

Appendix B: Experiment Instructions

INSTRUCTIONS

This is an experiment about decision making. You will always be given truthful information during this experiment because deception is not allowed in experimental economics research.

You will earn cash during this experiment if you follow these instructions carefully and make informed decisions. The amount you earn depends on your decisions and on the decisions of the other participants. Money you earn will be paid to you, in cash, at the end of the experiment.

There are eight parts to the experiment. We will now review the general instructions for Part 1 through Part 8.

GENERAL INSTRUCTIONS FOR PART 1 through PART 8

Your role: You own and operate a firm. You will make decisions that affect the amount of money your firm earns. This money will be called your Production Income

Decision Rounds: Each part of the experiment is divided into five decision "rounds." Each decision round is independent, meaning that the decisions you make in one round will not affect the decisions or outcomes of other rounds.

Decisions: You will make two decisions in each round. The two decisions are:

- (1) **Management Decision** – You will choose one of ten management options labeled "A" through "J"
- (2) **Technology Decision** – You will choose one of two technology options labeled "Technology 1" or "Technology 2"

The options for the two decisions will be the same in each round.

Groups: You will be in a group consisting of six players (firms). All firms in your group are identical. Think of your firm and the five other firms as being located near a common water resource. Groups are randomly assigned in each part of the experiment. You will know who is assigned to each group. Your group will always be the six firms seated in a

semi-circle together. Firms that are not seated in your group of six are not in your group. Firms that are not in your group do not have any impact on your earnings.

Pollution: Your firm can also generate pollution, and the amount of the pollution depends on the management and technology decisions that you make for your firm. In general, decisions that provide higher Firm Profits for your firm also generate more pollution. The relationship between your decisions, production income, and pollution is shown in the attached Decision Table. [Refer to this table before making your decisions.]

Total Pollution: Total Pollution is the combined pollution from all six firms in your group, including the pollution from your firm.

Pollution Calculator: A Pollution Calculator is provided to test different scenarios to see how the decisions of other firms in your group could affect Total Pollution. This tool is for informational purposes as the scenarios you implement with the tool are hypothetical.

Tax on Pollution: In order to protect the water resource, the regulator does not want Total Pollution to exceed 18 units. The regulator requires you and everyone else in your group to pay a Tax if the Total Pollution in your group is greater than 18 units. The Tax Payment sheet explains how the Tax is calculated.

Firm Profit: Your Firm Profit is the final amount of money that your firm earns after any taxes have been deducted from your Production Income. $\text{Firm Profit} = \text{Production Income} - \text{Tax}$

Information after Each Round: After submitting your decision in a round, a summary table will be displayed showing your individual decision, pollution, and production income for that round. Once all six firms in your group have submitted their decisions, you will also see the Total Pollution level, any applicable Tax Payments, and your Firm Profit for that round.

Group Relocation: At the end of each part, new groups will be assigned. The administrator will tell you your new group number. When told to do so, carefully take your pen, number tent, and *all* instructions with you *and move* to the group to which you are assigned. Leave the tablet and headphones at your desk. The administrator for each group will tell you which specific seat to sit at. Do **NOT** press any buttons on your tablet when changing groups. Always place your number tent at the front left side of your desk.

Earning money in the experiment: The money your firm makes (Firm Profit) will be shown in "experimental dollars." Experimental dollars will be exchanged for cash at the end of the experiment at the rate of 910 experimental dollars to 1 US Dollar.

General comments:

- Each firm is identical and faces the same relationship between production income and pollution.
- A round of the experiment is complete when all six firms have made their Management and Technology Decisions.
- Before each part of the experiment, you will be given additional instructions and all calculations will be described.
- Your group will remain the same for the five rounds in a specific part of the experiment.
- New groups are assigned for each new part, and you will be told where to relocate.
- Take your pen, number tent, and *all* instructions with you when moving seats.
- Do **NOT** press any buttons on your tablet when moving seats.

HOW TO MAKE YOUR DECISIONS

In each round, you will be shown an interactive Decision Table like the one on the other side of this page.

Management Decision: You make your management decision ('A' thru 'J') by clicking one of the buttons located in the rows of the *Decision Table*.

Technology Decision: You make your technology decision ('1' or '2') by clicking one of the buttons located in the columns of the *Decision Table*.

You can use the Pollution Calculator tool to see how the decisions of others will affect Total Pollution. Scenarios you check with this tool are for informational purposes only and will not affect your earnings.

After you have made your decisions, click the CONFIRM button. Once you have clicked this button, it is no longer possible to change your decisions for that round.

Results – While you are waiting for the other firms to make their decisions, you can review the results of past rounds, which will be shown on your screen. After all six firms have clicked the CONFIRM button, the results of the current round will appear, including the Total Pollution from all members of your group, your Firm Profit, and the total experimental dollars you have earned.

Decision Table

The image below is a screenshot of the Decision Table and the Pollution Calculator that you will use on your tablet.

Please make a Technology and Management Decision

Decision Table				
Management Decision	Technology 1		Technology 2	
	Production Income	Pollution	Production Income	Pollution
A	440	0.0	335	0.0
B	550	1.0	445	0.5
C	640	2.0	535	1.0
D	710	3.0	605	1.5
E	760	4.0	655	2.0
F	790	5.0	685	2.5
G	800	6.0	695	3.0
H	790	7.0	685	3.5
I	760	8.0	655	4.0
J	710	9.0	605	4.5

Pollution Calculator

My Pollution

Tech 1 Tech 2

Participant 2 Expected Pollution

Tech 1 Tech 2

Participant 3 Expected Pollution

Tech 1 Tech 2

Participant 4 Expected Pollution

Tech 1 Tech 2

Participant 5 Expected Pollution

Tech 1 Tech 2

Participant 6 Expected Pollution

Total Pollution

Pollution tax for each person \$

Based on the scenario you calculated above:

Your Firm Profit in this round would be \$

TAX PAYMENT SHEET

This tax payment sheet applies to all 8 parts of this experiment.

You will see different treatments throughout the experiment, however this tax *will always apply*.

In order to protect the water resource, the regulator requires that Total Pollution from your group does not exceed 18 units. To enforce this, the regulator requires you and everyone else in your group to make the following Tax Payment if the Total Pollution in your group is greater than 18:

The Tax Payment for each firm in your group is calculated as follows:

Total Pollution \leq 18	Tax Payment = 0
Total Pollution $>$ 18	Tax Payment = 26 x (Total Pollution – 18)

In other words,

- If the Total Pollution in your group is less than or equal to 18, you and each person in your group pays 0 in taxes.
- If the Total Pollution in your group is greater than 18, you and each firm pays 26 experimental dollars in taxes for every unit of pollution above 18 units.

The amount of the Tax Payment is determined by decisions of everyone in your group. The *Tax Payment Sheet* (on the back of this page) indicates the Tax Payment corresponding to different levels of Total Pollution.

The Tax Payment, if any, will be deducted from your Production Income such that
Firm Profit = Production Income - Tax Payment

<u>Tax Payment Sheet</u>					
Total Pollution	Tax Payment	Total Pollution	Tax Payment	Total Pollution	Tax Payment
0	0	21	78	41	598
1	0	22	104	42	624
2	0	23	130	43	650
3	0	24	156	44	676
4	0	25	182	45	702
5	0	26	208	46	728
6	0	27	234	47	754
7	0	28	260	48	780
8	0	29	286	49	806
9	0	30	312	50	832
10	0	31	338	51	858
11	0	32	364	52	884
12	0	33	390	53	910
13	0	34	416	54	936
14	0	35	442	55	962
15	0	36	468	56	988
16	0	37	494	57	1,014
17	0	38	520	58	1,040
18	0	39	546	59	1,066
19	26	40	572	60	1,092
20	52				

INSTRUCTIONS FOR PRACTICE

You will now play five practice rounds to learn how the experiment works. The outcomes of these rounds will **not** affect your cash earnings.

In each round of this part, you will make your Management Decision and your Technology Decision. Refer to the *Decision Table* to see how your decisions affect your Production Income and Pollution.

After everyone makes their decisions, the results of that round will be displayed.

INSTRUCTIONS FOR PART 1

This part has five rounds. In each round of this part, you will make your Management Decision and your Technology Decision.

INSTRUCTIONS FOR PART 2

This part has five rounds. In each round of this part, you will make your Management Decision and your Technology Decision.

For this part, Technology 2 is recognized because this technology reduces pollution. After each round is complete and the summary screen appears, firms that selected Technology 2 in that round will stand their green flag on the front right corner of their desk upright indicating they chose the environmentally-friendly technology. The flag will remain standing upright on the desk until the next round has been completed and the summary screens appears again. The administrator will indicate when the flags should be put up or taken down, and will check to assure that only those that selected Technology 2 put their flag up.

INSTRUCTIONS FOR PART 3

This part has five rounds. In each round of this part, you will make your Management Decision and your Technology Decision.

For this part, please put your headphones on over both ears. If the Total Pollution from your group is greater than 18, the University of Delaware mascot (YoUDee) will express displeasure towards you and your group of six firms through a video clip on the television in your group. A series of beeps will also be played to remind you that the video is being shown.

INSTRUCTIONS FOR PART 4

This part has five rounds. In each round of this part, you will make your Management Decision and your Technology Decision.

For this part, Technology 2 is recognized because this technology reduces pollution. After each round is complete and the summary screen appears, firms that selected Technology 2 in that round will stand their green flag on the front right corner of their desk upright indicating they chose the environmentally-friendly technology. The flag will remain standing upright on the desk until the next round has been completed and the summary screens appears again. The administrator will indicate when the flags should be put up or taken down, and will check to assure that only those that selected Technology 2 put their flag up.

For this part, please put your headphones on over both ears. If the Total Pollution from your group is greater than 18, the University of Delaware mascot (YoUDee) will express displeasure towards you and your group of six firms through a video clip on the television in your group. A series of beeps will also be played to remind you that the video is being shown.

INSTRUCTIONS FOR PART 5

This part has five rounds. In each round of this part, you will make your Management Decision and your Technology Decision.

For this part, please put your headphones on over both ears. If the Total Pollution from your group is greater than 18, the University of Delaware mascot (YoUDee) will express displeasure towards you and your group of six firms through a video clip on the television in your group. A series of beeps will also be played to remind you that the video is being shown.

In addition, in each round you are given the opportunity to send other firms in your group a predetermined message that says, “Think about the rest of the group; do the right thing.”

Information about messages:

- Using the check boxes at the bottom of your screen under the text box, you can select to whom you want to send messages.
- You may send messages to multiple firms.
- You do not have to send any messages.
- If you decide to not send any messages, you must select “Do not send any messages.”
- The numbers at the bottom of your screen represent the tent number on each firm’s desk in your group.
- Once you have decided who to send messages to (or selected “Do not send any messages”), click the “Send” button.
- Messages you receive will appear on your screen in a pop-up message with a red exclamation point.
- You must click the “Ok” button to remove the pop-up every time you receive a message.
- You cannot see who specifically sent you a message, but if you receive more than one message, the messages will stack on top of each other (multiple firms may send you a message).

Once everyone in your group has confirmed their messaging decisions, you can make your Management and Technology Decisions. The CONFIRM button for the Management and Technology Decisions *cannot be clicked until everyone has made their messaging decisions.*

INSTRUCTIONS FOR PART 6

This part has five rounds. In each round of this part, you will make your Management Decision and your Technology Decision.

For this part, Technology 2 is recognized because this technology reduces pollution. After each round is complete and the summary screen appears, firms that selected Technology 2 in that round will stand their green flag on the front right corner of their desk upright indicating they chose the environmentally-friendly technology. The flag will remain standing upright on the desk until the next round has been completed and the summary screens appears again. The administrator will indicate when the flags should be put up or taken down, and will check to assure that only those that selected Technology 2 put their flag up.

For this part, please put your headphones on over both ears. If the Total Pollution from your group is greater than 18, the University of Delaware mascot (YoUDee) will express displeasure towards you and your group of six firms through a video clip on the television in your group. A series of beeps will also be played to remind you that the video is being shown.

In addition, in each round you are given the opportunity to send other firms in your group a predetermined message that says, “Think about the rest of the group; do the right thing.”

Information about messages:

- Using the check boxes at the bottom of your screen under the text box, you can select to whom you want to send messages.
- You may send messages to multiple firms.
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- The numbers at the bottom of your screen represent the tent number on each firm’s desk in your group.
- Once you have decided who to send messages to (or selected “Do not send any messages”), click the “Send” button.
- Messages you receive will appear on your screen in a pop-up message with a red exclamation point.
- You must click the “Ok” button to remove the pop-up every time you receive a message.
- You cannot see who specifically sent you a message, but if you receive more than one message, the messages will stack on top of each other (multiple firms may send you a message).

Once everyone in your group has confirmed their messaging decisions, you can make your Management and Technology Decisions. The CONFIRM button for the Management and Technology Decisions *cannot be clicked until everyone has made their messaging decisions.*

INSTRUCTIONS FOR PART 7

This part has five rounds. In each round of this part, you will make your Management Decision and your Technology Decision.

For this part, in each round you are given the opportunity to send other firms in your group a predetermined message that says, “Think about the rest of the group; do the right thing.”

Information about messages:

- Using the check boxes at the bottom of your screen under the text box, you can select to whom you want to send messages.
- You may send messages to multiple firms.
- You do not have to send any messages.
- If you decide to not send any messages, you must select “Do not send any messages.”
- The numbers at the bottom of your screen represent the tent number on each firm’s desk in your group.
- Once you have decided who to send messages to (or selected “Do not send any messages”), click the “Send” button.
- Messages you receive will appear on your screen in a pop-up message with a red exclamation point.
- You must click the “Ok” button to remove the pop-up every time you receive a message.
- You cannot see who specifically sent you a message, but if you receive more than one message, the messages will stack on top of each other (multiple firms may send you a message).

Once everyone in your group has confirmed their messaging decisions, you can make your Management and Technology Decisions. The CONFIRM button for the Management and Technology Decisions *cannot be clicked until everyone has made their messaging decisions.*

INSTRUCTIONS FOR PART 8

This part has five rounds. In each round of this part, you will make your Management Decision and your Technology Decision.

For this part, Technology 2 is recognized because this technology reduces pollution. After each round is complete and the summary screen appears, firms that selected Technology 2 in that round will stand their green flag on the front right corner of their desk upright indicating they chose the environmentally-friendly technology. The flag will remain standing upright on the desk until the next round has been completed and the summary screens appears again. The administrator will indicate when the flags should be put up or taken down, and will check to assure that only those that selected Technology 2 put their flag up.

In addition, in each round you are given the opportunity to send other firms in your group a predetermined message that says, “Think about the rest of the group; do the right thing.”

Information about messages:

- Using the check boxes at the bottom of your screen under the text box, you can select to whom you want to send messages.
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- You cannot see who specifically sent you a message, but if you receive more than one message, the messages will stack on top of each other (multiple firms may send you a message).

Once everyone in your group has confirmed their messaging decisions, you can make your Management and Technology Decisions. The CONFIRM button for the Management and Technology Decisions *cannot be clicked until everyone has made their messaging decisions.*