We are in this together: Climate negotiations under a heterogeneous impact of climate change

Erasmus University Rotterdam

MSc thesis program Business Economics- Behavioral Economics

Douwe Epema
547949

Aurelien Baillon

Abstract

This thesis studied whether heterogeneous environmental impact has an impact on climate negotiations. This is done by means of an experimental research design deploying a public goods game. While climate negotiations have been studied on a number of occasions with an experimental design, it has not been done before with allowing for a heterogeneous climate impact in case of unsuccessful negotiations. However, it is argued by the literature that the impact of climate change is heterogeneous across countries due to differences in institutions to mitigate the impact of climate change and geographical factors. The aim of this research is to study the effect of a heterogeneous impact on different parties of a negotiation on the outcome of the negotiation. The experimental design led to the following results: (1) there is no difference in contributions under heterogeneous impact of climate change and (2) there is weak support for an effect on signaling under heterogenous impact of climate change. These finding are interesting since it means that a heterogeneous impact of climate change should not affect climate negotiations.

Keywords: public goods game, experimental design climate negotiation & heterogeneity

Table of contents

1. Introduction

Climate change is widely recognized as one of the major challenges of the 21st century. It poses a significant threat not only to the global economy, but also to human life (Jamet & Corfee-Morlot, 2009). To address this threat, negotiations involving most countries in the world have been held over the past few decades. After a number of disappointing negotiations, the 2015 climate agreement is regarded as a breakthrough in climate negotiations. However, even with this 'breakthrough' experts still doubt whether the promised reductions are enough to stay below the 2 degrees Celsius increase in temperature, which is set as a target (Rogelj et al, 2016). To make matters worse the yearly global CO2 emissions have been increasing in the years after the agreement (Dimitrov et al, 2019; Our World Data, 2023). Only in 2020 the CO2 emissions decreased on a global level, but this is mostly due to the covid-19 crisis (Saadat, Rawtani & Hussain, 2020; Ritchie & Roser, 2020). This increase can either be the result of countries deviating from the promised CO2 reductions or of the promised reductions being too low.

There are many reasons why climate change is a difficult problem to tackle (Dietz, Ostrom & Stern 2003; Gardiner, 2006; Wagner & Weitzman, 2016). However, this paper will focus specifically on climate negotiations through a behavioral economic scope. It will analyze the effect of a heterogeneous climate impact on the success of climate negotiations with the use of an experimental design deploying a public goods game. The public goods paradigm has been, on many occasions, applied to analyze climate negotiations (Barret & Dannenberg, 2012; Barret & Dannenberg 2014; Barret & Dannenberg, 2016; Tavoni, Dannenberg, Kallis and Löschel, 2011; Milinski et al., 2008).

When studying climate negotiations by deploying a threshold public goods game, in which case a threshold means that a certain minimum must be reached by shared contributions to the public good. It is found that cooperation most of the times does not collapse. The players have a shared interest and are equally capable to deal with it (Barret & Dannenberg, 2016). But when adding inequality, by means of differentiating the endowments, the chance of success decreases. The players with a higher endowment, the rich countries, have to voluntarily contribute more (Tavoni, Dannenberg, Kallis & Löschel, 2011). While the effect of inequality of endowments on climate change negotiations has been studied with the use of the public goods paradigm, the effect of a differentiated impact of climate change on countries has not. But, the unequal effect of climate change on the economies of different countries has been recognized by multiple studies (Mendelsohn,

Morrison, Schlesinger & Andronova, 2000; Fankhauser & McDermott, 2014). Strong institutions improve both income of a country and the ability to mitigate climate disasters. Hence rich countries do not only have a higher endowment going into climate negotiations, but can also mitigate the effect of climate disasters at a lower cost (Fankhauser & McDermott, 2014; Easterly and Levine, 2003). While geography does play a role, the effect of institutions are suggested to have a greater impact on the ability to mitigate climate change (Easterly and Levine, 2003).

2. Objective & Research question

This research aims to investigate the effect of a heterogeneous impact of climate change on various countries on the successfulness of climate negotiations aimed at mitigating the effects of climate change. Since studying real countries and real negotiations is beyond the capabilities of the time and resources of this thesis an experimental design is used to simulate a negotiation and the research sample is the social network of the researcher. The main research question to attain this goal is:

How does a heterogeneous impact on different parties of a negotiation affect the negotiation outcome?

3. Literature review

The experimental method of the public goods game has been widely applied to analyze climate change negotiations. In 2008, Milinski et al. employed the method to study whether a group of participants would reach a certain threshold through individual contributions. Each participant started off with an endowment of which they could contribute money from to a 'public good'. At the end of the game the players could take home what was left of their endowment. However, when they failed to reach the threshold all players would lose their entire endowment with a specified probability. They found that under a high probability of losing the endowment, half of the groups would reach the threshold. While, only very few groups succeed when the risk was lower. The possible loss of their endowments is framed as being the result of a 'climate crisis'.

In 2011 Tavoni, Dannenberg, Kallis and Löschel designed a public goods game similar to that of Milinski et al. 2008. However, they allowed for communication, distributed the endowments unevenly and the probability of the participants losing their endowments was equal across all games. They found that inequality reduced the prospects of reaching the target. But, allowing for communication increased the chance of success. Most of the

successful groups, eliminated inequality due to the rich participants signaling their willingness to redistribute their endowment.

Another public goods game, designed by Barret and Dannenberg (2012), allowed for an uncertain threshold and impact. Under the treatment, the impact and threshold values were chosen by "nature". They found that an uncertain impact led to a higher degree of cooperation. But, when the threshold was uncertain it is more likely for the cooperation to collapse. A similar model designed by Barret Dannenberg (2014) studied the behavior of the participants under an uncertain threshold compared to no threshold. This study found, in contrast to the study by Barret and Dannenberg (2012), that an uncertain threshold results in larger contributions by the participants. Hence, a greater willingness to cooperate.

Yet another study by Barret and Dannenberg (2016) deploying the public goods game analyzed the effect of "pledge and review" as a treatment. In this design the group of participants was allowed to set a target themselves. The group did this by doing proposals of what they intended contribute, the median of these proposals was chosen as the groups target. The groups could then grade the proposals of their peers, note that bad grades did not come with consequences. After setting the target and the grading of peers, the group pledged what they, after now knowing the target, intended to contribute. Both pledges and targets are non-binding. After the target was set and pledges were made the players would contribute in two subsequent rounds. The results shows that the review system mostly affects targets and pledges and very marginally the actual contributions.

The studies analyzing the public goods game have differentiated many factors to get a better understanding of climate change negotiations. To add to the existing literature this paper tries to explore the effect of a differentiated impact of climate change among the participants. This means that, in case the threshold of the game is not attained, half of the participants will lose a greater part of their endowment than the other half.

The studies outlined above have aimed to shed light on the various factors that could influence climate change negotiations. However, the effect of a differentiated impact of climate change across countries has not yet been studied with the public goods game. Meanwhile, the existence of a heterogeneous impact of climate change is recognized by a wide variety of scientific literature. This is mostly suggested to either be the result of strong and weak institutions of countries or due to geography (Fankhauser & McDermott, 2014; Easterly and Levine, 2003; Mendelson et al. 2000). The paper by Mendelson et al.

(2000) designed a model to calculate climate impact per continent. They found that the damage of climate change can have a different net negative effect on continents and that some continents can even experience a positive effect. A paper by Fankhauser and McDermott (2014) stated that poor countries will suffer more from climate change due to a lack of institutions to adapt to it.

The countries that climate change might pose the biggest threat are the small islands developing states, since it poses an existential threat. These countries have played an important role on the international stage to raise awareness about climate change. They have also had a great influence, regarding their size relatively to other countries, on the Paris agreement actually entering into force (Ourbak and Magnan, 2018). While rich countries who have reeked the benefits of historically producing a lot of GHG and are more resilient to climate change due to their institutions, have refused compensation to vulnerable countries in case of a climate emergency (Wyns, 2022). So vulnerable countries seem to be more willing to cooperate compared to resilient countries.

To add to the existing literature this paper will analyze the effect of a heterogeneous impact of climate change on 'climate mitigating negotiations'. I expect that cooperation is more likely to collapse due to a reduced incentive for the low impact players to cooperate. This leads to the construction of the hypothesis found below.

Hypothesis:

A differentiated impact of climate change determined by nature reduces the contributions made by the participants

4. Methods

This research followed an experimental design which was performed by means of two surveys. Running the experiment by means of surveys instead of doing it live at a location was chosen due to restrictions and uncertainties caused by the pandemic. The first survey contained the seed game which was used to collect data for the main game which in its turn was played in the second survey. Note that because the data was collected by means of a survey the data was not collected simultaneously as would normally be the case with an experimental design. To still allow for negotiations a seed game was needed.

The method section includes the following subsections: the main game will be explained in subsection 4.1, the seed game in subsection 4.2, the sample in subsection 4.3 and the

analysis and variables in subsection 4.4. To clarify the games and interaction between them, figure 1 can be found in the subsection 4.1.2 which illustrates the flow of the games.

4.1.   The main game

4.1.1. Design of the main game

In this section, the design of the main game will be discussed in detail. The analysis was based on a laboratory experiment of a game played by 10 players. In both the control game and the treatment all players had an endowment of 100 coins. The leftover endowment at the end of the game did not translate into anything of value in the real world, due to financial constraints. However, a narrative was created to make the participants act a bit more realistically to create a bit of a feel for what the game resembled. This narrative can be found in appendix 1.

Table 1: the impact of the control game and the treatment for both the main and seed game

Game 1: Control	Game 2: Treatment
Equal impact of a climate disaster	Differentiated impact of a climate disaster
All players lose 50 % of their endowment	*5 players lose 25% of their endowment (high impact players) and 5 players lose 75 % of their endowment (low impact players)*

In both the control and treatment game the players could decide how much of their endowment they wanted to contribute to prevent a climate disaster. A threshold was set of a value of 400 coins, if the players did not reach this threshold with their cumulative investments a climate crisis would prevail. This threshold was set to simulate the 2 degrees target set for the Paris agreement (Rogelj et al, 2016). The impact of a "climate crisis" is differentiated among the two games, as can be observed in table 1. In the control game all players lost 50 percent of their endowments in case the threshold was not attained with their cumulative investments. In the treatment, half of the players lost 75 percent of their endowment and the other half lost 25 percent of their endowment in case the threshold was not attained.

In both games the percentage of the endowment lost was calculated after the contributions were made. So if an individual playing in the control game contributed 60 coins and the threshold is not attained this player will lose 75 percent of 40 coins which is 30. Hence the player will be left with an endowment of 10 coins. Also, the games will be played in a

randomized order to avoid order effects and the roles, whether a player is a low or high impact player, are randomly distributed as well.

4.1.2. Phases of the main game

Each participant of the main game had to go through 6 phases of the game, these phases will be explained below. Figure 1 illustrates the flow of both the seed and main game. The numbers in the shape show which phase of the game it is.

Figure 1: this diagram illustrates the flow of the flow the surveys
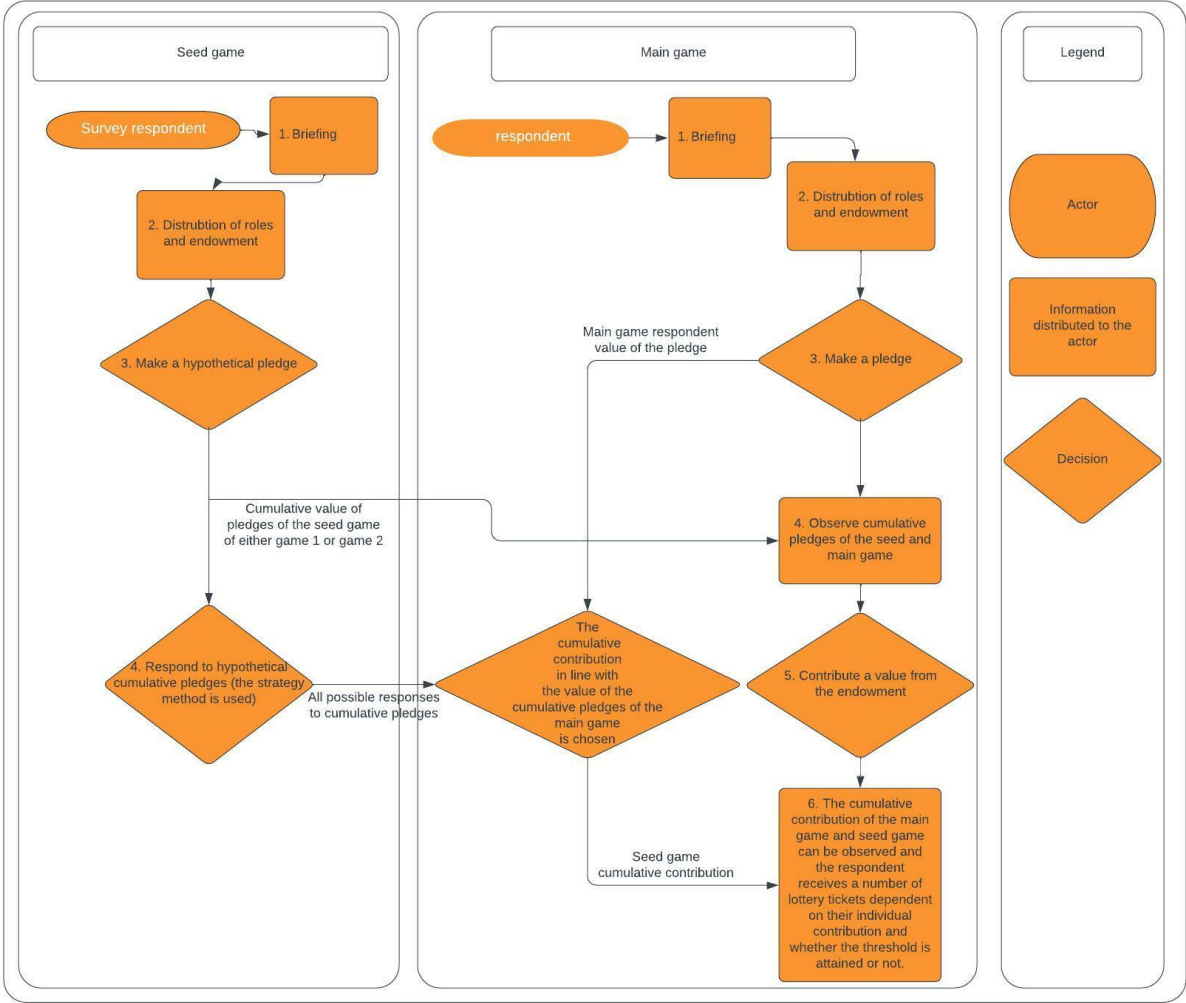
Phase 1 Briefing: The participant got briefed on the rules and aim of the game that was played. Each player played both the control and the treatment game in an order randomized by Qualtrics. After they got briefed on which game they were playing they were tested on their knowledge. A hypothetical scenario was sketched in which they represent a country which participates in a climate negotiation. They were also informed that the survey is anonymous. The full information of the briefing can be found in appendix 2.

Phase 2 Distribution of roles and endowment: The player received his or her role and their endowment of 100 coins. In the treatment game the player received the role of a low or high impact country.

Phase 3 Negotiation: The player could pledge an amount that they were willing to contribute as a form of negotiation. Note, that the player did not have to contribute this amount.

Phase 4 observe pledges: The player observed an amount that represented the cumulative amount of the pledges. This amount was the cumulative value of the pledges of the seed game, in response to their pledge, and their own pledge.

Phase 5 choose investment: The player chose and contributed an amount of virtual coins.

Phase 6 outcome and debriefing: The player observed whether the threshold was reached or not and with this whether they were successful in preventing the climate crisis. They were also informed that they finished the experiment.

As stated earlier to allow for negotiation data needs to be collected beforehand. This is done by means of the seed game which will be explained below.

4.2. The seed game

4.2.1. Design of the seed game

Collecting the data with a survey comes with the constraint that the participants do not play the game simultaneously. As a result of this, the participant cannot negotiate with other participants playing the main game. To still allow for negotiation a seed game was created which deployed the 'strategy method'. This was a hypothetical game to collect data of hypothetical pledges and responses to hypothetical cumulative pledges, the collected data was used in the main game. So the players of the seed game first stated the value they would pledge and then chose their responses to an interval of possible cumulative pledges. With this information the 'players' were created that played with the participant of the main game. So, the participant of the main game were injected in a game in which the response to all possible pledges that he or she could make are predetermined by the data collected with the seed game. The data that flows from the seed game to the main game and at which points it flows from one to the other can be observed in figure 1.

The following example further clarifies this:

The threshold set for the games, both the seed game and main game, is 400. The cumulative value of the pledges of the seed game is 350 and the player of the main game pledged a value of 30, note that this player did not know the value of the other pledges before pledging. So the sum pledges of the seed game and main game is 380. The players of the seed game all gave a hypothetical response to all possible cumulative pledges, hence also to a cumulative pledge value of approximately 380. This hypothetical response will now be used as a response in the main game to the cumulative value of the pledges. Besides that, the participant of the main game also responds to the cumulative pledges. The sum of the hypothetical responses from the seed game and the response of the main game participant results in the cumulative contribution.

The seed game has the same set up and explanation as the main game and also follows the same control and treatment that can be observed in table 1. There is only one difference, instead of responding with a contribution to one cumulative pledge that is observed. The players respond with a contribution to a range of possible cumulative pledges. Hence, the strategy method was deployed here to collect the data.

4.2.2. Phases of the seed game

The seed game only had 4 phases as can be observed in figure 1. These phases will be elaborated upon in this section.

Phase 1 Briefing: The participant got briefed on the rules and aim of the game that would be played. Each player played both the control and the treatment game in an order randomized by Qualtrics. A hypothetical scenario was sketched in which they represent a country which participates in a climate negotiation. After they got briefed on which game they were playing they were tested on their knowledge. They were also informed that the survey is anonymous. The briefing can be found in appendix 1. Unlike the main game, this game is hypothetical and they will not know the outcome of the negotiations since there is none. They were fully informed of this fact.

Phase 2 Distribution of roles and endowment: Depending on whether data was collected for the control or treatment main game the roles were be distributed. Also, the players were informed of their endowment.

Phase 3 Hypothetical negotiation: The player made a hypothetical pledge which they would be willing to contribute if they had actually played the game.

Phase 4 Choose hypothetical contribution: The player made a contribution in response to all the cumulative pledges possible. The range of coins which they respond with to each cumulative pledge is 0-100. The cumulative pledges shown will be given in intervals, these intervals become larger when the amount is unlikelier. This was done to limit the number responses each player had to give.

Phase 5 debriefing: They were thanked for their participation and informed that they finished the experiment.

4.3. Sample

The data collection method was a survey for both the seed game and main game, the data was collected over the spring of 2022 and it was collected from the social network and connections of the social network of the researcher. There were no exemptions from participation in the experiment. However, data was collected on the understanding of the game that they were playing to be able to exclude people who lacked understanding. The seed game counted 35 responses and the main game 75. For the seed game 14 of the observations were dropped leading to 21 observations and for the main game 35 observations were dropped leading to 40 observations. The result section 5.1. will further elaborate on why these observations were dropped.

According to the G power calculator, putting in the Wilcoxon matched pairs test, a sample size of 57 was at least needed. Unfortunately this was not reached after dropping observations since it was hard to find people willing to fill in the survey and an already large amount of time was put into finding the number of respondents whom are now used.

Demographics were excluded from the survey to shorten the survey and only keep the essential questions. The mean time spent on the survey was extraordinarily high since it recorded the time from start to finish and it was possible to stop and continue at a later moment. This resulted in some people taking multiple days. So I will use the median time spent on it. The median time needed for the seed game was 15 minutes and 12 seconds and for the main game it was 8 minutes and 50 seconds. Hence, this is quite a long time for a survey without a reward so the demographics were cut out of it to make it more appealing to participate.

4.4 analysis and variables

The main dependent variables to do the analysis with are the contributions and pledges which are treated as continuous variables in the analysis. The main independent variables are the dummy variables which state whether it is the control or the treatment

for both the seed and main game. The tests that will be used compares the mean of the pledges and the mean of the contributions of the control and treatment game of both the seed and main game. The tests that will be used are the Wilcoxon test matched pair test and the Cohen's D test. They both compare the mean differences of two paired groups. The Wilcoxon test is a signed ranked test and with the Cohen's D test the difference in means is divided by the standard deviation. Since each player has played both the control and the treatment game it is a within-subject analysis.

5. Results

The result section shows the results of both the seed game and main-game. This only shows the data after dropping some of the observations. Observations were dropped for the following reasons: (1) having insufficiently finished the survey, which is the case when less than one entire game is finished, and (2) a low self-reported understanding in combination with a bad score on the test of their knowledge. For the main game 32 observations were dropped for the first (1) reason and 3 observations were dropped for the second (2) reason. For the seed game 14 observations were dropped for the first (1) reason and none for the second (2).

5.1.1. Participants

The illustrations below illustrate the number and the flow of the participants for the seed game, on the left, and the main game, on the right. There is an arrow going from control to one of the two treatments and the other way around since the order in which they play the game was randomized. The seed game had a total of 21 participants who all played the control game. The division between the treatments is skewed towards the 'treatment low impact' while the program evenly divides participants. This is the result of dropped observations. The main game has a total of 40 participants, who a played the control game. The division is slightly skewed to the 'treatment low impact'. Also, one participant stopped after finishing the control game.

Figure 2: seed game and the number of participants of the control game and the treatments
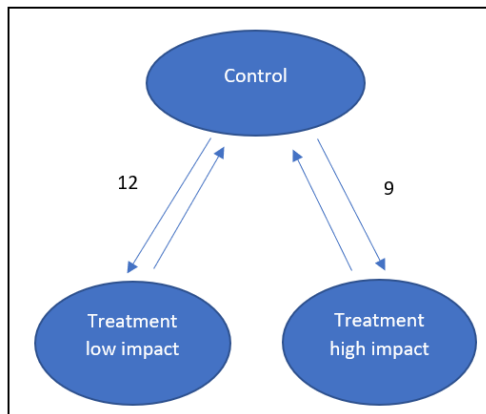
Figure 3: main game and the number of participants of the control game and the treatments
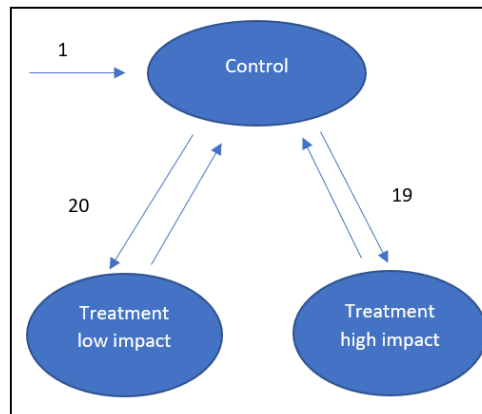
5.1.2. Self-reported understanding

The participants of both the seed and main game, self-reported their understanding of the game after the explanation. This data was collected to be able to judge the quality of the response and be able to filter out 'bad' responses. The tables 2 shows the self-reported understanding of the participants of the seed game. After dropping observations the participants of the seed game all have a self-reported understanding of 'neutral', 'good' or 'excellent'. In general, the individuals with a self-reported understanding below "neutral" were dropped.

Table 2: The self-reported understanding of the participants of the seed game

	Seed game					
	Self-reported understanding of the seed game					
	No understanding at all	Poor understanding	Neutral understanding	Good understanding	Excellent understanding	Sum
Control	0	0	1	15	5	21
Treatment LI	0	0	3	7	2	12
Treatment HI	0	0	1	5	3	9

Treatment LI= treatment low impact, treatment HI= treatment high impact

Table 3 shows the self-reported understanding of the participants of the main game. After dropping observations the participants of the main game all have a self-reported understanding of 'poor', 'neutral', 'good' or 'excellent'. The observations for which a poor

self-reported understanding was recorded did score well, average or above average, on the tested understanding so they were kept in.

Table 3: The self-reported understanding of the participants of the main game

	Main game					
	Self-reported understanding of the main game					
	No understanding at all	Poor understanding	Neutral understanding	Good understanding	Excellent understanding	Sum
Control	0	1	4	15	20	40
Treatment LI	0	0	2	10	8	20
Treatment HI	0	1	1	8	9	19

Treatment LI= treatment low impact, treatment HI= treatment high impact

5.1.3. Tested understanding

The tables 4 & 5 show the success in answering the control questions for the seed game and main game respectively. The questions can be found in appendix 1 & 2 These control questions quizzed the participants on their knowledge of the game they would be playing after they had read the instructions. This could be used in combination with the self-reported understanding, time spent on the survey and the answers given to the main questions to judge whether the observation would be kept in. Note that for the seed game, table 4, the 'treatment high 3' control question has a very low number of right responses. This is mainly due to an error in the question that was only fixed after some responses had already been given. The other questions had a high percentage of correct answers.

Table 4: The number of right and wrong answers to the control questions of the seed game

Seed game			
Game	Right answers	Wrong answers	~Percentage right answer
Control 1	18	3	86%
Control 2	20	1	95%
Control 3	16	5	76%
Treatment low 1	8	1	89%
Treatment low 2	8	1	89%
Treatment low 3	7	2	78%
Treatment high 1	10	2	83%
Treatment high 2	12	0	100%
Treatment high 3	5	7	42%

The first column states to which game and for the treatment to which role in the game the control questions related: the control game, treatment low impact or treatment high impact.

In the main game, table 5, the understanding of the questions 'treatment low 3 and 4' are poor. The reason for this poor understanding is unknown. The other questions have a high percentage of correct answers.

Table 5: The number of right and wrong answers to the control questions of the main game

Main game			
Game	Right answer	Wrong answer	~Percentage right answer
Control 1	37	3	93%
Control 2	37	3	93%
Control 3	34	6	85%
Treatment low 1	13	7	65%
Treatment low 2	20	0	100%
Treatment low 3	12	8	60%
Treatment high 1	17	2	89%
Treatment high 2	19	0	100%
Treatment high 3	17	2	89%

The first column states to which game and for the treatment to which role in the game the control questions related: the control game, treatment low impact or treatment high impact.

5.1.4. Summary statistics

In this section the summary statistics of the seed game and the main game can be observed, in table 6 & 7.

In table 6, the summary statistics of the seed game can be observed. The pledges of the control and the two treatments are approximately the same as can be observed in part 1 of the table.

The contributions, as can be observed in part 4, 5 and 6 of the table, increase at first when the cumulative pledges increase but decrease after the cumulative pledges are higher than 350 coins, this is true for all three rounds. This means that willingness to cooperate is low when the other players signal low willingness to cooperate and that free riding increases when the other players signal a high willingness to cooperate. The highest mean contribution is found in the high impact (HI) rounds and the lowest in the low impact rounds. This would indicate that the HI players are most willing to cooperate. Interestingly enough the control has the highest mean when the average is taken of the contributions, part 2 and 3 of the table. This would indicate that in case of an equal impact the players would be most willing to cooperate. Whether this result is significant will be tested later in this chapter. Part 3 of the table shows the mean contributions when only the responses to the pledges of 400-500. This is done to make it easier to compare it to the main game in which the players only response to that ratio.

After this point part 1 and 3 of table 6 will be used for the analysis since this makes it easier to compare the results of the seed game and the main game.

Table 6: Summary statistics of the seed game

Seed Game					
	Mean	SD	Min	Max	Skew
1. Pledges:					
Control	43.19	9.23	25	60	1.31
High impact	43.89	15.57	15	60	-.61
Low impact	42.83	12.13	20	60	-.23
Treatment (HI + LI)	43.29	13.35	15	60	-.49
2. Average contribution as response to pledges					
Control	31.91	12.45	11	56.6	0.29
High impact	29.51	11.39	6	43.2	-.71
Low impact	28.47	12.65	13	48	0.13
3. Average contribution response to a pledge of 400-500					
Control	38.84	14.71	4	77	-.06
High impact	37.64	19.91	4	76	0.31
Low impact	37.26	16.68	3	57	-.72

	Mean	SD	Min	Max	
Treatment	37.47	18.05	3	77	-.02

4. Control group response contribution to pledged coins:

	Mean	SD	Min	Max	
50	10.43	17.82	0	50	1.31
200	18.43	28.21	0	100	1.34
300	41.86	34.13	0	100	0.26
350	50.38	9.58	32	80	0.90
400	41.00	14.38	3	80	-.08
450	38.29	15.04	5	81	0.38
500	36.33	18.03	0	69	-.73
600	32.33	18.37	0	61	-.52
700	30.29	19.67	0	65	-.08
850	27.30	19.03	0	65	0.10

5. Treatment high impact response contribution to pledged coins:

	Mean	SD	Min	Max	
50	0.00	0.00	0	0	-
200	12.22	22.10	0	65	1.43
300	33.56	33.80	0	100	0.57
350	51.78	12.64	25	70	-.57
400	39.78	16.56	10	65	-.36
450	37.44	17.64	0	60	-.88
500	34.56	16.97	0	55	-.71
600	29.89	15.50	0	45	-.60
700	28.89	16.73	0	50	-.36
850	27.00	16.42	0	50	-.25

6. Treatment low impact response contribution to pledged coins:

	Mean	SD	Min	Max	
50	7.00	14.72	0	40	1.45
200	12.09	17.06	0	50	1.01
300	29.91	28.71	0	100	1.02
350	44.36	19.94	0	80	-.47
400	40.27	17.61	11	80	0.54
450	37.55	21.03	0	80	0.12
500	35.09	23.77	0	80	0.28
600	27.00	22.02	0	60	0.05
700	26.55	21.01	0	55	-.09
850	24.91	20.71	0	55	0.05

Table 7 shows the summary statistics of the main game. In this game the pledge and the contributions have the highest mean in the high impact game and the low impact rounds the lowest. The mean of the low impact and high impact game combined are lower than the mean of the control game. This would mean that in case of an equal impact the players would be most willing to cooperate.

Table 7: summary statistics of the main game

	Main Game					
	n	Mean	SD	Min	Max	Skew
1. Pledges:						
Control	40	44.25	15.67	0	82	-0.49
High impact	19	59.89	59.89	20	100	-0.12
Low impact	20	39.30	21.94	5	100	1.03
Pledge treatment (HI+LI)	39	49.33	21.91	5	100	0.22
2. Control group contributions in response to pledge of:						
400	4	17.50	12.58	0	30	-0.42
450	35	47.40	13.00	0	75	-0.92
500	1	80	-	80	80	-
3. High impact group contributions in response to pledge of:						
400	1	20	-	20	20	-
450	17	53.24	14.61	10	75	-1.24
500	1	74	-	74	74	-
4. Low impact group contributions in response to pledge of:						
400	18	36.61	18.48	0	70	-0.52
450	2	60.50	28.99	40	81	0.00
5. Contributions combined:						
All control	40	45.23	16.54	0	80	-0.66
All low impact	19	39.11	16.57	10	75	-0.18
All high impact	19	52.58	20.64	0	81	-0.97
Contribution treatment (HI+LI)	38	45.84	19.68	0	81	-0.58

From this point onwards part 1 and 5 of table 7 will be used for the analysis. This is done because there is a lack of responses to some of the cumulative pledges, as can be observed in parts 2, 3 and 4, to be analyzed and compared. So this solved by combining the results.

5.1.5. Plots of the pledges and contributions

Figure 4 shows the plot of the pledges of the treatment and control of the main game. The color of the dots determine whether the observation is from the low or high impact treatment, light blue is low impact and dark blue is high impact, this is the same in all plots. This plot is more clustered than it is linear.

Figure 4: this plot illustrates the pledges of the control and treatment of the seed game
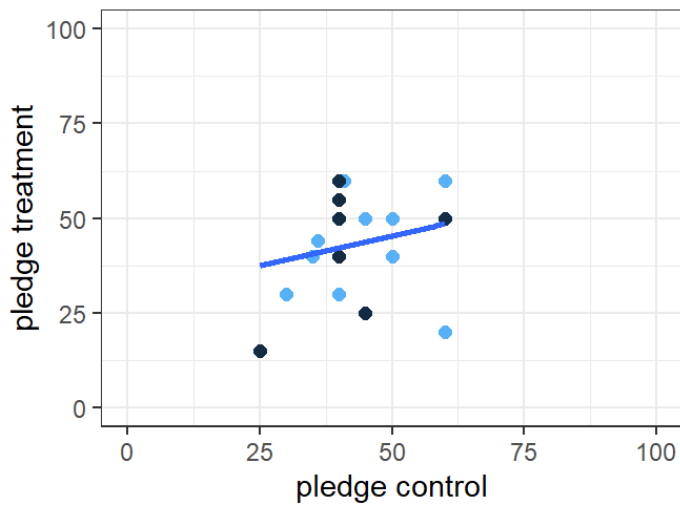
Light blue dot=low impact treatment & dark blue dot=high impact treatment

Figure 5 shows the contributions of the control and treatment of the seed game. It shows a more linear trend than the pledges. However, this is mainly due to two outliers in the low impact group. Without these observations it would be quite clustered as well.

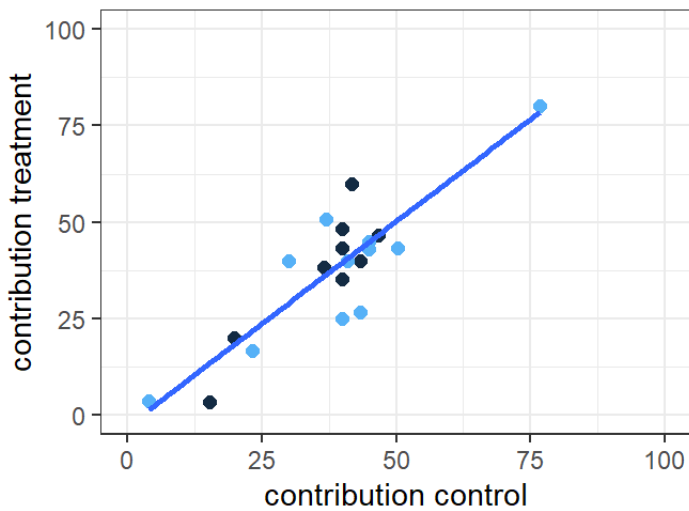*Figure 5: this plot illustrates the contributions of the control and treatment of the seed game*

Light blue dot=low impact treatment & dark blue dot=high impact treatment

Figure 6 shows the pledge of the control rounds, on the x-axis, against the pledge of the treatment, on the y axis of the main game. The pledges are far more scattered and linear than that of the pledges of the seed game.

Figure 7 plots the contribution of the control rounds, on the x-axis, against the contribution of the treatment, on the y-axis. Again the plot is fairly linear. We can observe that the linear line is flatter compared to the pledges. This indicates that contributions of the treatment are more clustered than that of the pledges of the treatment. Compared to the contributions of the seed game it shows a far flatter trend line and more clustered contributions.

Figure 7: this plot illustrates the contributions of the control and treatment of the main game
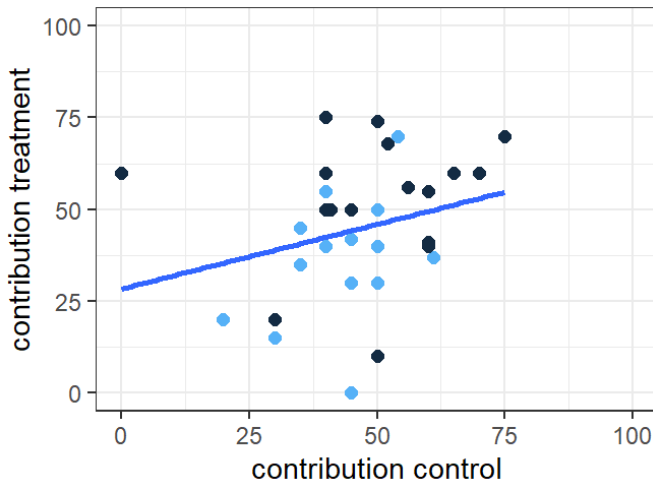
5.2.   Statistical tests

This section includes the results of the statistical to test whether the variables follow a normal distribution and the Wilcoxon and Cohen's D test to test for a difference of the means.

5.2.1. Normal distribution

To test whether the main variables for the analysis follow a normal distribution the Shapiro-wilk test will be used.

Table 8: seed game Shapiro-Wilk test for normality

Shapiro-Wilk test seed game			
	Calc W	P-value	Null-hypothesis of normality
Pledge control	0.91	0.01	Rejected
Contribution control	0.90148	0.04	Rejected
Pledge all treatment	0.92	0.11	Accepted
Contribution all treatment	0.94	0.27	Accepted

Table 9: main game Shapiro-Wilk test for normality

Shapiro-Wilk test main game			
	Calc W	P-value	Null-hypothesis of normality
Pledge control	0.90	0.00	Rejected
Contribution control	0.94	0.03	Rejected
Pledge all treatment	0.98	0.63	Accepted
Contribution all treatment	0.95	0.09	Accepted

The Wilcoxon and Cohen's D statistical tests will be used for the seed game and the main game to compare the variables since both variables of the control group do not follow a normal distribution. The null hypothesis of normality is rejected for the control variables in both the seed and main game as can be observed in table 8 and 9. This outcome was likely to prevail since the merged variables are more likely to be normally distributed and the control to be clustered.

5.2.2. Wilcoxon test

The null hypothesis states that the median difference between pairs of observations is zero. Hence, the alternative hypothesis states that the median difference between pairs of observations is not zero.

As can be observed tables 10 and 11 the null hypothesis of zero mean difference between the pairs is not rejected. This means that there is no significant difference between the means of the control pledge and treatment pledge and the control contribution and treatment contribution of the seed and main game. and this would imply that there should be no difference in how successful negotiations are when a heterogeneous climate impact is compared to a homogeneous climate impact.

Table 10: seed game Wilcoxon test for a difference of the mean of variables

	Wilcoxon test		
	Estimate	P-value	Null hypothesis
Control and treatment pledge	-4.979477e-05	0.72	Accepted
Control and treatment contribution	6.942285e-05	0.91	Accepted

Table 11: main game Wilcoxon test for a difference of the mean of variables

	Wilcoxon test		
	Estimate	P-value	Null hypothesis
Control and treatment pledge	-4.999955e-05	0.34	Accepted
Control and treatment contribution	-1.038596e-05	0.82	Accepted

5.2.3. Cohen's D

To double check for whether there is an effect the Cohen's D test will also be deployed to analyze whether there is a difference between the means pledges and contributions of the control and treatment.

In table 12 we can observe that in the seed game both the differences of the means of the pledges and of contributions are both negligible. This implies that that a heterogeneous effect of climate change does not impact climate negotiation in a significant way.

In table 13 we can observe that in the main game the differences between the means are approximately the same. Only for the pledges a small difference of the means of the control and treatment can be found. This means that the signaling can be slightly affected by a heterogeneous effect of climate change. However, the difference between the contributions are negligible again. Meaning that the outcome will not be affected.

Table 12: seed game Cohen's D testing for a difference of the mean of variables

	Cohen's D		
	Upper	Lower	Effect
Mean difference pledges	-0.63	0.62	Negligible
Mean difference contributions	-0.57	0.70	Negligible

Table 13: main game Cohen's D testing for a difference of the mean of variables

	Cohen's D		
	Upper	Lower	Effect
Mean difference pledges	-0.72	0.18	small
Mean difference contributions	-0.43	0.48	negligible

6. Discussion

This paper found that a heterogeneous climate impact does not significantly impact the outcome of climate negotiations. Only the Cohen's D, not the Wilcoxon test, test found a small effect on mean differences of the pledges when the homogeneous and heterogeneous impact were compared. But the actual contribution was not found to have significantly different means. This means that at the most the signaling of the players might be affected. The difference in signals was only supported by the Cohen's D test and not by the Wilcoxon test, so the support for this statement is weak.

However, the statistical power of this study is low due to the small sample size. It could be the case that a significant effect, or larger effect in case of the Cohen's D for the pledges, is found when the sample size is increased. But I do not deem this as a very likely scenario because the summary statistics show that the mean pledges and contributions of the control and treatment game of both the seed and main game are quite close together. Besides that, the contributions do not move in one consistent direction. In case of the main game the mean contribution is higher for the treatment than the control group and in case of the seed game this is the other way around.

This means that a difference in impact of a climate disaster on the wealth of countries does not, or at the most at a neglectable level, reduce cooperation in climate negotiations. This is a positive outcome since it implies that the successfulness of climate negotiations are not hindered by unavoidable differences in the severity of impact. Compared to the literature it is interesting that inequality of endowments does result in lower cooperation, but an inequality of effect unsuccessful cooperation, introduced by this study, does not result in lower cooperation.

However, the results might not apply to the real world since this study used an experimental research design. The incentives of the representatives of the countries involved in climate negotiations are most probably different than the incentives in this experiment. In this study ordinary people participated who represented the representatives taking part in real climate negotiations. Another limitation is that no real money was used in this experiment to incentivize the participants to act in a realistic manner. Also, the sample was small in size. Besides that, no questions relating to demographics were asked in the survey which makes it harder find confounding variables. This was not included to shorten the survey and reduce the amount of people quitting due to the survey being too long. The last limitation is that most of the respondents in the main game control group and treatment high impact responded to a cumulative pledge of

450, while most of the respondents in the main game treatment low impact responded to a cumulative pledge of 400. This could affect the responses and makes them less comparable. In hindsight it would have been better to show them all the same cumulative pledge and not let it depend on their own actions or solely depend on the experiment with the strategy method.

To gain further knowledge on the topic I would recommend to perform a similar study with a larger sample, monetary incentives and conducting it in a laboratory setting instead of with a survey. This topic can be abandoned if this also does not yield an effect of heterogeneity.

7. Conclusion

Different countries can experience a different impact of climate change due to institutional means to mitigate the effect or due to geography. This could affect climate negotiations since some countries have more on the line than others. This paper studied how heterogeneous impact on different parties of a negotiation affected the negotiation outcome.

To study this problem an experimental design was used by means of a survey. It was found that a heterogeneous effect on different parties in the negotiation does not significantly impact the outcome of the negotiation. This could mean that climate negotiations under heterogeneous impact effects are just as likely to be successful as climate negotiations under homogeneous impact effects. So climate negotiations are not hindered by heterogeneity of the impact linked to climate change.

For future research, this research should be replicated with monetary incentives to make the study more realistic. Also a setting in a lab in real life instead of a survey can make the setting more realistic.

Bibliography

Barrett, S., & Dannenberg, A. (2012). Climate negotiations under scientific uncertainty. *Proceedings of the National Academy of Sciences*, *109*(43), 17372-17376.

Barrett, S., & Dannenberg, A. (2014). Negotiating to Avoid'Gradual'Versus' Dangerous' Climate Change: An Experimental Test of Two Prisoners' Dilemmas. *Available at SSRN 2390561*.

Barrett, S., & Dannenberg, A. (2016). An experimental investigation into 'pledge and review'in climate negotiations. *Climatic Change*, *138*(1), 339-351.

Dietz, T., Ostrom, E. & Stern, P. C. The struggle to govern the commons. *Science* **302**, 1907–1912 (2003).

Dimitrov, R., Hovi, J., Sprinz, D. F., Sælen, H., & Underdal, A. (2019). Institutional and environmental effectiveness: Will the Paris Agreement work?. *Wiley Interdisciplinary Reviews: Climate Change*, *10*(4), e583.

Easterly, W., & Levine, R. (2003). Tropics, germs, and crops: how endowments influence economic development. *Journal of monetary economics*, *50*(1), 3-39.

Fankhauser, S., & McDermott, T. K. (2014). Understanding the adaptation deficit: why are poor countries more vulnerable to climate events than rich countries?. *Global Environmental Change*, *27*, 9-18.

Gardiner, S. M. A perfect moral storm: climate change, intergenerational ethics and the problem of moral corruption. *Environ. Values* **15**, 397–413 (2006).

Jamet, S., & Corfee-Morlot, J. (2009). Assessing the impacts of climate change: a literature review.

Mendelsohn, R., Morrison, W., Schlesinger, M. E., & Andronova, N. G. (2000). Country-specific market impacts of climate change. *Climatic change*, *45*(3), 553-569.

Milinski, M., Sommerfeld, R. D., Krambeck, H. J., Reed, F. A., & Marotzke, J. (2008). The collective-risk social dilemma and the prevention of simulated dangerous climate change. *Proceedings of the National Academy of Sciences*, *105*(7), 2291-2294.

Our World Data. (2023). *CO2 Emissions*. https://ourworldindata.org/co2-emissions

Ourbak, T., & Magnan, A. K. (2018). The Paris Agreement and climate change negotiations: Small Islands, big players. Regional Environmental Change, 18, 2201-2207.

Ritchie, H., & Roser, M. (2020). CO2 emissions. Our World Data, 1-31.

Rogelj, J., Den Elzen, M., Höhne, N., Fransen, T., Fekete, H., Winkler, H., ... & Meinshausen, M. (2016). Paris Agreement climate proposals need a boost to keep warming well below 2 C. *Nature*, *534*(7609), 631-639.

Saadat, S., Rawtani, D., & Hussain, C. M. (2020). Environmental perspective of COVID-19. *Science of the Total environment*, *728*, 138870.

Tavoni A, Dannenberg A, Kallis G, Loschel A (2011) Inequality, communication, and the avoidance of disastrous climate change in a public goods game. Proc Natl Acad Sci U S A 108:11825–11829

Wagner, G. & Weitzman, M. L. *Climate Shock: The Economic Consequences of a Hotter Planet* (Princeton Univ. Press, Princeton, NJ, 2016).

Wyns, A. (2022). Climate negotiations: time to implement planetary health promises. The Lancet Planetary Health, 6(8), e645-e647.

Seed game

Survey Flow

Standard: Introduction (1 Question)
Standard: Block 4 (1 Question)

BlockRandomizer: 2 -

> **Block: Control game (8 Questions)**
>
> **BlockRandomizer: 2 -**
>
> > **Block: Treatment game high impact (8 Questions)**
> > **Block: Treatment game low impact (8 Questions)**

Page Break ─────────────────────────────────────

Start of Block: Introduction

Introduction Dear participant, You are now taking part in an economic experiment of which the results are used for a master thesis. The survey is anonymous, your identity will not be revealed to other participants or the researcher. In this experiment you will play two hypothetical games with slightly different rules. Please read the instructions of both games carefully, answer as truthfully as possible and do not communicate with others during the survey. You are allowed to use a calculator if needed.

Thank you in advance, I really appreciate your effort!

End of Block: Introduction

Start of Block: Block 4

General mechanics In this experiment you will be playing two games with slightly different rules. Here you can find the 'goal of the game' and the 'rounds of the negotiation', which applies to both games. Please read this carefully.

Goal of the game
 You are taking part in a climate negotiation in which you represent, the non-existent country, walhalla. Your country has **100 coins in its treasury**. The treasury can be used to give your citizens a

life like they are in an actual walhalla. However, a potential climate disaster threatens your treasury and that of all other countries (**10 including walhalla**) and with this the quality of life of your citizens and the citizens of the other countries. To prevent this climate disaster from happening you can use coins from your treasury. But, preventing a climate crisis by contributing coins also shrinks the treasury and with this it also reduces the quality of life of your citizens.

Rounds of the negotiation

Round 1 pledging: In the first round you "pledge" (promise) to contribute an amount of coins in the second round. With this you show your intentions to the other players. The amount you choose in this round is **non-binding**, this means that you can deviate from it in the second round if you want to. But choose carefully, the amount you choose might influence the contribution the other players make in the second round.

Round 2 contributing: In the second round you can observe the pledges of the other players and choose an amount you would like to contribute in response. The contribution that you choose in this round is **binding**. The sum of the contributions will determine whether the climate disaster will happen. Note that the other countries might deviate from the amount that you observe as their pledges.

Now you will continue to the first game, good luck!

Game C **Rules of game C**
10 countries, including walhalla, are taking part in the negotiations to prevent a climate disaster from happening. Each of these countries have a treasury of **100 coins** of which they can pledge and contribute an amount during the negotiations. To prevent the climate disaster, a **total of 400 coins** or more needs to be **contributed** by the countries. If the amount of 400 coins is not reached, a climate disaster prevails and all countries will **lose 50 percent** of their treasury after contributions.

Example

Walhalla contributes 60 coins and is left with a treasury of 40, but the cumulative amount of coins contributed is 388 (which is lower than the threshold of 400). Hence, all countries lose 50 percent of their leftover treasury, Walhalla will have 20 coins left at the end.

Reminder:	
Treasury each country	100 coins
Cumulative amount of treasuries	1.000 coins
Threshold to prevent climate disaster	400 coins
Loss in case of climate disaster	50% of treasury after contribution

Note that the pledges (round 1) are **non-binding**, players can deviate from the number of coins that they pledge to contribute. So the threshold is **not** necessarily reached when the sum of the pledges is 400. The contribution (round 2) on the other hand, **is binding**.

Before you start with the experiment you first have to answer a few control questions to check whether you understand the mechanics of the game, good luck!

Control question 1 Do you understand the game you will be playing?

	Not at all (1)	Poorly (2)	Neutral (3)	Good (4)	Excellent (5)
How well do you understand the game? (14)	○	○	○	○	○

Control question 2 The sum of the pledges is 300 and in response you decide not to contribute any of your 100 coins. The threshold of 400 coins is not reached. How many will you have in the end?

○ 0 (1)

○ 25 (2)

○ 50 (3)

○ 75 (4)

○ 100 (5)

Control question 3 The sum of the pledges is 550 and in response you decide to contribute 50 coins of your 100 coins. The threshold of 400 is reached. How many coins will you have in the end?

○ 0 (1)

○ 25 (2)

○ 50 (3)

○ 75 (4)

○ 100 (6)

Control question 4 The sum of the pledges is 350 and in response you decide to contribute 60 of your 100 coins. But, the threshold of 400 is not reached. How many coins will you have in the end?

○ 0 (1)

○ 10 (2)

○ 20 (3)

○ 30 (6)

Experiment start This is where you start the experiment, please read the questions carefully and answer truthfully. Good luck!

Round 1 Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is non-binding, meaning that you can deviate from the number of coins that you pledge to contribute.

Reminder: Treasury each country   100
coins   Cumulative amount of treasuries
                1.000 coins   Threshold to prevent
climate disaster   400 coins
        Loss in case of climate disaster   50% of treasury after contribution

0   10   20   30   40   50   60   70   80   90   100

Choose an amount that you would like to pledge ()	

Round 2 Here you can find some of the possible amounts of the cumulative pledges of the other countries. So each amount represents the pledges of the other countries added up. For example, the first number, 50, is the sum of all the pledges of the other countries. So not the pledged amount of a single country. Keep in mind that the countries face the same decision. They also observe the pledges of the other countries and then decide on the amount of coins they would like to contribute.

Note, that the pledges are non-binding and that other players might deviate from their pledge. But, the contributions (the numbers on the right that you choose) are binding.

Reminder: Treasury each country   100 coins   Cumulative amount of treasuries
                1.000 coins   Threshold to prevent climate disaster   400 coins
            Loss in case of climate disaster   50% of treasury after contribution

Please indicate the amount that you would like to contribute in response to all of these cumulative pledges with the sliders.

0   10   20   30   40   50   60   70   80   90   100

The pledges of the other countries add up to 50 coins. Respond with a contribution ()	
The pledges of the other countries add up to 200 coins. Respond with a contribution ()	
The pledges of the other countries add up to 300 coins. Respond with a contribution ()	
The pledges of the other countries add up to 350 coins. Respond with a contribution ()	
The pledges of the other countries add up to 400 coins. Respond with a contribution ()	
The pledges of the other countries add up to 450 coins. Respond with a contribution ()	
The pledges of the other countries add up to 500 coins. Respond with a contribution ()	
The pledges of the other countries add up to 600 coins. Respond with a contribution ()	
The pledges of the other countries add up to 700 coins. Respond with a contribution ()	
The pledges of the other countries add up to 850 coins. Respond with a contribution ()	

Page Break

End of Block: Control game

Start of Block: Treatment game high impact

Game T2 **Rules of game T2**

10 countries, including walhalla, are taking part in the negotiations to prevent a climate disaster from happening. Each of these countries have a treasury of **100 coins** of which they can pledge and contribute an amount during the negotiations. To prevent the climate disaster, a **total of 400 coins** or more need to be **contributed** by the countries. A climate disaster does not have an equal impact on all the countries in the negotiation. **Walhalla and 4 other countries will lose 75 % of their treasury** in case of a climate disaster, while **the other 5 countries will only lose 25%.**

Example

Walhalla contributes 60 coins and is left with a treasury of 40, but the cumulative amount of coins contributed is 388 (which is lower than the threshold of 400). Hence, walhalla loses 75 percent of its treasury and will have 10 coins left.

Reminder: Treasury each country   100 coins   Cumulative amount of treasuries   1.000 coins   Threshold to prevent climate disaster   400 coins

Loss in case of climate disaster walhalla and 4 other countries   75% of treasury   Loss in case of climate disaster the 5 other countries   25% of treasury

Note that the **pledges** (round 1) are **non-binding**, players can deviate from the number of coins that they pledge to contribute. So the threshold is not necessarily reached when the sum of the pledges is 400. The **contribution** (round 2) on the other hand, **is binding**.

Before you start with the experiment you first have to answer a few control questions to check whether you understand the mechanics of the game, good luck!

Control question 1 Do you understand the game you will be playing?

	Not at all (1)	Poorly (2)	Neutral (3)	Good (4)	Excellent (5)
How well do you understand the game? (1)	○	○	○	○	○

Control question 2 The sum of the pledges is 300 and in response you decide not to contribute any of your 100 coins. The threshold of 400 is not reached. How many will you have in the end?

○ 0 (1)

○ 25 (2)

○ 50 (3)

○ 75 (4)

○ 100 (5)

Control question 3 The sum of the pledges is 550 and in response you decide to contribute 50 coins of your 100 coins. The threshold of 400 is reached. How many coins will you have in the end?

○ 0 (1)

○ 25 (2)

○ 50 (3)

○ 75 (4)

○ 100 (5)

Control question 4 The sum of the pledges is 350 and in response you decide to contribute 60 of your 100 coins. But, the threshold of 400 is not reached. How many coins will you have in the end?

○ 0 (1)

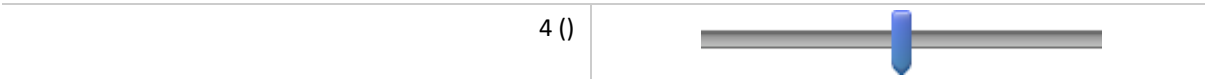○ 10 (2)

○ 20 (3)

○ 30 (4)

Page Break

Start experiment This is where you start the experiment, please read the questions carefully and answer truthfully. Good luck!

Round 1 Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is non-binding, meaning that you can deviate from the number of coins that you pledge to contribute.

Reminder: Treasury each country   100 coins   Cumulative amount of treasuries
              1.000 coins   Threshold to prevent climate disaster   400 coins
          Loss in case of climate disaster walhalla and 4 other countries   75% of treasury   Loss in case of climate disaster the 5 other countries   25% of treasury

0   10   20   30   40   50   60   70   80   90   100

4 ()	

Page Break ───

Round 2 Here you can find some of the possible amounts of the cumulative pledges of the other countries. So each amount represents the pledges of the other countries added up. For example, the first number, 50, is the sum of all the pledges of the other countries. So not the pledged amount of a single country. Keep in mind that the countries face the same decision. They also observe the pledges of the other countries and then decide on the amount of coins they would like to contribute.

Note, that the pledges are non-binding and that other players might deviate from their pledge. But, the contributions (the numbers on the right that you choose) are binding.

Reminder: Treasury each country   100 coins   Cumulative amount of treasuries
              1.000 coins   Threshold to prevent climate disaster   400 coins
          Loss in case of climate disaster walhalla and 4 other countries   75% of treasury   Loss in case of climate disaster the 5 other countries   25% of treasury
Please indicate the amount that you would like to contribute in response to all of these cumulative pledges with the sliders.

The pledges of the other countries add up to 50 coins. Respond with a contribution ()	
The pledges of the other countries add up to 200 coins. Respond with a contribution ()	
The pledges of the other countries add up to 300 coins. Respond with a contribution ()	
The pledges of the other countries add up to 350 coins. Respond with a contribution ()	
The pledges of the other countries add up to 400 coins. Respond with a contribution ()	
The pledges of the other countries add up to 450 coins. Respond with a contribution ()	
The pledges of the other countries add up to 500 coins. Respond with a contribution ()	
The pledges of the other countries add up to 600 coins. Respond with a contribution ()	
The pledges of the other countries add up to 700 coins. Respond with a contribution ()	
The pledges of the other countries add up to 850 coins. Respond with a contribution ()	

End of Block: Treatment game high impact

Start of Block: Treatment game low impact

Game T1 **Rules of game T1**
 10 countries, including walhalla, are taking part in the negotiations to prevent a climate disaster from happening. Each of these countries have a treasury of **100 coins** of which they can pledge and contribute an amount during the negotiations. To prevent the climate disaster, a **total of 400 coins** or more need to be **contributed** by the countries. A climate disaster does not have an equal impact on all the countries in the negotiation. **Walhalla and 4 other countries will lose 25%** of their treasury in case of a climate disaster, while **the other 5 countries will lose their 75% of their treasury.**

 Example
 Walhalla contributes 60 coins and is left with a treasury of 40, but the cumulative amount of coins contributed is 388 (which is lower than the threshold of 400). Hence, Walhalla loses 25% of its leftover treasury and will have 30 coins left.

 Reminder: Treasury of each country
        100 coins   Cumulative amount of treasuries   1.000 coins
        Threshold to prevent climate disaster   400 coins
                        Loss in case of climate disaster walhalla and 4 other countries

25%   Loss in case of climate disaster for the 5 other countries   75%

Note that the **pledges** (round 1) are **non-binding**, players can deviate from the number of coins that they pledge to contribute. So the threshold is not necessarily reached when the sum of the pledges is 400. The **contribution** (round 2) on the other hand, **is binding**.

Before you start with the experiment you first have to answer a few control questions to check whether you understand the mechanics of the game, good luck!

Control question 1 Do you understand the game you will be playing?

	Not at all (1)	Poorly (2)	Neutral (3)	Good (4)	Excellent (5)
How well do you understand the game? (9)	○	○	○	○	○

Control question 2 The sum of the pledges is 300 and in response you decide not to contribute any of your 100 coins. The threshold of 400 is not reached. How many will you have in the end?

○ 0 (1)

○ 25 (2)

○ 50 (3)

○ 75 (4)

○ 100 (5)

Control question 3 The sum of the pledges is 550 and in response you decide to contribute 50 coins of your 100 coins. The threshold of 400 is reached. How many coins will you have in the end?

○ 0 (4)

○ 25 (5)

○ 50 (6)

○ 75 (7)

○ 100 (8)

Control question 4 The sum of the pledges is 450 and in response you decide to contribute 60 of your 100 coins. But, the threshold of 400 is not reached. How many coins will you have in the end?

○ 0 (4)

○ 10 (5)

○ 20 (6)

○ 30 (7)

○ 40 (8)

Page Break ────────────────────────────────────

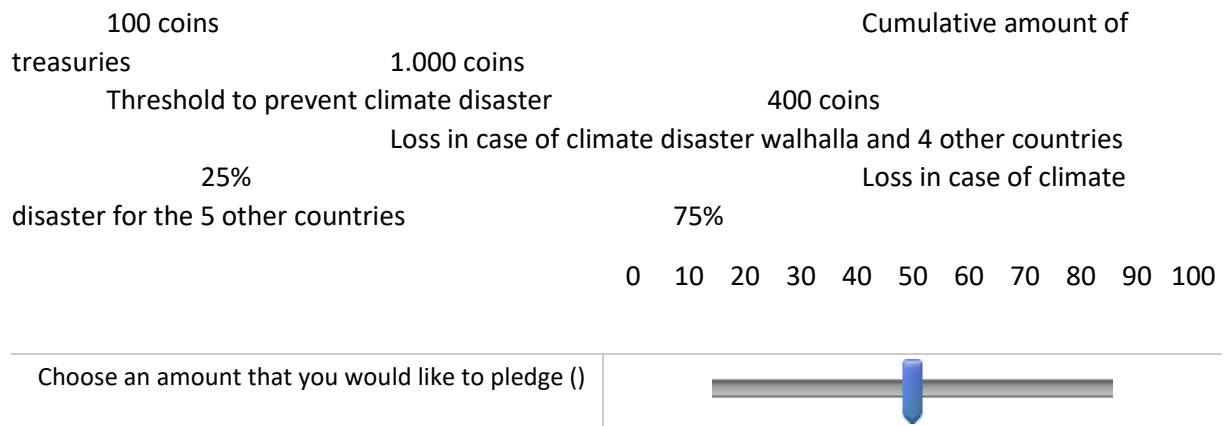Start experiment This is where you start the experiment, please read the questions carefully and answer truthfully. Good luck!

Round 1 Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is non-binding, meaning that you can deviate from the number of coins that you pledge to contribute.

Reminder: Treasury of each country

100 coins   Cumulative amount of
treasuries   1.000 coins
        Threshold to prevent climate disaster   400 coins
                        Loss in case of climate disaster walhalla and 4 other countries
                25%   Loss in case of climate
disaster for the 5 other countries   75%

0   10   20   30   40   50   60   70   80   90   100

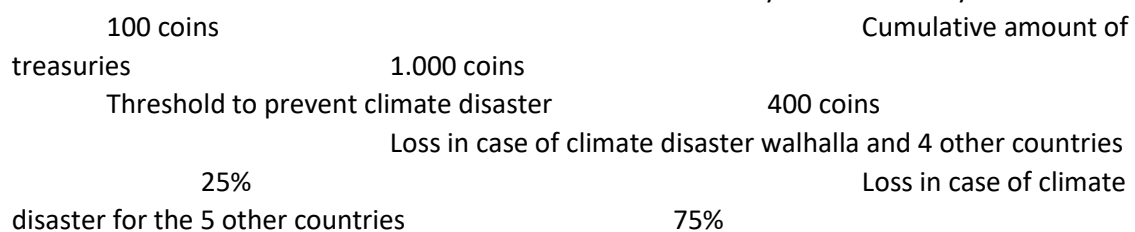| Choose an amount that you would like to pledge ()	

Page Break

Round 2 Here you can find some of the possible amounts of the cumulative pledges of the other countries. So each amount represents the pledges of the other countries added up. For example, the first number, 50, is the sum of all the pledges of the other countries. So not the pledged amount of a single country. Keep in mind that the countries face the same decision. They also observe the pledges of the other countries and then decide on the amount of coins they would like to contribute.

Note, that the pledges are non-binding and that other players might deviate from their pledge. But, the contributions (the numbers on the right that you choose) are binding.

Reminder: Treasury of each country
        100 coins   Cumulative amount of
treasuries   1.000 coins
        Threshold to prevent climate disaster   400 coins
                        Loss in case of climate disaster walhalla and 4 other countries
                25%   Loss in case of climate
disaster for the 5 other countries   75%
Please indicate the amount that you would like to contribute in response to all of these cumulative pledges with the sliders.

0   10   20   30   40   50   60   70   80   90   100

The pledges of the other countries add up to 50 coins. Respond with a contribution ()	
The pledges of the other countries add up to 200 coins. Respond with a contribution ()	
The pledges of the other countries add up to 300 coins. Respond with a contribution ()	
The pledges of the other countries add up to 350 coins. Respond with a contribution ()	
The pledges of the other countries add up to 400 coins. Respond with a contribution ()	
The pledges of the other countries add up to 450 coins. Respond with a contribution ()	
The pledges of the other countries add up to 500 coins. Respond with a contribution ()	
The pledges of the other countries add up to 600 coins. Respond with a contribution ()	
The pledges of the other countries add up to 700 coins. Respond with a contribution ()	
The pledges of the other countries add up to 850 coins. Respond with a contribution ()	

End of Block: Treatment game low impact

Appendix 2

The main game

Survey Flow

Standard: Introduction (1 Question)
Standard: General instructions (1 Question)

BlockRandomizer: 1 - Evenly Present Elements

> **BlockRandomizer: 2 -**

>> **Group: C1**

>>> **Block: Control game (7 Questions)**

>>> **Branch: New Branch**
>>>   If
>>>   If Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Less Than 29

>>>> **Block: Game C, round 2, 400 coins (2 Questions)**

>>>> **Branch: New Branch**
>>>>   If
>>>>   If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Less Than 37

>>>>> **Block: Disaster (1 Question)**

>>>> **Branch: New Branch**
>>>>   If
>>>>   If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Greater Than or Equal to 37

>>>>> **Block: Succes (1 Question)**

>>> **Branch: New Branch**
>>>   If
>>>   If Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Greater Than or Equal to 29
>>>   And Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Less Than 79

>>>> **Block: Game C, Round 2, 450 coins (2 Questions)**

>>>> **Branch: New Branch**
>>>>   If

If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Less Than 47

Block: Disaster (1 Question)

Branch: New Branch
    If
        If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Greater Than or Equal to 47

Block: Succes (1 Question)

Branch: New Branch
    If
        If Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Greater Than or Equal to 79

Block: Game C, round 2, 500 coins (2 Questions)
Block: Disaster (1 Question)

Group: T1

Block: Treatment game 1 low impact (7 Questions)

Branch: New Branch
    If
        If Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Less Than 5

Block: Contribution T1, low impact, 350 coins (2 Questions)
Block: Succes (1 Question)

Branch: New Branch
    If
        If Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Greater Than or Equal to 5
        And Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Less Than 55

Block: Contribution T1, low impact, 400 coins (2 Questions)

Branch: New Branch
    If

If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Greater Than or Equal to 96

Block: Succes (1 Question)

Branch: New Branch
    If
        If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Less Than 96

Block: Disaster (1 Question)

Branch: New Branch
    If
        If Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Greater Than or Equal to 55

Block: Contribution T1, low impact, 450 coins (2 Questions)
Block: Disaster (1 Question)

BlockRandomizer: 2 - Evenly Present Elements

Group: C2

Block: Control game (7 Questions)

Branch: New Branch
    If
        If Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Less Than 24

Block: Game C, round 2, 400 coins (2 Questions)

Branch: New Branch
    If
        If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Less Than 17

Block: Disaster (1 Question)

Branch: New Branch
    If
        If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Greater Than or Equal to 17

Block: Succes (1 Question)

Branch: New Branch
    If
        If Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Greater Than or Equal to 24
        And Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Less Than 74

Block: Game C, Round 2, 450 coins (2 Questions)

Branch: New Branch
    If
        If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Less Than 37

Block: Disaster (1 Question)

Branch: New Branch
    If
        If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Greater Than or Equal to 37

Block: Succes (1 Question)

Branch: New Branch
    If
        If Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Greater Than or Equal to 74

Block: Game C, round 2, 500 coins (2 Questions)

Branch: New Branch
    If
        If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Less Than 84

Block: Disaster (1 Question)

Branch: New Branch
    If

If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Greater Than or Equal to 84

Block: Succes (1 Question)

Group: T2

Block: Treatment game 2, high impact (7 Questions)

Branch: New Branch
    If
        If Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Less Than 40

Block: Contribution T2, high impact, 400 coins (2 Questions)

Branch: New Branch
    If
        If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Greater Than or Equal to 36

Block: Succes (1 Question)

Branch: New Branch
    If
        If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Less Than 36

Block: Disaster (1 Question)

Branch: New Branch
    If
        If Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Greater Than or Equal to 40
        And Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is... Choose an amount that you would like to pledge Is Less Than 90

Block: Contribution T2, high impact, 450 coins (2 Questions)

Branch: New Branch
    If
        If Here you decide how many coins you would like to contribute. Keep in mind that the other countrie... Choose the amount that you would like to contribute Is Less Than 78

Page Break

Start of Block: Introduction

Introduction Dear participant, You are now taking part in an economic experiment of which the results are used for a master thesis. The survey is anonymous, your identity will not be revealed to other participants or the researcher. In this experiment you will play two games with slightly different rules. Please read the instructions of both games carefully, answer as truthfully as possible and do not communicate with others during the survey. You are allowed to use a calculator if needed.

Thank you in advance, I really appreciate your effort!

End of Block: Introduction

Start of Block: General instructions

General mechanics In this experiment you will be playing two games with slightly different rules. Here you can find the 'goal of the game' and the 'rounds of the negotiation', which applies to both games. Please read this carefully.

Goal of the game
 You are taking part in a climate negotiation in which you represent, the non-existent country, walhalla. Your country has **100 coins in its treasury**. The treasury can be used to give your citizens a life like they are in an actual walhalla. However, a potential climate disaster threatens your treasury and that of all other countries (**10 including walhalla**) and with this the quality of life of your citizens

and the citizens of the other countries. To prevent this climate disaster from happening you can use coins from your treasury. But, preventing a climate crisis by contributing coins also shrinks the treasury and with this it reduces the quality of life of your citizens.

Rounds of the negotiation
Round 1 pledging: In the first round you "pledge" (promise) to contribute an amount of coins in the second round. With this you show your intentions to the other players. The amount you choose in this round is **non-binding**, this means that you can deviate from it in the second round if you want to. But choose carefully, the amount you choose might influence the contribution the other players make in the second round.

Round 2 contributing: In the second round you can observe the pledges of the other players and choose an amount you would like to contribute in response. The contribution that you choose in this round is **binding**. The sum of the contributions will determine whether the climate disaster will happen. Note that the other countries might deviate from the amount that you observe as their pledges.

Now you will continue to the first game, good luck!

Game C1 **Rules of game C**
10 countries, including walhalla, are taking part in the negotiations to prevent a climate disaster from happening. Each of these countries has a treasury of **100 coins** of which they can contribute an amount during the negotiations. To prevent the climate disaster, a **total of 400 coins** or more needs to be **contributed** by the countries. If the amount of 400 coins is not reached, a climate disaster prevails and all countries will **lose 50 percent** of their treasury after contributions.

Example
Walhalla contributes 60 coins and is left with a treasury of 40, but the cumulative amount of coins contributed is 388 (which is lower than the threshold of 400). Hence, all countries lose 50 percent of their leftover treasury, Walhalla will have 20 coins left at the end.

Reminder:	
Treasury each country	100 coins
Cumulative amount of treasuries	1.000 coins
Threshold to prevent climate disaster	400 coins
Loss in case of climate disaster	50% of treasury after contribution

Note that the pledges (round 1) are **non-binding**, players can deviate from the number of coins that they pledge to contribute. So the threshold is **not** necessarily reached when the sum of the pledges is 400. The contribution (round 2) on the other hand, **is binding**.

Before you start with the experiment you first have to answer a few control questions to check whether you understand the mechanics of the game, good luck!

Control question 1 Do you understand the game you will be playing?

	Not at all (1)	Poorly (2)	Neutral (3)	Good (4)	Excellent (5)
How well do you understand the game? (14)	○	○	○	○	○

Control question 2 The sum of the pledges is 300 and in response you decide not to contribute any of your 100 coins. The threshold of 400 coins is not reached. How many will you have in the end?

○ 0 (1)

○ 25 (2)

○ 50 (3)

○ 75 (4)

○ 100 (5)

Control question 3 The sum of the pledges is 550 and in response you decide to contribute 50 coins of your 100 coins. The threshold of 400 is reached. How many coins will you have in the end?

○ 0 (1)

○ 25 (2)

○ 50 (3)

○ 75 (4)

○ 100 (6)

Control question 4 The sum of the pledges is 350 and in response you decide to contribute 60 of your 100 coins. But, the threshold of 400 is not reached. How many coins will you have in the end?

○ 0 (1)

○ 10 (2)

○ 20 (3)

○ 30 (6)

Page Break

Experiment start This is where you start the experiment, please read the questions carefully and answer truthfully. Good luck!

C1 round 1 Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is non-binding, meaning that you can deviate from the number of coins that you pledge to contribute.

Reminder: Treasury each country   100 coins   Cumulative amount of treasuries
               1.000 coins   Threshold to prevent climate disaster   400 coins

Loss in case of climate disaster		50% of treasury after contribution	

0 10 20 30 40 50 60 70 80 90 100

Choose an amount that you would like to pledge ()	

Cumulative pledges The cumulative amount of coins of the pledges **(including your pledge)** is **400 coins**

C1.2, 400 coins Here you decide how many coins you would like to **contribute**. Keep in mind that the other countries face the same decision. They also observe the pledges of the other countries and then decide on the amount of coins that they would like to contribute. So, the pledges are non-binding and the other players might deviate from their pledge. But, the **contribution is binding**.

Reminder:		
coins	Treasury each country	100
1.000 coins	Cumulative amount of treasuries	
climate disaster 400 coins	Threshold to prevent	
Loss in case of climate disaster	50% of treasury after contribution	

Please indicate the amount of coins that you would like to contribute, in response to the cumulative amount of the pledges, with the slider.

0 10 20 30 40 50 60 70 80 90 100

Choose the amount that you would like to contribute ()	

Disaster! You failed to prevent a climate disaster. Continue to the next page.

Succes! Congratulations, the negotiations were succesful and you prevented a climate disaster! You won't lose any more coins on top of your contribution. Continue to the next page.

Cumulative pledges The cumulative amount of coins of the pledges **(including your pledge)** is **450 coins**

C1.2, 450 coins Here you decide how many coins you would like to **contribute**. Keep in mind that the other countries face the same decision. They also observe the pledges of the other countries and then decide on the amount of coins that they would like to contribute. So, the pledges are non-binding and the other players might deviate from their pledge. But, the **contribution is binding**.

Reminder:		Treasury each country	100
coins		Cumulative amount of treasuries	
	1.000 coins		Threshold to prevent
climate disaster	400 coins		
	Loss in case of climate disaster	50% of treasury after contribution	

Please indicate the amount of coins that you would like to contribute, in response to the cumulative amount of the pledges, with the slider.

	0 10 20 30 40 50 60 70 80 90 100
Choose the amount that you would like to contribute ()	

Cumulative pledges The cumulative amount of coins of the pledges **(including your pledge)** is **500 coins**

C1.2, 500 coins Here you decide how many coins you would like to **contribute**. Keep in mind that the other countries face the same decision. They also observe the pledges of the other countries and then decide on the amount of coins that they would like to contribute. So, the pledges are non-binding and the other players might deviate from their pledge. But, the **contribution is binding**.

Reminder:		Treasury each country	100 coins
	1.000 coins	Cumulative amount of treasuries	Threshold to prevent
climate disaster	400 coins		
Loss in case of climate disaster		50% of treasury after contribution	

Please indicate the amount of coins that you would like to contribute, in response to the cumulative amount of the pledges, with the slider.

	0 10 20 30 40 50 60 70 80 90 100
Choose the amount that you would like to contribute ()	▭▭▭▭▭▭▭

Game T1 **Rules of game T1**
 10 countries, including walhalla, are taking part in the negotiations to prevent a climate disaster from happening. Each of these countries has a treasury of **100 coins** of which they can contribute an amount during the negotiations. To prevent the climate disaster, a **total of 400 coins** or more need to be **contributed** by the countries. A climate disaster does not have an equal impact on all the countries in the negotiation. **Walhalla and 4 other countries will lose 25%** of their treasury in case of a climate disaster, while **the other 5 countries will lose their 75% of their treasury.**

 Example
 Walhalla contributes 60 coins and is left with a treasury of 40, but the cumulative amount of coins contributed is 388 (which is lower than the threshold of 400). Hence, Walhalla loses 25% of its leftover treasury and will have 30 coins left.

Reminder:
Treasury of each country 100 coins
Cumulative amount of treasuries 1.000 coins
Threshold to prevent climate disaster 400 coins
Loss in case of climate disaster walhalla and 4 other countries 25%
Loss in case of climate disaster for the 5 other countries 75%

Note that the **pledges** (round 1) are **non-binding**, players can deviate from the number of coins that they pledge to contribute. So the threshold is not necessarily reached when the sum of the pledges is 400. The **contribution** (round 2) on the other hand, **is binding**.

Before you start with the experiment you first have to answer a few control questions to check whether you understand the mechanics of the game, good luck!

Control question 1 Do you understand the game you will be playing?

	Not at all (1)	Poorly (2)	Neutral (3)	Good (4)	Excellent (5)
How well do you understand the game? (9)	○	○	○	○	○

Control question 2 The sum of the pledges is 300 and in response you decide not to contribute any of your 100 coins. The threshold of 400 is not reached. How many will you have in the end?

○ 0 (1)

○ 25 (2)

○ 50 (3)

○ 75 (4)

○ 100 (5)

Control question 3 The sum of the pledges is 550 and in response you decide to contribute 50 coins of your 100 coins. The threshold of 400 is reached. How many coins will you have in the end?

○ 0 (4)

○ 25 (5)

○ 50 (6)

○ 75 (7)

○ 100 (8)

Control question 4 The sum of the pledges is 450 and in response you decide to contribute 60 of your 100 coins. But, the threshold of 400 is not reached. How many coins will you have in the end?

○ 0 (4)

○ 10 (5)

○ 20 (6)

○ 30 (7)

○ 40 (8)

Page Break ——

Start experiment This is where you start the experiment, please read the questions carefully and answer truthfully. Good luck!

T1, Round 1 Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is non-binding, meaning that you can deviate from the number of coins that you pledge to contribute.

Reminder: Treasury of each country
         100 coins   Cumulative amount of
treasuries   1.000 coins

Threshold to prevent climate disaster   400 coins
                        Loss in case of climate disaster walhalla and 4 other countries
        25%   Loss in case of climate
disaster for the 5 other countries   75%

0   10   20   30   40   50   60   70   80   90   100

Choose an amount that you would like to pledge ()	
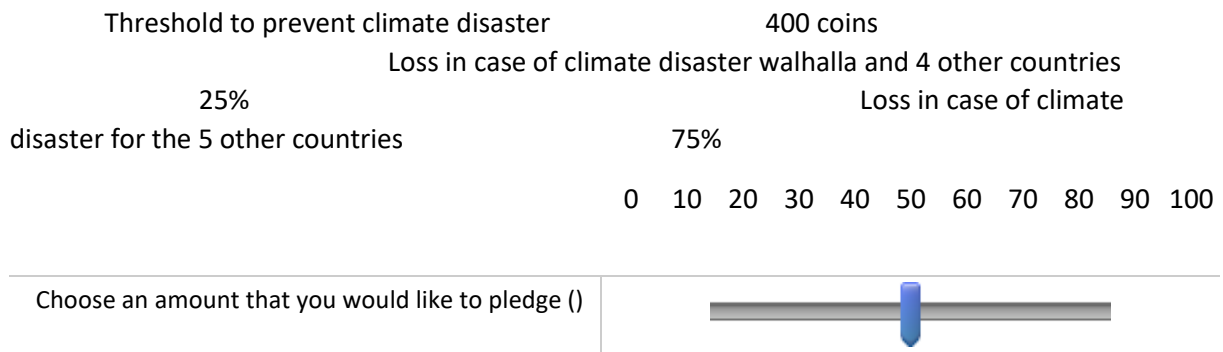
Q83 The cumulative amount of coins of the pledges **(including your pledge)** is 350 **coins**

T1.2, 350 coins Here you decide how many coins you would like to **contribute**. Keep in mind that the other countries face the same decision. They also observe the pledges of the other countries and then decide on the amount of coins that they would like to contribute. So, the pledges are non-binding and the other players might deviate from their pledge. But, the **contribution is binding**.

 Reminder: Treasury each country   100
coins   Cumulative amount of treasuries
        1.000 coins   Threshold to prevent
climate disaster   400 coins
        Loss in case of climate disaster Walhalla and 4 other countries   25% of
treasury after contribution   Loss in case of climate
disaster for the 5 other countries   75% of treasury after contribution

 Please indicate the amount of coins that you would like to contribute, in response to the cumulative amount of the pledges, with the slider.

0   10   20   30   40   50   60   70   80   90   100

Choose the amount that you would like to contribute ()	

Cumulative pledges The cumulative amount of coins of the pledges **(including your pledge)** is 400 **coins**

T1.2, 400 coins Here you decide how many coins you would like to **contribute**. Keep in mind that the other countries face the same decision. They also observe the pledges of the other countries and then decide on the amount of coins that they would like to contribute. So, the pledges are non-binding and the other players might deviate from their pledge. But, the **contribution is binding**.

Reminder: Treasury each country   100 coins   Cumulative amount of treasuries   1.000 coins   Threshold to prevent climate disaster   400 coins
          Loss in case of climate disaster Walhalla and 4 other countries   25% of treasury after contribution   Loss in case of climate disaster for the 5 other countries   75% of treasury after contribution

 Please indicate the amount of coins that you would like to contribute, in response to the cumulative amount of the pledges, with the slider.

	0 10 20 30 40 50 60 70 80 90 100
Choose the amount that you would like to contribute ()	

Cumulative pledges The cumulative amount of coins of the pledges **(including your pledge)** is 450 **coins**

T1.2, 450 Here you decide how many coins you would like to **contribute**. Keep in mind that the other countries face the same decision. They also observe the pledges of the other countries and then decide on the amount of coins that they would like to contribute. So, the pledges are non-binding and the other players might deviate from their pledge. But, the **contribution is binding**.

Reminder: Treasury each country   100 coins   Cumulative amount of treasuries   1.000 coins   Threshold to prevent climate disaster   400 coins
         Loss in case of climate disaster Walhalla and 4 other countries   25% of treasury after contribution   Loss in case of climate disaster for the 5 other countries   75% of treasury after contribution

 Please indicate the amount of coins that you would like to contribute, in response to the cumulative amount of the pledges, with the slider.

0   10   20   30   40   50   60   70   80   90   100

| Choose the amount that you would like to contribute () | |

Game T2 **Rules of game T2**
 10 countries, including walhalla, are taking part in the negotiations to prevent a climate disaster from happening. Each of these countries has a treasury of **100 coins** of which they can contribute an amount during the negotiations. To prevent the climate disaster, a **total of 400 coins** or more need to be **contributed** by the countries. A climate disaster does not have an equal impact on all the countries in the negotiation. **Walhalla and 4 other countries will lose 75 % of their treasury** in case of a climate disaster, while **the other 5 countries will only lose 25%.**

 Example
 Walhalla contributes 60 coins and is left with a treasury of 40, but the cumulative amount of coins contributed is 388 (which is lower than the threshold of 400). Hence, walhalla loses 75 percent of its treasury and will have 10 coins left.

 Reminder: Treasury each country   100 coins   Cumulative amount of treasuries   1.000 coins   Threshold to prevent climate disaster   400 coins
         Loss in case of climate disaster walhalla and 4 other countries   75% of treasury   Loss in case of climate disaster the 5 other countries   25% of treasury
 Note that the **pledges** (round 1) are **non-binding**, players can deviate from the number of coins that they pledge to contribute. So the threshold is not necessarily reached when the sum of the pledges is 400. The **contribution** (round 2) on the other hand, **is binding**.

Before you start with the experiment you first have to answer a few control questions to check whether you understand the mechanics of the game, good luck!

Control question 1 Do you understand the game you will be playing?

	Not at all (1)	Poorly (2)	Neutral (3)	Good (4)	Excellent (5)
How well do you understand the game? (1)	○	○	○	○	○

Control question 2 The sum of the pledges is 300 and in response you decide not to contribute any of your 100 coins. The threshold of 400 is not reached. How many will you have in the end?

○ 0 (1)

○ 25 (2)

○ 50 (3)

○ 75 (4)

○ 100 (5)

Control question 3 The sum of the pledges is 550 and in response you decide to contribute 50 coins of your 100 coins. The threshold of 400 is reached. How many coins will you have in the end?

○ 0 (1)

○ 25 (2)

○ 50 (3)

○ 75 (4)

○ 100 (5)

Control question 4 The sum of the pledges is 350 and in response you decide to contribute 60 of your 100 coins. But, the threshold of 400 is not reached. How many coins will you have in the end?

○ 0 (1)

○ 10 (2)

○ 20 (3)

○ 30 (4)

Page Break

Start This is where you start the experiment, please read the questions carefully and answer truthfully. Good luck!

T2, round 1 Please pledge an amount of coins of 0-100 coins to show your intentions. Note that your pledge is non-binding, meaning that you can deviate from the number of coins that you pledge to contribute.

Reminder: Treasury of each country
        100 coins   Cumulative amount of treasuries   1.000 coins
        Threshold to prevent climate disaster   400 coins
                              Loss in case of climate disaster walhalla and 4 other countries
        75%   Loss in case of climate disaster for the 5 other countries   25%

0   10   20   30   40   50   60   70   80   90   100

Choose an amount that you would like to pledge ()	

Cumulative pledges The cumulative amount of coins of the pledges **(including your pledge)** is 400 **coins**

T2.2, 400 coins Here you decide how many coins you would like to **contribute**. Keep in mind that the other countries face the same decision. They also observe the pledges of the other countries and then decide on the amount of coins that they would like to contribute. So, the pledges are non-binding and the other players might deviate from their pledge. But, the **contribution is binding**.

Reminder: Treasury each country   100 coins   Cumulative amount of treasuries   1.000 coins   Threshold to prevent climate disaster   400 coins
        Loss in case of climate disaster Walhalla and 4 other countries   25% of treasury after contribution   Loss in case of climate

disaster for the 5 other countries   75% of treasury after contribution

 Please indicate the amount of coins that you would like to contribute, in response to the cumulative amount of the pledges, with the slider.

0 10 20 30 40 50 60 70 80 90 100

Choose the amount that you would like to contribute ()	

Cumulative pledges The cumulative amount of coins of the pledges **(including your pledge)** is 450 **coins**

T2.2, 450 coins Here you decide how many coins you would like to **contribute**. Keep in mind that the other countries face the same decision. They also observe the pledges of the other countries and then decide on the amount of coins that they would like to contribute. So, the pledges are non-binding and the other players might deviate from their pledge. But, the **contribution is binding**.

 Reminder: Treasury each country   100 coins   Cumulative amount of treasuries
          1.000 coins   Threshold to prevent climate disaster   400 coins
          Loss in case of climate disaster Walhalla and 4 other countries   25% of treasury after contribution   Loss in case of climate disaster for the 5 other countries   75% of treasury after contribution

 Please indicate the amount of coins that you would like to contribute, in response to the cumulative amount of the pledges, with the slider.

0 10 20 30 40 50 60 70 80 90 100

Choose the amount that you would like to contribute ()	

Cumulative pledges The cumulative amount of coins of the pledges **(including your pledge)** is 500 **coins**

T2.2, 500 coins Here you decide how many coins you would like to **contribute**. Keep in mind that the other countries face the same decision. They also observe the pledges of the other countries and then decide on the amount of coins that they would like to contribute. So, the pledges are non-binding and the other players might deviate from their pledge. But, the **contribution is binding**.

Reminder: Treasury each country   100 coins   Cumulative amount of treasuries
              1.000 coins   Threshold to prevent climate disaster   400 coins
          Loss in case of climate disaster Walhalla and 4 other countries   25% of treasury after contribution   Loss in case of climate disaster for the 5 other countries   75% of treasury after contribution

Please indicate the amount of coins that you would like to contribute, in response to the cumulative amount of the pledges, with the slider.

| | | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

| Choose the amount that you would like to contribute () | |