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Supplementary Material

Knowledge about aerosol injection does not reduce individual mitigation efforts

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Table A1: Survey items used in the analysis

| <i>Questions and items</i> | <i>response scale</i> |
|--|--|
| Dependent variable | |
| How many CO ₂ offsets would you like to buy? | 0 – 10 |
| Attitude towards mitigation | |
| In your daily life, how often do you try to cut down on greenhouse gas emission? | never (0); rarely (1); from time to time (2); often (3); always (4) |
| I feel morally obliged to help mitigate climate change. | strongly disagree (0) - strongly agree (5) |
| Determinants for the purchase decision | |
| (How did the following aspects influence your choice in buying CO ₂ offsets?) | |
| The IfW is handling the purchase, not me. | negatively influenced purchase amount (-2)- |
| My remaining endowment can only be cashed in via the online panel. | positively influenced purchase amount (2) |
| Effectiveness of measures against climate change | |
| (How do you evaluate the effectiveness of the following measures against climate change?) | |
| Release of sulfate particles in higher regions of the atmosphere | very ineffective (0) - very effective (3) |
| Effectiveness of individual mitigation options | |
| (How do you evaluate the effectiveness of the different options with which you can do something about climate change?) | |
| Purchase of voluntary carbon offsets | very ineffective (0) - very effective (3) |
| Perception of climate change impacts | |
| (How do you evaluate climate change? Do you think the following demographic groups will be positively or negatively affected by climate change today / in 25 years?) Questions combined into one factor by principal component analysis. | |
| People in my environment, including myself (today/in 25 years) | |
| People in industrialized countries (today/in 25 years) | strongly negatively affected (-3) – strongly positively affected (3) |
| People in developing countries (today/in 25 years) | |
| Effect of SAI information on perception of climate change | |
| (The idea of sulfate particles being released into higher regions of the atmosphere to counter climate change affects my feelings about climate change. I now find it ...) | |
| ... a lot more threatening; ... more threatening; ... as threatening or not threatening as before; | |
| ... less threatening; ... no longer threatening. | |
| Research on SAI | |
| (Do you agree or disagree with the following kinds of research being conducted within the next 25 years?) | |
| Research on efficiency and side effects of releasing sulfate particles via computer models in the laboratory, without releasing any particles in the atmosphere. | strongly disagree (0) - strongly agree (5) |
| Socio-demographics (from panel database) | |
| Age | years |
| Gender | male (0); female (1) |
| Highest academic qualifications obtained | no degree or secondary education certificate (0); university entrance certificate or university degree (1) |

Table A2: Tobit regression including interaction terms between SAI and SAI effectiveness for Fehler!
Verweisquelle konnte nicht gefunden werden.

| Dependent variable: | | Average | Standard |
|------------------------------------|----------------------------------|-----------------|----------|
| purchase of VCOs | | Marginal Effect | Error |
| <i>Treatment Group</i> | | | |
| SAI | (at SAI effectiveness = 1) | -0.146 | (0.663) |
| | (at SAI effectiveness = 2) | 1.095** | (0.459) |
| | (at SAI effectiveness = 3) | -0.181 | (0.608) |
| | (at SAI effectiveness = 4) | 1.572*** | (0.489) |
| <i>Perceived SAI effectiveness</i> | | | |
| | SAI effectiveness = 2 | -0.842* | (0.477) |
| | SAI effectiveness = 3 | -0.601 | (0.558) |
| | SAI effectiveness = 4 | -0.891* | (0.471) |
| <i>Climate Change</i> | | | |
| | (1) Awareness of impacts | 0.004 | (0.127) |
| | (2) Daily mitigation | -0.007 | (0.142) |
| | (3) Moral obligation to mitigate | 0.644*** | (0.119) |
| <i>Experiment characteristics</i> | | | |
| | (4) VCO effectiveness | 1.378*** | (0.161) |
| | (5) Indirect purchase of VCOs | 1.044*** | (0.135) |
| | (6) Payment via panel points | 0.141 | (0.177) |
| <i>Socio-demographic variables</i> | | | |
| | Female | 0.049 | (0.261) |
| | Age | 0.014* | (0.008) |
| | Higher education | 0.982*** | (0.257) |
| pseudo R ² | | 0.099 | |
| N | | 658 | |

Note: SAI is a dummy variable indicating the SAI treatment. SAI effectiveness is a categorical variable indicating perceived SAI effectiveness (1 = not effective, 2 = largely ineffective, 3 = effective, 4 = don't know).

Female and higher education are dummy variables; all others except awareness of climate change impacts are standardised. (1) factor of the variables perception of climate change impacts 'today'/in 25' years for people in 'my environment including myself'/in industrialized countries'/in developing countries' (2) 'In your daily life, how often do you try to cut down on greenhouse gas emission?'; (3) 'I feel morally obliged to help mitigate climate change.' (4) Perceived effectiveness of voluntary carbon offsets; influence on purchase decision of: (5) 'The IfW is handling the purchase, not me.' and (6) 'My remaining endowment can only be cashed in via the online panel.' For complete description of variables, see table A1.

* p < 0.10, ** p < 0.05, *** p < 0.01

Table A3: Tobit regression including interaction terms between SAI and change in perception of climate change caused by learning about SAI

| Dependent variable: purchase of VCOs | Average Marginal Effect | Standard Error |
|---|----------------------------|-------------------|
| <i>Treatment Group</i> | | |
| SAI (at Higher CC threat = 1) | 0.671* | (0.387) |
| (at Higher CC threat = 0) | 0.812** | (0.341) |
| (at Higher CC threat = -1) | 1.028 | (1.218) |
| <i>Climate Change</i> | | |
| (1) Awareness of impacts | 0.032 | (0.128) |
| (2) Daily mitigation | 0.019 | (0.143) |
| (3) Moral obligation to mitigate | 0.633*** | (0.120) |
| <i>Experiment characteristics</i> | | |
| (4) VCO effectiveness | 1.338*** | (0.157) |
| (5) Indirect purchase of VCOs | 1.053*** | (0.136) |
| (6) Payment via panel points | 0.116 | (0.177) |
| <i>Socio-demographic variables</i> | | |
| Female | 0.114 | (0.261) |
| Age | 0.016* | (0.008) |
| Higher education | 1.016*** | (0.259) |
| pseudo R ² | 0.095 | |
| N | 658 | |

Note: Higher CC threat is a categorical variable indicating an alteration in perception of climate change caused by learning about SAI (1 = more threatening, 0 = as threatening or not threatening as before, -1 = less threatening); the variable was only elicited in the SAI treatment and is thus also an indication of the SAI treatment.

Female and higher education are dummy variables; all others except awareness of climate change impacts are standardised. (1) factor of the variables perception of climate change impacts 'today'/ 'in 25 years' for people in 'my environment including myself'/'in industrialized countries'/'in developing countries' (2) 'In your daily life, how often do you try to cut down on greenhouse gas emission?'; (3) 'I feel morally obliged to help mitigate climate change.' (4) Perceived effectiveness of voluntary carbon offsets; influence on purchase decision of: (5) 'The IfW is handling the purchase, not me.' and (6) 'My remaining endowment can only be cashed in via the online panel.' For complete description of variables, see table A1.

* p < 0.10, ** p < 0.05, *** p < 0.01

Table A4: Tobit regression including interaction term between SAI and acceptance of SAI research in the lab for **Fehler! Verweisquelle konnte nicht gefunden werden.**

| Dependent variable: purchase of VCOs | Average Marginal Effect | Standard Error |
|---|----------------------------|-------------------|
| <i>Treatment Group</i> | | |
| SAI (at SAI research = 1) | 1.327* | (0.762) |
| (at SAI research = 2) | 0.339 | (0.717) |
| (at SAI research = 3) | 0.248 | (0.421) |
| (at SAI research = 4) | 0.940** | (0.388) |
| (at SAI research = 5) | 1.998** | (0.819) |
| <i>Climate Change</i> | | |
| (1) Awareness of impacts | 0.025 | (0.127) |
| (2) Daily mitigation | 0.017 | (0.142) |
| (3) Moral obligation to mitigate | 0.623*** | (0.119) |
| <i>Experiment characteristics</i> | | |
| (4) VCO effectiveness | 1.339*** | (0.157) |
| (5) Indirect purchase of VCOs | 1.040*** | (0.136) |
| (6) Payment via panel points | 0.115 | (0.176) |
| <i>Socio-demographic variables</i> | | |
| Female | 0.126 | (0.260) |
| Age | 0.016* | (0.008) |
| Higher education | 0.993*** | (0.259) |
| pseudo R ² | 0.097 | |
| N | 658 | |

Note: SAI research is a categorical variable indicating agreement with SAI research in the lab or using computer models (1 = disagree, 2 = tend to disagree, 3 = tend to agree, 4 = agree, 5 = don't know); the variable was only elicited in the SAI treatment and is thus also an indication of the SAI treatment

Female and higher education are dummy variables; all others except awareness of climate change impacts are standardised. (1) factor of the variables perception of climate change impacts 'today'/'in 25 years' for people in 'my environment including myself'/'in industrialized countries'/'in developing countries' (2) 'In your daily life, how often do you try to cut down on greenhouse gas emission?'; (3) 'I feel morally obliged to help mitigate climate change.' (4) Perceived effectiveness of voluntary carbon offsets; influence on purchase decision of: (5) 'The IfW is handling the purchase, not me.' and (6) 'My remaining endowment can only be cashed in via the online panel.' For complete description of variables, see table A1.

* p < 0.10, ** p < 0.05, *** p < 0.01

Information material

Please read the following text carefully:

Causes of climate change

Since 1900, the average global surface temperature has risen by about 0.9°C. It is extremely likely that this has been caused by increased emissions of greenhouse gases such as carbon dioxide (CO₂). Greenhouse gases are, for example, released when coal, oil and gas are burnt. If the current trend continues and nothing is done about climate change, the average global surface temperature will have risen by about another 3.9°C by the end of the century.

Visible evidence of climate change

Changes in climate can already be observed. It has been getting warmer. Massive glacier loss is evident almost everywhere. Arctic sea-ice and the snow cover of the northern hemisphere have also decreased.

The oceans have grown warmer and the sea level has risen. Furthermore, the oceans have absorbed about two-thirds of the greenhouse gases emitted and acidification of the seas is on the rise.

Since about 1950, changes in many extreme weather and climate events have been observed. Among other things, there are fewer very cold days and more very hot days. There has also been an increase in the number of extreme precipitation events in some regions.

All of these changes have an effect on plants, animals and humans. The more greenhouse gases we emit, the bigger the future changes will be.

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To stop or reduce climate change and its effects, various measures can be adopted either individually or in combination with each other. These include:

Climate protection via reduction of greenhouse gas emissions

Greenhouse gas emissions can be reduced by switching to renewable energies or by a change in consumer behaviour. Switching to renewable energies (e.g. wind or solar energy) costs money, requires grid expansion and involves interference with landscapes and Nature. Changes in consumer behaviour

include flying less frequently, switching from the car to public transport/bikes or lowering room temperatures.

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Adaptation to climate change

Examples of adaptation to climate change are building higher dikes, resettling people or cultivating more stress-resistant crops. Adaptation measures also involve costs. Resettling means that a lot of people will lose their livelihood and their social environment. Some animals and plants are either completely or largely unable to adapt, especially when environmental changes happen very suddenly.

[new Screen]

only for SAI treatment

Manipulation of global surface temperature

Currently there is increasing discussion about a measure for manipulating surface temperature directly. When sulfate particles are released into higher regions of the atmosphere, they reflect some of the sunlight back out into space before it warms the Earth.

This measure could slow down global warming much faster than cutting back greenhouse gas emissions. To achieve that goal, the particle layer would have to be renewed constantly until the share of greenhouse gases in the atmosphere dropped again. Ocean acidification cannot be prevented by this measure.

Little research has been done on the effects and side effects of this measure. Injecting sulfate particles could have negative effects on various ecosystems, the ozone layer and the health of animals and people. Furthermore, political conflicts might arise over deployment itself and the extent of deployment. It is unclear whether additional negative effects would occur during deployment. Research can provide new information about effects and side effects, without necessarily coming to any definite conclusions.

only for AUG treatment

Future climate development

Researchers throughout the world are trying to work out how the climate will change in future. The following points are largely uncontested:

Global mean surface temperature will continue to rise. Heat waves will occur more frequently. In addition, hot days will become hotter and more frequent, while cold days will be warmer and less frequent. However, occasional extremely cold winters will continue to occur. In many regions, the number of extreme precipitation events will increase, as will the occurrence of longer and more severe droughts. The differences between arid and humid regions will increase. The differences between dry and wet seasons will also increase (with some regional exceptions).

In future, the Arctic sea-ice cover will shrink and lose volume and the spring snow cover in the northern hemisphere will decrease. Glacier volume will continue to decrease and the ocean will get progressively warmer. Extremest ocean warming is projected for subtropical regions in the northern hemisphere and for tropical regions. The sea level will continue to rise, though not uniformly across regions.

[new Screen]

for all treatment groups

Purchasing CO₂ certificates against climate change

Another way of cutting down greenhouse gas emissions is to buy CO₂ certificates. The trade revenues finance projects to combat climate change like the construction of renewable energy systems or projects to improve energy efficiency.

In this questionnaire you have the opportunity to contribute to the fight against climate change and to buy CO₂ certificates. To do so, you can use the 10 euros you were given for taking part in this survey. Any money you do not use to buy certificates will be added to your YouGov account approximately 4 weeks after completing the survey.

The certificates meet the so-called gold standard. In other words, you can rest assured that carefully selected and certified projects will be financed by the certificates and that CO₂ reduction is actually happening. Every one of these certificates reduces greenhouse gas emission by 50 kg CO₂.

[new Screen]

How much is 50 kg CO₂?

A car emits approximately 50 kg CO₂ during a drive from Hamburg to Berlin. Average per capita emission in Germany is 11,400 kg CO₂ every year. On a global scale, average emission per head of population amounts to approximately 5,100 kg CO₂ every year.

How much does one CO₂ certificate cost?

Usually, one certificate costs 1.15 euros. If you buy certificates during this survey, the Kiel Institute for the World Economy (IfW) will shoulder 15 cents of the cost of every certificate. As a participant in this survey you only need to pay 1 euro to mitigate the emission of 50 kg CO₂.

[new Screen]

How does the purchase work?

After completing the survey, the IfW will buy the requested amount of CO₂ certificates for every participant. The IfW will publish the overall amount of requested certificates on its website, so you can make sure that the certificates have actually been purchased. You will also find a confirmation of the buying process on the website. The corresponding link will be sent to you by email via YouGov. Your personal information will, of course, remain anonymous and will not be published.

[new Screen]

Control questions

Before you make your decision, please answer the following 4 questions to ensure that you have understood what is at stake.

Remember: Every participant has a credit of 10 euros, and one certificate for 50 kg CO₂ costs 1 euro.

Assume that one of the participants wants to buy 6 CO₂ certificates. *[Participants are excluded from the survey after three incorrect attempts to answer]*

How many CO₂ certificates will be bought on his behalf? _____ Certificates

What amount of CO₂ emissions will be avoided? _____ kg

How much is he paying for this purchase? _____ Euros

How much money is left after the purchase? _____ Euros

[new Screen]

Your purchase decision

In this survey, one certificate for 50 kg CO₂ costs 1 euro. Your credit is 10 euros.

How many CO₂ certificates would you like to buy? Please enter your decision here.

_____Y_____ certificates

[new Screen]

Your purchase decision is equivalent to the avoidance of $Y \cdot 50$ kg CO₂ and $10 - Y$ Euros remain in your account.