Covid-19 Crisis and Hostility against Foreigners

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Abstract

Harmful behavior against out-group members often rises during periods of economic hardship and health pandemics. Here, we test the widespread concern that the Covid-19 crisis may fuel hostility against people from other nations. Using a controlled money-burning task, we elicited hostile behavior among a nationally representative sample (n=2,186) in the Czech Republic during the first wave of the pandemic. We provide evidence that exogenously elevating salience of the Covid-19 crisis increases hostility against foreigners from the EU, USA and Asia. This behavioral response is similar across various demographic sub-groups. Further, we do not find support for the optimistic view that the Covid-19 crisis may create stronger social bonds within a country. The results underscore the importance of not inflaming anti-foreigner sentiments and suggest the need to monitor impacts of the crisis on behavior in the social domain.

JEL Classification: C93, D74, D91, J15

Keywords: COVID-19 pandemic, hostility, inter-group conflict, experiment

1. Introduction

Intergroup conflicts are among the most pressing problems facing human society (Bowles 2009; Fiske 2002; Blattman and Miguel 2014). Social scientists have long argued that difficult life conditions imposed upon individuals by external forces that threaten physical wellbeing and safety, such as economic and political upheavals or widespread disease, may create a fertile environment for xenophobia and out-group hostility. Evidence suggests that hostile behaviors and conflicts increase during periods of economic problems (Anderson, Johnson, and Koyama 2017; Grosfeld, Sakalli, and Zhuravskaya 2019; Miguel, Shanker, and Sergenti 2004). In the context of a crisis caused by a contagious disease, a particularly plausible mechanism is that people may form hostile attitudes to members of the groups that are associated with transmission of the disease (Murray and Schaller 2016; O'Shea et al. 2020).

In light of this reasoning, the Covid-19 crisis, arguably the most severe health and economic shock since WWII (Baldwin and Weder di Mauro 2020; *New York Times, 2020*), has created an unfortunate but suitable testing ground for exploring whether an important, naturally-occurring shock in the health and economic domains spills over to the social domain and magnifies inter-group animosity. Since Covid-19 originally surfaced in China and spreads across borders via interactions with people from other countries, contemporary commentators have suggested that it may foster prejudice against foreigners, particularly against people from Asia (*CNN* 2020)**.** For example, Fernand de Varennes, the UN Special Rapporteur, warns that "COVID-19 is not just a health issue; it can also be a virus that exacerbates xenophobia, hate and exclusion." (*United Nations News* 2020). Rigorously identifying the causal effects of Covid-19 on inter-national and domestic group divisions is fundamental for understanding the current and future social and political landscape. Such divisions may reduce support for global initiatives to tackle the pandemic, create barriers to re-establishing international trade, strengthen support for extreme right-wing political parties and increase the risk of conflicts.

Despite the importance of this issue, causal evidence on how fears associated with major health and economic shocks shape hostility against particular groups is lacking. This is not surprising because of several empirical challenges. First, hostility denotes aggressive harmful behavior motivated by positive utility from reduced welfare of certain individuals or groups, in contrast to harmful behavior motivated by personal material gain. Using naturally occurring data to uncover hostility, such as the prevalence of robbery or violence, is problematic because hardship often goes hand in hand with greater financial needs. Similarly, avoidance of out-group members or support for border closures can be a rational protective strategy. Thus, using

these measures does not allow us to separate selfish motivations, based on a rational calculus of potential (material) benefits to ones' self, from hostility. Second, a clean measurement requires an exogenous variation in the identity of the victim of the hostile behavior, in order to distinguish whether hardship fuels hostility towards particular groups, rather than towards people in general. The third challenge is identification of causal impacts. For understanding impacts of a shock that hits the whole country at a similar point in time, a key issue is finding a ceteris paribus variation in fears that is not correlated with time trends or unobserved confounders between individuals. Simply comparing individuals from localities with lower versus higher prevalence of disease during a health pandemic can be misleading. More pro-social and tolerant individuals can self-select into residing in localities that have a greater capacity to cope with the crisis. Moreover, individuals vary along many unobserved dimensions. For example, out-group hostility can be related to economic vulnerability and personal characteristics that affect people's ability to cope with economic or health shocks.

Here we provide evidence that a health pandemic accompanied by a severe economic shock increases prevalence of harmful behavior towards people living in other countries. Our evidence is based on a large-scale experiment implemented in midst of the Covid-19 crisis. We elicited hostile behavior among a nationally representative sample (n = 2,186) in the Czech Republic, a medium-sized country in Central Europe, while the pandemic was on the rise during its first wave, and the entire population lived under lockdown and border closure; see Supplementary Information (SI) for more details about the background.

Several features of our experimental design help us to overcome the empirical challenges described above. First, we directly elicit willingness to cause financial harm in a controlled money-allocation task. Subjects make anonymous, one-shot allocation decisions, in which they can decide to decrease a monetary reward for another person. Since reducing the reward does not result in pecuniary benefits for the decision-maker (or for anyone else), the choice reveals individual willingness to engage in hostile behavior. Second, we exogenously manipulate information about the identity of the recipient of the reward, in order to identify discrimination against foreigners. Third, we randomly assign the participants either to a treatment condition that increased the salience of Covid-related problems and fears, or to the control condition in which Covid-related challenges were not made salient. Random allocation ensures that participants in the treatment and control conditions are comparable in terms of observable and unobservable characteristics, helping to overcome selection issues and concerns about spurious correlation. Finally, an attractive feature of our empirical approach is that it can

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be easily employed on large representative samples in virtually any country with well-developed data collection infrastructure.

The paper is related to several literatures. In terms of measuring discrimination, we build on economic experiments designed to uncover biases in social preferences towards people with specific real-life group attributes (e.g., ethnicity), using incentivized allocation tasks (e.g., Bernhard, Fischbacher, and Fehr 2006; Fershtman and Gneezy 2001; Angerer et al. 2016; Berge et al. 2020).[1] A noteworthy aspect of our work is the focus on multiple dimensions of group identity, since most of the earlier work studies only a single group attribute, for an exception see Kranton et al. (2020). The paper also adds to an emerging empirical literature which tests the role of environmental factors that may influence behavior to out-group members. The focus has been mostly on the effects of inter-group contacts (Rao 2019; Mousa 2020), social environment (Bauer et al. 2018), exposure to violent elections (Hjort 2014) or violent inter-group conflict (Shayo and Zussman 2011; Bauer et al. 2014).

Finally, the paper is related to work on "Behavioral immune system" in social psychology which has documented a correlation between greater exposure to (real or perceived) health threats and measures of group biases in explicit and implicit attitudes. For example, in US states with higher rates of infectious diseases, people exhibited greater racial prejudice (O'Shea et al. 2020). A representative survey from the US shows that citizens who felt more vulnerable to contracting Ebola displayed greater prejudice against immigrants in survey questions (Kim, Sherman, and Updegraff 2016). Moving beyond correlations, showing a disease-related picture primes increased prejudice among subjects in the lab (Duncan and Schaller 2009) and among a sample of M-Turk workers (O'Shea et al. 2020). We contribute by providing causal evidence of the impacts of a naturally occurring health pandemic on incentivized behavior among a representative sample.

2. Experimental design

2.1 Sample

We collected experimental data on a large, nationally-representative sample, using an approach inspired by Almas, Cappelen, and Tungodden (2019) and Falk et al. (2018) and took advantage

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[1] In-group favoritism and out-group discrimination have also been measured using a minimal-group experimental paradigm, by creating artificial group boundaries in the laboratory (based on, for example, having T-shirts of the same color or sharing preferences for art). The most prominent examples are Tajfel (1981), Chen and Li (2009), and Charness, Rigotti, and Rustichini (2007).

of the online infrastructure of a leading data-collection agency in the Czech Republic (NMS Market Research and PAQ Research). The data were collected via the agency from a sample of 2,186 adults from March 30 to April 1, 2020. The sample is nationally representative in terms of age, sex, education, employment status before the Covid-19 pandemic, municipality size, and regional distribution, with a higher share of people living in large cities (Table S.1).

2.2 Measuring hostility

We developed a detailed experimental module, designed to uncover the shape of hostile preferences towards people with different group attributes. We administered a series of decisions in an allocation task that we label a Help-or-Harm task (HHT), which combines features of the well-established Dictator game and the Joy of Destruction game (Abbink and Sadrieh 2009). The participants were asked to increase or decrease rewards to a set of people with different characteristics, at no monetary costs to themselves. The default allocation was CZK 100 (USD 4). Participants could allocate any amount between CZK 0 and CZK 200 (USD 0-8), using a slider located in the middle of the 0-200 scale (see Fig. S.1). The participants had to make an active choice - even if they decided to keep the reward at the default allocation, they had to click on the slider.

The advantage of implementing a salient reference point is that we can identify (i) changes in basic pro-social behavior and (ii) changes in the prevalence of hostile behavior. We denote behavior as pro-social when subjects choose to increase rewards above CZK 100, revealing that a participant cares positively about the recipient. Next, we refer to behavior as being hostile when subjects allocate less than CZK 100 to the recipient, since in order to do so they have to actively cause financial harm with no pecuniary benefit to themselves. Thus, such behavior cannot be explained by selfish motivations. We also consider the most extreme manifestations of such behavior, when subjects destroy all recipient's earnings, by allocating CZK 0. Note that since the previous literature documents that a non-negligible fraction of people tend to act in hostile ways even towards in-group members (Abbink and Sadrieh 2009; Bauer et al. 2018), hostile behavior towards out-group members does not necessarily reflect anti-outgroup bias. A clear measurement of such bias requires a comparison of the prevalence of hostility towards in-group members and towards out-group members.

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2.3 Manipulating identity of a recipient

In order to measure nation-based divisions and hostile behavior towards foreigners, the participants made decisions whether to increase or decrease money to a person living in the Czech Republic, in the EU, in the USA, in Asia, and in Africa. We chose not to mention specific countries, such as Italy or China (the countries most saliently linked to the Covid-19 pandemic during our data collection period), in order to avoid inducing an experimenter demand effect. In the analysis, we focus on average behavior towards a foreigner, and compare it to behavior towards a person from the Czech Republic. Further, in order to measure domestic divisions and hostility to out-group members from one's own country, in the second set of decisions participants allocated money to people who all live in the Czech Republic but who either share a group attribute with them (in-group) or not (out-group). We focused on the following dimensions: region of residence, political orientation, ethnicity, and religion. In the analysis, we study average behavior towards domestic in-group members and towards domestic out-group members. In total, each participant made seventeen choices. The choices were incentivized -- the subjects knew that thirty participants would be randomly selected and one of their choices would be implemented.

2.4 Manipulating salience of Covid-19

In order to exogenously manipulate the intensity of Covid-19- related concerns when subjects made decisions, we used a priming technique. Each participant was randomly allocated either to the COVID-19 (n = 1,142) or to the CONTROL condition (n = 1,044). In the COVID-19 condition, before making decisions in the Help-or-Harm tasks, the subjects answered a series of survey questions focusing on the coronavirus crisis, specifically on their preventive health behavior, social distancing, economic situation, and psychological wellbeing. The prime is designed to activate or intensify a complex set of thoughts and concerns that characterize people's lives during the coronavirus crisis. The median time the respondents spent answering this set of questions was 13 minutes. In the CONTROL condition, the participants made the decisions in the Help-or-Harm tasks at the beginning of the survey, and answered the coronavirus-related questions only later. This is a relatively unobtrusive way of introducing priming into an online experiment, since given that the data were collected during the first wave of the pandemic, it was natural to ask questions about this issue. Thus, we believe experimenter demand effects are unlikely to drive the observed differences in behavior across the COVID-

19 and CONTROL conditions. Table S.1 shows that randomization was successful, since participants do not exhibit systematic differences across conditions in terms of observable characteristics. See Supplementary Information for more details about the sample, experimental design, definition of variables, and complete experimental protocol.

The priming technique allows us to measure purely psychological impacts of a greater intensity of Covid-related concerns on hostility. Priming is a well-established technique in social science (Bargh and Chartrand 2000; Cohn and Maréchal 2016) and has been successfully used to shed light on a range of other important issues (Cohn, Fehr, and Maréchal 2014; Mani et al. 2013; Cohn et al. 2015). Also note that this technique identifies impacts of greater intensity of Covid-related thoughts, rather than the overall effects of Covid-19. Thus, to the extent that people in the CONTROL condition also have Covid-19 concerns very much at top of mind, this technique may underestimate the actual effects of the pandemic.

3. Results

We find that, on average, participants allocate less money to foreigners (CZK 92) than to a person from their own country (CZK 133; Table 1; Somer's D test, P < 0.001). In order to test whether thinking about Covid-19 magnifies such nation-based discrimination by increasing hostility towards foreigners, we compare choices in the COVID-19 condition with choices in the CONTROL condition.

Thinking about Covid-19 has negative impacts on behavior towards foreigners (Fig. 1a and Table 2). While in the CONTROL condition, participants on average allocated CZK 94 to foreigners, in the COVID-19 condition they allocated CZK 89 (OLS, P = 0.022). In contrast, the effect on behavior towards a domestic recipient is small in magnitude and not statistically significant (P = 0.753). In a regression analysis, we find a negative interaction effect between COVID-19 and an indicator variable for 'foreigner' (as compared to a domestic person), but it does not reach statistical significance at conventional levels (Table S.2, P = 0.140).

Next, we take a more granular approach and explore the effects on behavior towards foreigners from different parts of the world separately. We find a negative impact of COVID-19 on behavior towards people from the EU, the USA and Asia, but not from Africa (Fig. 1a and Table 2). The effect is largest for behavior towards people living in the EU -- as compared to CONTROL, participants in COVID-19 allocated on average CZK 8 less to them (OLS, P = 0.001). The drop in COVID-19 as compared to CONTROL is CZK 5 for a person from the

USA (P = 0.063) and CZK 4 for a person from Asia (P = 0.094). Although the negative effects on behavior towards people from the EU, the USA and Asia are statistically significant, the magnitude of the effects is not large. This is not surprising for two reasons. First, the prime employed in the COVID-19 condition was quite subtle (answering a set of survey questions related to Covid-19 before making choices in the Help-or-Harm task). Second, the priming technique we used allows us to identify a marginal effect of greater salience of Covid-19 related thoughts, rather than the overall effects of Covid-19.

Figure 1. Effect of the COVID-19 condition on allocations in the Help-or-Harm task, by the identity of the recipients.
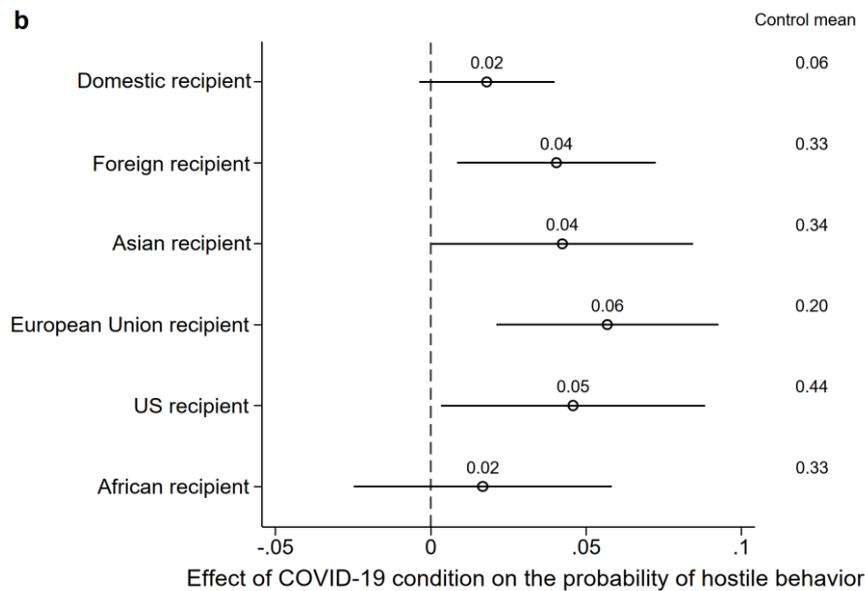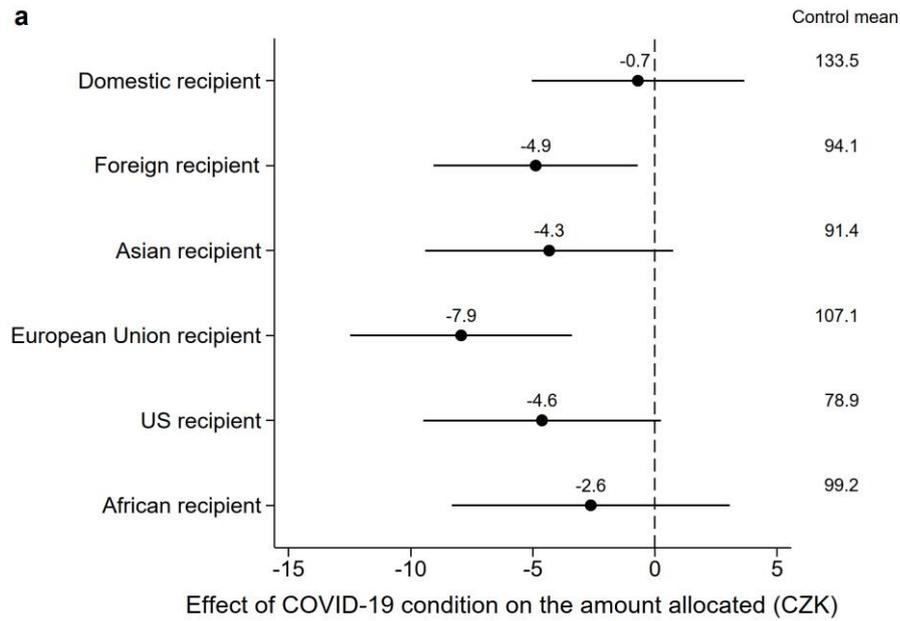
Notes: Coefficient plots. Bars represent 95 percent confidence intervals. In a, the dependent variable is the amount allocated. In b, the dependent variable is a binary variable indicating hostile behavior, equal to 1 if allocation is strictly lower than the default allocation (100 CZK). Both panels present estimated coefficients of the COVID-19 condition relative to the CONTROL condition (corresponding regression models including numbers of observations appear in Panel A of Table 2 and Panel A of Table S.3). Data for all 2,186 participants used.

Table 1. Mean allocations in the Help-or-Harm task by the identity of the recipient, across CONTROL and COVID-19 conditions

	Mean allocations [95% confidence intervals]			Effect [z-statistic, p-value]	N
	All	Control	COVID-19		
	(1)	(2)	(3)	(4)	(5)
Panel A: Indexes					
Domestic (Czech)	132.8	133.5	132.2	-1 [p=0.390]	2186
Foreign	91.6	94.1	89.3	-5 [p=0.013]	8743 (2186 clusters)
(vs. Domestic)	-41 [p<0.001]	-39 [p<0.001]	-43 [p<0.001]		
Domestic in-group	125.1	127.3	123.0	-4 [p=0.026]	9297 (2186 clusters)
Domestic out-group	95.0	96.5	93.5	-3 [p=0.043]	16935 (2186 clusters)
(vs. in-group)	-30 [p<0.001]	-31 [p<0.001]	-30 [p<0.001]		
Panel B: Foreign					
Asian	89.0	91.4	86.9	-4 [p=0.044]	2186
(vs. Domestic)	-44 [p<0.001]	-42 [p<0.001]	-45 [p<0.001]		
European Union	103.4	107.1	100.0	-7 [p=0.003]	2186
(vs. Domestic)	-29 [p<0.001]	-26 [p<0.001]	-32 [p<0.001]		
US	76.2	78.9	73.8	-5 [p=0.013]	2186
(vs. Domestic)	-57 [p<0.001]	-55 [p<0.001]	-58 [p<0.001]		
African	97.8	99.2	96.6	-3 [p=0.296]	2185
(vs. DOMESTIC)	-35 [p<0.001]	-34 [p<0.001]	-36 [p<0.001]		
Panel C: Domestic in-group/out-group					
Region in-group	129.7	133.0	126.7	-6 [p=0.015]	2783 (2186 clusters)
Region out-group	111.0	112.6	109.6	-3 [p=0.053]	3775 (2186 clusters)
(vs. in-group)	-19 [p<0.001]	-20 [p<0.001]	-17 [p<0.001]		
Political in-group	119.5	120.5	118.6	-2 [p=0.207]	2186
Political out-group	92.3	94.3	90.5	-4 [p=0.080]	2186
(vs. in-group)	-27 [p<0.001]	-26 [p<0.001]	-28 [p<0.001]		
Majority in-group	123.4	125.6	121.4	-4 [p=0.045]	2186

Roma ethnicity out-group	74.6	76.4	73.0	-3 [p=0.058]	2186
(vs. Majority in-group)	-49 [p<0.001]	-49 [p<0.001]	-48 [p<0.001]		
Immigrant out-group	94.6	95.5	93.8	-2 [p=0.550]	2186
(vs. Majority in-group)	-29 [p<0.001]	-30 [p<0.001]	-28 [p<0.001]		
Religion in-group	126.4	128.4	124.5	-4 [p=0.142]	2142 (2142 clusters)
Religion out-group	93.5	95.1	92.0	-3 [p=0.070]	6602 (2186 clusters)
(vs. in-group)	-33 [p<0.001]	-33 [p<0.001]	-32 [p<0.001]		

Notes: Mean allocations in the Help-or-Harm task. "In-group" indicates that the respondent and the recipient share the group attribute. Differences reported in column 4 and on respective rows indicate a comparison group (e.g., vs. Domestic). We report p-values from the Wilcoxon rank-sum equality test whenever the number of observations is the same as the number of clusters, and Somer's D p-values clustered at individual level whenever we have more observations than clusters. The number of observations equals the number of individual decisions considered for each group of recipients (See Supplementary Information 1.2 for detailed descriptions of recipient group construction)

Table 2. Effect of the COVID-19 condition on the amount allocated in the Help-or-Harm task, by the identity of the recipient (domestic vs. foreign)

|	(1)	(2)	(3)	(4) European Union	(5)	(6)
Identity of the recipient:	Domestic	Foreign	Asian		US	African
Panel A: Baseline controls						
COVID-19	-0.698	-4.882	-4.332	-7.933	-4.625	-2.628
p-value	[0.753]	[0.022]	[0.094]	[0.001]	[0.063]	[0.364]
p-value (MHT; 2 hypotheses)		[0.045]				
p-value (MHT; 17 hypotheses)	[0.755]	[0.202]	[0.459]	[0.008]	[0.398]	[0.797]
Panel B: No controls						
COVID-19	-1.277	-4.842	-4.478	-7.144	-5.110	-2.628
p-value	[0.558]	[0.025]	[0.076]	[0.002]	[0.039]	[0.349]
p-value (MHT; 2 hypotheses)		[0.044]				
p-value (MHT; 17 hypotheses)	[0.559]	[0.178]	[0.369]	[0.025]	[0.249]	[0.775]
Panel C: Additional controls						
COVID-19	-0.284	-5.473	-4.969	-8.094	-5.440	-3.386
p-value	[0.898]	[0.011]	[0.059]	[0.001]	[0.031]	[0.247]
p-value (MHT; 2 hypotheses)		[0.024]				
p-value (MHT; 17 hypotheses)	[0.889]	[0.118]	[0.348]	[0.004]	[0.217]	[0.623]
Panel D: Probability weights						
COVID-19	-2.740	-5.726	-6.131	-6.127	-8.298	-2.344
p-value	[0.337]	[0.049]	[0.071]	[0.039]	[0.011]	[0.536]
CONTROL mean	133.5	94.1	91.4	107.1	78.9	99.2
# Clusters		2186				
Observations	2186	8743	2186	2186	2186	2185

Notes: OLS. P-values reported in square brackets (robust standard errors clustered at an individual level in column 2 where multiple observations are used per individual). The dependent variable is the amount allocated in the Help-or-Harm task. In Panel A, each regression controls for gender, age category (6 categories), household size, number of children, region (14 regions), town size (7 categories), education (4 categories), economic status (7 categories), household income (11 categories) and task order. Panel B reports results from regressions without control variables. In Panel C, each regression controls for baseline controls (as in Panel A) and further controls for the variables approximating economic situation, mental health, Covid-19 symptoms and activities during the lockdown (see Supplementary Information 1.4 for the list and definition of variables). Panel D reports results of weighted OLS regressions with no controls, using probability weights to correct for the oversampling of respondents from large municipalities. We also report multiple hypothesis testing corrected p-values using a method developed by Barsbai et al. (2020). See Supplementary Information 1.6 for details on the procedure and the hypotheses tested.

As a baseline specification, we report unweighted results for all 2,186 participants (Fig. 1a and Panel A of Table 2, Fig. S.3 and Panel A of Table S.5). Baseline models control for gender, age, household size, number of children, region, town size, education, economic status, household income and task order. Precise definitions of all variables are provided in the Supplementary Information. As a robustness check, we report results of 1) OLS models with no controls, 2) OLS models with additional controls for the variables approximating economic situation, mental health, Covid-19 symptoms and activities during the lockdown, and 3) weighted OLS regressions, using probability weights to correct for the oversampling of respondents from large municipalities (Panels B-D of Table 2 and Table S.5). The results are robust.

Further, we show that the COVID-19 condition reduces money allocations to foreigners not only due to reduced pro-social behavior, but primarily due to increased prevalence of hostile behavior (Fig. 1b and Table S.3). We define an indicator variable equal to one if the participant actively destroyed the money allocated to the other person, i.e. reduced the reward to an amount below 100. The effect on prevalence of hostility is again largest for behavior towards a person living in the EU. In CONTROL, 20% decided to act in a hostile way towards a person from the EU, while in COVID-19 the prevalence of this behavior increased by 6 percentage points (OLS, $P = 0.002$). The difference is 5 percentage points ($P = 0.035$) and 4 percentage points ($P = 0.049$) for recipients living in the USA and Asia, respectively.

Interestingly, the observed increase in the prevalence of hostility towards these groups of foreigners is driven by the extreme manifestation of hostility, namely the prevalence of decisions to reduce the rewards to CZK 0 (Table S.3). Again, the magnitude of these effects is largest for the recipient from the EU -- while in the CONTROL condition, 6.2% of participants destroyed all the earning of a recipient from the EU, the proportion increases to 9.3% in the COVID-19 condition (OLS, $P = 0.007$). The prevalence of extreme hostility is very low towards domestic recipients, 2.3% in CONTROL and 2.5% in COVID-19 ($P = 0.797$). We provide further support for these conclusions in Fig. S.2, which shows full distributions of choices across both COVID-19 and CONTROL conditions. As expected, we also observe that COVID-19 reduces the prevalence of basic pro-sociality, defined as a willingness to increase rewards above the default allocation (Table S.3), but the effects are relatively small and mostly not significant statistically.

Figure 2. Sub-group analysis of the effect of the COVID-19 condition on the amount allocated in the Help-or-Harm task, by the identity of the recipients.
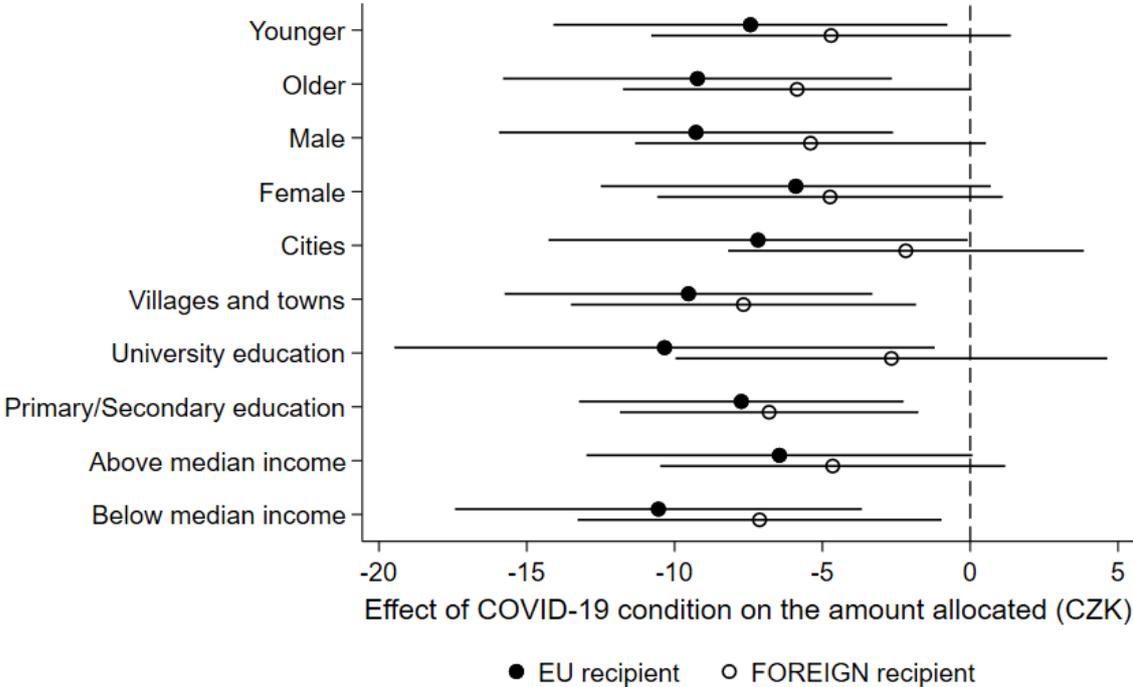
Notes: Coefficient plots. Bars represent 95 percent confidence intervals. The dependent variable is the amount allocated. The figure presents estimated coefficients of the COVID-19 condition relative to the CONTROL condition (corresponding regression models including numbers of observations are in Table S.4). Age and net monthly household income are divided by the median (50 years and CZK 35,000). Municipalities are divided into cities with more than 100,000 inhabitants, and smaller villages and towns. Data for all 2,186 participants used.

The size and diversity of our sample allows us to explore whether the observed effects of COVID-19 on hostility against foreigners is a broad response spanning across demographics, or behavior that characterizes certain demographic sub-groups of the population. Fig. 2 and Table S.4 displays the effect of the COVID-19 condition on the mean amount of money allocated (i) to all foreigners on average, and (ii) to recipients from the EU, for whom we observe the largest effects, across age groups, gender, education level, income level, and size of municipality. Overall, the results are similar across demographics.

Does thinking about Covid-19 increase hostility against any type of out-group members, including domestic ones, or is it a response specific to foreigners? To study this, we measure the average amount allocated to (i) domestic in-group members who share a group attribute with the decision-maker (region of residence, ethnicity, political opinions, and religious beliefs)

and (ii) domestic out-group members who do not share a given group attribute. We find an indication of negative effects of the COVID-19 condition on behavior towards both in-group and out-group members living in the same country as the respondent (Fig. S.3 and Tables S.5 and S.6). However, most of the effects do not reach statistical significance and in general they are smaller in magnitude than the effects on behavior towards foreigners.

Overall, the results about the effects on behavior towards domestic recipients need to be interpreted with caution. On one hand, we find virtually no effects on behavior towards a random person from the Czech Republic (Fig. 1). At the same time, the estimated coefficients on behavior towards specific groups within the Czech Republic are negative, although most of them are not statistically significant. While it remains an open question whether Covid-19 has null or mildly negative effects on behavior towards people from own country, in any case, our results do not support the optimistic view that the Covid-19 crisis may create stronger social bonds, as we do not see more favorable behavior towards in-group members in COVID-19 compared to CONTROL.

A potential concern is that thinking and answering questions in the COVID-19 condition may have caused fatigue and led to less attention to allocation decisions, and thus may have affected choices without activating Covid-related concerns and fears. This explanation is, however, not supported by our data. Subjects in COVID-19 are neither more prone to stick to the default allocation, nor less likely to correctly answer attention check questions (Table S.7). Both of these patterns would be expected if subjects were less attentive. In fact, the effects of COVID-19 on behavior towards foreigners is caused by reduced likelihood of sticking to the default allocation, and an increased tendency to actively reduce recipients' income (Fig. S.2). Subjects' response time is somewhat lower in COVID-19, but all results are robust to controlling for response time (Table S.8). These and other robustness tests, including various regression specifications, are reported in the Supplementary Information (Tables S.2-S.9).

In Table 2 and Table S.5 we present three types of p-values. The first is standard "per comparison" p-values. These are appropriate for researchers with an a priori interest in a specific outcome. For instance, researchers interested in the impact of Covid-19 on behavior specifically towards foreigners, or specifically towards people living in Asia, should focus on these p-values. In addition, the analysis also presents additional p-values that account for multiple hypothesis testing, using the method developed by Barsbai et al. (2020), since a potential concern might be that our results are susceptible to false discovery of significant results that arise simply by chance when testing the impacts on multiple outcome variables.

Since the paper is motivated by concerns about Covid-19 fostering out-group hostility, we consider the two main outcome variables capturing behavior towards out-group members: (i) behavior towards foreigners and (ii) behavior towards domestic out-group members. Thus, researchers with a priori interest in behavior towards out-group members should focus on these p-values. The effect on foreigners remains statistically significant (P = 0.045). Finally, we take the most conservative approach, relevant for the question whether Covid-19 affects social behavior in general, towards any type of recipient. Consequently, we adjust for the 17 hypotheses corresponding to all dependent variables for which we estimate the effects. Even under this approach, the effect on the recipients from the EU is statistically significant (P = 0.008). Nevertheless, the effects on behavior towards foreigners, people living in the USA and in Asia do not reach statistical significance after this correction.

4. Discussion and open questions

The evidence presented in this paper illuminates that Covid-19 can cause damage in the social domain, but it should be seen as only an initial step. Below we discuss several limitations and directions for future research.

First, although the effects of the prime on behavior towards various groups of foreigners are statistically significant, the magnitude of these effects is not large. This is not surprising given that we identify marginal effects of greater salience of Covid-19 concerns, and not their overall effects. While the priming technique is a useful tool to uncover qualitative effects, it is less informative about the magnitude of the impact of real-life experiences.

The second open question concerns the underlying mechanisms. Overall, the results are consistent with the idea that people form more negative attitudes towards people with group attributes associated with the transmission of the disease. First, at the time of the data collection, infection rates in the Czech Republic were relatively low, as compared to most of the EU countries, such as Italy, Germany, and Spain. The first reported cases of Covid-19 in the Czech Republic got infected in Italy. The Czech government quickly responded, by closing borders, in addition to other measures. These aspects may have fostered the perception of the coronavirus pandemic as an external threat, spreading mainly from other EU countries. Further, at the time of the data collection, Africa had been much less associated with the virus compared to EU, the US and Asia, thanks to relatively low infection rates, helping to explain why we observe negligible effects on behavior towards people from Africa. In this context, it may seem

surprising that we do not see greater effect on behavior towards individuals from Asia, as compared to behavior towards people from the EU or the US. While China was mentioned regularly by Czech public officials and the media, it mainly concerned positive remarks about medical supplies delivery.[2]

Further, the Covid-19 crisis has entered people's lives in complex ways. It has created fears about people's own health, and that of friends and family members. To many, it has imposed economic hardships and uncertainty about future material well-being. It has also forced people to isolate themselves socially. The prime used in this paper may have activated all these concerns, and we cannot separate their roles in triggering the observed increase in hostility towards foreigners. A fruitful avenue for future research would be to try to more sharply disentangle these aspects, perhaps by designing a set of Covid-related primes, each aiming to activate a different dimension of concerns.

Further, the mechanisms above consider direct effects of the pandemic on individual preferences. Another possibility is that the observed increase in anti-foreigner sentiments may have been created by the behavior of politicians who may have incentives to blame foreigners for spreading the virus, in order to redirect attention from their own internal problems fighting the pandemic. In such a case, the increase in hostility towards foreigners would not be a direct effect of the pandemic per se, but rather the effect of politicians using the pandemic to incite hostility against foreigners. This question could be tested by comparing the effects of Covid-19 in countries in which politicians do and do not incite anti-foreigner sentiments.

Finally, this paper focused on the immediate effects of the first coronavirus wave, but it will be important to study how the attitudes towards out-groups develop during the later stages of the pandemic and post-pandemic recovery. Also, the evidence comes from a single country and more research is needed to explore how generalizable the effects are across settings.

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[2] We performed a text analysis of all governmental Covid-19 related press conferences held before the end of our data collection, and the twitter feeds of the governmental officials most involved in the management of the Covid-19 crisis in the Czech Republic. We did not find a single case of labeling Covid-19 as "Chinese virus" or similar. A sole critical tweet pointed to the dependency of the EU on Chinese medical production.

5. Conclusions

This paper provides evidence documenting how concerns triggered by a global health pandemic, Covid-19, shape hostility towards people with different group attributes. The main result is that thinking about Covid-19 increases anti-foreigner sentiments, making people more prone to financially harm people from the EU, the USA and Asia. We show that this is a relatively general response, present across various demographic groups. Our results underscore the importance of making sure political and other opinion-leaders avoid associating or blaming foreigners and other countries for the crisis. Placing blame as a political strategy can either create or tap into elevated anti-foreigner sentiments, and consequently increase the risk that the health and economic crises will become compounded by unravelling of international collaborations.

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