COURSE ROADMAP

So far:

- Efficient outcomes
- How to measure benefits and costs
- Evaluate policy using BCA
- KO Ch. 1, 2, 3

COURSE ROADMAP

Moving Forward:

- Sources of inefficiencies
  - KO Ch. 4, 5, 6, 7
- How to correct for inefficiencies
  - KO Ch. 8, 9, 10
- Applications
  - KO Ch. 11

SOURCES OF MARKET FAILURE: EXTERNALITIES, PUBLIC GOODS, AND COMMON POOL RESOURCE GOODS

LESSON OBJECTIVES

01

Define and analyze market with externalities

02

Define and analyze market for public goods

03

Define and analyze market for common pool resources

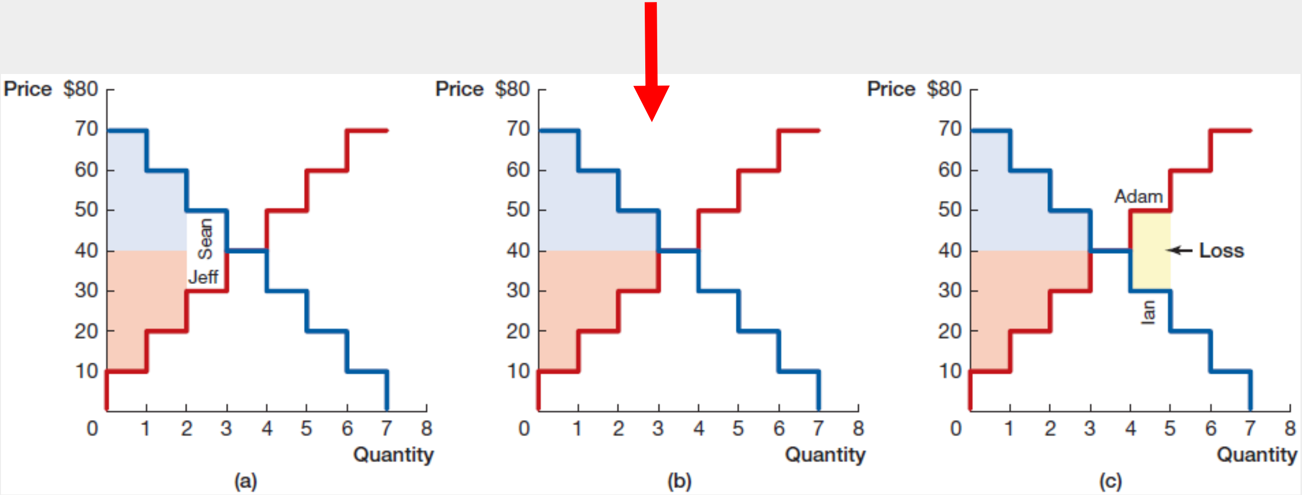
Why do we have peach pass lanes?

Why do the prices vary over time of day? Week? Year?

DO FREE MARKETS ALWAYS PROVIDE EFFICIENT OUTCOMES?

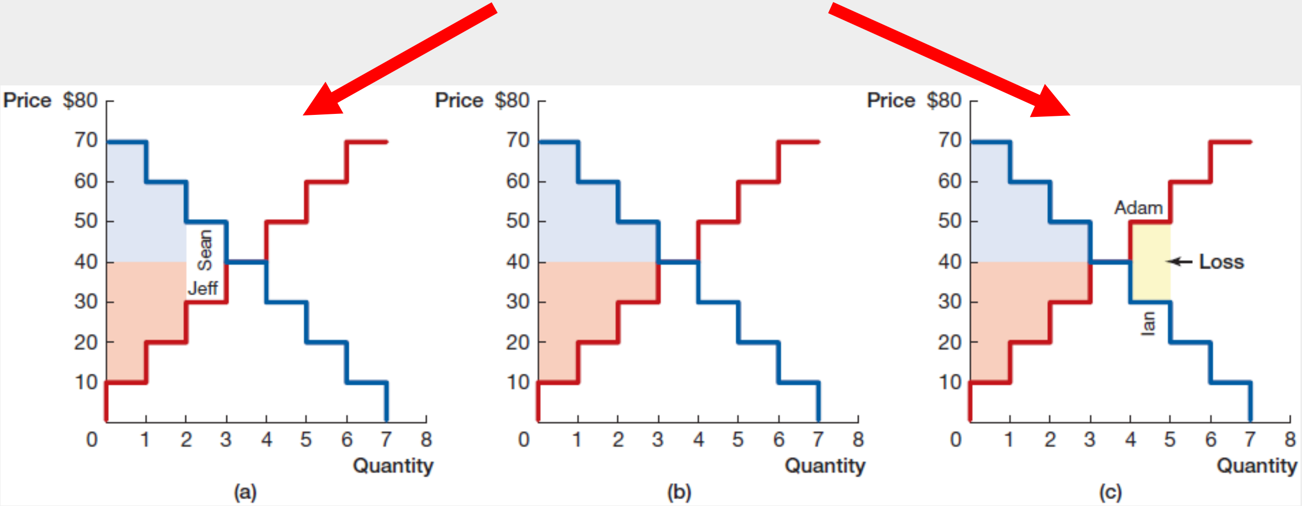
MARKET FAILURE

In a perfectly competitive market, free markets maximize social surplus. Self-interest lead to the Pareto efficient outcome.



MARKET FAILURE

Market failure occurs when allocation of resources by a free market is not Pareto efficient. This creates deadweight loss.



WHAT CAN CAUSE MARKET FAILURE?

Market failure occurs when free markets lead to an *inefficient* distribution of goods and services.

Economists agree on three potential causes of market failure:

1. Externalities (eg. Pollution)
2. Public goods problems (eg. Parks)
3. Market power/imperfect competition (eg. Monopolies)

What can cause market failure?

Economists agree on three potential causes of market failure:

1. Externalities (eg. Pollution)
2. Public goods problems (eg. Parks)
3. Market power/imperfect competition (eg. Monopolies)

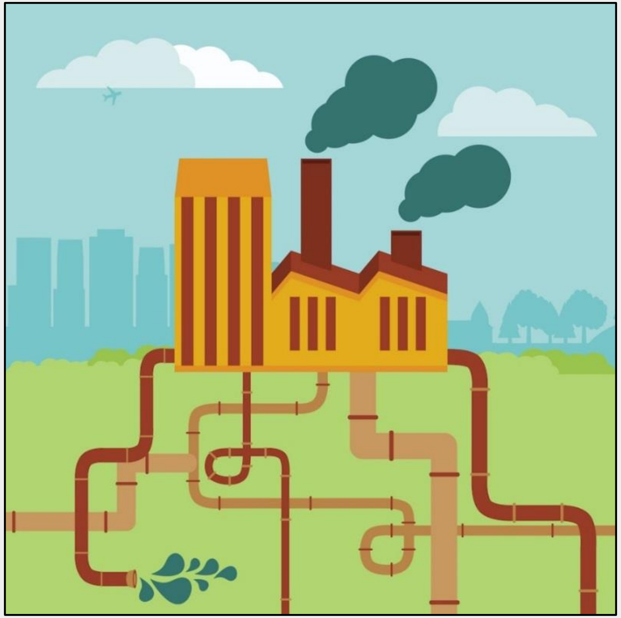
01

EXTERNALITIES

WHAT IS AN EXTERNALITY?

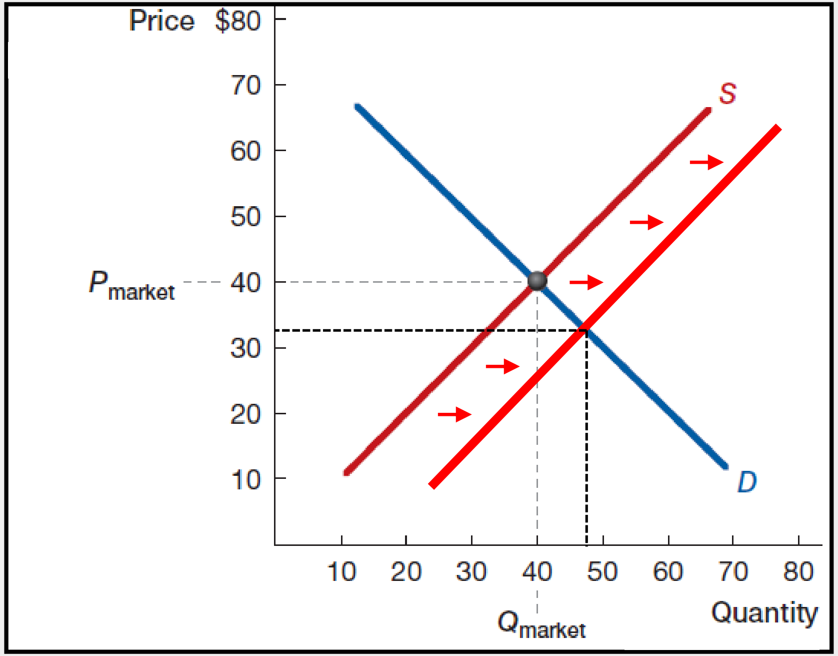
EXTERNALITIES

We Make Sweaters, Inc.

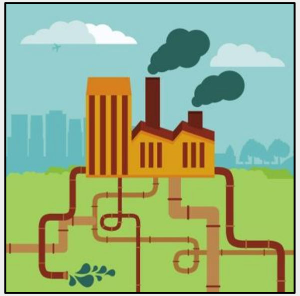


EXTERNALITIES

What happens when yarn and labor is free?



EXTERNALITIES



Externality

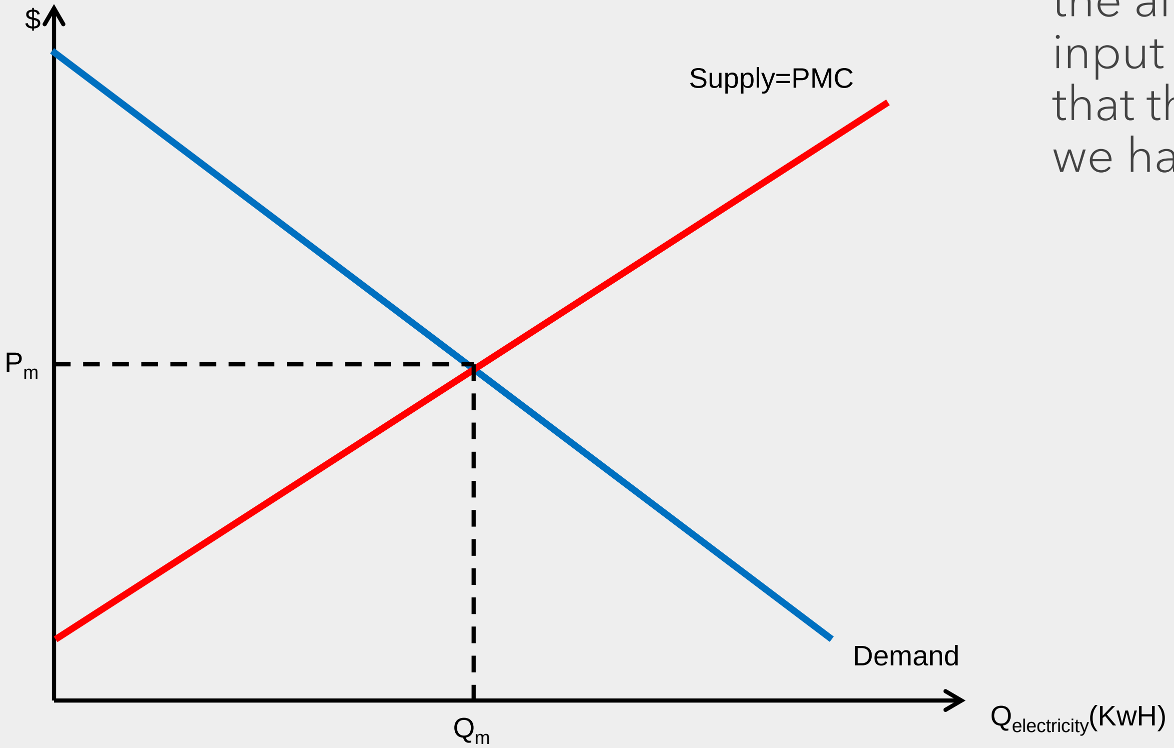
An economic activity that has a spillover cost to or a spillover benefit for a *bystander*

Consider air pollution generated with electricity production.

The demand and private supply associated with producing electricity are given in the graph.

WHAT HAPPENS WHEN THERE IS AN EXTERNALITY PRESENT?

MARKET EQUILIBRIUM



If firms do not take into account the costs of their emissions into the airshed (the airshed is an input in its production process that they get at zero cost),
we have equilibrium at Pm, Qm.

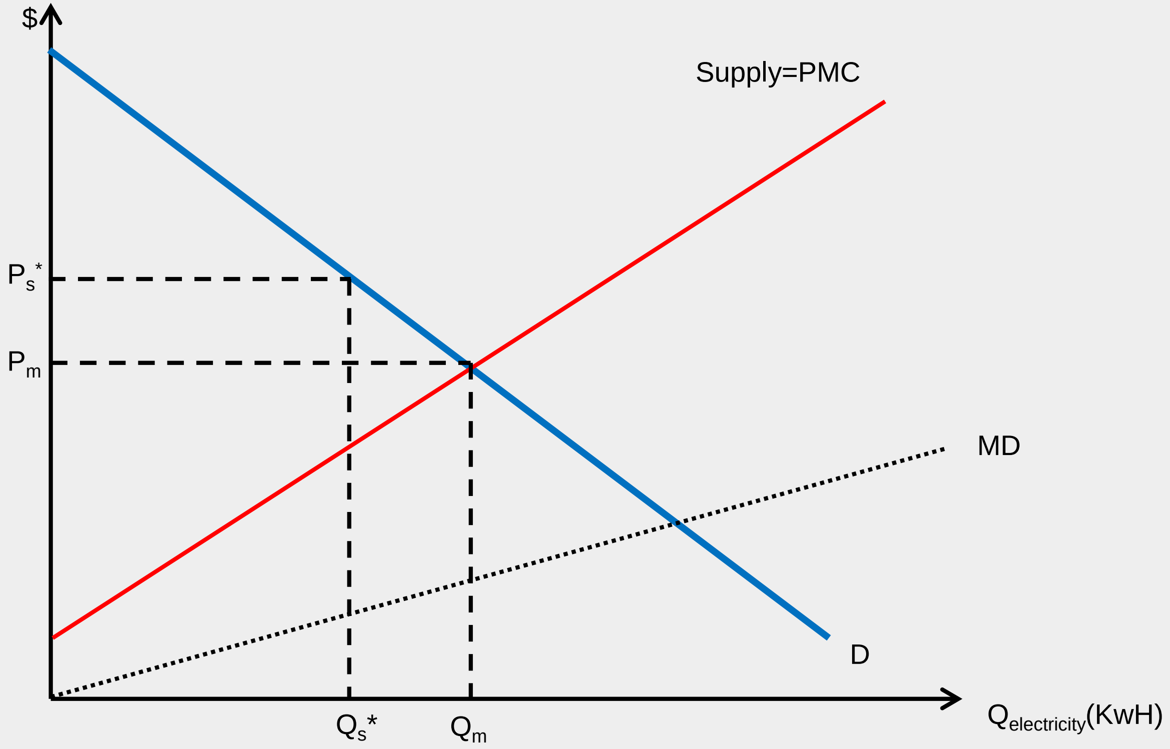
NOW CONSIDER A CASE WHERE THE FIRM MUST PAY FOR ITS 'USE' OF THE AIRSHED.

In other words, we would recognize explicitly that there is cost of using the airshed and firms should pay this cost.

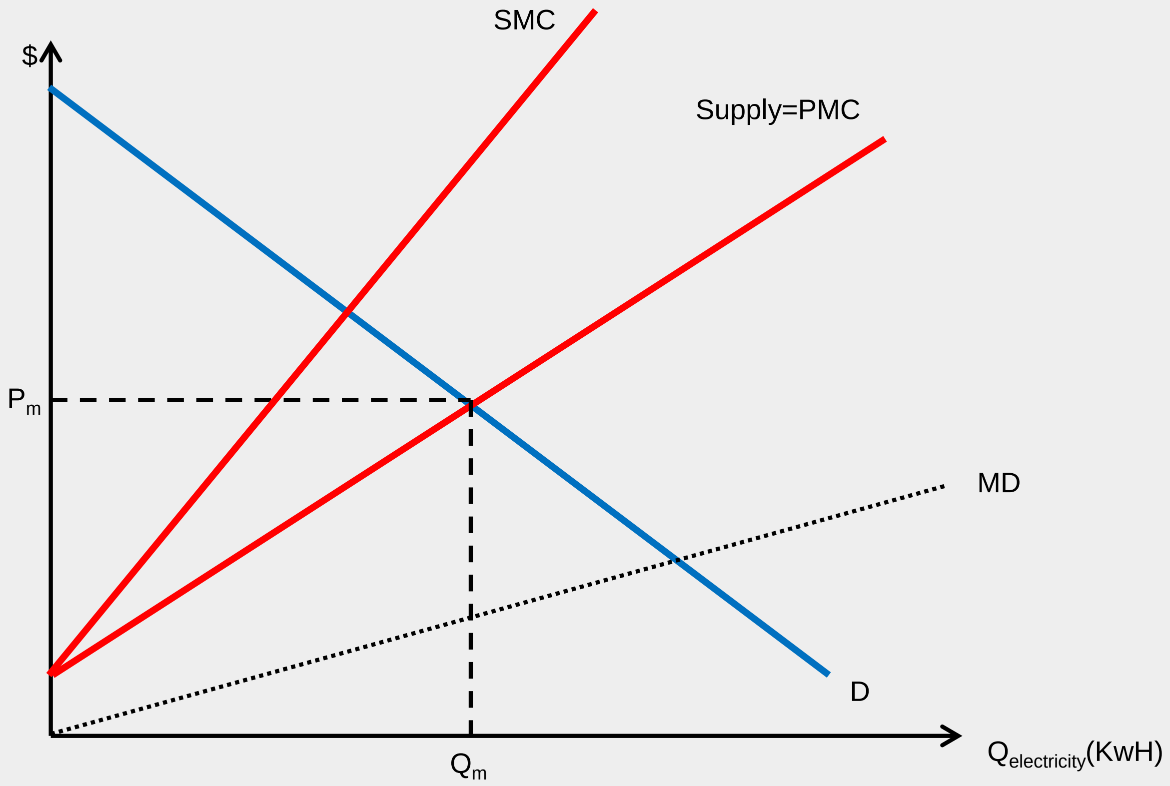
With any additional cost of production, the supply would fall (looks like the supply curve "shifts up").

The "social" supply curve reflects all the costs of producing electricity.

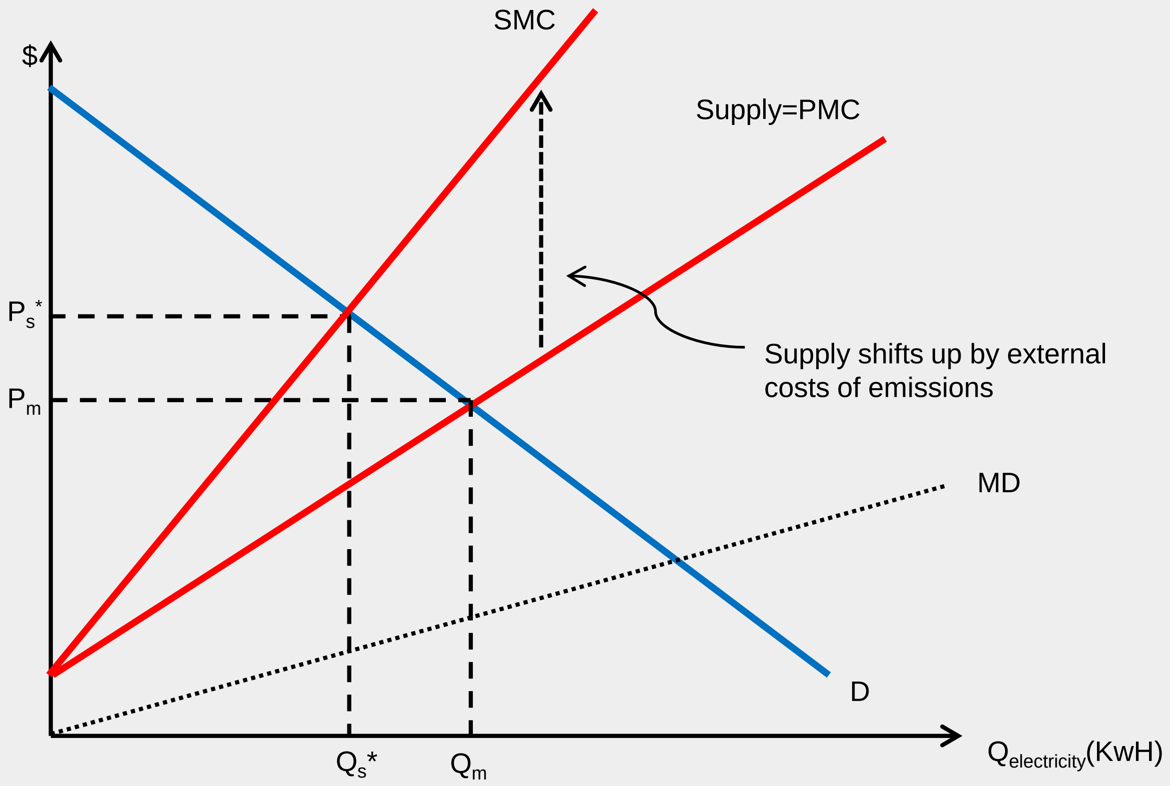
EFFICIENT EQUILIBRIUM



EFFICIENT EQUILIBRIUM



EFFICIENT EQUILIBRIUM



EFFICIENT VS. MARKET EQUILIBRIUM

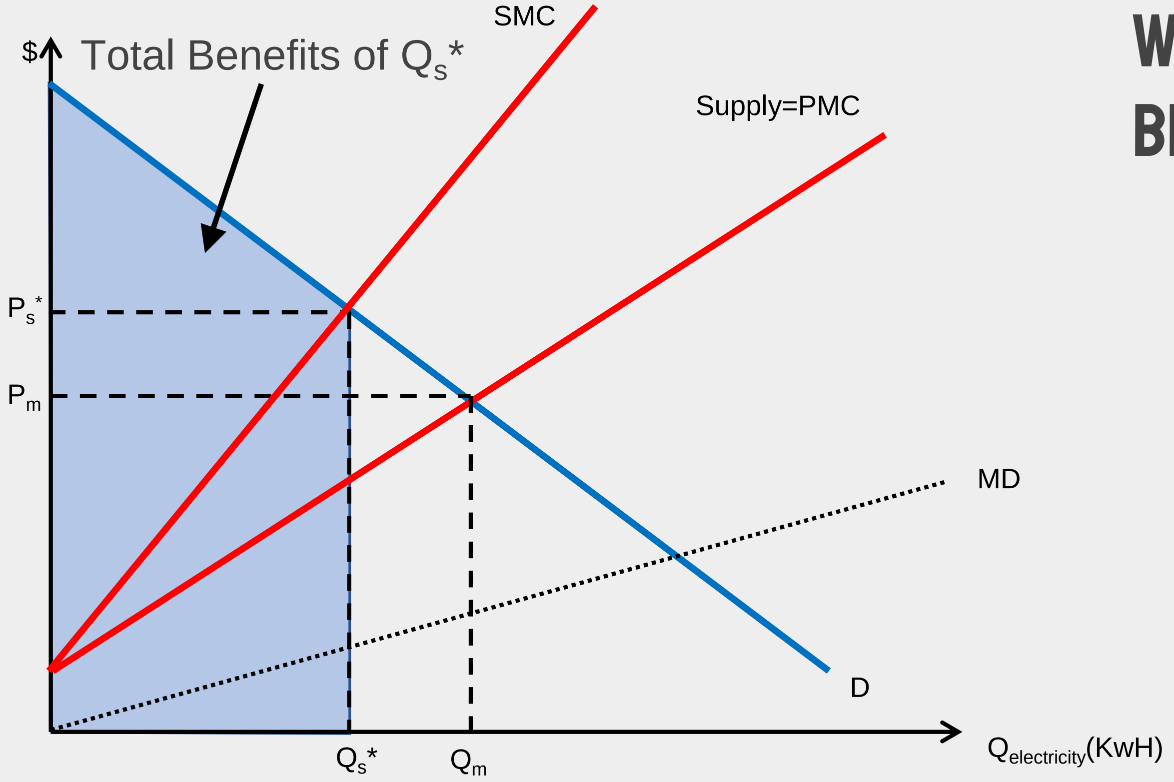
The comparison of the private market solution to the social equilibrium (socially optimally quantity) indicates that:

(1) electricity output too high (relative to optimum)
(2) too much pollution produced
(3) price of the polluting product too low (relative to the optimum)
(4) Net benefits from production of good (electricity in the example above) are not maximized

Why is Q_m <u>not an optimum</u> and Q_s* is an optimum?

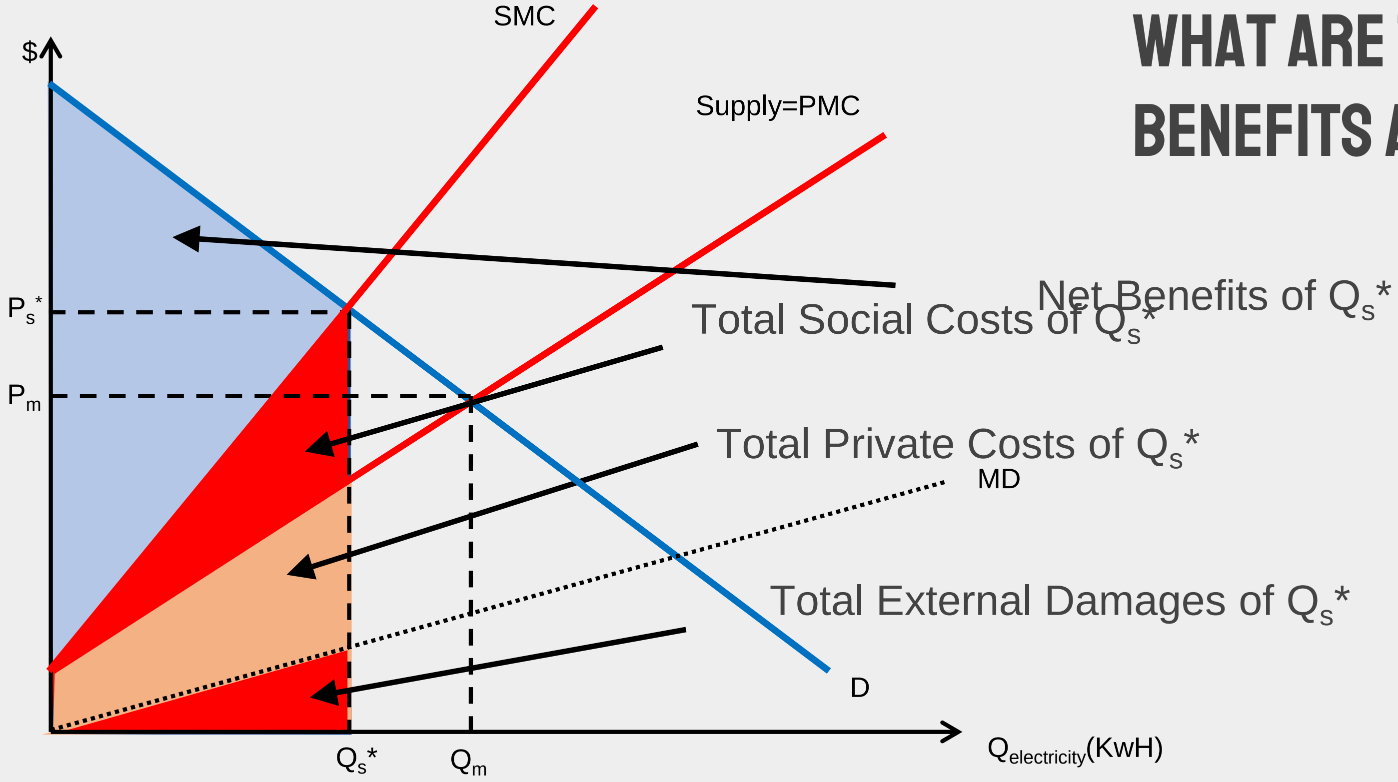
Because Q_s* maximizes <u>net benefits</u> from electricity production and consumption, and Q_m does not.

EFFICIENT VS. MARKET EQUILIBRIUM



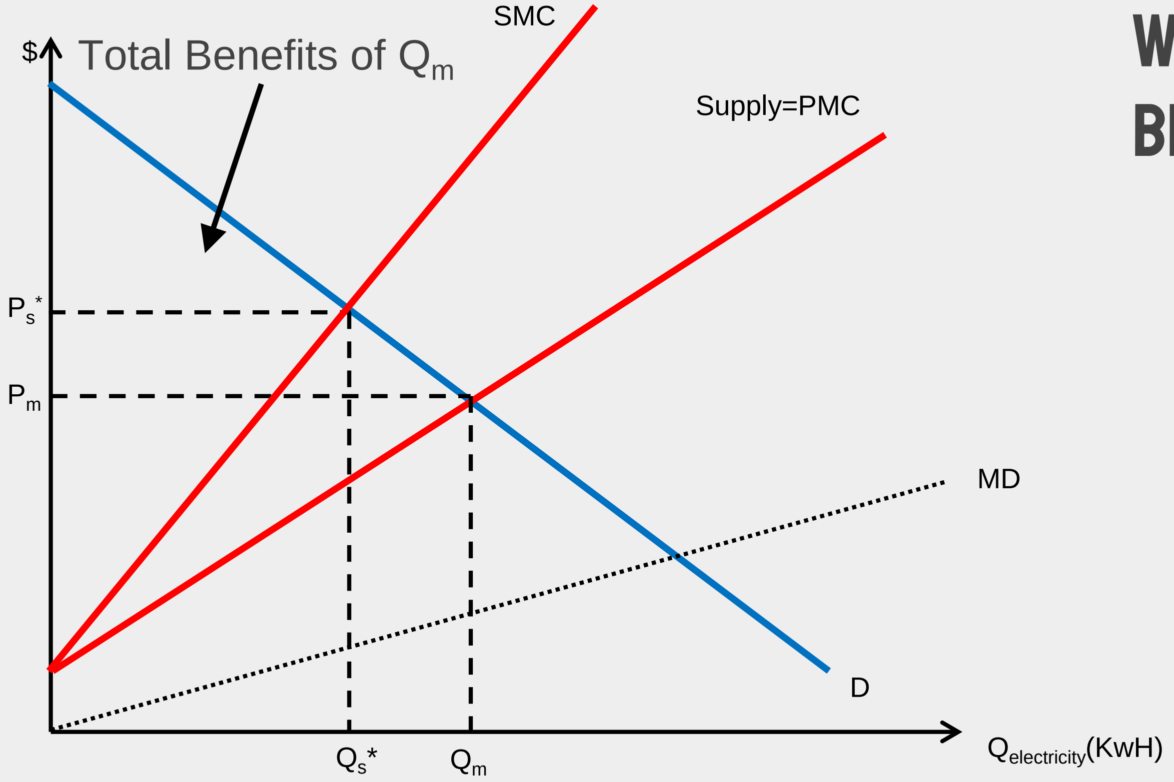
WHAT ARE THE NET BENEFITS AT Q_S*?

EFFICIENT VS. MARKET EQUILIBRIUM



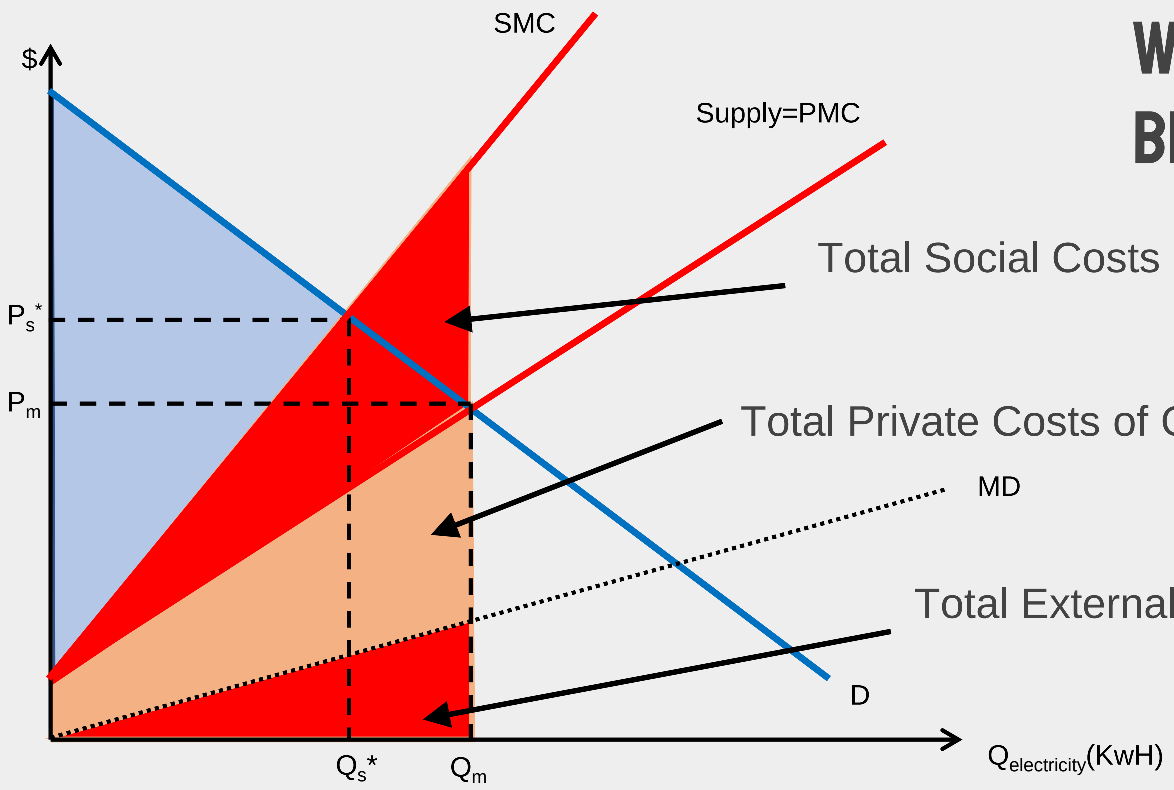
WHAT ARE THE NET BENEFITS AT Q_S*?

EFFICIENT VS. MARKET EQUILIBRIUM



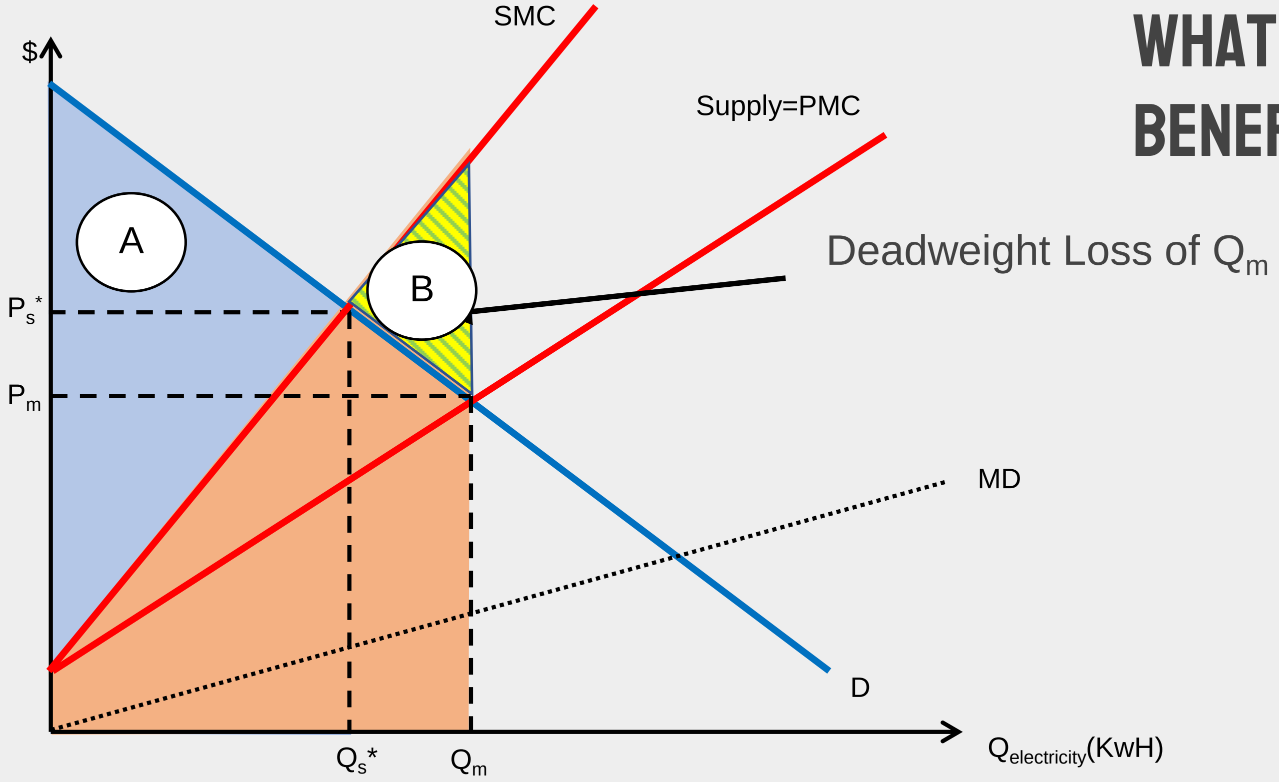
WHAT ARE THE NET BENEFITS AT Q_M?

EFFICIENT VS. MARKET EQUILIBRIUM



WHAT ARE THE NET BENEFITS AT Q_M?

EFFICIENT VS. MARKET EQUILIBRIUM



WHAT ARE THE NET BENEFITS AT Q_M?

EFFICIENT VS. MARKET EQUILIBRIA

Example Summary:

Net benefits for efficient equilibrium (A) is greater than market equilibrium (A-B)

Q_s* is socially optimal

- It maximizes the net benefits of electricity consumption to society
- The supply of electricity now reflects all the costs of production.

The costs of using the airshed = the damages caused by the emissions.

- Thus, the SMC is a shift up of the PMC by the dollar value of the damages caused by its emissions.

EFFICIENT VS. MARKET EQUILIBRIA

Externality Takeaway:

Externalities cause market failures – the private market fails to maximize net benefits of production.

Externalities are the underlying issue driving many of today's largest environmental challenges.

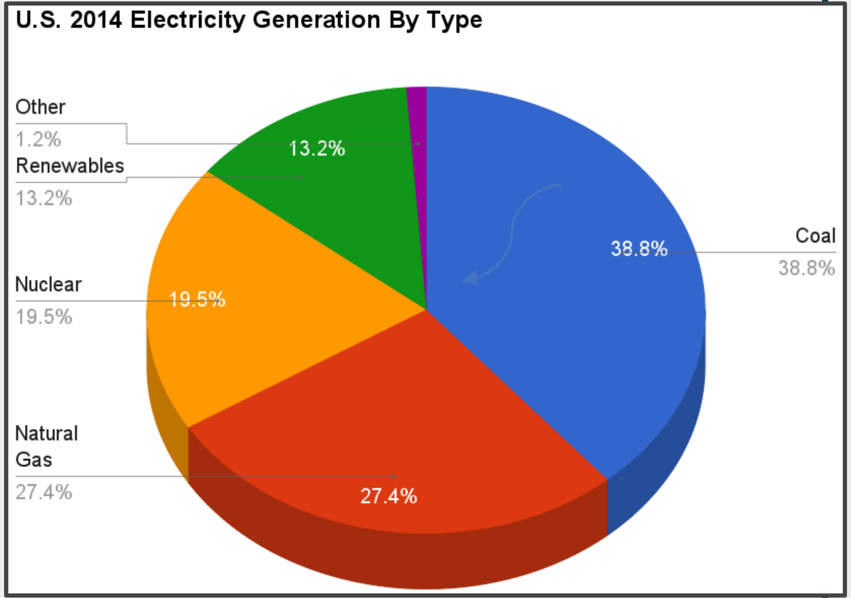
A key insight from our analysis above is that prices should reflect the full cost of a resource's use.

We refer to this as "internalizing the external costs of production."

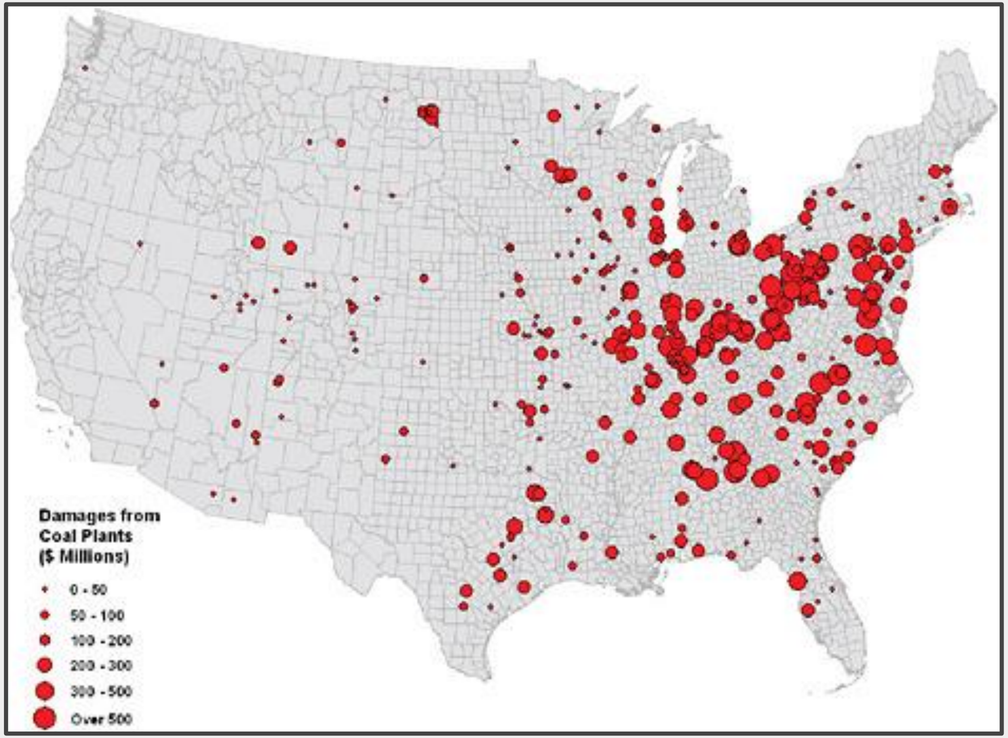
EXAMPLES OF QUANTIFIED EXTERNAL COSTS

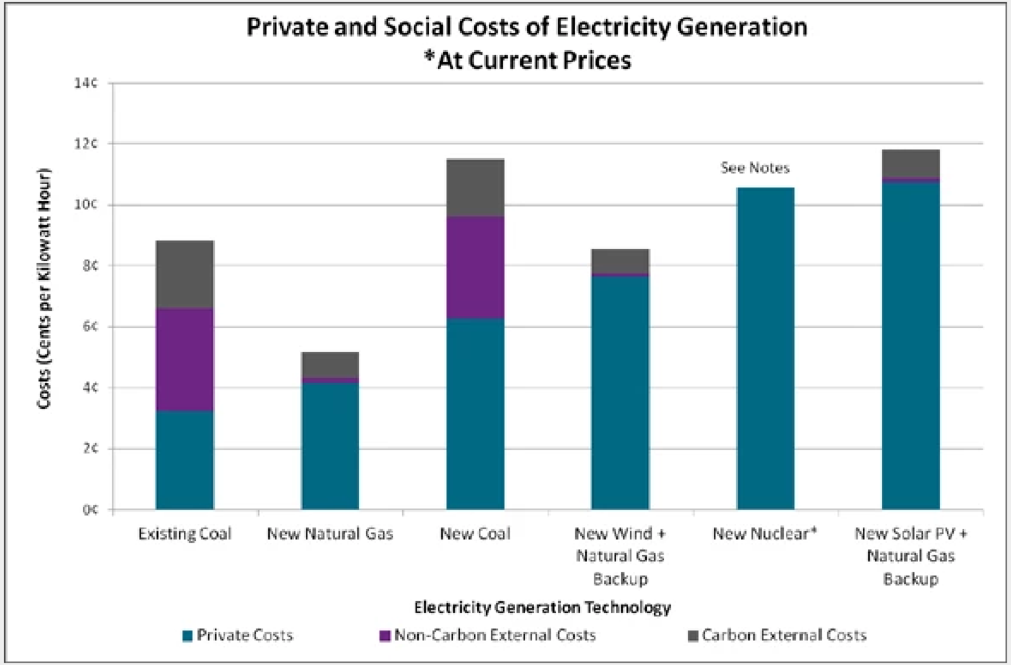
EXTERNAL COST OF COAL CONSUMPTION

≈ 2 trillion kilowatt-hours per year in coal consumption



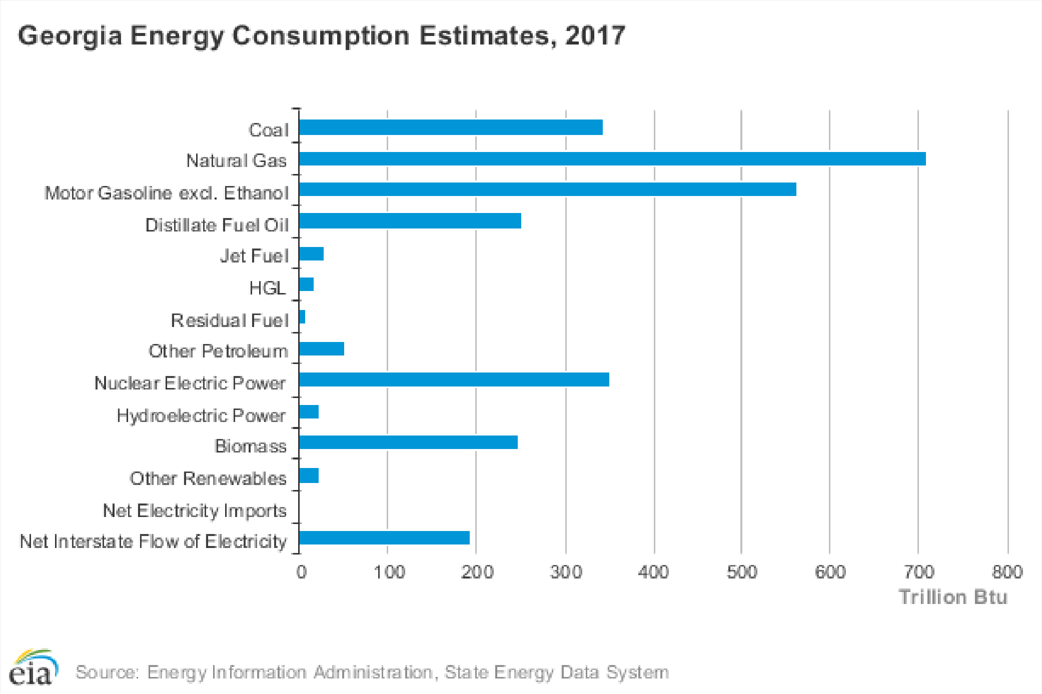
How are the external costs of coal-fire electricity distributed in the U.S.?





Nearly two-thirds the cost of coal consumption are external costs, nearly $0.06 per kilowatt hour ($62 billion total)

Source: Michael Greenstone, Brookings Institute



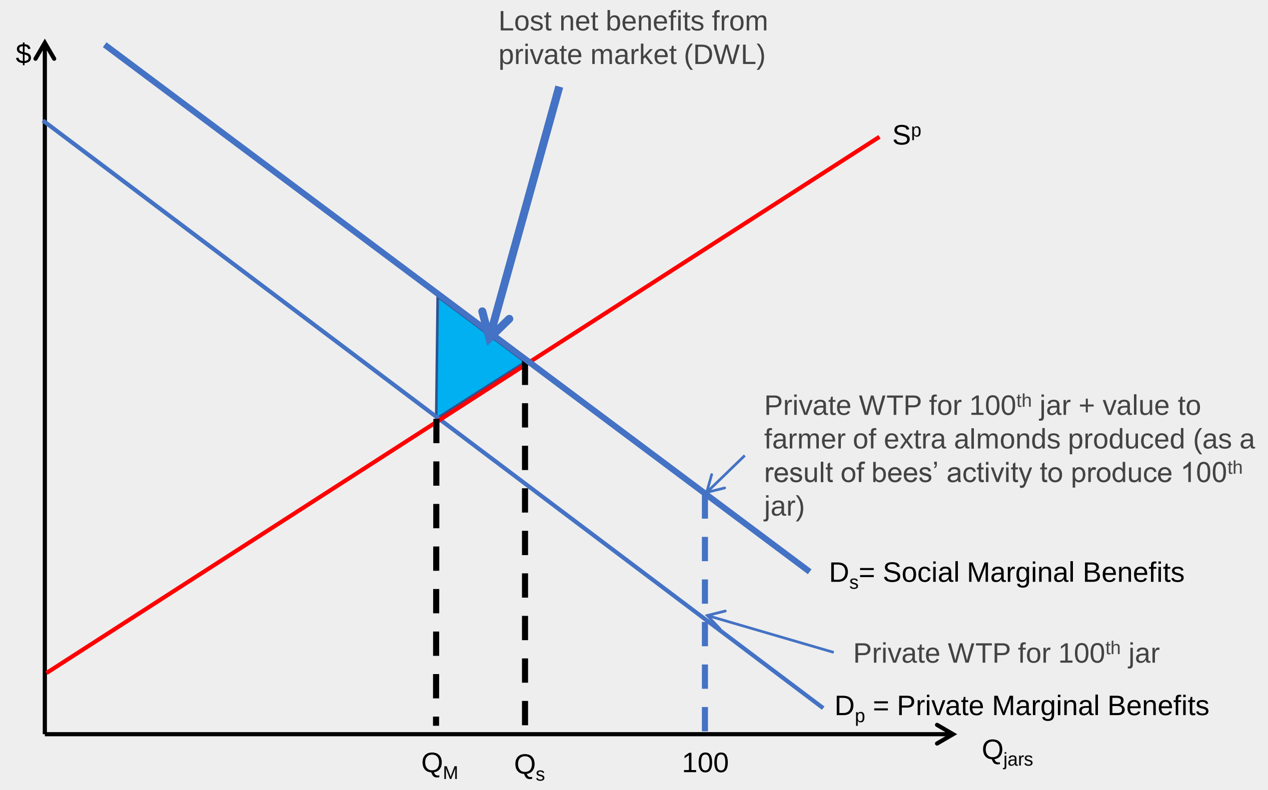
Georgia coal energy cost - $0.01/kwh
External costs - $0.06/kwh
If consumers paid full price, it would cost $0.07/kwh…. a 700% increase

POSITIVE EXTERNALITY: HONEY BEES

Honey bees are responsible for 15-30% of food US consumers eat.

Consider the market for honey. To make honey, beekeepers also provide benefits to other producers (farmers)

The positive externality implies the social value of honey production/consumption is greater than the private value of those purchasing honey.



Net Benefits of Q_s > Net Benefits of Q_M

(Net benefits are less by the amount of the shaded triangle)

ATTENDANCE ACTIVITY

Suppose demand is $Q_D = 80 - P$ and supply is $Q_S = P$. There is a constant positive externality of $8 per unit (Marginal External Benefit, MEB =$8) for consumption. Draw a graph illustrating the market supply and demand curves. Then, draw the marginal social benefit curve and find the socially efficient point. Using this graph answer the following questions.

1) The efficient outcome is an equilibrium price of ____ and an equilibrium quantity of ____.
2) Without intervention the market outcome will be an equilibrium price of ____ and an equilibrium quantity of ____.
3) The socially efficient price is ______ than the free market equilibrium price.
4) The deadweight loss in this market is _____.

ATTENDANCE ACTIVITY

Suppose demand is $Q_D = 80 - P$ and supply is $Q_S = P$. There is a constant positive externality of $8 per unit (Marginal External Benefit, MEB =$8) for consumption. Draw a graph illustrating the market supply and demand curves. Then, draw the marginal social benefit curve and find the socially efficient point. Using this graph answer the following questions.

1) The efficient outcome is an equilibrium price of ____ and an equilibrium quantity of ____.

Efficient Equilibrium is where MSB=MSC

$$MSB = 88 - Q = Q = MSC \rightarrow Q = 44$$

$$P = 88 - Q \rightarrow P = \$44$$

ATTENDANCE ACTIVITY

Suppose demand is $Q_D = 80 - P$ and supply is $Q_S = P$. There is a constant positive externality of $8 per unit (Marginal External Benefit, MEB =$8) for consumption. Draw a graph illustrating the market supply and demand curves. Then, draw the marginal social benefit curve and find the socially efficient point. Using this graph answer the following questions.

2) Without intervention the market outcome will be an equilibrium price of ____ and an equilibrium quantity of ____.

$$Q_D = 80 - P = P \rightarrow P = \$40$$

$$Q = 80 - P \rightarrow Q = 40$$

ATTENDANCE ACTIVITY

Suppose demand is $Q_D = 80 - P$ and supply is $Q_S = P$. There is a constant positive externality of \$8 per unit (Marginal External Benefit, MEB =\$8) for consumption. Draw a graph illustrating the market supply and demand curves. Then, draw the marginal social benefit curve and find the socially efficient point. Using this graph answer the following questions.

3) The socially efficient price is ______ than the free market equilibrium price.

$$\$44 > \$40$$

ATTENDANCE ACTIVITY

Suppose demand is $Q_D = 80 - P$ and supply is $Q_S = P$. There is a constant positive externality of $8 per unit (Marginal External Benefit, MEB =$8) for consumption. Draw a graph illustrating the market supply and demand curves. Then, draw the marginal social benefit curve and find the socially efficient point. Using this graph answer the following questions.

4) The deadweight loss in this market is _____.

$$\frac{1}{2} * \mathrm{MEB} * \left(\mathrm{P_{optimal}} - \mathrm{P_{market}}\right) = \frac{1}{2} * 8 * (\$44 - \$40) = \$16$$

PUBLIC GOODS AND COMMON POOL RESOURCES

How many people can eat this apple?

Rival good

Goods that only one person can consume at a time

Nonrival goods

Goods that more than one person at a time can consume

Rival

Non-rival

Rival

Non-rival

Can you eat this apple without paying for it?

Excludable goods

Must be paid for in order to consume them

Non excludable goods

Can be consumed, even if they are not paid for

Excludable

Excludable

Nonexcludable

Nonexcludable

TYPES OF GOODS

Excludable =
Must be paid for
Rival =
One person at a time

Nonexcludable =
Can be consumed without paying for
Rival =
One person at a time

		Excludability	
		High	Low
Rival in Consumption	High	**Ordinary Private Goods** (clothes, food, furniture)	**Common Pool Resource Goods** (fish, water, natural forests, food at a picnic)
	Low	**Club Goods** (cable TV, pay-per-view TV, Wi-Fi, music downloads)	**Public Goods** (national defense, early warning systems, earth protection programs)

Excludable =
Must be paid for
Nonrival =
More than one person at a time

Nonexcludable =
Can be consumed without paying for
Nonrival =
More than one person at a time

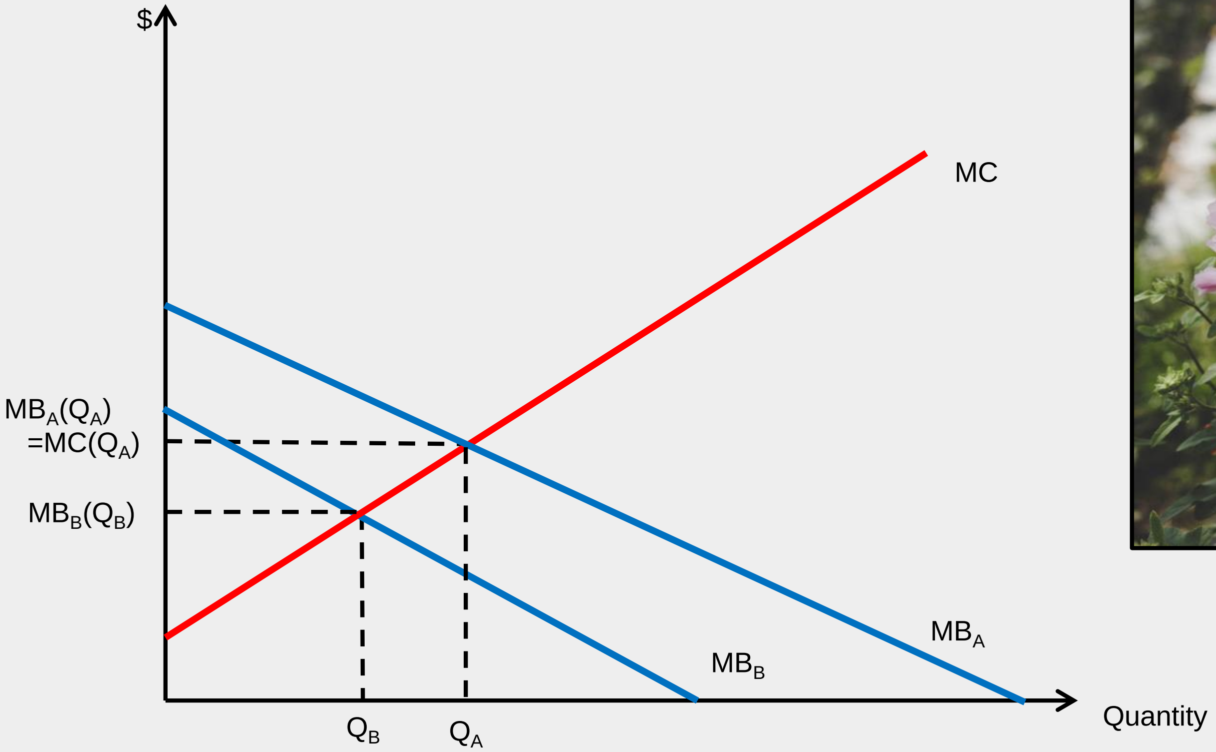
02

PUBLIC GOODS

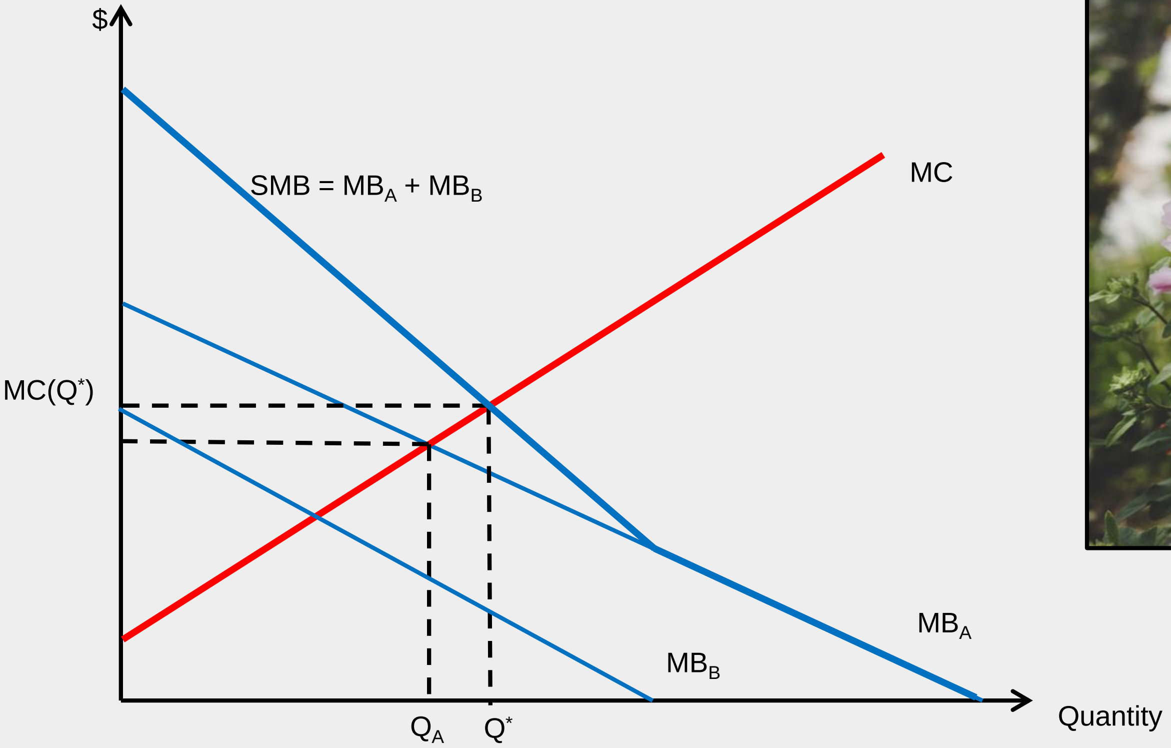
Goods with low excludability (common pool resource goods and public goods) can create market failure (inefficient market outcomes).

HOW DO PUBLIC GOODS LEAD TO MARKET FAILURE?

MARKET PUBLIC GOOD PROVISION



EFFICIENT PUBLIC GOOD PROVISION



PROBLEM

Public good provider is not compensated for marginal benefit to others.

- Positive externality

Positive externality is not internalized

Leads to under-provision of public good

CONSEQUENCE

Free-rider problem

Some individuals don’t contribute to a public good, instead relying only on the contributions of others

03

COMMON POOL RESOURCE GOODS

TRAGEDY OF THE COMMONS

COMMON POOL RESOURCE GOODS

Nonexcludable =
Can be consumed without paying for
Rival =
One person at a time

		Excludability	
Rival in Consumption		High	Low
	High	Ordinary Private Goods (clothes, food, furniture)	Common Pool Resource Goods (fish, water, natural forests, food at a picnic)
	Low	Club Goods (cable TV, pay-per-view TV, Wi-Fi, music downloads)	Public Goods (national defense, early warning systems, earth protection programs)

THE PROBLEM WITH COMMON POOL RESOURCE GOODS

Tragedy of the commons

- When common pool resources are overused

CONGESTION EXAMPLE

Two options:

Backroads – 40 minutes

Highway – 30 + N/60 minutes (extra second for every driver)

Efficient number of cars (minimize costs):

MB=10-N/60, MSC=N/60

Q^*=301 -> 301st driver saves 5 minutes and imposes cost of 5 minutes

Market outcome:

Will the 302nd driver take the backroads?

No! will save 4min 59sec by taking the highway.

MB=10-N/60, MC=0

Q^M=600 -> 40 minutes on highway and 40 minutes on backroads

MARKET LEADS TO OVERUSE OF HIGHWAY

Drivers do not internalize the costs they impose on other drivers, leading to overuse of the highway and a market failure.

This is a tragedy of the commons.

CONDITIONS FOR TRAGEDY OF THE COMMONS

There are two conditions for a tragedy of the commons to occur:

1. Common pool resource
2. Diminishing marginal returns

Must not be able to exclude others from using the resource

Marginal benefit of the resource must diminish with use, imposing a negative externality on others.

Other examples: fisheries, pastures, global atmosphere

Why do we have peach pass lanes?

Why do the prices vary over time of day? Week? Year?

COLLECTIVE ACTION PROBLEM

A collection of individuals may find itself in a situation where the group as a whole is better off if all contribute to the common good, but each individual member of the group has incentives to free ride.

Tragedy of the commons problems are often described as a *collective action problem*.

CLIMATE CHANGE EXAMPLE

Setup:
Two countries: A,B
Each can either reduce emissions or not: contribute, shirk

Four outcomes:

1. Both shirk – Temperatures rise 4.5°C
   - Cost: 0%, Damage 6%
2. Both contribute – Temperatures rise 2°C
   - Cost: 3.8%, Damage 1%
3. A contribute, B shirk – Temperatures rise 3°C
   - Cost A: 3.8%, Cost B: 0%, Damage 3.5%
4. A shirk, B contribute – Temperatures rise 3°C
   - Cost A: 0%, Cost B: 3.8%, Damage 3.5%

Note: Benefits of avoided climate damages are shared and nonexcludable

Player B
(payoffs in lower RH corner of each cell)

Player A
(payoffs in upper LH corner of each cell)

	Contribute	**Shirk**
Contribute	- 4.8% - 4.8%	- 7.3% - 3.5%
Shirk	- 3.5% - 7.3%	- 6.0% - 6.0%

Figure 5.5 Payoff matrix for the climate change collective action problem.

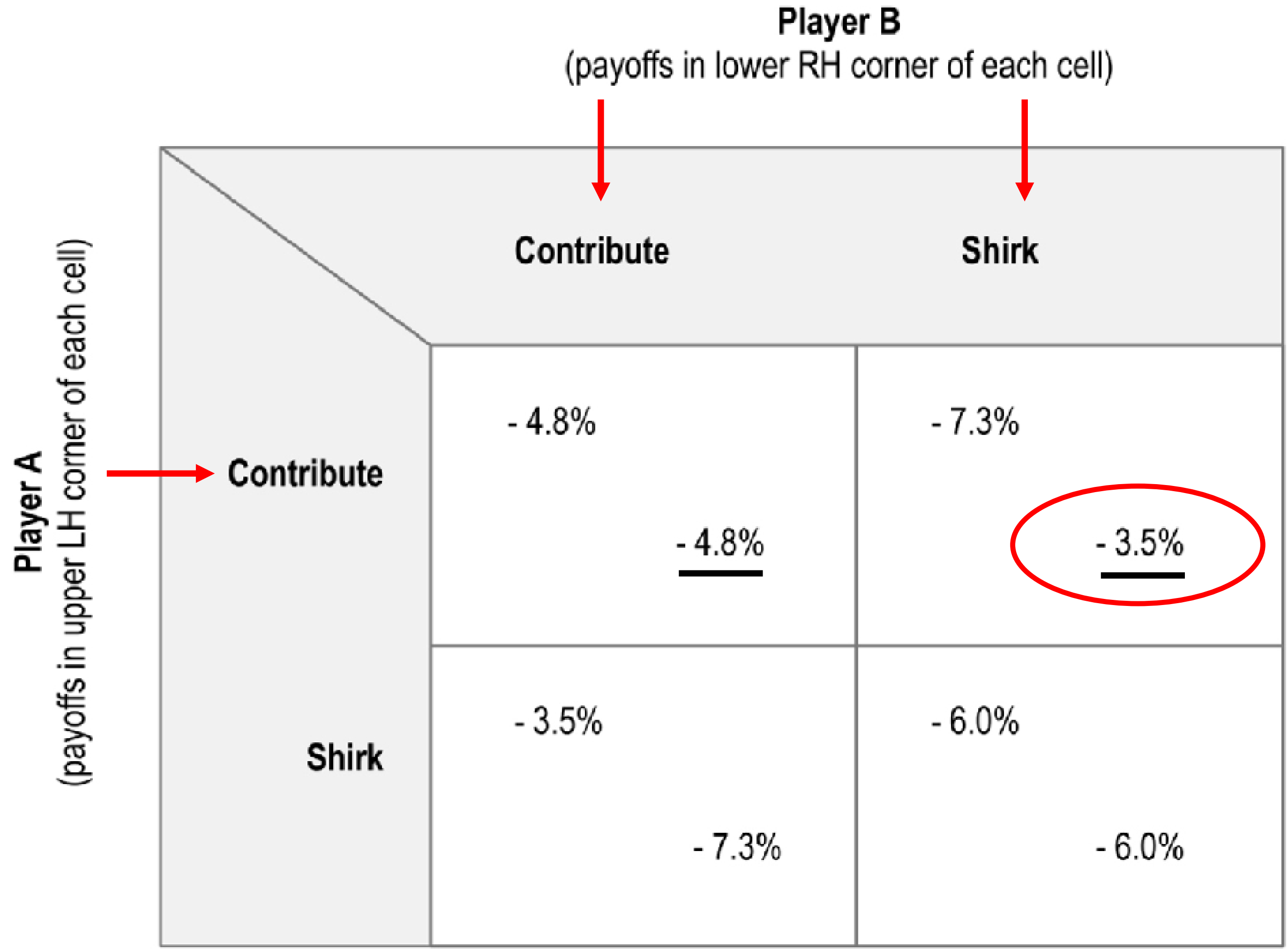


Figure 5.5 Payoff matrix for the climate change collective action problem.

Player B
(payoffs in lower RH corner of each cell)

Player A
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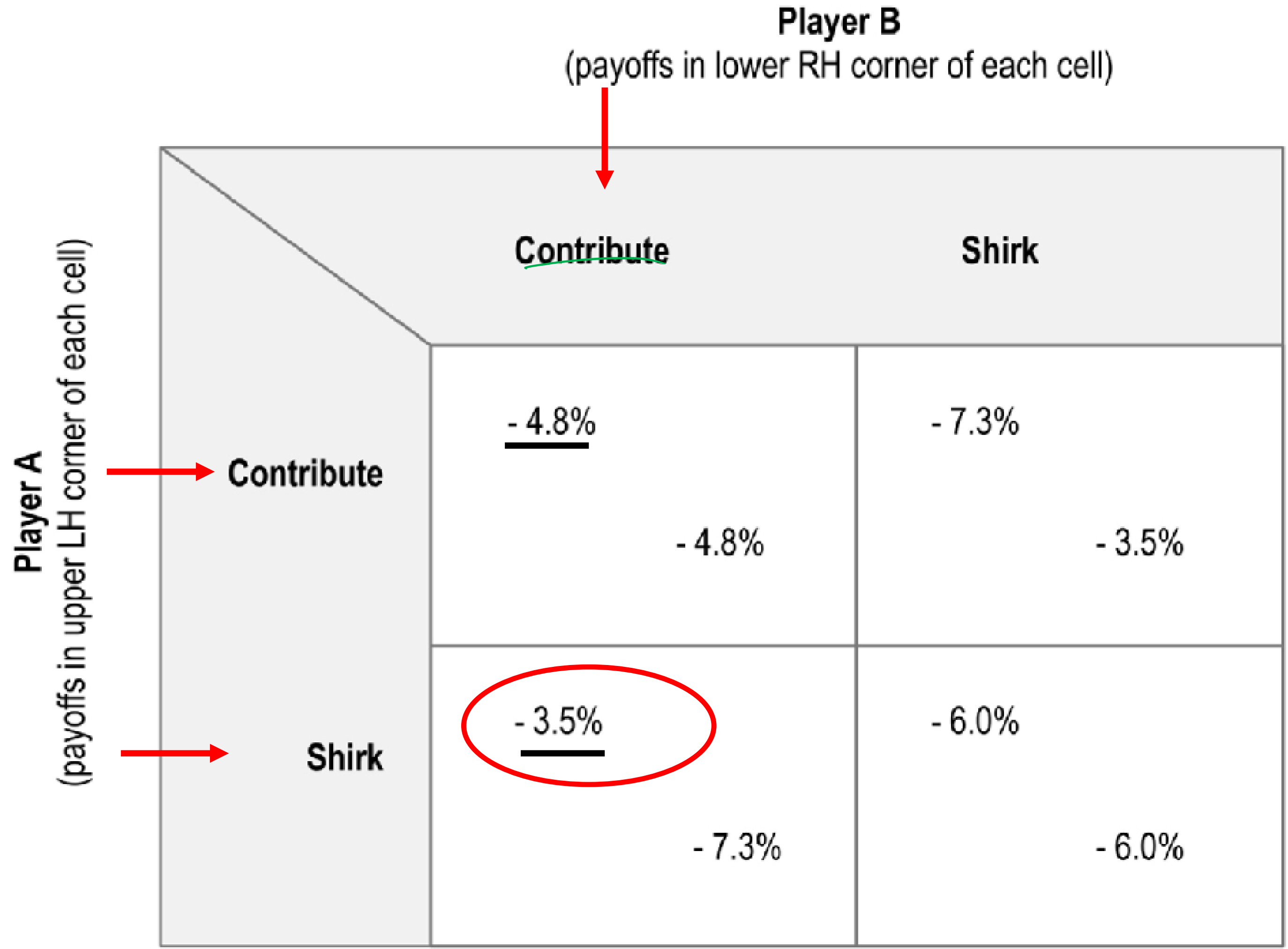

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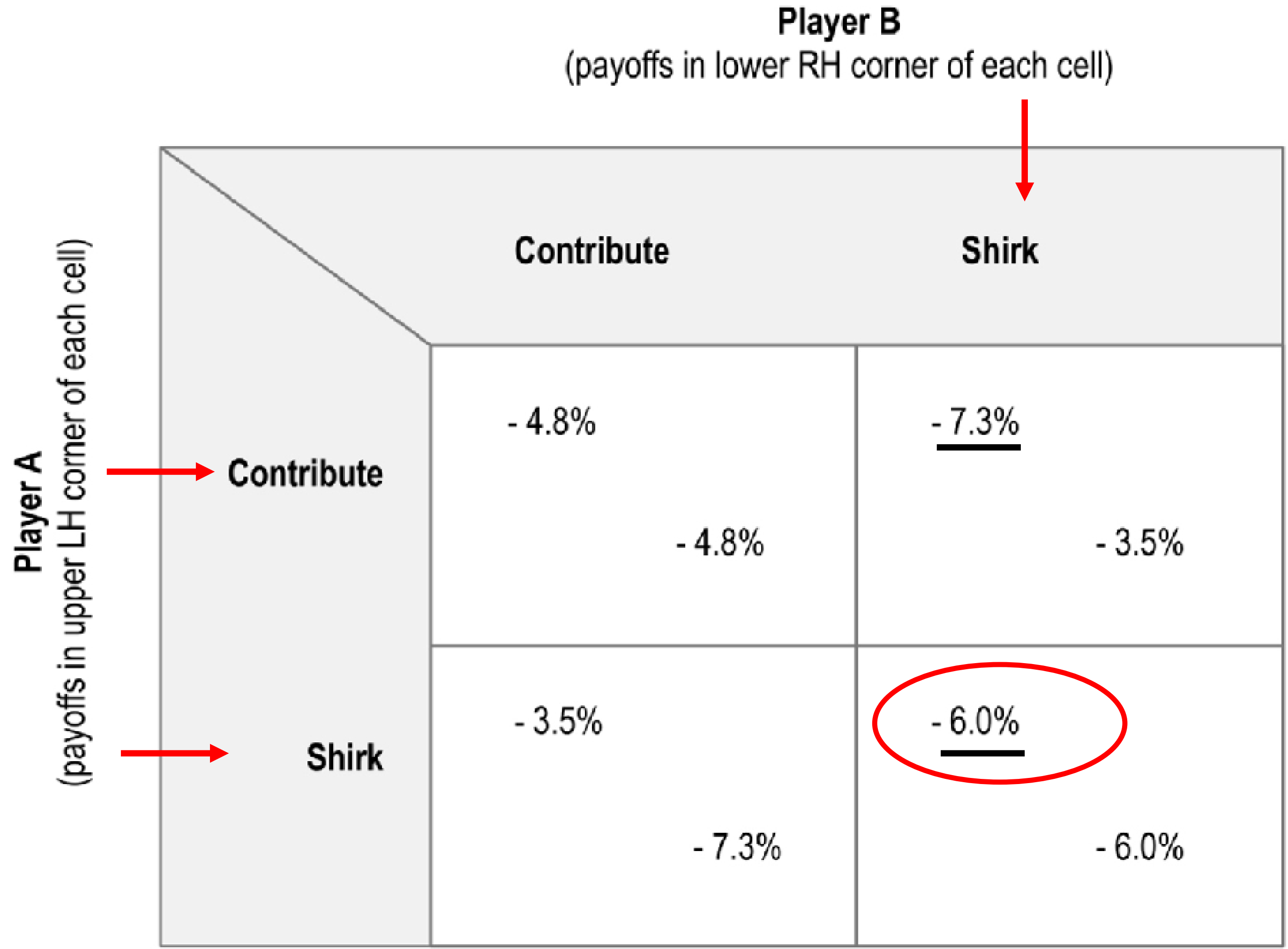

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Figure 5.5 Payoff matrix for the climate change collective action problem.

CLIMATE CHANGE EXAMPLE

Setup:
Two countries: A,B
Each can either reduce emissions or not: contribute, shirk

Efficient (and preferable) outcome for both players is to contribute

However, incentives for both individuals is to shirk.

This leads to a *collective action problem*.

LESSON OBJECTIVES

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Define and analyze market with externalities

02

Define and analyze market for public goods

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Define and analyze market for common pool resources