

Appendix
Results of a randomized evaluation of team-based learning exercises

Contents

	Page
1. Module 1 (Supply and Demand) Learning Objectives	2
2. Module 1 (Supply and Demand) Control Exercises	2
3. Module 1 (Supply and Demand) Treatment Exercises	4
4. Module 1 (Supply and Demand) Assessment Questions	8
5. Module 2 (Firm Costs and Competitive Market Analysis) Learning Objectives	10
6. Module 2 (Firm Costs and Competitive Market Analysis) Control Exercises	10
7. Module 2 (Firm Costs and Competitive Market Analysis) Treatment Exercises	12
8. Module 2 (Firm Costs and Competitive Market Analysis) Assessment Questions	15
9. Module 3 (Imperfect Competition) Learning Objectives	17
10. Module 3 (Imperfect Competition) Control Exercises	17
11. Module 3 (Imperfect Competition) Treatment Exercises	19
12. Module 3 (Imperfect Competition) Assessment Questions	23
13. Module 4 (Externalities) Learning Objectives	25
14. Module 4 (Externalities) Control Exercises	25
15. Module 4 (Externalities) Treatment Exercises	28
16. Module 4 (Externalities) Assessment Questions	30

Module 1 (Supply and Demand) Learning Objectives

1. Use models to explain and predict how events lead to changes in prices and quantities in affected markets.
2. Calculate price elasticities of demand and supply and explain how buyer and seller responsiveness to price changes influences the outcomes of economic events and policies.
3. Compare the effect of price ceilings with alternative policies such as rent subsidies and direct transfers.
4. Evaluate the effect of sales and excise taxes on prices, quantities, and economic efficiency in competitive markets.

Supply and Demand Control Exercises

1. Suppose that wheat farmers in Eastern Oregon are allowed to pump water from underground aquifers free of charge. Water policy reform in the state results in farmers being charged a substantial fee for underground water. What will happen in the market for Oregon wheat?

- A. Price and quantity both rise.
- B. Price and quantity both fall.
- C. Price rises, quantity falls.
- D. Price falls, quantity rises.

Note: team reporters must be prepared to show the class their notes with the appropriate graphical analysis!

2. Suppose that the supply and demand of tickets to Pacific University varsity football games are as given in the table.

P	Q _d	Q _s
10	3,200	5,000
8	3,500	5,000
6	4,000	5,000
4	5,000	5,000
2	7,000	5,000
0	10,000	5,000

Graph the supply and demand curves in this market, indicating clearly the equilibrium price and quantity.

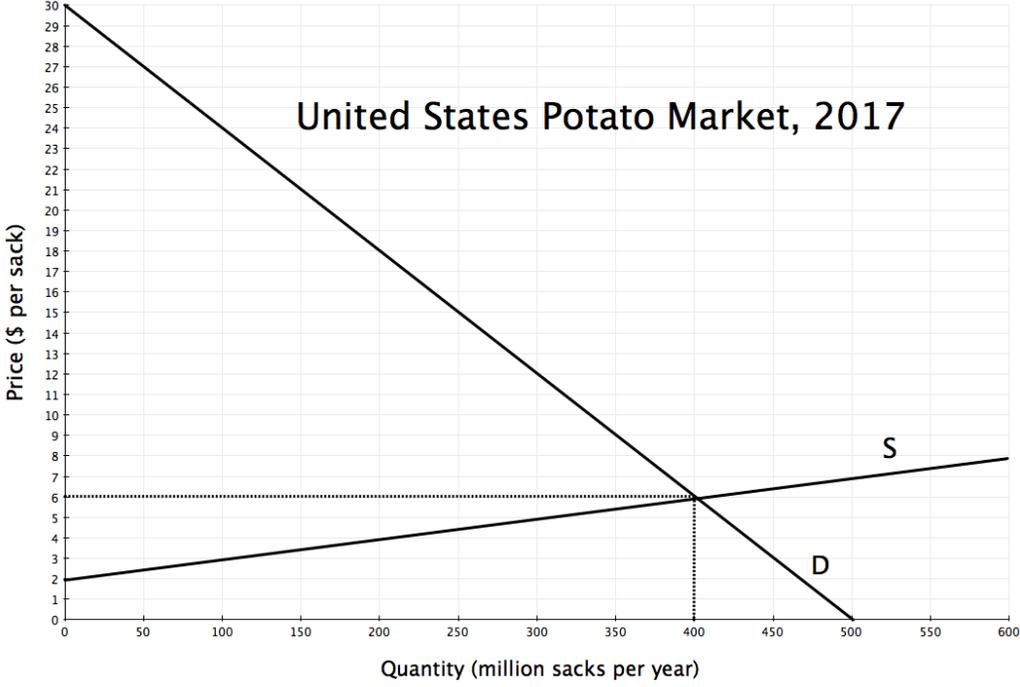
Economics professors begin to hype the football team in their classes and the amount people want to buy increases by 1,000 at every price. Add the analysis of this event to your graph *in different color ink*.

Gallery walk reporting.

3. Due to a new awareness of the conditions in which farm animals are raised, the demand for tofu increases in the United States. At the same time, scientists develop a new soybean hybrid seed that greatly increases yield. (Tofu is made from soybeans.) What will happen in the US market for tofu?

- A. Price goes down, quantity rises.
- B. Price goes up, quantity rises.
- C. Quantity rises but price might go up or down.
- D. Price rises but quantity might go up or down.

4. Consider the United States potato market in 2017, graphed below. Suppose that in an effort to increase revenues to pay down the national debt, federal authorities imposed a \$3.50 tax on each sack of potatoes. Use a colored Sharpie pen to add your team’s analysis of the tax to the graph on the handout. **Be sure to label the new price paid by buyers, the new price received by sellers, and the new quantity of potatoes exchanged in the market.** Hand in your team graph when time is called.



5. The tax on potatoes caused deadweight loss. Should we conclude that the tax on potatoes should be removed?

- A. Yes. The tax squanders economic well-being and should be eliminated.
- B. No. The tax is necessary to fund government operations.
- C. It depends. If the net benefit created by the government operations funded by the tax is greater than the deadweight loss, then the tax should remain in place.
- D. It depends. If a different tax is possible and would cause less deadweight loss or even increase economic well-being, then the tax should be shifted away from potatoes.

6. Who would win, who would lose under a rent control law in Forest Grove?

- A. Renters win; landlords lose.
- B. Landlords win; renters lose.
- C. Both renters and landlords lose.
- D. Some renters win; landlords and some renters lose.

Note: as always, team reporters must be prepared to show the class their notes containing supporting graphical analysis.

7. For which of the following goods would consumers likely have the **most elastic** demand at prevailing prices?

- A. Gasoline (short-run).
- B. Gasoline (long-run).
- C. Coca cola.
- D. Soft drinks in general.

8. Maggie Pike, the proprietor of a local coffee shop, wants to increase the volume of her bun sales by 5%. If Maggie knows that the price elasticity of demand for buns is -1.4 , how should Maggie change her bun price in order to meet her goal? **Report by writing "increase" or "decrease" along with your numerical estimate in large Sharpie ink on an entire sheet of 8.5" by 11" scratch paper.**

9. A successful DEA enforcement operation reduces the supply of methamphetamine in the United States and meth prices spike by 10%. How will property crimes committed by methamphetamine addicts likely be affected? (*Hint: For meth addicts $E^d = -0.15$.*)

- A. Such crimes will probably fall.
- B. Such crimes will probably rise.
- C. Such crimes will probably stay the same.

Supply and Demand Treatment Exercises

1. Uber drivers are paid based upon the time and distance of a given trip and the Uber fare rate in operation at the time that they are with a passenger. The Uber fare rate is determined through a system known as "surge pricing" that charges a higher rate during times when many passengers are seeking service. Which of the following is the best strategy to follow as an Uber driver if you wish to maximize your total compensation per hour of driving? Be prepared to use the supply and demand for Uber rides to support your answer.

- A. Uber fares (and thus driver pay) are higher during busy times such as after a concert or sporting event lets out. Therefore, it is better to locate near event venues and drive during busy times when fares are high.
- B. The higher Uber fares charged during busy times such as after a concert or sporting event lets out decrease rider demand. Therefore, it is better to avoid large event venues and drive when fares are lower.
- C. The high Uber fares during busy times increase the number of Uber drivers in the area making it more difficult for the drivers to find passengers. Therefore, it is better to avoid large event venues and drive elsewhere.

Note: team reporters should be prepared with notes that show the appropriate supply-demand analysis to support the team answer. (<https://serc.carleton.edu/econ/tbl-econ/activities/209583.html>)

2. You are a chief economist to the White House; your expertise is international relations and economic growth. In order to strengthen the relationship with China, you prepare a report on their recent economic development in education, real estate, health and energy. It appears from the data that over the last decade, energy prices in China have risen 30%, but energy use per person in China has risen 35%. This information seems weird to you, as you know that along the demand curve there is a negative

correlation between price and quantity, and you are looking for possible explanations to see if this phenomenon follows the law of demand.

Your possible explanations are:

- A. Chinese government intervention in markets causes results not predicted by supply-demand analysis.
- B. This change must be coming from a shifting of the demand curve, rather than a movement along it.
- C. Price ceilings on energy were eliminated.
- D. Energy in China is an inferior good.

(<https://serc.carleton.edu/econ/tbl-econ/activities/209565.html>)

3. In the fall of 2015, floods ravaged communities in Arkansas; there were huge floods in Texas this year. In the Arkansas case, a state of emergency was declared; the state of Arkansas has a “price gouging” law, quoted in part:

Act 376 of 1997 prohibits businesses from price gouging during a state of emergency. The law prohibits businesses from charging more than 10 percent above the pre-disaster price of goods or services. The...law...is intended to cover anything that may be needed in the event of a state of emergency. Examples...include: food, fuel, water, flashlights, batteries, blankets, medicine, bandages and construction materials.

...While the law sets a general 10 percent cap on price increases during an emergency, businesses may lawfully charge a higher price if they can establish that the higher price is directly attributable to additional costs incurred by the retailer, by its supplier or as the result of additional costs for labor or materials used to provide the goods or service. “ (Arkansas Attorney General at <http://arkansasag.gov/programs/consumer-protection/my-money/price-gouging>). Criminal prosecution can result from violations.

Put yourself in the place of a long-standing community leader of a flooded town who knows many of the stricken people personally (and you are not employed by state of Arkansas or affiliated with the state government in any way).

Question: Suppose someone transported fuel to the flooded area in an amphibious vehicle (image provided) and attempted to sell fuel and charge 25% above usual prices to those who could not get to their usual sources of fuel.

Decide as a community leader whether you would:

- A. Report the seller to the police, arguing that the attempted sale is immoral and illegal.
- B. Encourage the seller to leave the area because the sale is illegal, but concede that such a sale would make people better off, and commit to work toward changing the law in the future.
- C. Condemn the law as creating further harm on top of the natural disaster itself and encourage the seller to continue to sell fuel at 25% above the usual price.
- D. Provide assistance to the seller in locating customers for a cut of the profit.

You will be called upon for a complete defense of your decision! Economic theory should play some role in your reasoning even if it does not determine your decision.

(<https://serc.carleton.edu/econ/tbl-econ/activities/198444.html>)

4. Given the following supply/demand model for the U.S. heroin market, what will be the most effective government policy? (Diagram showing inelastic demand). Be prepared to justify your answer with

reference to this diagram and any changes to it that chosen policy will cause to the price of heroin and the quantity available in the market.

Note that even though this is an illegal market, nonetheless there are buyers with a demand schedule and sellers with a supply schedule, and a market that will tend to move to an equilibrium price as shown in the preceding diagram.

Which policy should the federal government pursue?

- A. Longer prison terms for heroin sellers
- B. Increased border controls to prevent imports of heroin
- C. Subsidies for drug user rehabilitation programs
- D. Subsidies for education efforts dissuading use of heroin
- E. Legalization of the heroin market

<https://serc.carleton.edu/econ/tbl-econ/activities/191385.html>)

5. Cigarettes are proven to lead to serious negative health effects for both smokers and those exposed to the second-hand smoke. In an effort to reduce smoking, the government requires the suppliers of cigarettes to pay a per-unit tax on each pack of cigarettes sold. Who would be most against this tax policy? Note that the degree of opposition to the tax corresponds exactly to the increase in price paid by the buyers or the price received by the sellers for cigarettes, so you should consider how the tax changes those prices when selecting your answer.

- A. Cigarette manufacturers will be more opposed to this tax.
- B. Cigarette smokers will be more opposed to this tax.
- C. Both cigarette manufacturers and smokers will be equally opposed to this tax.

Be prepared to illustrate on a standard supply and demand graph why your answer is correct. Be sure to show how the incidence of the tax is shared between buyers and sellers of cigarettes.

<https://serc.carleton.edu/econ/tbl-econ/activities/209736.html>)

6. Every 50 minutes. That's how often one person in the United States dies due to a car crash involving an alcohol-impaired driver. The National Highway Traffic Safety Administration puts annual cost of alcohol-related crashes at more than \$44 billion. The good news is that there are a variety of ways to prevent injury and death from alcohol-related crashes. One prevention method is to increase the price of alcohol by raising taxes.

Suppose the price elasticity of demand for beer among young adults age 18-20 is $ED = |1.3|$. And, assume that the number of alcohol-related motor vehicle fatalities is roughly proportional (same as) to beer consumption for these young adults.

Part 1: If the state imposes a beer tax that increases the price of beer by 10% **how would this affect the quantity demanded of beer**, and therefore the number of alcohol-related motor vehicle fatalities among 18-20 year-olds? (**Note:** your answer should be a percentage change). Reporting will be done by a selected representative from your group.

Part 2: What is the federal government's best policy option to reduce the number of alcohol-related motor vehicle crashes among 18-20 year-olds?

- A. Impose taxes on all alcohol, not just beer, to increase price and thus decrease consumption.
- B. Pass legislation requiring that all bars and restaurants offer free non-alcoholic drinks to any designated driver.
- C. Mandatory screening and brief intervention for alcohol problems among high school seniors and college freshman.
- D. Strictly enforce the laws about the purchase and consumption of alcohol by anyone under age 21.
- E. Requiring ignition interlocks for all offenders, including first-time offenders

Reporting will be done via simultaneous answer selection. (<https://serc.carleton.edu/econ/tbl-econ/activities/209346.html>)

Module 1 (Supply and Demand) Assessment Questions

Questions 1 and 2 are based on the following scenario.

The student population at Little College, a 1000-student 4-year college in Schoolville, Kansas, fell by 20% in 2018. Despite the drop in student numbers, no faculty or staff reductions are expected because of robust endowment earnings.

1. Which of the following changes in related Schoolville markets would be expected to result from the reduction in the college student population of the town?
 1. The price of pizzas in Schoolville pizzerias will rise.
 2. The quantity of Schoolville apartments rented will increase.
 - 3. The wage for tutors of high school students will rise.**
 4. The price of rooms at Schoolville hotels will increase.

2. How would you expect the Schoolville rental apartment market to be affected by the reduction in Little College's enrollment during the first year after the fall in the number of students?
 1. Rents will fall by a small amount; the number of apartments rented will fall by a large amount.
 2. Rents will fall by a large amount; the number of apartments rented will increase by a small amount.
 3. Rents will fall by a small amount; the number of apartments rented will increase by a large amount.
 - 4. Rents will fall by a large amount; the number of apartments rented will fall by a small amount.**

Questions 3 and 4 are based on the following excerpt from a recent news article.

"Recent regulatory blowback against Uber, Lyft and other ridesharing services around the world have reignited the ongoing regulatory policy debate surrounding the ride service in India, Uber's second biggest market in terms of cities where it operates. Most prominently, India's government recently enacted legislation that allows major cities to set limits how much ride service companies such as Uber can charge riders during peak times." (*Forbes*, May 31, 2016)

3. If the city of Mumbai, India, restricts ridesharing service price increases during rush hours, which of the following outcomes would be most likely?
 - 1. Wait times would increase for people seeking a ride from Uber and similar companies during rush hour.**
 2. All of the people who want to use a ridesharing service during rush hours would benefit by getting their rides at a lower price.
 3. Ridership for Uber and similar companies would increase during rush hours because of the lower price.

4. The taxicabs that compete with the ridesharing services would reduce their prices to preserve their market share.
4. If the policy goal of Mumbai authorities is to increase the availability of low-cost ridesharing services during rush hours, which of the following policy approaches should be preferred?
1. Place a tax on ridesharing customers.
 2. **Subsidize ridesharing drivers.**
 3. Limit the price that ridesharing drivers can charge.
 4. Set a minimum price for ridesharing services.
5. Suppose that the State Legislature is considering imposing an additional 5% sales tax on all consumer purchases in order to generate revenue for increased state government spending. Which of the following arguments is most likely to convince a legislator to vote **against** the sales tax proposal, based on economic principles?
1. A sales tax increase causes economic inefficiency by raising prices for consumers, lowering them for producers, and reducing output.
 2. The sales tax increase will be unfair to relatively wealthy citizens.
 3. The increased tax on goods and services should be collected from sellers rather than buyers in order to avoid burdening consumers.
 4. **The resulting increase in government spending creates benefits that are smaller than the efficiency cost of the new tax.**

Module 2 (Firm Costs and Competitive Market Analysis) Learning Objectives

1. Explain how different types of production costs influence production decisions.
2. Describe the conditions that make possible highly competitive markets.
3. Analyze the effect of market events on prices and quantities in competitive markets and on output and profits of competitive firms.
4. Explain and predict the impact of economic policy and events on resource allocation in competitive markets.

Firm Costs and Competitive Market Analysis Control Exercises

1. Casey is an expert poker player and can make \$35 per hour playing poker online. On Saturday Casey goes to a local tournament with a \$15 entry fee. She plays for four hours and wins first place, taking home the \$150 prize. What was Casey's economic profit? (Assume that she enjoyed the tournament exactly as much as playing online.)

- A. -\$5
- B. \$100
- C. \$135
- D. \$150

2. Which situation will likely give rise to diminishing marginal product of labor?

- A. Plasma television manufacturers are going out of business because of increased competition from LCD televisions.
- B. Hell's Kitchen, which has enough counter space for three cooks per shift, decides to hire a fourth cook per shift.
- C. Nevaeh's Kitchen undertakes a massive expansion, doubling both the size of its kitchen and number of cooks.
- D. A landscaping firm replaces all of its self-propelled lawn mowers with push mowers.

3. (Objective 1) Which production function(s) exhibit diminishing marginal returns?

Labor Input	Process A Output	Process B Output	Process C Output	Process D Output
0	22	0	0	0
1	20	5	6	7
2	18	11	14	14
3	16	18	20	21
4	14	26	24	28
5	12	35	27	35
6	10	45	28	42

4. This figure shows the set of short-run cost functions that microeconomists use as they analyze firm behavior in various market settings (competitive, monopoly, oligopoly, monopolistically competitive). Why is the average fixed cost (AFC) function not shown?

- A. The information on average fixed cost is shown as ATC-AVC.
- B. The structure of a firm's fixed costs is generally unimportant.

- C. Regardless of the nature of fixed costs, AVC, ATC, and MC are the same.
- D. The study of a firm's AFC is too mathematically complex to study in an intro course.

5. Paducah Slugger Company makes baseball bats out of lumber supplied to it by Acme Sporting Goods, which pays Paducah \$10 for each finished bat. Paducah's only factors of production are lathe operators and a small building with a lathe. The number of bats it produces per day depends on the number of employee hours per day, as shown in the table below.

- Fill out table and answer the questions in the worksheet.
- Graph AVC, ATC, and MC curves
- Gallery walk report of table and graph.

Labor (worker hrs/day)	Output (bats/day)	Marginal Product (bats/hr)	Total Fixed Cost (\$/day)	Total Variable Cost (\$/day)	Total Cost (\$/day)	Average Fixed Cost (\$/bat)	Average Variable Cost (\$/bat)	Average Total Cost (\$/bat)	Marginal Cost (\$/bat)
0	0								
1	5								
2	10								
4	15								
7	20								
11	25								
16	30								
22	35								

- A. At what point do diminishing marginal returns occur?
- B. Wages are \$15 per hour and Paducah's daily fixed cost for the lathe and building is \$60. Fill out the table above.
- C. How many bats should Paducah make if its only goal is to maximize profits?
- D. What would be the profit-maximizing number of bats if the government imposed a tax of \$10 per day on the company?
- E. What would be the profit-maximizing number of bats if the government imposed a tax of \$2 per bat?
- F. Why do the taxes in parts 3 and 4 have such different effects?

6. A dressmaker specializes in outfits for quinceañeras and weddings. The company has fixed costs of \$250. The marginal cost of producing dresses is \$700 for the first one, \$250 for the second, \$300 for the third, \$350 for the fourth, \$400 for the fifth, \$450 for the sixth, and \$500 for the seventh.

-**Plot** the firm's **AVC**, **ATC**, and **MC** functions.

-**Label** the firm's **breakeven price**, **shutdown price**, and **supply curve**.

-Suppose price is \$500 per dress. Identify the firm's profit-maximizing output and the firm's profit in your graph.

Gallery walk reporting.

7. For the past nine months, Iliana has been producing artisanal ice creams from her small shop in Portland. She's been just breaking even that entire time. This morning, the Board of Health informed her that they are doubling the annual fee for the dairy license she operates under, retroactive to the beginning of her operations.

Assuming that ice cream industry costs do not change with the number of firms in the industry, map the **short-run** and **long-run** effects of this event on (1) the ice cream market and (2) Iliana's output and profits in the side-by-side market-and-firm framework.

Gallery walk reporting.

Firm Costs and Competitive Market Analysis Treatment Exercises

1. Consider the market for ball caps. Rank the assumptions of the competitive model from least appropriate to most appropriate for analyzing the market for ball caps in the United States.

- A. All firms sell the same standardized product.
- B. The market has many buyers and many sellers, each of which buys or sells only a small fraction of the total quantity exchanged in the market.
- C. Productive resources are mobile; that is, firms face little difficulty in entering or exiting the market.
- D. Buyers and sellers are well informed.

Report your team's ABCD ranking in large Sharpie ink on a sheet of scratch paper.

(<https://serc.carleton.edu/econ/tbl-econ/activities/221255.html>)

2. When news outlets report 4% annual profits for Nike, the company reacts by laying off workers and/or reorganizing divisions, and/or revamping its marketing strategy. What is the best explanation for this phenomenon?

- A. Economic profits were positive but investors expected better.
- B. The company failed to cover important implicit costs.
- C. Accounting profits were negative.
- D. Successful companies constantly change the way they operate.

(<https://serc.carleton.edu/econ/tbl-econ/activities/221257.html>)

3. You are the owner of a restaurant that is falling on hard times. You need to close it down next week but question remains: **Should you stay open this weekend?**

Here are your cost considerations.

- Rent for the month paid already \$2000
- Time you already spent preparing the weekend's menu and hiring schedule 10 hours
- Time you will spend this weekend opening and closing the restaurant 20 hours
- Cost of food and utilities for the kitchen this weekend \$600
- Cost of staff for the weekend \$700
- Total revenue you expect to receive for the weekend after taxes \$1700

Do you:

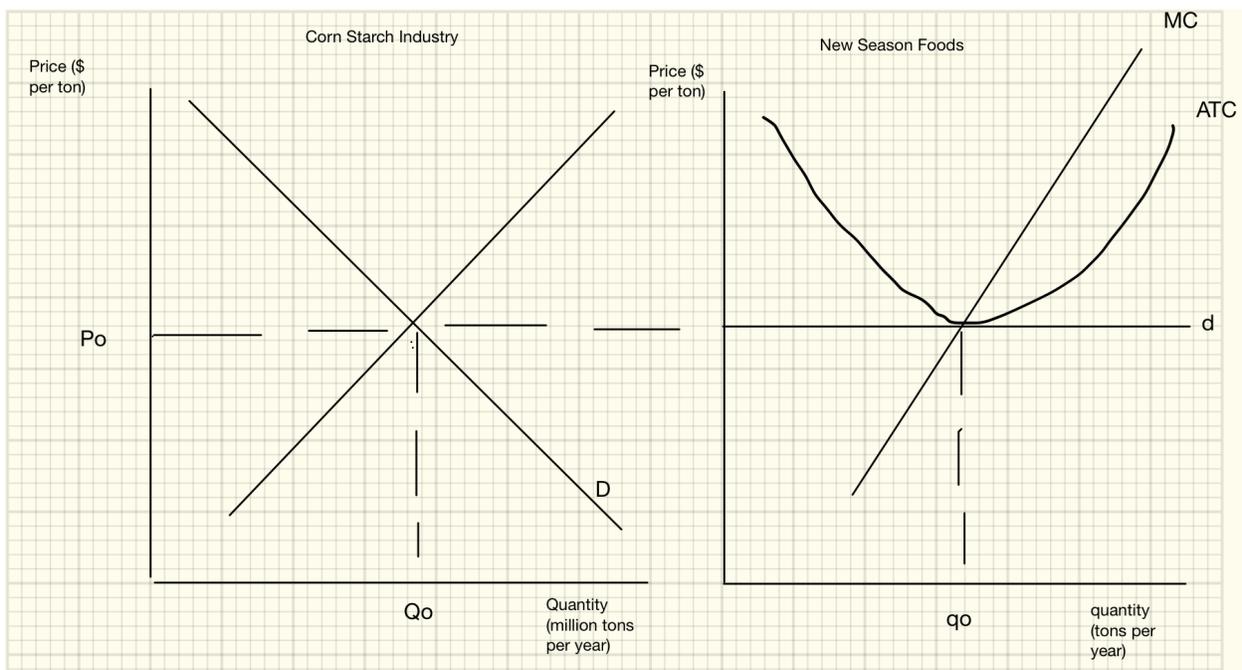
- A. Not open for the weekend because you will be operating with a loss
- B. Not open for the weekend because you will have a profit that is positive but too small
- C. Open for the weekend as usual
- D. Open for the weekend but not hire any staff and run the restaurant as best you can with your own labor

<https://serc.carleton.edu/econ/tbl-econ/activities/218259.html>

4. Consider the events described in the article "Company Costs are Rising, But Getting Shoppers to Pay More is Hard" (WSJ, May 9, 2018). What will happen to the market price in the perfectly competitive corn starch industry in the long run, assuming no other events occur?

(Worksheet)

In blue ink, map the short-run effects of the cost increases described in "Company Costs are Rising, But Getting Shoppers to Pay More is Hard" (*Wall Street Journal*, May 8, 2018) for New Season Foods in Forest Grove, a single producer in the industry, and for the competitive corn starch industry in the graphs below.



In red ink, add the long-run effect of these events to your graphs above, assuming that no other events occur.

After completing the worksheet and then select one of the following possible.

- A. 100% of the cost increase will be borne by producers.
- B. 100% of the cost increase will be borne by consumers.
- C. The proportion of the cost increase passed on to consumers depends on the price elasticities of supply and demand.
- D. Inventors will discover alternatives to corn starch and this product will disappear from use in the United States.

<https://serc.carleton.edu/econ/tbl-econ/activities/221262.html>)

Module 2 (Firm Costs and Competitive Market Analysis) Assessment Questions

1. Suppose that Elena owns and operates a frozen yogurt shop in Redding, CA. Initially, she is doing just as well as she would if she ran a tattoo parlor, which is what she would be doing if she closed the frozen yogurt shop. If the Redding frozen yogurt market is perfectly competitive, how will an increase in the cost of fire insurance for her business affect Elena and the Redding frozen yogurt market in the short run?

- 1. Elena's economic profit will fall.**
2. Elena will exit the market.
3. Elena will increase the price of her frozen yogurt.
4. Elena will reduce her production of frozen yogurt.

2. According to the model of competitive markets and firms, which of the following would make it easier for a firm to expand output rapidly in response to an increase in output price?

1. The entrepreneur managing the firm works without drawing a salary.
2. The firm currently earns a positive economic profit.
3. The firm's stock price is at an all-time high.
- 4. The firm can increase production without increasing hourly wages.**

3. For which of the following markets would the competitive market supply and demand model most likely be a useful approximation?

- 1. The market for men's dress shirts (e.g. Van Heusen and Arrow).**
2. The market for ridesharing services (e.g. Uber and Lyft).
3. The market for video streaming services (e.g. Netflix and Hulu).
4. The market for cell phone service (e.g. Verizon and Sprint).

4. The following items are likely to be owned by a typical college student: pants, shirt, bookbag, water bottle, and shoes. Consider the markets in which these goods are sold. Which of the following assumptions of the competitive model is LEAST appropriate for these markets?

1. Well-informed buyers and sellers.
- 2. Standardized products.**
3. Many buyers and sellers.
4. Freely mobile resources.

5. Electric scooters have become popular in cities across the United States and laws require scooter riders to wear a helmet. In the short-run, the increased demand for helmets increases the price of each helmet, the market quantity sold, and the profits of bicycle helmet sellers immediately following the arrival of e-scooters in a city. If the helmet industry is competitive, what would you expect to happen to production, price, and profits in the helmet industry over time?

- 1. The quantity of helmets sold will increase, the price of bicycle helmets will decrease, and bicycle helmet sellers' profits will decrease.**

2. The quantity of helmets sold will increase, the price of bicycle helmets will increase, and bicycle helmet sellers' profits will increase.
3. The quantity of helmets sold will decrease, the price of bicycle helmets will decrease, and bicycle helmet sellers' profits will decrease.
4. The quantity of helmets sold will decrease, the price of bicycle helmets will increase, and bicycle helmet sellers' profits will increase.

Module 3 (Imperfect Competition) Learning Objectives

1. Discuss the scope of a particular market that is appropriate for antitrust policymakers to consider as antitrust actions are weighed.
2. Describe the conditions that give rise to monopoly or oligopoly, including technological (set-up costs) and artificial (patents, exclusive ownership of inputs, government licenses, etc.) barriers to entry.
3. Compare market outcomes in competitive and uncompetitive markets.
4. Evaluate the effect on social well-being of antitrust and price control policy proposals when one or a few firms exist in a market.
5. Describe the conditions that make it possible for firms to offer different prices for the same good or service to different consumers.
6. Analyze the effect on firm profits and social well-being of price discrimination.

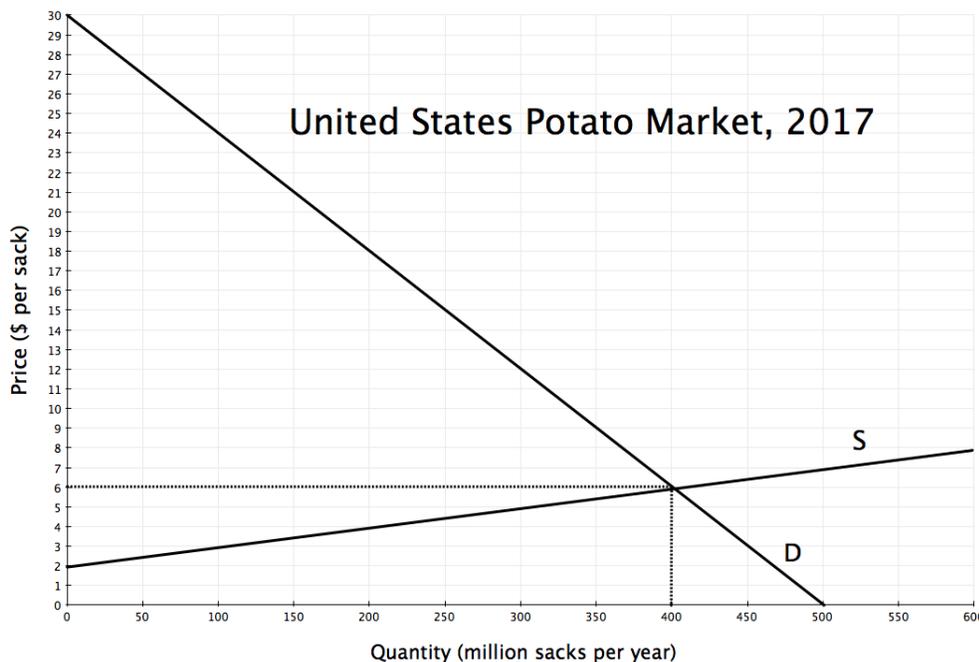
Imperfect Competition Control Exercises

1. Two manufacturers of regional airliners, Bombardier and Embraer, have fixed costs of \$6 billion and marginal costs of \$1,000,000 per plane. Bombardier produces 300 planes per year and Embraer produces 150. Which company's market share do you think will grow?

- A. Bombardier.
- B. Embraer.
- C. Not enough information.

Every student must have the appropriate calculations in their notes to support the team answer.

2. Consider the US market for wholesale potatoes in which potatoes are sold in 100-lb. sacks. As illustrated in the graph below, the competitive market outcome clears at a market-clearing price of \$6 per sack.



Suppose producers band together to restrict output and succeed in attaining the output and price levels of a monopoly firm. Illustrate the cartel price and quantity in the handout that depicts the competitive market outcome. Hand in your team report before time is called.

3. Tatiana, a profit-maximizing senior majoring in economics, runs a tutoring business on campus that specializes in helping introductory economics students. Tatiana has 20 hours of time available either to work as an economics tutor or to work as an office assistant at a wage of \$15 per hour. The table below presents Tatiana’s expected weekly demand schedule for her tutoring services.

Tatiana’s weekly demand schedule (Each student demands exactly one hour of tutoring each week.)

Student	Willingness to pay
1	30
2	28
3	26
4	23
5	18
6	13
7	8

If Tatiana could accurately assess each customer’s willingness to pay and could charge each tutee a different hourly wage, **how much higher would her weekly income be** relative to the situation where she charged a single price for every hour spent tutoring?

How would Tatiana’s ability to perfectly price discriminate affect **economic efficiency**?

Report in large Sharpie ink on a sheet of scratch paper.

4. Tatiana, a profit-maximizing senior majoring in economics, runs a tutoring business on campus that specializes in helping introductory economics students. Tatiana has 20 hours of time available either to work as an economics tutor or to work as an office assistant at a wage of \$15 per hour. The table below presents Tatiana’s expected weekly demand schedule for her tutoring services.

Student	Willingness to pay
1	30
2	28
3	26
4	23

5	18
6	13
7	8

Tatiana cannot perfectly price discriminate but she knows that people who are willing to pay \$26 or more per hour for her services never use coupons and the rest of her customers would use a coupon.

How much higher would her weekly income be if she published a coupon in the student newspaper relative to the situation where she charged a single price for every hour spent tutoring? (*Hint: find the optimum coupon price first.*)

Would this type of price discrimination reduce consumer surplus?

Report in large Sharpie ink on a sheet of scratch paper.

Imperfect Competition Treatment Problems

1. Bayer is a large German pharmaceutical company that was founded in the 19th century. It is perhaps best known as the company that introduced Aspirin.

It is the 1970s, and you are a consultant of the executives at Bayer, who are trying to decide what avenues of research to prioritize. The executives have recently learned about the discovery in Japan of a very potent antibacterial compound called norfloxacin. Bayer scientists claim that they have theories on how to substantially improve on the discovery by the Japanese scientists, to the point where the product they hope to develop would easily outsell norfloxacin and revolutionize the market for antibiotics. An antibiotic so effective would be lifechanging and lifesaving all over the world, as bacterial infections are painful, debilitating, and in many cases deadly. However, the decision is not so simple.

Putting a drug on the market involves substantial costs: the cost of the research to discover the compound (from millions to tens or hundreds of millions), the cost of clinical trials (each of three phases may be hundreds of millions), and the cost of regulatory approval (the FDA again charges millions as a fee for getting approval). Estimates of the average cost range from hundreds of millions to billions of dollars. The marginal cost of producing a drug, by contrast, is substantially lower.

Now, consider Bayer's problem. Suppose that if it invests, the cost to get the drug from the scientists' brains to FDA approval is \$1 billion. However, once the drug is discovered and information about it published (as is required), other companies can easily produce it without incurring the \$1 billion research and development (R&D) cost. These companies would still incur the marginal cost of production, but would effectively have no fixed costs.

- A. **Use your whiteboard to show the cost structure and break-even point of Bayer, including whatever curves are necessary to show this.**
- B. Bayer knows that an American company, Barr Pharmaceuticals, will likely produce a generic version of the drug as soon as Bayer's results are released. **Use your whiteboard to show the cost structure and break-even point of Barr Pharmaceuticals as compared to that of Bayer, including whatever curves are necessary to show this.**

- C. In addition to Barr Pharmaceuticals, there are many other potential entrants into the generic antibiotic market. What will the long-run price of the drug be, if this is the case? **Use your whiteboard to show the location of the long-run price on your cost structure graph from the previous question.**
- D. From a business point of view, would you recommend Bayer to invest? Characterize the consumer and producer surpluses as a consequence of your recommendation. **Write YES or NO, 1 word on consumer surplus, and 1 word on producer surplus on the whiteboard.**

This isn't quite how the pharmaceutical market works in real-life. Bayer will actually be able to apply for a document that makes it illegal for companies like Barr Pharmaceuticals to produce the drug—this document is a patent. With the ability to prevent Barr from producing, Bayer will effectively have a monopoly on the new antibiotic once it discovers it.

- A. Return to your diagram of Bayer's cost structure and add consumer demand. Assume that at least part of the demand curve lies above Bayer's ATC curve. **Indicate, on your whiteboard, the range of prices/quantities for which Bayer can make a profit.** (Add any other curves that are necessary to show this).

Given that the patent system exists, Bayer decides to go ahead with the research. Congratulations, your company has just discovered ciprofloxacin, 2 to 10 times as strong as norfloxacin, and one of the most widely prescribed antibiotics in the world!

- B. **Indicate the profit maximizing price/quantity for Bayer, and shade in the consumer and producer surpluses if Bayer maximizes its profit.**
- C. **Shade in the deadweight loss** (and discuss in your groups what it represents).
- D. Now, suppose Bayer sells the medicine directly to consumers and can charge a different price on every transaction it makes (this is called pure price discrimination). If it is able to do this, **indicate the consumer surplus, producer surplus, and deadweight loss on your graph.**

Discussion: One of the most important stipulations of the patent system is that patent applicants must fully disclose the details of their discovery, to the point that someone trained in the field could reproduce it. Aside from proving that their discovery is valid and useful, what role do you think this plays? (Keep in mind that patents expire after about 20 years.) What if Bayer were only able to patent its invention in Germany, and Barr Pharmaceuticals could still produce the drug in the US? How would this affect surpluses and Bayer's decision? How might Bayer's situation differ from the situation of an American company like Merck (think about the size of the US compared to Germany)? Would such a situation be advantageous to certain countries or companies? What are the downsides to Bayer being able to patent its invention in every country? (<https://serc.carleton.edu/econ/tbl-econ/activities/207564.html>)

2. Concern over rising drug prices such as the drastic increase in Epi-Pen pricing noted in 2016 and the more recent Humira case described in the first NY Times article read for class has called into question the advisability of pharmaceutical drug patenting given the monopoly power and economic deadweight loss that results from those patents. However, patents can serve an important role according to the second NY Times article on drug shortages read for class. Today we consider the insight that microeconomic theory provides on development of an appropriate policy response to this problem.

Which of the following possible policy alternatives is most likely to improve long term societal well-being?

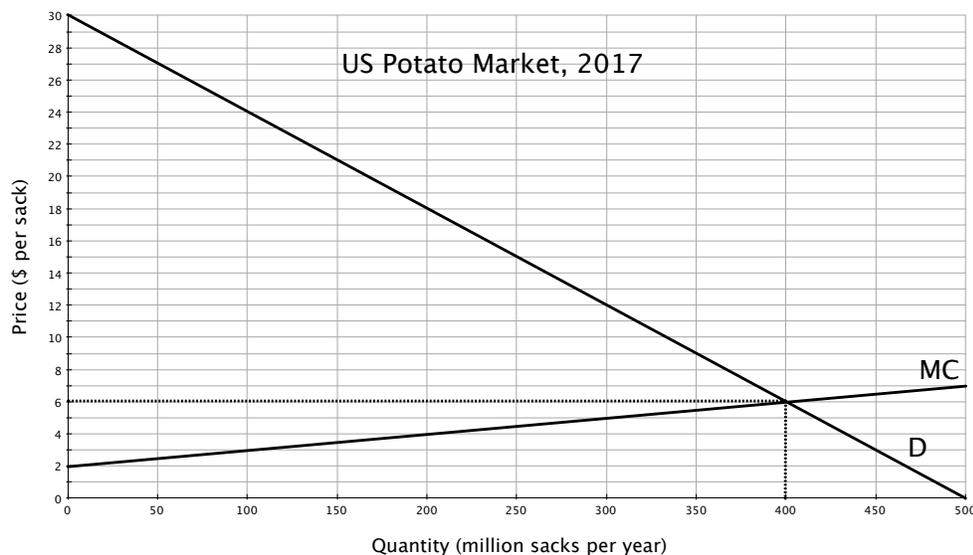
- A. Disallow any further pharmaceutical patenting as patents are allowing pharmaceutical companies to earn economic profits at the expense of those in need of medication.
- B. Disallow any further pharmaceutical patenting that would protect innovating firms from immediate competition, but create a system in which the government awards large cash prizes to innovating firms for breakthroughs in treating medical conditions.
- C. Allow continued patenting, but force pharmaceutical companies to set fair prices by imposing a price ceiling set at the competitive market price.
- D. Allow continued patenting, but force pharmaceutical companies to offer discounted pricing / rebates to low income individuals or individuals without access to insurance.
- E. Have the government pay for (fully subsidize) all pharmaceutical research and development instead of providing patents to those companies.

NOTE: Team reporters must be prepared to support their answers with the appropriate graphical analysis (in the framework with market quantity on the x-axis and market price/marginal cost on the y-axis) of the monopoly outcome in their notes.

(<https://serc.carleton.edu/econ/tbl-econ/activities/209502.html>)

3. Consider the US market for wholesale potatoes in which potatoes are sold in 100-lb. sacks. Suppose that the competitive market outcome features a market-clearing price of \$6 per sack.

Suppose producers band together to restrict output and succeed in attaining the output and price levels of a monopoly firm. Illustrate that price and quantity along with the deadweight loss in the graph below that depicts the competitive market outcome.



Would a potato cartel be likely to succeed? Write your prediction large (YES! or NO!) in the space at the bottom of the graph along with a phrase summarizing your reasoning. (Be ready to explain in your report!) Gallery walk reporting. (<https://serc.carleton.edu/econ/tbl-econ/activities/199476.html>)

4. Individually, think about a good in the economy that is sold at different prices to different consumers.
- Which buyers get the low price and which get the high price?
 - How do sellers determine which type of buyer a potential customer is?
 - As a customer, how might you change your behavior to get the low price?
 - Would it be worth your while to do so?

Now, have each student present their example to the team.

Next, teams select the single most interesting case to report in Sharpie ink on the 11" by 17" sheet of paper provided. Gallery walk reporting!

<https://serc.carleton.edu/econ/tbl-econ/activities/197493.html>)

Module 3 (Imperfect Competition) Assessment Questions

Questions 1 through 3 are based on the following news article.

As you walk into a sunglass store, you may be overwhelmed by the wide variety of brands you have to choose from.

But many of those brands are actually owned by the same company, the Italian eyeglass conglomerate Luxottica. Luxottica owns nearly every popular brand of sunglasses sold worldwide as well as Sunglass Hut, where much of that eyewear is for sale. Luxottica's brands include icons like Ray-Ban and Persol in addition to a large portion of fashion brands that have licensing deals with the company.

Luxottica actually accounts for 60% of all sunglass sales in the US, according to IBISWorld. The next largest is Safilo, which holds a comparatively small share of 6%. (*Business Insider*, August 25, 2017)

1. Which of the following seems the most likely source of Luxottica's market power in the United States retail sunglasses market?
 1. Luxottica controls a large share of the natural resources required to make sunglasses.
 2. The sunglasses market is a natural monopoly and the government protects Luxottica's sole right to serve much of the market.
 3. People gain more satisfaction from high-status brands so competition from lesser brands is minimal.
 4. **There are large fixed costs to design and market sunglasses but it costs little to make them.**

2. Recently, government antitrust authorities considered blocking a merger between Luxottica, the world's largest maker of glasses frames, and Essilon, the world's largest lens maker. Which of the following concerns were likely to have been important to antitrust authorities as they deliberated the case?
 1. What prices should the government set for a pair of sunglasses sold by the oligopoly firm?
 2. Would Luxottica's shareholders be harmed by the merger?
 3. **What increase in price would result from the increased market power in frames and lenses of the merged companies?**
 4. Would the combined firm continue to offer a broad range of sunglasses brands?

3. Which features of the US market for sunglasses indicate that the market is an oligopoly?
 1. There is great variety in the styles of sunglasses offered for sale.
 2. Millions of people buy sunglasses every year even though they already have a perfectly good pair.
 3. Recently, several online sunglasses sellers have entered the market.
 4. **Luxottica regularly earns a higher rate of return on its assets than do producers of other**

fashion goods.

4. Many sellers price discriminate; that is, sellers offer different prices to different customers. Which of the following statements about price discrimination is TRUE?

1. Sellers can gain from price discriminating even without the ability to detect differences in different consumers' willingness to pay.
2. **If it is easy for one buyer of a good or service to re-sell it to other buyers, then price discrimination will not increase sellers' profits.**
3. Price discrimination generally reduces the well-being of consumers.
4. Large corporations are more likely to price discriminate than are small businesses.

5. Governments often conduct antitrust enforcement in order to limit the power of monopolists to reduce output and raise prices to consumers. However, governments also commonly create monopolies by means of patents and copyrights. Which of the following statements can explain the contradiction?

1. Government protection of monopoly producers exists because of special interest lobbying and is never good for consumers.
2. **In some cases, without government protection there would be no incentive to develop new products.**
3. Patents and copyright protection enable the government to ensure the high quality of new products.
4. Government protection allows firms to grow to sufficient size that they can benefit from important economies of scale.

Module 4 (Externalities) Learning Objectives

1. Identify situations where important costs and benefits associated market activities fall on people not directly participating in the market.
2. Analyze the difference between market outcomes and socially desirable quantities in the presence of negative and positive externalities.
3. Describe the circumstances (i.e., low transactions costs) in which it is possible to eliminate externality issues by establishing clear property rights.
4. Compare command and control with incentive-based policies in situations where government intervenes to address externality issues.

Externalities Control Exercises

1. Two businesses share a building. On one side, the Chop Shop is an edgy barber shop catering to young men who listen to loud hip-hop music as they wait or get their hair cut. On the other side, the Tea House serves a variety of teas, a comfortable sitting area, and free wifi for people to work and study in peace. It is prohibitively expensive to soundproof the old building. The table below presents the surplus for each business if the Chop Shop plays loud music and if the Chop Shop keeps the volume low.

Surpluses for Chop Shop and Tea House

	Chop Shop plays LOUD music	Chop Shop turns volume down
Surplus for Chop Shop	\$1,000/day	\$750/day
Surplus for Tea House	\$800/day	\$900/day

Suppose that the law states that the Chop Shop must keep the volume low if the Tea House complains about the loud music. If the two businesses can negotiate at no cost, will the Chop Shop play loud music?

2. Suppose that in the Portland Oregon Metropolitan Area (POMA) the marginal private benefits of getting a flu vaccine are given by the function $MPV=500-0.5Q$, where Q is the number of vaccines per year, in thousands. Suppose that the typical citizen of POMA faces a cost of getting a vaccine of \$20. If each flu shot results in an external benefit of \$10 to other citizens of POMA, by how much will the quantity of vaccines that results from the decisions of private individuals fall short of the socially best number of vaccines?

- A. 10,000
- B. 20,000
- C. 30,000
- D. 40,000

Note that team reporters must be prepared to show work in their own notes!

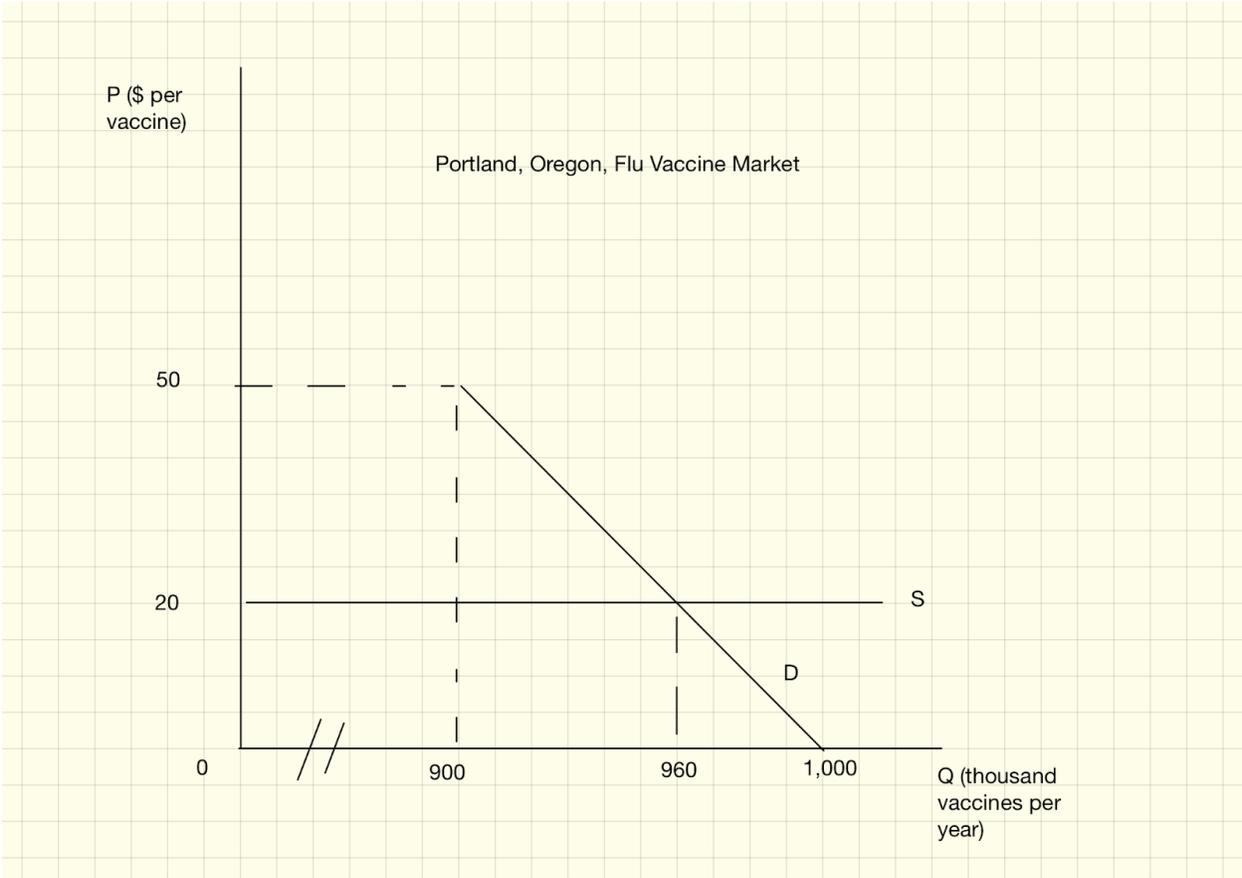
3. Suppose that in the Portland Oregon Metropolitan Area (POMA) the private demand for measles vaccines is given by the graph in the graph below. Suppose that the typical citizen of POMA faces a constant cost of getting a vaccine of \$20.

If each flu shot results in an external benefit of \$10 to other citizens of POMA, by how much will the quantity of vaccines that results from the decisions of private individuals fall short of the socially best number of vaccines?

- A. 10,000
- B. 20,000
- C. 30,000
- D. 40,000

Note that team reporters must be prepared to show the work added to their own handout!

Portland Vaccine Market



4. Suppose that the daily demand for motorboat rentals at Trinity Lake in Northern California is given by the function $P=300-2Q^d$ and supply is given by the function $P=60+Q^s$, where P is the price of a day's rental and Q is the number of boats rented out per day. The noise of the motorboats disturbs other users of the lake, as do the exhaust fumes. What's more, the boats emit pollution, contaminating the lake's otherwise pure water. If the negative externalities cause damages of \$30 per daily boat rental, the unregulated market outcome will result in deadweight loss of _____ dollars per day.

- A. 150
- B. 200
- C. 250
- D. 300

Note that team reporters must be prepared to show work in their own notes!

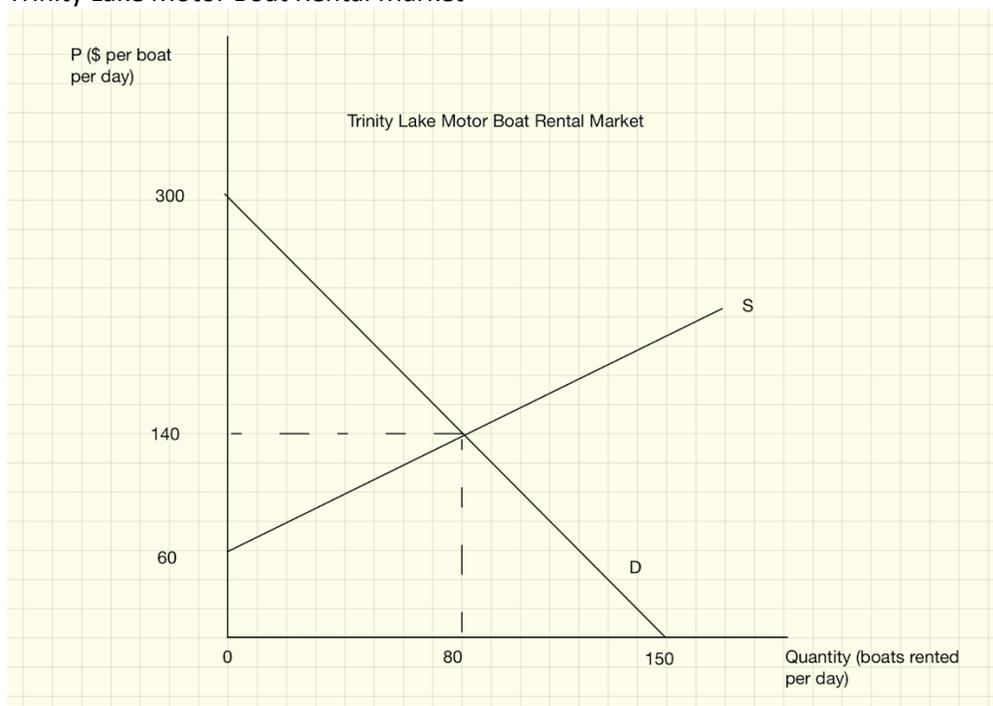
5. Suppose that the daily demand for and supply of motorboat rentals at Trinity Lake in Northern California are those depicted in the graph below. The noise of the motorboats disturbs other users of the lake, as do the exhaust fumes. What's more, the boats emit pollution, contaminating the lake's otherwise pure water.

If the negative externalities cause damages of \$30 per daily boat rental, the unregulated market outcome will result in deadweight loss of _____ dollars per day.

- A. 150
- B. 200
- C. 250
- D. 300

Note that team reporters must be prepared to show the work added to their own handout!

Trinity Lake Motor Boat Rental Market



6. Suppose that two polluters -- Joanne-Berk Paper Company and Brown Water Services -- emit glop into the Fox River near Appleton, Wisconsin. In the absence of any government regulation, each firm emits 4

tons of glop per month into the river. The following table presents information on how the two companies' monthly operating costs change as they are required to clean up various amounts of glop.

Glop emissions	4	3	2	1	0
Joanne-Berk	10,000	11,000	12,500	15,000	20,000
Brown Water	10,000	10,100	10,500	11,500	13,500

If the government takes action to clean up half the glop emitted to the river by conducting an auction where the price starts at zero and climbs by one dollar until exactly 4 permits are demanded, what will be the price of a permit?

- A. \$101
- B. \$401
- C. \$1,001
- D. \$1501

7. Suppose that two polluters -- Joanne-Berk Paper Company and Brown Water Services -- emit glop into the Fox River near Appleton, Wisconsin. In the absence of any government regulation, each firm emits 4 tons of glop per month into the river. The following table presents information on how the two companies' monthly operating costs change as they are required to clean up various amounts of glop.

Glop emissions	4	3	2	1	0
Joanne-Berk	10,000	11,000	12,500	15,000	20,000
Brown Water	10,000	10.100	10,500	11,500	13,500

If the government takes action to clean up half the glop emitted to the river by issuing each firm tradable permits to emit just two tons of glop per month, _____ will buy permits and clean-up costs will be _____ dollars per month less than under command-and-control regulation of the same amount of clean-up.

- A. Joanne-Berk; 500
- B. Joanne-Berk; 1000
- C. Brown Water; 500
- D. Brown Water; 1000

Externalities Treatment Exercises

1. The rapid economic growth during the last 200 years has resulted in great harm to the natural environment. The authors of one economics text state that "the permanent technological revolution -- which brought about dependence on fossil fuels -- may also be part of the solution to today's

environmental problems." (CORE Econ, core-econ.org)

Why has the shift from fossil fuels to less environmentally destructive energy technologies been so slow?

- A. The technology for converting wind, solar, and geothermal energy into a form easily used by machines has not existed until very recently.
- B. The cost of the environmental resources consumed in production has generally not been paid by producers.
- C. Government policy promotes fossil fuel energy use in favor of cleaner alternatives.
- D. The harm done to the environment by much modern economic activity has been largely unknown until very recently.

<https://serc.carleton.edu/econ/tbl-econ/activities/197280.html>

2. Consider the issue of nitrate pollution by farms in Iowa fouling the Raccoon and Des Moines Rivers, the sources of drinking water for the City of Des Moines. What policy measure should be enacted to remedy the problem?

- A. Ban nitrate emissions from farms.
- B. Tax each ton of nitrate emissions.
- C. Assign property rights over the river water clearly to the City of Des Moines.
- D. Assign property rights over the river water clearly to farmers.

<https://serc.carleton.edu/econ/tbl-econ/activities/188943.html>

3. What is the **most important** outcome (either positive or negative) to be considered in voting (for or against) a carbon tax? Use economic terminology and at least one supply-and-demand diagram to model your choice. In addition to the choice, a gallery walk will be employed, in which each team draws and shares the economic model backing their choice.

- A. Higher gasoline prices
- B. Higher product prices (due to higher transportation and production costs)
- C. Lower business profits (due to higher transportation and production costs)
- D. Less pollution
- E. Less traffic congestion

Module 4 (Externalities) Assessment Questions

1. Given the importance of a healthy environment to human well-being, what is the most important reason why people haven't voluntarily switched to cleaner ways of producing energy?
 1. The general public is unaware of the connection between burning fossil fuels and environmental degradation.
 2. **The prices of fossil fuels do not include the environmental damage and, thus, they are inexpensive.**
 3. The technology to produce energy without burning fossil fuels has only recently been invented.
 4. Alternative energy sources produce different types of pollution but ultimately are equally harmful to the environment.

2. Which of the following statements can explain why economists generally prefer taxes on regional and global pollutants over government "command and control" mandates that each polluter clean up a certain percentage of pollution emissions?
 1. **Firms facing a pollution tax will clean up if doing so is less expensive than paying the tax; thus, aggregate cleanup costs are minimized.**
 2. Pollution taxes do not give polluting firms the incentive to outsource production to nations with relatively little pollution regulation.
 3. Pollution tax systems do not require the expensive enforcement mechanisms that "command and control" approaches do.
 4. Businesses prefer pollution taxes to command and control regulation and thus are less likely to oppose pollution taxes than command and control rules.

3. The town council is considering offering low income households a subsidy if they paint the outside of their houses. Which of the following is an example of an externality?
 1. The subsidy will increase the value of the house being painted.
 2. **The subsidy will increase the value of neighboring houses.**
 3. The subsidy will increase the profits of stores selling paint.
 4. The subsidy will increase the wages of house painters.

4. According to the Coase theorem, in which of the following externality cases would negotiation among private parties be most likely to lead to the efficient outcome?
 1. **Beekeepers' operations increase farmers' crop yields.**
 2. Vaccinated people reduce the chance of illness for themselves and others.
 3. A coal plant emits high quantities of carbon dioxide into the atmosphere.
 4. Cattle grazing in streams harm fish habitat and downstream water quality.

5. Which of the following statements is a characteristic of efficient regulation of pollution?
 1. **The net benefit of each unit of pollution cleaned up is greater than or equal to zero.**
 2. Large firms are required to clean up disproportionately more pollution than small firms.
 3. Pollutants that create irreversible harm to ecosystems are banned completely.

4. Corporations pay for pollution clean-up without raising the price of their products.