

COURSE ROADMAP

So far:

- Efficient outcomes
 - KO Ch. 2
- How to measure benefits and costs
 - KO Ch. 3
- Evaluate policy using BCA
 - KO Ch. 3
- Sources of Market Failure
 - KO Ch. 3, 4, 5, 6, 7

COURSE ROADMAP

Moving Forward:

- How to correct for market failure
 - KO Ch. 8, 9, 10
- Applications
 - KO Ch. 10, 11

PRIVATE SOLUTIONS TO INEFFICIENT MARKET OUTCOMES



LESSON OBJECTIVES

01

Define and explain Coase Theorem

02

Explain and analyze limitations of Coase Theorem

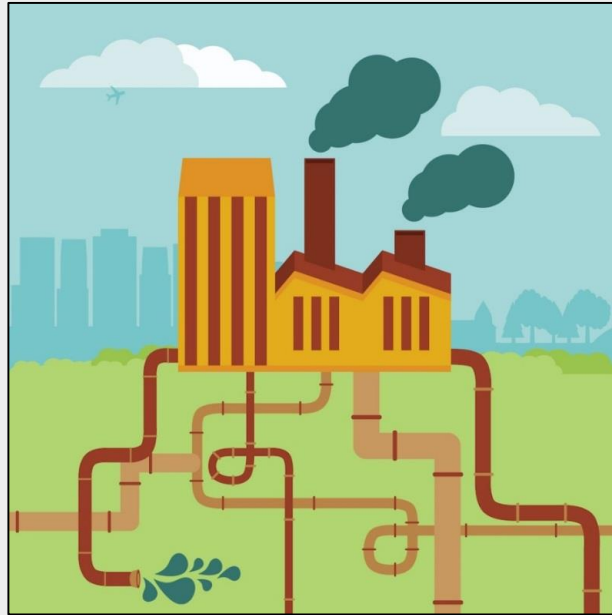
03

Explain social pressure and information-based approaches

MARKET FAILURE FROM EXTERNALITIES

EXTERNALITIES

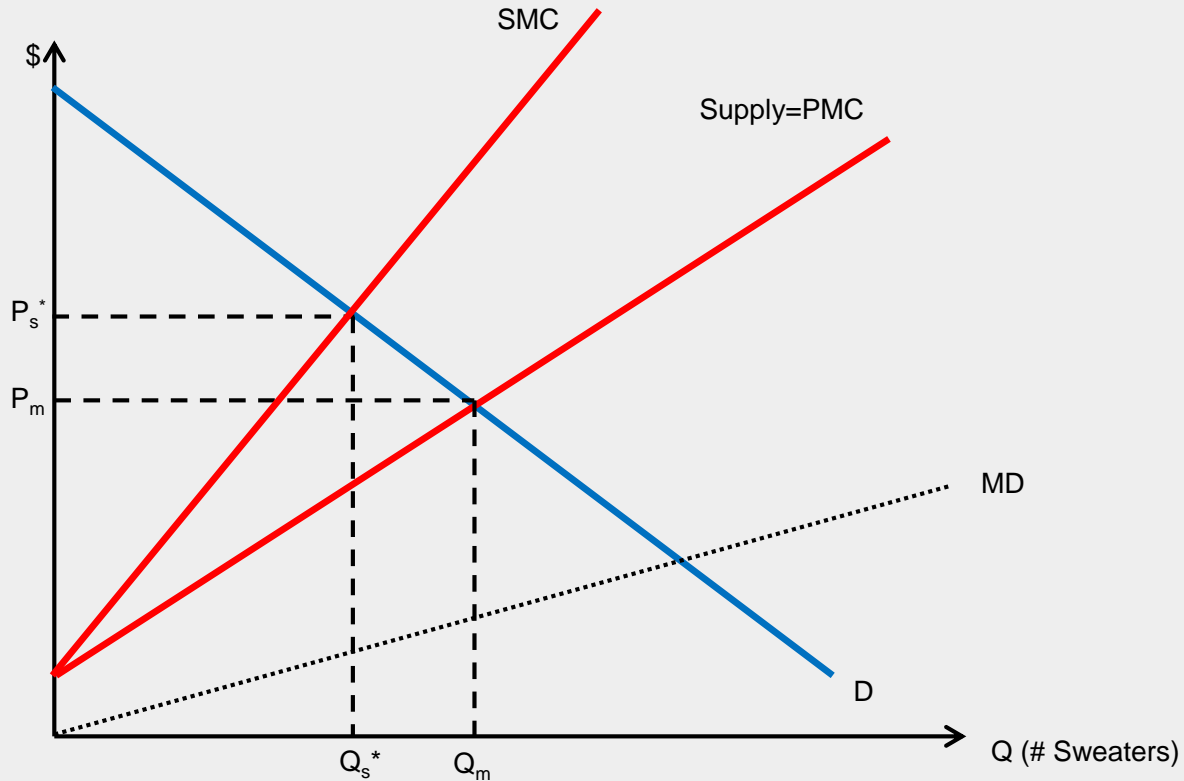
We Make Sweaters, Inc.



EXTERNALITIES



EFFICIENT VS MARKET EQUILIBRIUM



HOW CAN WE ADDRESS INEFFICIENT OUTCOMES FROM EXTERNALITIES?

Private solutions:

- Coase Theorem
- Social Pressure

Public solutions:

- Standards
- Taxes
- Permits

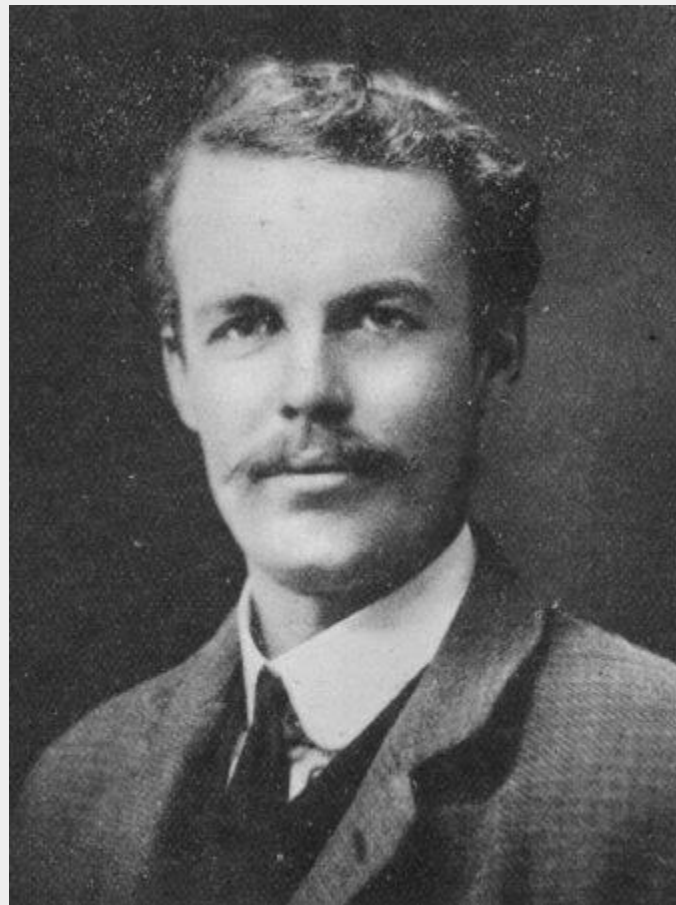


A BRIEF HISTORY...

In 1920, Pigou released *The Economics of Welfare*

Challenged the thinking of Adam Smith, arguing a need for government intervention in some instances to achieve efficient outcomes

He argued that profit maximizing firms would not internalize their external social costs.

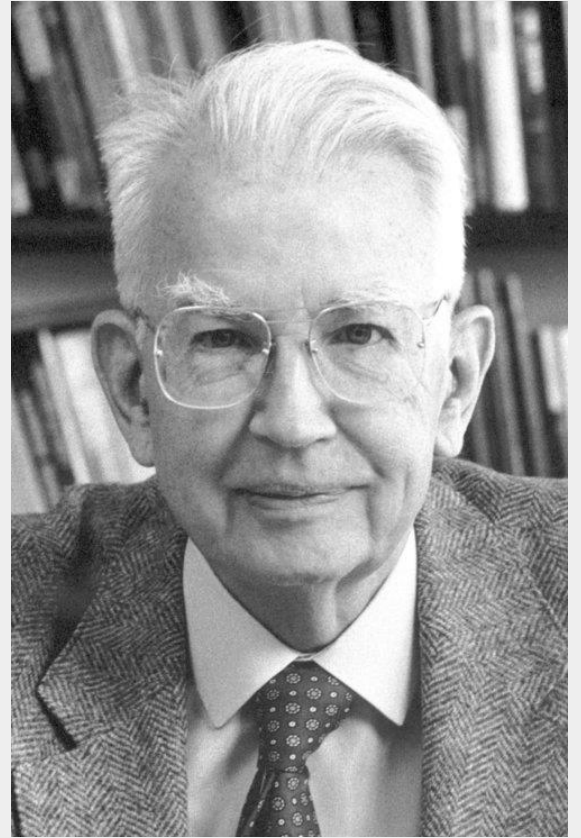


A BRIEF HISTORY...

In 1960, Coase released *The Problem of Social Cost*

Challenged the thinking of Pigou, arguing that government intervention may not be needed in certain instances to achieve efficient outcomes

He argued that in cases with clearly defined property rights and sufficiently low transaction costs, private bargaining can lead to an efficient outcome.



COASE THEOREM, A CLOSER LOOK

01

**COASE THEOREM:
HOW DOES IT WORK?**

COASE THEOREM

The Coase Theorem states that private bargaining will result in the *efficient* resolution of *negative externalities*, without the need for government intervention, as long as property rights are fully allocated (but regardless of the distribution of property rights among affected parties).

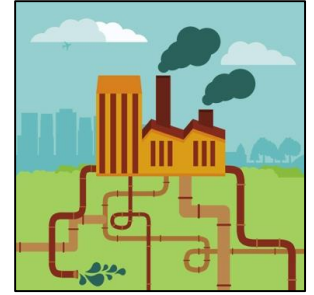
Let's take a closer look...

CONSIDER THE FOLLOWING...

Consider a sweater manufacturer (Fred) and a brewer (Anne)

The production of sweaters generates waste, which could be dumped in the river for cheap disposal

Anne uses the water as an input to production. If it is contaminated, she must pay to clean it.



CONSIDER THE FOLLOWING...

When dumping the waste in the river

- Fred makes a profit of \$130/day
- Anne makes \$140/day but must pay \$50/day to clean the water

Alternatively, Fred could pay \$30/day to filter the waste

- Fred makes a profit of \$100/day
- Anne makes \$140/day

What is the economically efficient outcome?

- Fred pays to filter the waste (lower cost, higher combined profit)

Will this occur?

SCENARIO I: NO LAW AGAINST POLLUTING THE RIVER

Profits Per Day

	Without Filter	With Filter
Fred	\$130	\$100
Anne	\$90	\$140

If there **is no** law against polluting the river, so that Fred can do it freely (has property rights). What will happen?

Fred will maximize profits and not filter the waste.

This leads to an inefficient outcome because Fred is imposing a costly externality on Anne.

Pigou would suggest taxing Fred...but is that needed?

SCENARIO I: NO LAW AGAINST POLLUTING THE RIVER

Profits Per Day

	Without Filter	With Filter
Fred	\$130	\$100
Anne	\$90	\$140

What if Anne walked upstream and talked with Fred about the waste problem?

How much would Anne have to offer to convince Fred to filter the waste?

$$\$130 - \$100 = \$30$$

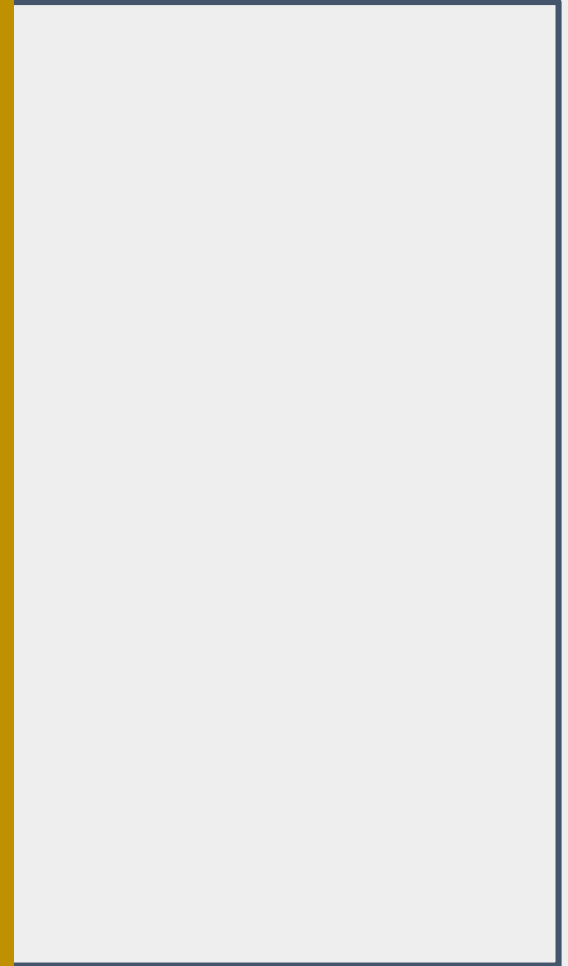
How much would Anne be willing to offer Fred to filter the waste?

$$\$140 - \$90 = \$50$$

Could they come to an agreement that leads to the efficient outcome?
Yes, if Anne offers $\$50 > x > \30 Fred will agree to filter the waste

**DOES ASSIGNMENT OF
PROPERTY RIGHTS MATTER?**

**WHAT IF THE GOVERNMENT
SAYS FRED CANNOT POLLUTE
THE RIVER?**



SCENARIO 2: LAW AGAINST POLLUTING THE RIVER

If there is a law against polluting the river, Anne (has property rights) can call get the government to intervene if Fred pollutes the river. What will happen?

Fred could pay Anne for permission to pollute.

Would Fred?

Anne requires $\$140 - \$90 = \$50$

Fred is willing to offer $\$130 - \$100 = \$30$

Fred is not willing to pay Anne to pollute, so Fred filters the water.

This is the efficient outcome

Profits Per Day		
	Without Filter	With Filter
Fred	\$130	\$100
Anne	\$90	\$140

SWEATER/BEER EXAMPLE OUTCOMES

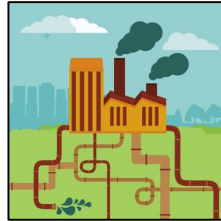
Scenario 1: Factory property rights

- Factory filters waste
- Factory profit $> \$130$
- Brewery profit $\$90 < \$90 + X < \$140$

Scenario 2: Brewery property rights

- Factory filters waste
- Factory profit = $\$100$
- Brewery profit = $\$140$

SWEATER/BEER EXAMPLE TAKEAWAY



We can see a couple important concepts in this example:

Government intervention was not needed to reach the economic efficient outcome.

Independent of who was assigned property rights, the actors were able to bargain and achieve the efficient outcome.

Who is assigned property rights is important for individual outcomes.

ATTENDANCE ACTIVITY

Consider the payoff matrix shown.
What is the efficient outcome?

Assuming no law against polluting,
what is the outcome?

Assuming a law against polluting,
what is the outcome?

Profits Per Day		
	Without Filter	With Filter
Fred	\$130	\$100
Anne	\$100	\$120

ATTENDANCE ACTIVITY

Consider the payoff matrix shown.

What is the efficient outcome?

- For Fred to pollute
 $\$130 + \$100 > \$100 + \120

Assuming no law against polluting, what is the outcome?

- Fred will pollute

Assuming a law against polluting, what is the outcome?

- Fred pays Anne to pollute

Profits Per Day		
	Without Filter	With Filter
Fred	\$130	\$100
Anne	\$100	\$120

**EXAMPLE 2:
MINE AND
WATER SUPPLY**

ANOTHER EXAMPLE...

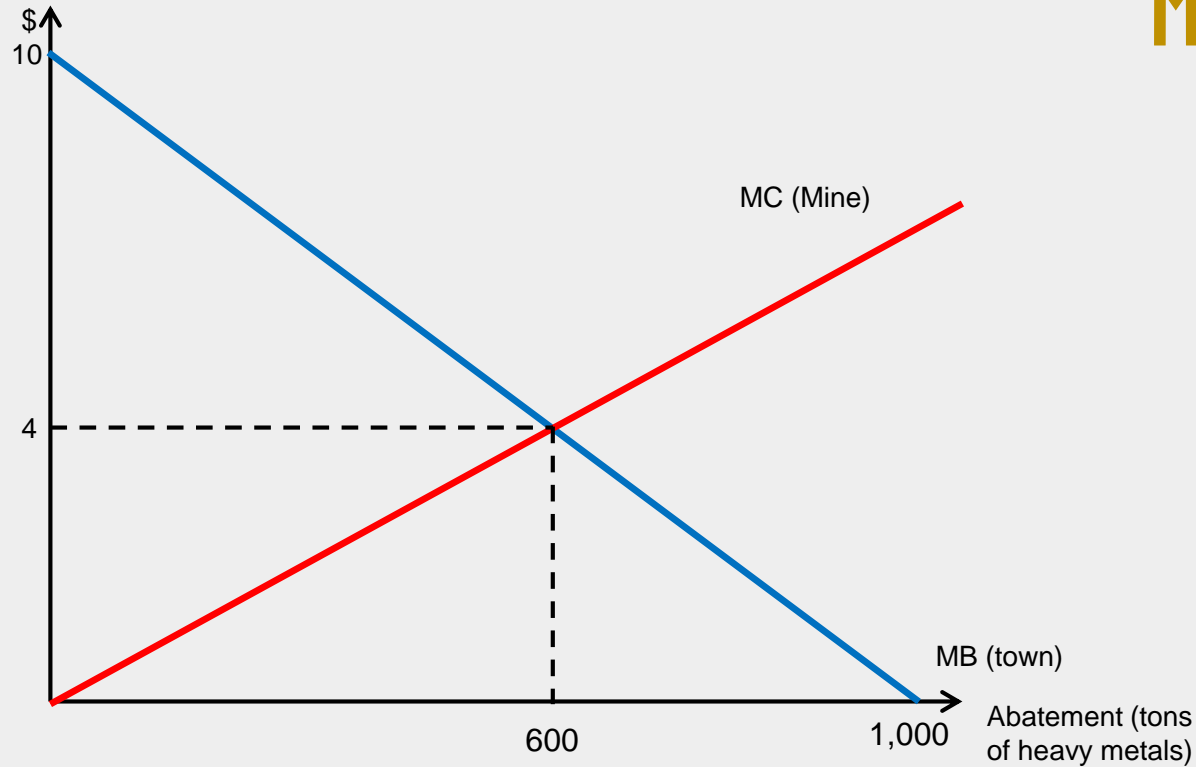
Consider the following example:

A township uses groundwater for local drinking water.

A mining company identifies valuable resources in the town and wants to extract them. This process releases toxins that contaminate ground water.



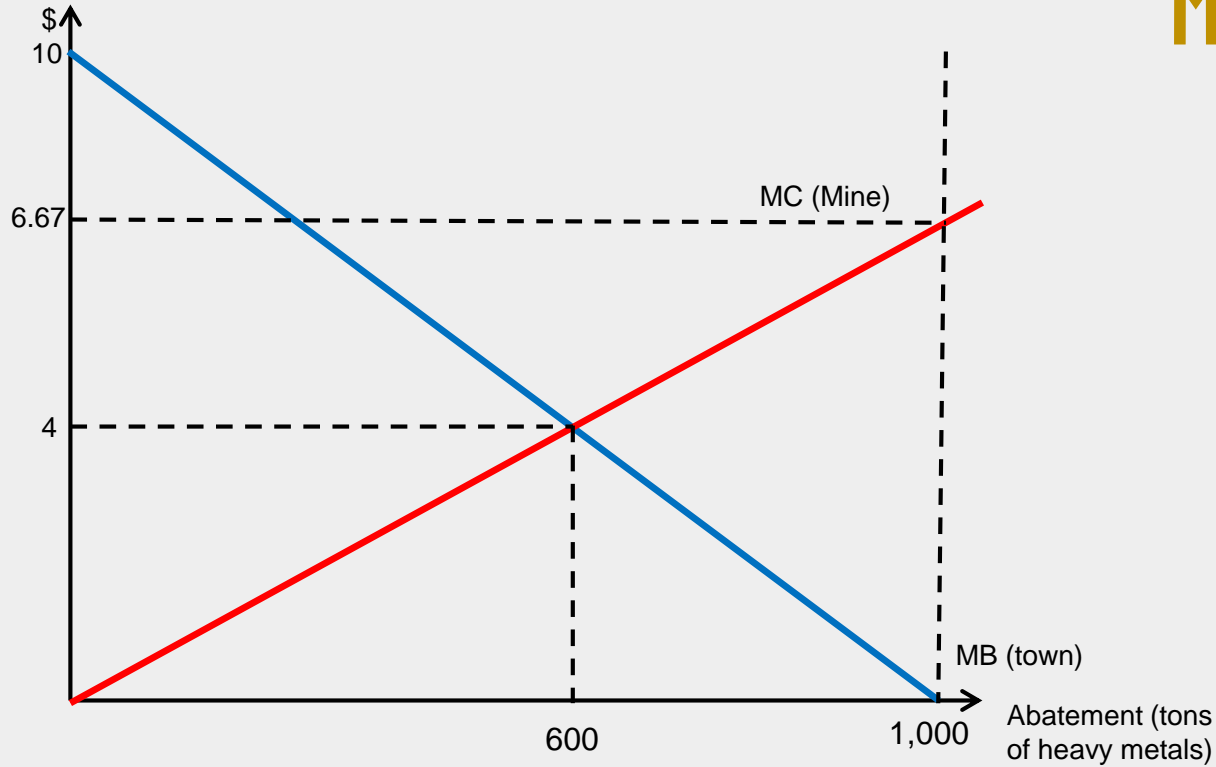
MINING EXAMPLE



**SCENARIO I:
TOWNSHIP
HAS THE
RIGHT TO
CLEAN WATER**

Mine is allowed 0 tons of
pollution (1,000 tons of
abatement required)

MINING EXAMPLE

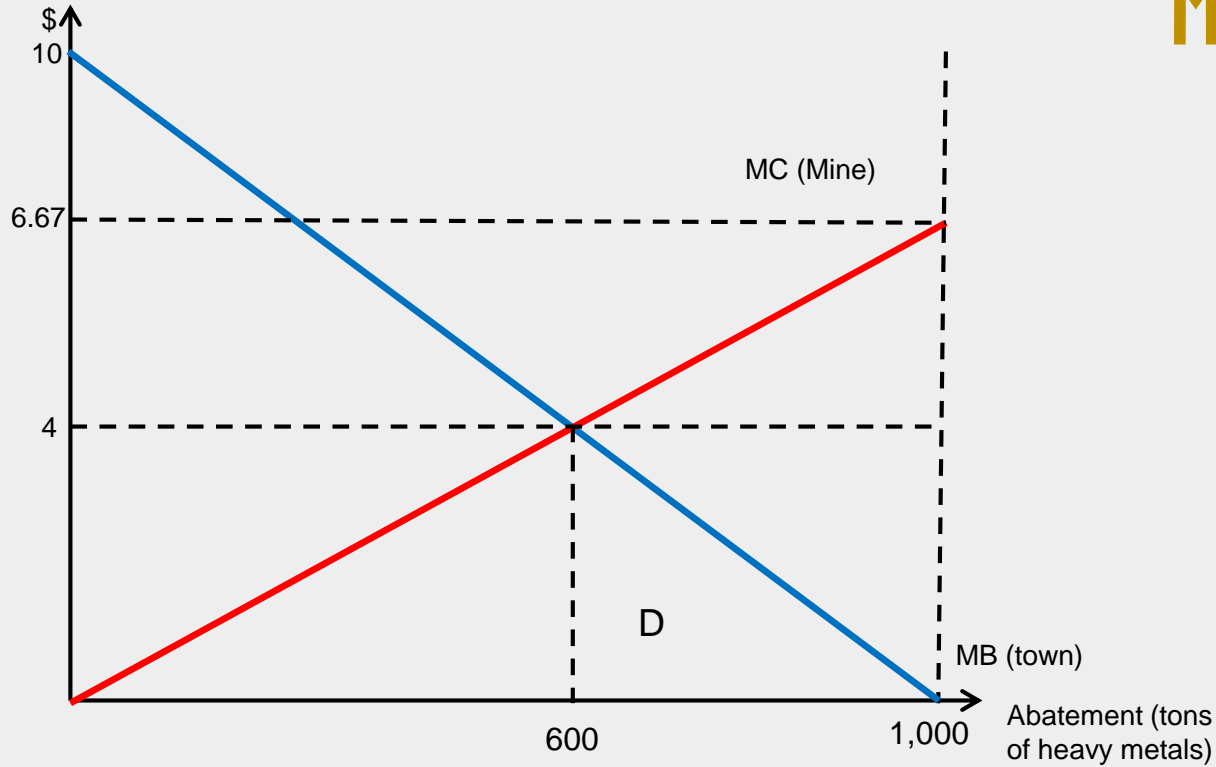


**SCENARIO I:
TOWNSHIP
HAS THE
RIGHT TO
CLEAN WATER**

Mine is allowed 0 tons of pollution (1,000 tons of abatement required)

How much would the township be willing to accept for 400 tons of pollution?

MINING EXAMPLE



**SCENARIO I:
TOWNSHIP
HAS THE
RIGHT TO
CLEAN WATER**

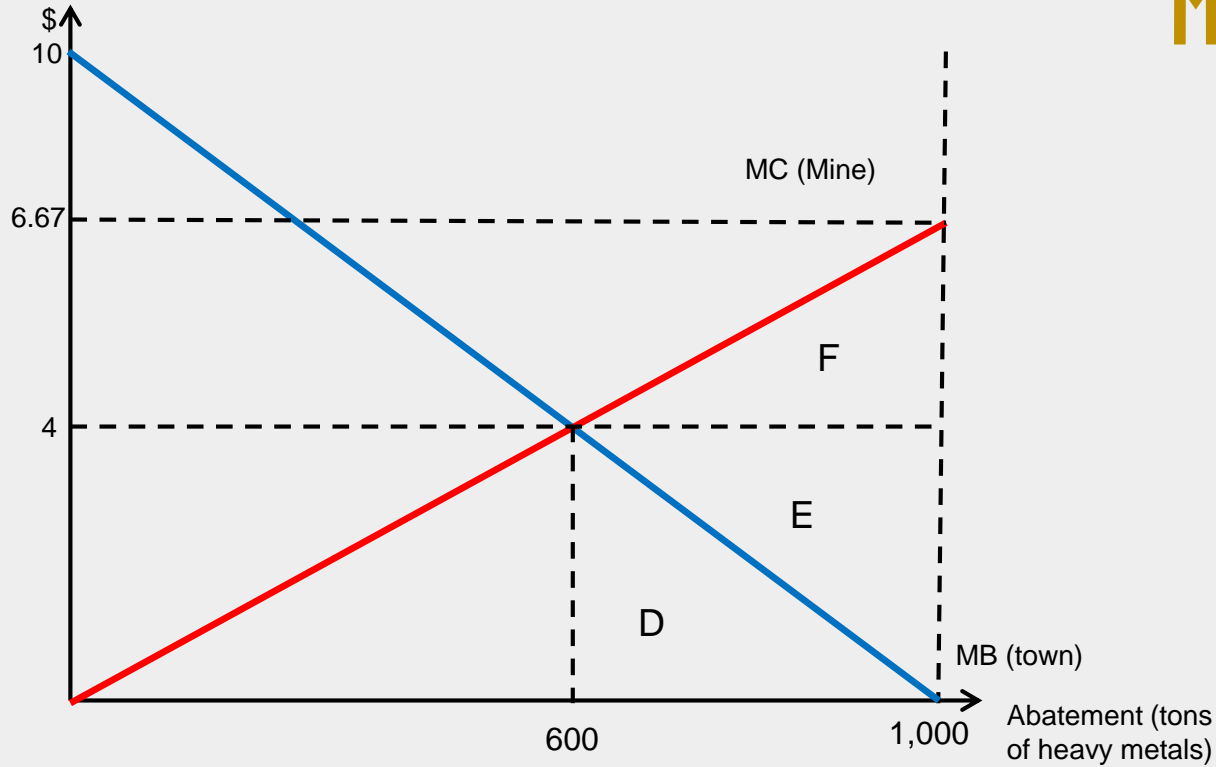
Mine is allowed 0 tons of pollution
(1,000 tons of abatement
required)

How much would the township be
willing to accept for 400 tons of
pollution?

- Area D = \$800

How much would the mining
company be willing to pay for 400
tons of pollution

MINING EXAMPLE



**SCENARIO I:
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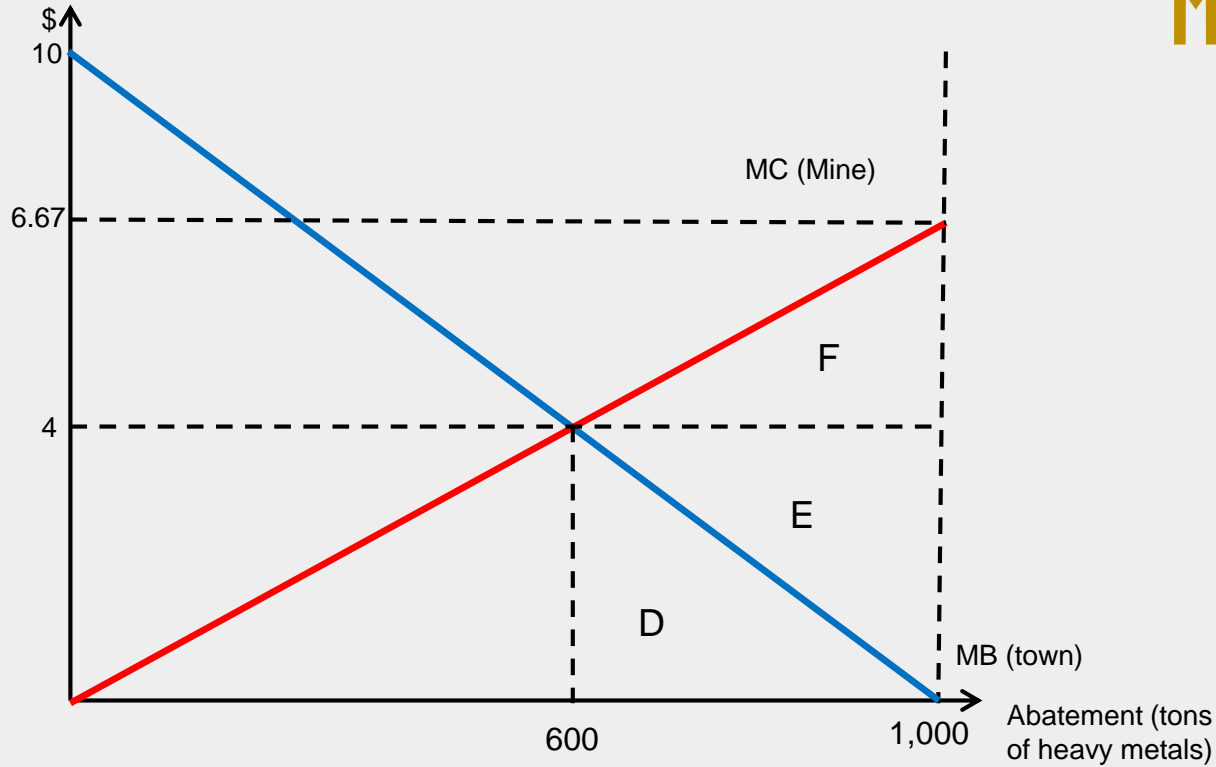
- Area D = \$800

How much would the mining
company be willing to pay for 400
tons of pollution

- Area D+E+F = \$2,134

Will they achieve the efficient
outcome?

MINING EXAMPLE



SCENARIO I: TOWNSHIP HAS THE RIGHT TO CLEAN WATER

Mine is allowed 0 tons of pollution
(1,000 tons of abatement
required)

How much would the township be
willing to accept for 400 tons of
pollution?

- Area D = \$800

How much would the mining
company be willing to pay for 400
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- Area D+E+F = \$2,134

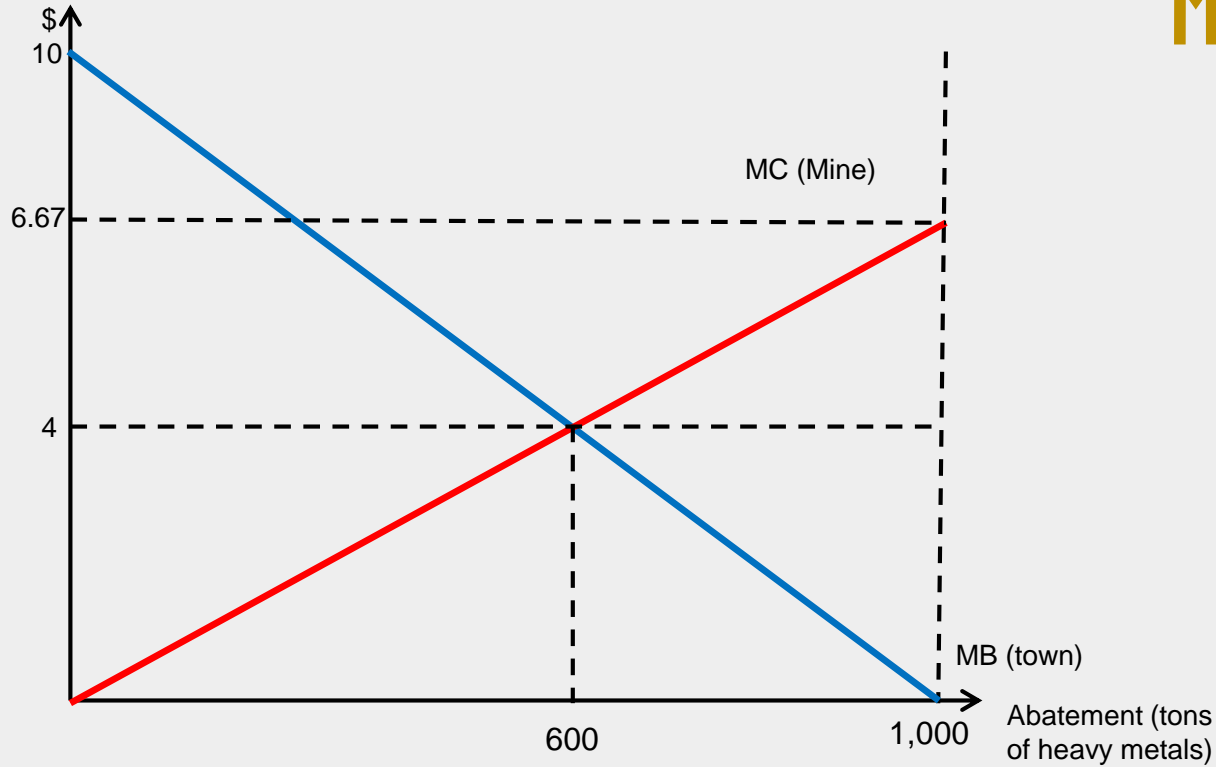
Will they achieve the efficient
outcome?

- Yes, mine will offer $D < X < D + E + F$

Mine is allowed 1,000 tons of pollution

**SCENARIO 2:
MINE HAS
RIGHT TO
POLLUTE**

MINING EXAMPLE

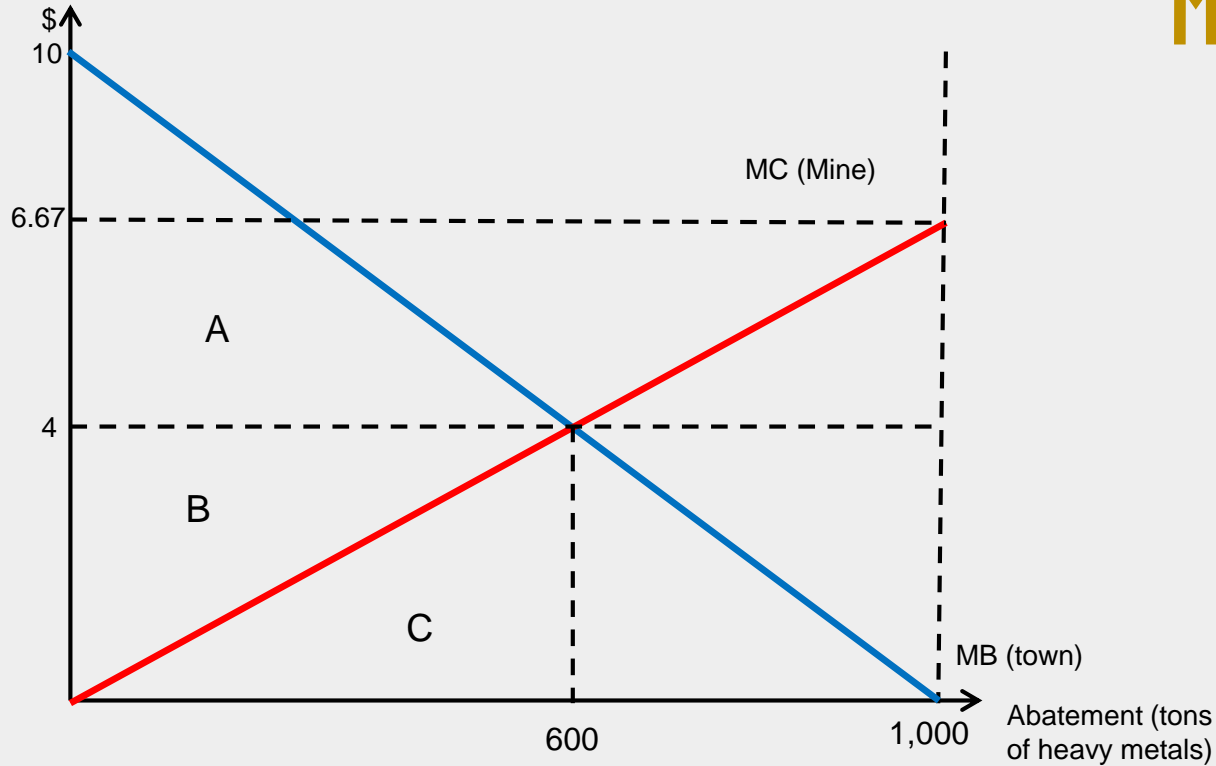


Mine is allowed 1,000 tons of pollution

How much would the township be willing to pay for 600 tons of abatement?

**SCENARIO 2:
MINE HAS
RIGHT TO
POLLUTE**

MINING EXAMPLE



Mine is allowed 1,000 tons of pollution

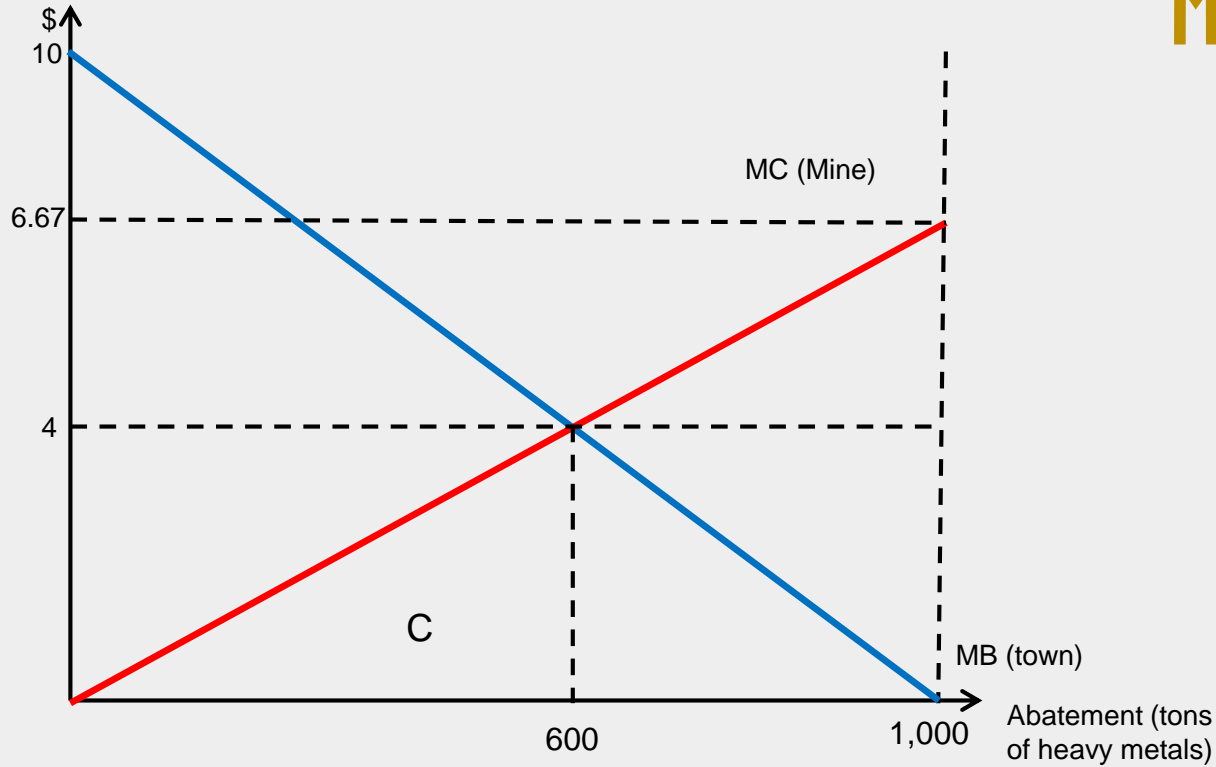
How much would the township be willing to pay for 600 tons of abatement?

- Area A+B+C = \$4,200

How much would the mining company be willing to accept for 600 tons of abatement

**SCENARIO 2:
MINE HAS
RIGHT TO
POLLUTE**

MINING EXAMPLE



Mine is allowed 1,000 tons of pollution

How much would the township be willing to pay for 600 tons of abatement?

- Area A+B+C = \$4,200

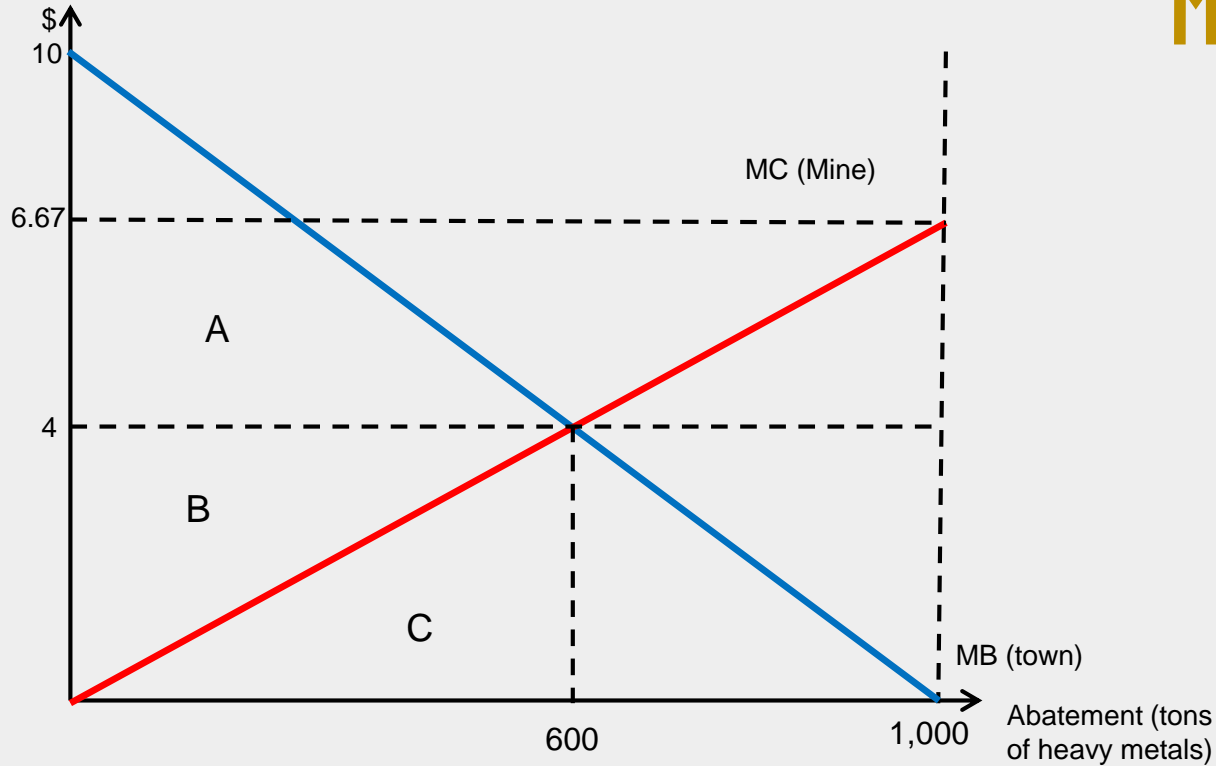
How much would the mining company be willing to accept for 600 tons of abatement

- Area C = \$1,200

Will they achieve the efficient outcome?

**SCENARIO 2:
MINE HAS
RIGHT TO
POLLUTE**

MINING EXAMPLE



Mine is allowed 1,000 tons of pollution

How much would the township be willing to pay for 600 tons of abatement?

- Area A+B+C = \$4,200

How much would the mining company be willing to accept for 600 tons of abatement

- Area C = \$1,200

Will they achieve the efficient outcome?

- Yes, township will offer $C < X < A+B+C$

**SCENARIO 2:
MINE HAS
RIGHT TO
POLLUTE**

MINING EXAMPLE OUTCOMES

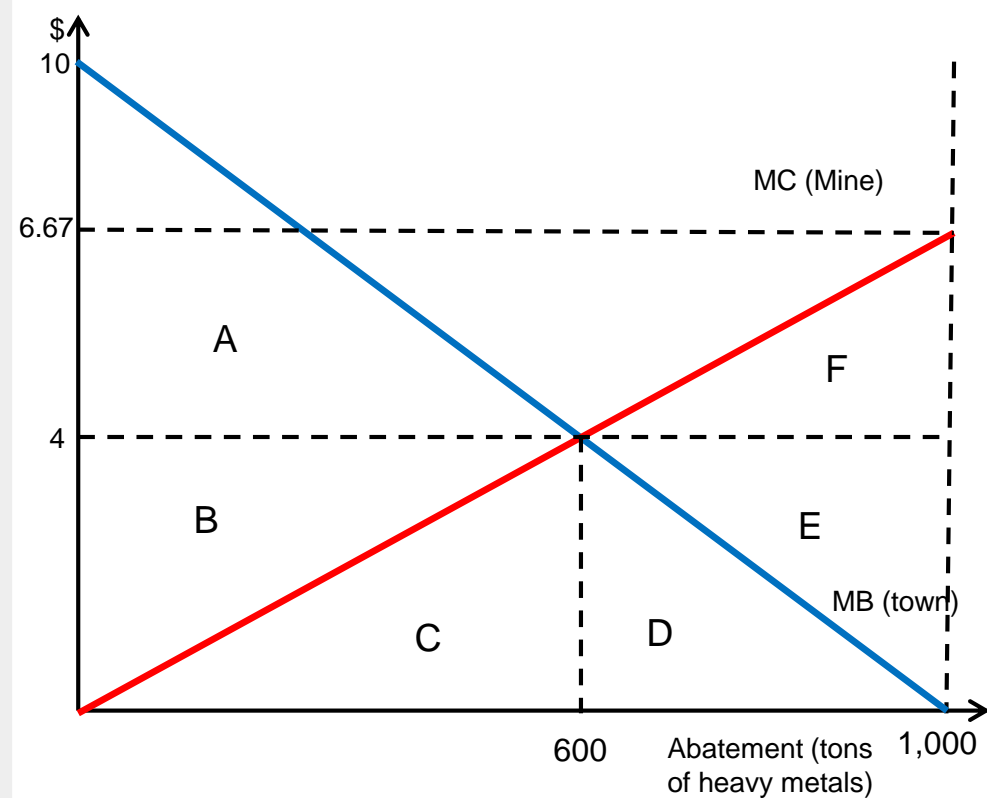
Scenario 1: Township property rights

- Mining company abates 600 tons
- Township benefit = $A+B+C+X$
- Mining company cost = $C+X$
- Where $D < X < D+E+F$

Scenario 2: Mining property rights

- Mining company abates 600 tons
- Township benefit = $A+B+C-X$
- Mining company cost = $C-X$
- Where $C < X < A+B+C$

MINING EXAMPLE OUTCOMES



Scenario 1: Township property rights

- Mining company abates 600 tons
- Township benefit = $A+B+C+X$
- Mining company cost = $C+X$
- Where $D < X < D+E+F$

Scenario 2: Mining property rights

- Mining company abates 600 tons
- Township benefit = $A+B+C-X$
- Mining company cost = $C-X$
- Where $C < X < A+B+C$

**DO WE
OBSERVE
COASE
THEOREM?**

COASE IN THE REAL WORLD

Coase's original work (*The Problem of Social Cost*, 1970) provides anecdotal evidence

However, generally there is mixed evidence of Coase's Theorem.

Economists have mixed belief in Coase's Theorem

- Much of this is arguably due to the assumptions and limitations of Coase's Theorem, not the underlying theory itself.

EXAMPLE OF COASE IN THE REAL WORLD

GAVIN POWER PLANT



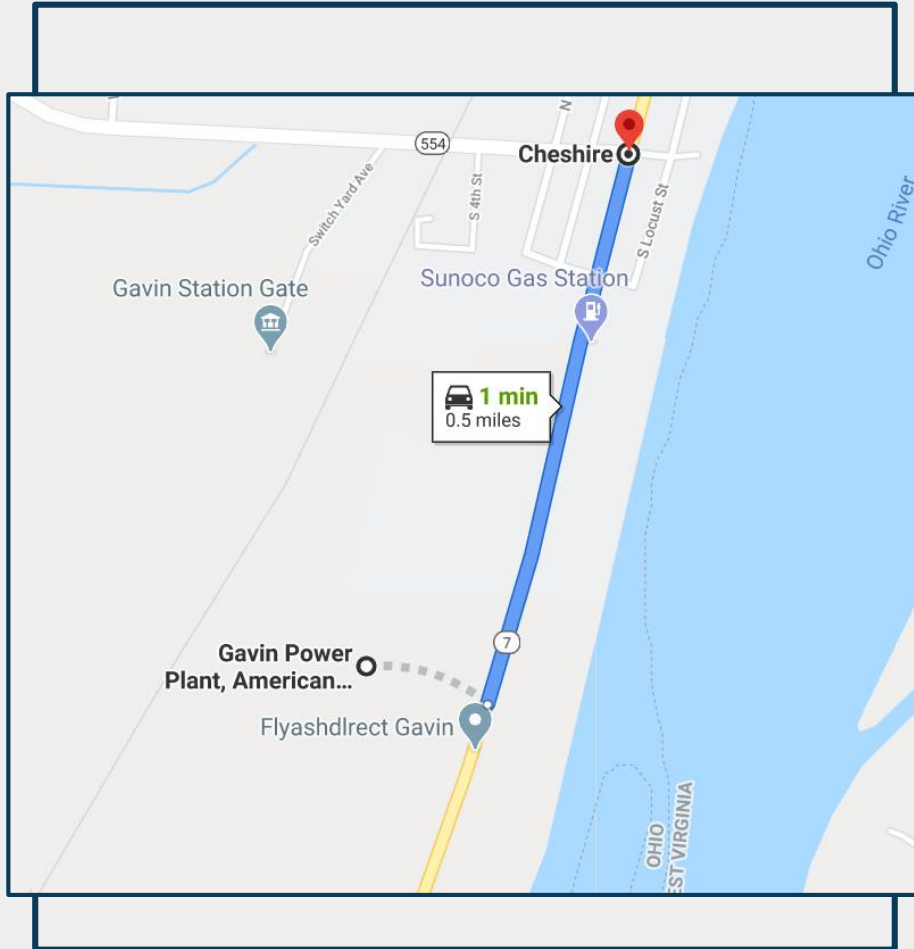
GAVIN POWER PLANT

Gavin Power Plant

- 2.6 GW coal-fired power plant
- Located in Cheshire, Ohio
- Commissioned in 1974
- Owned by American Electric Power (AEP)

In 2001, installed new technology to convert nitrous oxides (smog) into nitrogen

- Side-effect of turning sulfur dioxide into sulfuric acid
- On humid days, blue cloud of sulfuric acid would affect nearby town
- CDC found levels of sulfuric acid and sulfur dioxide posed a public health risk



The local residents affected by the pollutants began to raise complaints against the power plant

SO WHAT DID AEP DO?

In response to a potential lawsuit, AEP bought the town!

AEP paid every homeowner 3.5 times the market value of their house to move out.

AEP paid attorney's around 1/3 of the payout

AEP paid renters for the time they lived in Cheshire.

The total cost to AEP was around \$20 million.

COASE THEOREM IN THE WILD

Was this an efficient outcome? Did it increase net benefits?

Township

- Received 3.5x the market value of their house.
- Arguably a welfare improvement

Power Plant

- Paid around \$20 million to the township
- But was allowed to continue to operate
- Presumably would only make the transaction if it were profitable

Township had right to clean air, but the plant bargained with residents. As a result, the township residents were made better off *and* the power plant was made better off with no government intervention!

HOW CAN POLICYMAKERS LEVERAGE COASE THEOREM?

PROBLEM

Lack of clearly defined property rights leads to inefficiencies

Examples

Overgrazing pasture

Overfishing oceans

Over polluting air

SOLUTION?

Establish and enforce property rights!

Then, markets will take care of the rest!

02

COASE THEOREM: ASSUMPTIONS AND LIMITATIONS

**WHAT MAKES COASE
THEOREM WORK?**

COASE THEOREM ASSUMPTIONS

Coase Theorem necessary conditions:

1. Clearly defined property rights
2. Small or no transaction costs
3. No income effects

I. CLEARLY DEFINED PROPERTY RIGHTS



Coase theorem requires
clearly defined property rights.

We can see in the previous
examples that it was due to
property rights being
assigned that bargaining
could occur.

Coase theorem requires small or no transaction costs.

This is arguably the hardest (and most commonly overlooked) condition.

Example: what would happen if Anne had to uber every day to bargain with Fred? What if the Uber cost $> \$20/\text{day}$

Example: what if we considered the beach instead of brewery? Could 10,000 beach goers reasonably coordinate and bargain with Fred?



2. SMALL OR NO TRANSACTION COSTS

3. NO INCOME EFFECTS



Coase theorem requires no income effects.

Selling of the right to pollute cannot have an effect on wealth.

If it does, it will change the demand for pollution.

LIMITATIONS

- 1) Small transaction costs - Negotiating over environmental goods typically involves large numbers of individuals where negotiation is difficult
 - a. Measuring damages among diffuse recipients - hard with lots of people
 - b. Organizing diffuse/many players
 - Free-riders - let others negotiate, so I benefit but don't bear the cost
 - Holdouts - refuse to negotiate, even when in my favor
 - c. Establishing property rights can be difficult - often environmental problems are transboundary

- 2) Equity - what if the right is to pollute, and the recipients of pollution are low income? Although damages are significant, they cannot afford to pay to reduce.

HOLDOUT EXAMPLE

HOLD OUT EXAMPLE



HOLD OUT EXAMPLE



HOLD OUT EXAMPLE



HOLD OUT EXAMPLE



HOLD OUT EXAMPLE

A couple in Wenling, Zhejiang province of China, refuses to sign an agreement allowing their home to be demolished to complete a highway project, resulting in the authorities building the road around the 5-story building.

Read more: <http://www.digitaljournal.com/article/337891#ixzz3ps3K6ati>





**SOCIAL PRESSURE
AND
INFORMATION-BASED
APPROACHES**

03

SOCIAL PRESSURE AND INFORMATION-BASED APPROACHES



**WHY DO
PEOPLE NOT
CUT IN LINE?**

**WHY DO YOU
RECYCLE?**



SOCIAL PRESSURE

In both of these examples, there are no financial incentives.

So what can explain the behavior...
Social pressure!

All around us there are social enforcement mechanisms incentivizing us to “do the right thing”.

These incentives can help (at least partially) internalize externalities

This is true for environmental problems where there is social pressure to “go green”.

NUDGES



Leverage social pressure to incentivize environmental conservation

Example:

Opower included a comparison of energy use to neighbors use.

This was found to lead to a small but significant reduction in household energy use.

INFORMATION-BASED APPROACHES

**HOW MUCH
ELECTRICITY DID YOU
USE LAST MONTH?**

**HOW MUCH AIR
POLLUTION IS THERE
IN MIDTOWN?**

Goal

Influence the behavior of firms and consumers by changing their incentives.

Reduce inefficiencies caused by *asymmetric information* problem.

RIGHT-TO-KNOW LAWS

Mandate firms to share information about risk and hazards with employees and communities.

Federal Hazardous Substances Labeling Act

- Labelling of certain hazardous chemicals and materials

Emergency Planning and Community Right to Know Act (EPCRA).

- Partially a response to 1984 chemical spills in Bhopal, India and West Virginia
- Created to help communities plan for chemical emergencies
- Requires firms to report information about storage, use, and release of certain hazardous substances.
- Eg. Toxics Release Inventory (TRI)

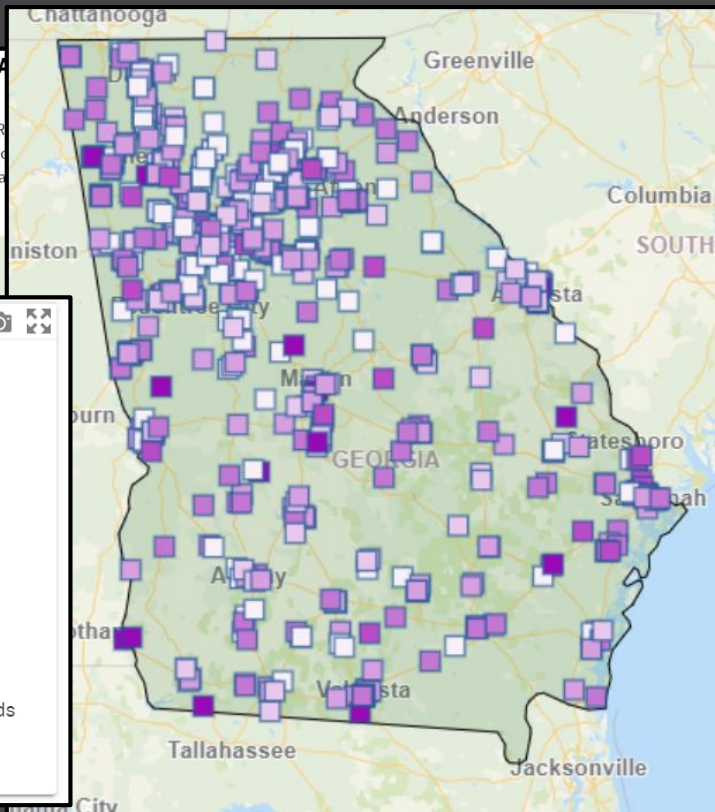
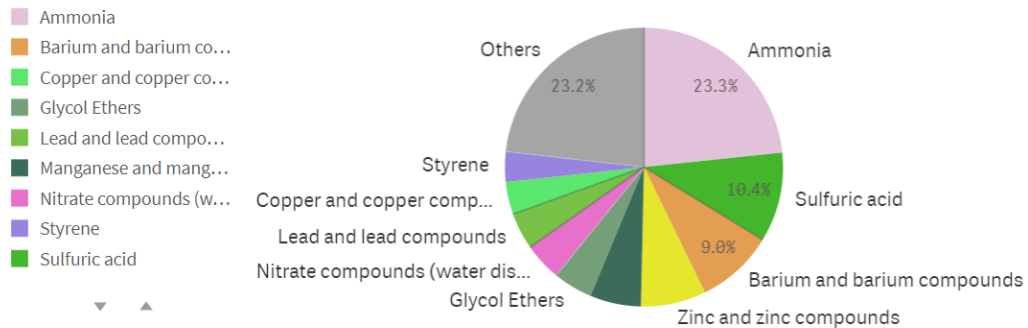
TRI FOR GEORGIA/ATLANTA

SUMMARY OF 271 TRI FACILITIES

The map shows the location of TRI facilities in Georgia. Facility locations may not fall exactly on the map. Click on the map options on the left to learn more about the data.

Releases by Chemical for Facilities in the Current Selection

Total Releases: 5,308,158



ECOLABELLING

Label products that produced using environmentally conservative or sustainable practices.

Some labels are voluntary while others are mandated.

Examples:

Organic foods

Energy Star

Dolphin safe tuna



CERTIFICATIONS

Certifies products that meet certain environmental or sustainability standards

Certification is voluntary and often conducted by private firms

Examples:

LEED certification

Non-GMO project verification

Gluten-Free Certification



HOW DOES INFORMATION INFLUENCE INCENTIVES?

Social Pressure

Firms are compared to each other based on environmental practices

Consumers may have social pressure to “buy green”

Asymmetric Information

Consumers have improved information on “true cost” of products

LESSON OBJECTIVES

01

Define and explain Coase Theorem

02

Explain and analyze the limitations of Coase Theorem

03

Explain role of social pressure and information-based approaches

