Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
The effects of COVID-19 lockdown on fairness and cooperation: Evidence from a lablike experiment

Irene Maria Buso\textsuperscript{a,1}, Sofia De Caprariis\textsuperscript{a,2}, Daniela Di Cagno\textsuperscript{a,2}, Lorenzo Ferrari\textsuperscript{a,2}, Vittorio Larocca\textsuperscript{a,3}, Francesca Marazzi\textsuperscript{b,*}, Luca Panaccione\textsuperscript{b,4}, Lorenzo Spadoni\textsuperscript{a,2}

\textsuperscript{a} Luiss University, Italy
\textsuperscript{b} Università degli Studi di Roma “Tor Vergata”, Italy

\textbf{A B S T R A C T}

We run an experiment to study the effects of Covid-19 lockdown in Italy on preferences for fairness and cooperation. Given the impossibility of having participants in the lab during the lockdown, we adopted an online methodology based on a multi-platform architecture that brings experimental subjects in a “Lab on the Web”. Results from standard Ultimatum and linear Public Good games show that the circumstances in which participants lived the lockdown significantly affect their behavior in the two games. In particular, participants are more selfish in the ultimatum bargaining and contribute more to the public good when social isolation is stronger. However, cooperation decreases when lockdown is longer. We interpret these results as evidence of “social embeddedness” to compensate for “social distancing”.

© 2020 Elsevier B.V. All rights reserved.

\textbf{1. Introduction}

Covid-19 has heavily affected the way we live and react to different social interactions. Especially during lockdown, we experienced instances ranging from much reduced physical interaction to complete isolation. As new forms of social interaction will be maintained also in the foreseeable future, it is relevant to investigate whether and how social distancing affects individual behavior.

Our locked down participants play standard Ultimatum and linear Public Good game (Voluntary Contribution Mechanism) using a system of linked web platforms which preserves the salient features of lab experiments while avoiding physical proximity. Collected data permit to analyze: (i) how lockdown influences individual preferences for fairness and cooperation, and (ii) whether the perceived danger of the pandemic strengthens other-regarding concerns or exacerbates self-protection.

The paper develops as follows: Section 2 presents the experimental design; Section 3 reports our main results; Section 4 concludes.

\textbf{2. Experimental design}

The experiment was run between April 21 and April 29, 2020 with overall 106 participants from LUISS Guido Carli: 52 for the Public Good game (PG hereafter) and 54 for the Ultimatum game (UG hereafter).

In PG sessions participants repeatedly interact for 10 rounds, randomly assigned to groups of 4 with individual per-round endowment of 25 tokens (1 token = 1€) and MPCR equal to 0.5.
End-of-round feedback information includes aggregate contribution by other group members and own current and cumulative payoff. In addition to the show-up fee, participants receive 3% of the cumulative (across all rounds) payoff.

In UG sessions, participants, who are permanently assigned to either Proposer or Responder role, play an Ultimatum game repeatedly for nine rounds, preceded by a single-round Dictator game (DG hereafter) – to elicit fairness concerns in absence of punishment and strategic uncertainty – with 10 tokens (1 token = 1.5€) to be shared in each round. Participants are randomly paired to play first DG and then rematched in the initial round of UG, which is played with constant partner thereafter. End-of-round feedback information include Proposer and Responder decisions as well as current and cumulative payoff. In addition to the show-up fee, participants received 10% of the cumulative (across all rounds) payoff.

Participants are recruited via Orsee (Greiner, 2015) and invited via email to individual virtual cubicles in the Cisco Webex Meetings platform. They are monitored via webcam and can communicate with the experimenter (but not with each other) via chat or microphone. Instructions are distributed via Google Drive (with download disabled) and read aloud using a recorded audio file in order to preserve common awareness. Participants perform the required tasks on Veconlab and, at the end of the experiment, they fill a questionnaire on LimeSurvey. Payments are administered via Prolific, which guarantees anonymity since Prolific IDs are not associated with the identity of participants.

---

5 https://www.webex.com/index.html.
6 When recruited, participants were asked to accept the condition of being monitored (but not recorded) using a webcam.
7 https://www.google.com/drive.
8 http://veconlab.econ.virginia.edu/.
9 https://www.limesurvey.org/en/.
10 https://www.prolific.co/.
Average payment, including the show-up fee (6€), was 15.9€ for PG and 12.5€ for UG.

3. Lockdown evidence

Overall our results are in line with standard evidence from experimental literature. In PG average individual contribution across rounds amounts to 31.7% of per-round endowment, furthermore regression analysis shows both a (mild) end-game effect and conditional cooperation (see Andreoni, 1988 and Fischbacher et al., 2001).

In the single-round DG (see e.g. Camerer, 2003, and Engel, 2011), average Proposer demand amounts to 81.5% of the pie size, higher than in the nine rounds of the UG (57.65% of the pie size). Consistently with the literature (see, e.g., Harrison and McCabe, 1996, Güth and Kocher, 2014), the (focal) equal-sharing demand is modal (46% of all Proposer choices) across rounds and almost always accepted (98%). However, 21.13% of unequal, yet rather parsimonious, demands equal to six are rejected. Similarly, almost a third of demands equal to seven as well as to eight is rejected, although the latter rather ambitious demands are rare (2.47%).

To account for the effect of social distancing on individual fairness and cooperation, we consider three features of the lockdown: self-reported length (more or less than six weeks), number of housemates (at most one, two and more than two) and whether participants are spending the lockdown in their hometown or not (situation). Figs. 1 and 2 report mean contribution in PG and mean Proposer demand in UG, respectively, distinguishing by lockdown features.

Our first descriptive finding is that the self-reported length of experienced lockdown is associated with lower cooperation and fairness: on average participants choose smaller contribution in PG and larger Proposer demand in UG when they have been locked down for more than six weeks and these differences are statistically significant.

Our second descriptive finding is that mean contribution in PG does not vary significantly with the number of housemates, while mean Proposer demand in the UG decreases when there are at least three housemates. Since the difference is statistically

\[ \text{Average payment, including the show-up fee (6€), was 15.9€ for PG and 12.5€ for UG.} \]

\[ \text{3. Lockdown evidence} \]

\[ \text{Overall our results are in line with standard evidence from experimental literature. In PG average individual contribution across rounds amounts to 31.7% of per-round endowment, furthermore regression analysis shows both a (mild) end-game effect and conditional cooperation (see Andreoni, 1988 and Fischbacher et al., 2001).} \]

\[ \text{In the single-round DG (see e.g. Camerer, 2003, and Engel, 2011), average Proposer demand amounts to 81.5% of the pie size, higher than in the nine rounds of the UG (57.65% of the pie size). Consistently with the literature (see, e.g., Harrison and McCabe, 1996, Güth and Kocher, 2014), the (focal) equal-sharing demand is modal (46% of all Proposer choices) across rounds and almost always accepted (98%). However, 21.13% of unequal, yet rather parsimonious, demands equal to six are rejected. Similarly, almost a third of demands equal to seven as well as to eight is rejected, although the latter rather ambitious demands are rare (2.47%).} \]

\[ \text{To account for the effect of social distancing on individual fairness and cooperation, we consider three features of the lockdown: self-reported length (more or less than six weeks), number of housemates (at most one, two and more than two) and whether participants are spending the lockdown in their hometown or not (situation). Figs. 1 and 2 report mean contribution in PG and mean Proposer demand in UG, respectively, distinguishing by lockdown features.} \]

\[ \text{Our first descriptive finding is that the self-reported length of experienced lockdown is associated with lower cooperation and fairness: on average participants choose smaller contribution in PG and larger Proposer demand in UG when they have been locked down for more than six weeks and these differences are statistically significant.} \]

\[ \text{Our second descriptive finding is that mean contribution in PG does not vary significantly with the number of housemates, while mean Proposer demand in the UG decreases when there are at least three housemates. Since the difference is statistically} \]

\[ \text{significant, this might suggest that living in a socially richer environment promotes fairness and increases awareness of strategic uncertainty.} \]

\[ \text{Our third descriptive finding is that participants living away from their hometown during the lockdown on average choose larger contribution in the PG (and the difference with those living in their hometown is statistically significant) but also larger Proposer demand in UG, what might suggest that being far from the own social environment promotes cooperation with unknown others but also fosters more ambitious claims in sharing agreement.} \]

\[ \text{In the regression analysis we estimate separately the effect of the three lockdown features on individual contribution in PG (see Table 1) and Proposer demand in UG (see Table 2).} \]

\[ \text{13 Model (1) includes the number of housemates (with baseline category equal to “more than 2”), model (2) includes a dummy for the length of experienced lockdown (with baseline equal to 6 weeks or less), and model (3) includes a dummy which equals 1 when being away from hometown during the lockdown. For PG game choices we control also for previous round individual and mean group contribution and for UG choices also for previous round Proposer demands, Responder decision, and Proposer demand in the single-round DG. All specifications include demographic controls (gender, age, geographic area and a dummy for students in Economics), level of self-reported risk aversion and round dummies.} \]

\[ \text{Overall, the regression analysis confirms the descriptive findings regarding the features of experienced lockdown on participants’ choices. In the Public Good game, individual contribution is not significantly correlated with the number of housemates (see model 1 in Table 1), is significantly lower for participants locked down for more than 6 weeks (see model 2 in Table 1) and higher for subjects locked down away from their hometown (see model 3 in Table 1). In the Ultimatum game, a decrease in the number of housemates from three or more to two is associated with an increase in Proposer demand (see model 1 in Table 2).} \]

\[ \text{As expected, the difference between Proposer demand in DG and average (across rounds) Proposer demand in UG is statistically significant (p-value=0.000, paired t-test).} \]

11 Consistently with the literature, we use a two-nested level model (individual and group levels) for contributions and a random effect model for demands.

12 Demographic controls are not statistically significant. Full regression tables are available upon request.

13 Reducing further the housemates does not have a statistically significant effect.
participants locked down for more than six weeks choose higher demand (see model 2 in Table 2), likewise participants locked down away from their hometown (see model 3 in Table 2), this last effect being weakly significant.

In PG, all model specifications confirm conditional cooperation: higher group contribution in previous period has a positive and significant effect on own contribution in current round. The absence of sharp changes in individual contributions across rounds and the significant effect of previous round own contribution on the current one confirm intra-personal consistency. Self-reported risk-aversion is always significant and negatively correlated with contribution to the public good, what might suggest that more risk-averse participants tend to self-insure against strategic uncertainty.

Table 2 shows in UG internal consistency of Proposerdemands and a (positive and significant) effect of Responder acceptance in round \( t - 1 \) on Proposer demands in \( t \). Self-reported risk aversion has a significantly negative effect on Proposer demand, suggesting that more risk-averse subjects are concerned that ambitious demands can be perceived as unfair by Responders and therefore rejected.

4. Conclusions

Our lablike experimental data suggest that attitudes toward fairness and cooperation are correlated with the circumstances in which participants spent the lockdown. Specifically, they are more cooperative and more selfish when isolation is stronger, in particular when spending the lockdown away from their hometown. However, cooperation decreases, while selfishness increases, when the lockdown becomes longer.

This evidence suggests that the costs of “social distancing”, represented by the reduction of social interaction experienced during the lockdown, could be mitigated by increasing “social embeddedness”, i.e. the possibility to cope with the background risk of the epidemic event in a “comfort zone”.

Acknowledgement

This work was funded by LUISS ‘Guido Carli’ University.

References

Andreoni, J., 1988. Why free ride?: Strategies and learning in public goods experiments. J. Public Econ. 37 (3), 291–304.
Camerer, C., 2003. Behavioral Game Theory. Experiments in Strategic Interaction. Princeton University Press, Princeton, New Jersey.
Engel, C., 2011. Dictator games: a meta study. Exp. Econ. 14, 583–610.
Fischbacher, U., Gächter, S., Fehr, E., 2001. Are people conditionally cooperative? Evidence from a public goods experiment. Econom. Lett. 71 (3), 397–404.
Greiner, B., 2015. Subject pool recruitment procedures: organizing experiments with or see. J. Econ. Sci. Assoc. 1 (1), 114–125.
Güth, W., Kocher, M., 2014. More than thirty years of ultimatum bargaining experiments: Motives, variations, and a survey of the recent literature. J. Econ. Behav. Organ. 108 (C), 396–409.
Harrison, G., McCabe, K., 1996. Expectations and fairness in a simple bargaining experiment. Internat. J. Game Theory 25 (3), 303–327.