Centre for Social and Behaviour Change

Climate Change Risk, and Human Behavior: Theory and Evidence (Supplementary Section)

WORKING PAPER 2307

SEPTEMBER 2023

Sanjit Dhami
Narges Hajimoladarvish
Pavan Mamidi

SUPPLEMENTARY SECTION
Climate Change Risk, and Human Behavior: Theory and Evidence

Sanjit Dhami* **Narges Hajimoladarvish** †
Pavan Mamidi‡

September 21, 2023

Abstract

A group of decision makers simultaneously make contributions towards a green fund that reduces the future probability of a climate catastrophe. We derive the theoretical predictions of the effects on contributions arising from 'behavioral parameters' such as loss aversion and present-bias; 'structural factors' such as variation in the timing of uncertainty; the 'demand for a commitment device'; and 'institutional factors' such as comparing voluntary contributions with mandatory tax financed contributions. We then run experiments to stringently, test our predictions. Loss aversion and present-bias reduce contributions; there is demand for the commitment technology; and voluntary contributions are higher relative to mandatory tax-financed contributions.

Keywords: Climate risk abatement; loss aversion; present-biased preferences; voluntary versus mandatory contribution mechanisms; commitment technology.

*Corresponding author. Professor of Economics, Department of Economics, Finance and Accounting, School of Business, Room 0.20, Teaching Centre, Brookfield, 266 London Road, University of Leicester, Leicester LE2 1RQ, UK. Phone: +44-116-2522086. Fax: +44-116-2522908. E-mail: sd106@le.ac.uk.

†Senior Research Fellow, Centre for Social and Behaviour Change, Ashoka University, Delhi Office No. 222, Second Floor, Okhla Industrial Estate - Phase III, New Delhi, 110020, India. E-mail: narges.hajimoladarvish@ashoka.edu.in.

‡Director, Centre for Social and Behaviour Change, Ashoka University, Delhi Office No. 222, Second Floor, Okhla Industrial Estate - Phase III, New Delhi, 110020, India. E-mail: pavan.mamidi@ashoka.edu.in.

1 Robustness: Additional results

In this section, we successfully demonstrate the robustness of our results by running regressions with subsets of our data. Table 1 gives the regression results using data from treatments T1 and T2. Table 2 gives the regression results using data from treatments T3 and T4. Table 3 uses data from treatments T1 and T3 to specifically test the effect of a change in the contributions mechanism from voluntary to tax financed contributions. Table 4 uses data from treatments T2 and T4 to test the effect of change in the contributions mechanism (from voluntary to tax financed contributions) in the presence of a commitment device. In all cases, the results reported in the main paper continue to hold.

Table 1: Regression results using data from T1 and T2

	Dependent variable: *Contributions to the Green Fund*			
	(1)	(2)	(3)	(4)
Loss aversion	-2.246^{*}	-2.834^{*}	-2.184	-2.742^{*}
	(1.313)	(1.551)	(1.332)	(1.587)
Present Bias Mag	-1.917	1.818	-2.124	0.929
	(15.314)	(18.709)	(15.804)	(19.646)
T2	4.788	5.517	3.912	4.118
	(3.301)	(4.195)	(3.546)	(4.519)
$Z == 200$	9.158^{***}	12.322^{***}	9.158^{***}	12.387^{***}
	(1.420)	(1.982)	(1.424)	(2.003)
$Z == 400$	23.016^{***}	29.247^{***}	23.016^{***}	29.335^{***}
	(2.118)	(3.018)	(2.125)	(3.043)
Ttime			0.104	0.136
			(0.249)	(0.306)
House Ownership			4.783	7.766
			(3.961)	(5.290)
Gender			2.034	3.957
			(3.769)	(4.838)
Religion			0.740	0.806
			(3.568)	(4.537)
Marital			2.922	2.540
			(4.931)	(6.314)
Age			0.127	0.185
			(0.689)	(0.849)
Time			0.002	0.002
			(0.002)	(0.003)
House ownership			4.783^{**}	7.766^{**}
			(2.371)	(3.158)
logSigma		3.583^{***}		3.579^{***}
		(0.058)		(0.057)
Constant	36.043^{***}	32.252^{***}	26.240	17.375
	(3.715)	(4.759)	(16.875)	(21.008)

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors are clustered at the individual level (the level of randomization) and are reported in parentheses. Column 1 reports output from OLS regressions and Column 2 reports results using a Tobit specification. Columns 3 and 4 replicate the same specifications as columns 1 and 2, respectively, while incorporating control variables.

Table 2: Regression results using data from T3 and T4

	Dependent variable: *Contributions to the Green Fund*			
	(1)	(2)	(3)	(4)
Loss aversion	−0.725	−0.934	−0.617	−0.762
	(0.733)	(0.895)	(0.790)	(0.965)
Present Bias Mag	−14.984	−16.224	−12.987	−14.072
	(10.807)	(12.181)	(10.528)	(11.867)
T4	−1.890	−1.741	−2.453	−2.527
	(2.789)	(3.275)	(2.834)	(3.373)
$Z == 200$	6.196***	7.213***	6.196***	7.240***
	(1.259)	(1.572)	(1.263)	(1.577)
$Z == 400$	18.515***	21.456***	18.515***	21.490***
	(2.255)	(2.827)	(2.261)	(2.838)
Time			0.078	0.105
			(0.175)	(0.207)
House Ownership			−4.868	−5.180
			(3.156)	(3.683)
Gender			3.319	4.659
			(3.059)	(3.665)
Religion			4.265	5.745*
			(2.856)	(3.468)
Marital			−3.197	−4.219
			(4.002)	(4.882)
Age			0.296	0.324
			(0.665)	(0.793)
logSigma		3.403***		3.394***
		(0.064)		(0.063)
Constant	30.874***	29.135***	22.917	18.681
	(2.656)	(3.138)	(14.277)	(16.987)

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors are clustered at the individual level (the level of randomization) and are reported in parentheses. Column 1 reports output from OLS regressions and Column 2 reports results using a Tobit specification. Columns 3 and 4 replicate the same specifications as columns 1 and 2, respectively, while incorporating control variables.

Table 3: Regression results using data from T1 and T3

	Dependent variable: *Contributions to the Green Fund*			
	(1)	(2)	(3)	(4)
Loss aversion	−0.878	−1.198	−0.775	−1.043
	(0.746)	(0.937)	(0.727)	(0.908)
Present Bias Mag	0.421	1.564	0.644	1.014
	(13.422)	(16.069)	(13.357)	(16.215)
T3	−5.167*	−4.842	−4.967	−4.647
	(3.115)	(3.887)	(3.130)	(3.898)
$Z == 200$	7.917***	10.515***	7.917***	10.533***
	(1.343)	(1.872)	(1.348)	(1.881)
$Z == 400$	22.572***	27.896***	22.572***	27.909***
	(2.294)	(3.162)	(2.303)	(3.176)
Time			0.092	0.085
			(0.240)	(0.307)
House Ownership			3.370	5.860
			(3.697)	(4.914)
Gender			−0.335	0.016
			(3.215)	(4.018)
Religion			1.056	1.187
			(3.316)	(4.164)
Marital			1.361	1.687
			(5.053)	(6.490)
Age			0.410	0.442
			(0.575)	(0.707)
logSigma		3.526***		3.523***
		(0.061)		(0.061)
Constant	33.713***	30.194***	20.325	13.871
	(3.286)	(4.281)	(14.086)	(17.575)

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors are clustered at the individual level (the level of randomization) and are reported in parentheses. Columns 3 and 4 replicate the same specifications as columns 1 and 2, respectively, while incorporating control variables.

Table 4: Regression results using data from T2 and T4

	Dependent variable:			
	Contributions to the Green Fund			
	(1)	(2)	(3)	(4)
Loss aversion	-2.612^{**}	-2.920^{**}	-2.424^{*}	-2.654^{*}
	(1.256)	(1.425)	(1.343)	(1.549)
Present Bias Mag	-8.810	-7.699	-8.078	-7.247
	(13.749)	(16.152)	(14.508)	(17.243)
T4	-12.742^{***}	-12.990^{***}	-12.558^{***}	-12.701^{***}
	(3.059)	(3.686)	(3.102)	(3.746)
$Z == 200$	7.230^{***}	8.623^{***}	7.230^{***}	8.663^{***}
	(1.335)	(1.685)	(1.339)	(1.695)
$Z == 400$	18.860^{***}	22.398^{***}	18.860^{***}	22.450^{***}
	(2.075)	(2.662)	(2.081)	(2.677)
Time			0.081	0.113
			(0.184)	(0.217)
House Ownership			-1.862	-1.382
			(3.432)	(4.137)
Gender			4.148	6.505
			(3.572)	(4.409)
Religion			2.327	3.378
			(3.214)	(3.945)
Marital			-0.916	-2.382
			(4.239)	(5.258)
Age			-0.119	-0.114
			(0.738)	(0.890)
logSigma		3.475^{***}		3.470^{***}
		(0.058)		(0.057)
Constant	43.989^{***}	42.273^{***}	41.883^{**}	36.799^{*}
	(3.691)	(4.469)	(17.459)	(21.056)

Note: *p<0.1; **p<0.05; ***p<0.01. Standard errors are clustered at the individual level (the level of randomization) and are reported in parentheses. Column 1 reports output from OLS regressions and Column 2 reports results using a Tobit specification. Columns 3 and 4 replicate the same specifications as columns 1 and 2, respectively, while incorporating control variables.

2 Budget sets for the time preference parameters

Table 5: Battery of choices for eliciting time preferences

	Choice	1	2	3	4	5	6
t1q1	Payment today	190	152	114	76	38	0
	Payment in 5 weeks	0	40	80	120	160	200
t1q2	Payment today	180	144	108	72	36	0
	Payment in 5 weeks	0	40	80	120	160	200
t1q3	Payment today	170	136	102	68	34	0
	Payment in 5 weeks	0	40	80	120	160	200
t1q4	Payment today	160	128	96	64	32	0
	Payment in 5 weeks	0	40	80	120	160	200
t1q5	Payment today	140	112	84	56	28	0
	Payment in 5 weeks	0	40	80	120	160	200
t1q6	Payment today	110	88	66	44	22	0
	Payment in 5 weeks	0	40	80	120	160	200
t1q7	Payment today	200	160	120	80	40	0
	Payment in 10 weeks	0	40	80	120	160	200
t1q8	Payment today	190	152	114	76	38	0
	Payment in 10 weeks	0	40	80	120	160	200
t1q9	Payment today	170	144	108	72	36	0
	Payment in 10 weeks	0	40	80	120	160	200
t1q10	Payment today	150	120	90	60	30	0
	Payment in 10 weeks	0	40	80	120	160	200
t1q11	Payment today	120	96	72	48	24	0
	Payment in 10 weeks	0	40	80	120	160	200
t1q12	Payment today	90	72	54	36	18	0
	Payment in 10 weeks	0	40	80	120	160	200
t1q13	Payment in 5 weeks	190	152	114	76	38	0
	Payment in 10 weeks	0	40	80	120	160	200
t1q14	Payment in 5 weeks	180	144	108	72	36	0
	Payment in 10 weeks	0	40	80	120	160	200
t1q15	Payment in 5 weeks	170	136	102	68	34	0
	Payment in 10 weeks	0	40	80	120	160	200
t1q16	Payment in 5 weeks	160	128	96	64	32	0
	Payment in 10 weeks	0	40	80	120	160	200
t1q17	Payment in 5 weeks	140	112	84	56	28	0
	Payment in 10 weeks	0	40	80	120	160	200
t1q18	Payment in 5 weeks	110	88	66	44	22	0
	Payment in 15 weeks	0	40	80	120	160	200
t1q19	Payment in 5 weeks	200	160	120	80	40	0
	Payment in 15 weeks	0	40	80	120	160	200
t1q20	Payment in 5 weeks	190	152	114	76	38	0
	Payment in 15 weeks	0	40	80	120	160	200
t1q21	Payment in 5 weeks	170	144	108	72	36	0
	Payment in 15 weeks	0	40	80	120	160	200
t1q22	Payment in 5 weeks	150	120	90	60	30	0
	Payment in 15 weeks	0	40	80	120	160	200
t1q23	Payment in 5 weeks	120	96	72	48	24	0
	Payment in 15 weeks	0	40	80	120	160	200
t1q24	Payment in 5 weeks	90	72	54	36	18	0
	Payment in 15 weeks	0	40	80	120	160	200

3 Experimental Instructions

Consent form

Thank you for joining this study session!

Please read the following before proceeding with the study.

Participation in this study is voluntary. There will be no penalty if you choose to not participate.

All information we collect from you will remain completely anonymous. You will be assigned a random ID number for the study. Prior to analysis, all the personally-identifiable information will be removed from the dataset. Hence, the researchers will not be able to identify particular individuals.

The entire study session is made up of three tasks.

Task 1 is a payment preference task, wherein you will be asked to choose a payment combination with the chance to receive a payment today and a payment in the future. Task 2 is a risk task, wherein you choose between risky lotteries and sure amounts. Task 3 is a green investment task, wherein you will make decisions about how much of your money to keep for yourself or spend on green investments that can benefit you in the future.

At the end of the study, your final payout will include the following:
Your show-up fee of Rs. 100.
Income from the decisions you made in task 1
Income from the decisions you made in task 2
Income from the decisions you made in task 3

Do you agree to participate in the study?

Before starting the actual study, you will be familiarized with the 3 tasks through examples.

Task 1 Instructions

In this task, you will be asked to make decisions involving **receiving payments over various points in time**.

Each box on the screen is a separate decision. Each box will feature a series of options. Each option consists of a sooner payment AND a later payment.

You will be asked to **pick your preferred option in each row** by clicking the checkbox below it. Pick the combination of sooner payment

AND later payment that you prefer the most. For each row, please click only one checkbox.

Let us take an example and understand how to make a decision in Example Box 1.

	95 Rupees today AND **0** Rupees in 5 weeks	**76** Rupees today AND **20** Rupees in 5 weeks	**57** Rupees today AND **40** Rupees in 5 weeks	**38** Rupees today AND **60** Rupees in 5 weeks	**19** Rupees today AND **80** Rupees in 5 weeks	**0** Rupees today AND **100** Rupees in 5 weeks
Example Box 1	○	○	○	○	○	○

In Example Box 1, you are asked to choose your most preferred combination of payment today AND payment in 5 weeks. As you can see, the sooner payment varies in value from 95 to 0 Rupees and the later payment varies in value from 0 to 100 Rupees. Thus, there are 6 different options to choose from in each box.

Note that as we move across the 6 options, the sooner payment decreases, and the later payment increases. Please choose only one out of the six options in the box. Remember that you can choose any of the six options.

For instance, if you choose the third option, then you have chosen to receive 57 Rupees today AND 40 Rupees after 5 weeks. You WILL receive BOTH the amounts in the chosen option. We will send you a payment of 57 Rupees today and a payment of 40 Rupees in 5 weeks. How much you get and when you get it depends on the decisions you make in each of these boxes.

If your most preferred option is 95 today AND 0 in five weeks, then you would mark as follows:

	95 Rupees today AND **0** Rupees in 5 weeks	**76** Rupees today AND **20** Rupees in 5 weeks	**57** Rupees today AND **40** Rupees in 5 weeks	**38** Rupees today AND **60** Rupees in 5 weeks	**19** Rupees today AND **80** Rupees in 5 weeks	**0** Rupees today AND **100** Rupees in 5 weeks
Example Box 2	⊗	○	○	○	○	○

If your most preferred option is 38 today AND 60 in five weeks, you would mark as follows:

	95 Rupees today AND **0** Rupees in 5 weeks	**76** Rupees today AND **20** Rupees in 5 weeks	**57** Rupees today AND **40** Rupees in 5 weeks	**38** Rupees today AND **60** Rupees in 5 weeks	**19** Rupees today AND **80** Rupees in 5 weeks	**0** Rupees today AND **100** Rupees in 5 weeks
Example Box 3	○	○	○	⊗	○	○

Trial Run: Payment Preferences Task

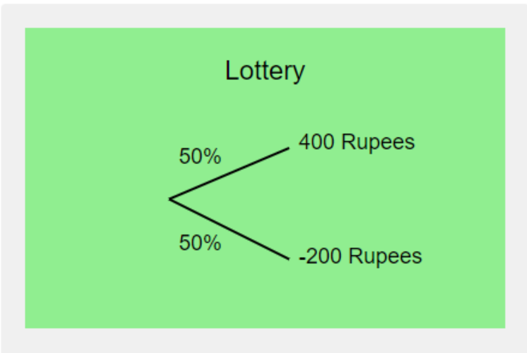
The following is a trial run of the payment preferences task. Select the option that you prefer for the box below:

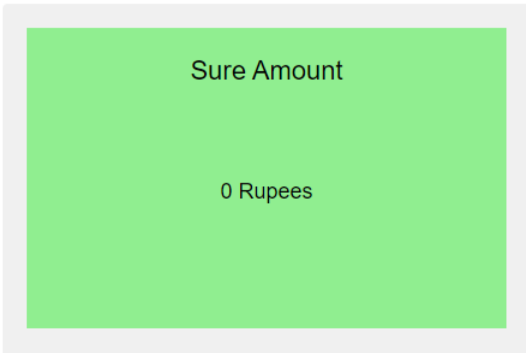
	95 Rupees today AND **0** Rupees in 5 weeks	**72** Rupees today AND **20** Rupees in 5 weeks	**54** Rupees today AND **40** Rupees in 5 weeks	**36** Rupees today AND **60** Rupees in 5 weeks	**18** Rupees today AND **80** Rupees in 5 weeks	**0** Rupees today AND **100** Rupees in 5 weeks
Example Box 1	○	○	○	○	○	○

In this task you will face 24 boxes. Note that all 24 boxes in the actual study will have an equal probability of being chosen to be paid for real, so please pay close attention to each choice and treat each choice as if it could be the one that determines your payout. You will receive the combination of sooner and later payment in your final payout.

Task 2 Instructions

In this task, you will be asked to indicate your choices over risky outcomes (which we call lotteries) and a sure amount of zero. Lotteries are shown by decision trees with associated probabilities of each outcome on the branches of the decision tree. Please indicate your preference between the lottery (shown below on the left) and the sure amount (shown below on the right) for deciding your income.





The lottery offers you two possibilities, each with a 50 percent chance. With a 50 percent chance your income is 400 Rupees and with a 50 percent chance your income is −200 Rupees.

You will face 12 choices in this task. **Any of the 12 lotteries may be chosen for your payout. You will be given the loss amount in the lottery before the payout is calculated so that you don't pay anything out of your own pocket**. For example, if there is a possibility to lose 200 Rupees in the lottery, you will be given 200 Rupees first, irrespective of your choice. Hence, if you chose the sure amount of 0 Rupees in the above lottery, your payout will be 200 Rupees. If you had chosen the lottery, the lottery will be played out, the computer draws a single random number between 1 and 100 that will determine the outcome you will receive. If the random number is between 1 and 50, you win; if the random number is between 51 and 100 you lose the indicated amounts. In any case, you will be endowed with the loss amount; if the lottery outcome is 400 Rupees, your payout will be 600 Rupees and if the lottery outcome is -200, your payout will be 0 Rupees as losses are deducted from your endowment of 200 Rupees. Remember there are no right or wrong answers; you only need to indicate your preference.

The following is a trial run of the lottery task.

Please indicate your preference between the lottery (shown below on the left) and the sure amount (shown below on the right) for deciding your income.

The lottery offers you two possibilities, each with a 50 percent chance. With a 50 percent chance your income is 400 Rupees and with a 50 percent chance your income is -120 Rupees.

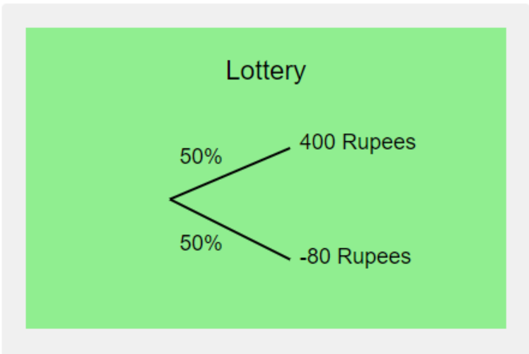
Remember there are no right or wrong answers, you only need to indicate your preference.

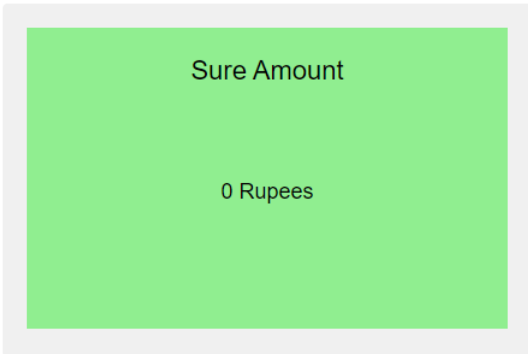
The following is a trial run of the lottery task.

Please indicate your preference between the lottery (shown below on the left) and the sure amount (shown below on the right) for deciding your income.

The lottery offers you two possibilities, each with a 50 percent chance. With a 50 percent chance your income is 400 Rupees and with a 50 percent chance your income is -80 Rupees.

Remember there are no right or wrong answers, you only need to indicate your preference.





Task 3 Instructions: Treatment 1

You will be put in a **group with 6 other people** who are participating in this study. Each group member will be given 100 Rupees by us **today**. Each group member will be asked to **divide their 100 Rupees** between the **amount kept for themselves** and the **amount invested in the Green Fund**.

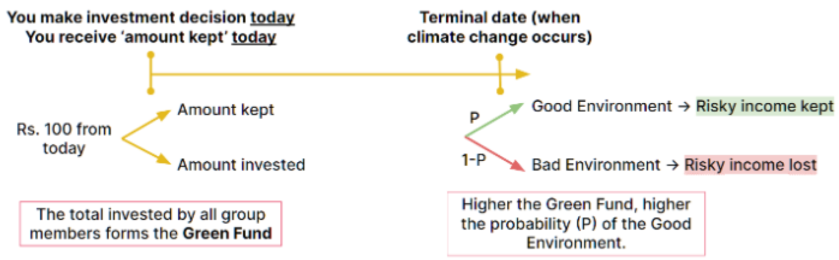
You must decide how you want to divide your 100 Rupees today. All group members make their green investment decisions at the same time, without knowing the decision of any other member of the group.

The green investments of all group members are added to form the Green Fund which will only be used to **mitigate the effects of climate change** at the **terminal date**. The terminal date is when the effects of climate change take place.

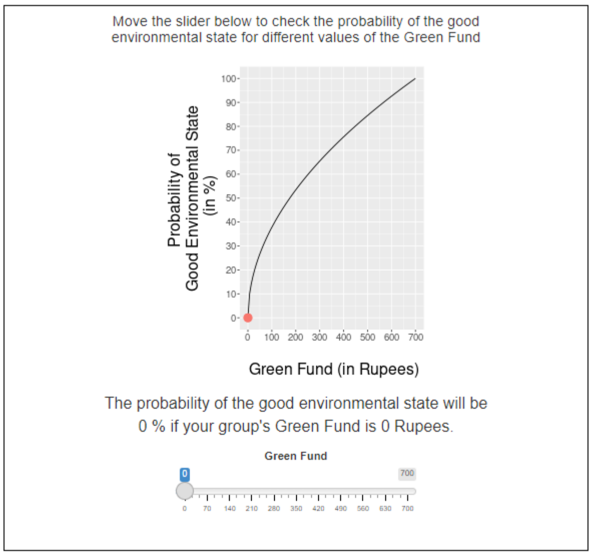
At the **terminal date**, each group member has the chance to keep a **new but risky income**. If there is a **good environment** at the **terminal date**, you will get to keep the risky income at that point in the future. However, on account of climate change and a bad environment you will not get to keep your risky income. This could be because of risks arising from many possible causes, say, flooding, fires, earthquakes, temperature increases, and social unrest from events associated with climate change.

The higher the Green Fund, the higher the probability of the Good Environment, and the lower the probability of the Bad Environment. This is how the Green Fund mitigates the effect of climate change by making it less likely to happen.

The diagram below shows the timeline of events. You receive 100 Rupees today and you are asked to divide it between 2 uses today.



The probability of the Good Environment is given by the graph and slider below. What you see in the graph is that as the Green Fund increases, the increase in probability gets smaller and smaller. This means, there are diminishing additional benefits to investing in the Green fund.



When the Green fund increases from 0 to 100 Rupees, the probability of Good Environment increases from 0 to 38%. However, when the Green Fund increases from 600 to 700 Rupees, the probability of Good Environment increases from 93% to 100%. Hence, while the first 100 Rupees of Green Fund increase the probability of Good Environment by 38 percentage points, the last 100 Rupees only increase the probability by 7 percentage points.

If everyone in your group including you were to contribute their full 100 Rupees to the Green Fund, then the probability of Good Environment becomes 100%, which means you will definitely get the terminal date amount at the terminal date. If nobody in your group contributes anything to the Green fund, then the probability of the Good Environment becomes 0%, and none of you get the terminal date amount.

Important note: The benefits of the Green Fund are <u>the same</u> for all group members, even if they contributed different amounts, including a zero amount. Group members will never find out the individual investments of the other group members.

Let's take an example: Suppose that the individual investments of 7 group members to the Green Fund are 10, 40, 20, 0, 60, 70, and 80 Rupees. Then the Green Fund has 280 Rupees, and this fund will benefit all 7 members equally. A Green Fund of 280 Rupees gives us a 63% probability of

Good Environment and a 37% probability of Bad Environment. If, however, the person who contributed 0 had contributed 70 Rupees, then the Green Fund would be 350 Rupees, and the Good Environment would have a 71% chance of happening.

Trial Run: Green Investment Task Questions

Question 1: You stand a chance to receive 200 Rupees as your **risky income** at the terminal date. The terminal date amount is risky because you only receive it if there is a Good Environment at the terminal date, which depends on your group's Green Fund.

For each **possible terminal date** in the table below, choose your allocation of 100 Rupees between 'amount you wish to keep' and 'amount you wish to invest' in the Green fund. You will receive the 'amount you wish to keep' **today**.

Please also state your expectation of the Green Fund in every case.

	Enter the amount you wish to keep out of the 100 Rupees you receive today	Enter the amount you wish to invest in the Green Fund out of the 100 Rupees you receive today	Based on your estimate of how much others in your group will contribute, write your total estimated value of Green Fund out of 700 Rupees
If terminal date was 5 weeks from now	☐ Rupees	☐ Rupees	☐ Rupees
If terminal date was 25 weeks from now	☐ Rupees	☐ Rupees	☐ Rupees

Question 2: You stand a chance to receive different amounts stated below as your **risky income**, which is received at the terminal date that is 5 weeks from now. The terminal date income is risky because you only receive it if there is a Good Environment at the terminal date, which depends on your group's Green Fund.

For each **possible value of the risky income** in the table below, choose your allocation of 100 Rupees between 'amount you wish to keep' and 'amount you wish to invest' in the Green fund. You will receive the 'amount you wish to keep' **today**.

Please also state your expectation of the Green fund in every case.

	Enter the amount you wish to keep out of the 100 Rupees you receive today	Enter the amount you wish to invest in the Green Fund out of the 100 Rupees you receive today	Based on your estimate of how much others in your group will contribute, write your total estimated value of Green Fund out of 700 Rupees
If risky terminal date income was 100 Rupees	☐ Rupees	☐ Rupees	☐ Rupees
If risky terminal date income was 400 Rupees	☐ Rupees	☐ Rupees	☐ Rupees

One of your decisions from either Question 1 or 2 will be chosen at random and you will receive the time dependent amounts that you have chosen. Remember that any of your decisions could be chosen to calculate your payout from this study.

Task 3 Instructions: Treatment 2

You will be put in a **group with 6 other people** who are participating in this study. Each group member will be given 100 Rupees by us sometimes in the future. Each group member will be asked to **divide their 100 Rupees** between the **amount kept for themselves** and the **amount invested in the Green Fund**.

You must decide how you want to divide your 100 Rupees today. At the future date, the decision you make today will be implemented.

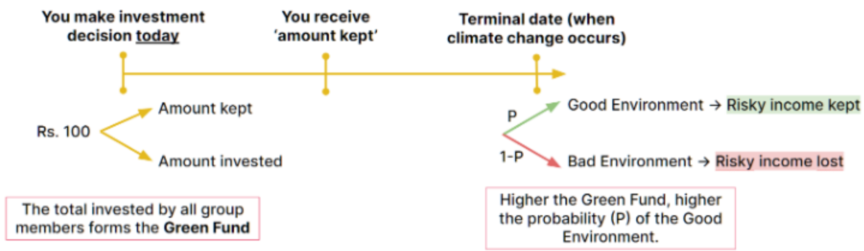
All group members make their green investment decisions at the same time, without knowing the decision of any other member of the group.

The green investments of all group members are added to form the Green Fund which will only be used to **mitigate the effects of climate change** at the **terminal date**. The terminal date is when the effects of climate change take place.

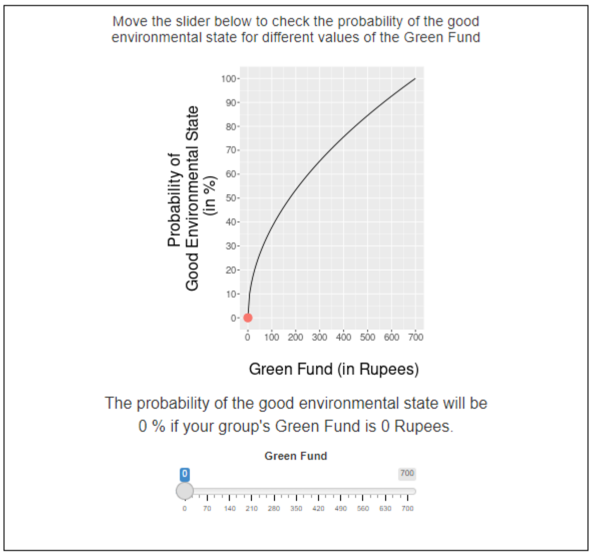
At the **terminal date**, each group member has the chance to keep a **new but risky income**. If there is a **good environment** at the **terminal date**, you will get to keep the risky income at that point in the future. However, on account of climate change and a bad environment you will not get to keep your risky income. This could be because of risks arising from many possible causes, say, flooding, fires, earthquakes, temperature increases, and social unrest from events associated with climate change.

The higher the Green Fund, the higher the probability of the Good Environment, and the lower the probability of the Bad Environment. This is how the Green Fund mitigates the effect of climate change by making it less likely to happen.

The diagram below shows the timeline of events. You receive 100 Rupees today and you are asked to divide it between 2 uses today.



The probability of the Good Environment is given by the graph and slider below. What you see in the graph is that as the Green Fund increases, the increase in probability gets smaller and smaller. This means, there are diminishing additional benefits to investing in the Green fund.



When the Green fund increases from 0 to 100 Rupees, the probability of Good Environment increases from 0 to 38%. However, when the Green Fund increases from 600 to 700 Rupees, the probability of Good Environment increases from 93% to 100%. Hence, while the first 100 Rupees of Green

Fund increase the probability of Good Environment by 38 percentage points, the last 100 Rupees only increase the probability by 7 percentage points.

If everyone in your group including you were to contribute their full 100 Rupees to the Green Fund, then the probability of Good Environment becomes 100%, which means you will definitely get the terminal date amount at the terminal date. If nobody in your group contributes anything to the Green fund, then the probability of the Good Environment becomes 0%, and none of you get the terminal date amount.

Important note: The benefits of the Green Fund are the same for all group members, even if they contributed different amounts, including a zero amount. Group members will never find out the individual investments of the other group members.

Let's take an example: Suppose that the individual investments of 7 group members to the Green Fund are 10, 40, 20, 0, 60, 70, and 80 Rupees. Then the Green Fund has 280 Rupees, and this fund will benefit all 7 members equally. A Green Fund of 280 Rupees gives us a 63% probability of Good Environment and a 37% probability of Bad Environment. If, however, the person who contributed 0 had contributed 70 Rupees, then the Green Fund would be 350 Rupees, and the Good Environment would have a 71% chance of happening.

Trial Run: Green Investment Task Questions

Question 1: You stand a chance to receive 200 Rupees as your **risky income** at the terminal date. The terminal date amount is risky because you only receive it if there is a Good Environment at the terminal date, which depends on your group's Green Fund.

For each **possible terminal date** in the table below, make a binding decision now of how much of 100 Rupees between 'amount you wish to keep' and 'amount you wish to invest' in the Green fund. You will receive the 'amount you wish to keep' **today**.

Please also state your expectation of the Green Fund in every case.

	Enter the amount you wish to keep out of the 100 Rupees you receive 5 weeks from now	Enter the amount you wish to invest in the Green Fund out of the 100 Rupees you receive 5 weeks from now	Based on your estimate of how much others in your group will contribute, write your total estimated value of Green Fund out of 700 Rupees
If terminal date was 10 weeks from now	☐ Rupees	☐ Rupees	☐ Rupees
If terminal date was 30 weeks from now	☐ Rupees	☐ Rupees	☐ Rupees

Question 2: You stand a chance to receive different amounts stated below as your **risky income**, which is received at the terminal date that is 10 weeks from now. The terminal date income is risky because you only receive it if there is a Good Environment at the terminal date, which depends on your group's Green Fund.

For each **possible value of the risky income** in the table below, make a binding decision now of how you want to allocate your 100 Rupees between 'amount you wish to keep' and 'amount you wish to invest' in the Green fund. You will receive the 'amount you wish to keep' **in 5 weeks**.

Please also state your expectation of the Green Fund in every case.

	Enter the amount you wish to keep out of the 100 Rupees you receive 5 weeks from now	Enter the amount you wish to invest in the Green Fund out of the 100 Rupees you receive 5 weeks from now	Based on your estimate of how much others in your group will contribute, write your total estimated value of Green Fund out of 700 Rupees
If risky terminal date income was 100 Rupees	☐ Rupees	☐ Rupees	☐ Rupees
If risky terminal date income was 400 Rupees	☐ Rupees	☐ Rupees	☐ Rupees

Question 3: You stand a chance to receive 200 Rupees as your risky income which is received at the terminal date that is 10 weeks from now. The terminal date income is risky because you only receive it if there is a Good Environment at the terminal date, which depends on your group's Green Fund.

For each possible value of the future date in the table below, which is the date at which you receive your 'amount kept' after tax has been deducted, make a binding decision now of how you want to allocate your 100 Rupees between 'amount you wish to keep' and 'amount you wish to invest' in the Green Fund. You will receive the 'amount you wish to keep' in the number of weeks specified.

Please also state your expectation of the Green Fund in every case.

One of your decisions from either Question 1 or 2 or 3 will be chosen

	Enter the amount you wish to keep out of 100 Rupees you will receive at the future date	Enter the amount you wish to invest in the Green Fund out of 100 Rupees you receive at the future date	Based on your estimate of how much others in your group will contribute, write your total estimated value of Green Fund out of 700 Rupees
If future date was 1 week from now	☐ Rupees	☐ Rupees	☐ Rupees
If future date was 9 weeks from now	☐ Rupees	☐ Rupees	☐ Rupees

at random and you will receive the time dependent amounts that you have chosen. Remember that any of your decisions could be chosen to calculate your payout from this study.

Task 3 Instructions: Treatment 3

You will be put in a **group with 6 other people** who are participating in this study. Each group member will be given 100 Rupees by us today. Each group member will be asked to choose their most preferred tax rate on their income of Rs. 100.

All 7 group members make their tax decisions at the same time, without knowing the decision of any other group member. This gives us 7 most preferred tax rates. We eventually pick the middle point of these 7 tax rates, also known as the median tax rate. For example, if the most preferred tax rates in your group are 0, 0.05, 0.15, 0.2, 0.3, 0.35, 0.40 then the median tax rate will be 0.2 as three rates are higher than 0.2 and three rates are lower than 0.2. **A tax rate of 0.2 means the taxes to be paid on income of Rs. 100 will be 100 * 0.2 = Rs. 20.**

When proposing your most preferred tax rate (which we denote by t) you do not have to take account of the group's median tax rate that will be decided later. Hence, in our discussion below, from your point of view, we only talk of your most preferred tax rate (t) and the role that it plays, **as if it were to be the chosen tax rate for the entire group**.

Your income of 100 Rupees can be used for two purposes:

Use 1: Tax paid, which equals t*100 Rupees, is entirely used to finance a Green Fund that helps to mitigate climate change. Climate change occurs at some terminal date.

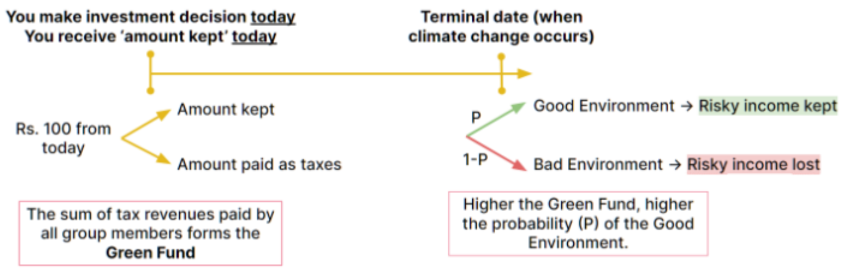
Use 2: After-tax income which equals (1-t)*100 Rupees is for you to keep today.

Your decisions must be made today. The total tax revenues of all 7 group members (7 × t × 100 Rupees) form the Green Fund which will only be used to mitigate the effects of climate change at the terminal date. The terminal date is when the effects of climate change take place.

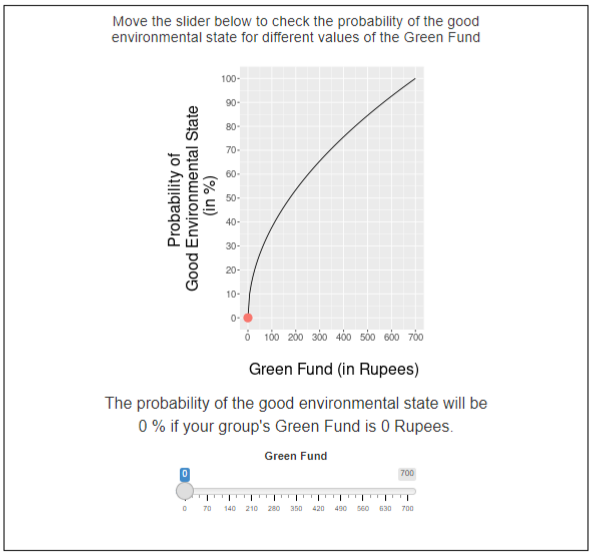
At the **terminal date**, each group member has the chance to keep a **new but risky income**. If there is a **good environment** at the **terminal date**, you will get to keep the risky income at that point in the future. However, on account of climate change and a bad environment you will not get to keep your risky income. This could be because of risks arising from many possible causes, say, flooding, fires, earthquakes, temperature increases, and social unrest from events associated with climate change.

The higher the Green Fund, the higher the probability of the Good Environment, and the lower the probability of the Bad Environment. This is how the Green Fund mitigates the effect of climate change by making it less likely to happen.

The diagram below shows the timeline of events. You receive 100 Rupees today and you are asked to divide it between 2 uses today.



The probability of the Good Environment is given by the graph and slider below. What you see in the graph is that as the Green Fund increases, the increase in probability gets smaller and smaller. This means, there are diminishing additional benefits to investing in the Green fund.



When the Green fund increases from 0 to 100 Rupees, the probability of Good Environment increases from 0 to 38%. However, when the Green Fund increases from 600 to 700 Rupees, the probability of Good Environment increases from 93% to 100%. Hence, while the first 100 Rupees of Green Fund increase the probability of Good Environment by 38 percentage points, the last 100 Rupees only increase the probability by 7 percentage points

If the tax rate is 1, so that the entire income of every group member is taxed and used to finance the Green Fund, then the probability of Good Environment becomes 100%, which means you will definitely get the terminal date amount at the terminal date. At the other extreme, if the tax rate is 0, then nobody pays any taxes, and the Green Fund is empty, then the probability of the Good Environment becomes 0%, and none of you get the terminal date amount. For intermediate values of the tax rate, between 0 and 1, we get various values of P between 0% and 100%.

Important note: The benefits of the Green Fund are the same for all group members, even if they chose to pay different taxes, including no taxes. Group members will never find out the individual taxes paid by the other group members.

Let's take an example: Suppose that your most preferred tax rate is 0.4 and this is implemented as the group's tax rate. Then the Green Fund is

$7 \times 0.4 \times 100 = 280$ Rupees, and it benefits all 7 members equally. A Green Fund of 280 Rupees gives us a 63% probability of a Good Environment and a 37% probability of a Bad Environment. If, however, you had chosen a tax rate of 0.5, then the Green Fund would have been 350 Rupees, and the Good Environment would have a 71% chance of happening.

Trial Run: Green Investment Task Questions

Question 1: You stand a chance to receive 200 Rupees as your risky income at the terminal date. The terminal date amount is risky because you only receive it if there is a Good Environment at the terminal date, which depends on your group's Green Fund.

For each possible value of the terminal date in the table below, choose the amount of tax you want to pay from your 100 Rupees.

Please also state your expectation of how much your group (including you) will pay as taxes.

	Enter your most preferred tax rate for your income of 100 Rupees which you receive today. Tax rates lie between 0 and 1, where 0 means no taxes paid, 0.5 means 50 Rupees paid as tax, 1 means 100 Rupees paid as tax	Enter your expectation of the average most preferred tax rate chosen by all group members (including you) for each case
If terminal date was 5 weeks from now	☐ Rupees	☐ Rupees
If terminal date was 25 weeks from now	☐ Rupees	☐ Rupees

Question 2: You stand a chance to receive different amounts stated below as your risky income which is received at the terminal date that is 5 weeks from now. The terminal date income is risky because you only receive it if there is a Good Environment at the terminal date, which depends on your group's Green Fund.

For each possible value of the risky terminal date income in the table below, choose the amount of tax you want to pay from your 100 Rupees.

Please also state your expectation of how much your group (including you) will pay as taxes.

	Enter your most preferred tax rate for your income of 100 Rupees which you receive today	Enter your expectation of the average most preferred tax rate chosen by all group members (including you) for each case
If risky terminal date income was 100 Rupees	☐ Rupees	☐ Rupees
If risky terminal date income was 400 Rupees	☐ Rupees	☐ Rupees

One of your decisions from either Question 1 or 2 will be chosen at random and you will receive the time dependent tokens that you have chosen. Remember that any of your decisions could be chosen to calculate your payout from this study.

Task 3 Instructions: Treatment 4

You will be put in a **group with 6 other people** who are participating in this study. Each group member will be given 100 Rupees by us sometimes in the future. Each group member will be asked to choose their most preferred tax rate on their income of 100 Rupees.

All 7 group members make their tax decisions at the same time, without knowing the decision of any other group member. This gives us 7 most preferred tax rates. We eventually pick the middle point of these 7 tax rates, also known as the median tax rate. For example, if the most preferred tax rates in your group are 0, 0.05, 0.15, 0.2, 0.3, 0.35, 0.40 then the median tax rate will be 0.2 as three rates are higher than 0.2 and three rates are lower than 0.2. **A tax rate of 0.2 means the taxes to be paid on income of Rs. 100 will be 100 * 0.2 = Rs. 20.**

When proposing your most preferred tax rate (which we denote by t) you do not have to take account of the group's median tax rate that will be decided later. Hence, in our discussion below, from your point of view, we only talk of your most preferred tax rate (t) and the role that it plays, **as if it were to be the chosen tax rate for the entire group**.

Your income of 100 Rupees can be used for two purposes:

Use 1: Tax paid, which equals t*100 Rupees, is entirely used to finance a Green Fund that helps to mitigate climate change. Climate change occurs at some terminal date.

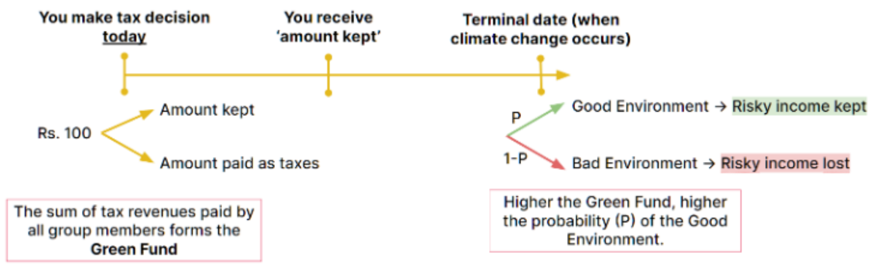
Use 2: After-tax income which equals (1-t)*100 Rupees is for you to keep.

Your decisions must be made today. You will make a binding decision today, and at the future date, your decision will be implemented with certainty. The total tax revenues of all 7 group members (7 × t × 100 Rupees) form the Green Fund which will only be used to mitigate the effects of climate change at the terminal date. The terminal date is when the effects of climate change take place.

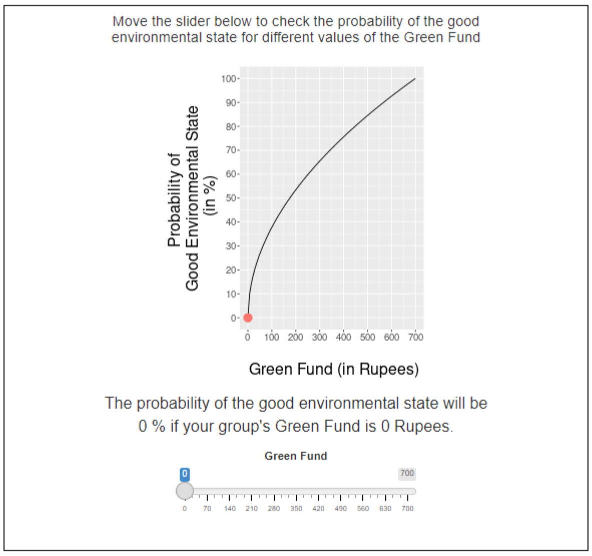
At the **terminal date**, each group member has the chance to keep a **new but risky income**. If there is a **good environment** at the **terminal date**, you will get to keep the risky income at that point in the future. However, on account of climate change and a bad environment you will not get to keep your risky income. This could be because of risks arising from many possible causes, say, flooding, fires, earthquakes, temperature increases, and social unrest from events associated with climate change.

The higher the Green Fund, the higher the probability of the Good Environment, and the lower the probability of the Bad Environment. This is how the Green Fund mitigates the effect of climate change by making it less likely to happen.

The diagram below shows the timeline of events. You receive 100 Rupees in future and you are asked to divide it between 2 uses today.



The probability of the Good Environment is given by the graph and slider below. What you see in the graph is that as the Green Fund increases, the increase in probability gets smaller and smaller. This means, there are diminishing additional benefits to investing in the Green fund.



When the Green fund increases from 0 to 100 Rupees, the probability of Good Environment increases from 0 to 38%. However, when the Green Fund increases from 600 to 700 Rupees, the probability of Good Environment increases from 93% to 100%. Hence, while the first 100 Rupees of Green Fund increase the probability of Good Environment by 38 percentage points, the last 100 Rupees only increase the probability by 7 percentage points.

If the tax rate is 1, so that the entire income of every group member is taxed and used to finance the Green Fund, then the probability of Good Environment becomes 100%, which means you will definitely get the terminal date amount at the terminal date. At the other extreme, if the tax rate is 0, then nobody pays any taxes, and the Green Fund is empty, then the probability of the Good Environment becomes 0%, and none of you get the terminal date amount. For intermediate values of the tax rate, between 0 and 1, we get various values of P between 0% and 100%.

Important note: The benefits of the Green Fund are the same for all group members, even if they chose to pay different taxes, including no taxes. Group members will never find out the individual taxes paid by the other group members.

Let's take an example: Suppose that your most preferred tax rate is 0.4 and this is implemented as the group's tax rate. Then the Green Fund is

$7 \times 0.4 \times 100 = 280$ Rupees, and it benefits all 7 members equally. A Green Fund of 280 Rupees gives us a 63% probability of a Good Environment and a 37% probability of a Bad Environment. If, however, you had chosen a tax rate of 0.5, then the Green Fund would have been 350 Rupees, and the Good Environment would have a 71% chance of happening.

Trial Run: Green Investment Task Questions

Question 1: You stand a chance to receive 200 Rupees as your risky income at the terminal date. The terminal date amount is risky because you only receive it if there is a Good Environment at the terminal date, which depends on your group's Green Fund.

For each possible value of the terminal date in the table below, make a binding decision now of your most preferred tax rate for your income of 100 Rupees. You will receive your 'amount kept' **5 weeks from now**, after the tax has been deducted.

Please also state your expectation of how much your group (including you) will pay as taxes.

	Make a binding decision today of your most preferred tax rate for your income of 100 Rupees which you receive 5 weeks from now. Tax rates lie between 0 and 1, where 0 means no taxes paid, 0.5 means 50 Rupees paid as tax, 1 means 100 Rupees paid as tax	Enter your expectation of the average most preferred tax rate chosen by all group members (including you) for each case
If terminal date was 10 weeks from now	☐ Rupees	☐ Rupees
If terminal date was 30 weeks from now	☐ Rupees	☐ Rupees

Question 2: You stand a chance to receive different amounts stated below as your risky income which is received at the terminal date that is 10 weeks from now. The terminal date income is risky because you only receive it if there is a Good Environment at the terminal date, which depends on your group's Green Fund.

For each possible value of the risky terminal date income in the table below, make a binding decision now of your most preferred tax rate for your income of 100 Rupees. You will receive your 'amount kept' **5 weeks from now**, after the tax has been deducted.

Please also state your expectation of how much your group (including you) will pay as taxes.

	Make a binding decision today of your most preferred tax rate for your income of 100 Rupees which you receive 5 weeks from now	Enter your expectation of the average most preferred tax rate chosen by all group members (including you) for each case
If risky terminal date income was 100 Rupees	☐ Rupees	☐ Rupees
If risky terminal date income was 400 Rupees	☐ Rupees	☐ Rupees

Question 3: You stand a chance to receive 200 Rupees as your risky income which is received at the terminal date that is 10 weeks from now. The terminal date income is risky because you only receive it if there is a Good Environment at the terminal date, which depends on your group's Green Fund.

For each possible value of the future date in the table below, which is the date at which you receive your 'amount kept' after tax has been deducted, make a binding decision now of your most preferred tax rate for your income of 100 Rupees. You will receive your 'amount kept' in the number of weeks specified.

Please also state your expectation of the average most preferred tax rate chosen by all 7 group members.

	Make a binding decision today of your most preferred tax rate for your income of 100 Rupees to be received at the following future dates	Enter your expectation of the average most preferred tax rate chosen by all group members (including you) for each case
If future date was 1 week from now	☐ Rupees	☐ Rupees
If future date was 9 weeks from now	☐ Rupees	☐ Rupees

One of your decisions from either Question 1 or 2 or 3 will be chosen at random and you will receive the time dependent amounts that you have *chosen. Remember that any of your decisions could be chosen to calculate your payout from this study.*