ECONSTOR
Make Your Publications Visible.

A Service of

ZBW Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Kesternich, Martin; Bartels, Lara

Conference Paper

Do Municipal Climate Protection Activities interfere with Individual Engagement?

Beiträge zur Jahrestagung des Vereins für Socialpolitik 2021: Climate Economics

Provided in Cooperation with:
Verein für Socialpolitik / German Economic Association

Suggested Citation: Kesternich, Martin; Bartels, Lara (2021) : Do Municipal Climate Protection Activities interfere with Individual Engagement?, Beiträge zur Jahrestagung des Vereins für Socialpolitik 2021: Climate Economics, ZBW - Leibniz Information Centre for Economics, Kiel, Hamburg

This Version is available at:
https://hdl.handle.net/10419/242456

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

Working Title: Do Municipal Climate Protection Activities interfere with Individual Engagement?

Lara Bartels[a], Martin Kesternich[a,b]

[a] ZEW – Leibniz Centre for European Economic Research, Mannheim
[b] University of Kassel

Version: March 1, 2021

Abstract: The Paris Agreement aims at limiting the global average temperature increase to well below 2°C above preindustrial levels. A key component of the agreement are "nationally determined contributions" (NDC). For this, non-state actors such as civil society groups, economic actors, and subnational and local actors (e.g. Municipalities) play a decisive role. However, a successful integration of non-state actors must happen within the larger framework of the global climate regime. Literature has already stressed the importance of a "polycentric" or multi-level climate governance as an enabler for a transformation climate governance. As the role of non-state actors for reaching the climate goals has received little attention within research, our research focuses on the lowest rungs of the multi-level climate governance ladder and analyses feedback loops between local non-state actors, here municipalities, and individual climate protection activities. With a framed-field experiment we aim to analyze the relationship between individual commitment to climate protection and the commitment of other fellow citizens, and the interaction between individual commitment and municipal engagement. Special attention is paid on potential crowding in or crowding-out effects. Our first preliminary results indicate that the share of contributors and the mean contributions are the highest in the citizen-reference treatment. The city-treatment values are compared to the citizen-treatment reference both at the extensive and intensive margin significantly lower. Additionally, we find that stated personal traits and attitudes predict pro-environmental behavior in form of the contribution very well.

Keywords: voluntary provision of environmental public goods, voluntary climate change mitigation, carbon sequestration, willingness to pay, co-benefits
JEL:
Acknowledgement: This work has been funded by the German Ministry of Education and Research (BMBF) through the project NostaClimate (FKZ: 01LA1813).
Correspondence: Martin Kesternich (martin.kesternich@zew.de)

This study is registered in the AEA RCT Registry and the digital object identifier (DOI) is: "10.1257/rct.6807-1.0".”

1. Introduction

The global task to effectively mitigate climate change requires commitment at all levels of societal organization. Governments agreed at the Paris Climate Convention to limit global warming to 2°C - preferably 1.5°C - above pre-industrial levels. Just recently, the EU set its emission targets higher and decided on an emission reduction of 55% until 2030.

There is now a widespread consensus that civil society and local communities can and must play an essential role in achieving the climate targets. To achieve these goals, non-state actors are expected to give this process a decisive impetus and help bridging the gap between the state and individual actors for climate protection. Non-state actors include civil-society groups such as municipalities, companies, or churches and can critically support achieving governmental climate goals by (i) monitoring the nationally determined contributions (NDCs), (ii) contributing to climate protection by own additional activities, and (iii) acting as multipliers for the individual acceptance of climate policy and climate protection activities (e.g. Rogelj et al., 2016, UNEP, 2016).

Also literature has stressed the importance of a "polycentric" or multi-level climate governance as an enabler for a transformation of climate governance (Ostrom, 2010; Johnson et al., 2015; Romero-Lankao and Hardoy, 2015; Jänicke and Quitzow, 2017). And only recently, the IPCC's SR 1.5 report (2018) emphasized that understanding the synergies and interplays of geophysical, environmental–ecological, technological, economic, socio-cultural, and institutional dimensions will determine the feasibility of a transformation pathways towards the 1.5°C goal. Driven by the increased recognition of the role of citizens and communities in combating climate change, our research focuses on the lowest rungs of the multi-level climate governance ladder and analyses feedback loops between the socio-cultural and the institutional dimension within this transformation process. We analyze if and how municipal climate protection activities by state means may act as multipliers for voluntary individual climate protection activities. For this, we focus on a single climate protection activity that is measurable and substitutable.

So far, little is known about the importance of non-state actors in shaping norms for individual preferences, but a few studies find evidence that public policy can influence individual choices by introducing social norms towards e.g. pro-environmental alternatives (Nyborg et al., 2016; Farrow et al., 2017; Huber et al., 2018). To fill this gap, we analysis and compare the relationship between individual commitment to climate protection and the commitment of other fellow citizens, as well as the interaction between individual commitment and municipal engagement. We do that in the context of a framed-field experiment that explores the individual willingness to pay (WTP) to contribute to climate change mitigation. As novelty, we introduce three treatments that vary a given reference point – none, a fellow-citizen reference point, and a city reference point. As second novelty, instead of revealing the WTP for emissions mitigation via purchasing emissions allowances, we investigate the public valuation of a local forest carbon sink. So far, it remains an open empirical question whether insights from voluntary contributions to CO_2 mitigation carry over to a situation where subjects can actively contribute to CO_2 removal. However, such measures will gain importance in climate protection. Insights from our research may help to enhance individual acceptance of climate policy and help to design effective climate policies that motivate individuals to increase their voluntary efforts to mitigate global warming.

From a theoretical perspective, the effect of climate policy on individual willingness to take up climate protection efforts is ambiguous. Among others, Bernheim (1986) suggest that voluntary

contributions by individuals to public goods may be completely crowded-out by government contributions to the same public goods. Thus, if individuals perceive state climate policies and actions effective, they may decide to scale back their own voluntary activities. On the other hand, empirical research investigating the neutrality of government spending on public goods suggests that crowding-out is incomplete and likely to be small (Abrams and Schmitz, 1984; Andreoni, 1993). Additionally, based on social influence theories (Kelman (1958)) individual attitudes and behavior are strongly intertwined with social interactions and environments. Within this process, norms play a crucial role (Nolan et al., 2008). Research on norm-based interventions found them to be an effective tool to encourage pro-environmental behavioral change (Cialdini and Goldstein, 2004) and can thus contribute to solving highly complex cooperation problems like climate change (Nyborg et al., 2016; Huber et al., 2018).

Norms are transmitted within a social circle or reference groups. These groups are an important driver for social comparison, imitation, and repetition (Welsch and Kühling, 2009). However, membership to a group is not mutually exclusive as groups are nested. Individuals can belong to several groups, each of these groups can act as reference group and "individuals will tend to follow whichever group's norms appear most salient at a given moment" (Huber et al., 2018). Nonetheless, most research in that area has been done on the individual level, but it is equally important to examine the broader sociocultural level to understand possibilities of municipal-norm shaping and leadership by example on individual behavior. Understanding and identifying the correct reference group for respective situations is important to design adequate policy tools.

The experiment was conducted in November 2020. It was attached to a survey being thematically unrelated to the experiment. At the end of the survey, participants were given the opportunity to donate their fixed survey payment to support a reforestation project. Unknown to the potential donors, subjects were at this stage randomly allocated to one of the three treatment conditions. Before being able to make a contribution, participants of all treatments received the same information on climate change and the role of trees. In the base treatment (*base*), the contribution decision was framed in a neutral manner without any reference point The mean willingness to donate of this treatment was then used to provide a reference value on the mean climate protection activities of other fellow citizens in the two weeks later conducted second (*citizens*) treatment. Based on the resulting contributions, conclusions can be drawn about the relationship between individual climate protection commitment and the commitment of other fellow citizens. In the third treatment (*city*) a beforehand calculated reference value for municipal climate protection commitment with respect to the local forest carbon sink was provided. Based on this, conclusions can be drawn about the relationship between individual commitment to climate protection and municipal involvement. What is important to note is, that we only varied the reference point in the sense of either referencing to fellow citizens or the city of Mannheim. We however did not vary the level (contribution provided by the reference group) of the reference point across the two treatments. Overall, 483 individuals participated in the experiment. Our first preliminary results indicate that individuals do react to the reference points, but to a different degree. In our baseline condition, 44.4% of all participants contributed to the local carbon sink, the average contribution across all individuals was 3.47 EUR (23.1% of their remuneration). The share of contributors (61.3%) and the mean contributions (4.20 EUR, 28% of their remuneration) are the highest in the citizen-reference treatment and significantly exceed those in the other two treatments. To our surprise, we do not find evidence that municipal-norm shaping enhances contributions to the environmental public good. Additionally, we find that

stated personal traits and attitudes predict pro-environmental behavior in form of the voluntary climate contribution very well.

2. Literature

We link our research to the well-established literature on voluntary contributions to public goods. This literature builds upon the theoretical concept of the voluntary provision of public goods and the vast experimental evidence suggesting that individuals do - other that predicted by standard economic theory - privately contribute to public goods to a large extent (see e.g. Ledyard, 1995; Zelmer, 2003; Chaudhuri, 2011 for comprehensive literature reviews). Both stated and revealed preference methods have been applied to evaluate how much people are voluntarily willing to pay for climate change mitigation. Revealed preference studies find a low but positive willingness to voluntarily pay for carbon emission reductions (Löschel et al., 2013; Diederich and Goeschl, 2014; Uehleke and Sturm, 2017; Diederich and Goeschl, 2018; Loeschel et al., 2018).

As novelty, we investigate a potential channel that so far has not received much attention: municipal climate protection activities as multiplier for voluntary individual climate protection activities. From a theoretical perspective, the effect of climate policy on the individual willingness to take up climate protection efforts is ambiguous. Models based on standard economic theory argue that people only being concerned with the total supply of the public good treat government spending as a substitute for their own contributions. In that sense, voluntary private contributions to a public good would be crowded out dollar for dollar by government contributions to the same public good (Warr, 1982; Roberts, 1984; Bergstrom et al., 1986; Bernheim, 1986). If this relationship was indeed such straight forward, the resulting perfect crowding-out of private contributions would have important policy implications. For example, if individuals perceive state climate policies and actions effective they may decide to scale back their own voluntary activities, which are however urgently needed. However, past empirical research investigating the perfect crowding-out through government spending on public goods (Abrams and Schmitz, 1978, 1984; Clotfelter, 1985; Kingma, 1989; Andreoni, 1993; Nyborg and Rege, 2003) suggests that crowding-out is incomplete and likely to be small. Less than 30 percent of private contributions may be crowded-out by government spending.

Also, considerable empirical and experimental research has shown that motivations for voluntary individual contributions to public goods are not merely driven by the traditional assumptions of Homo Economicus. Instead individual attitudes and behavior are strongly intertwined with social interactions and environments – as put forwards by the social influence theories (Kelman, 1958) – and embedded in complex system of social preferences (Fehr and Fischbacher, 2002). Within this process, social norms play a crucial role (Nolan et al., 2008; Tankard and Paluck, 2016). Social norms refer to common behaviors but also beliefs that support behavioral patterns in a given society. They generally define what is accepted in a society and are thus understood as common rules of conduct arising from human interactions (Bicchieri, 2006; Young, 2015). Social norms cover both perceptions about what behaviors are typically approved or disapproved in a society (injunctive norms), as well as perceptions about what actually is common practice and done by others (descriptive norms) (Brennan et al., 2013).

Past research on social norms clearly indicates that either witnessing (Cialdini et al., 1991; Cialdini and Goldstein, 2004) or even being solely informed (Schultz, 1999; Goldstein et al., 2008) about how people behave in a certain situation affects behavior. These findings extend over to a broad range of social issues such as alcohol consumption (Lewis and Neighbors, 2006; Neighbors et al., 2010), drug

use (Donaldson et al., 1994), smoking (Rhodes and Ewoldsen, 2009), diet and exercise habits (Schultz et al., 2007; Mollen et al., 2013), as well as charitable giving (Agerström et al., 2016). But they also embrace environmental issues and have found to initiate substantial behavioral changes (Schultz et al., 2007; Farrow et al., 2017; Huber et al., 2018; Bechtel et al., 2019). They can alter littering behavior (Cialdini et al., 1990), are relevant for recycling (Schultz, 1999; Thøgersen, 2006; Nolan, 2011), influence energy (Schultz et al., 2007; Allcott, 2011), water usage (Bernedo et al., 2014; Schultz et al., 2016; Torres and Carlsson, 2018) and sustainable transportation behavior (Flüchter et al., 2014; Kormos et al., 2015), and increase reuse of towels in hotels (Goldstein et al., 2008). Social norms also matter for stated behavioral intentions and stated previous behavior concerning voluntary carbon offsetting. When carbon offsetting is perceived as relevant social norm, the willingness to pay for offsetting and to use potential lottery wins from survey participation to offset emissions increases (Blasch and Farsi, 2014; Blasch and Ohndorf, 2015; Schwirplies and Ziegler, 2016).

But why do social norms effectively encourage behavioral changes? Norms convey social rules of appropriate behavior within a social networks or reference groups. While individualism is a core value of many Western societies, there is also vast and strong evidence that the need to belong is a powerful inner human drive (Baumeister and Leary, 1995). Social identity theory postulates that networks and groups identity are defining aspects of peoples' self-concept and identity (Tajfel and Turner, 2004; Hogg and Reid, 2006). Against this background, groups are an important driver for social comparison, imitation, and repetition (Welsch and Kühling, 2009). Within these groups, people care about what others think about them, they seek approval and social esteem (Christensen et al., 2004), and are unwilling to depart too far from group standards (Lewin and Gold, 1999). Consequently, group membership involves conformity, which is defined as "the act of changing one's actions, attitudes, and behaviors to match the norms of others" (Cialdini and Goldstein, 2004). Evidence from standard public good games proves that this group attachment impacts cooperation behavior: cooperation increases towards others recognized as group members and decreases towards group outsiders (Turner et al., 1979; Bernhard et al., 2006; Charness et al., 2007). In contrast, recent field-experimental evidence on the effect of parochialism across neighborhoods on the efficiency of multi-level public goods provision does also find evidence for a narrow concern for local outcomes but this preference does not interfere with efficiency (Gallier et al., 2019). The average subject responds to a change in relative productivities at different regional scales in the same way.
This also points into the direction that membership to a group is not mutually exclusive but that groups are "nested". Individuals can belong to several groups, e.g. in a more private context there is the group of friends or extended family. In the public context, they may belong to groups formed by school, neighborhood, city, or even the country of origin. Each of these groups can act as reference group and "individuals will tend to follow whichever group's norms appear most salient at a given moment" (Huber et al., 2018). These nested structures add further complexity to the social dilemma of public good contributions: individuals belong to smaller group that is fully contained within the next largest group (Fellner and Lünser, 2014; Gallier et al., 2019).

Yet, most research on the impact of group attachment and norm following has been done at the individual and neighborhood level and neglects wider defined and more public group memberships. Nonetheless, it is equally important to examine the broader sociocultural level to understand possibilities of municipal-norm shaping and leadership by example on individual behavior, especially in the context of encouraging pro-environmental behavior. Thus, our main contribution is to research the effect of providing a reference value of municipal climate protection activities on

individual climate protection activities for a single substitutable activity. We compare this against a rather well researched behavioral setting that provides a reference value on climate protection activities by fellow survey participants, and against a setting that provides no reference value. Therewith, we hope to increase the understanding on the impact of municipal-norm shaping on the individual acceptance of climate policy and individual climate protection activities.

We also contribute to the literature on individuals' willingness to contribute to combating climate change. While so far most studies focused on revealing the WTP for emissions mitigation via e.g. purchasing and withdrawing emissions allowances from existing emissions trading schemes, our context allows us to investigate the public valuation to contribute to a reforestation project. Forest ecosystems account for more than half of the carbon being stored in the terrestrial ecosystems (Obersteiner et al., 2010; Pan et al., 2011; Hui et al., 2019). With that they identify as a natural negative emission technology[1] (NET), which increasingly gain importance in the political and academic debate on the achievement of the Paris Agreement. NETs are based on carbon sequestration and thus cover technologies and approaches that remove carbon dioxide from the atmosphere and capture and transfer it back to geologic reservoirs and ecosystems, such as plants, soils, geologic formations, as well as the ocean (Herzog and Golomb, 2004). NETs are present in 87% of IPCC scenarios that give a more than 50% chance of meeting the 2°C target (Fuss et al., 2014). A priori, it remains unclear to what extent the insights from voluntary emissions mitigation studies carry over to the voluntary provision of local carbon sinks given the different characteristics of the public goods.

3. Data

3.1. Experimental Data

The experiment is enclosed to a survey on the topic of the *General Data Protection Regulation* (GDPR). Importantly, the topic of the survey is thematically unrelated to our experiment to avoid potential framing effects. The survey was implement as online questionnaire, for which the LimeSurvey software was used. Participants were on the one hand randomly selected from an existing database for experimental studies[2] using a computer based random number generator mechanism. On the other hand, new participants were recruited by randomly distributed direct mail in the city of Mannheim. Each participant received a unique token to access the survey that could only be used once. In the invitation email or letter, participants were informed about the general content of the survey and the fixed reimbursement of 15 € for complete survey participation, which would be transferred via PayPal. The experiment was placed at the end on the survey. After completing the online survey, participants were, for the first time, confronted with the opportunity to donate their fixed reimbursement of 15€ in order to support additional tree planting at a reforestation project in Mannheim. This reforestation project is part of the *Bundesgartenschau*[3] (Federal Horticultural Show, BuGa), which will take place in Mannheim in 2023. As preparation for the event, the City of Mannheim plans to unseal urban areas and create an additional local carbon sink by permanently

[1] Fuss et al. (2018) give a comprehensive overview of the relevant NET literature and reviews potentials, costs and implications of NET deployment (including large-scale afforestation and reforestation).

[2] The database was established by the research department Environmental and Resource Economics, Environmental Management of the ZEW – Leibniz Centre for European Economic Research. At the time of the experiment, it contained 1,470 German participants mainly from the Rhein-Neckar-area. The experiment was used to further recruit new participants. By recruiting new participants to the existing database, it is kept active and diverse for future interventions.

[3] The *Bundesgartenschau* is a German exhibition on horticulture which also included topics such as landscape architecture. In its current form, it traces back to 1951 and takes place every two years in various German cities, and every ten years as the International Horticultural Exhibition. In 2019, the Federal Horticultural Show took place in Heilbronn and attracted a total of around 2.3 million visitors on the 173 open days (Statista, 2019).

planting about 500 trees. Participants were informed that they were able to donate to the planting of additional trees within the BuGa2023. With the collected contributions, additional trees will be planted on the BuGa2023 site in addition to those already planned.

Before being able to make a contribution, participants of all treatments first received the same information about the need to protect our climate, the Parisian climate goals, the role of trees as carbon sinks, and the recipient of the individual contributions. Unknown to the potential donors, participants were then randomly allocated to one out of the three treatments when they proceeded to the next screen (see Appendix A1 for a translated version of the information provided and the treatments). This screen then contained the possibility to make the voluntary contribution to the reforestation project in Mannheim, for which we asked participants with how much they would like to support the removal of 100kg CO2 from the atmosphere as part of the reforestation project (in EUR). For the contribution statement, we deployed a slider. The slider's initial position was set at 0, and participants could then adjust the slider to indicate the amount they wanted to donate within 10 cents increments. The maximum possible amount was fixed at 15, which equals the participants' reimbursement.

The experiment was conducted in two waves. The first wave only contained the first treatment. The second wave was conducted two weeks later and contained the second and third treatment.
The first intervention – our *Base* treatment –took place from 19th October to 4th November 2020, were no reference values were used. Based on the baseline treatment, we identified the reference values based on the mean contribution for our second treatment – the *Fellows* Treatment. The third treatment – the *City* treatment – gives a reference value based on a city reforestation project. The second and third treatment run in parallel from 16th to 30th November. We perform our power analysis based on the results of the first treatment. This analysis indicates that 150 experimental observations are needed for the second and third treatment to achieve sufficient statistical power (>0.7) to establish a 10% difference in means.

In the first treatment, the *Base* treatment, the contribution decision is framed in a neutral manner without giving any reference values. Participants were only confronted with the question how much they would like to support the removal of 100kg CO2 from the atmosphere as part of the reforestation project (in EUR) and the slider to indicate their contribution amount. The mean willingness to donate of *Base* was then used as reference value for the second treatment – the *Fellows* – and was formulated the following: *Maybe the following information is helpful for your decision: In the last weeks, 145 people have already participated in this survey. The average donation of survey participants from Mannheim was about 3€.* To further illustrate this, we included a picture of a slider fixed at the value of 3 above the adjustable slider (see A1.2.2). Thus, the second treatment provides a reference value on the mean climate protection activities of fellow citizens living in Mannheim. With the resulting contribution results, conclusions can be drawn about the relationship between individual commitment to climate protection and the commitment of others.

Similarly, a reference value for municipal climate protection commitment is provided in the third treatment (*City*). The climate campaigns of the city of Mannheim within the framework of BuGa2023 are used as a reference value for municipal climate commitment. This was formulated the following: *Maybe the following information is helpful for your decision: In preparation for the Bundesgartenshow 2023, the Bundesgartenschau Mannheim 2023 gGmbH is planting native trees on behalf of the city of Mannheim. According to*

current information, the city invests about 3€ per citizen of the inner Mannheim city area[4] *for this purpose.* Again, to further illustrate this, we included a picture of a slider fixed at the value of 3 above the adjustable slider (see A1.2.3). By providing the city reference value and the resulting contribution results, conclusions can be drawn about the relationship between individual commitment to climate protection and municipal involvement.

3.2. Additional Survey Data

In March 2020, we conducted a survey among the registered participants of our database for experimental studies. The survey was designed to update information on the participants such as general socio-economics, but also participants' current living situation, their working status, net income and voting behavior. Moreover, we queried general attitudes towards public infrastructure (e.g. public transport condition and usage, commuting behavior), housing (e.g. rental prices), city politics, but also included question to elicit participant's identification with their city and city district. Finally, based on Falk et al. (2016; 2018), the survey also covers the well-established GPS preference measures to identify preferences (risk, patience, neg. reciprocity, altruism, and trust); as well as the New Ecological Paradigm (NEP) Scale (Dunlap et al., 2000).

We are able to combine the survey answers at the participant level with the data retrieved from the experiment. This, however, only holds for the already registered participants in the database, which amount for about 61% (n=298) of all participants. The remaining 39% (n=194), are newly recruited participants. To minimize the data gap, we gave newly recruited participants the opportunity to answer the survey on attitudes and preferences for an additional 5€ after they finished the experiment. 83% of the newly recruited answered the additional survey, such that in total, for 459 of the 492 participants we have additional data on preferences and attitudes.

We restrict the available answers on items relevant for our experimental context. These participants identification with their city, whether they know city climate policies, if they think that the city engages enough for climate engagement, and whether they think that the spaces created by the *Bundesgartenshow* enhance a city's' living quality. On a more personal level, we also consider participants' stated engagement in climate protection activities, how much they feel motivated by climate protection of others, an indicator on environmentalism based on created from the nine NEP-indicators, and the GPS preference measures (see Appendix Table A2 and A3 for variable descriptions).

4. Hypotheses

Based on the provided contribution results in the control and treatments groups, we can derive causalities of voluntary individual contributions to climate protection and the commitment of other fellow citizens, as well as the city. Summary information about behaviors of different reference groups has proven to influence individual behavior. A field study in Arizona's Petrified Forest National Park by Cialdini et al. (2006) shows that a sign with the message "many past visitors have removed the petrified wood from the park" increased the stealing of petrified wood souvenirs of

[4] To create comparability and higher interpretability of the results, we aimed at keeping constant the amount given across the two reference groups. The citizen reference value was a given through the first treatment. To calculate the city reference value, the organizers of the BuGa 2023 provided us the estimated amount of trees to be planted on the area, as well as the average expected costs of a tree. Restricting our municipality-reference group to the inner city area enables us to calculate a true expected reference point of 3 EUR per inhabitant of the inner city region which coincides with the reference point in our *Citizen* treatment. We therefore write in our instructions: According to current information, the city invests about 3 EUR per citizen of the inner Mannheim city area for this purpose.

other visitors from the trail. On the other hand, Goldstein et al. (2008) find that a sign indicating that almost 75% of hotel guests reuse their towels increases towel reuse compared to a sign indicating the importance of environmental protection. And at the neighborhood level, Allcott (2011) find that information about neighbors' behavior influences the households' energy use, and Nolan (2011) find that providing information about paper recycling by neighbors too increases paper recycling. These examples show the effectiveness of different reference groups' levels – other park visitors, other hotel guests, and at a smaller scale one's own neighborhood.

Based on the majority of existing findings, we thus expect the information on the average contributions of previous survey participants from Mannheim to positively affect individuals' willingness to contribute to the local reforestation project. Here, the reference group we refer to are the citizens of Mannheim that already participated in the survey. Our participant pool consists to the largest part of people that either now live in Mannheim, or have at an earlier stage of recruitment lived in Mannheim and moved to a new city, which is known to us. A smaller portion of the participant pool covers people that live in close distance to Mannheim, such as Heidelberg. As for the Mannheim group, people by now may have moved. Nevertheless, we believe that the common factor of either living, having lived or living in close distance to Mannheim suffice to cause a reaction to the reference value.

H1: Providing a reference to the average contributions of previous survey participants from Mannheim in the Citizen treatment positively affects individuals' willingness to contribute to the local reforestation project (compared to the control group).

While past research on comparable reference groups to our citizen reference is vast, the impact of providing higher scaled references such as done in our second treatment is so far fairly unexplored. Hence, we here pursue a rather explorative approach. Nonetheless, based on related research we too derive a hypothesis. From a theoretical perspective, the effect of state action on individual willingness to contribute to a public good is ambiguous. Among others, Bernheim (1986) suggest that voluntary contributions by individuals to public goods may be completely crowded-out by government contributions to the same public goods. Thus, if individuals perceive state climate policies and actions effective, they may decide to scale back their own voluntary activities.

In line with that, Huber et al. (2018) conjecture that individuals may perceive voluntary individual action as unnecessary and refrain from it when they learn that the same problem is already addressed by the government. To the best of our knowledge, the experimental study on social norm interventions to increase voluntary carbon offsetting by Huber et al. (2018) is the only other study that too influences to impact of referencing a government-led intervention as social norm. They conclude that "government-led interventions can promote rather than crowd out voluntary pro-environmental behavior […]," such that governments can have "[…] a positive force in fostering (complementary) voluntary pro-environment action among citizens." We derive our second hypothesis based on Huber et al. (2018):

H2: Providing a reference on the climate protection activities of the city of Mannheim positively affects individuals' willingness to contribute to the local reforestation project (compared to the control group).

However, complying with a group does strongly depend on the strength of identity in relation to the group (Turner et al., 1979; Terry and Hogg, 2000). So does research also find that individuals may be more willing to give to charitable causes for individuals they feel close to (Jones and Rachlin, 2006; Harrison et al., 2011; Duclos and Barasch, 2014). We thus expect that individuals that indicate a high interaction with the city of Mannheim react more strongly to the city treatment.

H3: Individuals that indicate a high interaction with the city of Mannheim react more strongly to the city treatment.

Finally, we conjecture that personal attitudes and previous engagements towards climate protection predict behavior in our experimental setting. For example. Huber et al. (2020) find that individual preferences and household differences matter for recycling costs. In their analysis, considering oneself as an environmentalist, or have recycled in the past do strongly predict future recycling behavior. However, the effects may vary depending on the treatment. Schultz et al. (2007) find that participants of their study began to use more electricity if they learned that they were using less electricity than the presented norm of their neighbors. Similar effects were also observed in Allcott (2011). Thus, individuals that indicate in our survey data that they engage highly in climate protection activities and are then confronted with the given reference values in our treatments may react differently than those participants that are not or only little engaged in climate protection activities.

H4: Stated personal traits and previous engagements towards climate protection predict pro-environmental behavior in form of the contribution.

5. Preliminary Results

As primary outcome measures, we analyze the willingness to contribute to the local reforestation project in form of the voluntary contribution decision. We investigate both extensive margin (i.e. share of donors) and intensive margin (i.e. amount of money donated) effects and the impact of reference contributions of fellow citizens, the city, and none.

Table 1: Overview Dependent Variables

	N	mean	median	sd	min	max
Average Contributions						
Base	169	3.476	0	5.259	0	15
Citizen	160	4.392	3	5.335	0	15
City	163	2.971	0	4.962	0	15
Total	492	3.606	0	5.209	0	15
Conditional Contributions						
Base	75	7.833	5	5.31	.5	15
Citizen	98	7.17	5	5.151	.1	15
City	66	7.338	5	5.368	.9	15
Total	239	7.424	5	5.247	.1	15
Share of Donors						
Base	169	44.4%			0	1
Citizen	160	61.3%			0	1
City	163	40.5%			0	1
Total	492	48.6%			0	1

Table 1 gives an overview of the share of donors and the average contribution levels by treatment. Over the whole sample, we establish a total willingness to contribute of 48.6%, and mean average contributions of 3.6 EUR. Donors give on average 7.4 EUR, which equals 49% of their total endowment.

Extensive Margin & Treatment Effects

In the *Base* treatment, about 44% of all participants were willing to make a positive contribution. In the *Citizen* treatment, this share increases to 61%, while it decreases to 40% in the *City* treatment. The *Citizen* treatments yields significantly higher shares compared to the *Base* treatment (44% in Base vs. 61% in Citizen, Chi2 p-value: 0.002) as well as to the *City* treatment (61% in Citizen vs. 40% in City; Chi2 p-value: 0.000). The decrease in shares in the *City* treatment against the *Base* treatment is however not statistically different (44% in Base vs. 40% in City; Chi2 p-value: 0.474). In the following course of the analysis, we perform several logistic regressions with different specifications.

Table 2

	(1) Donor	(2) Donation	(3) Cond. Donation
Treatment			
Citizen	0.43** (0.14) [0.17**]	0.92 (0.58)	-0.66 (0.80)
City	-0.10 (0.14) [-0.04]	-0.51 (0.56)	-0.50 (0.90)
Constant	-0.14 (0.10)	3.48*** (0.40)	7.83*** (0.61)
Observations	492	492	239
Adjusted R^2		0.009	-0.005

Note: Donor (1=yes, 0=no) was calculated using a probit regression. The donation and conditional donation models were calculated using linear regressions. Standard errors in parentheses, marginal effects in brackets for the probit models

Across all specifications, the models confirm the significantly higher and similar in magnitude shares of donors in the *Citizen* treatment compared to the *Base* treatment. Participants in the Citizen treatment are about 17 more likely to become a donor (see Table 2 model 1). Post estimation performed Wald tests confirm that the *Base* and *Citizen* coefficients, as well as the *Citizen* and *City* coefficients are significantly different over all specifications.

Result 1: Providing a reference value of climate protection activities of fellow citizen has a positive effect on the overall share of positive donor. Compared to providing no reference value, the share increases by 17%. Introducing a reference value of climate protection activities of the city has a negative but not significant effect on the overall share of positive donor.

Intensive Margin & Treatment Effects

Turning in a next step to the effects on the average contributions, we observe a similar trend (see Table 2 model 2). In the *Base* treatment, average contributions are 3.5 EUR. Providing the citizen reference value causes an increase of average contributions to 4.4 EUR. This increase is however is not statistically significant (ttest p-value: 0.1180). Providing the city reference value causes a decrease of average contributions to 2.9 EUR. This increase is however is not statistically significant (ttest p-value: 0.3690). However, the average contributions in the *Citizen* treatment are weakly statistically different from the average contributions in the City treatment (4.4 EUR in Citizen vs. 2.9 EUR in City; ttest p-value: 0.0137). Several linear regressions were performed to assess the impact of the treatments on the average donation under different specifications. Across all

specifications, compared to the *Base* treatment, the donations are higher in the *Citizen* treatment, and smaller in the *City* treatment but mainly not or weakly statistically different. Post estimation performed Wald tests confirm that the *Citizen* and *City* coefficients are significantly different over all specifications.

Result 2: Providing a reference value of climate protection activities of fellow citizen has a positive but not significant effect on average contributions. Providing a reference value of climate protection activities of the city has a negative but not significant effect on average contributions. These opposite effects result in weakly statistically different contributions in the Citizen compared to the City treatment.

Further Specifications

The main assumption for our setting to work is that the common factor of either living, having lived or living in close distance to Mannheim suffice to cause a reaction to the reference values provided in both treatments that either refer to Mannheim citizens or to the city of Mannheim. Thus in a first step, we check the robustness of this assumption. Table 3 shows that currently living in Mannheim (n=267) compared to not living in Mannheim (n=225) does not impact the probability to become a donor and neither the average donations over the whole sample (see model 1.2of Table 3) nor the conditional donations (see model 1.3 of Table 3). The same holds for those participants that were born in Mannheim and that were newly recruited for the experiment and added to the existing database[5]. Lastly, we included a dummy that indicated whether participants live in the closest area around Mannheim. Of our 447 participants about 80% live in the Rhein-Neckar area (n=360). Here we see that participants living in the Rhein-Neckar-area, which are also donors, make significantly higher donations (5.6 EUR if not Rhein-Neckar (n=43) compared to 7.8 EUR if Rhein-Neckar (n=176), p-value ttest 0.0137; and Table 1 row 1.3). Including an interaction with the treatments, we find that this difference seems to be manly driven by an interaction with the citizen treatment (4.6 EUR if not Rhein-Neckar (n=19) compared to 7.9 EUR if Rhein-Neckar (n=72), p-value ttest 0.0138). The initial findings on the strong effects of the Citizen treatment on the probability to become a donor, as well as the non-finding on donation continue to hold.

Table 3

	(1.1)	(1.2)	(1.3)
	Donor	Donation	Cond. Donation
Treatment			
Citizen	0.37* (0.15)[0.15*]	0.80 (0.60)	-0.45 (0.84)
City	-0.15 (0.15)[-0.06]	-0.75 (0.60)	-0.52 (0.93)
Mannheim residence	0.01 (0.16)[0.00]	-0.36 (0.66)	-0.78 (0.95)
Born in Mannheim	-0.23 (0.24)[-0.09]	-1.12 (0.97)	-1.15 (1.54)
Rhein-Neckar-Kreis	-0.03 (0.19)[-0.01]	1.41+ (0.77)	2.97** (1.11)
Newly recruited	0.16 (0.17)[0.06]	0.10 (0.69)	-0.62 (1.00)
Constant	-0.10 (0.16)	2.75*** (0.66)	5.98*** (0.98)
Observations	447	447	219
Adjusted R^2		0.013	0.016

Note: Donator (1=yes, 0=no) was calculated using a probit regression. The donation and conditional donation models were calculated using linear regressions. Standard errors in parentheses, marginal effects in brackets for the probit models (1.1 and 1.2); $^{+}$ *p < 0.10,* * *p < 0.05,* ** *p < 0.01,* *** *p < 0.001; interactions with the three treatments were tested for each variable and no substantial differences were found.*

[5] We control for newly recruited to test whether participants that are in our database for a while now and have participated in experiments and surveys in the past may behave differently than those new to the database.

With the assuring results from the regression table 3 that participants currently living in Mannheim do not behave differently, we now turn towards possible identification effects. Complying with a group does strongly depend on the strength of identity in relation to the group (Turner et al., 1979; Terry and Hogg, 2000).

In Table 4 we test whether attitudes and knowledge towards climate policies of the city matter and restrict the analysis only to partcipants living in Mannheim. We control whether the identification with the city (low to high), the knowledge about Mannheimer climate policies (yes/no), the subjective believe that Mannheim engages sufficiently for the climate (not at all to very much), as well as whether the participant agrees that Mannheim shall initiate stronger environmental regulations affects our outcome variables. We do not find that a feeling of identification with Mannheim has an impact on becoming a donor (Table 4, model 1), nor on the donation amount (Table 4, model 2) or the conditional donation made by the donors (Table 4, model 3). Participants being familiar with their city's climate policies are more likely to become a donor as well as those participants that believe that stronger environmental regulations are needed, which increases the chance to become a donor by 17% and 7%. (Table 4, model 1). Believing that stronger environmental regulations are needed also positively influences the donation amount (Table 4, model 2). The support for stronger environmental regulations also positively affects the donation amount. In line with other research, we do find that with increasing income the donation amounts increase. The model specifications of Table 4 were also interacted with three treatments and no substantial differences were found. Thus, other than expect individuals that indicate a high idenfitication with the city of Mannheim do not react more strongly to treatments.

Table 4

	(1) Donator	(2) Donation	(3) Cond. Donation
Treatment			
Citizen	0.58^{+} (0.30)[0.21]	1.39 (1.14)	-0.80 (1.59)
City	-0.19 (0.30)[-0.07]	-0.78 (1.15)	-0.59 (1.85)
MAN_identification	-0.06 (0.12)[-0.02]	0.13 (0.43)	0.36 (0.65)
MAN_climatepolicies known	0.51* (0.24)[0.17]	0.29 (0.93)	-2.24 (1.35)
MAN_climateengage	-0.08 (0.15)[-0.03]	0.01 (0.56)	0.34 (0.81)
MAN_stronger_regulations	0.21* (0.10)[0.07*]	0.78* (0.39)	0.25 (0.60)
Age	0.01 (0.01)[0.00]	0.00 (0.00)	-0.00 (0.00)
Female	0.19 (0.24)[0.06]	0.93 (0.91)	1.03 (1.29)
Education	0.03 (0.07)[0.01]	0.00 (0.25)	-0.20 (0.37)
Net Income	0.01 (0.07)[0.00]	0.62* (0.26)	1.18** (0.39)
Corona financials	-0.25 (0.16)[-0.09^{+}]	-0.71 (0.57)	-0.01 (0.88)
Constant	-0.90 (0.89)	-1.86 (3.37)	1.97 (5.25)
Observations	154	154	76
Adjusted R^2		0.063	0.089

Note: Donator (1=yes, 0=no) was calculated using a probit regression. The donation and conditional donation models were calculated using linear regressions. Standard errors in parentheses, marginal effects in brackets for the probit model $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Finally, we turn towards potential effects of stated personal traits and attitudes elicited in an additional survey, which have proven to be a good indicator for future behavior. Participants that state that they engage in climate activities have a weakly significant higher probability to become a donor, while being motivated by climate activities of others strongly increases the probability to become a donor (Table 6, column 4). Prior stated strong self-engagement in climate change activities positively influences all relevant outcome variables. Strong self-engagement increases the probability to become

a donor by 18% and also increases the donation amounts. In the Donor-models and interacted with the treatments, we see however, that strong self-engagement interacts significantly and positively with the Base and City treatment. Interacted with the Citizen treatment, we find a negative but not-significant effect. However, when having decided to make a contribution, strong self-engagements interacts only significantly with the Citizen treatment.

The effect of indicating to be strongly motivated by others positively and significantly influences the decision to become a donor but negatively and significantly the conditional donations made. Further, measures on altruism, time, concern, trust and a NEP measure indicating a pro-ecological world view of the participants are included, but are not found to impact our outcome variables.

Result 3: Stated personal traits and attitudes elicited in an additional survey on socio-economics, climate policies and identification partially predict pro-environmental behavior very well. Real-world traits indicating a pro-environmental attitude such as engagement in climate activities, demand for stronger environmental regulations, and green voting behavior also translate into pro-environmental behavior in form of being willing to become a donor and to make higher contributions.

Table 5

	Donor		Cond. donation		Av. donation	
	I	II	III	IV	V	VI
Treatment						
Citizen	0.51** (0.17)[0.18**]	0.76+ (0.43)[0.17**]	-0.10 (0.89)	-5.54+ (2.90)	1.17+ (0.61)	0.14 (1.43)
City	-0.15 (0.17)[-0.05]	-0.26 (0.49)[-0.05]	-0.77 (0.98)	-6.32 (3.85)	-0.68 (0.61)	-1.67 (1.46)
Self-engagement	0.52** (0.18)[0.18**]		2.95** (1.07)		2.45*** (0.63)	
*Base		0.85** (0.30)		1.86 (2.06)		2.85** (1.02)
*Citizen		-0.01 (0.31)		4.33** (1.41)		2.96** (1.10)
*City		0.74* (0.34)		1.49 (2.42)		1.47 (1.09)
Others motivate	0.48* (0.21)[0.16*]		-2.77* (1.31)		-0.18 (0.72)	
*Base		0.30 (0.36)		-6.09** (2.33)		-1.40 (1.18)
*Citizen		0.74* (0.35)		-2.16 (1.87)		-0.22 (1.25)
*City		0.52 (0.37)		0.42 (2.64)		1.10 (1.21)
Altruism	0.04 (0.04)[0.01]	0.03 (0.04)[0.01]	0.01 (0.22)	0.06 (0.22)	0.13 (0.13)	0.14 (0.13)
Time	0.01 (0.04)[0.00]	0.01 (0.04)[0.00]	0.36 (0.26)	0.35 (0.27)	0.15 (0.15)	0.15 (0.15)
Perception	-0.00 (0.03)[-0.00]	0.00 (0.03)[0.00]	-0.16 (0.17)	-0.13 (0.17)	-0.10 (0.11)	-0.11 (0.11)
NEP_trust	0.06 (0.10)[0.02]	0.07 (0.10)[0.02]	0.41 (0.51)	0.39 (0.51)	0.49 (0.34)	0.47 (0.34)
NEP_env	0.16 (0.14)[0.05]	0.14 (0.14)[0.05]	-0.83 (0.78)	-0.93 (0.79)	0.24 (0.47)	0.17 (0.47)
Age	0.01+ (0.01)[0.00+]	0.01+ (0.01)[0.00+]	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Female	0.15 (0.16)[0.05]	0.17 (0.16)[0.06]	0.96 (0.84)	0.64 (0.87)	0.85 (0.55)	0.85 (0.56)
Education	-0.00 (0.04)[-0.00]	-0.01 (0.04)[-0.00]	-0.19 (0.24)	-0.24 (0.24)	-0.06 (0.15)	-0.07 (0.15)
Netincome	0.09* (0.04)[0.03*]	0.10* (0.04)[0.03*]	0.75** (0.23)	0.70** (0.23)	0.61*** (0.14)	0.60*** (0.14)
Corona finance	-0.13 (0.10)[-0.03]	-0.12 (0.10)[-0.04]	0.25 (0.57)	0.25 (0.57)	-0.28 (0.35)	-0.29 (0.35)
Constant	-2.61*** (0.76)	-2.73*** (0.82)	4.32 (4.46)	8.85+ (4.81)	-4.42+ (2.59)	-3.32 (2.78)
Observations	371	371	179	179	371	371
Adjusted R^2			0.099	0.111	0.132	0.129

*Note: Donator (1=yes, 0=no) was calculated using a probit regression. The donation and conditional donation models were calculated using linear regressions. Standard errors in parentheses, marginal effects in brackets for the probit model; + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

6. Discussion and Conclusion

The great transformation towards emission neutrality requires the active involvement of the civil society. In order to reach civil societies, cities are a crucial link between governments and individuals. Thus, understanding the possibilities of municipal-norm shaping and leadership by example on individual behavior, especially in the context of encouraging pro-environmental behavior becomes necessary.

Our main contribution is to research the effect of providing a reference value of municipal climate protection activities on individual climate protection activities for a single substitutable activity. We compare this against a rather well researched behavioral setting that provides a reference value on climate protection activities by fellow survey participants, and against a setting that provides no reference value. We define this single substitutable activity as contribution towards a reforestation project that is being carried out by the city of Mannheim. Participants of our experiment have the chance to contribute to additional tree planting activities on the project site. Based on the treatments – *Base*, *Citizen*, *City* – we can elicit the effects of the two different references on the individual voluntary contributions compared to a control group and against each other. Integrated in this setting is the novelty of using a climate change activity that does not refer to emissions mitigation via e.g. purchasing and withdrawing emissions allowances, but instead refers to emission reduction by supporting a local forest carbon sink. Research on the WTP for mitigation activities, e.g. Löschel et al. (2018) and Diederich and Goeschl (2018), reports a positive WTP. In line with that, we find a positive WTP for emission reduction by supporting additional tree planting.

Our main results concern the effect of providing a reference towards municipal climate protection. Past research has almost exclusively investigated the impact of references on the individual level, between other individuals or reference groups such as neighborhoods. In this context, references on behaviors of others have been proven effective to trigger behavioral changes in various contexts (Schultz et al., 2007; Goldstein et al., 2008; Allcott, 2011; Farrow et al., 2017). However, the effects of referring to municipal behavior on individual behavior are not yet known. Our results show that providing a reference value of climate protection activities of fellow citizen has a positive and highly significant effect on the overall share of positive donors, and a positive but not significant effect on average contributions. The share of donors increases by 17% compared to providing no reference value. Against the vast research on social norms and their influence on individual pro-environmental behavior, these results are not surprising and are in line with previous findings. Surprising are however our results on providing a reference on city climate engagement. Compared to the Base treatment, we find neither significant effects at the extensive nor intensive margin but observe a negative trend of fewer donors and lower contribution levels. Taking together the crowding-in of donors and contribution levels in the *Citizen* treatment and the small crowding-out of donors and contribution levels in the *City* treatment, the *Citizen* treatment yields significantly higher results at the extensive and intensive margin. Finally, we find that stated personal traits and attitudes elicited in an additional survey on socio-economics, climate policies and identification partially predict pro-environmental behavior well. Real-world traits indicating a pro-environmental attitude such as engagement in climate activities, demand for stronger environmental regulations, and green voting behavior also translate into pro-environmental behavior in form of being willing to become a donor and to make higher contributions. And, in line with previous experimental studies, we find a relationship between household income and support for climate action.

In sum, our results show that providing a reference value of climate protection activities of fellow citizen has a positive and highly significant effect on the overall share of positive donors, and a positive but not significant effect on average contributions. Providing a reference on city climate engagement has no significant impact at the extensive nor intensive margin. Nonetheless, we observe a negative trend of fewer donors and lower contribution levels.

7. References

Abrams, B.A., Schmitz, M.D., 1978. The 'crowding-out' effect of governmental transfers on private charitable contributions. Public Choice 33, 29–39.

Abrams, B.A., Schmitz, M.D., 1984. The crowding-out effect of governmental transfers on private charitable contributions: Cross-section evidence. National Tax Journal 37, 563.

Agerström, J., Carlsson, R., Nicklasson, L., Guntell, L., 2016. Using descriptive social norms to increase charitable giving: The power of local norms. Journal of Economic Psychology 52, 147–153.

Allcott, H., 2011. Social norms and energy conservation. Journal of Public Economics 95, 1082–1095.

Andreoni, J., 1993. An Experimental Test of the Public-Goods Crowding-Out Hypothesis. The American Economic Review 83, 1317–1327.

Baumeister, R.F., Leary, M.R., 1995. The need to belong: Desire for interpersonal attachments as a fundamental human motivation. Psychological Bulletin 117, 497–529.

Bechtel, M.M., Genovese, F., Scheve, K.F., 2019. Interests, Norms and Support for the Provision of Global Public Goods: The Case of Climate Co-operation. British Journal of Political Science 49, 1333–1355.

Bergstrom, T., Blume, L., Varian, H., 1986. On the private provision of public goods. Journal of Public Economics 29, 25–49.

Bernedo, M., Ferraro, P.J., Price, M., 2014. The Persistent Impacts of Norm-Based Messaging and Their Implications for Water Conservation. Journal of Consumer Policy 37, 437–452.

Bernhard, H., Fischbacher, U., Fehr, E., 2006. Parochial altruism in humans. Nature 442, 912–915.

Bernheim, B.D., 1986. On the Voluntary and Involuntary Provision of Public Goods. The American Economic Review 76, 789–793.

Bicchieri, C., 2006. The grammar of society: The nature and dynamics of social norms. Cambridge University Press, Cambridge, 260 pp.

Blasch, J., Farsi, M., 2014. Context effects and heterogeneity in voluntary carbon offsetting – a choice experiment in Switzerland. Journal of Environmental Economics and Policy 3, 1–24.

Blasch, J., Ohndorf, M., 2015. Altruism, moral norms and social approval: Joint determinants of individual offset behavior. Ecological Economics 116, 251–260.

Brennan, G., Eriksson, L., Goodin, R.E., Southwood, N., 2013. Explaining Norms. Oxford University Press.

Charness, G., Rigotti, L., Rustichini, A., 2007. Individual Behavior and Group Membership. American Economic Review 97, 1340–1352.

Chaudhuri, A., 2011. Sustaining cooperation in laboratory public goods experiments: a selective survey of the literature. Experimental Economics 14, 47–83.

Christensen, P.N., Rothgerber, H., Wood, W., Matz, D.C., 2004. Social norms and identity relevance: a motivational approach to normative behavior. Personality and Social Psychology Bulletin 30, 1295–1309.

Cialdini, R.B., Demaine, L.J., Sagarin, B.J., Barrett, D.W., Rhoads, K., Winter, P.L., 2006. Managing social norms for persuasive impact. Social Influence 1, 3–15.

Cialdini, R.B., Goldstein, N.J., 2004. Social influence: compliance and conformity. Annual Review of Psychology 55.

Cialdini, R.B., Kallgren, C.A., Reno, R.R., 1991. A Focus Theory of Normative Conduct: A Theoretical Refinement and Reevaluation of the Role of Norms in Human Behavior. In: Zanna, M.P. (Ed.) Advances in experimental social psychology, vol. 24. Academic Press, San Diego, pp. 201–234.

Cialdini, R.B., Reno, R.R., Kallgren, C.A., 1990. A focus theory of normative conduct - recycling the concept of norms to reduce littering in public places. Journal of Personality and Social Psychology 58, 1015–1026.

Clotfelter, C.T., 1985. Federal Tax Policy and Charitable Giving. University of Chicago Press, Chicago, 336 pp.

Diederich, J., Goeschl, T., 2014. Willingness to Pay for Voluntary Climate Action and Its Determinants: Field-Experimental Evidence. Environmental and Resource Economics 57, 405–429.

Diederich, J., Goeschl, T., 2018. Voluntary action for climate change mitigation does not exhibit locational preferences. Journal of Environmental Economics and Management 90, 175–180.

Donaldson, S.I., Graham, J.W., Hansen, W.B., 1994. Testing the generalizability of intervening mechanism theories: Understanding the effects of adolescent drug use prevention interventions. Journal of Behavioral Medicine 17, 195–216.

Dunlap, R.E., van Liere, K.D., Mertig, A.G., Jones, R.E., 2000. New Trends in Measuring Environmental Attitudes: Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. Journal of Social Isssues 56, 425–442.

Falk, A., Becker, A., Dohmen, T., Enke, B., Huffman, D., Sunde, U., 2018. Global Evidence on Economic Preferences. The Quarterly Journal of Economics 133, 1645–1692.

Falk, A., Becker, A., Dohmen, T.J., Huffman, D., Sunde, U., 2016. The preference survey module: A validated instrument for measuring risk, time, and social preferences. IZA Discussion Paper No. 9674.

Farrow, K., Grolleau, G., Ibanez, L., 2017. Social Norms and Pro-environmental Behavior: A Review of the Evidence. Ecological Economics 140, 1–13.

Fehr, E., Fischbacher, U., 2002. Why Social Preferences Matter - The Impact of Non-Selfish Motives on Competition, Cooperation and Incentives. The Economic Journal 112, C1-C33.

Fellner, G., Lünser, G.K., 2014. Cooperation in local and global groups. Journal of Economic Behavior & Organization 108, 364–373.

Flüchter, K., Wortmann, F., Fleisch, E., 2014. Digital commuting: the effect of social normative feedback on e-bike commuting - evidence from a field study: Proceedings of the European Conference on Information Systems (ECIS) 2014, Tel Aviv, Israel, June 9-11, 2014, ISBN 978-0-9915567-0-0.

Fuss, S., Canadell, J.G., Peters, G.P., Tavoni, M., Andrew, R.M., Ciais, P., Jackson, R.B., Jones, C.D., Kraxner, F., Nakicenovic, N., Le Quéré, C., Raupach, M.R., Sharifi, A., Smith, P., Yamagata, Y., 2014. Betting on negative emissions. Nature Clim Change 4, 850–853.

Fuss, S., Lamb, W.F., Callaghan, M.W., Hilaire, J., Creutzig, F., Amann, T., Beringer, T., Oliveira Garcia, W.d., Hartmann, J., Khanna, T., Luderer, G., Nemet, G.F., Rogelj, J., Smith. Pete, Vicente, J.L.V., Wilcox, J., Maria del Mar Zamora Dominguez, Jan C Minx, 2018. Negative emissions—Part 2: Costs, potentials and side effects. Environmental Resource Letters. 13, 63002.

Gallier, C., Goeschl, T., Kesternich, M., Lohse, J., Reif, C., Römer, D., 2019. Leveling up? An inter-neighborhood experiment on parochialism and the efficiency of multi-level public goods provision. Journal of Economic Behavior & Organization 164, 500–517.

Goldstein, N.J., Cialdini, R.B., Griskevicius, V., 2008. A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels. Journal of Consumer Research 35, 472–482.

Hogg, M.A., Reid, S.A., 2006. Social Identity, Self-Categorization, and the Communication of Group Norms. Commun Theory 16, 7–30.

Huber, J., Viscusi, W.K., Bell, J., 2020. Dynamic relationships between social norms and pro-environmental behavior: evidence from household recycling. Behav. Public Policy 4, 1–25.

Huber, R.A., Anderson, B., Bernauer, T., 2018. Can social norm interventions promote voluntary pro environmental action? Environmental Science & Policy 89, 231–246.

Hui, D., Deng, Q., Tian, H., Luo, Y., 2019. Climate Change and Carbon Sequestration in Forest Ecosystems. In: Chen, W.-Y., Suzuki, T., Lackner, M. (Eds.) Handbook of Climate Change Mitigation and Adaptation. Springer New York; Springer, New York, NY, pp. 1–40.

IPCC, 2018. Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.

Jänicke, M., Quitzow, R., 2017. Multi-level Reinforcement in European Climate and Energy Governance: Mobilizing economic interests at the sub-national levels. Environmental Policy and Governance 27, 122–136.

Johnson, C., Schroeder, H., Toly, N., 2015. Introduction: Urban Resilience, Low Carbon Governance and the Global Climate Regime. In: Johnson, C., Toly, N., Schroeder, H. (Eds.) The Urban Climate Challenge. Rethinking the Role of Cities in the Global Climate Regime, 1st ed. Routledge, New York.

Kelman, H.C., 1958. Compliance, identification, and internalization three processes of attitude change. Journal of Conflict Resolution 2, 51–60.

Kingma, B.R., 1989. An Accurate Measurement of the Crowd-out Effect, Income Effect, and Price Effect for Charitable Contributions. Journal of Political Economy 97, 1197–1207.

Kormos, C., Gifford, R., Brown, E., 2015. The Influence of Descriptive Social Norm Information on Sustainable Transportation Behavior. Environment and Behavior 47, 479–501.

Ledyard, J., 1995. Public Goods: A survey of experimental research. In: Kagel, J.H. (Ed.) The handbook of experimental economics. Princeton Univ. Press, Princeton, NJ.

Lewin, K., Gold, M., 1999. The complete social scientist: A Kurt Lewin reader, 1st ed. American Psychological Association, Washington, DC, 363 pp.

Lewis, M.A., Neighbors, C., 2006. Social norms approaches using descriptive drinking norms education: a review of the research on personalized normative feedback. Journal of American College Health 54, 213–218.

Löschel, A., Pei, J., Sturm, B., Wang, R., Buchholz, W., Zhao, Z., 2018. The demand for global and local environmental protection - experimental evidence from climate change mitigation in Beijing. ZEW Discussion Paper No. 18-017, Mannheim.

Löschel, A., Sturm, B., Vogt, C., 2013. The demand for climate protection—Empirical evidence from Germany. Economics Letters 118, 415–418.

Mollen, S., Rimal, R.N., Ruiter, R.A.C., Kok, G., 2013. Healthy and unhealthy social norms and food selection. Findings from a field-experiment. Appetite 65, 83–89.

Neighbors, C., LaBrie, J.W., Hummer, J.F., Lewis, M.A., Lee, C.M., Desai, S., Kilmer, J.R., Larimer, M.E., 2010. Group identification as a moderator of the relationship between perceived social norms and alcohol consumption. Psychology of addictive behaviors: Journal of the Society of Psychologists in Addictive Behaviors 24, 522–528.

Nolan, J.M., 2011. The cognitive ripple of social norms communications. Group Processes & Intergroup Relations 14, 689–702.

Nolan, J.M., Schultz, P.W., Cialdini, R.B., Goldstein, N.J., Griskevicius, V., 2008. Normative social influence is underdetected. Personality & Social Psychology Bulletin 34, 913–923.

Nyborg, K., Anderies, J.M., Dannenberg, A., Lindahl, T., Schill, C., Schlüter, M., Adger, W.N., Arrow, K.J., Barrett, S., Carpenter, S., Chapin, F.S., Crépin, A.-S., Daily, G., Ehrlich, P., Folke, C., Jager, W., Kautsky, N., Levin, S.A., Madsen, O.J., Polasky, S., Scheffer, M., Walker, B., Weber, E.U., Wilen, J., Xepapadeas, A., Zeeuw, A. de, 2016. Social norms as solutions. Science (New York, N.Y.) 354, 42–43.

Nyborg, K., Rege, M., 2003. Does Public Policy Crowd Out Private Contributions to Public Goods. Public Choice 115, 397–418.

Obersteiner, M., Böttcher, H., Yamagata, Y., 2010. Terrestrial ecosystem management for climate change mitigation. Current Opinion in Environmental Sustainability 2, 271–276.

Ostrom, E., 2010. Beyond Markets and States: Polycentric Governance of Complex Economic Systems. The American Economic Review 100, 641–672.

Pan, Y., Birdsey, R.A., Fang, J., Houghton, R., Kauppi, P.E., Kurz, W.A., Phillips, O.L., Shvidenko, A., Lewis, S.L., Canadell, J.G., Ciais, P., Jackson, R.B., Pacala, S.W., McGuire, A.D., Piao, S., Rautiainen, A., Sitch, S., Hayes, D., 2011. A large and persistent carbon sink in the world's forests. Science (New York, N.Y.) 333, 988–993.

Rhodes, N., Ewoldsen, D.R., 2009. Attitude and Norm Accessibility and Cigarette Smoking. Journal of Applied Social Psychology 39, 2355–2372.

Roberts, R.D., 1984. A Positive Model of Private Charity and Public Transfers. Journal of Political Economy 92, 136–148.
Romero-Lankao, P., Hardoy, J., 2015. Multilevel Governance and Institutional Capacity for Climate Change Responses in Latin American Cities. In: Johnson, C., Toly, N., Schroeder, H. (Eds.) The Urban Climate Challenge. Rethinking the Role of Cities in the Global Climate Regime, 1st ed. Routledge, New York.
Schultz, P.W., 1999. Changing Behavior With Normative Feedback Interventions: A Field Experiment on Curbside Recycling. Basic and Applied Social Psychology 21, 25–36.
Schultz, P.W., Messina, A., Tronu, G., Limas, E.F., Gupta, R., Estrada, M., 2016. Personalized Normative Feedback and the Moderating Role of Personal Norms. Environment and Behavior 48, 686–710.
Schultz, P.W., Nolan, J.M., Cialdini, R.B., Goldstein, N.J., Griskevicius, V., 2007. The constructive, destructive, and reconstructive power of social norms. Psychological science 18, 429–434.
Schwirplies, C., Ziegler, A., 2016. Offset carbon emissions or pay a price premium for avoiding them? A cross-country analysis of motives for climate protection activities. Applied Economics 48, 746–758.
Statista, 2019. BUGA/IGA: Besucher der Gartenschau bis 2019. https://de.statista.com/statistik/daten/studie/39374/umfrage/besucher-der-gartenschau-seit-1951/. Accessed 29 July 2020.323Z.
Tajfel, H., Turner, J.C., 2004. The social identity theory of intergroup behavior. In: Jost, J.T., Sidanius, J. (Eds.) Political psychology: Key readings, Key readings in social psychology. Psychology Press, New York, pp. 276–293.
Tankard, M.E., Paluck, E.L., 2016. Norm Perception as a Vehicle for Social Change. Social Issues and Policy Review 10, 181–211.
Terry, D.J., Hogg, M.A., 2000. Attitudes, behavior, and social context: The role of norms and group membership. L. Erlbaum Associates, Mahwah, N.J, 348 pp.
Thøgersen, J., 2006. Norms for environmentally responsible behaviour: An extended taxonomy. Journal of Environmental Psychology 26, 247–261.
Torres, M.M.J., Carlsson, F., 2018. Direct and spillover effects of a social information campaign on residential water-savings. Journal of Environmental Economics and Management 92, 222–243.
Turner, J.C., Brown, R.J., Tajfel, H., 1979. Social comparison and group interest in ingroup favouritism. European Journal of Social Psychology. 9, 187–204.
Uehleke, R., Sturm, B., 2017. The Influence of Collective Action on the Demand for Voluntary Climate Change Mitigation in Hypothetical and Real Situations. Environmental Resource Economics 67, 429–454.
Warr, P.G., 1982. Pareto optimal redistribution and private charity. Journal of Public Economics 19, 131–138.
Welsch, H., Kühling, J., 2009. Determinants of pro-environmental consumption: The role of reference groups and routine behavior. Ecological Economics 69, 166–176.
Young, H.P., 2015. The Evolution of Social Norms. Annual Review of Economics 7, 359–387.
Zelmer, J., 2003. Linear Public Goods Experiments: A Meta-Analysis. Experimental Economics 6, 299–310.

Appendix

A1. Treatment Information

A1.1 Part I – Background Information

Your Reimbursement

Thank you for participating in the survey. You will receive 15€ for your participation. At the suggestion of previous study participants, you now have the opportunity to donate a freely chosen amount of your reimbursement. Donations made in this study will be used to support a climate protection project. Of course you are free to decide if you would like to make a donation at all, and if so, how much you would like to contribute. The following information is intended to provide you with essential background information on our selected climate project, which is a reforestation project.

Your Reimbursement

The Paris Climate Convention aims to limit global warming to 2 - preferably 1.5 - degrees Celsius above pre-industrial levels. According to the Intergovernmental Panel on Climate Change, this requires that "net emissions" of greenhouse gases such as CO2 are rapidly reduced to zero. More precisely, zero net emissions means that the amount of greenhouse gases emitted must be at least equal to the amount of greenhouse gases removed from the atmosphere.

Carbon sinks offer an opportunity to remove CO2 from the atmosphere and thus protect the climate globally. A well-known example of a carbon sink are forests and with reforestation the carbon sequestration capacities can be enhanced. In preparation for the Bundesgartenschau (Federal Horticultural Show) in 2023, the City of Mannheim intends to unseal urban areas over the next few months and to then create an additional local carbon sink by planting trees of predominantly native species. According to the current state of planning, the City of Mannheim guarantees permanent maintenance by the municipal park department.

You now have the opportunity to support this project of the city of Mannheim. With your contribution to the reforestation project additional trees can be planted. These trees actively remove CO2 from the atmosphere and bind it over their lifetime. How quickly or how much CO2 a tree binds depends on many factors, such as the tree species, its age, soil quality and water supply. For example, experts at the Forest Centre of the University of Münster calculate that a beech needs to grow for about 80 years to absorb one ton of CO2. On average, this means a beech absorbs 100kg of CO2 in eight years. This corresponds roughly to the emission value of a distance traveled by a car of about 550 km.

Your contribution will not only help to protect the global climate, but also creates additional habitats for animals and plants and supports local biodiversity. Besides, there are a range of other additional positive side-effects for society. Afforested areas serve as recreational and leisure areas. They improve local air quality by filtering harmful fine particles from the air, and improve the urban climate and the supply of fresh air. Especially in the summer months, reforestation can locally increase the balance of temperature and humidity extremes.

A1.2 Part II – The Reference Treatments

A1.2.1 Base Treatment

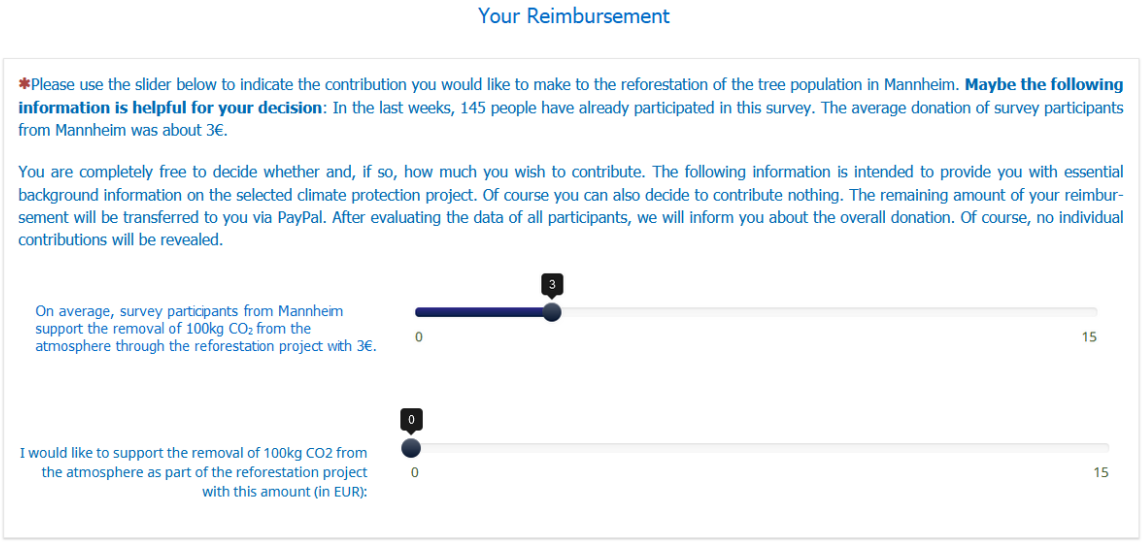
Your Reimbursement

*Please use the slider below to indicate the contribution you would like to make to the reforestation of the tree population in Mannheim.

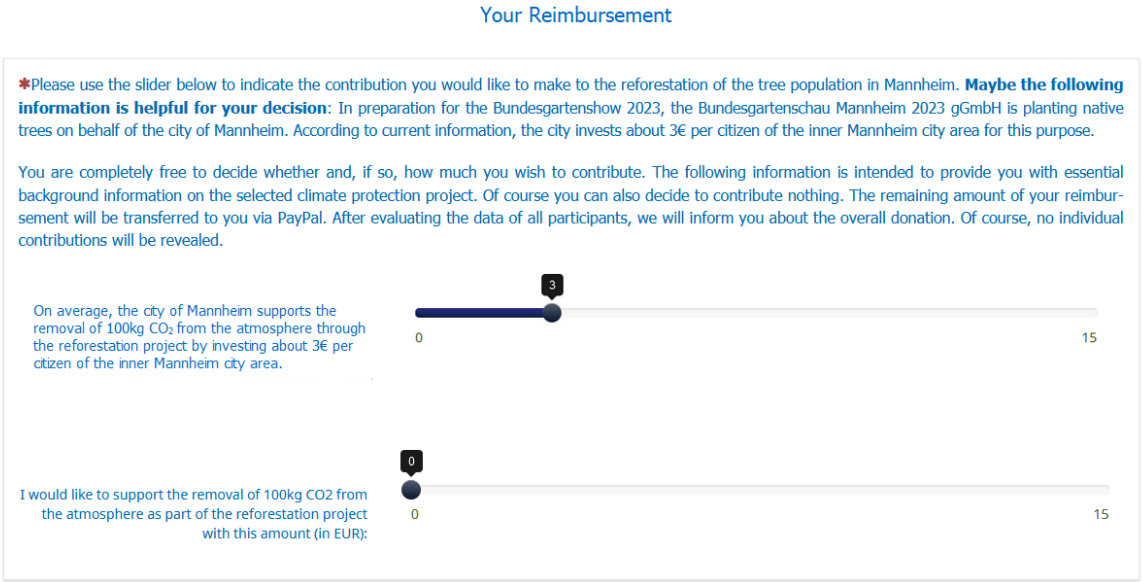
You are completely free to decide whether and, if so, how much you wish to contribute. The following information is intended to provide you with essential background information on the selected climate protection project. Of course you can also decide to contribute nothing. The remaining amount of your reimbursement will be transferred to you via PayPal. After evaluating the data of all participants, we will inform you about the overall donation. Of course, no individual contributions will be revealed.

I would like to support the removal of 100kg CO2 from the atmosphere as part of the reforestation project with this amount (in EUR):

A1.2.2 Fellows Treatment



A1.2.3 City Treatment



A2. Description of Dependent and Independent Variables

Treatment	Indicates the treatment [1=base; 2=citizens; 3=city]
Residence in Mannheim	Indicates whether participant lives at the time of the experiment in Mannheim [1=yes, 0=no].
Identification with Mannheim	Indicates to what extent participants identifies with her city of residence [1=No identification, 2=weak identification, 3=average identification, 4=high identification, 5=full identification].
Newly recruited	Indicates whether participant was newly recruited and added to the database at the time of the experiment [1=yes, 0=no].
City climate policies known	Indicates that participant does not know climate policies or actions of her city [1=

City's climate engagement	Indicates whether participant believes that her city engages sufficiently for climate change [1 = not at all, 2 = only a little, 3 = to some extent, 4 = rather much, and 5 = very much]
BUGA living quality	Indicates whether participant believes that spaces created by the BUGA increase the living qualities in cities [1 = not at all, 2 = only a little, 3 = to some extent, 4 = rather much, and 5 = very much]
Stronger environmental regulations	Indicates whether participant agrees that city shall initiate stronger environmental regulations [1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree].
Engages in climate activities	Indicates whether participant engage in climate change activities [1 = not at all, 2 = only a little, 3 = to some extent, 4 = rather much, and 5 = very much]
Motivated by other climate activities	Indicates whether participant is motivated by climate change activities of others [1 = not at all, 2 = only a little, 3 = to some extent, 4 = rather much, and 5 = very much]
Concerned about what others think	Indicates whether participant is concerned about what others think about herself [1 = not at all, 2 = only a little, 3 = to some extent, 4 = rather much, and 5 = very much]
Support good cause without reward	Indicates to what extent participant is willing to give to a good cause without expecting anything in return [scale 1 to 10; 1= not at all willing, 10= very *willing*]
Careful when dealing with strangers	Indicates to what extent participant agrees to the statement that when dealing with strangers, it is better to be careful before you trust them (NEP9) [1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree].
In general people can be trusted	Indicates to what extent participant agrees to the statement that in general, one can trust people (NEP7) [1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree].
Age	Indicates the age of the participant
Female	Indicates that participant is female [1=female, 0=male]
Education	Indicates the educational attainment of the participant [1 =Haupt-7(Volks-)schulabschluss, 2 =Mittlerer Abschluss, 3=Fachhochschul-/ Hochschulreife, 4=Ausbildung, 5=Fachhochschulabschluss, 6=Bachelor, 7 =Master/Diplom, 8=Promotion]
Net income	Indicates the net income of the participant [1 = <500€, 2= 500-1.000€, 3= 1.000-1.500€, 4= 1.500-2.000€, 5= 2.000-2.500€, 6= 2.500-3.000€, 7= 3.000-3.500€, 8= >3.500€]
Vote green party	Indicates that participant would vote the green party at the next election

A3. Sample Characteristics Pooled

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	485	37.565	14.168	18	88
Female	482	.463	.499	0	1
Education	481	5.923	2.164	1	9
Net income	422	4.528	2.165	1	8
Vote green party	492	.388	.488	0	1
Residence in Mannheim	492	.543	.499	0	1
Identification with Mannheim	291	.533	.5	0	1
Newly recruited	492	.232	.422	0	1
City climate policies known	435	1.543	.499	1	2
City's climate engagement	368	2.905	.854	1	5
Stronger environmental regulations	399	3.792	1.125	1	5
BUGA living quality	403	3.551	1.046	1	5
Engages in climate activities	443	2.957	.954	1	5
Motivated by other climate activities	433	3.36	1.067	1	5
Concerned about what others think	447	5.447	2.432	0	10
Careful when dealing with strangers	454	3.441	1.029	1	5
In general people can be trusted	454	2.989	1.002	1	5
Support good cause without reward	454	7.328	2.152	0	10

A4. Sample Characteristics by Treatment

	N	mean	sd	min	max
Base					
Age	165	36.218	12.226	19	73
Female	164	.439	.498	0	1
Education	163	6.11	2.129	1	9
Net income	143	4.776	2.256	1	8
Vote green	169	.391	.489	0	1
Residence in Mannheim	169	.527	.501	0	1
Identification with Mannheim	93	.452	.5	0	1
Newly recruited	169	.266	.443	0	1
City climate policies known	142	1.613	.489	1	2
City's climate engagement	123	2.911	.859	1	5
Stronger environmental regulations	98	3.724	1.299	1	5
BUGA living quality	131	3.565	1.124	1	5
Engages in climate activities	147	2.98	.996	1	5
Motivated by other climate activities	145	3.441	1.079	1	5
Concerned about what others think	149	5.523	2.393	0	10
Support good cause without reward	150	3.327	.986	1	5
Careful when dealing with strangers	150	3.067	1.008	1	5
In general people can be trusted	150	7.4	2.177	0	10

Citizen					
Age	158	40.032	15.837	18	85
Female	159	.459	.5	0	1
Education	158	5.658	2.293	1	9
Net income	141	4.511	2.186	1	8
Vote green	160	.412	.494	0	1
Residence in Mannheim	160	.537	.5	0	1
Identification with Mannheim	102	.627	.486	0	1
Newly recruited	160	.188	.392	0	1
City climate policies known	143	1.559	.498	1	2
City's climate engagement	122	2.885	.795	1	5
Stronger environmental regulations	147	3.871	.974	1	5
BUGA living quality	135	3.6	1.001	1	5
Engages in climate activities	144	2.903	.918	1	5
Motivated by other climate activities	141	3.255	1.038	1	5
Concerned about what others think	147	5.265	2.368	0	10
Support good cause without reward	150	3.493	1.06	1	5
Careful when dealing with strangers	150	2.947	1.009	1	5
In general people can be trusted	150	7.213	2.119	1	10
City					
Age	162	36.531	14.06	18	88
Female	159	.491	.501	0	1
Education	160	5.994	2.054	1	9
Net income	138	4.29	2.03	1	8
Vote green	163	.362	.482	0	1
Residence in Mannheim	163	.564	.497	0	1
Identification with Mannheim	96	.51	.503	0	1
Newly recruited	163	.239	.428	0	1
City climate policies known	150	1.46	.5	1	2
City's climate engagement	123	2.919	.911	1	5
Stronger environmental regulations	154	3.76	1.144	1	5
BUGA living quality	137	3.489	1.015	1	5
Engages in climate activities	152	2.987	.949	1	5
Motivated by other climate activities	147	3.381	1.081	1	5
Concerned about what others think	151	5.55	2.537	0	10
Support good cause without reward	154	3.5	1.037	1	5
Careful when dealing with strangers	154	2.955	.992	1	5
In general people can be trusted	154	7.37	2.169	0	10