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
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 Vitaliiia 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).

• 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$_2$ 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

P

D_1,PMB_1

S_1,PMC_1

P_1

Q

Q_1
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

![Diagram showing supply and demand curves with external costs and social welfare analysis.]

<table>
<thead>
<tr>
<th>Q1</th>
<th>Q*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Private Surplus</td>
<td>External Costs</td>
</tr>
<tr>
<td>Total Social Surplus</td>
<td>Deadweight Loss</td>
</tr>
</tbody>
</table>

Q1, PMC1, S1, SMC1, D1, PMB1, SMB1
When is the total social surplus as large as possible?
Some Points about the Welfare Analysis of a Negative Externality
Other Examples of Negative Externalities?
Whenever There Is a Negative Externality:
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

Total Private Surplus
External Benefits
Total Social Surplus
Deadweight Loss

Q₁

Q*
Other Examples of Positive Externalities?
Whenever There Is a Positive Externality:
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)

\[ Q^* \]

\[ D_1, PMB_1 \]

\[ S_1, PMC_1, SMC_1 \]

External MB

\[ Q_1, Q^* \]

\[ P \]

\[ Q \]