



# Market Failures: Externalities, Public Goods, and Information

When markets don't allocate resources efficiently—and what can be done about it

# When Markets Work Well

Markets often achieve efficient outcomes when certain conditions are met. These foundational conditions create the environment where Adam Smith's "invisible hand" can guide resources to their best uses.

## Key conditions for market efficiency:

- Property rights are clearly defined and enforceable
- Prices accurately reflect full costs and benefits
- Competition exists among buyers and sellers
- Information is adequate and accessible to all parties



When these conditions break down, we encounter **market failures**—situations where markets fail to allocate resources efficiently on their own.

Today's roadmap: externalities • public goods • common resources • information problems

# What "Efficient" Actually Means

## Allocative Efficiency

Resources flow to their highest-valued uses—society gets the maximum possible benefit from available resources.

## Competitive Benchmark

The gold standard: **Marginal Benefit = Marginal Cost**. This equality signals that resources are optimally allocated.

## Market Failure

Occurs when prices fail to reflect **true social** marginal benefits or costs, leading to inefficient resource allocation.

## Critical Terms to Remember

- **Marginal:** The effect of producing or consuming one additional unit
- **Social:** Includes effects on all parties, not just direct buyers and sellers



**Why this matters:** Market failures create deadweight loss—mutually beneficial trades that never happen, leaving society worse off than it could be.

# Externalities: When Prices Miss the Full Picture

An **externality** occurs when an economic activity creates costs or benefits for third parties that aren't reflected in market prices. These spillover effects drive a wedge between private and social outcomes.

## Negative Externalities

Costs imposed on others

- Air and water pollution from factories
- Traffic congestion in cities
- Secondhand smoke exposure
- Noise pollution from construction

## Positive Externalities

Benefits enjoyed by others

- Vaccination creating herd immunity
- Education spillovers to community
- Research and innovation benefits
- Beautiful landscaping in neighborhoods

The diagnostic question: **Who is affected by this transaction, and do they pay or get paid for it?** If the answer is "they're affected but don't participate in the price," you've found an externality.

# Pollution Example: The Problem of Overproduction

## The Market Without Intervention

When firms pollute, they consider only their **Private Marginal Cost (PMC)**—the direct costs of production. They ignore the harm imposed on society.

Consumers make decisions based on **Private Marginal Benefit (PMB)**—their personal satisfaction from the good.

The market equilibrium occurs where:

$$\mathbf{PMB = PMC \rightarrow Q_{market}}$$



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2

3

### Private Costs

Firms pay for labor, materials, energy—but not for environmental damage

### External Harm

Pollution damages health, ecosystems, property—costs borne by society

### Social Cost

$\mathbf{SMC = PMC + External\ Harm}$   
The true cost to society

- ❑ **The Inefficiency:** The efficient outcome occurs where  $\mathbf{PMB = SMC \rightarrow Q_{social}}$ . Because firms ignore external harm, the market produces too much:  $\mathbf{Q_{market} > Q_{social}}$ . Units produced between  $Q_{social}$  and  $Q_{market}$  have social costs exceeding benefits—pure deadweight loss.

# Education & Vaccination: The Underconsumption Problem

When activities generate benefits beyond the direct participants, markets tend to provide too little. Individuals make decisions based on **private** benefits, ignoring valuable spillovers to society.

01

## Private Benefit Recognition

Individuals capture some advantages: higher wages from education, personal protection from vaccines, improved health outcomes.

02

## Uncaptured Social Benefits

Society gains additional benefits: herd immunity protects vulnerable populations, educated workers drive innovation, reduced disease transmission lowers healthcare costs.

03

## Market Underprovision

Because individuals can't capture all benefits, they invest less than socially optimal:  $Q_{\text{market}} < Q_{\text{social}}$

## The Efficiency Gap

Market equilibrium:  $\mathbf{PMB} = \mathbf{PMC} \rightarrow Q_{\text{market}}$

Efficient outcome:  $\mathbf{SMB} = \mathbf{PMC} \rightarrow Q_{\text{social}}$

Where:  $\mathbf{SMB} = \mathbf{PMB} + \text{External Benefit}$

When people ignore benefits to others, society gets too little education, too few vaccinations, and insufficient investment in activities with positive spillovers.

# Correcting Externalities: Three Policy Approaches

Governments have multiple tools to align private incentives with social welfare. Each approach has distinct advantages and challenges.

1

## Pigouvian Taxes & Subsidies

**Price-based intervention:** Set tax equal to marginal external cost (for negative externalities) or subsidy equal to marginal external benefit (for positive externalities).

- Corrects price signals to reflect true social costs/benefits
- Allows market to determine optimal quantity
- Generates revenue (taxes) or requires spending (subsidies)

2

## Standards & Regulation

**Direct control:** Government mandates specific limits on activities, technology requirements, or performance standards.

- Emission limits for pollutants (e.g., Clean Air Act standards)
- Technology mandates (catalytic converters, scrubbers)
- Provides certainty about environmental outcomes
- May be less cost-effective than pricing mechanisms

3

## Cap-and-Trade Systems

**Quantity-based market:** Set total cap on harmful activity, issue tradable permits, let market determine permit price.

- Fixes total quantity of externality (e.g., carbon emissions)
- Trading ensures cost-effective allocation across firms
- Price fluctuates with market conditions
- Examples: EU Emissions Trading System, sulfur dioxide program

- Key distinction:** Taxes fix the *price* of the externality while letting quantity adjust. Cap-and-trade fixes the *quantity* while letting price adjust. Choose based on whether certainty about environmental outcomes or cost predictability matters more.

# The Free-Rider Problem and Underprovision

Public goods possess two defining characteristics that make private markets fail to provide adequate quantities. Understanding these properties explains why government intervention is often necessary.

## Defining Characteristics



### Non-Rival Consumption

One person's use doesn't reduce availability for others. Your enjoyment of national defense doesn't diminish mine.



### Non-Excludable

Difficult or impossible to prevent non-payers from benefiting. Can't selectively protect only paying citizens.

## Classic Examples of Public Goods



### National Defense

Military protection benefits all citizens equally; impossible to exclude non-payers from protection.



### Street Lighting

Illumination available to all pedestrians and drivers; challenging to charge only beneficiaries.



### Basic Scientific Research

Fundamental discoveries benefit entire society; knowledge spreads freely once discovered.

**The Free-Rider Incentive:** If people benefit whether or not they pay, many won't pay voluntarily. This isn't about morality—it's about incentive structure and enforcement. The result: private markets dramatically underprovide public goods, creating a strong case for government provision or subsidies.

# Tragedy of the Commons: The Overuse Problem

Common-pool resources share one characteristic with public goods (non-excludable) but differ critically in the other dimension—they are **rival** in consumption. This combination creates the opposite problem: overuse rather than underprovision.

## Ocean Fisheries

Each fisher's catch reduces stock available to others; open access leads to depletion beyond sustainable levels.

## Congested Roads

Each driver adds to congestion, slowing everyone; drivers ignore time costs imposed on others.



## Groundwater Aquifers

Farmers pumping water deplete shared underground reserves; no individual bears full cost of extraction.

## Grazing Land

Each additional animal degrades pasture quality for all herders; individual benefit exceeds shared cost.

## The Core Problem

Each user considers only their private benefit and cost, ignoring the **depletion or congestion imposed on all other users**. The result: systematic overuse and potential resource collapse.

## Governance Solutions

- Catch quotas and fishing licenses
- Access rules and usage limits
- Community-based management and monitoring
- Congestion pricing for roads
- Water rights and extraction permits

- Important insight:** Overuse is not inevitable. When governance exists—clear rules, effective monitoring, credible enforcement—common resources can be managed sustainably. Nobel laureate Elinor Ostrom documented numerous successful examples.

# Hidden Information and Hidden Actions

Markets function well when all parties have adequate information. When information is asymmetric—one side knows more than the other—two distinct problems emerge that can cause markets to unravel or function inefficiently.

## Adverse Selection

### Hidden Information Problem

**Timing:** Information gap exists *before* the transaction

**What's hidden:** Quality, type, or characteristics of goods or people

**Classic example:** Used car markets ("lemons problem")—sellers know car quality, buyers don't. Result: buyers assume average quality, offer average price. High-quality sellers exit (price too low), leaving only low-quality "lemons." Market unravels.

**Other examples:** Insurance markets (sick people buy more), job markets (worker ability unknown), credit markets (borrower riskiness)

## Moral Hazard

### Hidden Action Problem

**Timing:** Behavior changes *after* the transaction or contract

**What's hidden:** Actions, effort, or care taken by one party

**Classic example:** Insurance—once covered, people may take less care to prevent losses (leave car unlocked, neglect health). Insurer can't perfectly monitor behavior.

**Other examples:** Banking (excessive risk if bailouts expected), employment (effort hard to observe), lending (borrower may take bigger risks with loaned money)

## Common Solutions to Information Problems



### Screening & Signaling

Uninformed party designs tests (screening). Informed party demonstrates quality through costly signals (warranties, education credentials).



### Contractual Solutions

Deductibles reduce moral hazard. Performance bonds align incentives. Contingent payments based on outcomes.



### Monitoring & Enforcement

Audits, inspections, reputation systems. Costly but can restore market function when information gaps are severe.