

# Free riding in climate protests

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# Supplementary Information for: “Free riding in climate protests”

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## A Sample characteristics

|          | Berlin      | Hamburg     | Munich      | Cologne     | Total         |
|----------|-------------|-------------|-------------|-------------|---------------|
| 1st wave | 848         | 651         | 490         | 585         | 2,574         |
| 2nd wave | 610 (0.281) | 481 (0.261) | 363 (0.259) | 425 (0.274) | 1,879 (0.270) |
| 3rd wave | 490 (0.197) | 399 (0.170) | 280 (0.229) | 341 (0.198) | 1,510 (0.196) |

**Supplementary Table 1: Sample by location and survey wave.** The table shows the counts of subjects and attrition rates in percent in parentheses by respective location and for the full sample.

|                                                                   | Part. at least in Wave 1 |           | Part. in Waves 1, 2, 3 |           | Comparison         |                |
|-------------------------------------------------------------------|--------------------------|-----------|------------------------|-----------|--------------------|----------------|
|                                                                   | Mean<br>(1)              | SD<br>(2) | Mean<br>(3)            | SD<br>(4) | t-statistic<br>(5) | p-value<br>(6) |
| Being female                                                      | 0.560                    | 0.496     | 0.555                  | 0.497     | 0.326              | 0.744          |
| Age 18 up to 30                                                   | 0.244                    | 0.429     | 0.201                  | 0.401     | 3.111              | 0.002          |
| Age 30 up to 50                                                   | 0.404                    | 0.491     | 0.386                  | 0.487     | 1.107              | 0.268          |
| Age 50 up to 60                                                   | 0.283                    | 0.450     | 0.323                  | 0.468     | -2.724             | 0.006          |
| Age 65 and older                                                  | 0.070                    | 0.255     | 0.089                  | 0.285     | -2.253             | 0.024          |
| (Very) high importance of climate protection                      | 0.681                    | 0.466     | 0.685                  | 0.465     | -0.247             | 0.805          |
| Committing (almost) every decision to environ./climate protection | 0.314                    | 0.464     | 0.298                  | 0.458     | 1.062              | 0.288          |
| Own plan to participate/signal $s$                                | 0.353                    | 0.478     | 0.339                  | 0.474     | 0.911              | 0.362          |
| Belief re. others' planned participation $\bar{b}$                | 0.332                    | 0.232     | 0.326                  | 0.228     | 0.839              | 0.402          |
| Pre-intervention belief re. others' actual participation $b'$     | 0.260                    | 0.215     | 0.025                  | 0.206     | 1.409              | 0.159          |
| Observations                                                      | 2,574                    |           | 1,510                  |           |                    |                |

**Supplementary Table 2: Attrition from Wave 1 to Wave 3.** The table shows descriptive statistics in percent for all respondents who participated at least in Wave 1 (Columns 1-2) and for all respondents who participated in Wave 1, 2 and 3 (Columns 3-4). Descriptive statistics are compared using two-sided t-tests, yielding t-statistics and p-values (Columns 5-6).

|                                                                   | Control group       |           |             |                        |                    |                | Treatment group     |           |             |                        |                     |                 |
|-------------------------------------------------------------------|---------------------|-----------|-------------|------------------------|--------------------|----------------|---------------------|-----------|-------------|------------------------|---------------------|-----------------|
|                                                                   | Part. in Waves 1, 2 |           |             | Part. in Waves 1, 2, 3 |                    |                | Part. in Waves 1, 2 |           |             | Part. in Waves 1, 2, 3 |                     |                 |
|                                                                   | Mean<br>(1)         | SD<br>(2) | Mean<br>(3) | SD<br>(4)              | t-statistic<br>(5) | p-value<br>(6) | Mean<br>(7)         | SD<br>(8) | Mean<br>(9) | SD<br>(10)             | t-statistic<br>(11) | p-value<br>(12) |
| Being female                                                      | 0.548               | 0.498     | 0.548       | 0.498                  | 0.016              | 0.987          | 0.555               | 0.497     | 0.558       | 0.497                  | -0.19               | 0.849           |
| Age 18 up to 30                                                   | 0.232               | 0.422     | 0.209       | 0.407                  | 0.912              | 0.362          | 0.231               | 0.421     | 0.198       | 0.399                  | 1.897               | 0.058           |
| Age 30 up to 50                                                   | 0.371               | 0.483     | 0.353       | 0.478                  | 0.598              | 0.55           | 0.403               | 0.491     | 0.402       | 0.49                   | 0.077               | 0.939           |
| Age 50 up to 60                                                   | 0.321               | 0.467     | 0.355       | 0.479                  | -1.185             | 0.236          | 0.284               | 0.451     | 0.308       | 0.462                  | -1.259              | 0.208           |
| Age 65 and older                                                  | 0.076               | 0.265     | 0.083       | 0.276                  | -0.394             | 0.694          | 0.082               | 0.275     | 0.093       | 0.29                   | -0.866              | 0.386           |
| (Very) high importance of climate protection per se               | 0.675               | 0.469     | 0.659       | 0.475                  | 0.571              | 0.568          | 0.691               | 0.462     | 0.697       | 0.46                   | -0.305              | 0.76            |
| Committing (almost) every decision to environ./climate protection | 0.301               | 0.459     | 0.279       | 0.449                  | 0.808              | 0.42           | 0.314               | 0.464     | 0.307       | 0.461                  | 0.345               | 0.73            |
| Own plan to participate/signal $s$                                | 0.344               | 0.476     | 0.322       | 0.468                  | 0.766              | 0.444          | 0.362               | 0.481     | 0.347       | 0.476                  | 0.766               | 0.444           |
| Belief re. others' planned participation $\tilde{b}$              | 0.326               | 0.229     | 0.322       | 0.227                  | 0.331              | 0.741          | 0.332               | 0.232     | 0.328       | 0.229                  | 0.353               | 0.724           |
| Pre-intervention belief re. others' actual participation $b'$     | 0.25                | 0.21      | 0.243       | 0.205                  | 0.564              | 0.573          | 0.254               | 0.207     | 0.253       | 0.206                  | 0.12                | 0.905           |
| Observations                                                      | 604                 |           |             | 484                    |                    |                | 1,275               |           |             | 1,026                  |                     |                 |

**Supplementary Table 3: Attrition from Wave 2 to Wave 3 by experimental group.** The table shows descriptive statistics in percent for all respondents who participated in Waves 1 and 2 (Columns 1-2 and Columns 7-8) and for all respondents who participated in Wave 1, 2 and 3 (Columns 3-4 and Columns 9-10). Note that treatment assignment took place in Wave 2 and hence treatment-specific attrition is impossible from Wave 1 to Wave 2. Descriptive statistics are compared using two-sided t-tests, yielding t-statistics and p-values (Columns 5-6 and Columns 11-12).

|                 | Berlin        |                   |                | Hamburg       |                   |                | Munich        |                   |                | Cologne        |                    |                 |
|-----------------|---------------|-------------------|----------------|---------------|-------------------|----------------|---------------|-------------------|----------------|----------------|--------------------|-----------------|
|                 | Sample<br>(1) | Population<br>(2) | p-value<br>(3) | Sample<br>(4) | Population<br>(5) | p-value<br>(6) | Sample<br>(7) | Population<br>(8) | p-value<br>(9) | Sample<br>(10) | Population<br>(11) | p-value<br>(12) |
| Being female    | 0.5295        | 0.5083            | 0.2172         | 0.5837        | 0.5106            | 0.0002         | 0.5898        | 0.5124            | 0.0005         | 0.5538         | 0.5124             | 0.0444          |
| Age 18 up to 30 | 0.2335        | 0.2028            | 0.0350         | 0.2350        | 0.2161            | 0.2556         | 0.2837        | 0.2297            | 0.0084         | 0.2342         | 0.2288             | 0.7586          |
| Age 30 up to 50 | 0.3892        | 0.4042            | 0.3693         | 0.4224        | 0.4014            | 0.2782         | 0.4224        | 0.4151            | 0.7423         | 0.3880         | 0.3937             | 0.7788          |
| Age 50 up to 60 | 0.2830        | 0.2716            | 0.4609         | 0.2811        | 0.2697            | 0.5179         | 0.2429        | 0.2477            | 0.8029         | 0.3179         | 0.2675             | 0.0091          |
| Age 65 up to 75 | 0.0943        | 0.1215            | 0.0070         | 0.0614        | 0.1128            | 0.0000         | 0.0510        | 0.1075            | 0.0000         | 0.0598         | 0.1100             | 0.0000          |

**Supplementary Table 4: Comparison of sample and actual population by location.** The table shows mean percentages for subjects completing the first wave, i.e. n=2,574 (Columns 1, 4, 7, 10), statistics for the location population (Columns 2, 5, 8, 11) and p-values from two-sided t-tests (Columns 3, 6, 9, 12) by respective location. Data on gender and age groups are from Federal Statistical Office of Germany for 31 December 2019. Subjects up to an age of only 69 years were invited to the surveys while the Federal Statistical Office provides solely aggregated values for age group 65-75.

|                                                                   | Control group | Treatment group | p-value |
|-------------------------------------------------------------------|---------------|-----------------|---------|
| <b>Demographics</b>                                               |               |                 |         |
| Being female                                                      | 0.548         | 0.558           | 0.689   |
| Age groups                                                        |               |                 |         |
| 18 up to 30                                                       | 0.209         | 0.198           | 0.625   |
| 30 up to 50                                                       | 0.353         | 0.402           | 0.072   |
| 50 up to 65                                                       | 0.355         | 0.308           | 0.066   |
| 65 and older                                                      | 0.083         | 0.093           | 0.528   |
| Education                                                         |               |                 |         |
| Low                                                               | 0.041         | 0.044           | 0.821   |
| Middle                                                            | 0.610         | 0.598           | 0.682   |
| High                                                              | 0.347         | 0.355           | 0.771   |
| n/s                                                               | 0.002         | 0.003           | 0.762   |
| Monthly household net income in EUR                               |               |                 |         |
| Below 1,000                                                       | 0.070         | 0.083           | 0.397   |
| 1,000 - 2,000                                                     | 0.244         | 0.249           | 0.842   |
| 2,000 - 4,000                                                     | 0.432         | 0.402           | 0.265   |
| 4,000 - 6,000                                                     | 0.140         | 0.176           | 0.079   |
| Above 6,000                                                       | 0.041         | 0.035           | 0.550   |
| n/s                                                               | 0.072         | 0.056           | 0.204   |
| No. of adults in household                                        | 1.913         | 1.835           | 0.148   |
| No. of children in household                                      | 0.368         | 0.369           | 0.968   |
| <b>Attitudes and preferences</b>                                  |               |                 |         |
| Vote for Green party                                              | 0.217         | 0.251           | 0.143   |
| Active in party, union, NGO                                       | 0.238         | 0.209           | 0.203   |
| Active in environmental organization                              | 0.095         | 0.110           | 0.373   |
| (Very) high importance of climate protection                      | 0.659         | 0.697           | 0.140   |
| Committing (almost) every decision to environ./climate protection | 0.279         | 0.307           | 0.266   |
| <b>Intentions and beliefs</b>                                     |               |                 |         |
| Own plan to participate/signal $s$                                | 0.322         | 0.347           | 0.345   |
| Belief re. others' planned participation $\tilde{b}$              | 0.322         | 0.328           | 0.604   |
| Pre-intervention belief re. others' actual participation $b'$     | 0.243         | 0.253           | 0.355   |
| Observations                                                      | 484           | 1,026           |         |

**Supplementary Table 5: Sample characteristics by experimental group.** The table shows mean percentages for sample characteristics (except for number of adults and children in household) by experimental group for the final sample (n=1,510). p-values refer to paired two-sided t-tests. Education levels are: low = not graduated (yet), certificate of general secondary education; middle = certificate of intermediate secondary education, completed apprenticeship, university-entrance diploma; high = master craftsman, university degree, PhD

|                                                                   | Non-participants (a=0) | Participants (a=1) | p-value |
|-------------------------------------------------------------------|------------------------|--------------------|---------|
| <b>Demographics</b>                                               |                        |                    |         |
| Being female                                                      | 0.560                  | 0.518              | 0.311   |
| Age groups                                                        | ref.                   |                    |         |
| 18 up to 30                                                       | 0.195                  | 0.253              | 0.078   |
| 30 up to 50                                                       | 0.376                  | 0.470              | 0.019   |
| 50 up to 65                                                       | 0.332                  | 0.253              | 0.041   |
| 65 and older                                                      | 0.097                  | 0.024              | 0.002   |
| Education                                                         |                        |                    |         |
| Low                                                               | 0.046                  | 0.018              | 0.093   |
| Middle                                                            | 0.611                  | 0.530              | 0.045   |
| High                                                              | 0.340                  | 0.452              | 0.004   |
| n/s                                                               | 0.003                  | 0.000              | 0.482   |
| Monthly household net income in EUR                               |                        |                    |         |
| Below 1,000                                                       | 0.084                  | 0.036              | 0.031   |
| 1,000 - 2,000                                                     | 0.250                  | 0.223              | 0.445   |
| 2,000 - 4,000                                                     | 0.411                  | 0.410              | 0.964   |
| 4,000 - 6,000                                                     | 0.153                  | 0.259              | 0.001   |
| Above 6,000                                                       | 0.036                  | 0.042              | 0.714   |
| n/s                                                               | 0.065                  | 0.030              | 0.079   |
| No. of adults in household                                        | 1.849                  | 1.952              | 0.200   |
| No. of children in household                                      | 0.336                  | 0.639              | 0.000   |
| <b>Attitudes and preferences</b>                                  |                        |                    |         |
| Vote for Green party                                              | 0.213                  | 0.464              | 0.000   |
| Previous participation in FFF protest                             | 0.181                  | 0.952              | 0.000   |
| Active in party, union, NGO                                       | 0.207                  | 0.307              | 0.003   |
| Active in environmental organization                              | 0.078                  | 0.325              | 0.000   |
| Environ. and climate protection most important among other topics | 0.208                  | 0.331              | 0.000   |
| (Very) high importance of climate protection                      | 0.665                  | 0.843              | 0.000   |
| Committing (almost) every decision to environ./climate protection | 0.268                  | 0.542              | 0.000   |
| Observations                                                      | 1,344                  | 166                |         |

**Supplementary Table 6: Sample characteristics by protest participation.** The table shows mean percentages for characteristics (except for number of adults and children in household) for the group of non-participants, i.e. subjects who indicated that they not participated as a participant (a=0, n=1,344) and for the group of protest participants, i.e. subjects who indicated that they participated as a participant in the protest (a=1, n=166). p-values refer to paired two-sided t-tests. Education levels are: low = not graduated (yet), certificate of general secondary education; middle = certificate of intermediate secondary education, completed apprenticeship, university-entrance diploma; high = master craftsman, university degree, PhD

## B Sensitivity and robustness

|                                                       | (1)<br>Full<br>sample | (2)<br>Excl.<br>inattention | (3)<br>Excl. beliefs<br>close to signal | (4)<br>Reweighted for<br>attrition |
|-------------------------------------------------------|-----------------------|-----------------------------|-----------------------------------------|------------------------------------|
| Coefficients:                                         |                       |                             |                                         |                                    |
| Treatment ( $z = 1$ )                                 | 0.042***<br>(0.010)   | 0.051***<br>(0.010)         | 0.042***<br>(0.010)                     | 0.040***<br>(0.010)                |
| Above-group ( $c = 1$ )                               | -0.000<br>(0.013)     | 0.004<br>(0.013)            | -0.004<br>(0.013)                       | -0.001<br>(0.013)                  |
| Treatment $\times$<br>above-group ( $z \cdot c = 1$ ) | -0.098***<br>(0.016)  | -0.102***<br>(0.016)        | -0.095***<br>(0.016)                    | -0.096***<br>(0.016)               |
| Constant                                              | 0.007<br>(0.008)      | 0.000<br>(0.008)            | 0.008<br>(0.008)                        | 0.009<br>(0.008)                   |
| Average treatment effects:                            |                       |                             |                                         |                                    |
| In below-group ( $c = 0$ )                            | 0.042***<br>(0.010)   | 0.051***<br>(0.010)         | 0.042***<br>(0.010)                     | 0.040***<br>(0.010)                |
| In above-group ( $c = 1$ )                            | -0.055***<br>(0.012)  | -0.051***<br>(0.013)        | -0.054***<br>(0.012)                    | -0.056***<br>(0.012)               |
| Observations                                          | 1,510                 | 1,326                       | 1,465                                   | 1,510                              |
| $R^2$                                                 | 0.076                 | 0.083                       | 0.077                                   | 0.073                              |
| Adj. $R^2$                                            | 0.075                 | 0.081                       | 0.076                                   | 0.071                              |
| $F$                                                   | 41.496                | 39.869                      | 40.909                                  | 39.340                             |

**Supplementary Table 7: Linear regression table: Effect of information intervention on post-intervention beliefs (or equivalently on the difference between post- and pre-intervention beliefs).** The first part of the table shows coefficient estimates from Ordinary Least Squares linear regression of post-intervention beliefs or equivalently the difference between post- and pre-intervention beliefs  $\Delta b = b - b'$  on the treatment ( $z = 0$  for control,  $z = 1$  for treatment), a condition indicator ( $c = 0$  for respondents with expectations  $\tilde{b}$  below the signal  $s$ ,  $c = 1$  for above or equal to the signal) and the interaction of the two. Standard errors in parentheses. The second part of the table shows estimated average marginal effects from the linear regression described above. Delta-method standard errors in parentheses. Column (1) shows results for the final sample of respondents who completed all three waves ( $n=1,510$ ). Column (2) shows results for the final sample excluding those respondents who answered the attention question Q17.f incorrectly ( $n=1,326$ ). Column (3) shows results for the final sample excluding those respondents with beliefs re. others' planned participation  $\tilde{b}$  only 2pp or less away from signal  $s$ , i.e.  $-0.02 \leq \tilde{b} - s \leq 0.02$  ( $n=1,465$ ). Column (4) shows results for the final sample reweighted to match the sample of the first wave in terms of gender and age groups ( $n=1,510$ ). \*: Significant at 10%; \*\*: 5%; \*\*\*: 1%.

The average marginal effect of a change in beliefs, as shown in Table 2 and Supplementary Table 8, can be understood within the potential outcomes framework as a so-called “local average treatment effect”, or “LATE.”<sup>18,19</sup> This perspective clarifies that it hinges on two critical assumptions that are fundamentally untestable (because each subject is only observed under one of the two experimental conditions): the “monotonicity” assumption and the “independence” or “valid instrument” assumption. In our setting, the monotonicity assumption means that beliefs follow the direction of the informational stimulus. The valid instrument assumption means that any effect of treatment on participation is fully mediated by beliefs. Technically, the latter assumption requires all potential outcomes (potential beliefs and potential participation choices in our setting) to be statistically independent from treatment status and that treatment has some effect on beliefs in expectation. That this essentially amounts to an exclusion restriction is readily apparent from a causal mediation framework perspective<sup>42–45</sup>: treatment is assumed to have a direct effect on beliefs, but no (independent) direct effect on participation, such that the total effect of treatment on participation is purely indirect. Mourifié and Wan<sup>46</sup> derived testable implications of the two assumptions in the form of two conditional moment inequalities, which can be tested by a conditional likelihood ratio test in the intersection bounds framework<sup>47</sup>. In our setting, we must apply the local method of the test to each of the “above-signal-”

and “below-signal-groups” separately because the monotonicity assumption goes in opposite directions. Doing so, the tests do not reject the joint hypothesis of instrument validity and monotonicity in any of the classes at  $p < 0.1$ . This provides evidence that our estimated average marginal effect of a change in beliefs is consistent with the valid instrument and monotonicity assumptions, that is, most likely identifies the causal LATE on the class of subjects that respond to treatment.

Further evidence comes from a “reduced-form” probit regression of treatment on protest participation: Supplementary Table 9 lists results of OLS and probit regressions with an interaction-specification ( $z \times c$ ) on the full sample in columns 1 and 2, and split-group regressions (for  $c = 0$  and  $c = 1$  separately) in columns 3 and 4. Note that it can be read directly from the results that the reduced-form treatment effects are in fact just differences in proportions: the treatment effect estimates from the regressions are numerically identical to the empirical differences in proportion between treatment and control in the “below-group” ( $-0.012$ ) and the “above-group” ( $0.025$ ), respectively. Note also that this is the reason why the single regression specification with an interaction between  $c$  and  $z$  (reported in columns 1 and 2) and separate regressions for the below- ( $c = 0$ ) and above-groups ( $c = 1$ ), respectively (reported in columns 3 and 4), must produce the same results in terms of “reduced-form” treatment effects.

The results listed in Supplementary Table 9 are consistent with the expectation under strategic substitutability: in the “below-group”, the fraction of subjects participating is observed lower under treatment vs. control, and vice versa in the “above-group”. Given the results exposed in the main text of the manuscript this to be expected, as the reduced-form coefficients do not provide any additional information over and above the second-stage (“structural”, participation on beliefs) and first-stage (beliefs on treatment) coefficients<sup>48</sup>. Note that the non-significance of the reduced-form coefficients is to be expected even if the IV-estimates are valid and robust: Whenever the instrument is strong enough to yield a significant first-stage regression, but still leaves a lot of variance unexplained, insignificance of the reduced-form coefficients can easily happen. Technically, this is because the error term in the reduced form is the sum of the first-stage and second-stage error terms<sup>48</sup>, so the former’s variance is the sum of the latter’s variances plus twice their covariance. Intuitively, the unrelated variance of the endogenous variable then washes out the significance observed in the second-stage IV-regression (where this variance is eliminated). This is what is happening in our case: our sample is comparably large and the treatment is just one (and expectedly quantitatively minor) factor in belief formation among many, which is reflected in an (adjusted) first-stage  $R^2$  of 0.075, such that there is plenty of variance in beliefs left to disturb the reduced-form regression. There is no reason to be concerned about instrument strength and instrument relevance. The test for instrument relevance is already reported in Supplementary Table 7: the two average treatment effects on beliefs are significantly different from zero (in the expected direction). Alternatively, non-parametric exact Mann-Whitney rank sum tests reject the hypothesis (at the conventional significance level) that the distribution of  $\Delta b$  is equal under treatment and control both in the “below-group” ( $p = 0.000$ ) and the “above-group” ( $p = 0.000$ ). The same also holds directly for the distribution of post-intervention beliefs  $b$  ( $p = 0.000$  in the “below-group” and  $p = 0.018$  in the “above-group”). The standard  $F \geq 10$ -test for a weak instrument is also presented in Supplementary Table 7: we have  $F(3, 1506) = 41.50$  in the main regression, and  $F \geq 39.34$  in the remaining three robustness checks. Hence, there is no sign that the instrument is too weak for a valid IV-estimation. Hence, Supplementary Table 9 is for convenience as the reduced form is useful if we know (or assume) that the instrument is weak because the reduced-form estimates are unbiased even if the instrument is weak (such that at least the sign of the instrument effect on the outcome can be recovered).

|                                                      | (1)<br>Full<br>sample | (2)<br>Excl.<br>inattention | (3)<br>Excl. beliefs<br>close to signal | (4)<br>Rewighted for<br>attrition |
|------------------------------------------------------|-----------------------|-----------------------------|-----------------------------------------|-----------------------------------|
| Coefficients:                                        |                       |                             |                                         |                                   |
| Increase in post-intervention beliefs ( $\Delta b$ ) | -3.272***<br>(0.803)  | -3.199***<br>(0.936)        | -3.429***<br>(0.773)                    | -3.276***<br>(0.843)              |
| Constant                                             | -1.079***<br>(0.083)  | -1.133***<br>(0.086)        | -1.057***<br>(0.086)                    | -1.049***<br>(0.094)              |
| Average marginal effects:                            |                       |                             |                                         |                                   |
| Increase in post-intervention beliefs ( $\Delta b$ ) | -0.679***<br>(0.208)  | -0.625***<br>(0.218)        | -0.727***<br>(0.212)                    | -0.704***<br>(0.230)              |
| Observations                                         | 1,510                 | 1,326                       | 1,465                                   | 1,510                             |
| Wald $\chi^2$                                        | 16.622                | 11.674                      | 19.669                                  | 15.091                            |

**Supplementary Table 8: Instrumental variable regression table: Effect of a marginal increase in post-intervention beliefs (or equivalently in the difference between post- and pre-intervention beliefs) on participation probability.** The first part of the table shows coefficient estimates from instrumental variable probit regression of participation on the increase in post-intervention beliefs or equivalently in the difference between post- and pre-intervention beliefs  $\Delta b = b - b'$  and the instrument of the treatment ( $z = 0$  for control,  $z = 1$  for treatment), a condition indicator ( $c = 0$  for respondents with expectations  $\tilde{b}$  below the signal  $s$ ,  $c = 1$  for above or equal to the signal) and the interaction of the two. Standard errors in parentheses. The second part of the table shows estimated average marginal effects from the instrumental variable regression described above. Delta-method standard errors in parentheses. Column (1) shows results for the final sample of respondents who completed all three waves ( $n=1,510$ ). Column (2) shows results for the final sample excluding those respondents who answered the attention question Q17.f incorrectly ( $n=1,326$ ). Column (3) shows results for the final sample excluding those respondents with beliefs re. others' planned participation  $\tilde{b}$  only 2pp or less away from signal  $s$ , i.e.  $-0.02 \leq \tilde{b} - s \leq 0.02$  ( $n=1,465$ ). Column (4) shows results for the final sample reweighted to match the sample of the first wave in terms of gender and age groups ( $n=1,510$ ). \*: Significant at 10%; \*\*: 5%; \*\*\*: 1%.

|                                                    | Single OLS          | Single probit        | Split probit         |                      |
|----------------------------------------------------|---------------------|----------------------|----------------------|----------------------|
|                                                    |                     |                      | Below-group          | Above-group          |
| Coefficients:                                      |                     |                      |                      |                      |
| Constant                                           | 0.095***<br>(0.018) | -1.308***<br>(0.099) | -1.308***<br>(0.099) | -1.137***<br>(0.119) |
| Treatment ( $z = 1$ )                              | -0.012<br>(0.022)   | -0.071<br>(0.123)    | -0.071<br>(0.123)    | 0.112<br>(0.141)     |
| Above-group ( $c = 1$ )                            | 0.032<br>(0.029)    | 0.171<br>(0.155)     |                      |                      |
| Treatment $\times$ above-group ( $z \cdot c = 1$ ) | 0.036<br>(0.035)    | 0.183<br>(0.187)     |                      |                      |
| Average treatment effects:                         |                     |                      |                      |                      |
| In below-group ( $c = 0$ )                         | -0.012<br>(0.022)   | -0.012<br>(0.020)    | -0.012<br>(0.020)    |                      |
| In above-group ( $c = 1$ )                         | 0.025<br>(0.028)    | 0.025<br>(0.031)     |                      | 0.025<br>(0.031)     |
| Observations                                       | 1,510               | 1,510                | 924                  | 586                  |
| $F$                                                | 4.41                |                      |                      |                      |
| Prob $> F$                                         | 0.004               |                      |                      |                      |
| $R^2$                                              | 0.009               |                      |                      |                      |
| Adj. $R^2$                                         | 0.007               |                      |                      |                      |
| LR $\chi^2$                                        |                     | 12.76                | 0.33                 | 0.64                 |
| Prob $> \chi^2$                                    |                     | 0.005                | 0.563                | 0.425                |
| Pseudo $R^2$                                       |                     | 0.012                | 0.001                | 0.001                |

**Supplementary Table 9: Reduced form (intent-to-treat) regression: Effect of information intervention on participation probability.** The first part of the table shows coefficient estimates from OLS and probit regression of participation on the treatment ( $z = 0$  for control,  $z = 1$  for treatment), a condition indicator ( $c = 0$  for respondents with expectations  $\bar{b}$  below the signal  $s$ ,  $c = 1$  for above or equal to the signal) and the interaction of the two for the final sample of respondents who completed all three waves ( $n=1,510$ ). Standard errors in parentheses. The second part of the table shows average treatment effect estimates (in probability terms) from the regressions described above. Delta-method standard errors in parentheses. The last two columns show coefficient and average treatment effect estimates from split-sample probit regression for the below-group ( $c = 0$ ,  $n=924$ ) and the above-group ( $c = 1$ ,  $n=586$ ). \*: Significant at 10%; \*\*: 5%; \*\*\*: 1%.

## C Effect heterogeneity

Extending the regression shown in Table 2 with additional selected covariates to check for effect heterogeneity, the following is found. First, the marginal effects are not significantly different by gender. Second, with respect to the age classes as listed in Supplementary Table 5, the effect is largest in the youngest class ( $-0.851$ ) and smallest in the oldest class ( $-0.370$ ), with the 30-to-50 class ( $-0.656$ ) and the 50-to-65 class ( $-0.532$ ) in between. All pairwise differences are statistically significant at the five-percent level.

Third, the effect is significantly (at the one-percent level) greater in the group of subjects that rank climate change as an important issue (item Q5 in the questionnaire) compared to the remaining group of subjects,  $-0.691$  vs.  $-0.252$ . Finally, effect sizes are very similar in Berlin ( $-0.551$ ), Hamburg ( $-0.613$ ), Munich ( $-0.680$ ), and Cologne ( $-0.722$ ), albeit Berlin stands out a bit: the effect there is significantly (at the five-percent level) smaller than in Hamburg and marginally significantly (at the ten-percent level) smaller than in Munich and Cologne. That is, while treatment had an effect on beliefs similar to the grand average in Berlin ( $+0.040$  in the below-signal-group,  $-0.066$  in the above-signal-group), the strategic response was a bit weaker there in comparison to the other three cities.

$n = 613$  ( $n = 496$  in the final, post-attrition sample) randomly selected subjects in the treatment group received an additional treatment that was identical to the main treatment except that beliefs have also been elicited specific to two age groups, namely age 18-29 (the “the young”) and age 30-69 (the “the mature”), and that subjects received age group specific signal values in return. These treatments can be used to test whether subjects respond stronger to one of the age group specific beliefs, or whether strategic interdependence is stronger within age group.

The results listed in Supplementary Table 10 are evidence for the former, but not the latter. Both age groups respond markedly stronger to their beliefs with respect to turnout among “the mature.” A plausible explanation that could be tested in future research is that mobilization of the “the mature” is a stronger political signal, as the Fridays for Future movement has already demonstrated the mobilization potential in the younger population before. There is no clear evidence for a within-age-group bias: “the young” also respond stronger to their beliefs re. the turnout among “the mature.”

|                 | Belief re. the 18-29 age group<br>(1) | Belief re. the 30-69 age group<br>(2) |
|-----------------|---------------------------------------|---------------------------------------|
| Overall         | $-0.235$<br>(0.217)                   | $-0.493^{**}$<br>(0.238)              |
| 18-29 age-group | $-0.228$<br>(0.208)                   | $-0.477^{**}$<br>(0.235)              |
| 30-69 age-group | $-0.237$<br>(0.219)                   | $-0.496^{**}$<br>(0.239)              |
| Group equality? | $p = 0.565$                           | $p = 0.420$                           |

**Supplementary Table 10: Average marginal effects of changes in age group specific beliefs on participation probability** Estimates derived from instrumental variable probit regression of participation on change in beliefs (difference between post- and pre-intervention beliefs) re. the 18-29 and 30-69 age groups, the instrument of the treatment ( $z = 0$  for control,  $z = 1$  for assignment to the age group specific treatment group), condition indicators ( $c = 0$  for respondents with expectations below the age group specific signal,  $c = 1$  for above or equal to the age group specific signal), and an age group classifier (1 for subjects in the 18-29 age group and 2 for subjects in the 30-69 age group.  $n = 980$ . Delta-method standard errors in parentheses. \*: Significant at 10%; \*\*: 5%; \*\*\*: 1%. The upper row shows the overall effects (both age groups together), the middle rows show the effects broken down by age group, and the bottom row lists the p-values of a test for effect equality between the two age groups.

## D Supplementary Information-specific references

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