N. GREGORY MANKIW

PRINCIPLES OF

ECONOMICS

Eight Edition

CHAPTER

10

Externalities

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Externalities, Part 1

- Government action can sometimes improve upon market outcomes
  - Why markets sometimes fail to allocate resources efficiently
  - How government policies can potentially improve the market's allocation
  - What kinds of policies are likely to work best

Externalities, Part 2

- Externality
  - The uncompensated impact of one person's actions on the well-being of a bystander
  - Market failure
- Negative externality
  - Impact on the bystander is adverse
- Positive externality
  - Impact on the bystander is beneficial

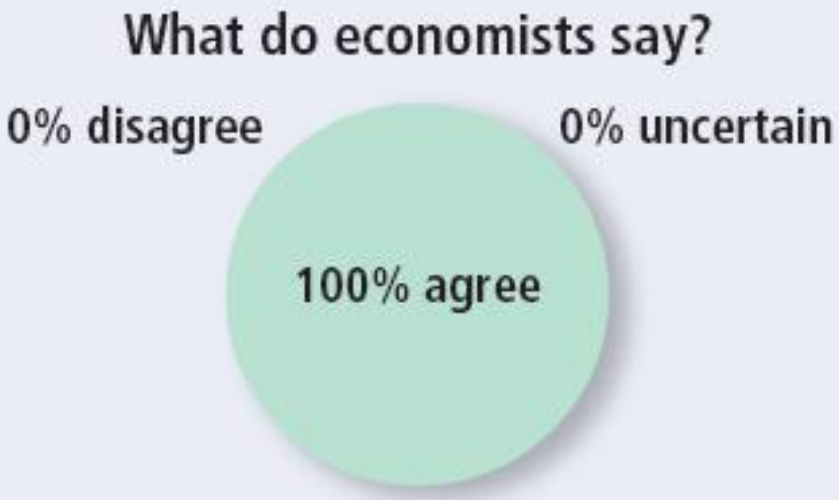
Externalities, Part 3

- Negative externalities
  - Exhaust from automobiles
  - Barking dogs
- Positive externalities
  - Restored historic buildings
  - Research into new technologies

ASK THE EXPERTS, Part 1

Vaccines

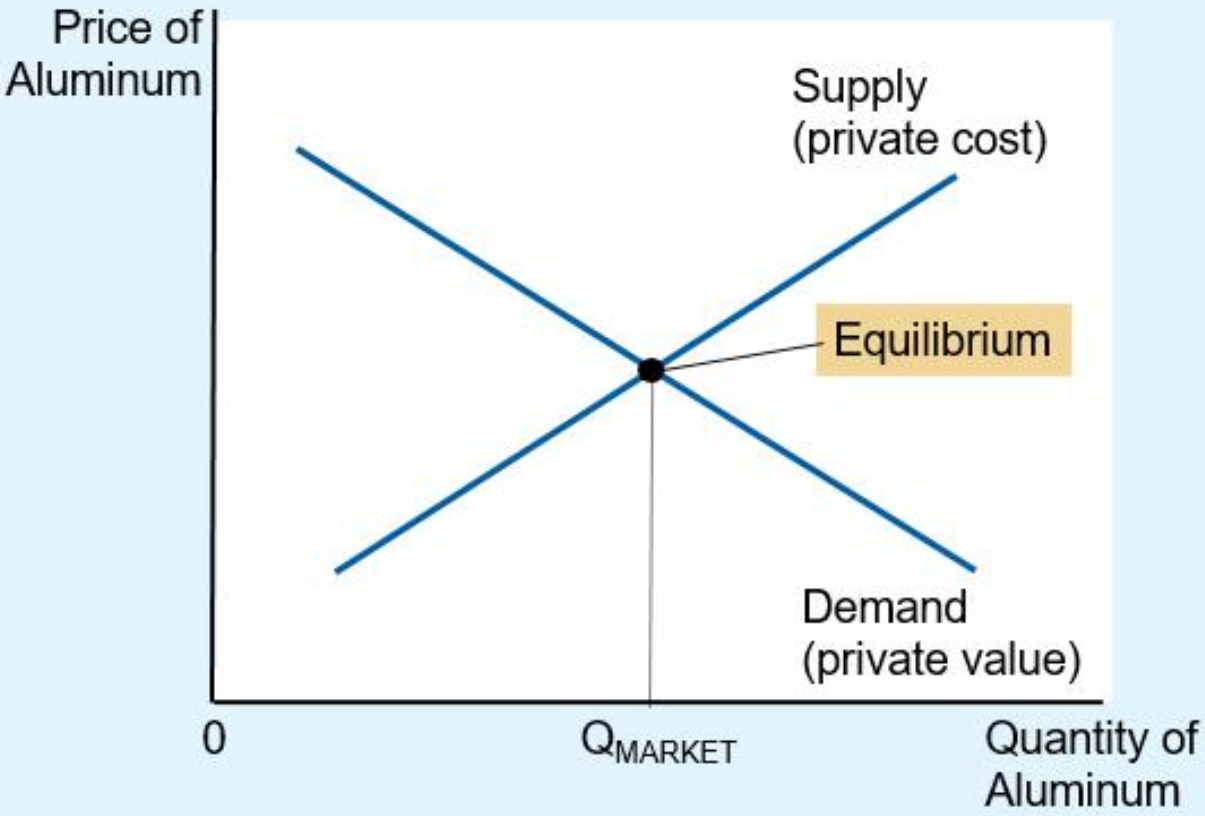
"Declining to be vaccinated against contagious diseases such as measles imposes costs on other people, which is a negative externality."



Externalities and Market Inefficiency, Part 1

- Welfare economics: A recap
  - Demand curve: value to consumers
    - Prices they are willing to pay
  - Supply curve: cost to suppliers
  - Equilibrium quantity and price
    - Efficient
    - Maximizes the sum of producer and consumer surplus

Figure 1 The Market for Aluminum



The demand curve reflects the value to buyers, and the supply curve reflects the costs of sellers. The equilibrium quantity, Q_{MARKET}, maximizes the total value to buyers minus the total costs of sellers. In the absence of externalities, therefore, the market equilibrium is efficient.

Externalities and Market Inefficiency, Part 2

- Negative externalities
  - Cost to society (of producing a good)
    - Larger than the cost to the good producers

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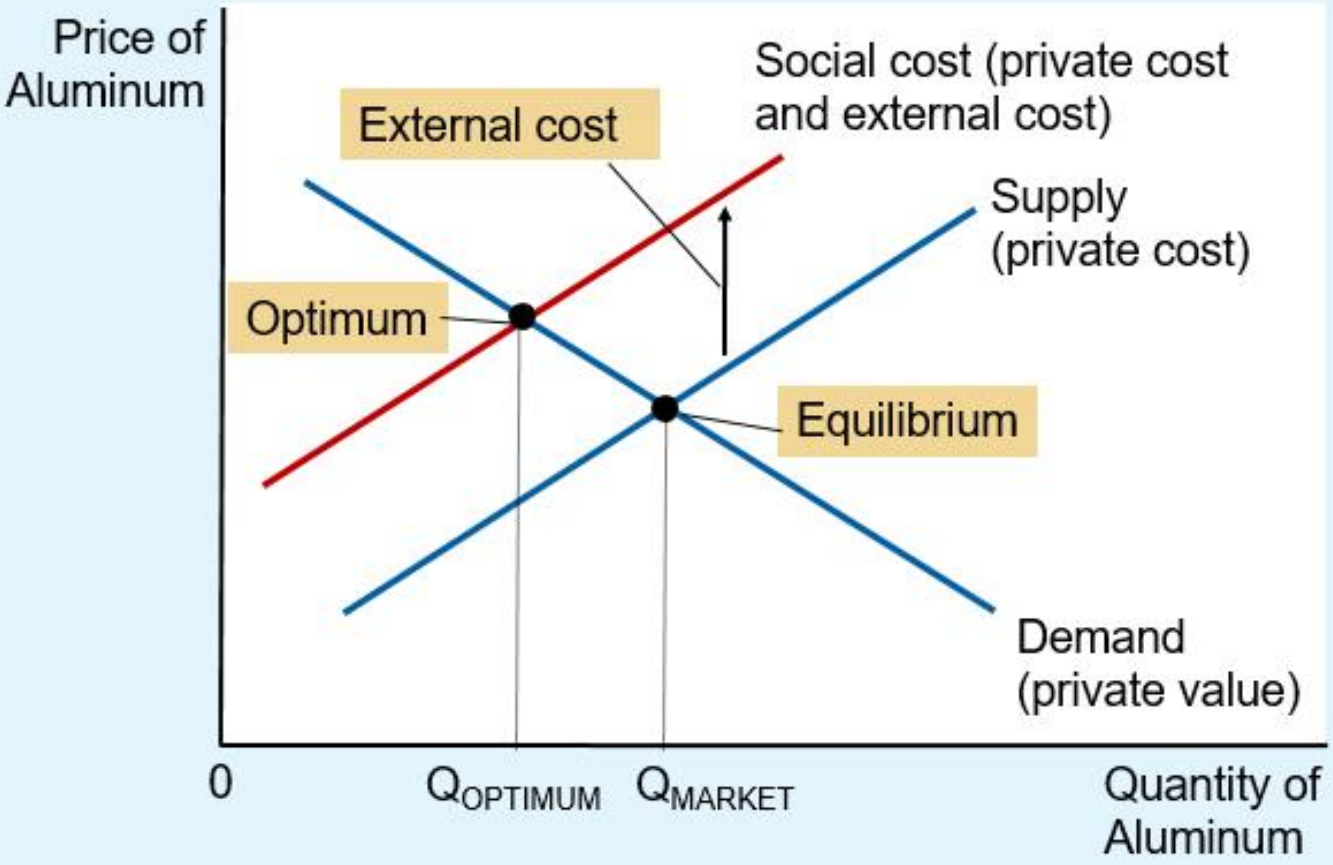
"All I can say is that if being a leading manufacturer means being a leading polluter, so be it."

Externalities and Market Inefficiency, Part 3

- Negative externalities
  - Social cost
    - Private costs of the producers (supply)
    - Plus the costs to those bystanders affected adversely by the negative externality
  - Social cost curve is above the supply curve
    - Takes into account the external costs imposed on society

Figure 2 Pollution and the Social Optimum



In the presence of a negative externality, such as pollution, the social cost of the good exceeds the private cost. The optimal quantity, $Q_{OPTIMUM}$, is therefore smaller than the equilibrium quantity, Q_{MARKET}.

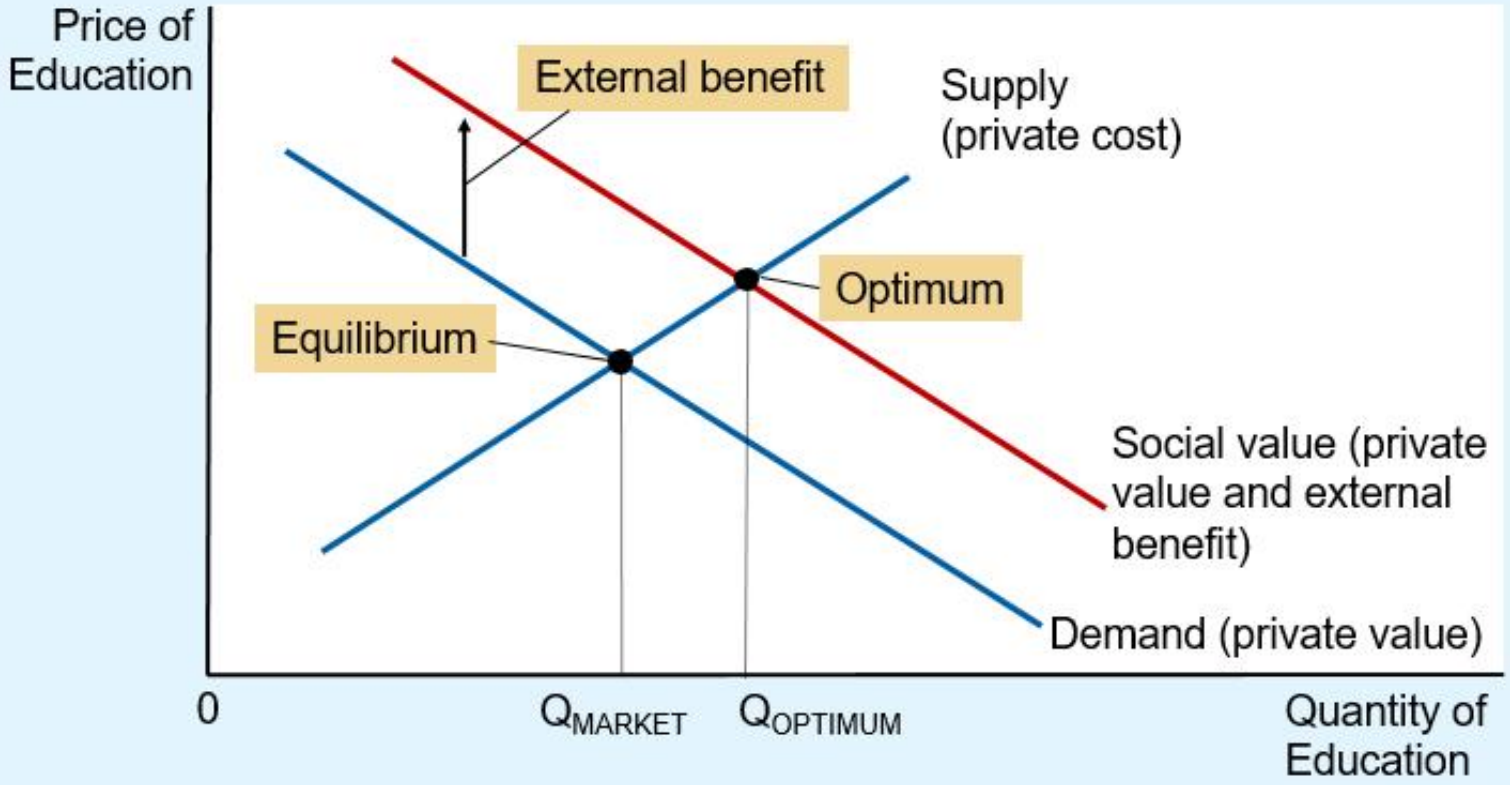
Externalities and Market Inefficiency, Part 4

- Negative externalities
  - Optimum quantity produced
    - Maximize total welfare
    - Smaller than market equilibrium quantity
- Government – correct market failure
  - Internalizing the externality
    - Altering incentives so that people take account of the external effects of their actions

Externalities and Market Inefficiency, Part 5

- Positive externalities
  - Education
    - Benefit of education is private
    - Externalities: better government, lower crime rates, higher productivity and wages
  - Social value is greater than private value
  - Social value curve
    - Above the demand curve

Figure 3 Education and the Social Optimum



In the presence of a positive externality, the social value of the good exceeds the private value. The optimal quantity, $Q_{OPTIMUM}$, is therefore larger than the equilibrium quantity, Q_{MARKET}.

Externalities and Market Inefficiency, Part 6

- Positive externalities
  - Socially optimal quantity is greater than market equilibrium quantity
  - Government – correct market failure
    - Internalize the externality
    - Subsidy

Externalities and Market Inefficiency, Part 7

- Negative externalities
  - Markets produce a larger quantity than is socially desirable
  - Government: tax
- Positive externalities
  - Markets produce a smaller quantity than is socially desirable
  - Government: subsidy

CASE STUDY

Technology spillovers, industrial policy, and patent protection, Part 1

- Technology spillover = Positive externality
  - Impact of one firm's research and production efforts on other firms' access to technological advance
  - Government: internalize the externality
    - Subsidy = value of the technology spillover

CASE STUDY

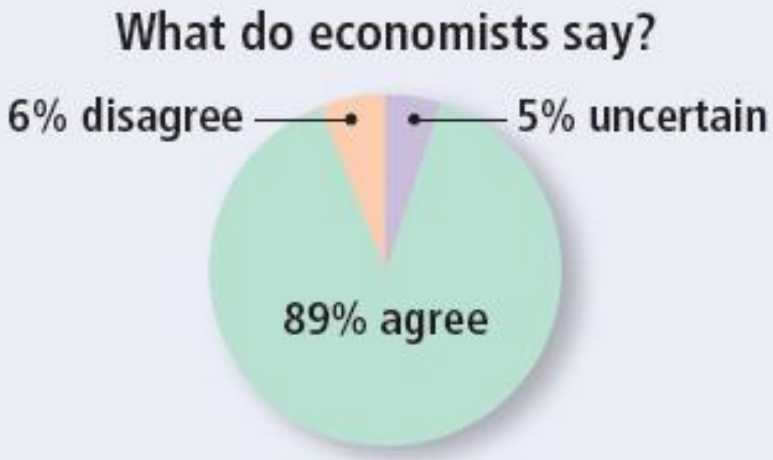
Technology spillovers, industrial policy, and patent protection, Part 2

- Industrial policy
  - Government intervention in the economy that aims to promote technology-enhancing industries
- Patent law
  - Protect the rights of inventors by giving them exclusive use of their inventions for a period of time

ASK THE EXPERTS, Part 2

Vaccines

"Considering the costs of restricting free choice, and the share of people in the US who choose not to vaccinate their children for measles, the social benefit of mandating measles vaccines for all Americans (except those with compelling medical reasons) would exceed the social cost."



Public Policies toward Externalities, Part 1

- Command-and-control policies
  - Regulate behavior directly
  - Regulation
- Market-based policies
  - Provide incentives so that private decision makers will choose to solve the problem on their own
  - Corrective taxes and subsidies
  - Tradable pollution permits

Public Policies toward Externalities, Part 2

- Regulation
  - Regulate behavior directly: making certain behaviors either required or forbidden
  - Cannot eradicate pollution
  - Environmental Protection Agency (EPA)
    - Develop and enforce regulations
    - Dictates maximum level of pollution
    - Requires that firms adopt a particular technology to reduce emissions

Public Policies toward Externalities, Part 3

- Corrective taxes and subsidies
  - Corrective taxes (*Pigovian taxes*)
    - Induce private decision makers to take account of the social costs that arise from a negative externality
    - Places a price on the right to pollute
    - Reduce pollution at a lower cost to society
    - Raise revenue for the government
    - Enhance economic efficiency

CASE STUDY

Why is gasoline taxed so heavily?, Part 1

- Negative externalities associated with driving
  - Congestion, accidents, pollution

CASE STUDY

Why is gasoline taxed so heavily?, Part 2

- The gas tax = corrective tax
  - Doesn't cause deadweight losses
  - Makes the economy work better
    - Less traffic congestion
    - Safer roads
    - Cleaner environment

CASE STUDY

Why is gasoline taxed so heavily?, Part 3

- How high should the tax on gasoline be?
  - Most European countries
    - Higher gasoline tax than in the U.S.
- 2007, *Journal of Economic Literature*
  - Optimal corrective tax on gasoline
  - $2.28 per gallon in 2005 dollars
  - $2.78 per gallon in 2012 dollars
- Actual tax in the U.S. in 2015:
  - 50 cents per gallon

CASE STUDY

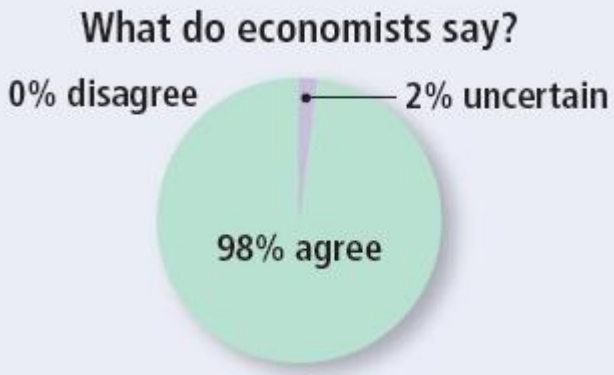
Why is gasoline taxed so heavily?, Part 4

- Tax revenue from a gasoline tax
  - Used to lower taxes that distort incentives and cause deadweight losses
  - Some government regulations
    - Production of fuel-efficient cars – unnecessary

ASK THE EXPERTS, Part 3

Carbon Taxes

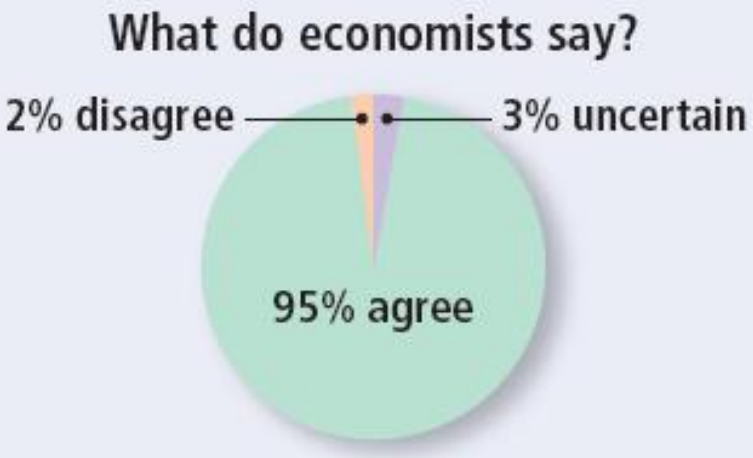
"The Brookings Institution recently described a U.S. carbon tax of $20 per ton, increasing at 4 percent per year, which would raise an estimated $150 billion per year in federal revenues over the next decade. Given the negative externalities created by carbon dioxide emissions, a federal carbon tax at this rate would involve fewer harmful net distortions to the U.S. economy than a tax increase that generated the same revenue by raising marginal tax rates on labor income across the board."



ASK THE EXPERTS, Part 4

Carbon Taxes

"A tax on the carbon content of fuels would be a less expensive way to reduce carbon-dioxide emissions than would a collection of policies such as 'corporate average fuel economy' requirements for automobiles."



Public Policies toward Externalities, Part 4

- Tradable pollution permits
  - Voluntary transfer of the right to pollute from one firm to another
  - New scarce resource: pollution permits
  - Market to trade permits
  - Firm's willingness to pay
    - Depend on its cost of reducing pollution

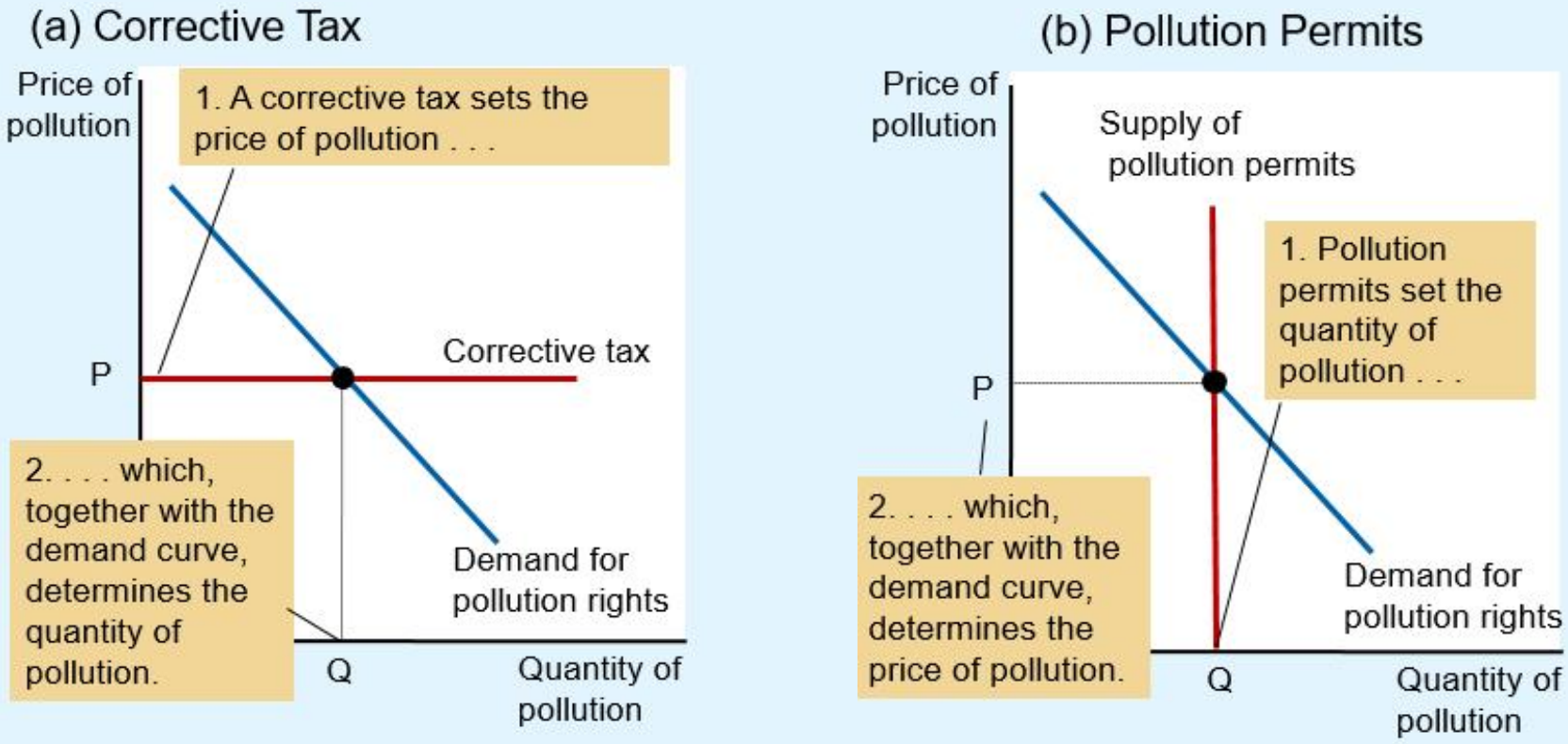
Public Policies toward Externalities, Part 5

- Advantage of free market for pollution permits
  - Initial allocation of pollution permits doesn't matter
  - If firms can reduce pollution at a low cost:
    - Sell whatever permits they get
  - If firms can reduce pollution only at a high cost: buy whatever permits they need
  - Efficient final allocation

Public Policies toward Externalities, Part 6

- Reducing pollution using pollution permits or corrective taxes
  - Firms pay for their pollution
    - Corrective taxes: pay to the government
    - Pollution permits: pay to buy permits
  - Internalize the externality of pollution

Figure 4 The Equivalence of Corrective Taxes and Pollution Permits



In panel (a), the EPA sets a price on pollution by levying a corrective tax, and the demand curve determines the quantity of pollution. In panel (b), the EPA limits the quantity of pollution by limiting the number of pollution permits, and the demand curve determines the price of pollution. The price and quantity of pollution are the same in the two cases.

Public Policies toward Externalities, Part 7

- Objections to the economic analysis of pollution
  - "We cannot give anyone the option of polluting for a fee." – late Senator Edmund Muskie
- People face trade-offs
  - Eliminating all pollution is impossible
  - Clean water and clean air — opportunity cost: lower standard of living

Public Policies toward Externalities, Part 8

- Clean environment is a normal good
  - Positive income elasticity
    - Rich countries can afford a cleaner environment
    - More rigorous environmental protection
  - Clean air and clean water – law of demand
    - The lower the price of environmental protection
    - The more the public will want it

Private Solutions to Externalities, Part 1

- The types of private solutions
  - Moral codes and social sanctions
  - Charities
  - Self-interest of the relevant parties
    - Integrating different types of businesses
  - Interested parties can enter into a contract

Private Solutions to Externalities, Part 2

- The Coase theorem
  - If private parties can bargain without cost over the allocation of resources
    - They can solve the problem of externalities on their own
- Whatever the initial distribution of rights
  - Interested parties can reach a bargain:
    - Everyone is better off
    - Outcome is efficient

Private Solutions to Externalities, Part 3

1. Dick has the legal right to keep a barking dog.

- Dick gets a $500 benefit from the dog
- Jane bears an $800 cost from the barking
- Efficient outcome:
  - Jane can offer Dick $600 to get rid of the dog
  - Dick will gladly accept

Private Solutions to Externalities, Part 4

2. Dick has the legal right to keep a barking dog.

- Dick gets a $1,000 benefit from the dog
- Jane bears an $800 cost from the barking
- Efficient outcome:
  - Dick turns down any offer below $1,000
  - Jane will not offer any amount above $800
  - Dick keeps the dog

Private Solutions to Externalities, Part 5

3. Jane can legally compel Dick to get rid of the dog.

- Dick can offer to pay Jane to allow him to keep the dog
  - If the benefit of the dog to Dick exceeds the cost of the barking to Jane
  - Then Dick and Jane will strike a bargain in which Dick keeps the dog

Private Solutions to Externalities, Part 6

- Why private solutions do not always work
  - High transaction costs
    - Costs that parties incur in the process of agreeing to and following through on a bargain
  - Bargaining simply breaks down
  - Large number of interested parties
    - Coordinating everyone is costly