Lesson 2:
Property Rights

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Standards and Benchmarks (see page 2.14)

Lesson Description

This lesson demonstrates the Coase theorem, which suggests that if bargaining can be done with low costs, then resources will be allocated in an efficient manner. In the activity, a household and a business sit on a shared lake. The two must decide whether the business will be able to pollute the lake, which imposes an external cost on the household. The lesson shows that ownership of the lake has no impact on whether the lake gets polluted, although ownership of the lake means potential gains for the owner.

Grade Level

High School

Concepts

Coase theorem

Negative externality

Property rights

Objectives

Students will be able to

- define Coase theorem, negative externality, and property rights;
- describe the effects of a change in ownership of environmental resources; and
- explain why environmental solutions are often difficult to negotiate.

Compelling Question

Does it matter who owns resources?

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Time Required

45 minutes

Materials

- PowerPoint Slides 2.1-2.3
- Handout 2-1, one copy folded in half for each pair of students
- Handout 2-2, one copy cut in half for each pair of students
- Handout 2-3A, one copy cut in half for each pair of students in half of the class
- Handout 2-3B, one copy cut in half for each pair of students in the other half of the class
- Handout 2-4, one copy for each student

Introduction

Economists advocate for the use of market-based incentives to decide whether businesses can use a natural resource like a lake or the air to dispose of waste. The Coase theorem suggests that if a business can negotiate with people, such as those who live on a lake, then the parties can fix the problem of externalities in an efficient way. In other words, if the benefits of using a lake for waste disposal exceed the costs of doing so, the business will be allowed to pollute the lake. In addition, it should not matter who controls (or owns) the lake. If the business owns the lake, it can do as it likes with the lake. It will use the lake for disposal unless households pay the business to refrain from doing so. But if households control the lake, then the business can still use the lake for waste disposal by paying the households for the right to do so. The point is that with bargaining, the lake will be used to do whatever is valued most by society. The only difference that occurs when the property is assigned to one group or another is with the income; the owner of the property is wealthier because of the ownership. The lesson can be generalized to other market-based systems. For example, in a tradeable permit system used to control pollution, the ultimate result—how much pollution and by whom—is not in doubt; differences in allocation only impact the wealth of the businesses who receive permits, not the amount of pollution.

Procedure

1. Display Slide 2.2. Ask the students to speculate on why an environmental group would sell its land to a logging company. (*Answers will vary.*)

2. Tell the students you will conduct a short simulation to demonstrate the effects of property ownership on the use of a resource. Group the students into pairs. Put a folded copy of

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Handout 2-1: Clean or Dirty between each pair. Tell the students they will determine if the lake should be clean or dirty. Demonstrate the difference by flipping the sheet from one side to the other. Tell the students that the lake will begin each round as clean—so flip Handout 2-1 so that the clean side faces up.

3. Display Slide 2.3. Explain that the student in each pair who is seated to the left will represent the business. The other student will represent the household. Both the business and the household are located next to the same lake. No one in the household works for the business.

4. Distribute a cut-apart copy of *Handout 2-2: Transaction Sheets* to each pair of students. The business sheets should be handed to the students representing the business. The household sheets should be handed to the students representing the household. Tell the students they will be using the transaction sheets to keep track of the finances for their business or household. Explain that they start with a certain level of wealth or assets and that that level will be affected by any payments made or received, as well as by whether the lake is clean or dirty.

5. Distribute a cut-apart copy of *Handout 2-3A: Business and Household* to each pair of students in half of the class. Distribute a cut-apart copy of *Handout 2-3B: Business and Household* to each pair of students in the other half of the class. (NOTE: Versions A and B are different. To keep easy track of the two versions, distribute version A to one side of the class and version B to the other side.) The business sheets should be handed to the students representing the business. The household sheets should be handed to the students representing the household. Tell the students to review their information without immediately sharing their information with their partner. Discuss the following to remind them of the incentives for each role:

    - Ask the business students why they would like to pollute the lake. (*They would save money by doing so.*)
    - Ask the household students why they would like the lake to remain clean. (*Their homes would have more value.*)

6. Tell the students they will now try to decide whether the lake will remain clean or be polluted. Explain that they will be playing two rounds in this activity. In the first round, the households will control the fate of the lake, but everything is up for negotiation. If the business can persuade the household, monetarily, to allow pollution, then the lake can be polluted. Explain the following:

    - The students can make payments using an electronic funds transfer (EFT) form on the bottom of Handouts 2-3A and 2-3B. They just fill in the amounts, fold along the dotted line, and tear off a sheet to give it as payment after entering the payment on their transaction sheets. The person receiving the EFT should note the amount on their transaction sheet and keep the EFT form as a receipt.

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- When the round begins, the students should negotiate to see what will become of the lake. Note that in some cases, a deal might not be possible. After they have made any agreements, the households should flip their sheets to reveal what happened.
- Instruct the students to begin round one of negotiations. After a few minutes, call time. Tell the students to make sure their transaction sheets are filled out in their entirety. Remind the students who are households to take their initial wealth, subtract any payments, add any receipts, and then subtract the environmental adjustment (if any) based on what happened to the lake. Remind the students who are businesses to take their total assets, subtract any payments, add any receipts, and then add the environmental adjustment (if any) based on what happened to the lake.

7. Tell the students they will conduct round two. Explain that this round will begin exactly like the last, except now the businesses will determine what happens to the lake. Explain that because the businesses would like to pollute the lake, the students should turn the "dirty lake" side of Handout 2-1 face up. Again, payments may be made via EFT between the households and businesses that may cause the lake to go from dirty to clean. Note again that in some cases, a deal might not be possible. After they have made any agreements, the businesses should flip their sheets to reveal what happened.

8. Instruct the students to begin round two of negotiations. After a few minutes, call time. Tell the students to make sure their transaction sheets are filled out in their entirety. Remind the students who are households to take their initial wealth, subtract any payments, add any receipts, and then subtract the environmental adjustment (if any) based on what happened to the lake. Remind the students who are businesses to take their total assets, subtract any payments, add any receipts, and then add the environmental adjustment (if any) based on what happened to the lake.

9. After completing both rounds of the activity, discuss the following:
   - In the first round, when households controlled the lake, did anyone make payments? What did you pay and why? (*For those with version A, the business savings would be $60 dollars and the household cost would be only $20 to have a dirty lake. This difference meant there was an opportunity for the business to pay the household to pollute the lake. The exact amount—between $20 and $60—would depend on negotiations. For those with version B, the business savings would be only $20, which was lower than the household cost of $60, so no payment would be made.*)
   - Ask those businesses and households who made a payment if the payment made them better off. (*Yes, if they negotiated a price between $20 and $60.*)
   - In the second round, when businesses controlled the lake, did anyone make payments? What did you pay and why? (*For those with version B, the household savings would be $60 dollars and the business cost would be only $20 to have a clean lake. This difference*

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meant an opportunity for the household to pay the business between $20 and $60. For those with version A, the business savings would be $60, which was higher than the household cost of $20, so no payment would be made.)

- Ask those businesses and households who made a payment if the payment made them better off. (*Yes, if they negotiated a price between $20 and $60.*)
- Ask those with version A to reveal what the business cost of cleaning up was. (*$60*) Ask the households what it was worth for them to have a clean lake. (*$20*) Ask the class if, based on that information, it's best to have the lake dirty or clean. (*Since the cost of cleaning up is $60 and the value of a clean lake is only $20, the lake should end up dirty.*)
- Ask those with version A, comparing round one with round two, did the lake remain clean or dirty? (*In both rounds, the lake should have been dirty.*) Did the lake being clean or dirty depend on who owned the lake? (*No*)
- Ask those with version B to reveal what the business cost of cleaning up was. (*$20*) Ask the households what it was worth for them to have a clean lake. (*$60*) Ask the class if, based on that information, it's best to have the lake dirty or clean. (*Since the cost of cleaning up is only $20 and the value of a clean lake is $60, the lake should end up clean.*)
- Ask those with version B, comparing round one with round two, did the lake remain clean or dirty? (*In both rounds, the lake should have been clean.*) Did the lake being clean or dirty depend on who owned the lake? (*No*)

10. Explain that a **negative externality** is a negative side effect that results when the production or consumption of a good or service affects the welfare of people who are not the parties directly involved in a market exchange. Ask what the externality was in this simulation. (*If the business polluted the lake, a cost was imposed on the household.*)

11. Explain that the **Coase theorem** says that externalities can be resolved efficiently if the parties can negotiate with low bargaining costs and that the result does not depend on who has **property rights** (legal ownership of something with economic value). Discuss the following:
    - Ask the students with version A what the efficient use of the lake was. (*To be used for pollution—a dirty lake*) Ask them if a dirty lake was the result in both rounds. (*Yes*)
    - Ask the students with version B what the efficient use of the lake was. (*To remain clean*) Ask them if a clean lake was the result in both rounds. (*Yes*)
    - Ask the students if anyone had different results. (*In general, a number of things may affect the results. One is misunderstanding of the rules. In this case, clarify how things were supposed to work. Two, some students will object to any pollution from a moral standpoint, and so will not base their decisions on the costs and benefits as presented in the simulation. In this case, note that people do not always use purely economic incentives when making their decisions, or, looking at it in another way, their moral beliefs increase the benefits of a clean lake in their decisionmaking process.*)

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Closure

12. Explain that one takeaway from this lesson is that property rights do not matter in terms of what happens to the lake when the market can operate easily. In both rounds, the lake remained either clean or dirty regardless of who had ownership or control of the lake. Discuss the following:
    - Ask the students who represented businesses if they did better when they controlled the lake. (*Yes, because they never had to make payments and may have received payments.*)
    - Ask the students who represented households if they did better when they controlled the lake. (*Yes, because they never had to make payments and may have received payments.*)

13. Point out that while ownership of the lake does not determine what happens to the lake, it does affect the distribution of wealth/assets in the economy. If someone owns the property, they will be wealthier or richer.

14. Explain that the Coase theorem requires that people have the ability to easily buy and sell access to the lake. Ask the students to imagine a case where one business polluted the air over an area containing 100,000 households (such as in a city). Would it be easy for the business to negotiate with 100,000 households? (*No*) Note that in these cases, there is a role for government to provide rules for polluting the air or to establish a market-based system for deciding how much air pollution should be allowed.

15. Explain that a market-based system used to control pollution is one where a permit is needed to pollute the air. For each unit of pollution, one permit is needed. Discuss the following:
    - Think about what you learned about the lake and decide if it would matter who was given permits to pollute—businesses or households—in terms of how much the air would be polluted. (*No, the result should be the same.*)
    - Would it matter in terms of wealth or assets? (*Yes, the person who gets a permit would get something of value.*)
    - Who do you think should be given the permits—households or businesses? (*Answers will vary, but many people tend toward "the polluter should pay" opinion; it is the action of the business causing the harm, so the business should pay.*)

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Assessment

16. Distribute a copy of *Handout 2-4: Assessment* to each student. Allow time for the students to work and then review the answers as follows:

Multiple Choice

1. A business can save $100,000 a year if it is not required to reduce the noise levels caused by its factory. However, a city ordinance does not allow the noise unless affected homeowners agree to allow it. Ten homes are close enough to be affected by the noise. The business estimates that soundproofing the homes would cost $5,000 a home. If the business can easily bargain with the homeowners, it is likely that
   a. the homeowners will refuse to allow the business to emit noise.
   b. individual homeowners will accept between $0 and $4,999 to allow the noise.
   c. individual homeowners will accept between $5,000 and $10,000 to allow the noise.
   d. the business will charge the homeowners between $5,000 and $10,000 to reduce the noise.
2. If a polluter and those affected by the pollution can bargain over the impact of pollution and if property rights over the polluted resource are well defined, then it _____ matter who has the property rights for the resource in terms of the amount of pollution that will occur. Who has the property rights _____ affect the distribution of wealth.
   a. does; does
   b. does; does not
   c. does not; does
   d. does not; does not

Short Answer

3. One method of controlling air pollution is to issue tradeable permits. With a permit system, a business must have a permit to pollute (say, for example, one ton of pollution). An issue that arises is how to allocate the permits. Sometimes, at first, the government owns the permits and auctions them to businesses. In other cases, businesses are given permits for no monetary cost. In each case, permits are fully tradeable among businesses. Based on the simulation in class, do you think it will make any difference how the permits are distributed? Explain your answer.

   The distribution of permits will not matter in terms of which firms will end up with the permits and therefore do the most polluting. The firms that want to pollute the most (in terms of willingness to pay) will be the ones who receive the permits. However, who gets the permits will affect the wealth of the firms. A firm that is given a permit is given something of value, and so it is better off than having to buy a permit at auction.

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Extension

17. Tell the students that another market-based system to controlling pollution is to require a payment (emissions tax) from businesses to pollute the environment. Yet another market-based system would be to pay (subsidize) businesses not to pollute the environment. Note that a tax implicitly gives the property rights to the government (representing households) and that a subsidy implicitly gives the property rights to the businesses. Discuss the following:
    - Will it matter if a tax or subsidy is used to control pollution? Why or why not? (*No, based on the fact that property rights do not matter.*)
    - Does it matter in terms of the distribution of wealth or assets? Why or why not? (*Yes, a tax costs businesses and helps households. A subsidy helps businesses and costs households through government payments.*)

18. Behavioral economics suggests that people become attached to things they have and are less likely to give them up. How might this affect the results of the lake activity? (*When households have control over the lake, they may be less inclined to give up ownership of the lake. This means that businesses may not be able to easily buy access to the lake.*)

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Handout 2-1: Clean or Dirty

Clean

Dirty

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Handout 2-2: Transaction Sheets

Transaction sheet for households						
Round	**Beginning wealth**	**Payment to business**	**Receipt from business**	**Wealth after transactions**	**Environmental impact: Home value**	**Final end of round wealth**
1	$100	–	+	=	–	=
2	$100	–	+	=	–	=

Transaction sheet for businesses						
Round	**Beginning total assets**	**Payment to household**	**Receipt from household**	**Assets after transactions**	**Environmental impact: Savings if lake can be polluted**	**Final end of round assets**
1	$100	–	+	=	–	=
2	$100	–	+	=	–	=

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Handout 2-3A: Business and Household

"A" Business

You represent the CEO of Alpha Business. Your company needs to dispose of waste materials. If you are allowed to put the waste material in the nearby lake, you will save the following:

$ 60

This means you will add this amount to your wealth under the category "environmental impact" if you can dispose of the waste.

EFT form:

Alpha Company transfers $_____ to _____.

EFT form:

Alpha Company transfers $_____ to _____.

"A" Household

You represent the Avanti household. You do not like the fact that firms put trash in the lake near you. If trash appears in the nearby lake, you will see your wealth—in terms of value of your home—decrease by the following:

$ 20

This means you will subtract this amount from your wealth under the category "environmental impact" if the waste is disposed of into the lake.

EFT form:

Avanti Family transfers $_____ to _____.

EFT form:

Avanti Family transfers $_____ to _____.

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Handout 2-3B: Business and Household

"B" Business

You represent the CEO of Beta Business. Your company needs to dispose of waste materials. If you are allowed to put the waste material in the nearby lake, you will save the following:

$ 20

This means you will add this amount to your wealth under the category "environmental impact" if you can dispose of the waste.

EFT form:

Beta Company transfers $_____ to _____.

EFT form:

Beta Company transfers $_____ to _____.

"B" Household

You represent the Boss household. You do not like the fact that firms put trash in the lake near you. If trash appears in the nearby lake, you will see your wealth—in terms of value of your home—decrease by the following:

$ 60

This means you will subtract this amount from your wealth under the category "environmental impact" if the waste is disposed of into the lake.

EFT form:

Boss Family transfers $_____ to _____.

EFT form:

Boss Family transfers $_____ to _____.

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Handout 2-4: Assessment

Multiple Choice

Select the best answer for each of the following questions.

1. A business can save $100,000 a year if it is not required to reduce the noise levels caused by its factory. However, a city ordinance does not allow the noise unless affected homeowners agree to allow it. Ten homes are close enough to be affected by the noise. The business estimates that soundproofing the homes would cost $5,000 a home. If the business can easily bargain with the homeowners, it is likely that
   a. the homeowners will refuse to allow the business to emit noise.
   b. individual homeowners will accept between $0 and $4,999 to allow the noise.
   c. individual homeowners will accept between $5,000 and $10,000 to allow the noise.
   d. the business will charge the homeowners between $5,000 and $10,000 to reduce the noise.

2. If a polluter and those affected by the pollution can bargain over the impact of pollution and if property rights over the polluted resource are well defined, then it _____ matter who has the property rights for the resource in terms of the amount of pollution that will occur. Who has the property rights _____ affect the distribution of wealth.
   a. does; does
   b. does; does not
   c. does not; does
   d. does not; does not

Short Answer

Read the scenario below and provide a written answer using complete sentences and correct grammar and punctuation.

One method of controlling air pollution is to issue tradeable permits. With a permit system, a business must have a permit to pollute (say, for example, one ton of pollution). An issue that arises is how to allocate the permits. Sometimes, at first, the government owns the permits and auctions them to businesses. In other cases, businesses are given permits for no monetary cost. In each case, permits are fully tradeable among businesses. Based on the simulation in class, do you think it will make any difference how the permits are distributed? Explain your answer.

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Standards and Benchmarks

Voluntary National Content Standards in Economics

Standard 16: Role of Government and Market Failure

There is an economic role for government in a market economy whenever the benefits of a government policy outweigh its costs. Governments often provide for national defense, address environmental concerns, define and protect property rights, and attempt to make markets more competitive. Most government policies also have direct or indirect effects on peoples' incomes.

Standard 4: Incentives

People usually respond predictably to positive and negative incentives.

Common Core State Standards

CCSS.ELA-Literacy.RH.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

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