The Power of Microeconomics

Lecture Eleven:
Public Goods and Externalities

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Government Intervention into the Free Market

- Taxpayers heavily subsidize public education.
- The government imposes a wide range of health, safety, and environmental regulations on private companies.
- Government also takes a large tax bite out of your profits or wages.

Why Markets Fail

- We are going to return to some unfinished business from Lecture Five.
- In that lecture, we illustrated how perfect competition provides an efficient allocation of society's resources.
- When one or more of the assumptions of perfect competition are not met, we have what is called a market failure.

The Government's Role

- When you visit a restaurant or butcher shop, the government helps prevent food poisoning through meat inspections.
- As you jump into your car or onto your motorcycle, that seat belt or helmet you must wear has been mandated by the government as well.

From the Cradle to Grave…

- …the government always seems to be with us, whether it is providing police protection or a national defense system or roads and bridges and clean air.
- What we want to do in this lecture is better understand the economic underpinnings of government intervention in the marketplace.

Public Goods and Externalities

- We've examined the market failure of imperfect competition in our discussions of monopoly, monopolistic competition and oligopoly.
- In Lecture Five, I also briefly mentioned two additional market failures dealing with what are called public goods and externalities.
- It is to these two extremely important market failures that we now turn.

LECTURE TWELVE - PART TWO

Public Goods

- Each year, the United States government spends billions on one public good alone, national defense.
- Billions more are spent on other public goods ranging from parks, roads, and bridges to our criminal justice system, flood control programs, and even our lighthouses on the high seas.

The Nature of Public Goods

- So why is it that the government rather than the private marketplace has to provide for all these public goods?
- The answer lies in understanding the nature of the public goods market failure.
- To start towards that answer, let's first contrast private versus public goods.

Private Goods

- Private goods are divisible.
  - They come in small enough units to be afforded by individual buyers.
- A private good is rival in consumption.
  - If I consume the good, you can't.
- A private good is subject to the exclusion principle.
  - Those unable or unwilling to pay can be excluded from the product's benefits.

Public Goods

- Public goods are indivisible.
  - They come in such large units that individual buyers cannot afford them.
- Public goods are also non-rival in consumption.
  - Both you and I can consume a public good without interfering with the other's enjoyment.

Non-Excludability!

- Exclusion from the consumption of a public good is difficult or impossible.
- Non-excludability makes it very difficult for the private marketplace to supply the good.

Let's Be More Specific

- Suppose you are holding a hot dog in your hand.
- I tell you that I'm really hungry and want your hot dog!
- But you're hungry, too, so that if I eat that hot dog, you can't.
- That hot dog is rival in consumption.

Compare This To National Defense

- Here you are standing on American soil protected by an Army, a Navy, an Air Force, and a deadly array of nuclear missiles.
- But guess what: I am protected as well.
- My protection by this defense umbrella does not interfere with your protection!

In Other Words

- The defense umbrella is non-rival in consumption.
- Public goods like national defense are indivisible and too large to be purchased by one individual.

Non-Excludability

- Here's the problem we face when we try to rely on the free market to provide public goods like national defense.
- Nobody wants to pay for public goods!
- The reason has to do with the third characteristic of a public good: non-excludability.

The Free Rider Problem

- A producer cannot exclude non-payers from receiving its indivisible benefits.
- This creates a perverse incentive among potential buyers to want to free ride.
  - Potential buyers don't want to pay for a good they can get free.
- Nor will they want to reveal their true preferences as to how much they would be willing to pay for it prior to its provision for fear of being taxed that amount.

Where's The Demand Curve?

- The market demand curve for a public good is either non-existent or significantly understated.
- The perceived demand for the public good doesn't generate enough revenue to cover the costs of production.
- This is so even though the collective benefits of the public good may exceed the economic costs!

Flood Control and Free Riders

Flood Control and Free Riders

- No one wants to be flooded out, but each landowner knows that a flood control program will protect all landowners, regardless of who pays.
- Individual farmers and landowners may say they don't really want a dam and aren't willing to pay for it BUT what they are really doing is waiting for someone else to pay for the flood control.

Key Point

If we leave this project to market forces, all the property in the valley will be washed away.

The Punchline

- The economic difference between public goods and private goods rests on technical considerations -- <u>not</u> political philosophy.
- Do we have the technical capability to exclude non-payers from non-rival goods like national defense or flood control?
- Is exclusion economically feasible?

City Streets: Exclusion Not Feasible

- In theory, we could restrict the use of city streets to only those who pay to use them.
- We could put a gate on every corner; but that would be exceedingly expensive and impractical.
- So city streets have the characteristics of a public good.

Other Public Goods

- Administration of justice
- Regulation of commerce
- Conduct of foreign relations
- The provision of certain types of goods such as lighthouses, bridges, and roads.

LECTURE TWELVE - PART THREE

To Answer These Questions

- We have to understand more about the demand for public goods and, more importantly, how the market demand curves for private and public goods differ.

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The Horizontal Sum: Private Goods

- The demand curve for private goods is the horizontal sum of the individual demand curves.
- Because of this, individual consumers will pay the same price for a good but consume different quantities.

The Vertical Sum: Public Goods

- The market demand curve for a public good is the vertical sum of the individual demand curves.
- Individual consumers will all consume the same amount of the good but value that amount at different prices.

Market demand for corn, three buyers

Price Per bushel	Quantity demanded						Total quantity demanded per week
	Carlos		Carla		Leon		
$5	10	+	12	+	8	=	30
4	20	+	23	+	17	=	?
3	35	+	39	+	26	=	100
2	55	+	60	+	39	=	?
1	80	+	87	+	54	=	221

Pause the presentation now if you want to do this exercise.

Market demand for corn, three buyers

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2	55	+	60	+	39	=	154
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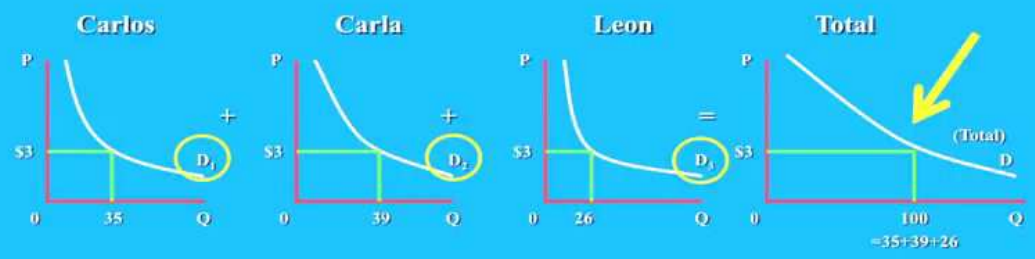

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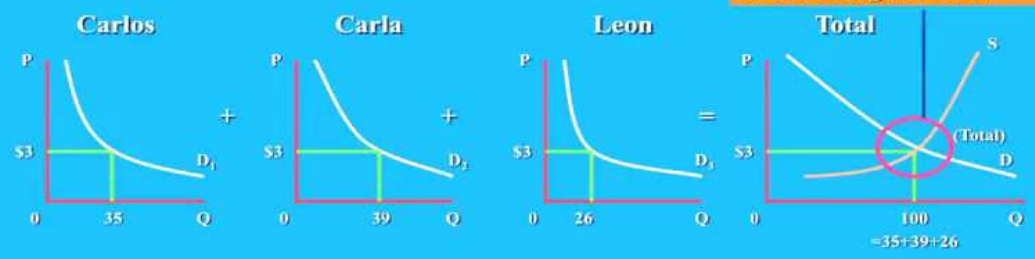
Social marginal benefits= Social marginal costs

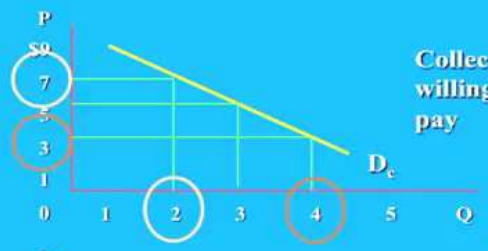


Demand for a public good, two individuals

(1) Quantity	(2) Mr. Dove's willingness to pay(price)		(3) Mr. Hawk's willingness to pay(price)		(4) Collective willingness to pay(price)
1	$4	+	$5	=	$9
2	3	+	4	=	7
3	2	+	3	=	5
4	1	+	2	=	3
5	0	+	1	=	1

- Q: Can you draw the market demand curve for this public good? Just remember to sum vertically!

Pause the presentation now if you want to do this exercise.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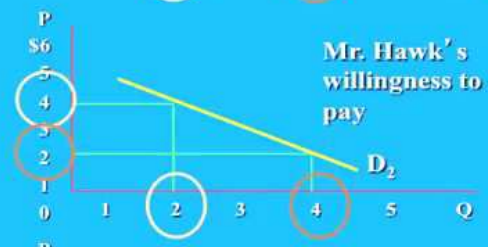
Collective willingness to pay
D_c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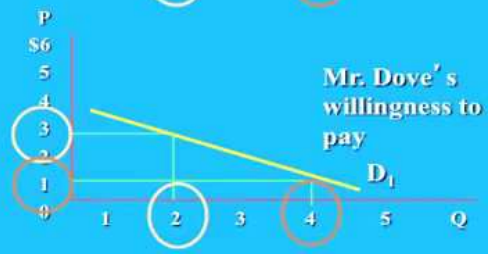
Q
Mr. Hawk's willingness to pay
D_2


P
$6
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4
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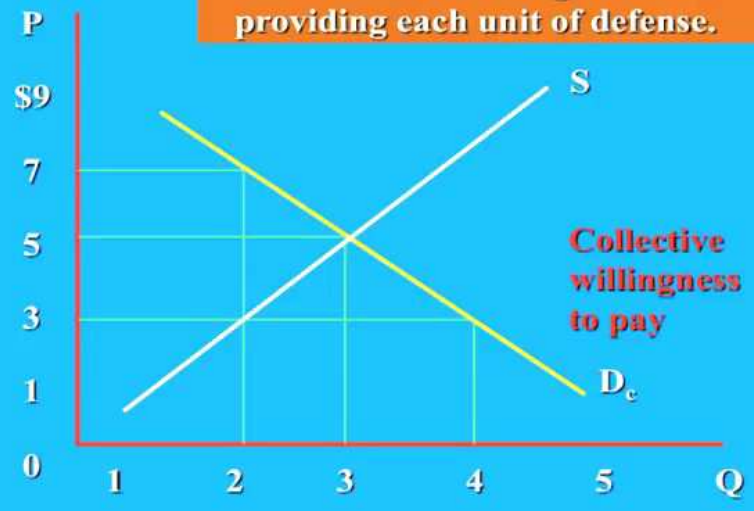
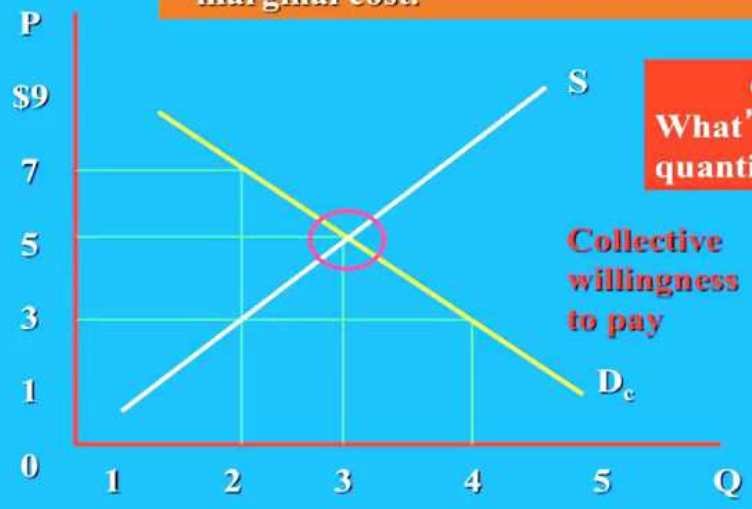
Q
Mr. Dove's willingness to pay
D_1

- This supply curve slopes upwards because of the law of diminishing returns.
- It measures the marginal cost to society of providing each unit of defense.



- The optimal output occurs at the intersection of supply and demand.
- Here, the social marginal benefit equals the social marginal cost.

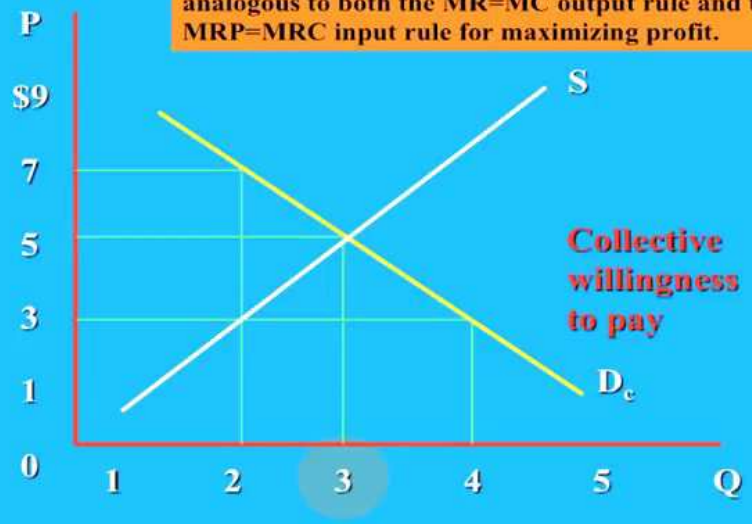


Question
What's the optimal quantity?

Collective willingness to pay

A: At 3 units, the combined willingness to pay for the extra unit--the marginal benefit to society--just matches that unit's marginal cost of $5.

This marginal benefit equals marginal cost principle is analogous to both the MR=MC output rule and the MRP=MRC input rule for maximizing profit.



LECTURE TWELVE - PART FOUR

Benefit-Cost Analysis

- Should government undertake the project?
- What is its proper size or scope?

The Benefits and Costs

- Benefits: Come from the reduction in damage to the land in the valley in the event of a flood.
- Costs: The loss of satisfaction associated with the accompanying decline in the production of private goods or some other public good.
- Costs can usually be measured simply by the cost of building the project!

The Decision Rule

- Build: If the benefits from the project exceed its costs, we should build the project.
- Don't Build: If the costs exceed the benefits, we should not.

Benefit-Cost Analysis

- Can indicate much more that just whether a public project is worth building.
- It can also help government choose among the best competing alternatives.

(1) Plan	(2) Total annual cost of project	(3) Marginal cost	(4) Total annual benefit (reduction in damage)	(5) Marginal benefit	(6) Net benefit or (4)-(2)
Without protection	$ 0		$ 0		$ 0
		$ 3,000		$ 6,000	
A: Levees	3,000		6,000		3,000
		7,000		10,000	
B: Small reservoir	10,000		16,000		6,000
C: Medium reservoir	18,000		25,000		
		12,000		7,000	
D: Large reservoir	30,000		32,000		2,000

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Pause the presentation now if you want to do this exercise.

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		12,000		7,000	
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Question
Which project should we choose?

Pause the presentation now if you want to do this exercise.

Answer: Compare the marginal cost and the marginal benefit associated with each plan.

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D: Large reservoir	30,000		32,000		2,000

Benefit-Cost Analysis

- Shatter the simplistic notion that the best way to make government more efficient is to always reduce government spending
- Key Point: Efficient government does not necessarily mean minimizing public spending.
- Use tools like benefit-cost analysis to efficiently allocate resources between the private and public sectors until no net benefits can be had from further re-allocations of resources.

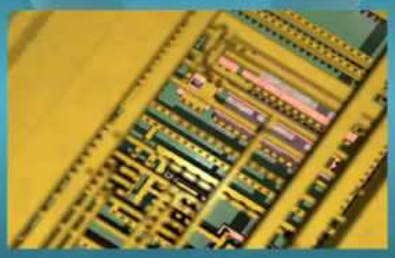
LECTURE TWELVE - PART FIVE

Negative and Positive Externalities

- The production or consumption of a good may generate "spillover effects.
- Key Point: External benefits or costs are not accurately reflected in the supply and demand curves of producers and consumers.
- As a result of externalities, the free market may be inefficient and under-supply or over-supply the good.

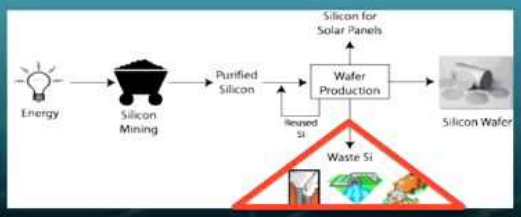
A Silicon Valley Chip Example

- To make chips, your company must pay workers, invest in new plant and equipment, and buy raw materials.
- Each of these costs will be reflected in your private marginal cost curve which, you may recall, is also your firm's supply curve.



Toxic Wastes R Us

- In a free market and in the absence of any laws to the contrary, your company may simply dump these toxic wastes into a nearby river to minimize its costs.
- Nonetheless, the resulting pollution will not be without cost to the broader society.



Why It Is A Negative Externality

- Children may get leukemia
- Fishermen catch less fish
- Homeowners get sick

Why It Is A Negative Externality

- These types of external or spillover effects are called negative externalities.
- Because they will not be borne by your firm in a free market, they are not reflected in your supply curve.
- The likely result: Your firm will produce both too many computer chips and too much pollution from society's point of view!

Positive Externalities

- Arise when all of the benefits of consuming a good do not accrue to the individual consumer.
- By getting a flu shot, Holmes not only protects himself from getting the flu.
- He also helps protect the broader London population from catching the flu from him.

The Problem of Underconsumption

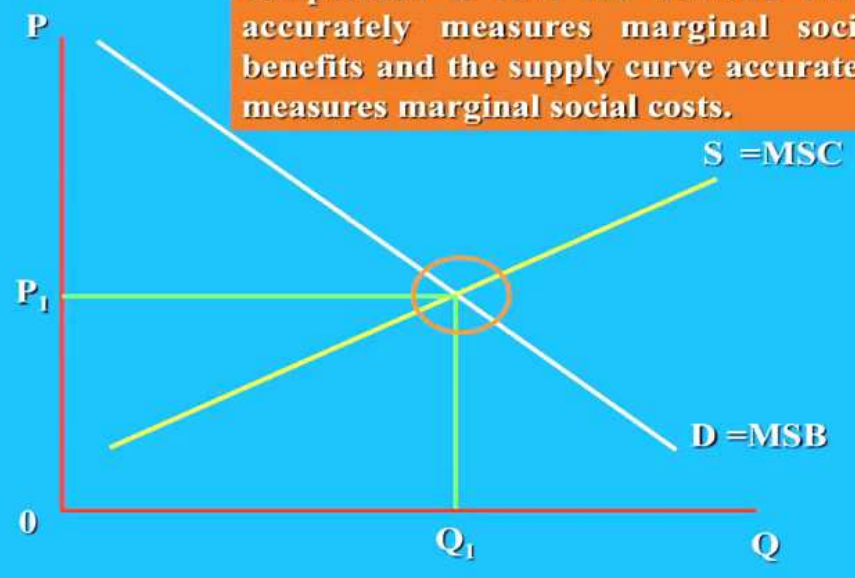
- When we magnify Holmes' behavior to the entire population, vaccinations mean a healthier and more productive workforce, a larger national output, and higher incomes for society.
- The Problem: The free market tends to lead to the underconsumption of goods that yield positive externalities – from vaccinations to education.

The Broader Point

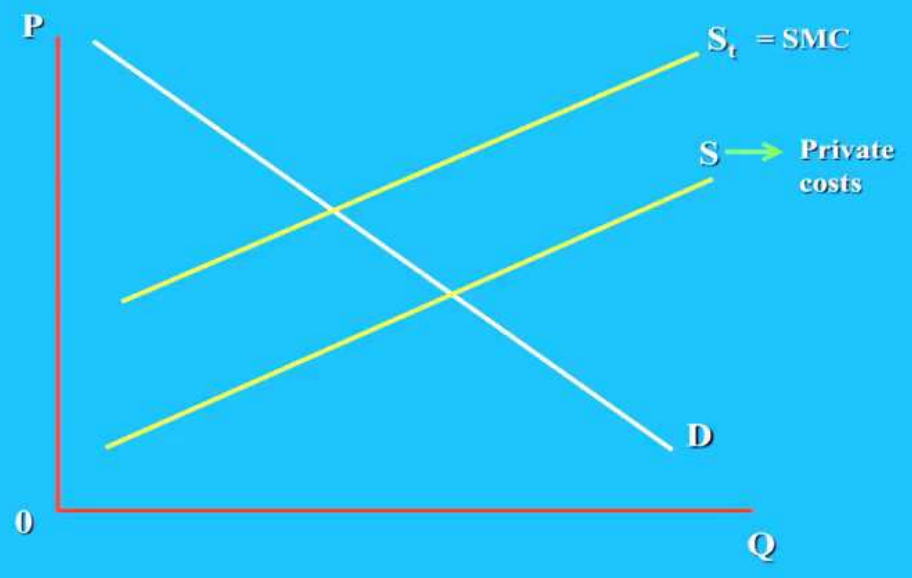
- Externalities: A strong economic rationale for federal, state, and local intervention into the free market.
- Examples: Environmental protection, traffic congestion, education and public health.
- Accordingly, it is appropriate that we take a more systematic theoretical look now at this very important market failure.

LECTURE TWELVE - PART SIX

One of the key assumptions of perfect competition is that the demand curve accurately measures marginal social benefits and the supply curve accurately measures marginal social costs.



A Negative Externality



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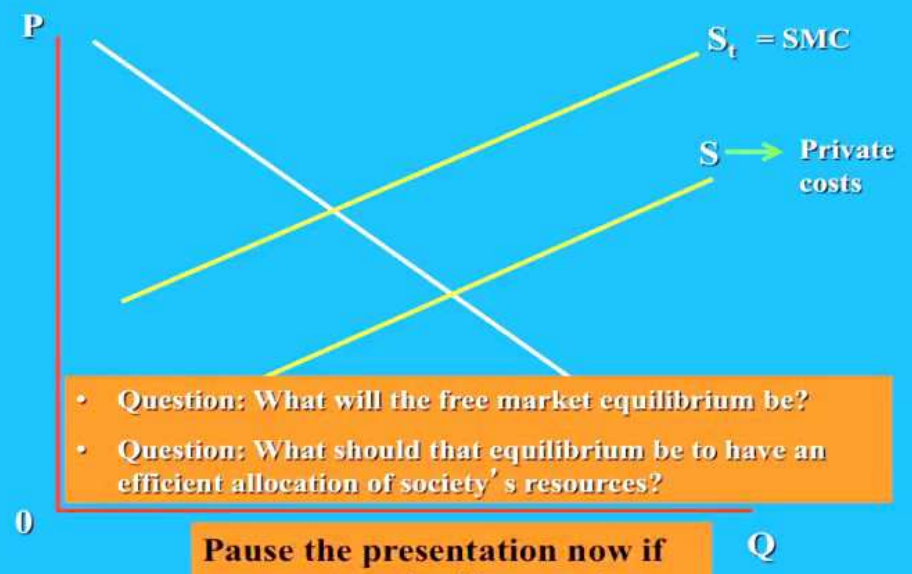
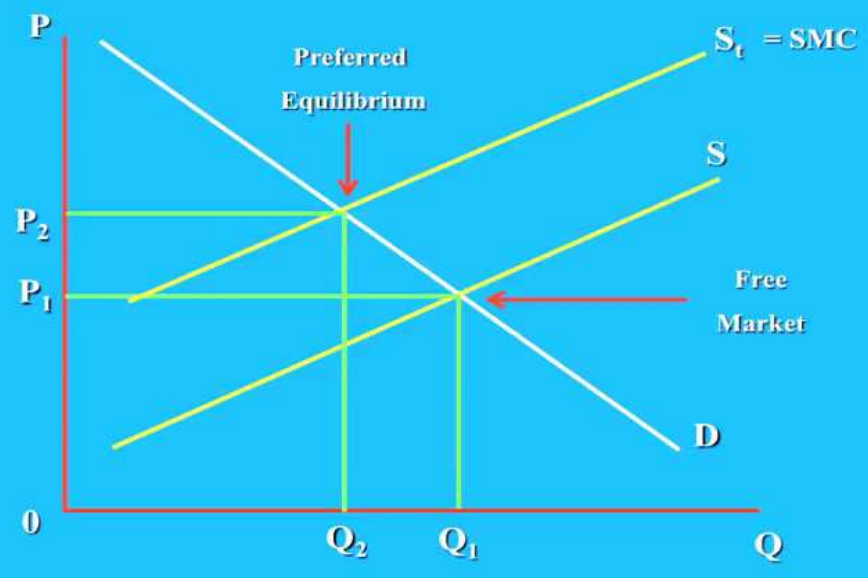


- Question: What will the free market equilibrium be?
- Question: What should that equilibrium be to have an efficient allocation of society's resources?

Pause the presentation now if you want to do this exercise.

A Negative Externality



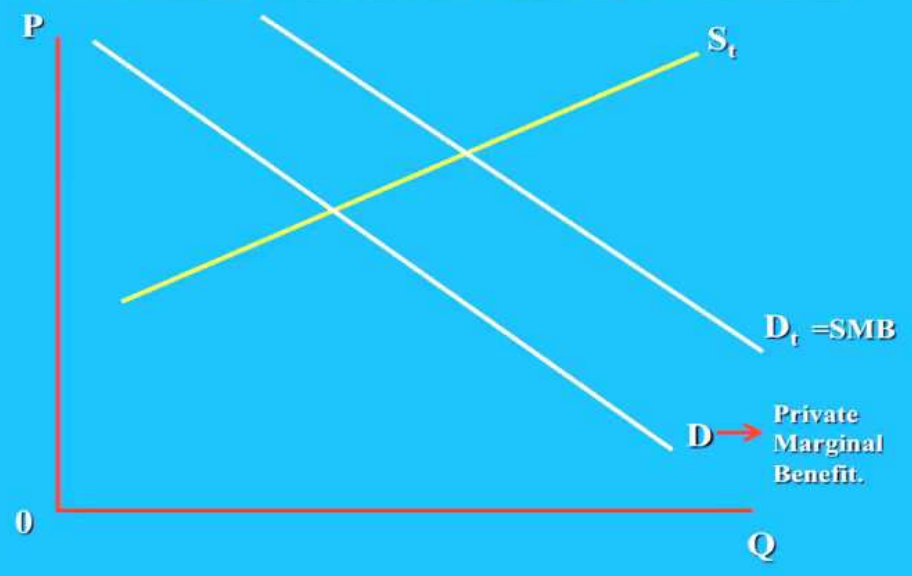
Positive Externalities

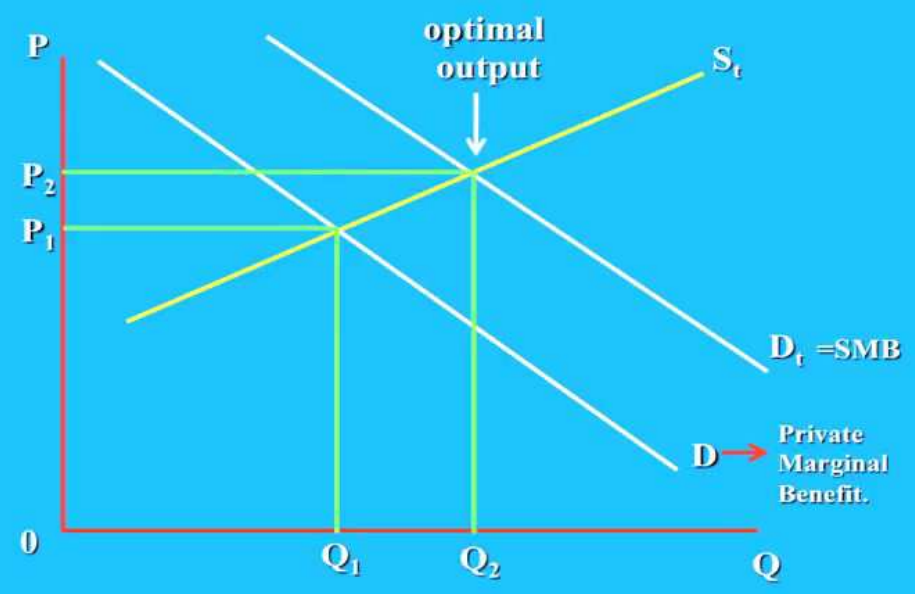
- Now, having seen the graph for a negative externality, can you draw one for a positive externality such as generated in our Sherlock Holmes example?

Pause the presentation now if you want to do this exercise.

Question: What will be the free market equilibrium?

Question: What should be the socially preferred equilibrium?




P
optimal
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D_t =SMB
D
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Marginal
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0
Q_1
Q_2
Q

Let's Summarize

- Negative externality: The free market is likely to produce too much of the externality and too much of the good generating the externality.

In Contrast

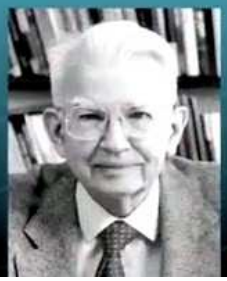
- Positive externality: The market under-supplies the good and generates too few spillover benefits.

Questions

1. Should the government intervene in the private marketplace to correct such externalities?
2. What form should such intervention take?

The Coase Theorem

- It helps to illustrate that government intervention into the marketplace may not be necessary because externalities can be solved through individual bargaining.
- The Coase Theorem was conceived by University of Chicago professor and Nobel laureate Ronald Coase.



Coase Argued That...

- Negative or positive externalities do not require government intervention where
  - (1) property ownership is clearly defined,
  - (2) the number of people involved is small, and
  - (3) bargaining costs are negligible.

An Example

- You live in a small town with a hundred other people.
- I own a tannery in that town that, in addition to producing leather, also stinks to high heaven.
- I make a lot of money from that tannery.
- You and your neighbors suffer a lot from the stench.

Assigning Property Rights

- Let's first assign the property rights to the air to me, meaning that under current law, I have a perfect right to pollute as much of the air as I want.

Question
How might Coase-type bargaining between your group and me resolve this issue?

The Coase Theorem Predicts

1. Your group might offer to pay me to reduce my output or, alternatively, simply buy my tannery and shut it down.
2. The payment will depend on how much profits my plant generates, how much your group values eliminating the discomfort caused by my plant, and how well each side negotiates.
3. If the value your group assigns to eliminating your discomfort is more than my profits, we may well come to some bargain!

Let's Switch Property Rights

- Assume *your* group owns the rights to the air and the only way I can produce my leather is to purchase from you the "right to pollute."

Question
What will the Coase Theorem predict here?

In This Case

- I will have to pay your group at least as much as the value your group puts on having clean air.
- If my profits are high enough to afford that, I will presumably do so.
- If not, I will simply have to close my plant.

Assigning Property Rights Is Critical!

- This example illustrates that "who has to pay whom" to eliminate the externality is completely determined by the initial assigning of property rights!
- If I have the rights, your group pays me, and vice versa.

A Value Question

Who in this example should be assigned the property rights to the air, your group in town or me and my tannery?

If You Are Like Most People

- You probably said that the people in the town should own the rights to clean air as a matter of fairness.
- But suppose I told you that my factory was there first and that your group only recently moved into town. Would this make a difference?

How The Coase Theorem Breaks Down

- When the town has to pay me not to pollute, there has to be some mechanism to collect the money from the townspeople. This might be difficult.
- For example, some people may be bothered more than others by the stench and some may not be bothered at all.

Questions

1. Should everyone pay the same amount?
2. Should only those who are bothered pay?

The Free Rider Problem Redux

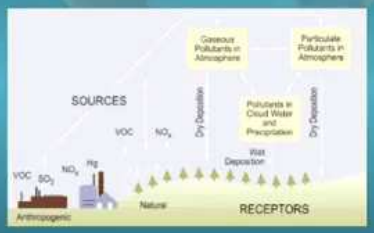
- How can we tell if people are telling the truth about how much the stench bothers them -- particularly if their payment will depend on their answer?

Key Point

As the number of people involved in the negotiations increases, the Coase Theorem tends to breakdown.

Acid Rain

- Affects millions of people in U.S. and Canada.
- The vast number of affected parties can not negotiate an agreement.
- We must rely on both governments to find acceptable solutions.



The Broader Point

- The Coase Theorem reminds us that clearly defined property rights can be a positive factor in remedying externalities
- However, many negative externalities involve large numbers of affected people, high bargaining costs, and community property such as air and water.

The Tort System

- A second approach to internalizing externalities relies upon a legal framework of liability laws.
- This framework is known in legal circles as the wrongful act or "tort system."
- The idea behind torts is that the person or corporation that produces the negative externality is legally liable for any damages caused to other persons.

For Example

- The Ajax Degreaser Company regularly dumps leaky barrels of solvents into a nearby canyon owned by the Bar B Q Ranch.
- The Bar B Q Ranch discovers this dump site and traces the leaky barrels to Ajax.
- Under the tort system, Ajax will get sued.
- If Ajax loses, it will pay the Bar B Q Ranch for the cleanup and possible additional damages.

Tort System Limitations

- As with the Coase Theorem, the tort system has its limitations.
- Lawsuits are expensive, time-consuming, and have uncertain outcomes.
- Major time delays in the court system are commonplace.

Other Tort Problems

- Will the court or a jury accept your claim that your child's leukemia has resulted from the toxic wastes?
- Can you prove a specific firm is the source of the contamination?
- Are you willing to risk all your money to sue a deep-pocketed corporation with hundreds of millions of dollars in assets and a team of 50 lawyers?

The Biggest Tort Problem

- Many negative externalities do not involve private property, but rather property held in common.
- Indeed, it is the public bodies of water, public lands, and the public air that often bear the brunt of negative externalities.
- This observation leads us to our third approach to internalizing externalities: direct government intervention.

LECTURE TWELVE - PART SEVEN

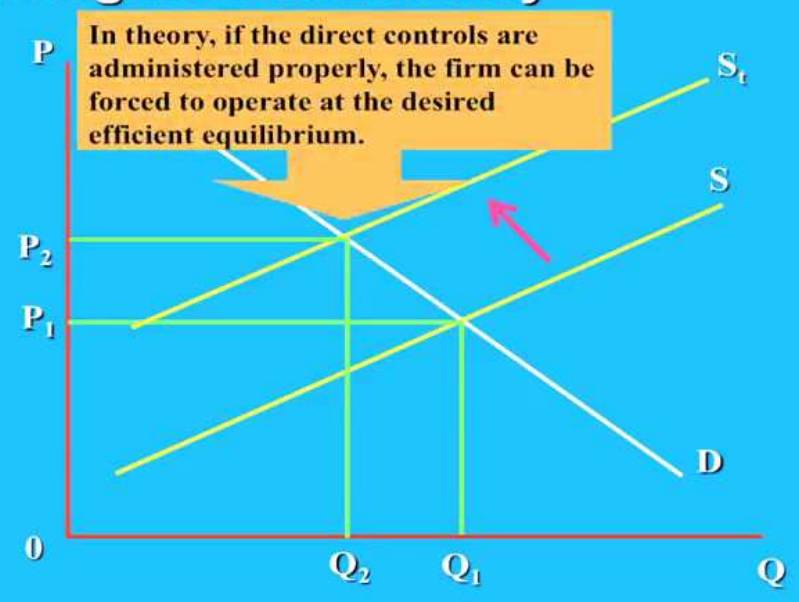
Direct Government Intervention

- Involves placing limits on the amount of pollution a polluter may emit.
- This "command and control" approach has dominated environmental public policy in the United States for decades.

An Example of Pollution Control

- Clean Air Act: Limits the amounts of sulfur dioxide, nitrogen oxide, particulates, and other substances that power plants and factories may emit into the air.
- Clean Water Act: Specifies the amount of heavy metals, detergents, and other pollutants that firms can dump into rivers and bays.
- Violation of these laws means fines and, on occasion, imprisonment.

A Negative Externality



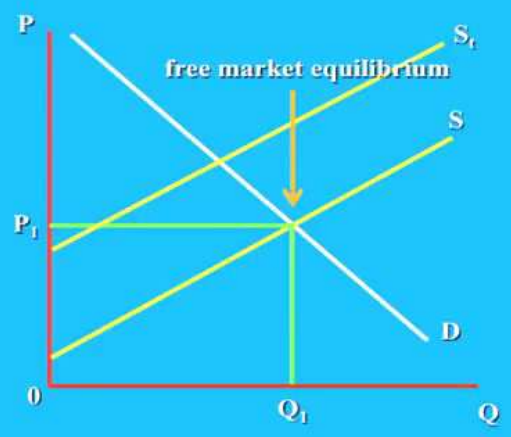
Pigouvian Taxes and Subsidies

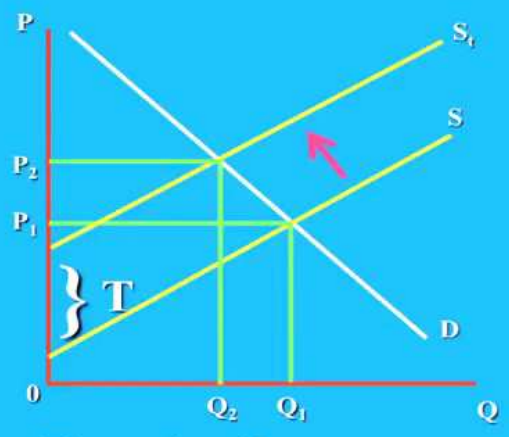
- There is a second way that this same result can be achieved.
- It is a method many economists prefer because it is less intrusive into the market place and relies more upon market and pricing signals.
- This method involves the use of so-called "Pigouvian taxes and subsidies" to tax negative externalities and subsidize positive externalities.

A.C. Pigou

- If you're wondering where the word Pigouvian comes from, it is used in honor of the French economist A.C. Pigou who originally thought up the idea.

Internalizing Negative Externalities





The tax is said to **internalize the externality.**

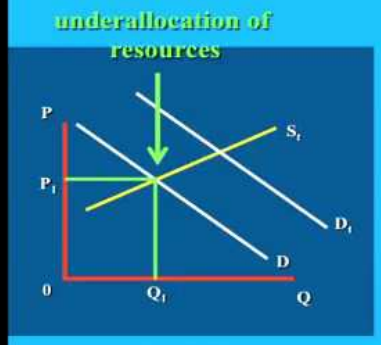
Pigouvian Taxes In Action

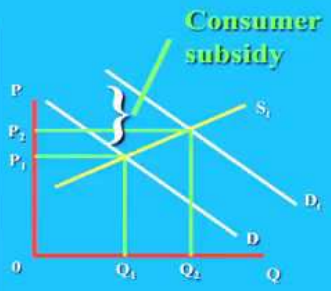
- Pigouvian-like taxes are regularly used by the government to internalize externalities.
- Example: The Federal government placed an excise tax on chorofluorocarbons which deplete the stratospheric ozone layer protecting the earth from excessive solar ultraviolet radiation.

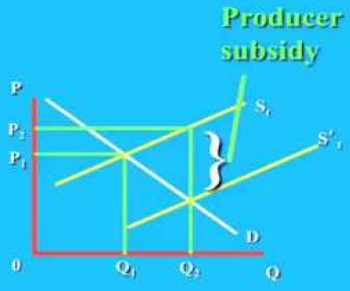
A Pigouvian Tax on CFCs

- CFCs are used as a coolant, a blowing agent, and a solvent.
- Manufacturers must decide whether to pay the tax or expend additional funds to purchase or develop substitute products.
- In either case, the tax will increase the marginal cost of producing CFCs, thereby shifting the private supply curve for this product leftward and presumably closer towards the optimal level.

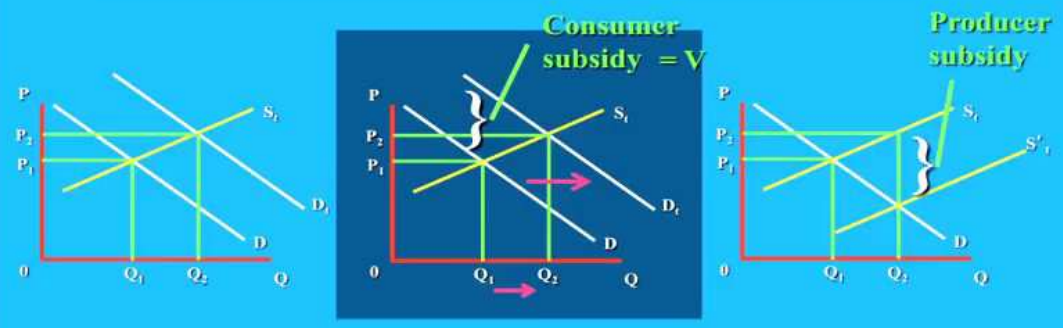
Internalizing Positive Externalities





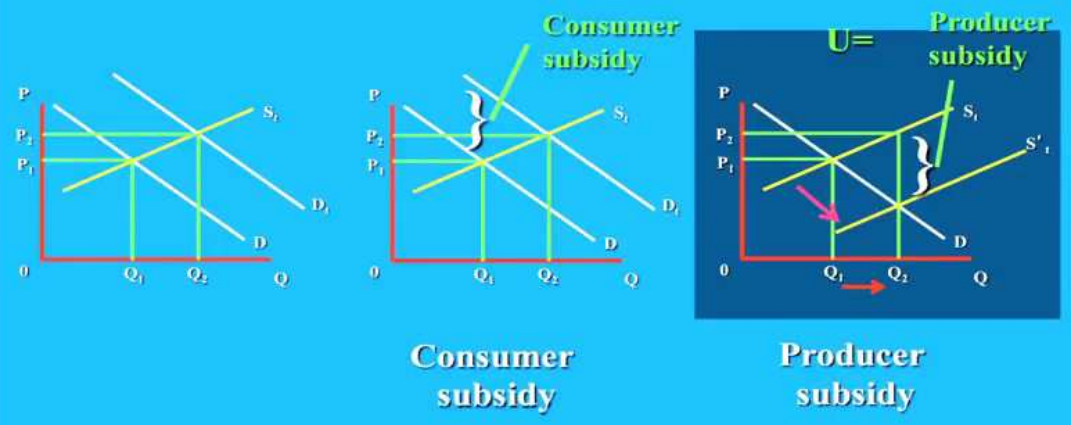


- The government might give each new mother a discount coupon with a value of V to spend on a polio vaccination for her child.



Consumer subsidy

- The government might provide a producer subsidy of U to physicians and medical clinics.



Consumer subsidy

Producer subsidy

Government Provision

- Where spillover benefits are extremely large, the government may decide to provide the product as a public good as an alternative to subsidization.
- In fact, the U.S. government largely eradicated the crippling disease of polio by administering free vaccines to all children.

Problem	Resource allocation outcome	Ways to correct
Spillover costs (negative externalities)	Overallocation of resources	1 Individual bargaining 2 Liability rules and lawsuits 3 Tax on producers 4 Direct controls 5 Market for externality rights
Spillover benefits (positive externalities)	Underallocation of resources	1 Individual bargaining 2 Subsidy to consumers 3 Subsidy to producers 4 Government provision

Conclusion

- This concludes our discussion of two of the most important market failures in economics: public goods and externalities.

THE POWER OF MICROECONOMICS

Professor Peter Navarro
University of California-Irvine

END OF LESSON ELEVEN

The Power of Microeconomics

Closing Thoughts

Presented By:
Professor Peter Navarro
University of California-Irvine

THE POWER OF MICROECONOMICS

Professor Peter Navarro
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END OF COURSE!

Feedback — Lecture Eleven Quiz Help

You submitted this quiz on **Mon 2 Dec 2013 3:55 AM PST**. You got a score of **28.00** out of **28.00**.

Question 1

Private goods are:

Your Answer		Score	Explanation
1. Divisible.	Correct	1.00	
2. Non-rival in consumption			
Both 1 and 2			
Don't know			
Total		1.00 / 1.00	

Question 2

Public goods are:

Your Answer		Score	Explanation
1. Indivisible			
2. Non-excludable			
Both 1 and 2	Correct	1.00	
Don't know			
Total		1.00 / 1.00	

Question 3

Which good is rival in consumption?

Your Answer		Score	Explanation
Bridge			
Computer	Correct	1.00	
National defense			
None of the above			
Don't know			
Total		1.00 / 1.00	

Question 4

A big problem when a good is non-excludable is that:

Your Answer		Score	Explanation
Nobody wants to pay for it			
A perverse incentive is created among potential buyers to want to free ride.			
Consumers don't reveal their preferences			
All of the above	Correct	1.00	
Don't know			

Total		1.00 / 1.00	

Question 5

The market demand curve for a public good is:

Your Answer		Score	Explanation
1. Non-existent or significantly understated	Correct	1.00	
2. Perfectly inelastic			
Both 1 and 2			
Don’t know			
Total		1.00 / 1.00	

Question 6

A public good tends to be:

Your Answer		Score	Explanation
Over-supplied			
Under-supplied	Correct	1.00	
Supplied at an efficient market outcome			
Don’t know			
Total		1.00 / 1.00	

Question 7

The economic difference between public goods and private goods rests on:

Your Answer		Score	Explanation
1. Political philosophy			
2. Technical considerations	Correct	1.00	
Both 1 and 2			
Don’t know			
Total		1.00 / 1.00	

Question 8

The demand curve for a public good is the:

Your Answer		Score	Explanation
Horizontal sum of the individual demand curves			
Horizontal sum of the individual demand curves divided by the supply curves			
Vertical sum of the individual demand curves	Correct	1.00	
Don’t know			
Total		1.00 / 1.00	

Question 9

With a private good:

Your Answer		Score	Explanation
Individual consumers will pay the same price for a good but consume different quantities	Correct	1.00	
Individual consumers will pay different prices for a good but consume the same quantity			
Individual consumers will pay the same price for a good and consume the same quantity			
Don’t know			
Total		1.00 / 1.00	

Question 10

In cost-benefit analysis, which is harder to measure?

Your Answer		Score	Explanation
Benefits	Correct	1.00	
Costs			
Both are equally difficult to measure			
Don’t know			
Total		1.00 / 1.00	

Question 11

The decision rule in cost-benefit analysis is:

Your Answer		Score	Explanation
If the benefits from the project exceed its costs, build the project	Correct	1.00	
If the benefits from the project are less than its costs, build the project			
If the benefits from the project minus tax revenues exceed its costs, build the project			
Don’t know			
Total		1.00 / 1.00	

Question 12

Benefit-Cost Analysis can:

Your Answer		Score	Explanation
1. Indicate whether a public project is worth building.			
2. Help government choose among the best competing alternatives			
Both 1 and 2	Correct	1.00	
Don’t know			
Total		1.00 / 1.00	

Question 13

Efficient government:

Your Answer		Score	Explanation
Does not mean minimizing public spending	Correct	1.00	
Means minimizing public spending			
Means balancing spending with tax revenues			
Don’t know			
Total		1.00 / 1.00	

Question 14

With externalities:

Your Answer		Score	Explanation
1. External benefits or costs are not accurately reflected in the supply and demand curves of producers and consumers			
2. The free market may be inefficient and under-supply or over-supply a good			
Both 1 and 2	Correct	1.00	
Don’t know			
Total		1.00 / 1.00	

Question 15

Negative externalities such as pollution from a chemical plant:

Your Answer		Score	Explanation
1. Are not reflected in the demand curve			
2. Are not reflected in the supply curve	Correct	1.00	
Both 1 and 2			
Don’t know			
Total		1.00 / 1.00	

Question 16

In the presence of a negative externality, a firm will produce:

Your Answer		Score	Explanation
1. Too few goods and too much pollution from society's point of view			
2. Too many goods and too much pollution from society's point of view	Correct	1.00	
Neither 1 or 2			
Don’t know			
Total		1.00 / 1.00	

Question 17

In the presence of positive externalities, the free market tends to lead to:

Your Answer		Score	Explanation
1. The underconsumption of goods that yield positive externalities	Correct	1.00	
2. The overproduction of goods that yield positive externalities			
Both 1 and 2			
Don’t know			
Total		1.00 / 1.00	

Question 18

Which provides a rationale for agencies like the Environmental Protection Agency?

Your Answer		Score	Explanation
1. Externalities theory	Correct	1.00	
2. Public goods theory			
Both 1 and 2			
Don’t know			
Total		1.00 / 1.00	

Question 19

In the presence of a negative externality:

Your Answer		Score	Explanation
The demand curve of the firm will be to the right of the demand curve reflecting social costs			
The supply curve of the firm will be to the left of the supply curve reflecting social costs			
The supply curve of the firm will be to the right of the supply curve reflecting social costs	Correct	1.00	
Don’t know			
Total		1.00 / 1.00	

Question 20

Coase argued that negative or positive externalities do not require government intervention where:

Your Answer		Score	Explanation
Property ownership is poorly defined,			
The number of people involved is large			
Bargaining costs are negligible	Correct	1.00	
All of the above			
Don’t know			
Total		1.00 / 1.00	

Question 21

In the Coase Theorem, what is the most important determinant of who pays whom?

Your Answer		Score	Explanation
The amount of the damage			
The assignment of property rights	Correct	1.00	
The number of claimants			
Don’t know			
Total		1.00 / 1.00	

Question 22

The Coase Theorem tends to breakdown:

Your Answer		Score	Explanation
As the number of people involved in the negotiations decreases			
As the number of people involved in the negotiations increases	Correct	1.00	
A Coase Theorem solution is independent of the number of people			
Don’t know			
Total		1.00 / 1.00	

Question 23

The tort system may be ineffective eliminating externalities because:

Your Answer		Score	Explanation
1. Lawsuits are expensive, time-consuming, and have uncertain outcomes			
2. Major time delays in the court system are commonplace			
Both 1 and 2	Correct	1.00	
Don’t know			
Total		1.00 / 1.00	

Question 24

When negative externalities involve property held in common rather than private property, the best solution may be:

Your Answer		Score	Explanation
1. A Coase Theorem solution			
2. Direct government intervention	Correct	1.00	
Either 1 or 2			
Don’t know			
Total		1.00 / 1.00	

Question 25

When you use Pigouvian taxes to internalize externalities, you:

Your Answer		Score	Explanation
Subsidize negative externalities			
Tax negative externalities	Correct	1.00	
Tax positive externalities			
Don’t know			
Total		1.00 / 1.00	

Question 26

In the accompanying figure, which project should you choose using cost-benefit analysis?

Your Answer		Score	Explanation
Levees			
Small reservoir			
Medium reservoir	Correct	1.00	
Large reservoir			
Don’t know			
Total		1.00 / 1.00	

Question 27

In the accompanying figure, which depicts a negative externality, the preferred equilibrium is at:

Your Answer		Score	Explanation
Point A with a price of P1			
Point A with a price of P2	Correct	1.00	
Point B with a price of P1			
Point B with a price of P2			
Don’t know			
Total		1.00 / 1.00	

Question 28

What is depicted in this graph?

Your Answer		Score	Explanation
A negative externality			
A positive externality	Correct	1.00	
A public good			
Don’t know			
Total		1.00 / 1.00	