

LECTURE 10  
EXTERNALITIES  
February 21, 2019

- I. OVERVIEW
  - A. Market failures
  - B. Definition of an externality
  
- II. NEGATIVE EXTERNALITIES (EXAMPLE: GASOLINE)
  - A. Definition
  - B. New names for old concepts
  - C. Social marginal cost
  - D. The private outcome versus the socially optimal outcome
  - E. Welfare analysis of a negative externality
  - F. Other examples of negative externalities
  
- III. POSITIVE EXTERNALITIES (EXAMPLE: VACCINES)
  - A. Definition
  - B. Social marginal benefit
  - C. The private outcome versus the socially optimal outcome
  - D. Welfare analysis of a positive externality
  - E. Other examples of positive externalities
  
- IV. REMEDIES FOR EXTERNALITIES
  - A. Private solutions
  - B. Government regulation
  - C. Taxes and subsidies

Economics 2  
Spring 2019

Christina Romer  
David Romer

# LECTURE 10

## Externalities



February 21, 2019

# Announcements

- **Midterm 1 Logistics:**
  - If your GSI is Todd Messer (Sections 101 and 102) go to **60 Barrows**.
  - If your GSI is Priscila de Oliveira (sections 103 and 104) go to **3108 Etcheverry**.
  - If your GSI is Vitaliia Yaremko (Sections 111 and 114) go to **170 Barrows**.
  - Everyone else come to usual room (**2050 VLSB**).

# Announcements

- **DSP Students:**
  - You should have received an email from the head GSI (Todd Messer) about arrangements. If you haven't, please contact him ([messertodd@berkeley.edu](mailto:messertodd@berkeley.edu)).
- **Review Session:**
  - Friday, February 22, 6 – 8 p.m. in 2050 VLSB.

# I. OVERVIEW

# Market Failure

- When markets do not work well; there is some defect.
- First example was monopoly—a profound lack of competition.

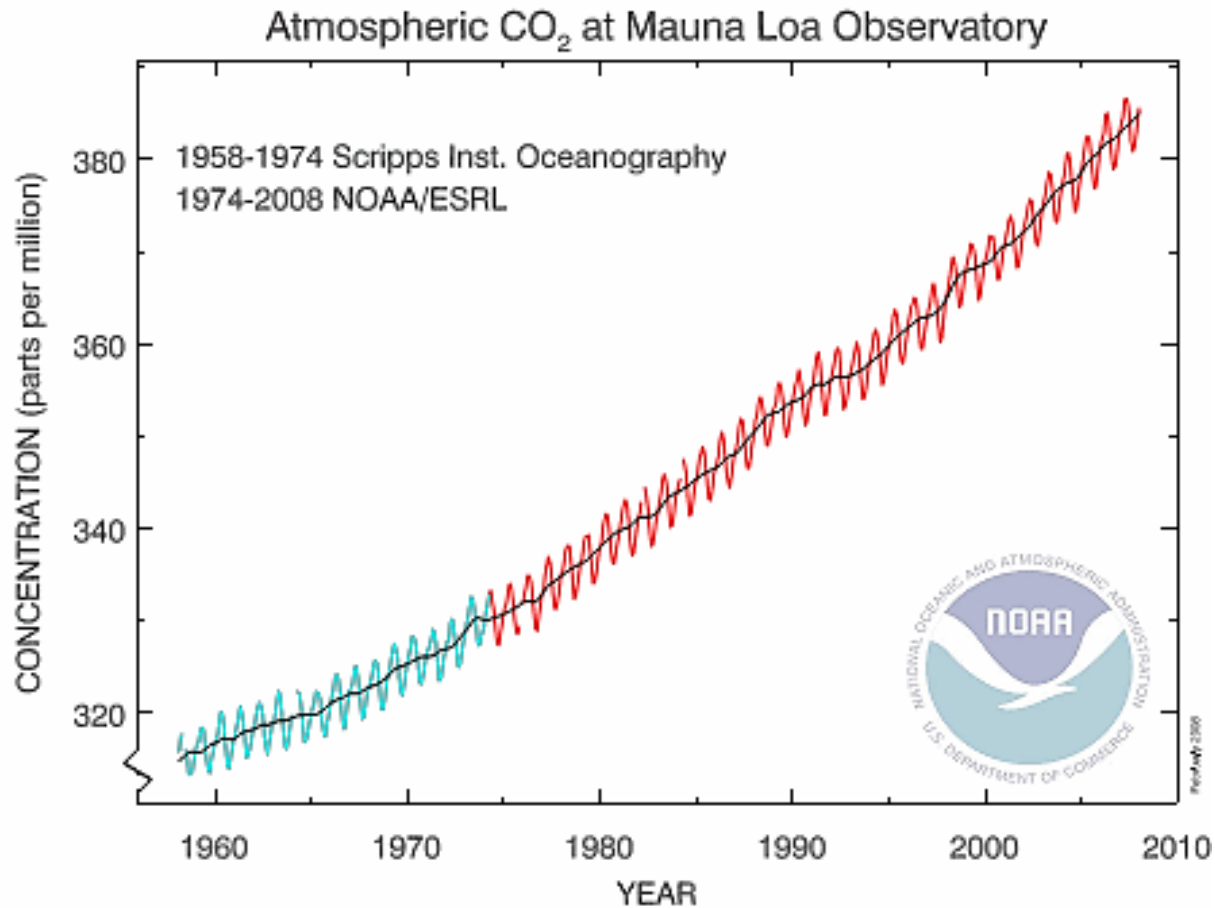
# Externality

- An effect related to the production or consumption of a good that falls on people who are not the producers or consumers.

## II. NEGATIVE EXTERNALITIES

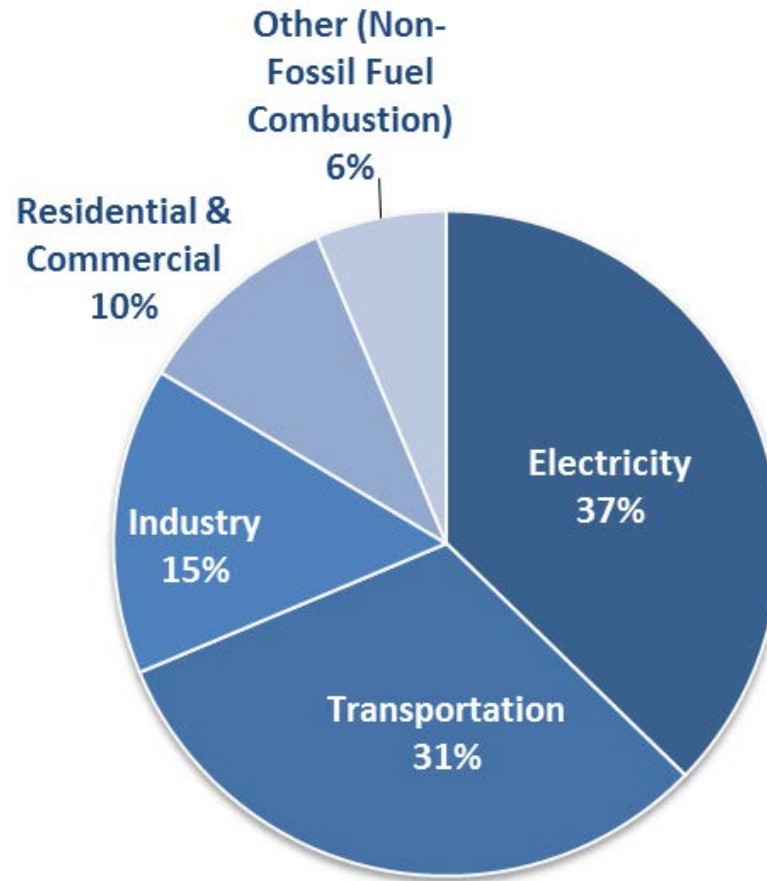


# Atmospheric CO<sub>2</sub> Concentration



Source: National Oceanic and Atmospheric Administration.

# U.S. Carbon Dioxide Emissions, By Source

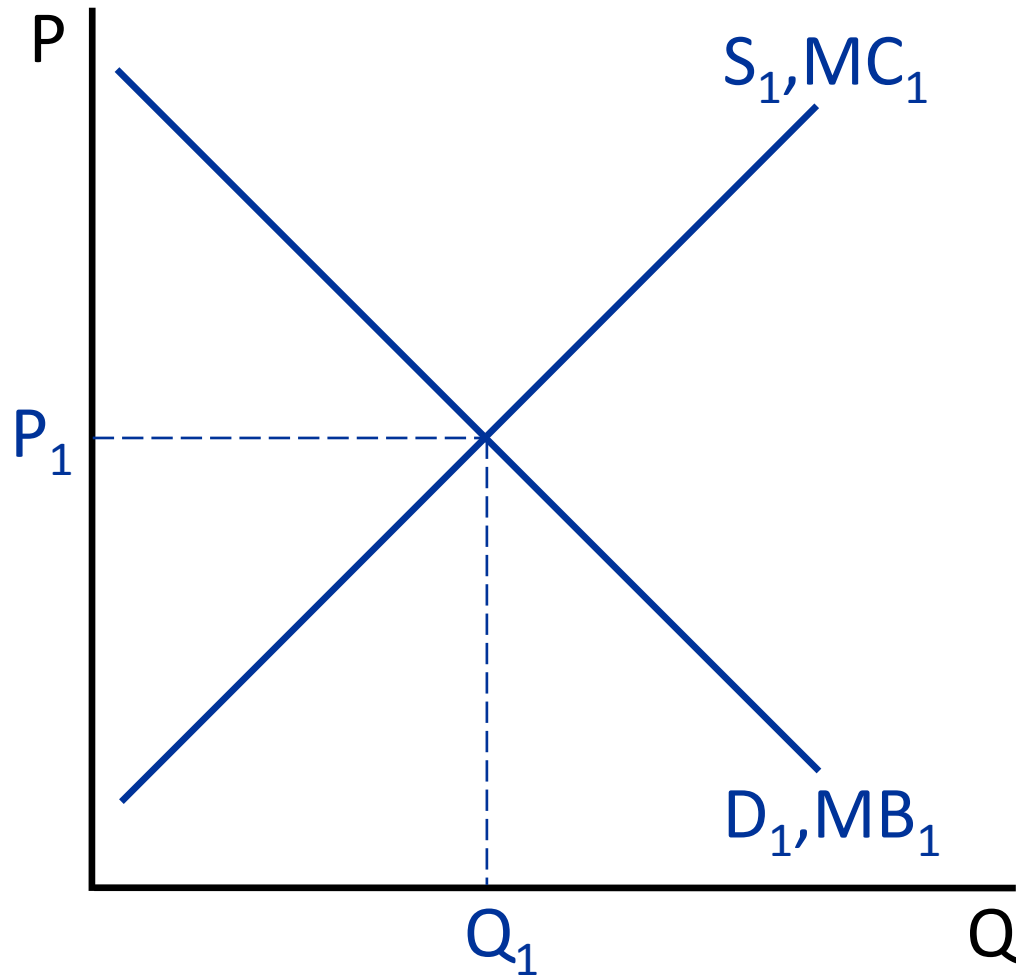


Source: Environmental Protection Agency.

# Negative Externality

- The effects on those outside the market are bad.
- There is an external cost.
- Negative externalities can result from either the consumption or the production of a good (or both).

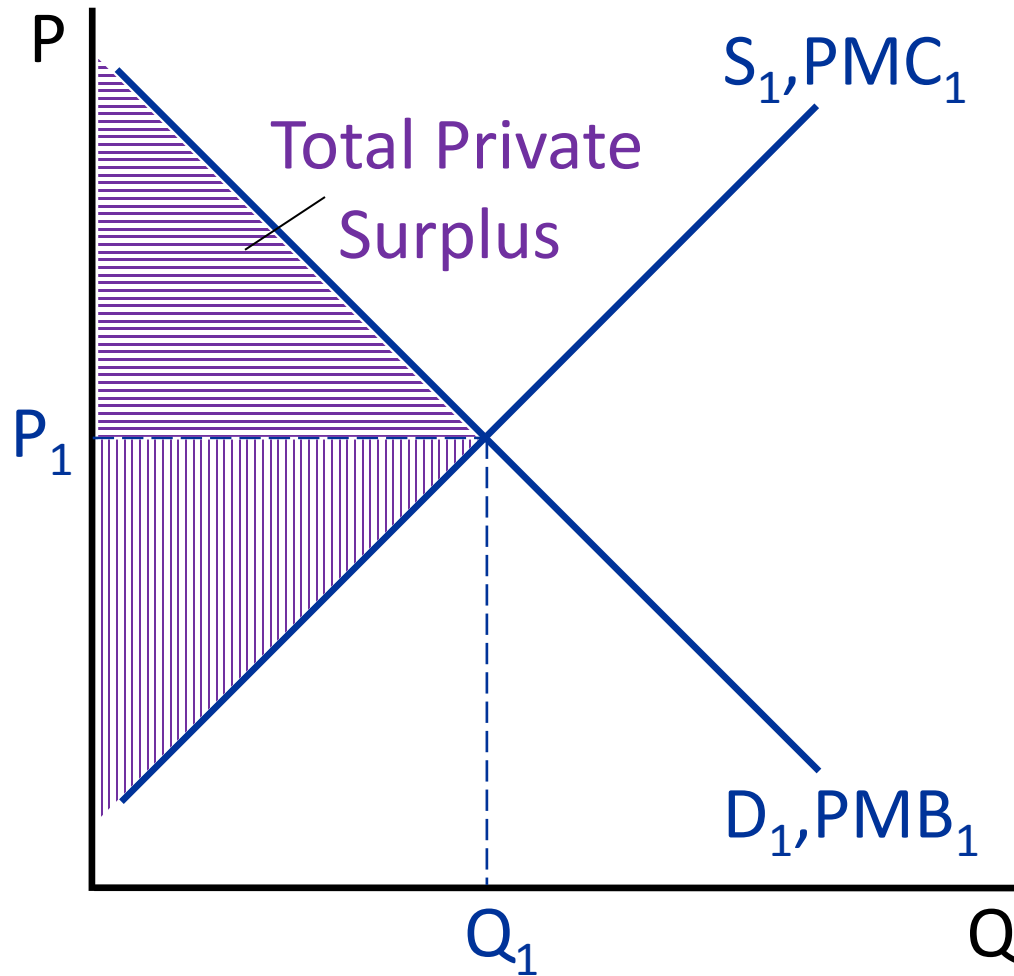
# Market for Gasoline



# Some Terminology

- “Private” refers to people participating in the market (the buyers and sellers).
- “Social” includes effects on people both in the market and outside the market.

# Review of Welfare Analysis



PMC is the private marginal cost; PMB is the private marginal benefit.

# Total Private Surplus

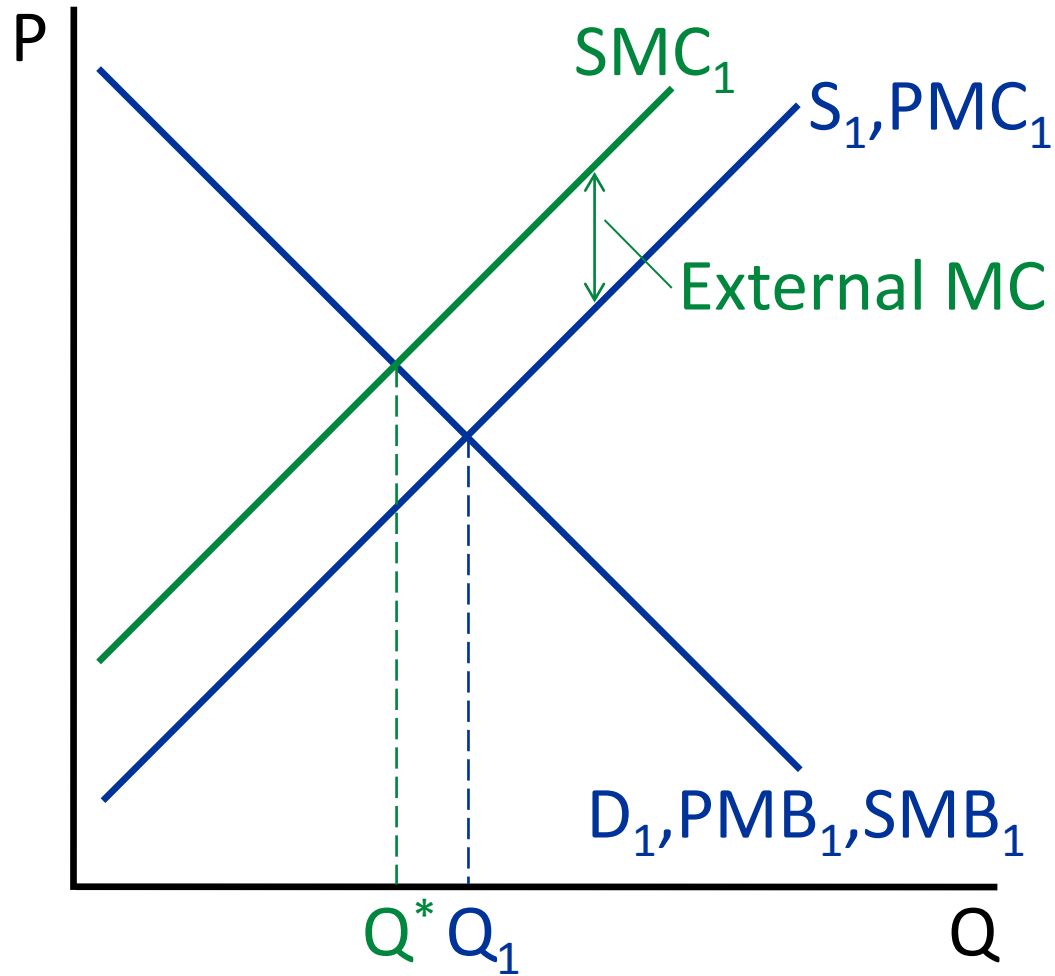
- Sum of consumer surplus and producer surplus.
- It is the area between the PMB and PMC, up to the level produced and consumed.

# More Terminology

- **External Marginal Cost:** The additional cost to people outside the market when one more unit is produced and consumed.
- **Social Marginal Cost:** Private marginal cost plus external marginal cost.



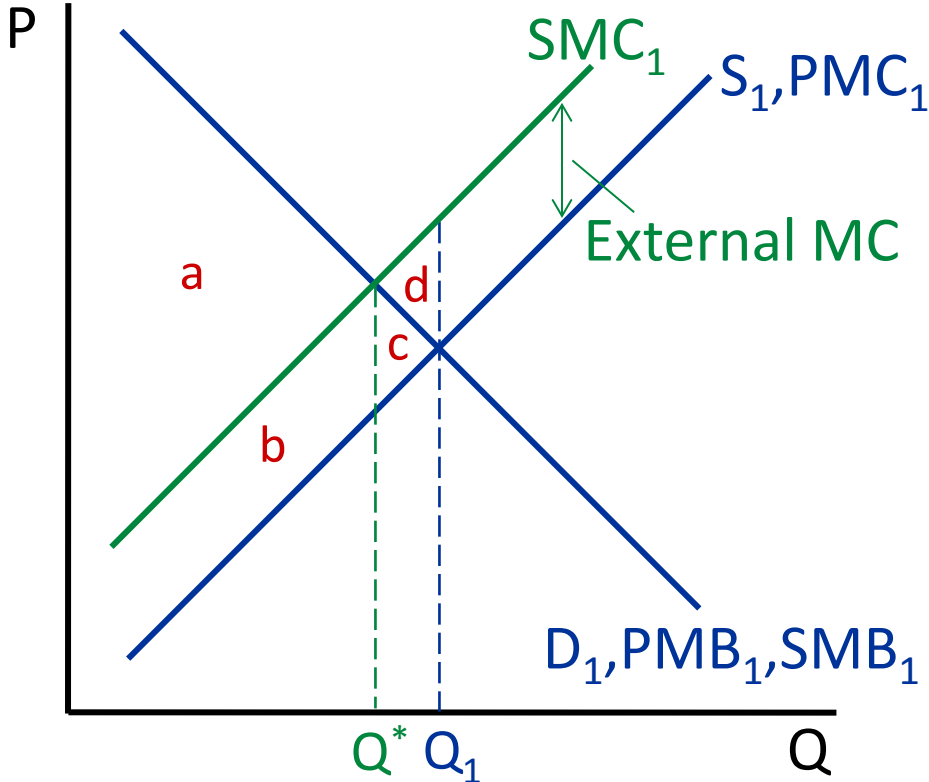
# Negative Externality (Market for Gasoline)



# Total Social Surplus

- Total private surplus plus external benefits minus external costs.
- It includes the welfare of both people in the market and outside the market.

# Welfare Analysis of a Negative Externality



	$Q_1$	$Q^*$
Total Private Surplus	$a+b+c$	$a+b$
External Costs	$-(b+c+d)$	$-b$
Total Social Surplus	$a-d$	$a$
Deadweight Loss	$d$	

## When is the total social surplus as large as possible?

- The total social surplus is largest at the quantity where  $SMB=SMC$ .
- Why is this the case?
- Any shortfall from the largest total social surplus is the deadweight loss.

## Some Points about the Welfare Analysis of a Negative Externality

- The total social surplus includes the people in the market.
- The total social surplus typically isn't maximized at very low levels of production and consumption.
- When there is no externality, SMB and PMB are the same, and SMC and PMC are the same.
  - The market produces where  $PMB=PMC$ , which is the same as where  $SMB=SMC$ .

## Other Examples of Negative Externalities?

- Second-hand smoke from cigarettes.
- Texting or drinking and driving.
- Pesticide runoff from farms.
- Noise related to a construction project.

## Whenever There Is a Negative Externality:

- The SMC curve lies above the PMC curve.
- The people in the market will choose to produce where  $PMC=PMB$  (or supply is equal to demand).
- But society would be better off if the market produced and consumed *less* (where  $SMC=SMB$ ).

### III. POSITIVE EXTERNALITIES



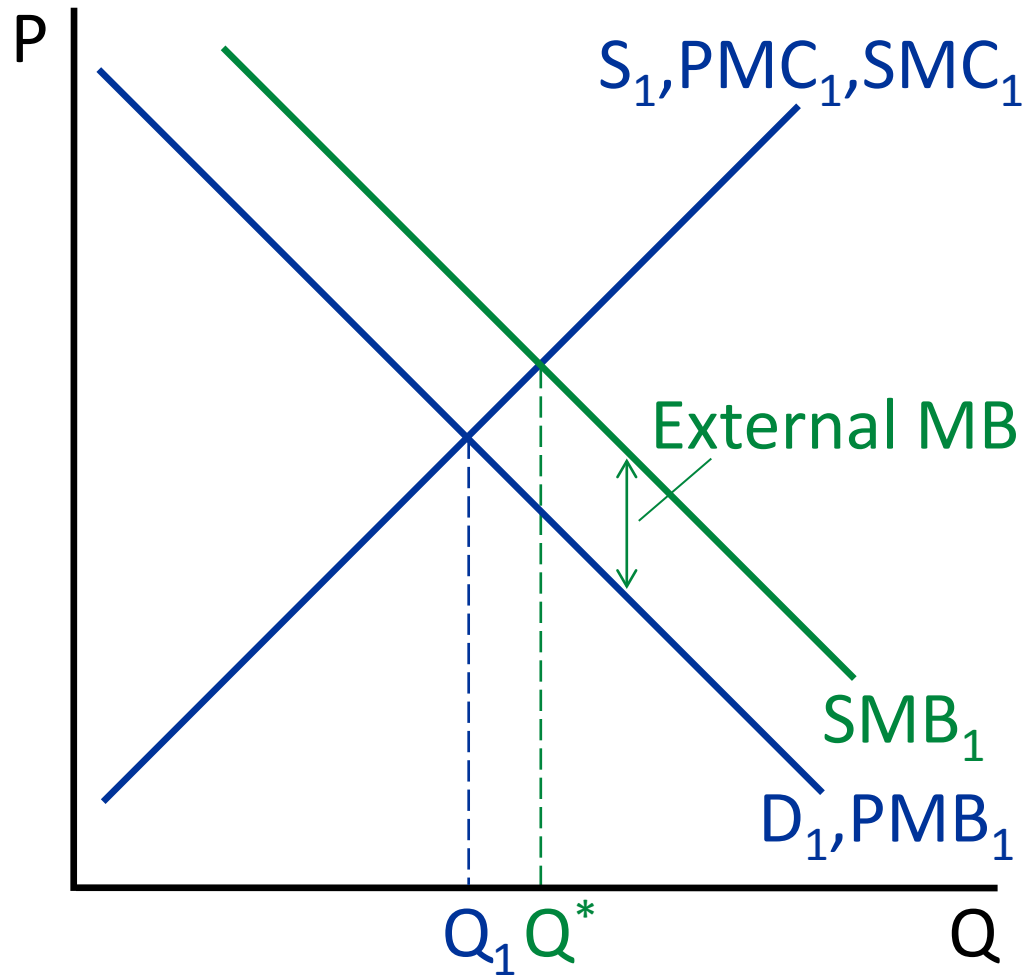
# Positive Externality

- The effects on those outside the market are good.
- There is an external benefit.
- Positive externalities can result from either the consumption or the production of a good (or both).

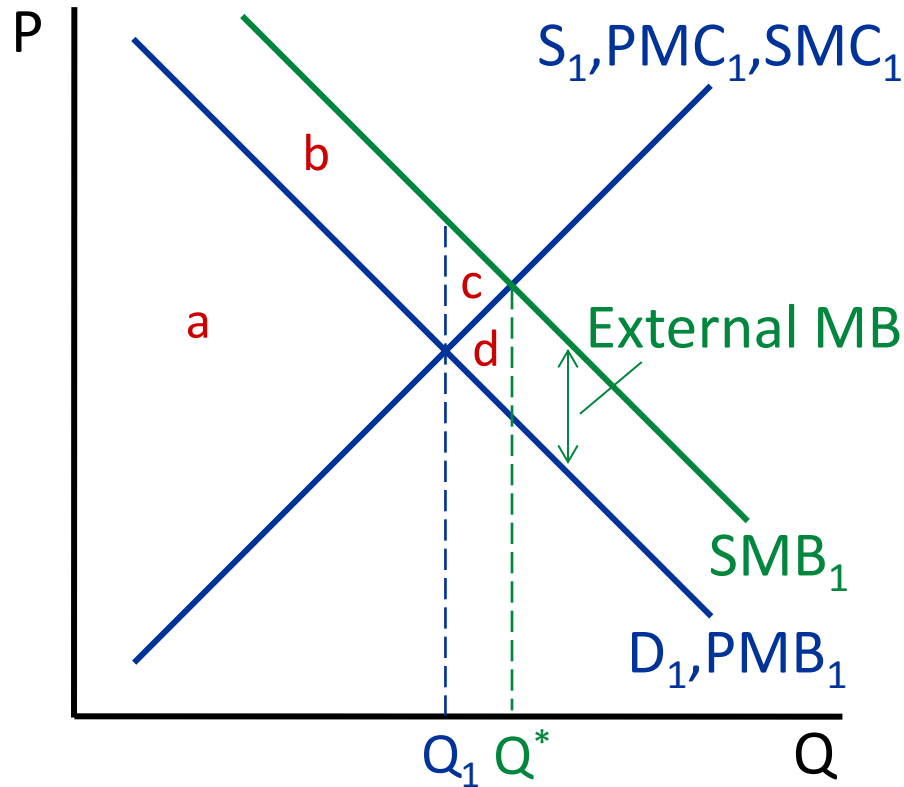
# More Terminology

- **External Marginal Benefit:** The additional benefit to people outside the market when one more unit is produced and consumed.
- **Social Marginal Benefit:** Private marginal benefit plus external marginal benefit.

# Positive Externality (Market for Vaccines)



# Welfare Analysis of a Positive Externality



	$Q_1$	$Q^*$
Total Private Surplus	a	a-d
External Benefits	b	b+c+d
Total Social Surplus	a+b	a+b+c
Deadweight Loss	c	

## Other Examples of Positive Externalities?

- Technology spillovers.
- Education.
- Planting flowers in your yard.

## Whenever There Is a Positive Externality:

- The SMB curve lies above the PMB curve.
- The people in the market will choose to produce where  $PMC=PMB$  (or supply is equal to demand).
- But society would be better off if the market produced and consumed *more* (where  $SMC=SMB$ ).

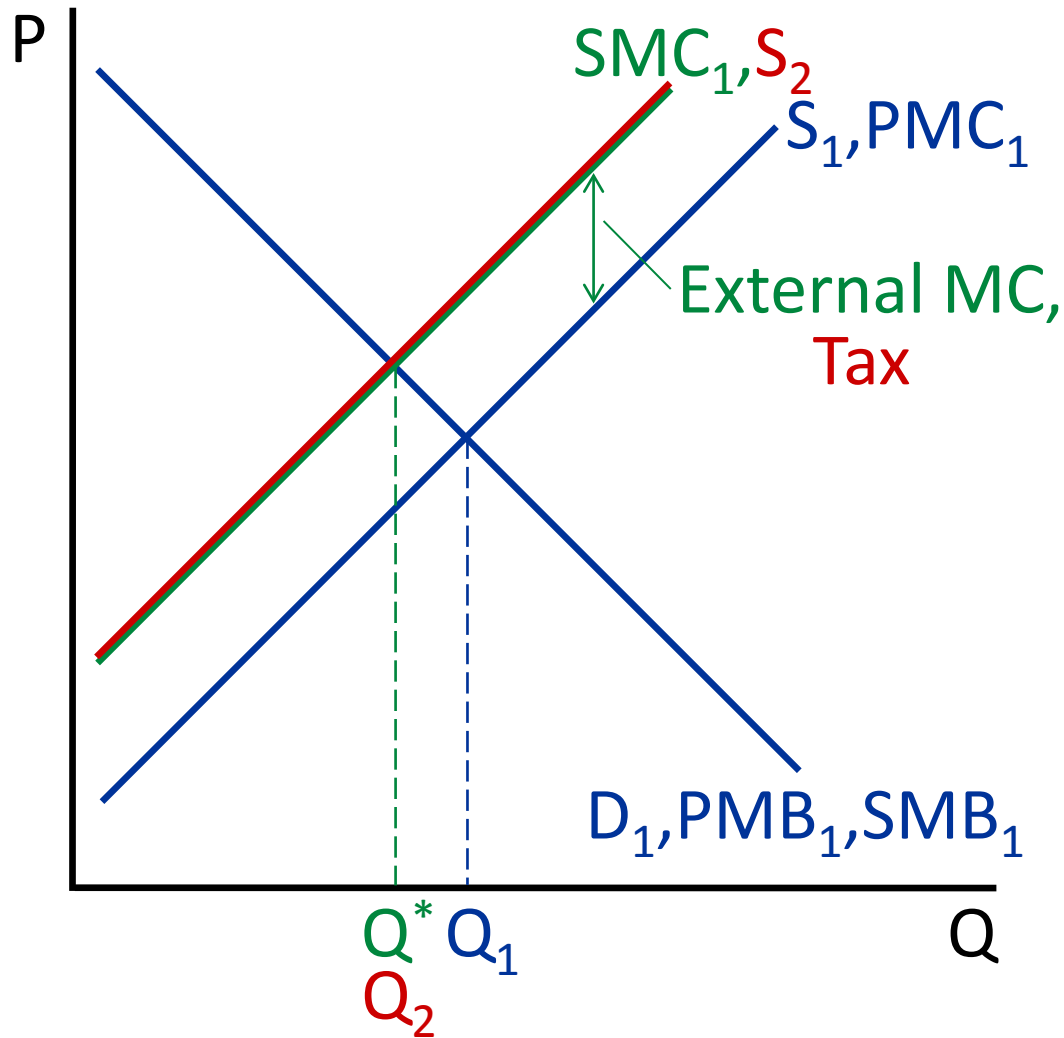
## IV. REMEDIES FOR EXTERNALITIES

# Remedies for Externalities

- **Private Solutions:**
  - Negotiation and compensation.
  - Social sanctions.
- **Government Regulation**
- **Taxes and Subsidies**



# Remedy for a Negative Externality (Tax)



# Remedy for a Positive Externality (Subsidy)

