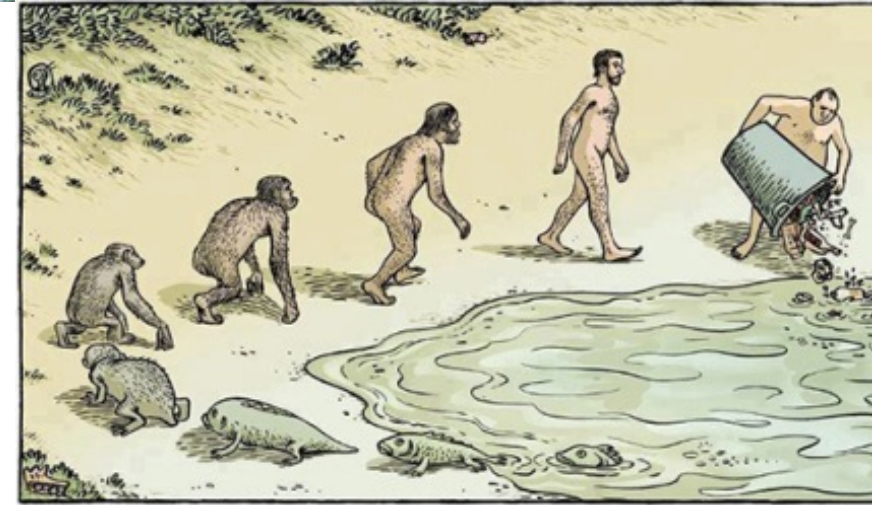




EE476
Environmental Economics

Lecture 2

2022





What is environmental economics

- **Environmental economics** : the application of the principles of economics to the study of how environmental resources are managed
 - focuses primarily on how and why people make decisions that have consequences for the natural environment.
 - concerned also with how economic institutions and policies can be changed to bring these environmental impacts more into balance



The Importance of Incentives

- people pollute because it is the cheapest way
- pollution is a result of the **profit motive**.
- entrepreneurs try to maximize monetary profits → give no thought to the environmental impacts of their actions

Incentives: A Household Example

Worcester Reduces Trash and Increases Recycling

EXHIBIT 1.1

"Pay-as-you-throw" (PAYT) works by putting a price on an activity that has an environmental cost: the disposal of household trash. Many cities and towns in the U.S. have adopted PAYT systems over the last few decades. One of the most successful has been the program in Worcester, Massachusetts. That program was started in 1993, as a result of a municipal budget crisis that forced the Department of Public Works to look for new ways of generating revenues. There was massive opposition to the idea at first. Why should people have to pay for a municipal service that had traditionally been free? But the system was installed over this opposition: \$1.50 for a large, 30-gallon trash bag and \$0.75 for a smaller, 15-gallon bag.

The data collected to monitor the program showed that within the first week the recycling rate was up from a meager 2% to 38%; so that Worcester residents throw out about 400 pounds of trash per capita per year compared to

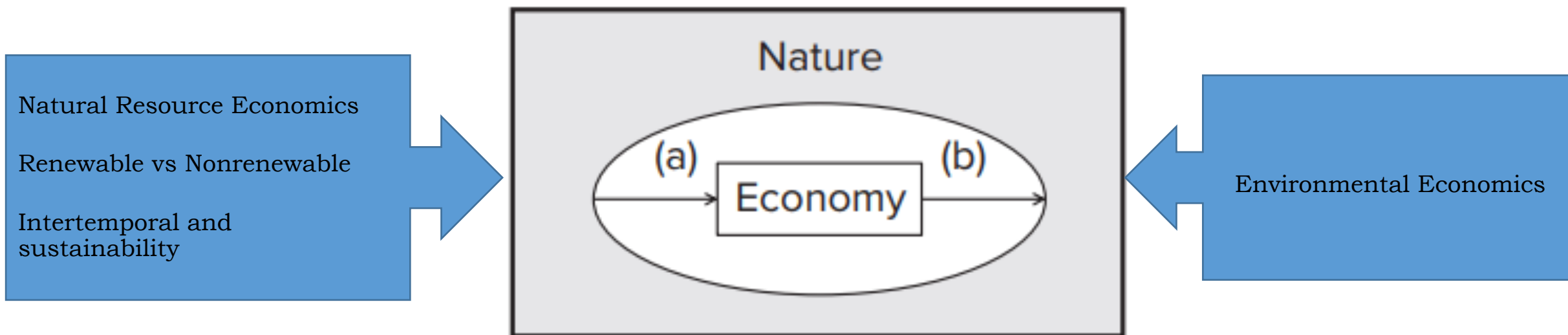
a national average of 900 pounds. The data show that over 400,000 pounds of trash that would have ended up in Worcester landfills was recycled instead. The program has saved Worcester an estimated \$10 to \$20 million over the last twenty years. Revenues from sales of the bags are primarily used to support a curbside recycling program and bulky waste collection. Worcester City Council Kathleen Toomey says, "While no one likes to pay for trash bags, it has truly made an enormous difference in the amount of recycling over the past two plus decades. People are more cognizant about what goes into their trash bags and make an effort to increase their recycling."

For added information see: Go Local Worcester, *Worcester's Pay-As-You-Throw Trash Removal Saves City \$10 – 20M*, April 2014, <http://www.golocalworchester.com/news/worcesters-pay-as-you-throw-trash-removal-saves-city-10-20-M>.

Before the program, people in the city paid a flat annual fee to have their trash collected.

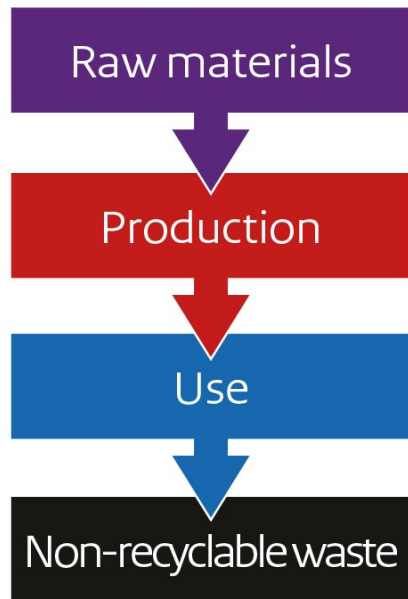
The Economy and the Environment

- economies make use directly of **natural assets** of all types.
- Production and consumption activities also produce leftover waste products, called “residuals” → may lead to pollution or the degradation of the natural environment.

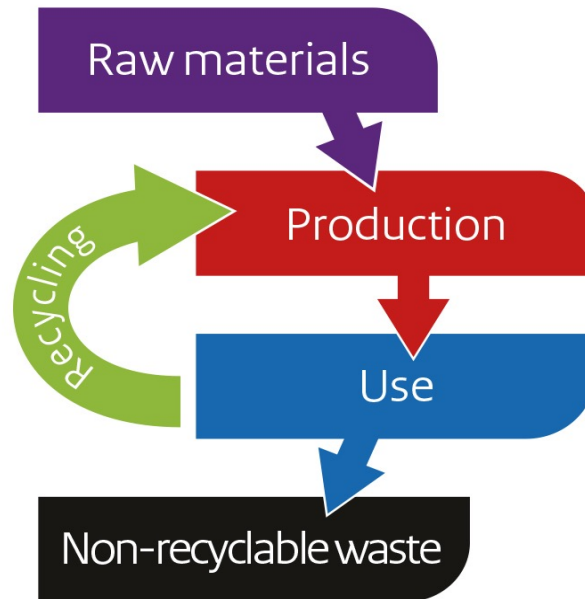


From a linear to a circular economy

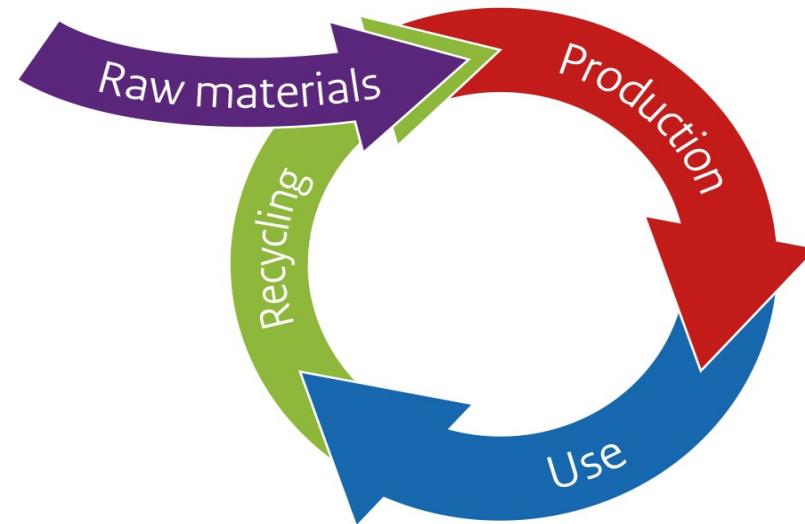
Linear economy



Reuse economy

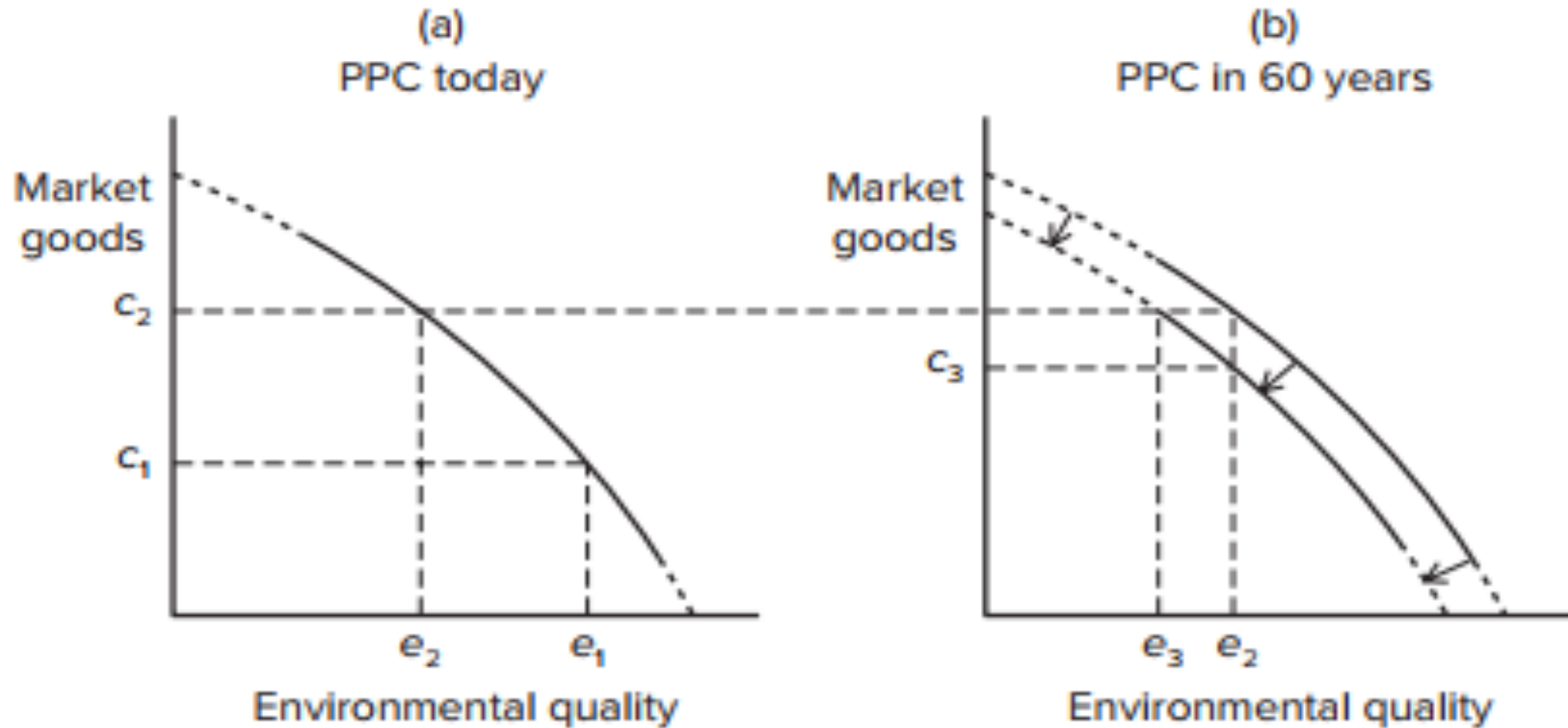


Circular economy



Trade off : growth and environment

FIGURE 2.2 Production Possibility Curves for Current and Future Generations



Basic Terminology



- **Ambient quality:** *ambient quality* refers to the quantity of pollutants in the environment, for example, the concentration of PM2.5 in the air over a city or the concentration of a particular chemical in the waters of a lake.
- **Effluent:** Sometimes *effluent* is used to talk about water pollutants, and *emissions* to refer to air pollutants, but in this book these two words are used interchangeably
- **Damages:** The negative impacts produced by environmental pollution

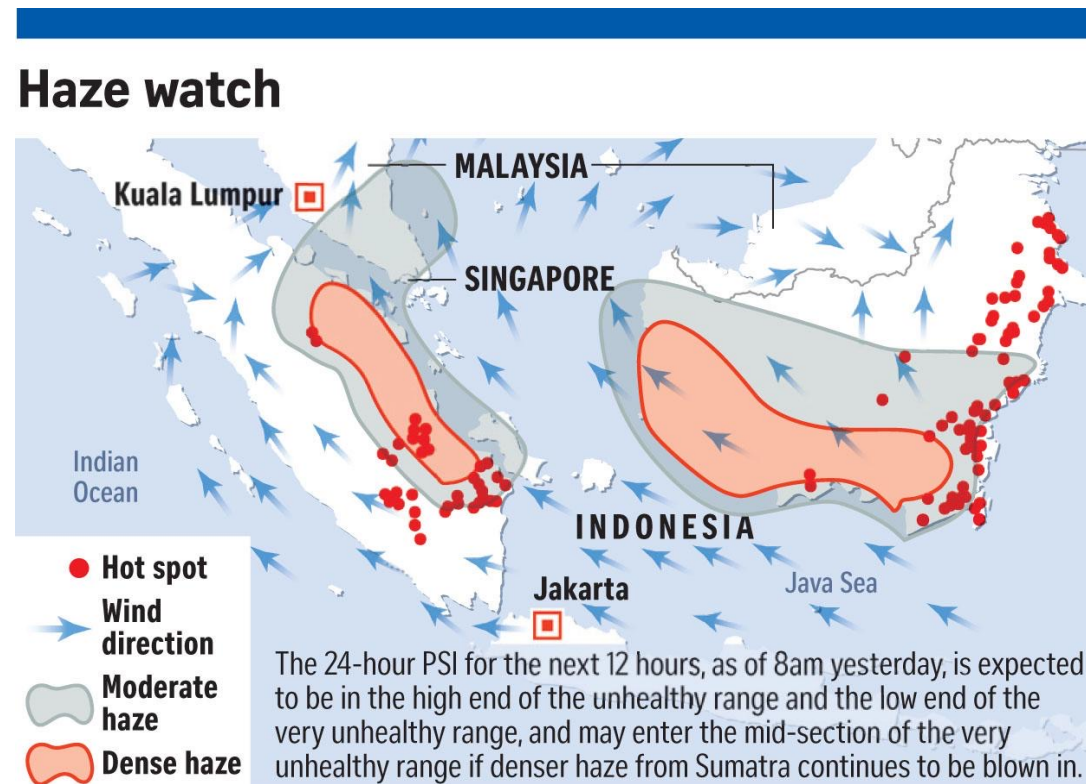
Types of Pollutants

- Cumulative Versus Noncumulative Pollutants

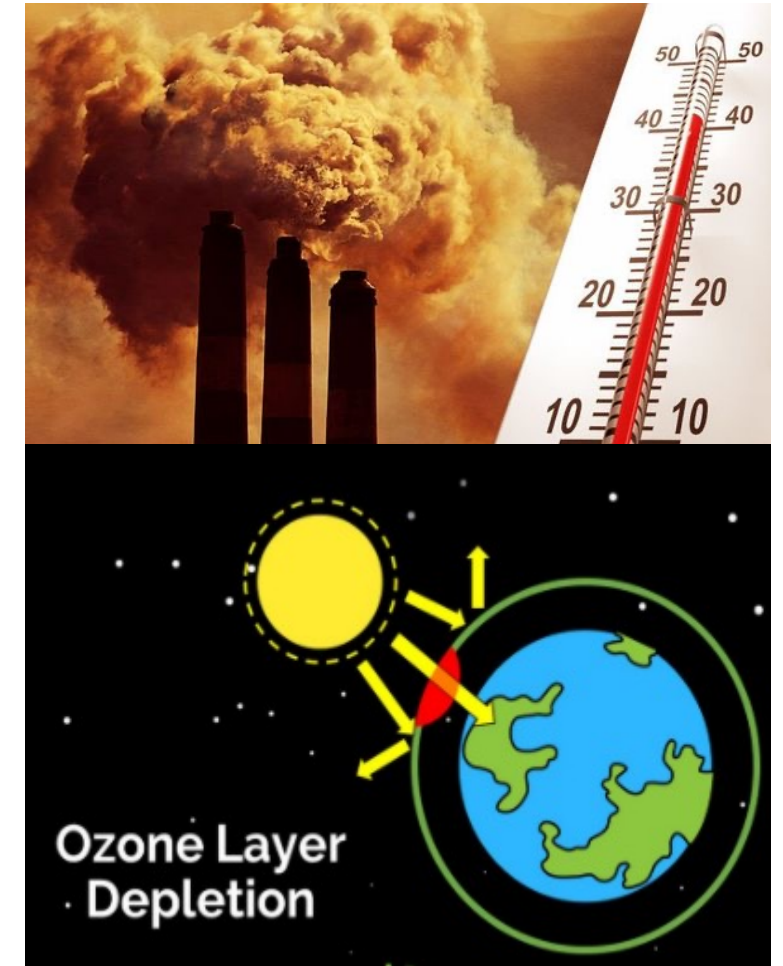


Types of Pollutants

- Local Versus Regional and Global Pollutants

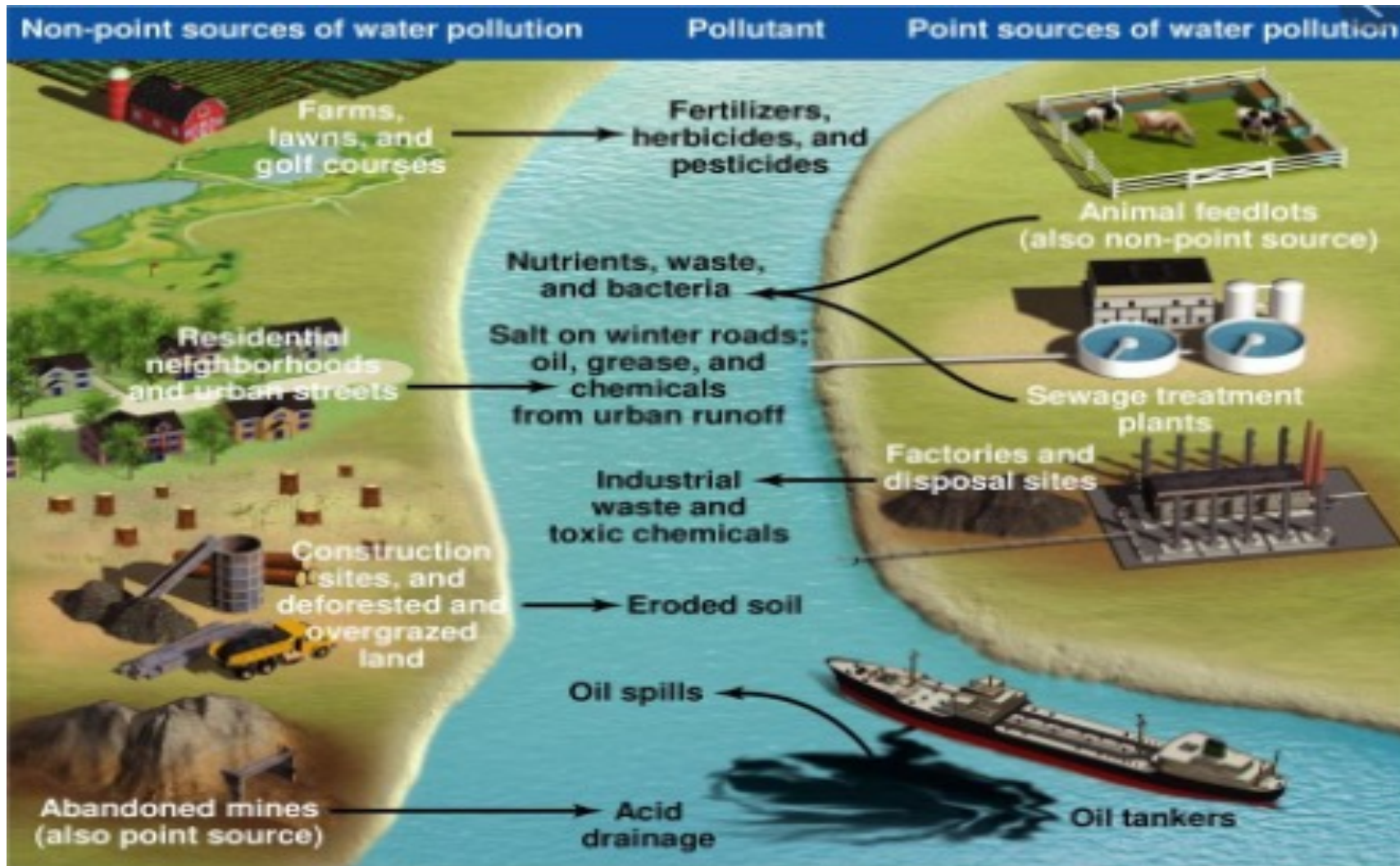


Source: METEOROLOGICAL SERVICE SINGAPORE ST GRAPHICS



Types of Pollutants

- Point-Source Versus Nonpoint-Source Pollutants



Well-defined points of discharge?

Types of Pollutants

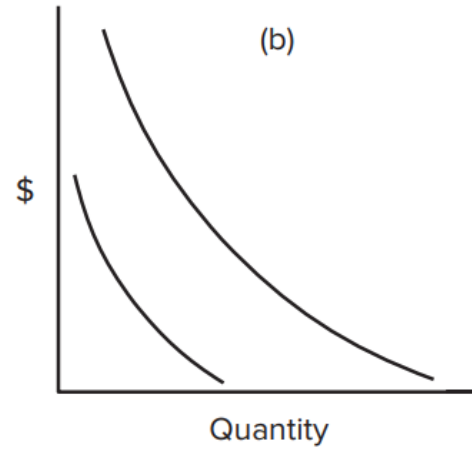
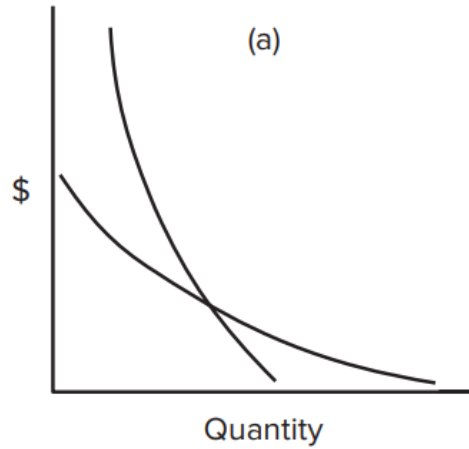
- Continuous Versus Episodic Emissions



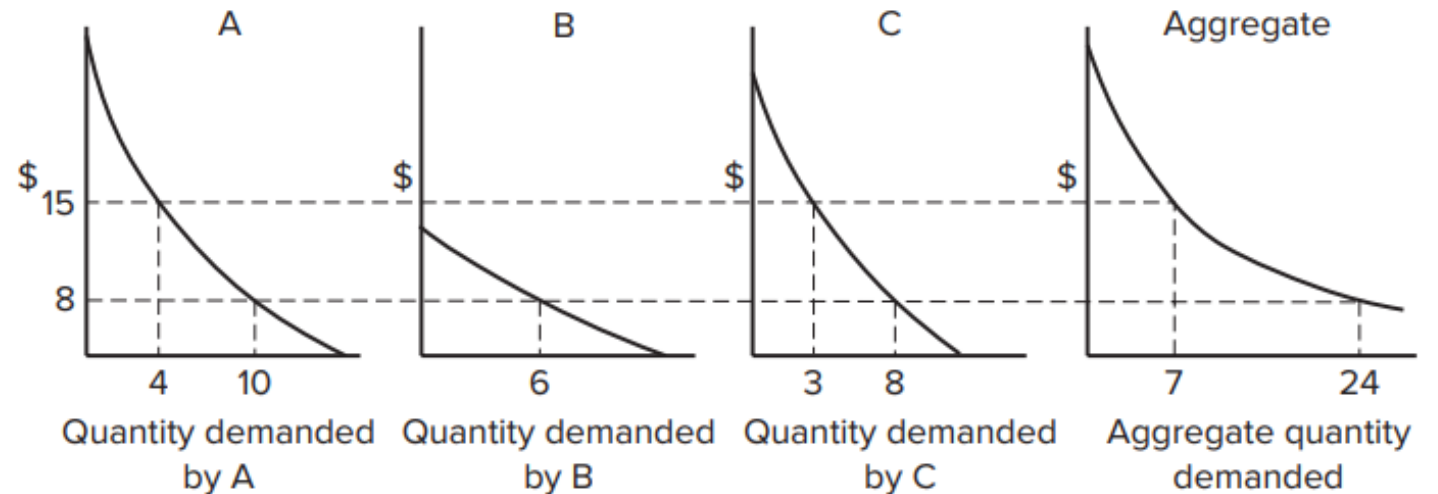
Probability of accident

Benefits and Cost, Demand and Supply

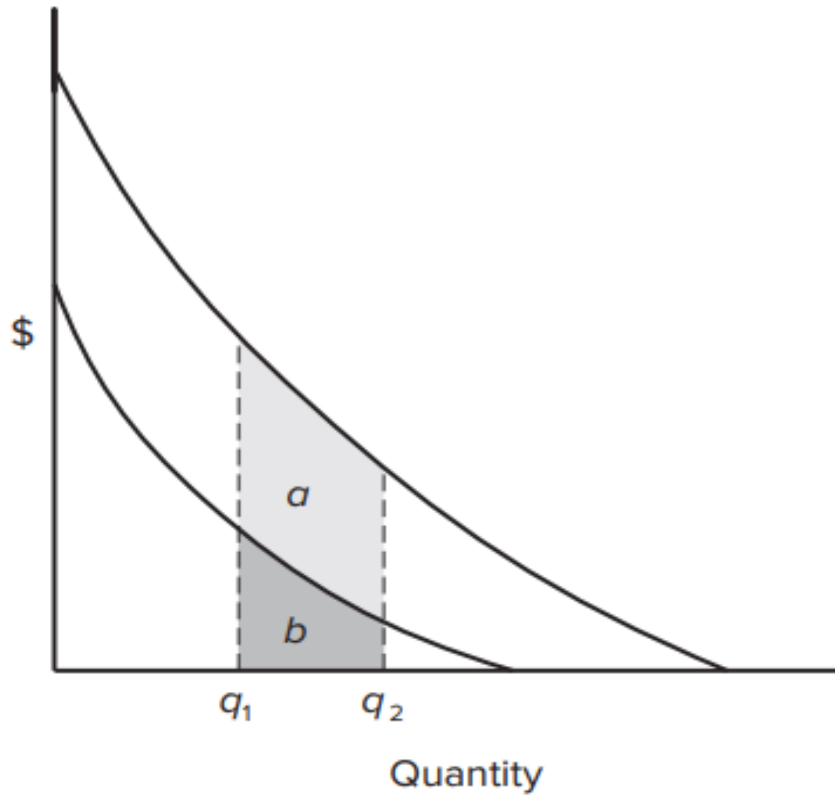
Typical Demand/Marginal Willingness-to-Pay Curves



Aggregate Demand/Marginal Willingness-to-Pay Curves



Measuring benefit



- Shortcomings
 1. demand curves are critically affected by the ability to pay → fewer benefits among lower income people than among higher-income people.
 2. demand curves are influenced by all kinds of real and imagined factors, as true expressions of the benefits of environmental actions.

TYPE OF GOODS

Non-rivalry means that consumption of a good by one person does not reduce the amount available for others.

Non-exclusion means that it is costly or impossible for one user to exclude others from using a good

EXCLUSION

**NON
EXCLUSION**

RIVALRY

NON-RIVALRY

PRIVATE GOOD

Motor vehicles
Computers
Smartphones
Hair cut
Essentially, only one person can own it or use it at the same time.
'Sharing it' means loss of utility.
No free rider problem!
Easy for sellers to set a price.

'CLUB' GOOD

Subscription TV
Hotel 'wi-fi'
Password protected website
Golf club
More than one person (a club) can use it at the same time, without reducing utility to others.
Ability to exclude means ability to charge - usually a fixed access charge.
Small 'clubs' can become congested.

EXCLUSION

'COMMON RESOURCE' [AKA COMMON PROPERTY]

Fish stocks
Rivers, oceans
The environment
People cannot be excluded from use, but using the resource reduces availability/has impact on others.
Resources may be depleted by free access, leading to over-use.

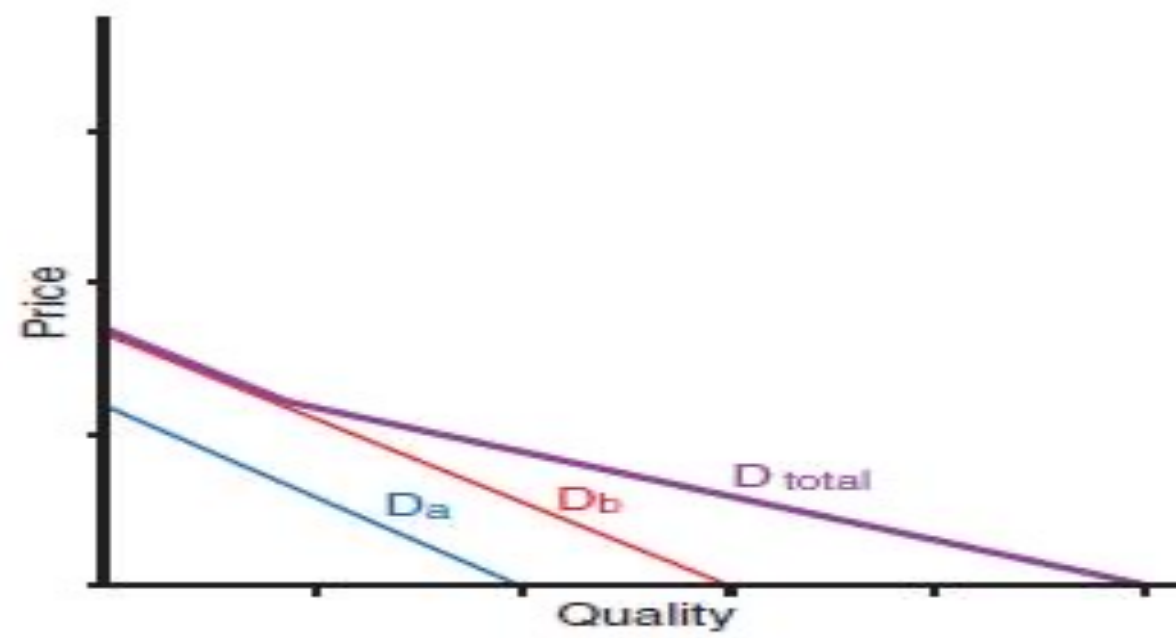
PUBLIC GOOD

Defense
Streetlighting
Tsunami/earthquake warning system
More than one person can use it at the same time.
Free to one means free to all - the free rider problem! Sellers/providers cannot charge at point of use!

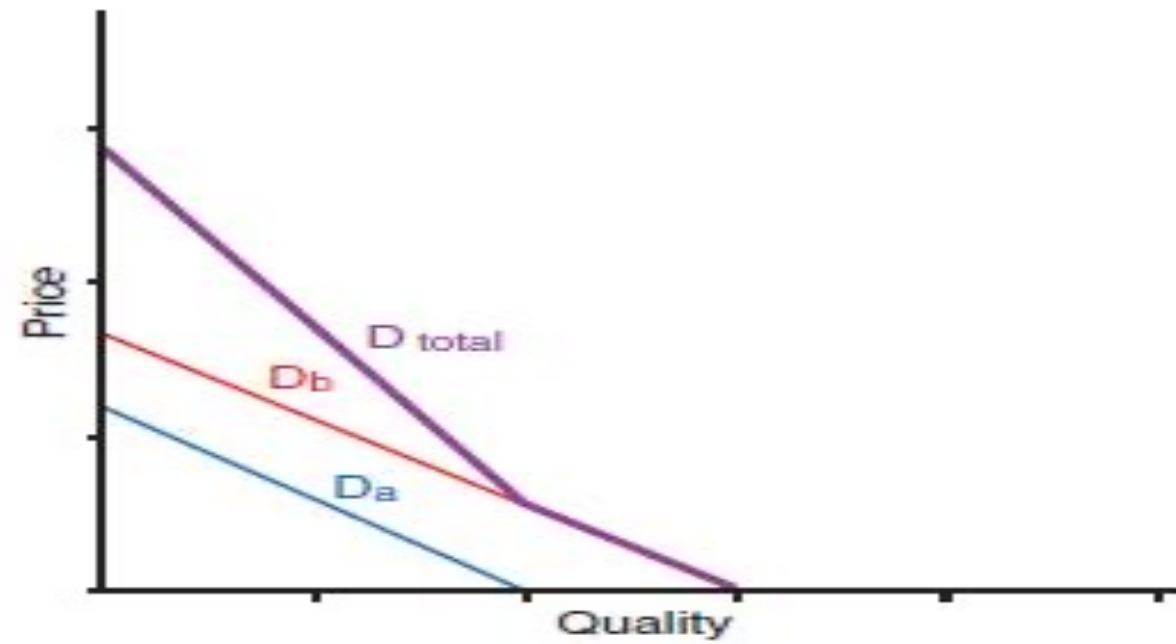
**NON
EXCLUSION**

RIVALRY

NON-RIVALRY

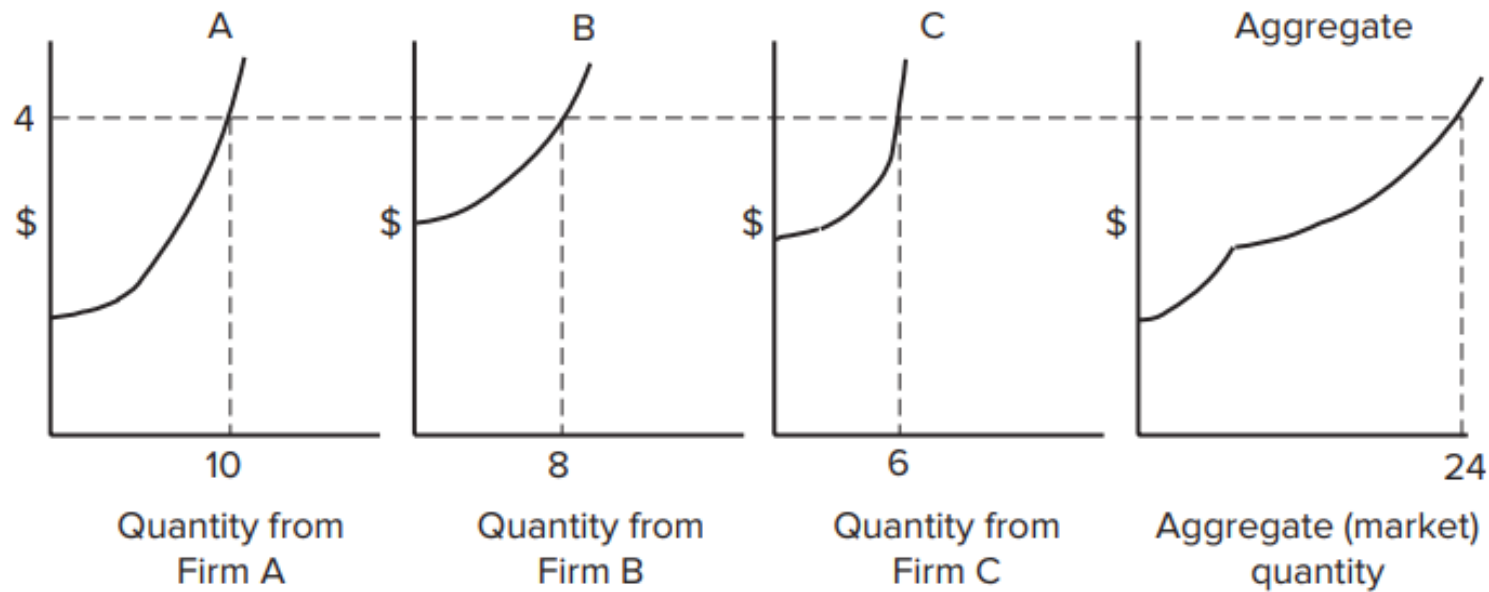


A. Private Good

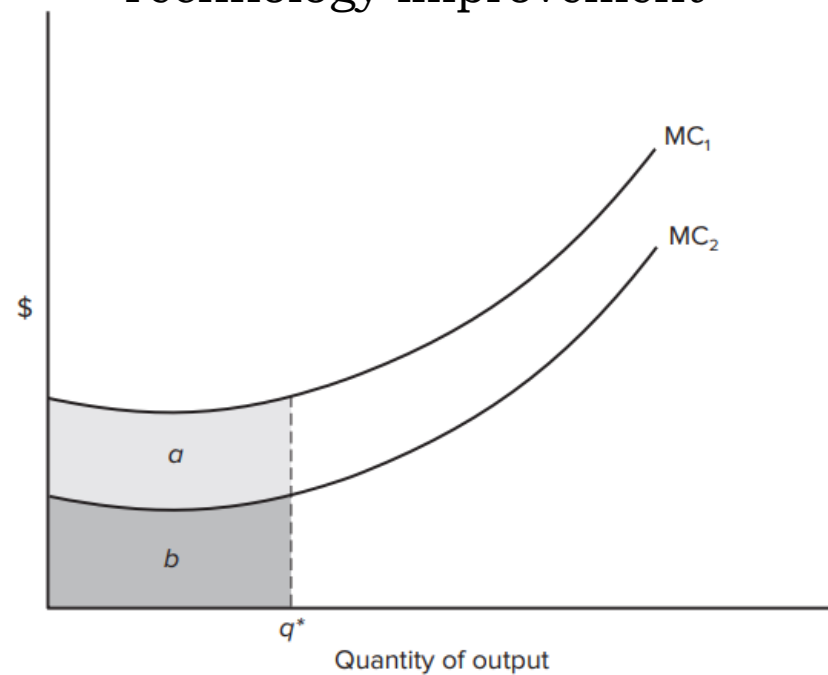


B. Public Good

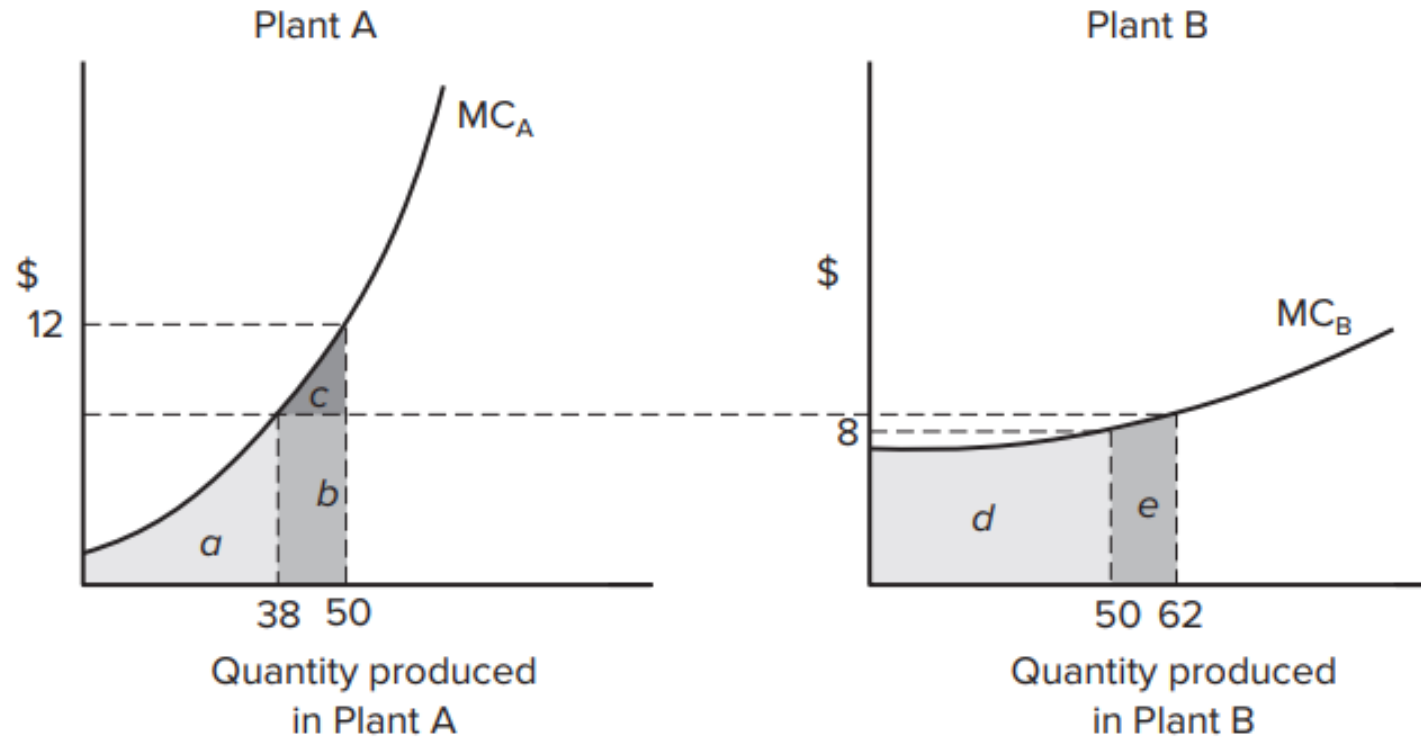
Marginal Cost curve



Technology improvement



The Equi-marginal Principle



As long as the marginal costs in the two plants differ from one another, we can continue to reallocate production—away from the high-marginal-cost plant and toward the low-marginal-cost plant—and get **a reduction in total cost**.

