Externalities

EE211

- Describe the differences between positive and negative externalities.
- Determine how negative externalities impact market efficiency.
- Explain the impact of regulation on negative externalities.
- Explain the impact of taxes on negative externalities.
- Determine how positive externalities impact market efficiency.
- Explain the impact of subsidies on positive externalities.
- Explain the impact of tradable permits on negative externalities.
- Explain how private solutions can correct for negative externalities.
- Explain the application of the Coase theorem, given a scenario.

Externalities and Market Inefficiency

Externalities

"Governments can sometimes improve market outcomes"

- One of the Ten Principles of Economics

Externality

- The uncompensated impact of one person's actions on the well-being of a bystander

Negative externality: Impact is adverse

Positive externality: Impact is beneficial

Externalities

When externalities are present, society's interest in a market outcome includes the well-being of bystanders

The market equilibrium is **not efficient**

- **Societal well-being is not maximized,** and **government policies can potentially correct the market failure**

Welfare Economics: A Recap

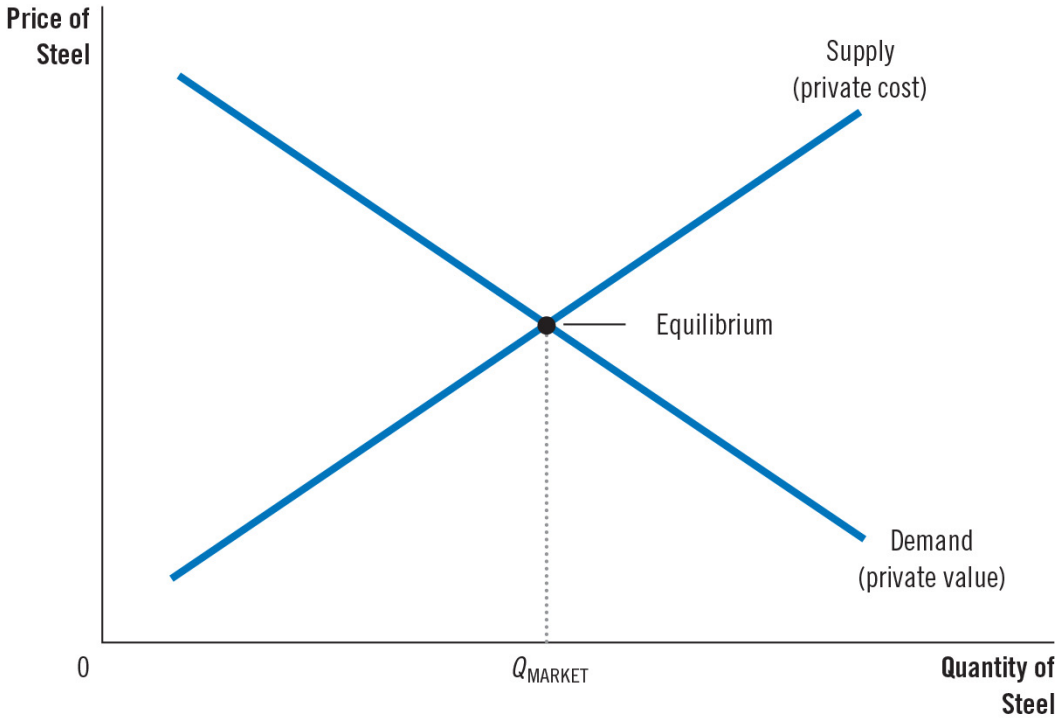
Supply and demand curves contain important information about costs and benefits

- Demand curve reflects the value to consumers
- Supply curve reflects the cost to producers
- Market equilibrium maximizes sum of producer and consumer surplus

The market allocates resources in a way that maximizes the total value to the consumers minus the total costs to the producers

The Market for Steel

- The demand curve reflects the value to buyers, and the supply curve reflects the costs of sellers.
- The equilibrium quantity, Q_{MARKET}, maximizes the total value to buyers minus the total costs of sellers.
- In the absence of externalities, the market equilibrium is efficient.



Negative Externalities

Cost to society **exceeds** the cost to the good producers

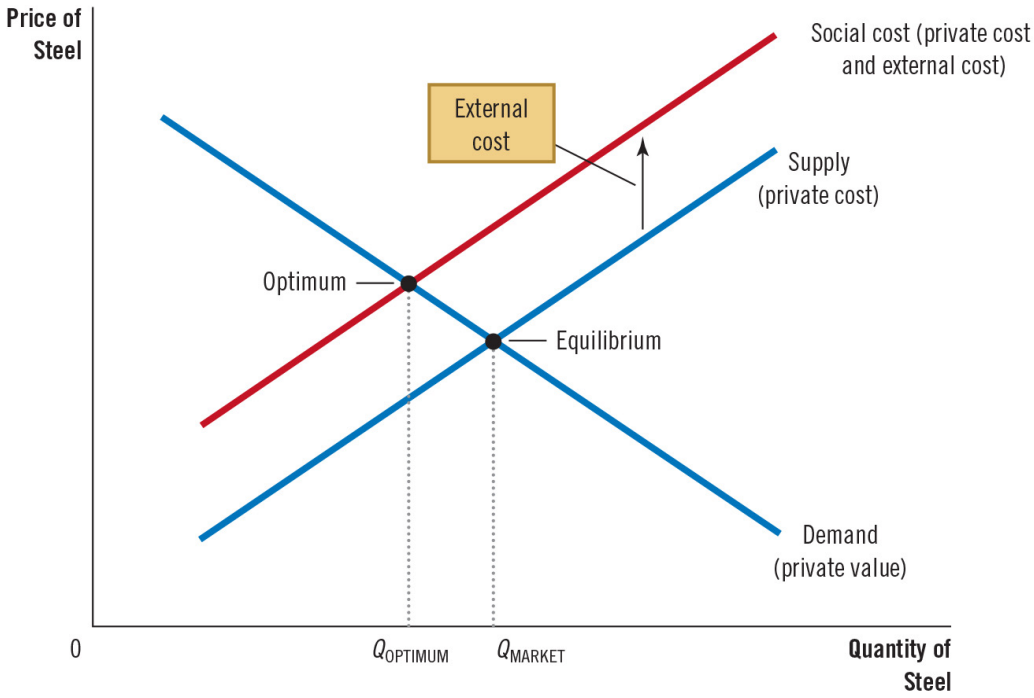
Social cost

- Private costs of the producers
- **Plus** the costs to those bystanders harmed by the negative externality
- **Social-cost curve is above the supply curve**
  - Takes into account the external costs imposed on society

Pollution and the Social Optimum

In the presence of a negative externality, such as pollution, the social cost of the good exceeds the private cost.

The optimal quantity, Q_{OPTIMUM}, is therefore smaller than the equilibrium quantity, Q_{MARKET}.



Internalizing the Externality

Internalizing the externality

- Altering incentives so that people take into account the external effects of their actions

If market participants pay social costs (tax on producers)

- Tax shifts supply curve upward by the size of the tax
- New supply curve would coincide with the social-cost curve
- **Market equilibrium = Socially optimal quantity**

Positive Externalities

With a positive externality

- Demand curve does not reflect the value to society of the good
- Social-value curve lies above the demand curve
- Socially optimal quantity exceeds the market equilibrium quantity

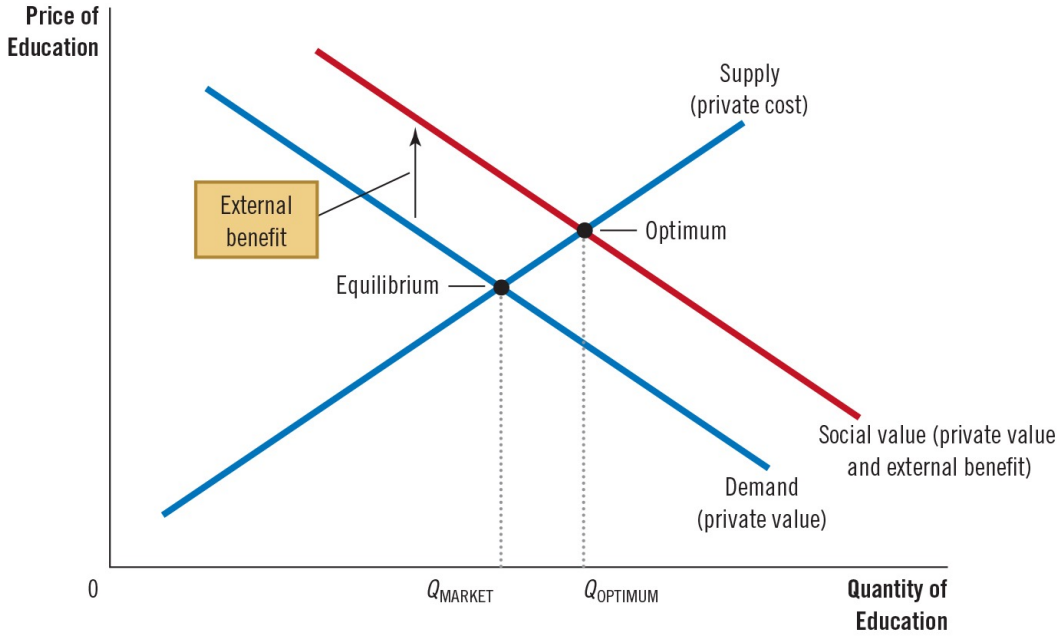
Government can correct market failure

- Internalize the externality
- Subsidy

Education and the Social Optimum

In the presence of a positive externality, **the social value of the good exceeds the private value.**

The optimal quantity, $Q_{OPTIMUM}$, is therefore larger than the equilibrium quantity, Q_{MARKET}.



Effect of Externalities Summary

Negative externalities

- Market quantity > Socially desirable

Positive externalities

- Market quantity < Socially desirable

To remedy the problem, “internalize the externality”

- **Tax goods with negative externalities**
- **Subsidize goods with positive externalities**

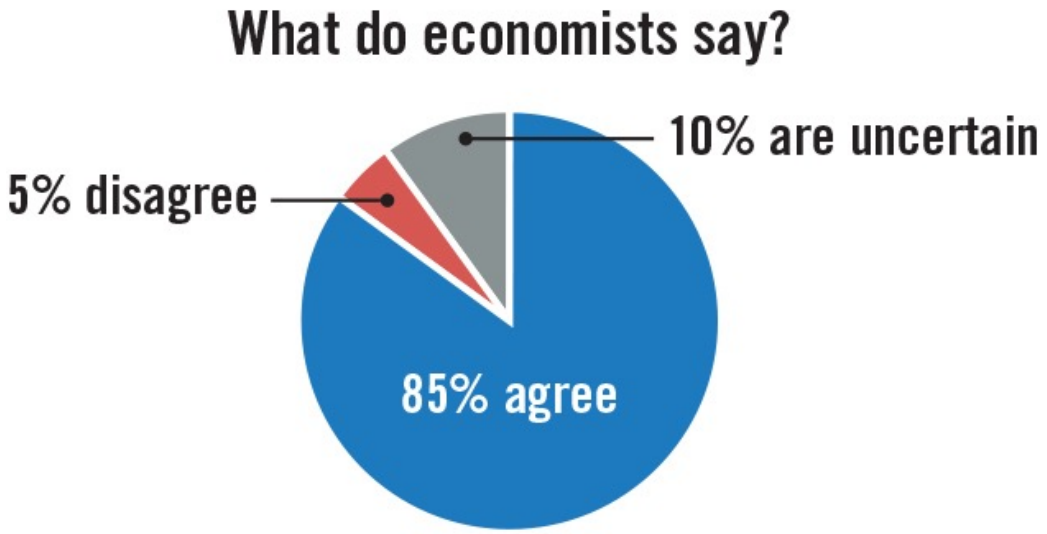
Public Policies toward Externalities

Command-and-Control Policies: Regulation

- Government can remedy an externality by either requiring or forbidding certain behaviors
- For example, **environmental regulations**
  - EPA may dictate the maximum level of pollution that a factory may emit or require firms to adopt a particular technology to reduce emissions
  - Profit-seeking industries often have an incentive to conceal adverse health effects and exaggerate the cost of moving toward cleaner technologies

Ask the Experts: Covid Vaccines

"Given the positive externalities from vaccination, an effective Covid-19 vaccine should be mandatory for every US resident (except those with health exceptions, such as infants and people with compromised immunity) with the cost covered by the federal government."



Source: IGM Economic Experts Panel, June 23, 2020.

Market-Based Policy 1: Corrective Taxes and Subsidies

Provide incentives so that private decision makers will choose to solve the problem on their own

Taxing activities with negative externalities (Pigovian taxes)

- Ideal corrective tax = External cost

Subsidizing activities with positive externalities

- Ideal corrective subsidy = External benefit

Market-Based Policy 1: Corrective Taxes and Subsidies

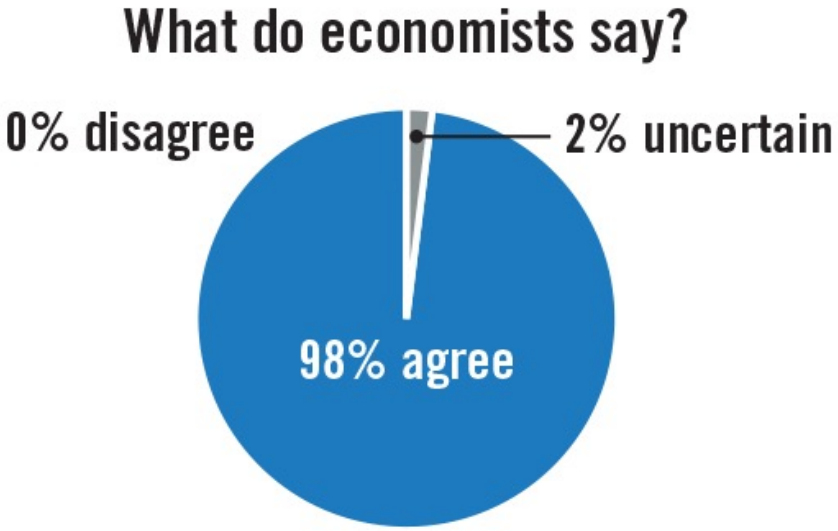
Economists usually prefer corrective taxes to regulations as a way to deal with pollution because they can reduce pollution at a lower cost to society

Corrective taxes

- Align private incentives with society's interests
- Move the allocation of resources closer to social optimum
- Raise government revenue
- Enhance economic efficiency

Ask the Experts: Carbon Taxes—A

"The Brookings Institution recently described a U.S. Carbon tax of $20 per ton, increasing at 4 percent per year, which would raise an estimated $150 billion per year in federal revenues over the next decade. Given the negative externalities created by carbon dioxide emissions, a federal carbon tax at this rate would involve fewer harmful net distortions to the U.S. economy than a tax increase that generated the same revenue by raising marginal tax rates on labor income across the board."



Source: IGM Economic Experts Panel, December 4, 2012, December 20, 2011, and November 13, 2018.

Market-Based Policy 2: Tradable Pollution Permits

Tradable pollution permits

- **Voluntary transfer of the right to pollute from one firm to another**
- **New scarce resource: pollution permits**
- **Market to trade permits develops**
- **Firm's willingness to pay depends on its cost of reducing pollution**

Market-Based Policy 2: Tradable Pollution Permits

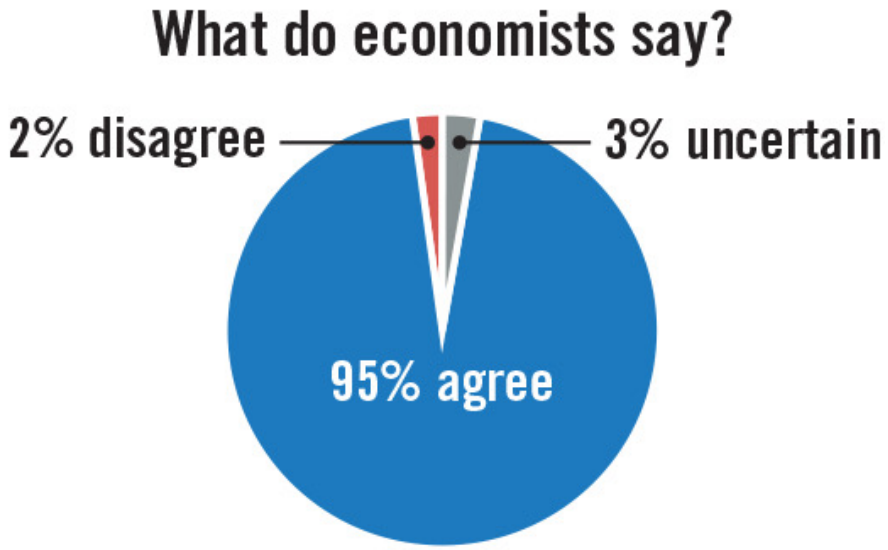
Advantage of a market for pollution permits

- Firms that can reduce pollution at a low cost will sell whatever permits they get
- Firms that can reduce pollution at a high cost will buy whatever permits they need

Final allocation will be efficient regardless of initial allocation

Ask the Experts: Carbon Taxes

"A tax on the carbon content of fuels would be a less expensive way to reduce carbon dioxide emissions than would a collection of policies such as 'corporate average fuel economy' requirements for automobiles."



Source: IGM Economic Experts Panel, December 4, 2012, December 20, 2011, and November 13, 2018.

Active Learning 1: Reducing Pollution

Tiana's Paper Mill and Jordan's Tire Factory are both polluting the Blue River with 100 tons of green glowing glop per month (each).

Goal

- Reduce total green glowing glop pollution to 140 tons/month

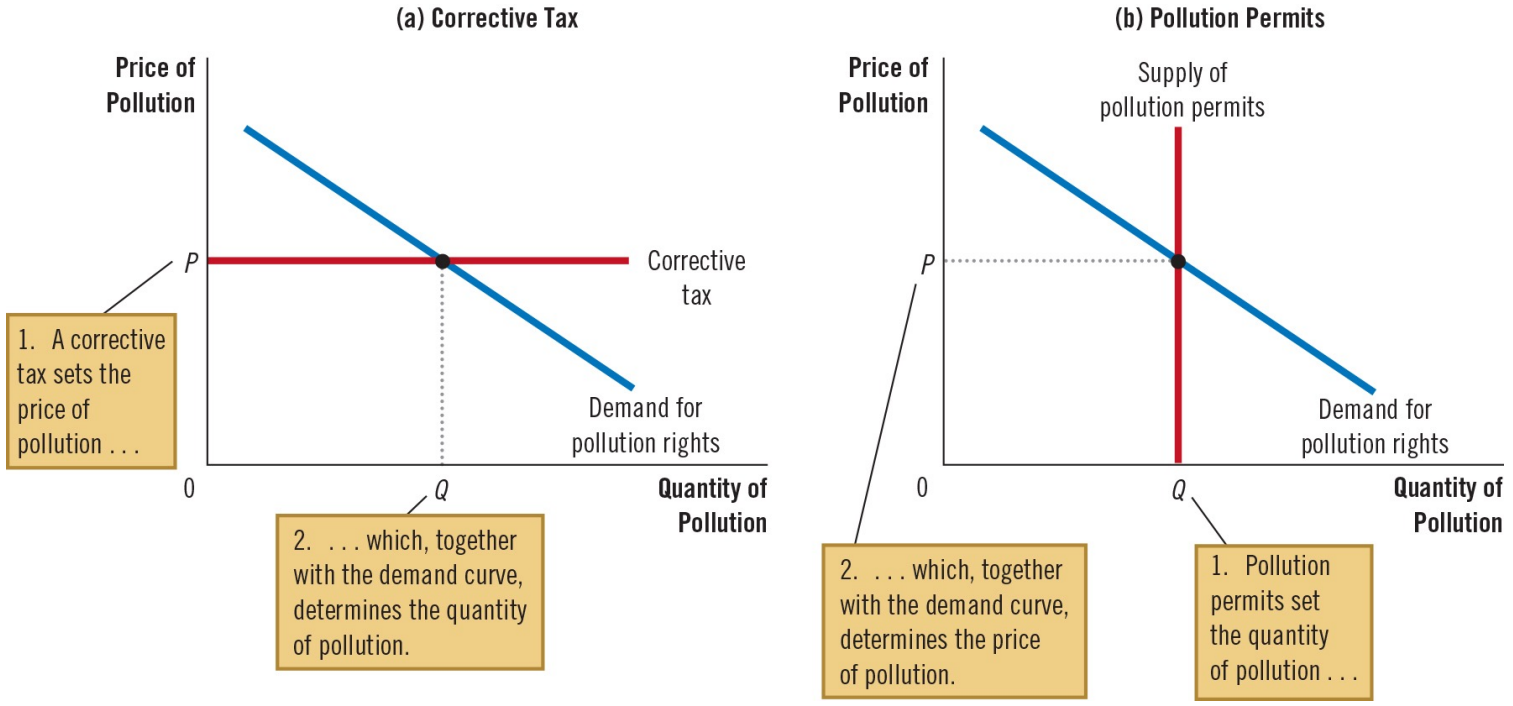
Cost of reducing pollution

- $100/ton for Tiana's Paper Mill
- $200/ton for Jordan's Tire Factory

Which is more efficient, regulation or tradable pollution permits?
Compute the cost of achieving the goal if Tiana's Paper Mill uses 40 permits and sells 30 to Jordan's Tire Factory for $150 each.

The Equivalence of Corrective Taxes and Pollution Permits

In panel (a), the EPA sets a price on pollution by levying a corrective tax, and the demand curve determines the quantity of pollution. In panel (b), the EPA limits the quantity of pollution by limiting the number of pollution permits, and the demand curve determines the price of pollution. The price and quantity of pollution are the same in the two cases.



Pollution Permits or Corrective Taxes?

Firms pay for their pollution

- Corrective taxes: pay a tax to the government
  - Firms can pollute as much as they want by paying the tax
- Pollution permits: pay to buy permits
- Internalize the externality of pollution

Objections to the Economic Analysis of Pollution

"We cannot give anyone the option of polluting for a fee"

- Late Senator Edmund Muskie

People face trade-offs

- Eliminating all pollution is impossible
- Value of environmental measures must be compared with their opportunity cost

Objections to the Economic Analysis of Pollution

Clean environment is a normal good

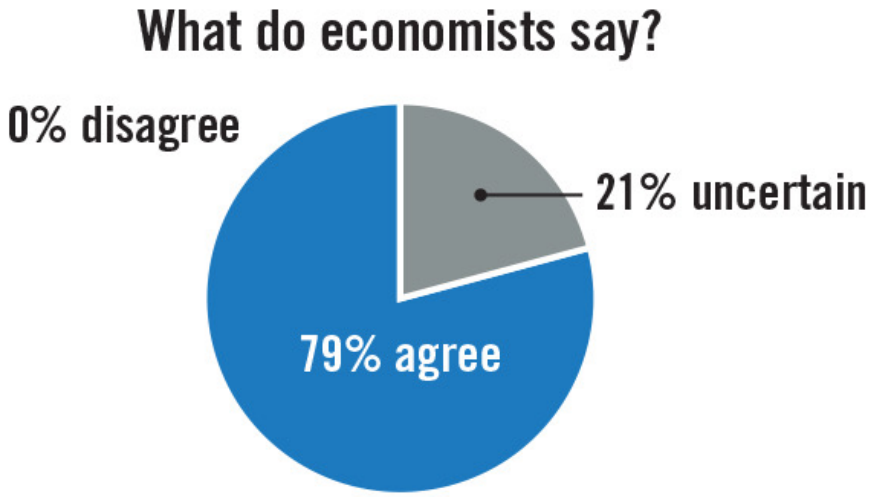
- Positive income elasticity
- Rich countries can afford a cleaner environment, have more rigorous environmental protection

Clean air and clean water obey the law of demand

- The lower the price of environmental protection, the more the public will want it
- Using pollution permits and corrective taxes reduces the cost of environmental protection

Ask the Experts: Carbon Taxes

"Carbon taxes are a better way to implement climate policy than cap-and-trade."



Source: IGM Economic Experts Panel, December 4, 2012, December 20, 2011, and November 13, 2018.

Private Solutions to Externalities

The Types of Private Solutions

Moral codes and social sanctions

Charities

Self-interest of the relevant parties

- Integrating different types of businesses
- Negotiating a contract

The Coase Theorem

Coase theorem

- Private economic actors can potentially solve the problem of externalities among themselves

Whatever the initial distribution of rights

- Interested parties can reach a bargain
- Everyone is better off
- Outcome is efficient

Why Private Solutions Do Not Always Work

Transaction costs

- Costs that parties incur in the process of agreeing to and following through on a bargain

Bargaining simply breaks down

Coordination problems

- Large number of interested parties
- Coordinating everyone is costly

Conclusion

- The invisible hand of the marketplace may fail to allocate resources efficiently
- When people cannot solve the problem of externalities privately, government intervenes
- Government can require market participants to bear the full costs of their actions by internalizing the externality
- Market forces, properly redirected, are often the best remedy for market failure

References

Mankiw, N.G., (2024) **Principles of Microeconomics**, 10th ed., Cengage, (ISBN-13: 978-981-5119-30-5)

Class activities

Consider the market for fire extinguishes

A. Why might fire extinguishers exhibit positive externalities?

B. Draw a graph of the market for fire extinguishers, labeling the demand curve, the social-value curve, the supply curve, and the social cost curve.

C. Indicate the market equilibrium level of output and the efficient level of output. Give an intuitive explanation for why these quantities differ.

D. If the externality benefit is $10 per extinguisher, describe a government policy that would yield the efficient outcome.