

Evaluation system

Students who participate in the experiment have a chance to earn bonus points toward their final grade. In order to earn the bonus points, students are required to finish the entire experiment. The experiment has two parts---

Part I: Rule of Law

Part II: Case by Case

Each part has 10 rounds. The experimenter will sum up all the **net profit** in each round from both the “Rule of Law” experiment and “Case by Case” experiment to derive the total net profit. The bonus points will be given based on your total net profit. We will use the following table to determine your bonus points.

Total Net Profit	Bonus Points
$\geq 451,697$	12 points
[376,414 , 451,697]	11 points
[301,131 , 376,414]	10 points
[225,849 , 301,131]	9 points
[150,566 , 225,849]	8 points
[75,283 , 150,566]	7 points
[0 , 75,283]	6 points
≤ 0	5 points

During the experiment, you are not allowed to talk to each other or try to collaborate with each other. If you have question, you can raise your hand and ask the experimenter. Now, we will start the background story for the experiment.

Introduction for Part I Experiment---Rule of Law

Green Island is an independent country. It has a democratic system and is ruled by law. The representatives in the legislature branch enact laws and everyone must abide by them without exception. If the current legal regulation does not serve the best interest to a particular group of people, the only way to change it is through lobbying. But lobbying is not free. You have to make political contributions to the representatives in order to have influence on them. Political contributions are legal in Green Island. The representatives use the political contributions to fund their campaign activities. By sponsoring the campaign activities, you can have access to the representative. Your opinion will be heard by them and thus their position on certain laws will be influenced by you.

If there are more people with the same interests as you who also make political contribution to the representatives, it means more people will have access to them. As a result, the same opinion will be repeated to them and there will be a greater chance that the law will be changed to suit your interest. However, people who share your interests but make no political contributions also enjoy the same benefit from the change of the law but incur no cost (make no political contribution).

Green Island produces a special product “Ortha”. There are 6 oligopolists producing identical “Ortha” on Green Island. The most important factor input in the production of Ortha is fuel. There are two types of fuels that can be used in producing “Ortha”: the traditional fuel and green fuel. The traditional fuel is cheap but its use causes a lot of pollution. The green fuel is much more expensive and totally clean to the environment. The mix of two fuels in the production process is feasible. The production cost increases with the amount of green fuel used.

Production Cost and Contribution

In the meantime, the Green Island has a law that requires the six oligopolists that produce “Ortha” to use 40% of traditional fuel and 60% of green fuel to produce “Ortha”. The unit production cost for this mix fuel input under the current regulation is \$260

You are one of the six identical oligopolists. You and the other 5 firms can lobby independently to try to change the law. But you need to make political contributions to the representatives to gain access to them. The greater the contributions you and other firms make, the greater extent the law will be modified so as to allow you to use more traditional fuel in the production, which will lower your production cost. Actually, the relationship between amount of contribution and unit production cost is described in the following table:

Table 1: Total contribution and production cost

	Below 2400	2401-4800	4801-7200	7201-9600	9601-12000	Above 12000
Total contribution from the six firms						
Unit production cost	260	180	140	110	90	80

Market Price, Benefit and Net Benefit

I. Market Price: the market price for “Ortha” is determined by the following equation:

$$P=1000 - 0.5 \times \sum q_i \quad (\text{Equation 1})$$

q_i : the output for firm i

$$\sum q_i = q_1 + q_2 + q_3 + q_4 + q_5 + q_6 \quad \text{the total output for the six firms.}$$

This equation means that the greater total production from the six firms, the lower market price will be. When the aggregate output exceeds 2000 units, the market price for “Ortha” will be zero.

II. Profit: your profit is calculated as follows:

$$\text{Profit} = P \times q_i - C \times q_i \quad (\text{Equation 2})$$

C : unit production cost for the six firms

III. Net Profit: your net profit is calculated as follows:

$$\text{Net Profit} = \text{profit} - \text{your political contribution} \quad (\text{Equation 3})$$

3)

IV. Cournot Equilibrium:

Because the six firms are identical, their outputs and profits under Cournot Equilibrium will also be the same when their costs are the same. The equilibrium outputs, prices and profits for the six levels of cost are summarized in table 2.

Table 2: Cournot Equilibrium outputs, prices and profits for the six levels of unit production cost.

Cost	260	180	140	110	90	80
Individual output	211	234	246	254	260	263
Market Price	366	297	263	237	220	211
Profit	22351	27445	30188	32331	33800	32547

V. The relationship between cost, output and profit.

In the **Rule of Law** experiment, you need to decide your **contribution** first. The aggregate contribution from the six firms will determine the production cost for all of you. The lower unit production cost you have, the higher profit you may obtain. Once the unit production cost is determined, you will be asked to decide your output level. It is possible to increase profit by increasing output. But keep in mind that your profit also depends on other firms' output decision. If the aggregate output is very large, the market price for "Ortha" will be very low, and the profit for each firm will also be low. When the aggregate output is greater than **2000 units**, the market price will drop to **ZERO**. At that point, each firm incurs loss(Negative profit), which is equal to cost times individual output plus individual contribution.

Experiment Procedure

In the “Rule of Law” experiment, you need to decide your contribution level and output in each round. Write down your contribution in column I. Also, write down your ID number and your contribution on the paper slip. The experimenter will record the individual contributions and add them up to calculate the total contribution. Using the total contribution and cost table in **page 3**, the experimenter will tell you the total amount of contributions and the corresponding unit cost for your group. Please write your unit cost in column II. In this case, each firm in your group has the same production cost. Next, you need to decide your output level. Write down your output decision in column III. Also, write down your ID number and output decision on the paper slip. The experimenter will record your output decision and calculate the profit and net profit for you. Please record price, profit and net profit in column IV, V and VI.

You cannot let other people in your group know your contribution and output. In the last page (page 12), you will have an assigned ID number. You cannot let other people see your ID number, either. At the end of each round, the experimenter will show each firm’s net profit on the blackboard from which you can see your own profit ranking in your group.

Let’s start two test rounds to see if everyone understands the experiment.

	I	II	III	IV	V	VI (VI=V-I)
Round	Individual contribution	Unit production cost	Individual Output	Market price	Profit	Net Profit
1						
2						

If you have no further question, we will start our experiment now. **Remember, it is the Net Profit that matters.**

Record Sheet

	I	II	III	IV	V	VI (VI=V-I)
Round	Individual contribution	Unit production cost	Individual Output	Market price	Profit	Net Profit
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
					Total Net Profit:	

Introduction for Part II experiment—Case by Case Exemption

After experiencing several years of democracy, the Green Island changes to be an authoritarian regime. The regulation on the mix of fuel in production of “Ortha” still remains, but each firm can apply for exemption on a case by case basis. You can offer a gratuity to the regulator and the regulator will allow you to increase the percentage of traditional fuel in production depending on the size of the gratuity you offer. Before you decide the gratuity, you know the relationship between the gratuity and unit production cost as shown in the following table:

Table 3. Gratuity and production cost

The gratuity from individual firm	0	600	1000	1400	1800	2200
Unit production cost	260	180	140	110	90	80

You are one of the six oligopolists. In this case, **your decision** on how much gratuity to offer will determine your unit production cost. You must choose one number from the 6 gratuity options (0, 600, 1000, 1400, 1800, 2200) as your decision. For example, if you give a \$600 gratuity, your unit production cost will be \$180. If your gratuity is \$2,200, then your unit production cost will go down to \$80.

Market Price, Benefit and Net Benefit

I. Market Price:

In this experiment, you face the same market demand curve as you did in the “Rule of Law” experiment.

$$P=1000 - 0.5 \times \sum q_i \quad (\text{Equation 1})$$

q_i : the output for firm i

$$\sum q_i = q_1 + q_2 + q_3 + q_4 + q_5 + q_6 \quad \text{the total output for the six firms.}$$

II. Profit:

Your profit now depends on your firm’s unit production cost:

$$\text{Profit} = P \times q_i - C_i \times q_i \quad (\text{Equation 4})$$

C_i : unit production cost for firm i

In the case by case experiment, your unit production cost depends on how much gratuity you offer, **not** on the total gratuity from the six firms. Therefore, the six firms may have different unit production costs.

III. Net Profit:

Your Net profit is calculated as follows:

$$\text{Net Profit}_i = \text{Profit}_i - \text{Gratuity}_i \quad (\text{Equation 5})$$

V. The relationship between cost, output and profit.

In the **case by case** experiment, you are asked to make decision on gratuity and output **at the same time**. Higher gratuity will give you lower production cost. Lower production cost may lead to a higher profit. However, the market price also depends on the aggregate output. If aggregate output is large, the market price will be low and the profit will also be low. When the aggregate output exceeds 2000 units, market price will drop to **zero**. At that point, each firm incurs loss (negative profit).

Experiment Procedure

In each round, you need to choose your gratuity level using table 3. Write down your decision in column I in the record sheet (Page 11). Once you decide your gratuity, use **table 3 in page 8** to find the corresponding cost and write it down in column II. At the same time, please decide your output level and write down in column III. Write down your ID number, gratuity and output decision on the paper slip. The experimenter will record your gratuity and output decision and provide you with market price, profit and net profit. Please record them in Colum IV, V and VI.

You cannot let other people in your group know your gratuity and output amount. In the last page, you will have an assigned ID number. You cannot let other people see your ID number, either. At the end of each round, the experimenter will show each firm's net profit on the blackboard from which you can determine your own profit ranking in your group.

Let's start two test rounds to see if everyone understands the experiment.

	I	II	III	IV	V	VI (VI=V-I)
Round	Individual gratuity	Unit production cost	Individual Output	Market price	Profit	Net Profit
1						
2						

If you have no further question, we will start our experiment now. **Remember, it is the Net Profit that matters.**

Record Sheet

	I	II	III	IV	V	VI (VI=V-I)
Round	Individual gratuity	Unit production cost	Individual Output	Market price	Profit	Net Profit
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
					Total Net Profit	

Name: _____

ID: _____

Total net profit from the two experiment: _____

Bonus Points: _____

Date: _____