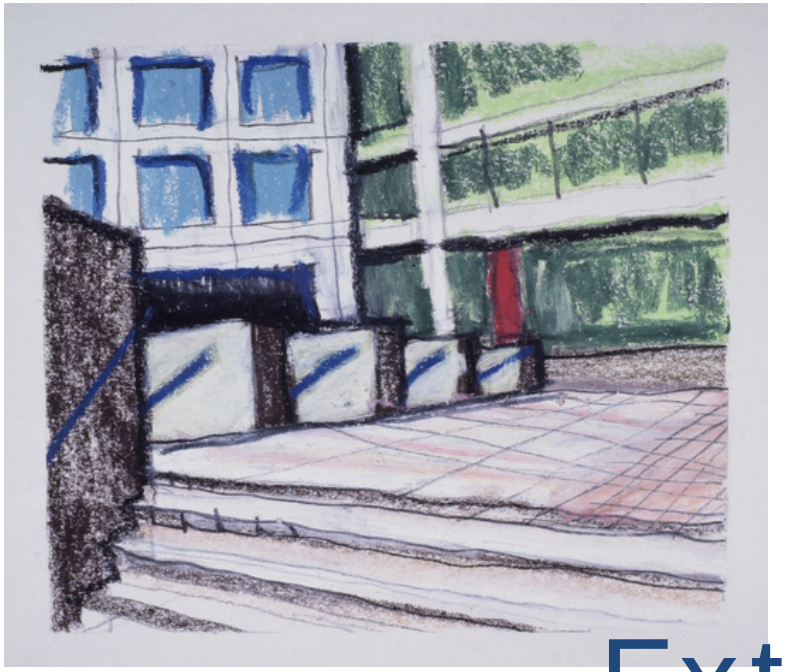


Externalities

Fei DING
HKUST ECON

Announcements

- Assigned reading:
  - Textbook Chapter 15, Antitrust Law (p394 to 397) not required.
  - Textbook Chapter 17 – externalities
- Problem set 8
  - Ch 15: 1, 4, 5, 7, 12, 18
  - Ch 17: 1-9
  - Due date will be announced on CANVAS.

“External” Costs and Benefits

EXAMPLE: Promotion activities at the atrium

- Promotion activities create noise. Some professors try to work; students try to study. Reduce productivity, feel uncomfortable, so these are costs on others.
- HOWEVER, students who perform promotion activities “**ONLY bear**” their own costs (private costs), but not costs on others. Promotion activities have “**external costs**”.
- **Conclusion: Should have fewer promotion activities from the “society’s perspective”.**

External Costs and Benefits

EXAMPLE: YOU are self-disciplined and study a lot during the day. ☺

- Your roommate would rather watch DVDs. But, your hard working inspires your roommate to study. ☺
- You work for your own grades ONLY, without considering the positive effect of your behavior on roommate – an "**external benefit**".
- **Conclusion: You should study even more from the society's perspective!**

External Costs and Benefits

- An activity with an external benefit (cost) is said to have **positive (negative)** externality.
- Externalities create **economic inefficiency.**
  - Over-doing/producing: Q>Q* or under-doing/producing: Q<Q*
- Because when deciding “how much to do”, people are not required / “**lack the incentive**” to consider the externalities that those activities create.
- People only care about their “private cost and benefit”.

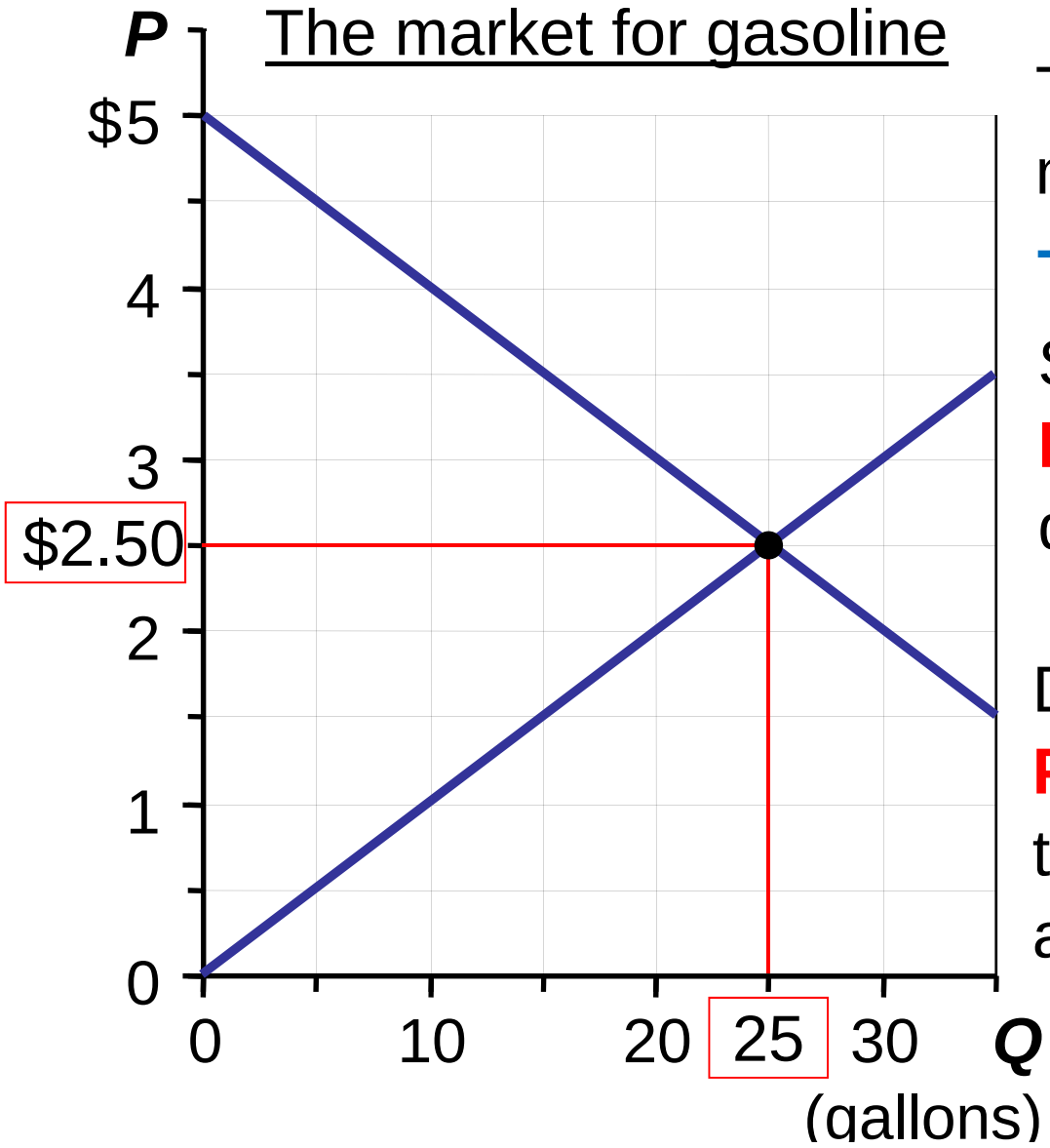
“Internalizing” Externalities

- **Externalities:** Costs and benefits not borne by an individual who makes the decision.
- **Internalizing:** Making her/him bear it … …
- How? One possibility: Tax/Subsidy
  - People (or firms) receive subsidies that correspond to positive externalities.
  - People (or firms) pay costs that correspond to negative externalities.
- Economists say that “Externalities have been “**internalized**”.

"Internalizing" Externalities

- **EXAMPLE:** Schools could pay (subsidize) students to study.
- **EXAMPLE:** Taxes on cigarettes could be set to include the costs of illness created by second-hand smoke.
- The above arrangements (mechanisms) increase efficiency by inducing people to act "**as if**" they are "held responsible" for the externalities that they create.

Examples – Pollution from Gasoline

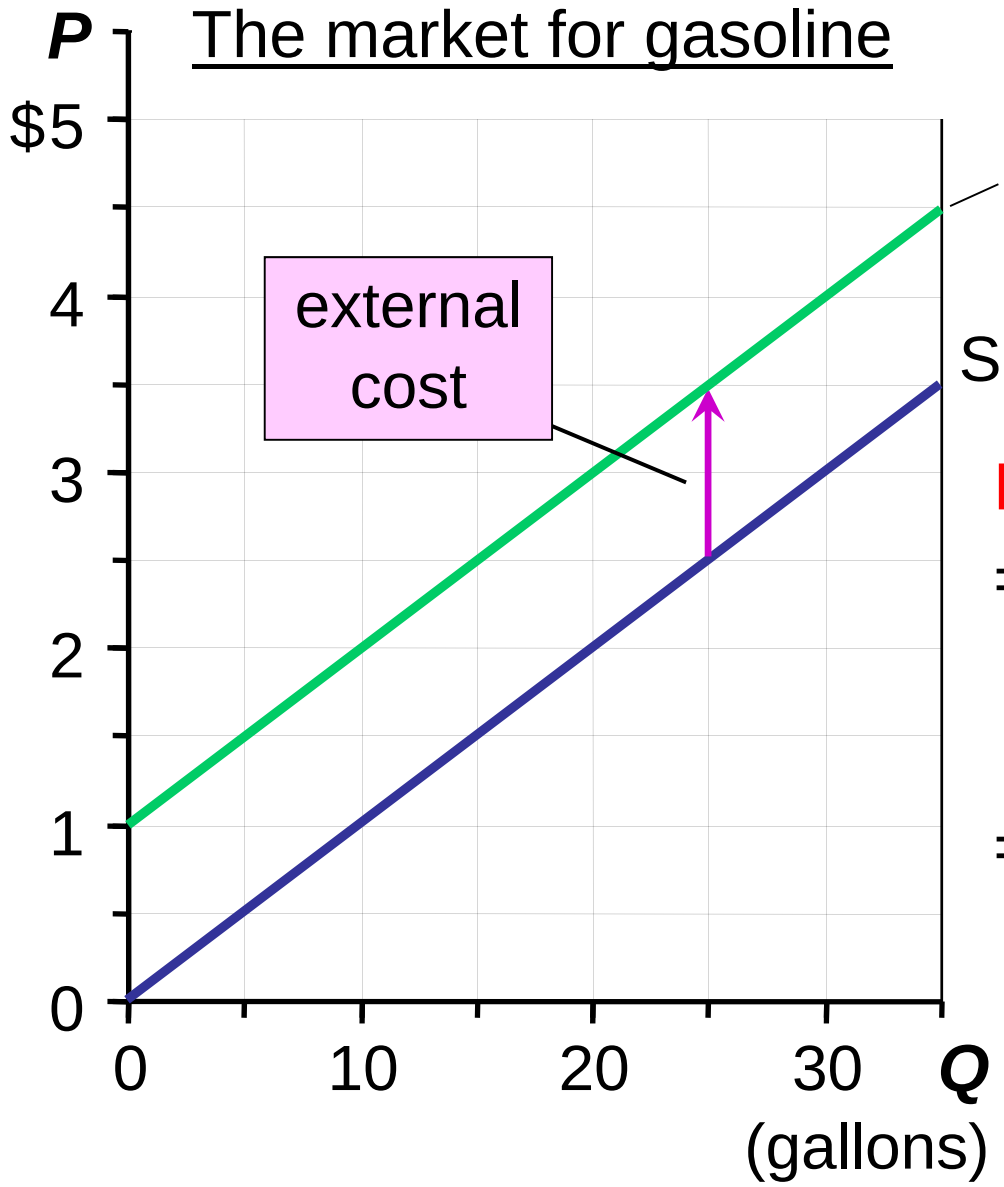


The market equilibrium maximizes: **Consumer + Producer Surplus.**

Supply curve shows **Private Cost**, the costs directly incurred by sellers.

Demand curve shows **Private Value**, the value to buyers (the prices they are willing to pay).

Examples – Pollution from Gasoline

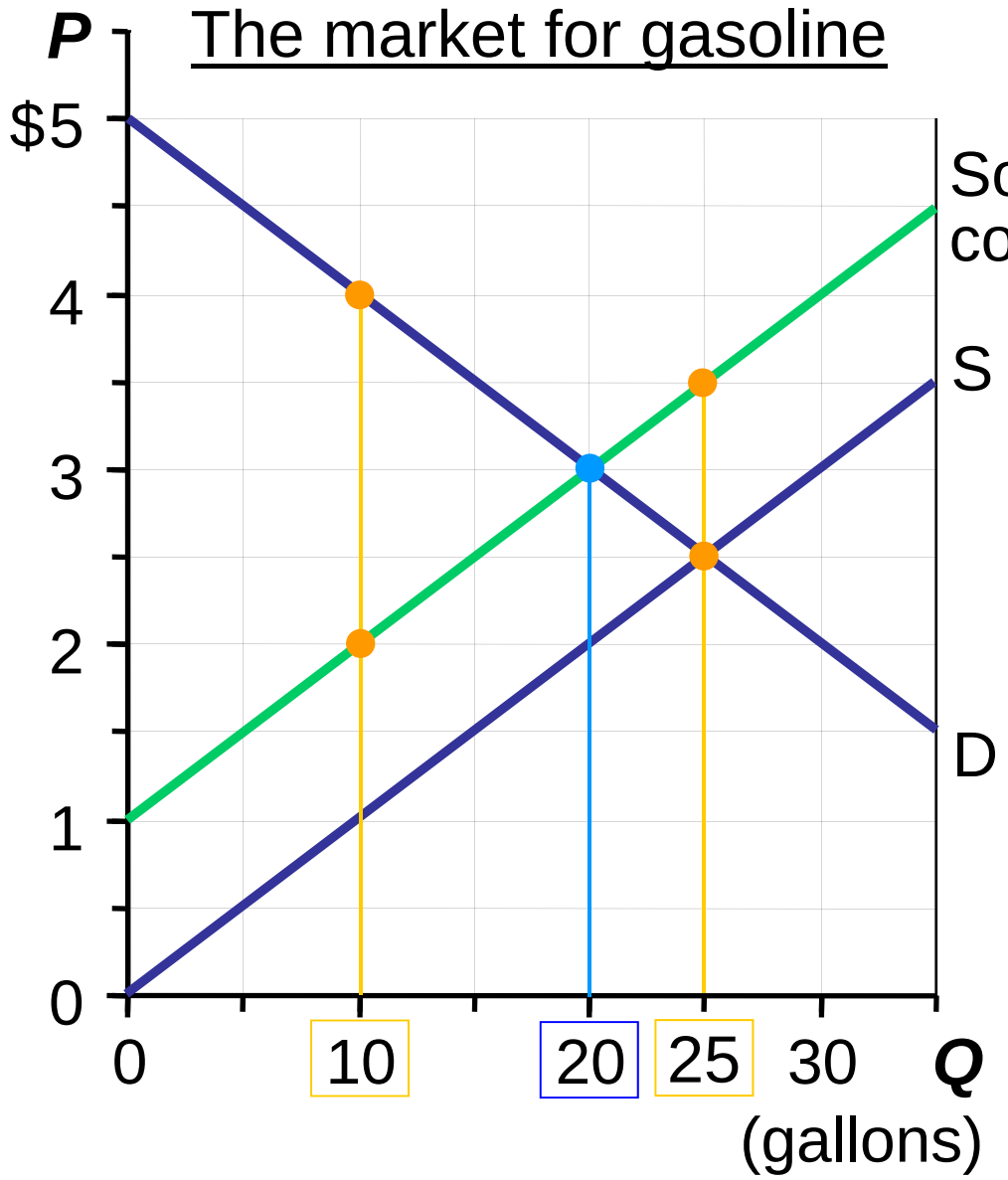


Social cost
= private **+** external cost

Supply (private cost)

External cost
= value of the negative impact on by-standers
= $1 per gallon (value of harm from smog, greenhouse gases)

Examples – Pollution from Gasoline

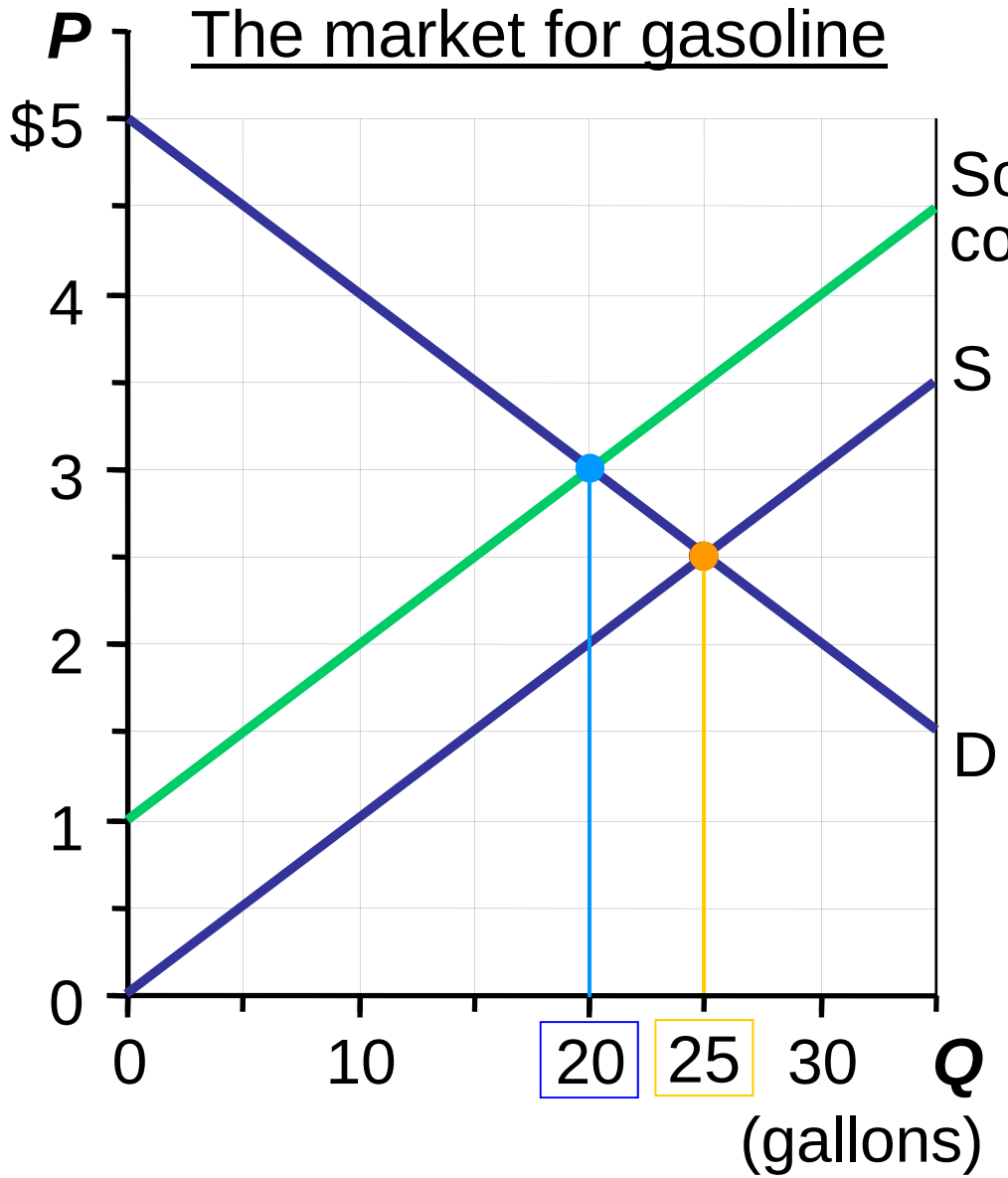


The socially optimal quantity is 20 gallons.

At any ***Q*** < 20, value of additional gas exceeds social cost.

At any ***Q*** > 20, social cost of the last gallon is greater than its value to the society.

Examples – Pollution from Gasoline



Market equilibrium (***Q*** = 25) is greater than the social optimum. (***Q*** = 20)

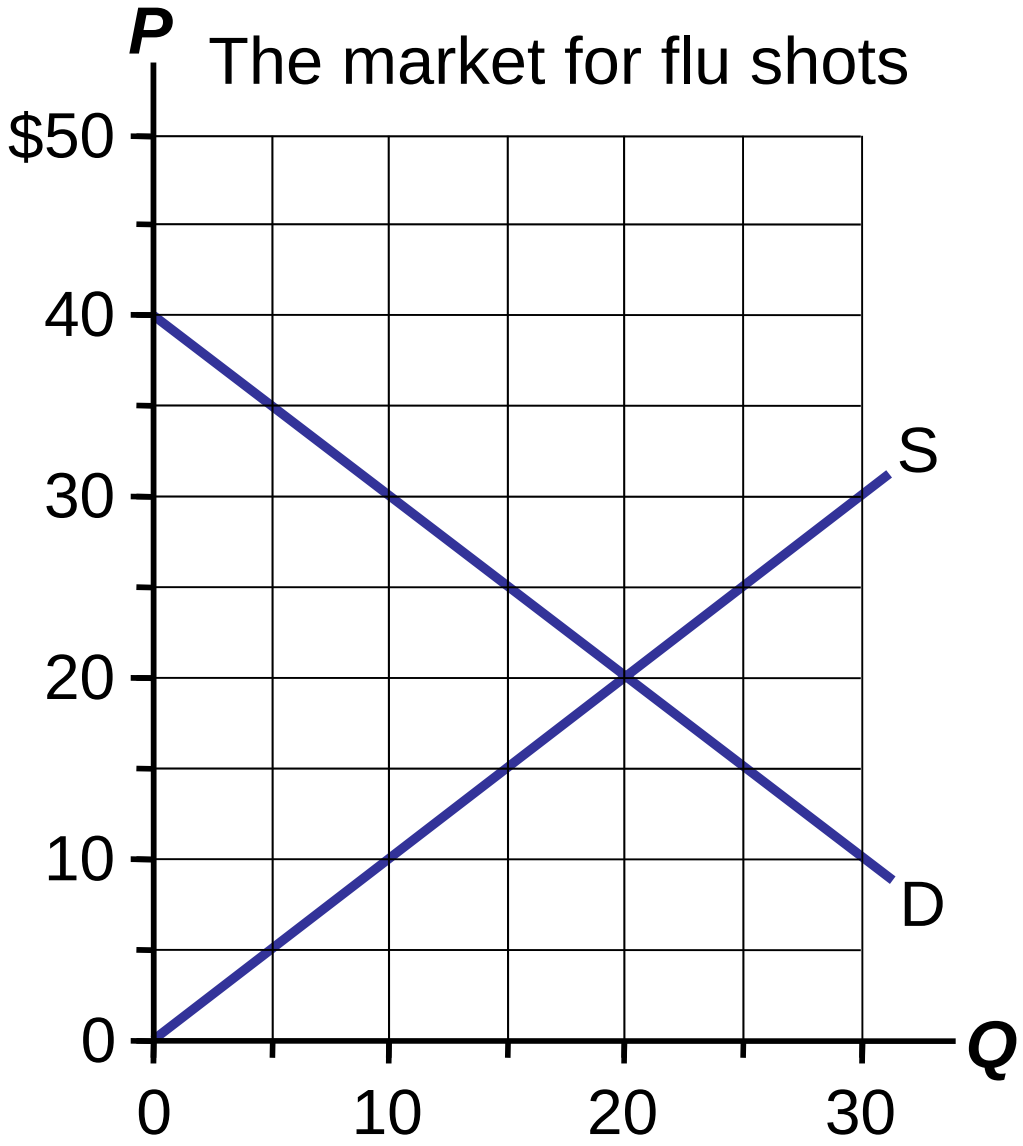
One solution:

Tax sellers $1/gallon, would shift ***S*** curve up $1.

Example – Vaccine

- Being vaccinated against contagious diseases protects not only you, but people who are next to you.

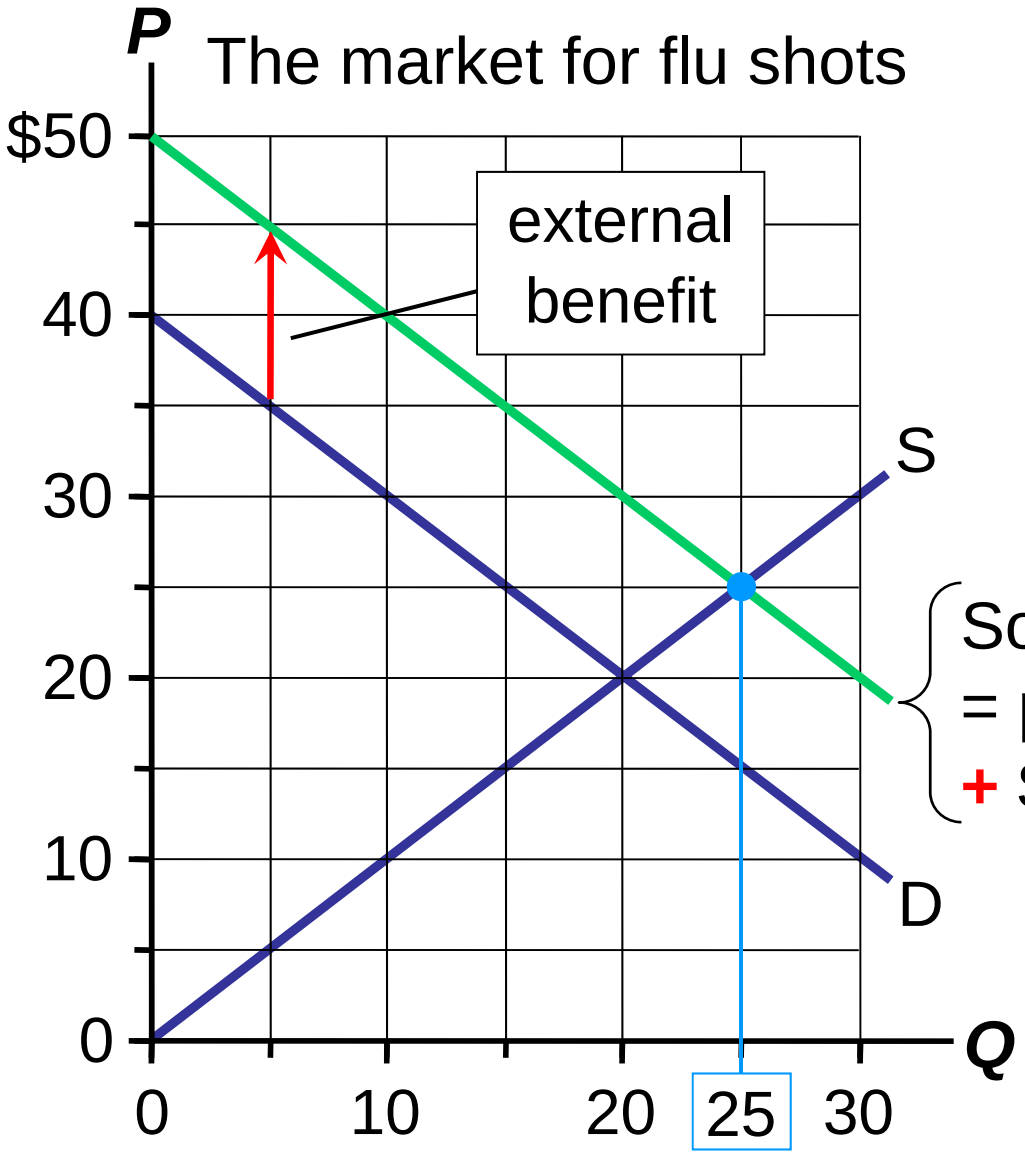
Example – Vaccine



External benefit
= $10/shot

- Draw the social value curve.
- Find the socially optimal ***Q***.
- What policy would internalize this externality?

Example – Vaccine



Socially optimal ***Q*** = 25 shots.

To internalize the externality, use subsidy = $10/shot.

Social value
= private value
+ $10 external benefit

Public Policies toward externalities

- To remedy the problem of externalities, many economists argued for
  - Government Intervention: Tax / Subsidy.
- Until Coase, who provides another perspective to look into this issue:
  - **Coase Theorem**
- Before getting into Coase Theorem, let's first think about "What is clean enough".

How clean is “clean”? – An Economic Perspective

- Your mother/bf/gf is coming to your dorm room, you need to clean up.
- But, how much???
  - Put away my coke bottles and cans?
  - Throw out the trash?
  - Vacuum the floor?
  - Clean/disinfect the bathroom?
  - Wipe the walls?
  - Filter the air?

How clean is “clean”? – An Economic Perspective

- The fact is, there is no such thing as “**completely clean**”.
- Cleaning up a dorm room is not an all-or-nothing decision.
- There is a tradeoff: No point to **sterilize** your room.
- **Same as for pollution**

Abating pollution

- Pollution caused by production activities can be controlled.
- FOR EXAMPLE: Electricity generating companies can adopt certain technology to remove sulfur from exhaust gases: Sulfur gases lead to acid rain.
- **How much to remove?** As trying to remove more and more sulfur, the process becomes more and more costly, and … …
- Electricity becomes increasingly expensive.

“How much”? – The Benefits and Costs

- For a given unit of pollution, the “marginal benefit of abatement” is the amount of damage that the unit would have caused if it had not been abated (cleaned or prevented).
- The opportunity cost of abating an additional unit pollution is the “marginal cost of abatement”.
- How much should pollution be prevented?

Efficient Abatement

- Economic efficiency means that abatement continues as long as **marginal benefit > marginal cost of abatement.**
- And stops when **marginal benefit < marginal cost.**
- At efficient level: **MB = MC.**
- Additional abatement would be inefficient (too costly)!
- There is such thing as “too clean”.

The Coase Theorem

- Ronald Coase was a law professor at the University of Chicago.
- He suggested that externalities would often be internalized by negotiation between the private parties being affected.
- EXAMPLE:
  - An economist steps into an elevator and noticed that a young girl is smoking. If there is no legal restriction, what can the economist do?

The Coase Theorem

- By private negotiation (market), “externalities” could be “internalized”, and efficient outcome can be reached (inefficiency solved).
- EXAMPLE: Dog Barking
  - You have a dog named Spot.
  - Negative externality:
  - Spot’s barking disturbs your neighbor.

The Coase Theorem

- The social efficient outcome would maximize both you and your neighbor's well-being (assuming only you and your neighbor in this society).
- If you value having Spot more than your neighbor values quiet and peace, the dog should stay. How?
- **Coase Theorem: Free market will reach the efficient outcome on its own.**

The Coase Theorem: An Example

Case 1: YOU have the right to keep Spot (have the right to have dog barking).

- Benefit to you of having Spot = $500
- Cost to neighbor of Spot's barking = $800

- Socially efficient outcome:

- Private (market) outcome:

- Private (market) outcome <> efficient outcome

The Coase Theorem: An Example

Case 2: You have the right to keep Spot.

- Benefit to you of having Spot = $1,000
- Cost to neighbor of Spot's barking = $800

- Socially efficient outcome:

- Private (market) outcome:

- Private (market) outcome <> efficient outcome

The Coase Theorem: An Example

Case 3: Neighbor has the right to quiet & peace.

- Benefit to you of having Spot = $500
- Cost to neighbor of Spot's barking = $800

- Socially efficient outcome:

- Private (market) outcome:

- Private (market) outcome <> efficient outcome

The Coase Theorem: An Example

Case 4: Neighbor has the right to quiet & peace.

- Benefit to you of having Spot = $1,000
- Cost to neighbor of Spot's barking = $800

- Socially efficient outcome:

- Private (market) outcome:

- Private (market) outcome <> efficient outcome

Note – The Coase Theorem

- **You and your neighbor's valuations on Spot and quiet & peaceful** environment determine whether Spot stays or goes (social optimal).
- **NOT** ownership or property rights (you or your neighbor owns the right of the environment).
- The difference in ownership, however, affects whether **there is a deal or the "payment flow"/ who pay who !!!**

Question

Mary and Cathy are roommates. Mary assigns a $30 value on smoking cigarettes. Cathy values smoke-free air at $15. Which of the following scenarios is a successful example of the Coase Theorem?

1) Cathy offers Mary $20 not to smoke. Mary accepts and does not smoke.

2) Mary pays Cathy $16 so that Mary can smoke.

3) Mary pays Cathy $14 so that Mary can smoke.

4) Cathy offers Mary $15 not to smoke. Mary accepts and does not smoke.

Limitation - The Coase Theorem

- The Coase Theorem does NOT work very well when the **costs of reaching agreements** are high – high transaction costs.
  - Externality is produced by many people (or firms): exhaust gas emitted by vehicles / Externality affects many people.
  - Legal costs for reaching / enforcing agreement are high.
- EXAMPLE: Global warming

Summary – The Coase Theorem

- People believe externalities = market failure and government should intervene.
- However, Coase sees the “problem” from another perspective.
  - Private (market) can solve it.
  - “Right” has to be clearly defined (ownership).
- Market failure happens due to **“not clearly defined” private property rights.**
- If a resource is owned by no one, what will happen?

Non-excludability

- **Excludable:** A good is excludable if other people can be prevented from using it.
  - Excludable: Coke, apple, orange
  - Non-excludable: TV and radio signals, national defense
- **Rival in consumption:** A good is rival in consumption if one person's use of it **diminishes others' use.**
  - Rival: Coke, apple, orange
  - Not rival: MP3 files, softwares, TV and radio signals

Some more definitions

- Private goods: Excludable and rival
  - Apple
- **Public goods:** Non-excludable and not rival
  - National defense
- **Common resources:** Non-excludable but rival
  - Fish in the ocean
- Club (natural monopoly) goods: Excludable but not rival
  - Cable TV

Question

- A road is “which” of the four kinds of goods?

Question

Common Goods

- Goods that are "**non-excludable**" and "**rivalrous**" are called "**common goods**".
  - The use of common goods tends to be excessive and inefficient.
  - Because individuals are not required to bear/pay their opportunity cost.
- The "**Tragedy of the Commons**" refers to an episode of English history, when common grazing lands were supposedly overused.

Example: Grand Banks Fishery

- A fishery is an area of the ocean used for commercial fishing of particular species.
- The “Grand Banks” is an area of the Atlantic Ocean about 1,000 mi (1,600 km) NE of Boston, very rich in cod fish, a highly valued food species.
  - Starting in the 1950s, factory fishing methods depleted the area of cod…
  - Until the 1990s, when the fishery collapsed.
  - Other species became dominant, and the cod fishery was never recovered.

Example: Grand Banks Fishery

- The Grand Banks is a modern example of the "**Tragedy of the Commons**".
- Each fishing company tried to take as many fish as possible without considering the effect on the overall resources.
  - "Let's get our share before someone else does!"
- The Grand Banks was an "un-owned" resource.
  - What will a private owner do?

Example: Grand Banks Fishery

- Government could have prevented the destruction of the fishery by charging a royalty (tax) for fish taken from the area.
- But a tax would have been politically unpopular.

Policy Options for Common

- Government intervention: Regulate the use of the resources.
- Impose a corrective tax to internalize the externalities.
  - Example: fishing license, entrance fees for congested national parks
- Convert into a “private good” – Coase Theorem
  - Example: Land
  - Example: Spectrum (mobile frequencies) auctions by the government

Why is Cow not extinct

- Cow with commercial value, same as elephant
- But, why elephant is facing extinction, but NOT cow?
- Cow is private good.
- Elephant is common resource.
- **The importance of property right !!!**

Public Goods

- Some goods and services **CANNOT** be **efficiently** provided in "private markets".
  - Law enforcement (police)
  - Clean streets
  - Disease control
- Why can't private markets provide these goods and services?
- Public Goods – These goods and services are "**non-excludable**" and "**non-rival in consumption**".

Problem due to Non-excludability

- If a good or service is non-excludable, consumers can obtain it without payment.
  - Well, maybe you will pay, but not others.
  - Buyers will not pay for something that they can get for free. ☺
- Consumers who obtain benefits without payment are called "**free riders**".
  - You will see this in group projects.

Free-Rider – Samaritan's Dilemma

- Should we be charitable when charity creates bad incentives?
- A healthy young man decides not to buy medical insurance.
  - I have not been sick in years.
  - The chance I will need medical insurance is tiny.
- However, he gets heart problem and he needs surgery (heart transplant is needed) that he cannot afford.
- **Should hospitals refuse to treat him and let him die?**

Free-Rider –Samaritan's Dilemma

- The hospital (society) faces the Samaritan's Dilemma.
  - If the man is excluded (isn't treated), there will be a high private and social cost (his death).
  - But if the man knows he will be treated anyway, why should he (actually, all of us) buy insurance?
- In most societies, urgent medical care is non-excludable (due to ethical concern).
  - However, please note that it is "rivalrous".
- So it may be necessary for the government to provide insurance or require people to buy their own insurance.

Non-excludability and Government

- Difficult for private firms to produce non-excludable services (losing money).
- Government can finance their production with taxes (taxpayers pay).
- On the other hand:
- What are Patents and Copyrights?
- Governments sometimes create "excludability" for the private to function.

Non-rivalry in Consumption

- How does Non-rivalry in consumption create “problems” for the free-market mechanism?

Non-rivalry in Consumption

- Most consumption is rivalrous.
- **EXAMPLE:** I drink this bottle of Coke, others cannot.
- Norivalry can occur when consumption does not “use up” the good.
- **EXAMPLE:** When one person enjoys a clean street, others can enjoy it just as much; TV broadcast can be watched by many people at the same time.

Scarcity vs. Non-rivalry

- Scarcity refers to the opportunity cost of creating a good or service.
  - Street-cleaning is a scarce service.
- Rivalry refers to the use or consumption of a scarce good or service.
- If a good or service is non-rivalrous, its use or consumption doesn't add to the scarcity.
  - Need no more resources to produce.

Example: A City Park

- A city park could be surrounded by fences or walls.
- People who do not pay to enter could be excluded (making the park excludable).
- If a park is not overcrowded, its use is non-rivalrous.
  - The social cost of having an additional user is zero (nearly).

Example: A City Park

- A private firm could construct a park and sell tickets to visitors (for using the park).
  - Income from tickets would have to be sufficient to cover the costs of park construction, operations and maintenance.
  - But people who wanted to use the park and had a WTP less than the ticket price would be excluded. The social cost of an additional user is 0, and exclusion creates a loss of surplus.
  - Exclusion is inefficient.
- BUT, without exclusion (ticket), who is going to build and operate a park?

Example: A City Park

- That is why governments help to provide many non-rivalrous (including public goods) goods and services, whether or not exclusion is possible.
  - Weather forecasting; Basic scientific research; Television and radio

Other Examples

- EXAMPLE: Microsoft Office (or other applications)
- There is no social cost when someone copies Microsoft Office.
  - Its use is non-rivalrous.
  - Social surplus would be maximized if everyone who wanted it was permitted to copy it.
- However, how can Microsoft pay for creating the product?
- Is there an efficient way to handle this situation?

Summary

- Markets work best for private goods, which are **excludable** and **rival** in consumption.
- Non-excludability, Non-rivalrous in consumption may prevent free-markets from delivering the most efficient output level.
- Therefore, public goods are commonly provided by the government, using cost-benefit analysis to determine how much to provide (though accurately estimating the cost and benefit may not be easy or possible).

Summary

- Common resources are rival in consumption but not excludable. EXAMPLES: Common grazing land, clean air, and congested roads
- People use common resources without paying, so they tend to overuse them. Therefore, governments try to limit the use of common resources.
- Instead of “government regulation”, according to the Coase Theorem, property right should be better defined (if possible).

Summary

- Non-rivalrous in consumption creates the problem: Who are going to “pay” for the production of such goods?
- As zero cost for additional users, it is efficient to allow, as many as possible, consumers with positive WTP to use it.
- However, not charging a price: Who are going to pay for the production cost?
- Many Non-rivalrous goods are provided by the government, whether or not exclusion is possible.

Words of encouragement

- The transition from “high school to university” is NOT easy, **but** you are not alone.
- Later, you will find all these toughness and bitterness life enriching.
- Sharing of my experience:
  - Smile
  - Do something “I don’t like” or “I am not interested”, everyday
- It is also part of the transition.

ECON2113

- I am very lucky to have the opportunity to have a trip in the “Temple of Economics” !
- Inside the Temple:

ECON2113

- It is my great honor to be here as your "tour-guide" !

End for today ☺

Thank you very much

See you next time !