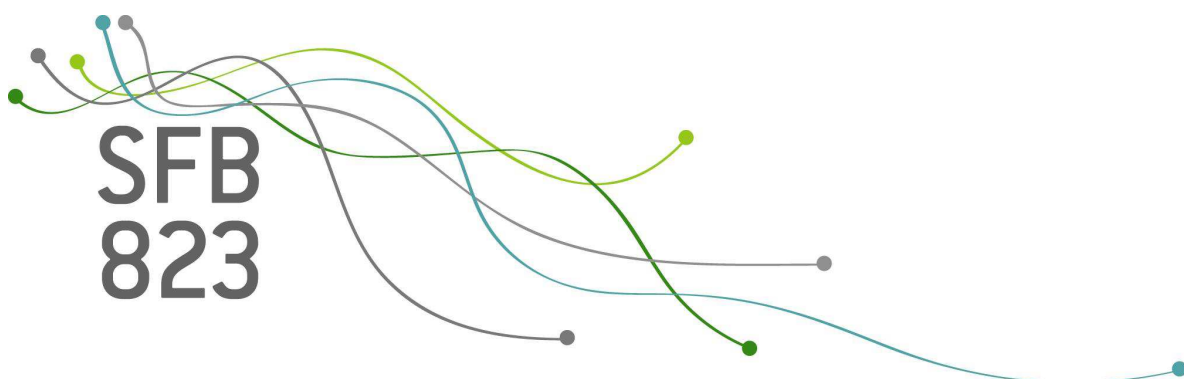


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# Climate policy in times of the corona pandemic: Empirical evidence from Germany

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Discussion Paper



## **Climate Policy in Times of the Corona Pandemic: Empirical Evidence from Germany**

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**Summary:** Given the dramatic changes triggered by the Corona pandemic, the question arises whether it has displaced people's concerns about climate change and whether Corona-related financial losses among affected households can influence their assessment of climate change. Based on a survey among more than 6,000 German household heads conducted in the period spanning from May 18 to June 14, 2020, this paper provides empirical evidence on the impact of the pandemic on perceptions of climate change and climate policy, as well as the extent to which respondents are affected in terms of health and finances. Although the majority of almost 77% of the respondents is concerned about their own health and that of their families, according to our descriptive results, climate change appears to remain an important issue: only six percent of the respondents feel that climate change has become less important since the beginning of 2020, while about 70% of the respondents see no change in the importance of the issue. Yet, employing discrete-choice models, our estimation results indicate that households that suffered from Corona-related financial losses consider climate change to be less important than households that remained unaffected in this respect. In accord with Engler et al. (2020), we thus conclude that lowering individual financial losses is not only relevant from a social perspective, but it is also critical for the acceptance of climate policy measures.

**Keywords:** Climate change, corona affectedness.

**JEL-Code:** D62, Q51.

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## 1. Introduction

Climate policy clearly dominated the public debate in Germany in 2019. Then, the Corona pandemic arrived in 2020 and has overwhelmed the political and media debate ever since. Given the dramatic changes due to the Corona pandemic, the question arises whether it has displaced people's concerns about climate change and whether the issue has taken a back seat in the public perception. Indeed, in times of the Corona pandemic, individuals might be more worried about its societal, health, and economic consequences than about the climate crisis and its long-term effects (Engler et al. 2020). In a similar vein, another question is whether Corona-related financial losses among affected households can influence their assessment of climate change.

To address these research questions, a survey among more than 6,000 German households was conducted, spanning the period from May 18 to June 14, 2020, when the first wave of the Corona pandemic slowly subsided in Germany. Based on this survey, this paper provides empirical evidence on the impact of the pandemic on perceptions of climate change and policy, the extent to which respondents are affected by Corona in terms of health and finances, as well as on the assessment of climate policy aspects in economic policy measures taken to overcome the consequences of the Corona crisis. While the majority of about 70% of the respondents sees no change in the importance of the issue of climate change, the results of our discrete-choice model estimations indicate that households that suffered from Corona-related financial losses consider climate change to be less important than households that remained unaffected in this respect.

The main descriptive findings from our survey are as follows: Although only 0.6% of the respondents indicated that they had been infected, the majority of almost 77% of the respondents is concerned about their own health and that of their families. Nevertheless, climate change appears to remain an important issue: only six percent of the respondents feel that climate change has become less important since the beginning of 2020. Around 23% even believe that climate change has become more important in recent months. Hence, our descriptive results are quite in line with those of Engler et al. (2020), who find no lower acceptance of climate policy measures compared to the time before the Corona crisis. Moreover, when it comes to economic policy measures to overcome the economic consequences of the pandemic, the majority of respondents prefers those measures that also help achieve climate targets.

The following Section 2 describes the data set, the sociodemographic characteristics of the sample households, as well as the methods employed for estimating our discrete choice models. Section 3 presents the main descriptive survey results, most notably on how affected sample households were by the

Corona pandemic and about the importance of climate change in times of the Corona pandemic. Section 4 reports the results of our econometric analyses with which we examine the relationship between being affected by the pandemic and the assessment of climate change. The final section summarizes and draws conclusions.

## **2. Data and Methods**

For our empirical analysis, we draw on data from the most recent wave of a household panel survey called [Socio-Ecological Panel](#).<sup>1</sup> More than 6,000 household heads were surveyed from May 18 to June 14, 2020, when the Corona pandemic was highly prevalent in Germany. Commissioned by the Federal Ministry of Education and Research (BMBF), the data was gathered in collaboration with the market research institute forsa, which maintains a sample of 80,000 households. These households are representative of the German-speaking population and generally have experience with surveys.

The questionnaire underlying the survey, being available on the [project homepage](#), was developed in conjunction with experts in experimental economics and was improved in several iterations together with survey professionals from forsa. forsa's state-of-the-art tool allows panelists to fill out the questionnaire using either a television or the internet. Respondents can interrupt and continue the survey at any time. By answering the questionnaire in full, survey participants earn bonus points that can be exchanged for rewards. A large set of socio-economic and demographic background information on all household members is available from forsa's household selection procedure and updated regularly. While survey pretesting is an important step of survey development and implementation, pretests including some 100 households served to prepare the survey. A total of 6,314 household heads took part in the survey. 6,059 answered all questions, which corresponds to a completion rate of almost 96%.

As in previous surveys (Andor, Frondel, Vance 2017a, b; Andor, Schmidt, Sommer 2018), higher educated people tend to be overrepresented in the sample (see especially Andor, Frondel, Sommer 2018). For example, 45.0% of the surveyed household heads have a university entrance qualification, while the respective share in the population only amounts to 32.9%. Similarly, the share of university graduates is 30.4% in the sample, but 18.1% in the population. In addition to education, there are several other socio-economic characteristics, such as age, gender, household size, and net household income, for which the

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<sup>1</sup> The [Socio-Ecological Panel](#) was established within the projects Eval-MAP and Eval-MAP 2 (Evaluating Germany's Climate Mitigation and Adaptation Practices), funded by the Federal Ministry of Education and Research. The resulting data sets are available at [www.rwi-essen.de/green-soep](http://www.rwi-essen.de/green-soep).

results indicate that, mainly due to non-response, our sample is not representative for the German population (Fronzel et al. 2020).

For instance, with a share of 29.4%, single-person households are underrepresented in the sample compared to their share of 41.9% in Germany as a whole (Destatis 2019). In contrast, with a share of 49.5% two-person households are overrepresented in the sample, relative to 33.8% in Germany. The shares of three- and four-person households, as well as households with five or more persons, roughly correspond to the population shares, which amount to 11.9%, 9.1%, and 3.4%, respectively. Another example is gender distribution: The share of female respondents only amounts to 32,4% (Table 1), while the share of male respondents is as high as 67,6%. This is due to our decision to address the questionnaire to household heads. By definition, household heads are those individuals who typically make the financial decisions for the household, either alone or with their partner.

**Table 1: Descriptive Statistics of the Variables used for the Discrete Choice Models.**

| Variable                                           | Type of variable | Mean  | Standard deviation | Min  | Max  |
|----------------------------------------------------|------------------|-------|--------------------|------|------|
| <i>Dependent variables:</i>                        |                  |       |                    |      |      |
| y =1: Combating climate change is very important   | Dummy            | 0.581 | --                 | 0    | 1    |
| z: Importance of combating climate change          | Ordinal, 1-5     | 4.365 | --                 | 1    | 5    |
| <i>Alternative key explanatory variables:</i>      |                  |       |                    |      |      |
| Any financial losses due to Corona                 | Dummy            | 0.493 | --                 | 0    | 1    |
| Severity of financial losses                       | Ordinal, 1-6     | 2.162 | --                 | 1    | 6    |
| Family member suffers financial loss due to Corona | Dummy            | 0.322 | --                 | 0    | 1    |
| Infected by COVID-19 virus                         | Dummy            | 0.006 | --                 | 0    | 1    |
| <i>Control variables:</i>                          |                  |       |                    |      |      |
| Age                                                | in years         | 59.91 | 13.00              | 20   | 92   |
| Female                                             | Dummy            | 0.324 | --                 | 0    | 1    |
| Net household income                               | in 1,000 €       | 3.259 | 1.380              | 0.75 | 5.75 |
| University entrance qualification                  | Dummy            | 0.507 | --                 | 0    | 1    |
| Household size                                     | # of persons     | 2.053 | 1.016              | 1    | 11   |
| Green Party supporter                              | Dummy            | 0.146 | --                 | 0    | 1    |
| New Ecological Paradigm Index                      | Aggregate        | 6.76  | 3.87               | -12  | 12   |

Note: The number of observations employed for our baseline regressions amounts to 5,118, while it is lower for some robustness checks.

To obtain information on the perceived importance of climate change, survey participants were requested to indicate how they assess the global challenge of combating climate change on a five-point scale from "completely unimportant" to "very important". At 57.3%, the largest proportion of respondents attributed the highest possible importance ("very important"). Based on the answers to this question, in what follows, we estimate the impact of Corona-related financial losses on the assessment of the importance of climate change using the following model specification:

$$y = \alpha_0 + \alpha_{\text{loss}} \text{loss} + \alpha_x^T \mathbf{x} + \varepsilon \quad (1)$$

where in this baseline specification the dependent variable  $y$  is a binary variable that equals unity if the respondent indicated that combating climate change is very important and equals zero otherwise. Alternatively, in a robustness check, we use the full information given by the responses to the question on the assessment of the importance of climate change, captured by variable  $z$  (see Table 1), and estimate an ordered probit model, rather than a probit or linear probability model. Vector  $\mathbf{x}$  comprises of a set of socio-economic characteristics described below,  $\varepsilon$  denotes an idiosyncratic error term, and the parameters to be estimated are designated by  $\alpha$ .

The key explanatory variable, called *loss*, reflects Corona-related financial losses. To capture such losses, we requested survey participants to indicate the severity of their financial losses due to the Corona crises on a 6-point scale, ranging from "I have not experienced any losses" to "very large losses". Pretty much half of the responding household heads report some financial losses, with 7.7% suffering from either large or very large losses (see Figure 1). Employing this information, for baseline specification (1), we define the dummy variable *loss* to equal unity if a household experienced any losses due to Corona and equals zero otherwise (Table 1). This is the case for a share of 50.3% of respondents (Figure 3). To check the robustness of the results, we alternatively employ an ordinal variable as key regressor, indicating the severity of financial losses (Table 1).

In addition to the impact of the Corona pandemic, there is a variety of factors that can influence the attributed importance of global climate change, such as age, gender, net household income, household size, and education level. For instance, to account for political views, a binary variable is employed that indicates whether the participant is a supporter of the Green Party - this applies to 14.6% of the respondents (Table 1, see also Table A1 of the appendix, which shows the correlations between these variables).

To control for environmental attitudes, we employ the New Ecological Paradigm (NEP) index as suggested and validated by Dunlap et al. (2000). The NEP index is based on the expressed agreement with

six statements with respect to the role of humans in nature and the resilience of nature to human impacts (see Table 2). While each of the six items are measured on a five-point Likert scale, the NEP index is bounded by a maximum value of 12, which indicates a high sympathy for nature and environmental concerns, whereas the minimum value of -12 indicates the opposite, specifically the attitude that humans are allowed to rule over the rest of the nature.

**Table 2: Statements employed for the Derivation of the New Ecological Paradigm Index**

| Statement                                                                                      | Mean | Median | Range |
|------------------------------------------------------------------------------------------------|------|--------|-------|
| Humans have the right to modify the natural environment to suit their needs.*                  | 2,00 | 2      | 1-5   |
| Humans are severely abusing the environment.                                                   | 4,28 | 5      | 1-5   |
| Plants and animals have as much right as humans to exist.                                      | 4,02 | 4      | 1-5   |
| The balance of nature is strong enough to cope with the impacts of modern industrial nations.* | 1,99 | 2      | 1-5   |
| Humans were meant to rule over the rest of nature.*                                            | 1,73 | 1      | 1-5   |
| The balance of nature is very delicate and easily upset.                                       | 4,19 | 4      | 1-5   |

The survey participants indicated how strongly they agree with each of the statements on a five-point Likert scale from "Do not agree at all" (value: 1) to "Fully agree" (value: 5). Statements marked with an \* were included in the calculation of the index with a negative sign.

Following Angrist and Pischke (2009), who advocate for using linear, instead of nonlinear probability models, such as probit or logit, because these non-linear models require distributional assumptions, we ignore the binarity of dependent variable  $y$  and estimate specification (1) using classical standard ordinary least squares methods. By calculating robust standard errors, the typical problems of these linear probability models (LPM), such as heteroscedastic error terms, can be alleviated (Thrane 2019: 122, Jenkins-Smith et al. 2017: 210).

Alternatively, as one of numerous robustness checks, we estimate the following probit model that is analogous to specification (1):

$$P(y = 1) = \Phi(\alpha_0 + \alpha_{\text{loss}} \text{loss} + \alpha_x^T \mathbf{x}), \quad (2)$$

where  $\Phi$  denotes the cumulative distribution function of the normal distribution because  $\varepsilon$  is assumed to be normally distributed with normalized variation  $\sigma^2$ :  $N(0, \sigma^2 = 1)$ . There is ample empirical evidence that, frequently, the results of probit and linear probability models are very similar (Thrane 2019: 126; Angrist, Pischke 2009: 115, Hellevik 2009: 73). To correct for sample biases described above, the observations are weighted with weighting factors that take into account the regional distribution of households across the

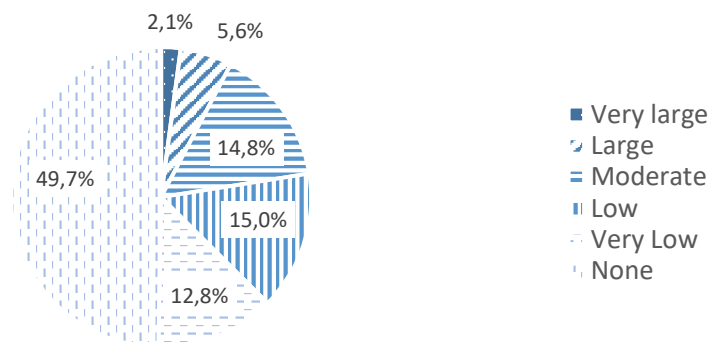
German states, as well as the household size, rendering the sample representative of the household distribution in Germany with respect to these two factors.

### 3. Descriptive Results

Starting with the affectedness by the pandemic, the overwhelming majority of 99.4% of the respondents stated that they had not been infected with the COVID-19 virus at the time of the survey or before. Accordingly, only a proportion of 0.6%, that is, 38 of the 6,314 respondents, reported having been infected with the virus. Fifteen of those proven to be infected, that is, 2.5 per thousand respondents had at most mild symptoms, and 16 reported suffering or having suffered from moderately severe symptoms. Only 7 of the infected, that is 0.1% of the respondents, had severe symptoms. In addition, 5.4% of the respondents reported severe infections in their family and closest social environment.

A much larger proportion of respondents were financially affected by the crisis: 7.7% of the respondents reported suffering major or even very major financial losses (Figure 1), while the others reported moderate (14.8%), minor (15.0%), or only very minor losses (12.8%). With a share of 49.7%, pretty much half of the 6,045 respondents to this question reported that they had not suffered any financial losses due to the Corona crisis at all.

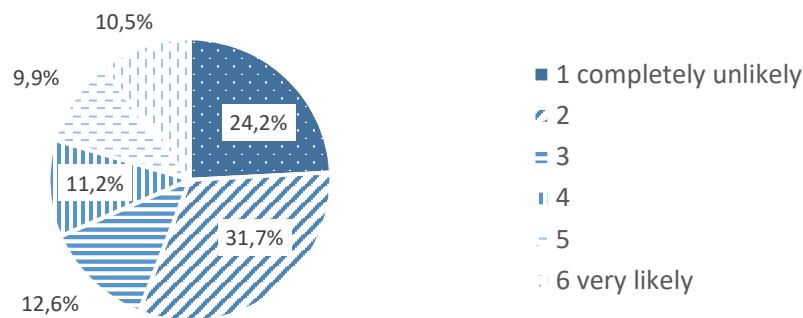
**Figure 1: Results for the question on Financial Losses due to the Corona Crisis. The related question reads: "How large are your financial losses to date due to the Corona Crisis?" (Number of observations: 6,045)**



Yet, with a share of 31.6%, almost a third of the respondents believe that it is likely that they will have to incur financial losses in the six months following the survey (Figure 2). Note that the answer option "don't know" was ignored throughout. Therefore, and because of the non-response to individual questions, the number of responses varies slightly from question to question. Further aspects with respect to the Corona

crisis, such as the personal concern regarding social cohesion within the society, are documented by Fron-  
del et al. (2020).

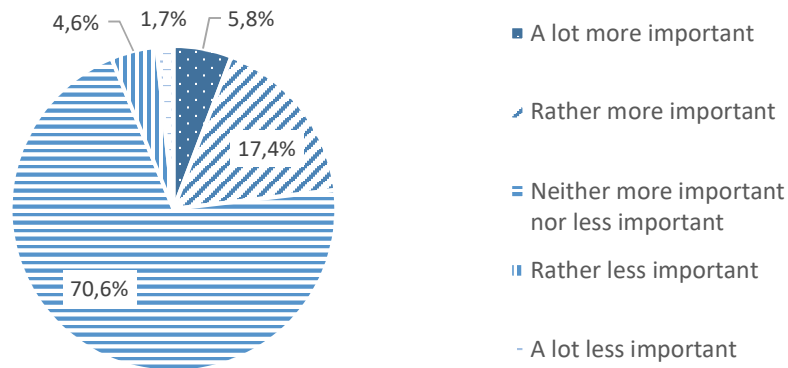
**Figure 2: Results on the question about Future Financial Losses due to the Corona crisis. The associated question reads: "How likely do you think it is that you will suffer financial losses due to the Corona Crisis in the next six months?" (Number of observations: 5,973).**



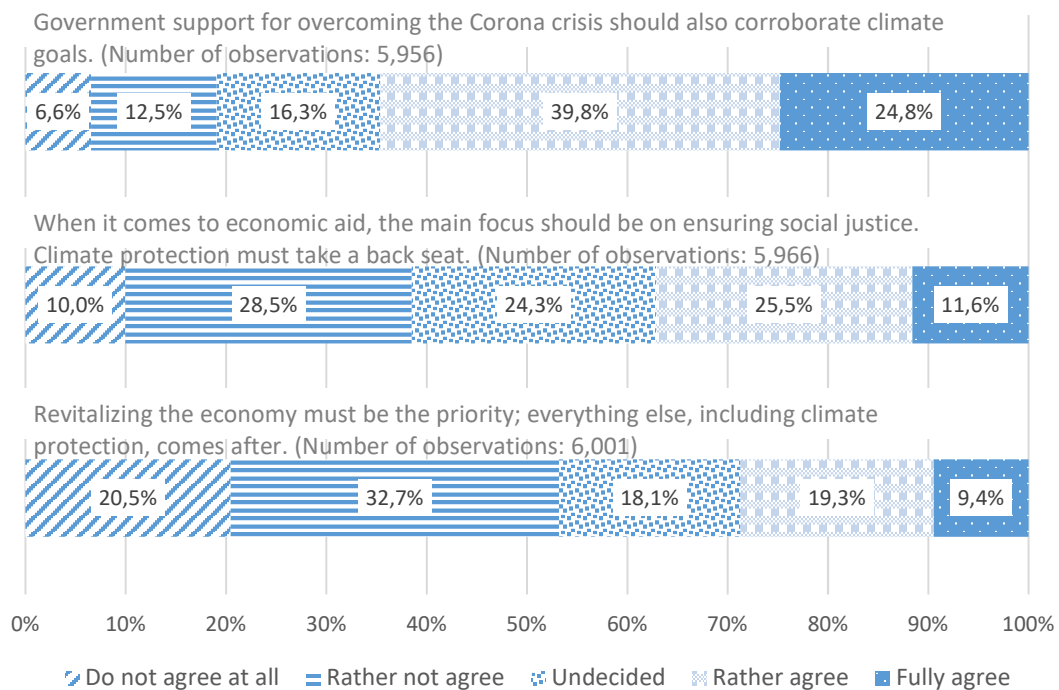
The concerns and hardships triggered by the Corona crisis may have pushed societal challenges with a long-term time horizon, such as climate change, into the background. However, the survey results seem to contradict this hypothesis. For example, just 1.7% of household heads state that climate change has become a lot less important relative to the beginning of the year 2020, and for only 4.6% it has become rather less important (Figure 3). In contrast, a much larger proportion of 23.2% of respondents believe that climate change has become more important relative to the outset of the year, while the vast majority of 70.6% of the respondents is convinced that the importance of climate change has not changed since then. It bears noting that, to avoid desirability bias, a reference to the Corona pandemic was omitted in formulating this question (see Figure 3).

To revive the economy after the economic downturn due to the Corona crisis, there has recently been an intense discussion about possible policy measures to stimulate the economy. Some of these measures have been directly linked to climate policy goals. With a share of 64.6%, almost two-thirds of the participants support the basic objective that government aid to overcome the crisis should be linked to also supporting climate targets (Figure 4). Only 19.1% disagree with this statement, 6.6% do not agree at all, and 12.5% do rather not agree.

**Figure 3: Results on the Personal Importance of the issue of Climate Change since the Beginning of 2020.** The associated question is: "Would you say that the importance of the issue of climate change has changed for you since the beginning of the year? The issue of climate change has become ... to me, compared to the beginning of 2020." (Number of observations: 6,080)



**Figure 4: Results on the questions on possible Measures to Overcome the Corona pandemic.** The associated question reads: "The Corona crisis has pushed the discussion on climate protection into the background. At the same time, there are voices to link programs to revive the economy after the pandemic to climate goals. What do you think about the following statements?"



In addition to climate protection, other political goals, such as social policy goals, can also be linked to economic aid with which the effects of the Corona crisis are intended to be mitigated. The statement

that economic aid should be primarily about social justice, with climate protection taking a back seat, is agreed to by 37.1% of the respondents, with a slight majority of 38.5% disagreeing. Only 28.7% of the household heads attribute a top priority to reviving the economy, behind which climate protection must take a back seat. However, the vast majority of 53.2% of the respondents disagree with this statement. In this respect, the majority of respondents shows a preference for taking climate policy goals into account. When weighing up social justice and other goals, a mixed picture emerges. In short, an absolute prioritization of promoting the economy tends to be an unpopular strategy.

#### 4. Estimation Results

The descriptive statistics presented in the previous section have not provided any evidence that the Corona pandemic has eclipsed climate change as a significant issue. Among financially affected households, however, there may have been changes in the perception of climate change. Based on econometric methods, this section therefore examines whether the assessments of the importance of climate change among respondents reporting negative financial impacts of the Corona pandemic differ from those of households that have remained unaffected in this respect.

To this end, we start with a bivariate correlation analysis the results of which are displayed in Table 3. From this table, a negative correlation emerges between financial losses due to the Corona pandemic and the perceived importance of climate change: the proportion of respondents who find climate change mitigation very important is about 6 percentage points lower among financially affected households than among households reporting no financial loss. The negative correlation between the two variables is also confirmed by the Spearman correlation coefficient (see Table A1 in the appendix): This coefficient is -0.06 and statistically significant at the 1% level.

**Table 3: Correlation between the Occurrence of Financial losses due to the Corona pandemic and Assessing the Importance of Climate Change.**

| Importance of climate change | No financial losses    | Financial losses       | Total                  |
|------------------------------|------------------------|------------------------|------------------------|
| Very important               | 1,813 (60.4 %)         | 1,649 (54.3 %)         | <b>3,462 (57.4 %)</b>  |
| Not very important           | 1,188 (39.6 %)         | 1,387 (45.7 %)         | <b>2,575 (42.7 %)</b>  |
| <b>Total</b>                 | <b>3,001 (100.0 %)</b> | <b>3,036 (100.0 %)</b> | <b>6,037 (100.0 %)</b> |

In addition to the impact of the Corona pandemic, there are a variety of factors that influence the attributed importance of global climate change and that may correlate with the financial impact of Corona.

Therefore, we now employ the discrete choice models described in Section 2 to test whether the bivariate correlation persists upon including socioeconomic variables in a multivariate estimation model. As control variables, socioeconomic variables, such as age, gender, household income and size, education level of the household head, and the New Ecological Paradigm index are included in the model specification, as well as indicators of the federal state of residence (see Table A1 of the appendix, for the correlations between these control variables).

Due to the binarity of the dependent variable  $y$  on the importance of climate change, probit model (2) is estimated, as well as the linear probability model (LPM) given by specification (1). The observations are weighted with weighting factors that take into account the regional distribution of households across German federal states, as well as the household size, rendering the sample representative of the household distribution in Germany with respect to these two factors. The marginal effects resulting from the probit model estimation are shown in the left-hand panel of Table 4, the corresponding LPM estimates are displayed in the right-hand panel.

**Table 4: Marginal Effects of Probit Model (2) and Coefficient Estimates of the Linear Probability Model (1) resulting from Estimations on the Perceived Importance of Climate Change Mitigation.**

| Dependent variable:                     | y = 1: Combating climate change is very important |         |    |                              |         |    |
|-----------------------------------------|---------------------------------------------------|---------|----|------------------------------|---------|----|
|                                         | Probit model (2)                                  |         |    | Linear probability model (1) |         |    |
| Any financial loss due to Corona        | -0.037                                            | (0.013) | ** | -0.039                       | (0.013) | ** |
| Age                                     | 0.003                                             | (0.001) | ** | 0.003                        | (0.001) | ** |
| Female                                  | 0.038                                             | (0.017) | *  | 0.041                        | (0.017) | *  |
| Net household income                    | 0.007                                             | (0.007) |    | 0.007                        | (0.007) |    |
| Higher education entrance qualification | 0.031                                             | (0.016) |    | 0.029                        | (0.016) |    |
| Household size                          | 0.007                                             | (0.008) |    | 0.008                        | (0.008) |    |
| Green Party supporter                   | 0.248                                             | (0.019) | ** | 0.222                        | (0.015) | ** |
| New Ecological Paradigm Index           | 0.046                                             | (0.001) | ** | 0.046                        | (0.002) | ** |
| Federal state dummies included          | Yes                                               |         |    | Yes                          |         |    |
| Pseudo-R <sup>2</sup> /R <sup>2</sup>   | 0.167                                             |         |    | 0.202                        |         |    |
| Number of Observations:                 | 5,118                                             |         |    | 5,118                        |         |    |

Standard errors, reported in parentheses, are clustered at the county level. \* and \*\* indicate significance levels of 5% and 1%, respectively.

Both the probit and LPM estimates confirm the negative correlation between financial concern from the Corona pandemic and the attributed importance of climate change found in Table 3: any financial loss

from the Corona pandemic is associated with a lower perceived importance of climate change, with the estimated marginal effect being negative and amounting to 3.7 percentage points in the probit model (Table 4). The result that households experiencing financial losses from the Corona pandemic tend to attach less importance to climate change remains robust even with methodological variation, most notably when an LPM, rather than a probit model, is estimated, but also when we employ alternative definitions of the pandemic impact variable (see Table A2 in the appendix) or estimate probit model (2) without using weighting factors (see Table A3 in the appendix) or employ specifications that are based on a smaller set of control variables than reported in Table 4.

Although being statistically significant, the finding that there may be negative effects on the perceived importance of climate change among households that are financially affected by the pandemic should be qualified for several reasons. First, the economic significance is rather low because of the relatively small marginal effects. Second, it is ultimately unclear to what extent the relationship found is causal due to unobserved heterogeneity, which could be alleviated if panel data were to be available. Investigating this issue in more depth, for example by evaluating longitudinal data on preferences and attitudes toward climate change, remains the subject of further empirical research given the current lack of such data for the second wave of the Corona pandemic.

## **5. Summary and Conclusion**

Since the advent of the Corona pandemic in Germany, it has dominated the political and media debate, whereas other topics, such as climate change, seem to have almost disappeared in media coverage. This impression raises the question of whether the pandemic has displaced people's concerns about climate change. Based on a survey among of more than 6,000 household heads conducted from mid-May to mid-June 2020, when the Corona pandemic was highly prevalent in Germany, this paper has provided empirical evidence on the pandemics' influence on peoples' perceptions of climate change and climate policy since the outbreak of the Corona crisis. Beyond financial and health affectedness in pandemic times, the assessment of climate policy aspects in economic policy measures taken to overcome the consequences of the Corona crisis was surveyed.

Our descriptive results show that only 0.6% of the respondents stated that they had been infected. Nevertheless, the large majority of respondents is concerned about the effects of the pandemic: almost 77% of the respondents are at least moderately concerned about their own health and that of their family.

Nonetheless, it appears that climate change also remains an important issue: Only around 6% of respondents believe that climate change has become less important since the beginning of the year. Around 70% see no change in the importance of the issue. However, the results of our discrete-choice model estimations indicate that households that suffered from Corona-related financial losses consider climate change to be less important than households that remained unaffected in this respect. Based on this result, in accord with Engler et al. (2020), we conclude that lowering individual financial losses is not only relevant from a social perspective, but it is also critical for the acceptance of climate policy and the respective measures.

Moreover, when it comes to economic policy measures to overcome the economic consequences of the pandemic, the majority of respondents prefers those measures that also help to achieve climate goals. For example, 63.5% of respondents agree with the statement that public investments should only be made if they help reduce emissions. Taken together, the majority of household heads apparently wants to combine the short-term goal of stimulating the economy with the long-term goal of climate protection when choosing economic policy measures to overcome the Corona crisis.

However, how individual preferences change over time, for instance as a result of the second lockdown or if the number of corporate insolvencies and thus the unemployment rate increases sharply, needs to be investigated on the basis of further surveys. While the empirical analysis presented here indicates that financial losses due to the Corona pandemic may change the preferences and attitudes of financially affected households, the extent to which these effects are causal remains a topic of future empirical research that is based on panel data.

## Appendix

**Table A1: Correlation Matrix for the Variables used in the Estimations.**

|                                               | Combating<br>climate<br>change is<br>very im-<br>portant | Financial<br>losses | Age     | Female  | Income  |
|-----------------------------------------------|----------------------------------------------------------|---------------------|---------|---------|---------|
| Combating climate<br>change is very important | 1                                                        |                     |         |         |         |
| Any financial losses due<br>to Corona         | -0.060*                                                  | 1                   |         |         |         |
| Age in years                                  | 0.064*                                                   | -0.089*             | 1       |         |         |
| Sex: female                                   | 0.114*                                                   | -0.063*             | -0.081* | 1       |         |
| Net income in €                               | -0.009                                                   | -0.046*             | -0.158* | -0.204* | 1       |
| University entrance qual-<br>ification        | -0.014                                                   | -0.004              | -0.148* | -0.030  | 0.256*  |
| Household size                                | -0.033                                                   | 0.102*              | -0.253* | -0.213* | 0.530*  |
| Green Party supporter                         | 0.223*                                                   | -0.030              | -0.071* | 0.099*  | 0.057*  |
| New Ecological Paradigm<br>Index (NEP Index)  | 0.391*                                                   | -0.025              | 0.006   | 0.182*  | -0.097* |

\* denote statistical significance at the 1% significance level.

**Table A1 (continued): Correlation Matrix for the Variables used in the Estimations.**

|                                              | University en-<br>trance qualifi-<br>cation | Household<br>size | Green Party<br>supporter | NEP Index |
|----------------------------------------------|---------------------------------------------|-------------------|--------------------------|-----------|
| University entrance qual-<br>ification       | 1                                           |                   |                          |           |
| Household size                               | 0.099*                                      | 1                 |                          |           |
| Green Party supporter                        | 0.111*                                      | 0.008             | 1                        |           |
| New Ecological Paradigm<br>Index (NEP Index) | -0.091*                                     | -0.067*           | 0.164*                   | 1         |

\* denote statistical significance at the 1% significance level.

## Robustness Checks

**Table A2: Robustness Checks on Probit Model (2) using Alternative Variables on the Financial or Health Affectedness due to the Corona Pandemic.**

| Dependent variable:                                | y =1: Combating climate change is very important |    |                    |    |                    |    |                    |    |
|----------------------------------------------------|--------------------------------------------------|----|--------------------|----|--------------------|----|--------------------|----|
|                                                    | Probit Model (2)                                 |    | Robustness Check 1 |    | Robustness Check 2 |    | Robustness Check 3 |    |
| Any financial loss due to Corona                   | -0.037                                           | ** |                    |    |                    |    |                    |    |
|                                                    | (0.013)                                          |    |                    |    |                    |    |                    |    |
| Severity of financial loss to Corona (1-6)         |                                                  |    | -0.015             | ** |                    |    |                    |    |
|                                                    |                                                  |    | (0.005)            |    |                    |    |                    |    |
| Family member suffers financial loss due to Corona |                                                  |    |                    |    | -0.035             | *  |                    |    |
|                                                    |                                                  |    |                    |    | (0.015)            |    |                    |    |
| Infected by Corona                                 |                                                  |    |                    |    |                    |    | -0.146             | *  |
|                                                    |                                                  |    |                    |    |                    |    | (0.072)            |    |
| Age                                                | 0.003                                            | ** | 0.003              | ** | 0.003              | ** | 0.003              | ** |
|                                                    | (0.001)                                          |    | (0.001)            |    | (0.001)            |    | (0.001)            |    |
| Female                                             | 0.038                                            | *  | 0.039              | *  | 0.036              | *  | 0.035              | *  |
|                                                    | (0.017)                                          |    | (0.017)            |    | (0.017)            |    | (0.017)            |    |
| Net household income                               | 0.007                                            |    | 0.006              |    | 0.007              |    | 0.011              |    |
|                                                    | (0.007)                                          |    | (0.007)            |    | (0.007)            |    | (0.007)            |    |
| University entrance qualification                  | 0.031                                            |    | 0.031              |    | 0.036              | *  | 0.038              | *  |
|                                                    | (0.016)                                          |    | (0.016)            |    | (0.016)            |    | (0.018)            |    |
| Household size                                     | 0.007                                            |    | 0.007              |    | 0.004              |    | 0.005              |    |
|                                                    | (0.008)                                          |    | (0.008)            |    | (0.008)            |    | (0.008)            |    |
| Green Party supporter                              | 0.248                                            | ** | 0.247              | ** | 0.248              | ** | 0.250              | ** |
|                                                    | (0.019)                                          |    | (0.019)            |    | (0.019)            |    | (0.021)            |    |
| New Ecological Paradigm Index                      | 0.046                                            | ** | 0.046              | ** | 0.046              | ** | 0.046              | ** |
|                                                    | (0.001)                                          |    | (0.001)            |    | (0.002)            |    | (0.002)            |    |
| Federal state dummies included                     | Yes                                              |    | Yes                |    | Yes                |    | Yes                |    |
| Pseudo-R2/R2                                       | 0.167                                            |    | 0.167              |    | 0.166              |    | 0.163              |    |
| Number of Observations:                            | 5,118                                            |    | 5,118              |    | 4,888              |    | 4,643              |    |

Note: Reported values are the marginal effects of probit estimations. Standard errors, reported in parentheses, are clustered at the county level. \* and \*\* indicate significance levels of 5% and 1%, respectively.

Table A3: Robustness Checks using Alternative Dependent Variables and Estimation Methods.

|                                   | Probit Model (2)                                | Robustness Check 4                        | Robustness Check 5                              | Robustness Check 6                              |
|-----------------------------------|-------------------------------------------------|-------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| Dependent variable:               | y=1: Combating climate change is very important | z: Importance of combating climate change | y=1: Combating climate change is very important | y=1: Combating climate change is very important |
| Estimation Method:                | Probit                                          | Ordered Probit                            | Probit (un-weighted)                            | Probit                                          |
| Any financial loss due to Corona  | -0.037 **<br>(0.013)                            | -0.103 **<br>(0.035)                      | -0.039 **<br>(0.012)                            | -0.051 **<br>(0.014)                            |
| Age                               | 0.003 **<br>(0.001)                             | 0.010 **<br>(0.001)                       | 0.003 **<br>(0.000)                             | 0.003 **<br>(0.001)                             |
| Female                            | 0.038 *<br>(0.017)                              | 0.169 **<br>(0.048)                       | 0.043 **<br>(0.016)                             | 0.129 **<br>(0.017)                             |
| Net household income              | 0.007<br>(0.007)                                | 0.040 *<br>(0.017)                        | 0.002<br>(0.006)                                |                                                 |
| University entrance qualification | 0.031<br>(0.016)                                | 0.098 *<br>(0.043)                        | 0.033 *<br>(0.015)                              | 0.031<br>(0.016)                                |
| Household size                    | 0.007<br>(0.008)                                | 0.024<br>(0.020)                          | 0.010<br>(0.008)                                | 0.012<br>(0.007)                                |
| Green Party supporter             | 0.248 **<br>(0.019)                             | 0.793 **<br>(0.058)                       | 0.243 **<br>(0.018)                             |                                                 |
| New Ecological Paradigm Index     | 0.046 **<br>(0.001)                             | 0.142 **<br>(0.005)                       | 0.046 **<br>(0.001)                             |                                                 |
| Federal state dummies included    | Yes                                             | Yes                                       | Yes                                             | Yes                                             |
| Pseudo-R2/R2                      | 0.167                                           | 0.137                                     | 0.165                                           | 0.026                                           |
| Number of Observations:           | 5,118                                           | 5,118                                     | 5,118                                           | 5,118                                           |

Note: Reported values are marginal effects, except for Robustness Check 4, where we report the coefficients of an ordered probit model. Standard errors, reported in parentheses, are clustered at the county level, except for Robustness Check 6. \* and \*\* indicate significance levels of 5% and 1%, respectively.

## References

- Andor, M. A., M. Frondel, S. Sommer (2018) Equity and the Willingness to Pay for Green Electricity in Germany. *Nature Energy* 3 (10): 876-881. DOI: 10.1038/s41560-018-0233-x
- Andor, M. A., M. Frondel, C. Vance (2017a) Germany's Energiewende: A Tale of Increasing Costs and Decreasing Willingness-To-Pay. *Energy Journal* 38 (Special Issue #1 – Renewables and Diversification in Heavily Energy Subsidized Economics): 211-228. DOI: 10.5547/01956574.38.SI1.mand
- Andor, M. A., M. Frondel, C. Vance (2017b) Mitigating Hypothetical Bias: Evidence on the Efforts of Correctives from a Large Field Study. *Environmental and Resource Economics* 68 (3): 777-796. DOI: 10.1007/s10640-016-0047-x
- Andor, M. A., C. M. Schmidt, S. Sommer (2018) Climate Change, Population Ageing and Public Spending: Evidence on Individual Preferences. *Ecological Economics* 151: 173-183. DOI: 10.1016/j.ecolecon.2018.05.003
- Angrist, J., Pischke, J. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press.
- Destatis (2019) Bevölkerung und Erwerbstätigkeit. Haushalte und Familien. Ergebnisse des Mikrozensus. Fachserie 1 Reihe 3. German Statistical Office, Wiesbaden.
- Dunlap, R. E., K. D. Van Liere, A. G. Mertig, R. E. Jones (2000) New Trends in Measuring Environmental Attitudes: Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. *Journal of Social Issues*, 56(3), 425–442. DOI: 10.1111/0022-4537.00176
- Engler, D., Groh, E. D., Gutsche, G., Ziegler, A. (2020) Acceptance of Climate-Oriented Policy Measures in Times of the COVID-19 crisis. MAGKS Discussion Paper No. 29-2020, forthcoming in *Climate Policy*.
- Frondel, M., Kussel, G., Larysch, T., Osberghaus, D. (2020) Klimapolitik während der Corony-Pandemie: Ergebnisse einer Haushaltsbefragung. *Zeitschrift für Umweltpolitik und Umweltrecht* (4): 402-425.
- Hellevik, O. (2009). Linear versus logistic regression when the dependent variable is a dichotomy. *Quality & Quantity*, 43(1), 59-74.
- Jenkins-Smith, H. C., Ripberger, J. T., Copeland, G., Nowlin, M. C., Hughes, T., Fister, A. L., Wehde, W. (2017) *Quantitative research methods for political science, public policy and public administration: 3rd edition, with applications in R*. University Libraries. The University of Oklahoma.
- Thrane, C. (2019). *Applied regression analysis: Doing, interpreting and reporting*. Routledge.





