

Lecture 13: Externalities

November 24, 2020

Overview

Course Administration

In Class

Defining Positive and Negative Externalities

Fixing Externalities

Coase Theorem



Course Administration

1. Reading quiz

Course Administration

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2. Use Numbers 3 is due
3. Reading quiz grading re-cap
 - We count the top seven grades from
 - All reading quizzes plus cost assignment
4. Final
 - Last year's final is posted
 - Final: Tuesday December 15 in class period
 - Review by Dan: Dec. 12, 9 to 11 am, his zoom room (link to zoom room on Piazza)

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5. Any questions?

Ripped from the Headlines

Next Week

Afternoon

Finder	Presenter
Brett Litzler	Junran Cao
Diane Harris	William Pullum

Evening

Finder	Presenter
Ellaina Williams	Patrick Roehm
Nicole Mackowski	Jack Nicholson
Charles Graham	

In Class

In Class Today

1. London congestion charge
2. Tradeable permits game
3. In-class problems, time permitting (unlikely!)

1. London Congestion Charge

The problem

- What was the problem?
- Is this an externality?
- Who is causing it? And whom is it harming?

1. London Congestion Charge

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The solution

- Congestion charge: what do we call this?
- How does it work?
- Did it succeed in its aims?
- What concerns do you have?
- Could you see a policy like this working in DC?

2. Tradeable Permits Game

- Go look at the handout for this game
- We'll review and then play together

Next Week: Public Goods

- Read Gruber, Chapter 7, pages 184-198; Rosen and Gayer, Chapter 4, pages 54-70
- Listen to podcasts on autopsies and asteroids – come prepared to discuss

Today

1. Defining externalities
2. Fixing externalities
3. Coase Theorem

Defining Externalities

Externality Definition

Externality \equiv cost or benefit accruing to party not involved in economic transaction

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Examples, please.

In a World Without Externalities

Demand measures private marginal benefit

- equal to social marginal benefit

In a World Without Externalities

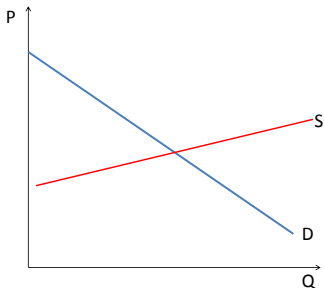
Demand measures private marginal benefit

- equal to social marginal benefit

Supply measures private marginal cost

- equal to social marginal cost

In a Market Without Externalities



- **If** private demand = private marginal benefit = social marginal benefit
- **And** Private supply = private marginal cost = social marginal cost
- **Then** market equilibrium maximizes social welfare, which is total surplus
- Provides goods to consumer at lowest possible cost

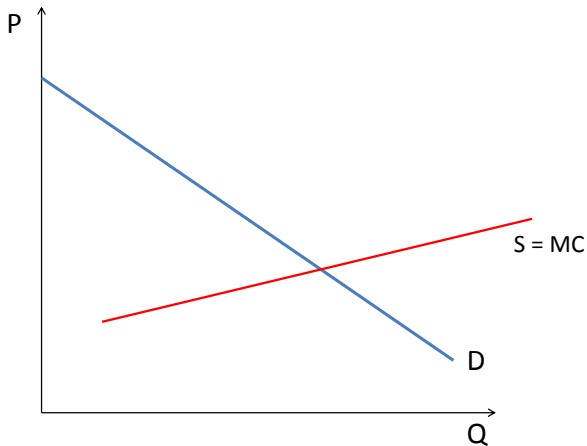
In a Market With Externalities

Assume a negative externality

- \Rightarrow Social marginal cost \neq private marginal cost
- \Rightarrow Social marginal cost = private marginal cost + external marginal cost

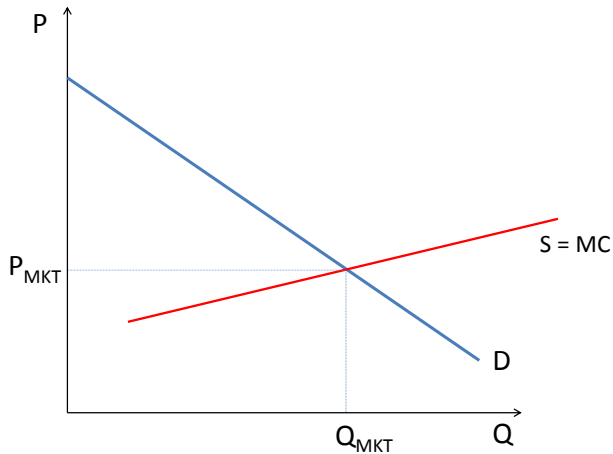
What Does a Negative Externality Do to Market Supply?

Where Are the Private Market P and Q ?



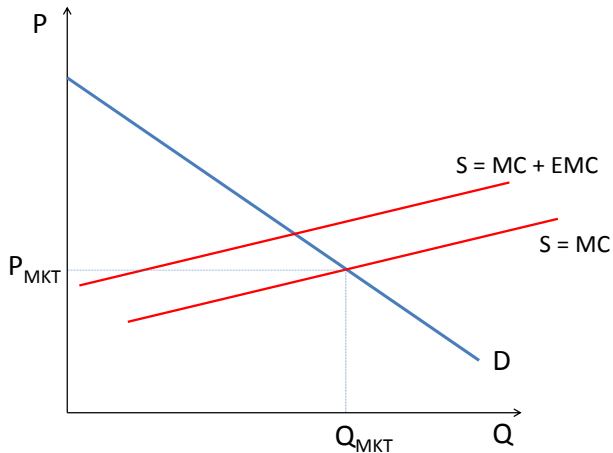
What Does a Negative Externality Do to Market Supply?

Where is the Social Marginal Cost?



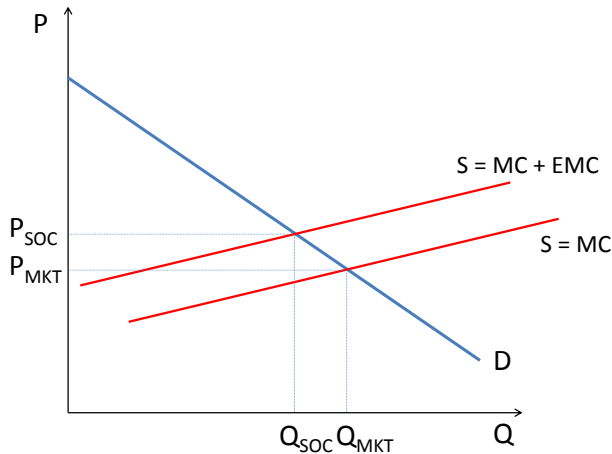
What Does a Negative Externality Do to Market Supply?

What are the Socially Optimal P and Q ?



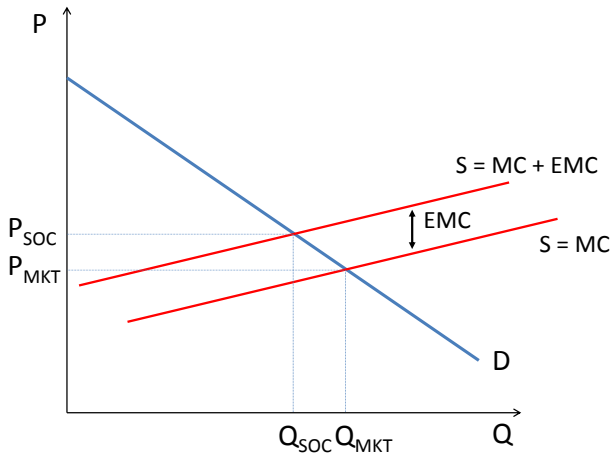
What Does a Negative Externality Do to Market Supply?

What is the Vertical Distance Between the Supply Curves?



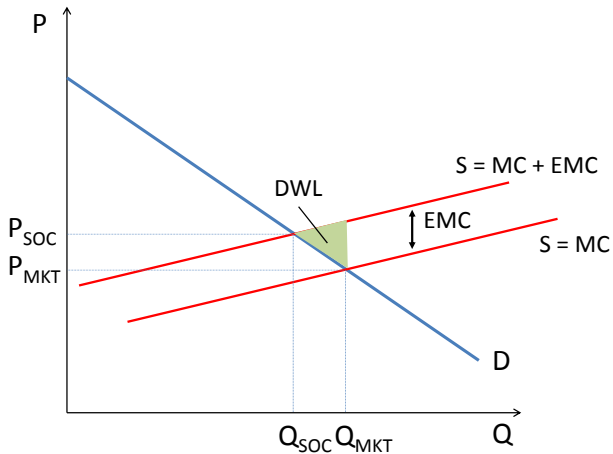
What Does a Negative Externality Do to Market Supply?

Where is the Deadweight Loss?



What Does a Negative Externality Do to Market Supply?

Too Much Production, at Too Low a Price



In a Market With Externalities

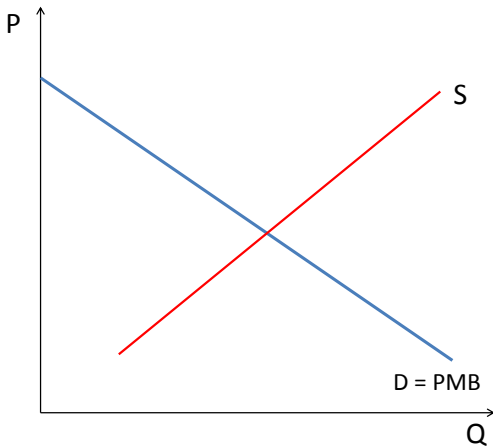
Assume a positive externality

- \Rightarrow Social marginal benefit \neq private marginal benefit
- \Rightarrow Social marginal benefit = private marginal benefit + external marginal benefit

What does this mean for the relationship between market equilibrium P_{MKT} and Q_{MKT} and socially optimal P_{SOC} and Q_{SOC} ?

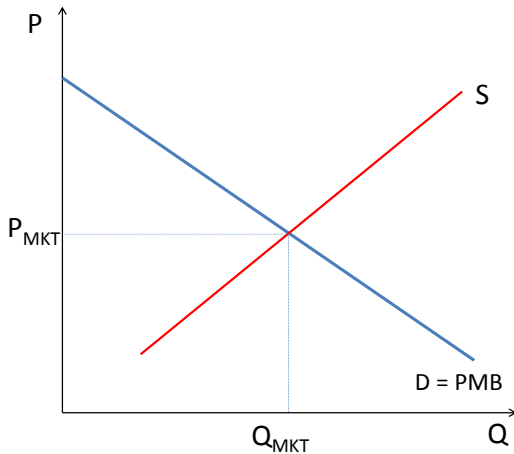
Positive Externalities

Where Are Market Equilibrium P and Q ?



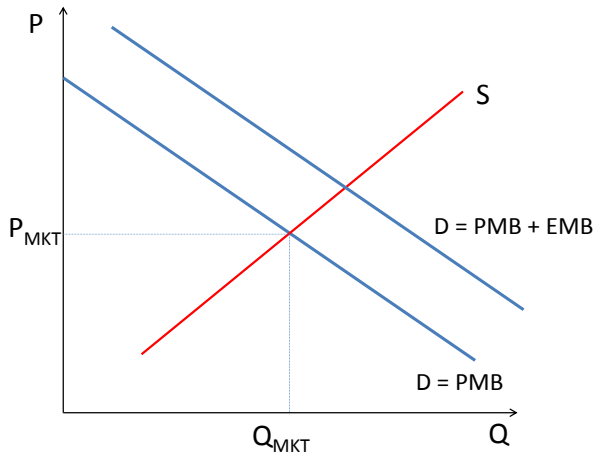
Positive Externalities

Where is the Social Marginal Benefit Curve?



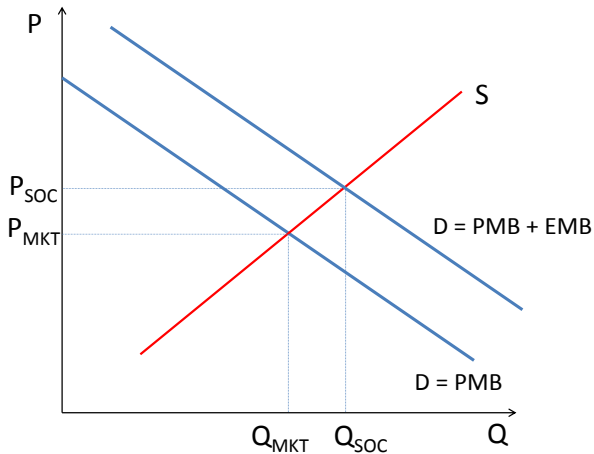
Positive Externalities

What are the Socially Optimal P and Q ?



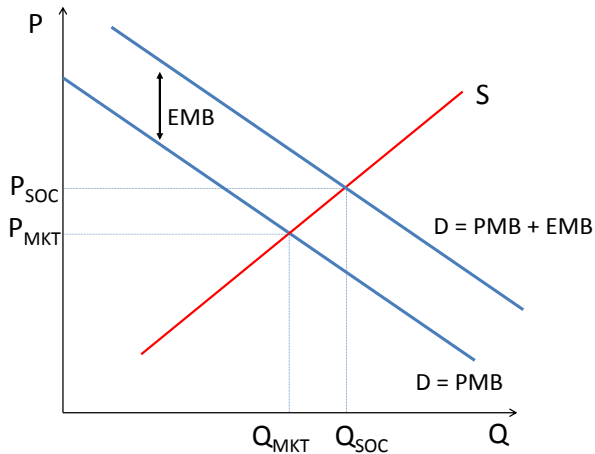
Positive Externalities

What is the Vertical Difference Between the Demand Curves?



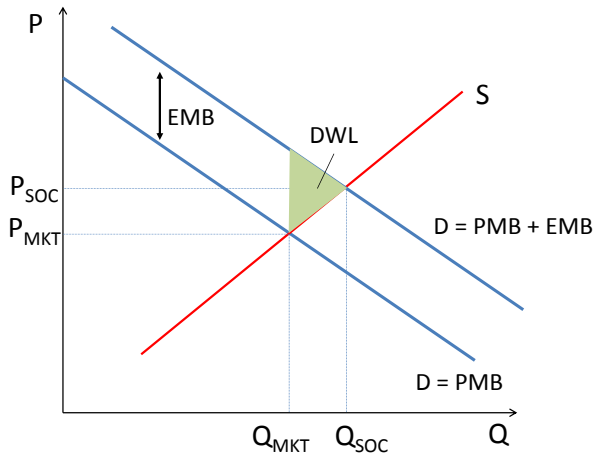
Positive Externalities

Where is the Deadweight Loss?



Positive Externalities

Too Little Production, at Too High a Price



Bottom Line

- Externalities cause a “market failure”
- This is defined as when market doesn't produce the efficient outcome

Bottom Line

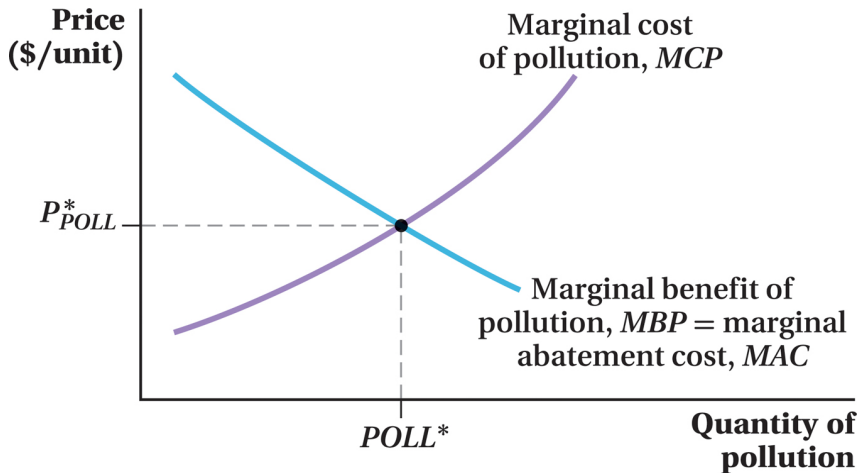
- Externalities cause a “market failure”
- This is defined as when market doesn't produce the efficient outcome
- What can we do?

Fixing Externalities

What is the Right Level of Production with Negative Externalities?

- Efficient level of production \equiv level of production necessary to produce the efficient quantity of the good tied to the externality
- Assume that there is a social marginal cost of production
 - $SMC = \text{private cost} + \text{external cost}$
- Assume that there is a social marginal benefit of production
 - $SMB = \text{marginal cost of abatement}$
- What level of production is optimal?

Optimal Provision of a Good with a Negative Externality



Why is $POLL^* \neq 0$?

Getting to the Socially Optimal P and Q

Three methods

1. Change prices
2. Change quantities
3. Tradeable permits

1. Using Taxes and Subsidies to Return to the Efficient Point

- Suppose we know the external marginal cost
- Charge a tax equal to the external marginal cost
- This returns us to the socially optimal equilibrium outcome
- Called a Pigouvian tax
- Requires that you (the policymaker) know the cost exactly
- Can redistribute tax revenues to those harmed by policy

Policy relevant? See Citizens' Climate Lobby's proposal for a carbon fee.

To Be Clear

Before tax

- private marginal cost = MC
- social marginal cost = $MC + EMC$

To Be Clear

Before tax

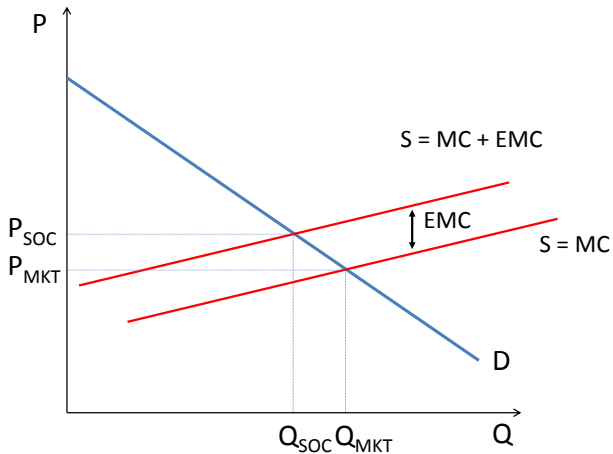
- private marginal cost = MC
- social marginal cost = $MC + EMC$

After tax, $T = EMC$

- private marginal cost = $MC + T$
- social marginal cost = $MC + EMC$

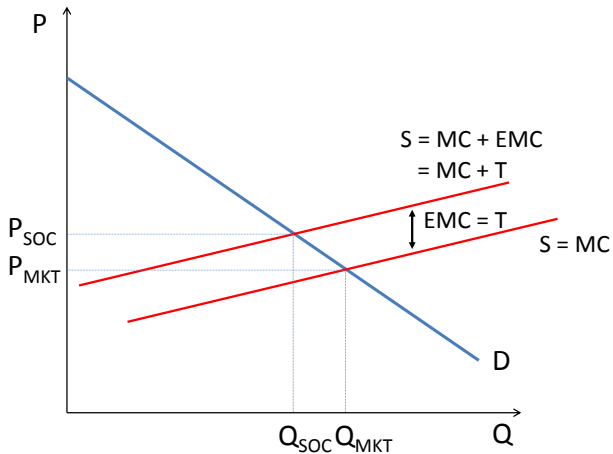
1a. Correcting for a Negative Externality

Private and Social Supply Before a Tax



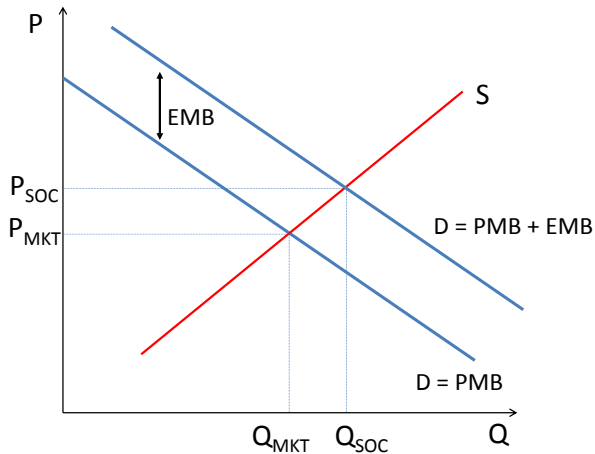
1a. Correcting for a Negative Externality

After the Tax, Private Supply = Social Supply



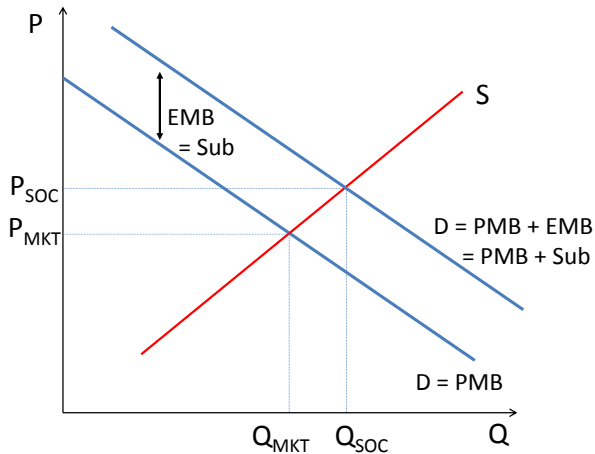
1b. Correcting for a Positive Externality

Private and Social Demand Before a Subsidy



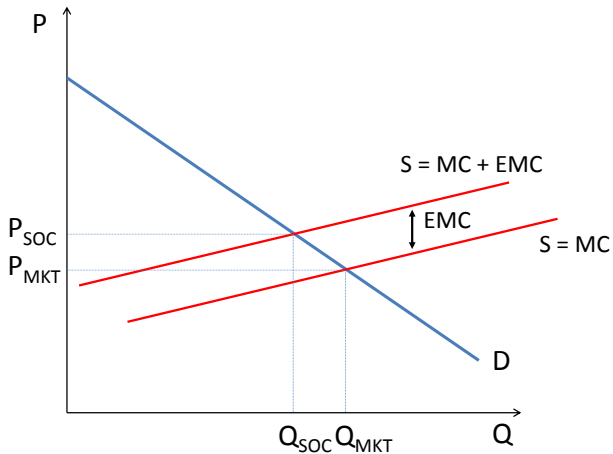
1b. Correcting for a Positive Externality

After the Subsidy, Private Demand = Social Demand



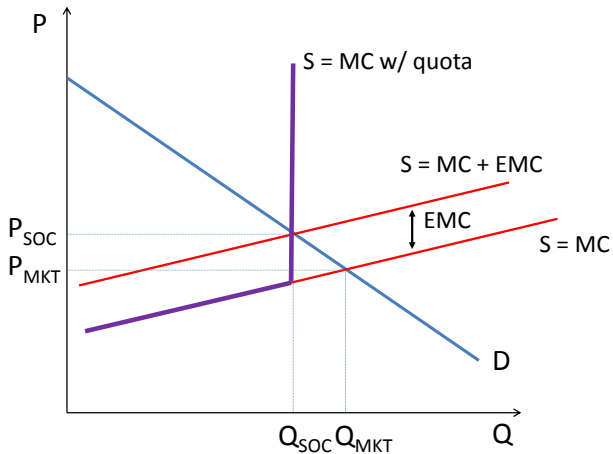
2. Using a Quota to Get to Efficient Point

Private and Social Supply Before a Quota



2. Using a Quota to Get to Efficient Point

With a Quota



The Trouble with Using Quotas

The Trouble with Using Quotas

1. May be hard to know optimal market output level
2. Even if you know the optimal market output, policy must assign quotas by firm. Ideally, you'd assign quotas by cost of reduction, but you'd need to know firm-specific costs.
3. All costs and benefits are borne by market participants; no tax revenues to redistribute

3. Tradeable Permits

- The government decides how much negative activity (or positive activity) to allow
- It makes permits to allow that much activity
- It distributes permits to anybody (firms, you)
 - The choice of distribution method determines winners and losers!
- Permits trade

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Why is this superior in terms of getting to the equilibrium outcome?

- Government doesn't need to know anything about firms' cost structures
- Firms with lowest cost of reducing activity will undertake it

Two Examples

1. Successful (for now): California and Quebec's carbon market
 - does seem to have reduced carbon
 - number of permits for sale decreases annually
 - recent report criticizes geographical distribution of pollution

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1. Successful (for now): California and Quebec's carbon market
 - does seem to have reduced carbon
 - number of permits for sale decreases annually
 - recent report criticizes geographical distribution of pollution
2. Unsuccessful (for now): European carbon market
 - failure in the sense that it hasn't reduced emissions
 - too many credits given out!

Coase Theorem

Where Does this Idea of Ownership Solving Problems Come From?

Coase Theorem

- in a world **with no transaction costs**
- if all property rights are allocated
- the market will efficiently sort out the externality issues

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- the market will efficiently sort out the externality issues

Intuition

- transaction costs are the costs to undertake negotiations
 - the more parties, the larger these costs
 - the more one party can hold out, the larger these costs
- Ownership “internalizes” externalities
- Somebody has a stake in all outcomes
 - “external” costs and benefits are now “internal” to someone

How Did Coase Start Thinking About This?

Ronald Coase, 1991 Nobel Laureate

- worried about interference across radio frequencies
- in the early days of radio, stations would interfere with other stations' frequencies
- how to fix this? do you need government?

Applying the Theory

- Coase Theorem: final allocation of frequencies will be the same regardless of initial ownership
- Stations will be better or worse off depending on initial ownership
- But after trading, the final outcome will always be the same stations will have the same frequencies

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- Coase Theorem: final allocation of frequencies will be the same regardless of initial ownership
- Stations will be better or worse off depending on initial ownership
- But after trading, the final outcome will always be the same stations will have the same frequencies
- Note: Coase didn't expect the private market to solve this problem, because he viewed the transaction costs as non-trivial
- The application of the theorem does give a best-case scenario against which to measure government or private action

How Do We Currently Solve the Spectrum Problem?

Policy tools

- lotteries
- comparative hearings
- auctions

How Do We Currently Solve the Spectrum Problem?

The Auction Method

- Government creates property rights in spectrum
- Auctions off access
- Why do economists think this is a good idea?
 - spectrum goes to those that value it most
 - government doesn't have to choose among spectrum providers
 - government gets revenue to use on other things

Want to know more? Read [here](#).

Policy tools

- lotteries
- comparative hearings
- auctions

Today

1. Defining externalities
2. Fixing externalities
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