0.02)	(0.01)
Pseudo R^2	.08	.08	.08	.15	.15	.15	.06	.06	.06
Observations	2424	2424	2424	261	261	261	616	616	616
Unconditional average	.49	.37	.14	.52	.38	.1	.51	.39	.1

Source: BOP-HH waves 9, 10, and 15.

Notes: This table replicates results from Table 5 using multinomial logit regressions. The dependent variable is a categorical variable indicating the choice of article (climate article, aging article, no information). Each cell reports the marginal effect of a one unit change of the regressor indicated in the respective row on the probability to select the info in the column header at sample mean of regressors used in the model. Columns (1) to (3) report marginal effects from a regression on attitudes towards climate change and population aging. Columns (4) to (6) report marginal effects from a regression on party affiliation (Greens voters as base category) using the matched BOP-HH wave 9 and 15 data set. Columns (7) to (9) report marginal effects from a multinomial logit regression on prior WTP (elicited in Wave 10) using the matched BOP-HH wave 10 and 15 data set. Robust standard errors are reported in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table F.11: Balance table: Covariates across climate spinning groups

	Full sample	Positive spin	Negative spin
WTP CO2	16.76	16.24	17.28
Interested in article	0.58	0.42	0.74
Environmental attitudes	0.20	0.14	0.25
Aging attitudes	-0.19	-0.17	-0.20
Age	55.29	55.22	55.37
Female	0.36	0.36	0.36
Working	0.58	0.58	0.57
Not working	0.05	0.05	0.06
Retired	0.37	0.37	0.37
High school or less	0.50	0.49	0.50
Bachelor or equivalent	0.18	0.20	0.16
Higher than bachelor	0.32	0.31	0.34
Homeowner	0.66	0.66	0.67
HHinc <€1500	0.07	0.08	0.06
HHinc €1500-3000	0.28	0.28	0.29
HHinc €3000-5000	0.39	0.40	0.39
HHinc €5000+	0.25	0.24	0.26
HHsize 1	0.23	0.22	0.25
HHsize 2	0.48	0.49	0.46
HHsize 3+	0.29	0.29	0.29
East Germany	0.17	0.18	0.16
City size < 20k	0.37	0.37	0.37
City size 20k-100k	0.31	0.29	0.32
City size 100k+	0.32	0.34	0.31
Observations	1230.00	613.00	617.00
F-statistic	.	0.93	0.93
P-value	.	0.54	0.54

Source: BOP-HH wave 15, March 2021.

Notes: This table reports sample averages for the full sample (column 1) , the positive spin climate info group (column 2), the negative spin climate info group (column 3). The last two rows report F-statistic for the joint statistical significance of b from estimating the following linear-probability regression for each group k indicated in the column header separately: $Group_i^{(k)} = \boldsymbol{X_i} b^{(k)} + \epsilon$, where i indexes respondents, $Group_i^{(k)}$ is a dummy variable equal to one if household i is member of group k indicated in the column header and zero otherwise, $\boldsymbol{X}$ is a vector of household/individual characteristics. Individual characteristics are gender, age, age squared, retired indicator, unemployment indicator, education (indicator variable for each group). Household characteristics are homeowner, household income (indicator variable for each category), household size (indicator variable for each size), indicator for living in East Germany and city size (indicator variable for each category).

Table F.12: Compensation of flights in the past

	%	øWTP	WTP=0 (in %)
Did not compensate	82.3	11.3	32.0
Compensated	17.7	20.1	3.2
Total	100.0	12.8	27.1

Source: BOP-HH wave 16, April 2021.

Notes: This table reports the percentage of respondents who did not compensate and did compensate the CO2 emissions of at least one of their flights in 2019 (column 1), respectively. Column 2 reports the average WTP for compensating CO2 emissions of a hypothetical return flight from Germany to Mallorca for each groups of respondents. Column 3 reports the percent of respondents with a WTP equal to zero for each groups of respondents. The sample is restricted to respondents who report that they flew at least once in 2019 (42.3 % of the full sample).

Table F.13: Climate information and planned expenditures for travel and holidays

	(1)		(2)	
	β	SE	β	SE
Treatment (T1-T4)	0.119***	(0.041)	0.090**	(0.042)
Sociodemographics	No		Yes	
Pseudo R^2	0.005		0.032	
Observations	745		745	

Source: BOP-HH, August and September 2020.

Notes: This table reports the average marginal effect of a ordered logistic regression. Individuals' planned expenditures for travel and holidays is the dependent variable, elicited in the September 2020 wave of the BOP-HH. Treatment (T1-T4) is a dummy variable that equals 1 if a individual receives information on ways to fight climate change in the August 2020 wave of the BOP-HH. Demographics include: age, gender, employment status, education level, rental or owned housing, income level group, household size. The survey asks participants of the September 2020 wave whether they plan to spend more, roughly the same, or less on travel and holidays over the next twelve months than over the past twelve months. In this table we study the *plan to spend less* outcome. Robust standard errors are reported in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table F.14: Summary statistics, BOP-HH April 2024 wave

	Mean	SD	Median	Min	Max	Obs.
Age	48.10	17.99	48.00	16.00	80.00	3782
Female	0.50	0.50	0.00	0.00	1.00	3782
Working	0.64	0.48	1.00	0.00	1.00	3777
Not working	0.09	0.29	0.00	0.00	1.00	3777
Retired	0.27	0.44	0.00	0.00	1.00	3777
High school or less	0.67	0.47	1.00	0.00	1.00	3760
Bachelor or equivalent	0.16	0.37	0.00	0.00	1.00	3760
Higher than bachelor	0.17	0.38	0.00	0.00	1.00	3760
Homeowner	0.58	0.49	1.00	0.00	1.00	3780
HHinc €Below 1500	0.08	0.27	0.00	0.00	1.00	3628
HHinc €1500-3000	0.30	0.46	0.00	0.00	1.00	3628
HHinc €3000-5000	0.38	0.49	0.00	0.00	1.00	3628
HHinc €5000+	0.24	0.43	0.00	0.00	1.00	3628
HHsize 1	0.25	0.43	0.00	0.00	1.00	3768
HHsize 2	0.41	0.49	0.00	0.00	1.00	3768
HHsize 3+	0.34	0.47	0.00	0.00	1.00	3768
East Germany	0.19	0.39	0.00	0.00	1.00	3782
City size < 20k	0.41	0.49	0.00	0.00	1.00	3782
City size 20k-100k	0.25	0.44	0.00	0.00	1.00	3782
City size 100k+	0.34	0.47	0.00	0.00	1.00	3782
Pre-returns DAX	4.72	3.33	5.00	0.00	15.00	2790
Pre-returns green assets	5.02	4.25	4.00	0.00	20.00	2787
Post returns DAX	8.82	10.11	7.00	-2.00	52.00	3115
Post returns green assets	4.92	4.25	4.00	0.00	20.00	2952
Inv. share in DAX	0.30	0.28	0.25	0.00	1.00	3506
Inv. share in green assets	0.28	0.26	0.25	0.00	1.00	3506
Inv. share in risk-free inv.	0.41	0.33	0.35	0.00	1.00	3506

Source: BOP-HH, wave 52, April 2024.

Notes: This table reports summary statistics for the sample of the April 2024 wave. Cases with pre- or post-treatment return expectation for the assets tied to the DAX 40 and the green assets smaller than the 5th percentile or larger than the 95th percentile are set to missing. 'Inv.share' refers to the shares of the endowment allocated to the respective assets. Statistics are weighted.

Table F.15: Balance of treatment groups, BOP-HH April 2024.

	Full sample	T1	T2	T3	T4
Pre-returns DAX	4.72	4.46	4.80	4.97	4.62
Pre-returns green assets	5.02	4.48	5.23	5.35	4.98
Post-returns DAX	8.82	8.81	8.01	9.10	9.40
Post-returns green assets	4.92	4.49	5.43	5.01	4.70
Inv-share DAX	0.30	0.30	0.28	0.32	0.31
Inv-share green assets	0.28	0.27	0.30	0.28	0.29
Inv-share risk free asset	0.41	0.43	0.42	0.41	0.40
Age	48.10	48.18	47.84	48.12	48.26
Female	0.50	0.48	0.50	0.52	0.49
Working	0.64	0.61	0.66	0.65	0.63
Not working	0.09	0.11	0.09	0.08	0.09
Retired	0.27	0.28	0.25	0.27	0.27
High school or less	0.67	0.66	0.68	0.66	0.66
Bachelor or equivalent	0.16	0.16	0.15	0.18	0.16
Higher than bachelor	0.17	0.19	0.17	0.16	0.18
Homeowner	0.58	0.57	0.57	0.57	0.60
HHinc <2500	0.08	0.09	0.09	0.08	0.06
HHinc 2500-3000	0.30	0.29	0.30	0.30	0.30
HHinc 3000-5000	0.38	0.39	0.36	0.39	0.39
HHinc >5000	0.24	0.23	0.25	0.23	0.25
HHsize 1	0.25	0.27	0.25	0.25	0.22
HHsize 2	0.41	0.39	0.39	0.41	0.45
HHsize 3+	0.34	0.34	0.36	0.34	0.32
East Germany	0.19	0.19	0.17	0.19	0.20
City size < 20k	0.41	0.40	0.43	0.42	0.39
City size 20k-100k	0.25	0.26	0.26	0.23	0.26
City size 100k+	0.34	0.34	0.31	0.35	0.35
Observations	3782.00	944.00	944.00	942.00	952.00
F-statistic	.	0.41	0.80	1.03	0.96
p-value	.	0.98	0.68	0.42	0.50

Source: BOP-HH, wave 52, April 2024.

Notes: Columns (1) to (5) report sample averages for the full sample (column 1) and the respective treatment group indicated in the column header (columns 2 to 5). The last two rows report the F-statistic for the joint statistical significance of b from estimating separately for each group k indicated in the column header the following linear regression model: $Group_i^{(k)} = \boldsymbol{X_i} b^{(k)} + \epsilon$, where i indexes respondents, $Group_i^{(k)}$ is a dummy variable equal to one if household i is a member of group k indicated in the column header and zero otherwise, and $\boldsymbol{X}$ is a vector of household/individual characteristics. Individual characteristics are gender, age, employment status (indicator variable for each group) and education (indicator variable for each group). Household characteristics are homeownership status, household income (indicator variable for each category), household size (indicator variable for each size), indicator for living in the former East Germany and city size (indicator variable for each category). Results are weighted.