

# Markets Failure

EE311

Chayun Tantivasadakarn

Faculty of Economics,

Thammasat University

# Topics to be Discussed

- Why markets fail
- Asymmetric information
  - Adverse selection problems
  - Moral Hazard problems
- Externalities
  - Negative externalities
  - Positive externalities
- Public goods and free rider problems

# Why Markets Fail

## 1. Market Power

Those with market power choose the price and quantity

Less output is sold than in competitive markets -->

Inefficiency

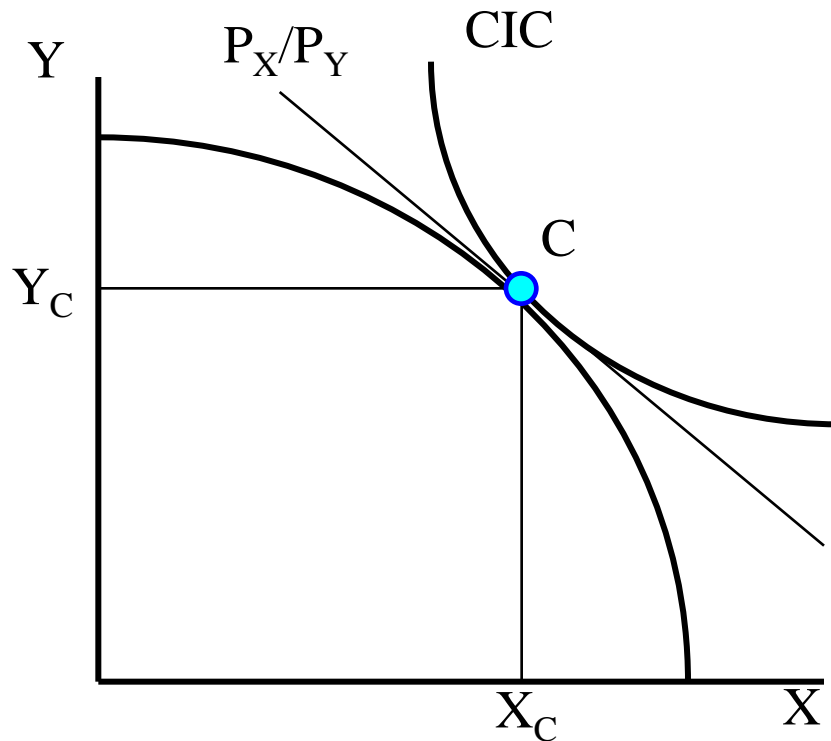
- Let X be a monopolized market, but Y be competitive  
Firms in X produce until  $P_X > MR_X = MC_X$ . Firms in Y produce until  $P_Y = MR_Y = MC_Y$ . Hence,

$$|MRS_{XY}| = \frac{P_X}{P_Y} > \frac{MR_X}{MR_Y} = \frac{MC_X}{MC_Y} = |MRT_{XY}|$$

# Imperfect competition and market failure

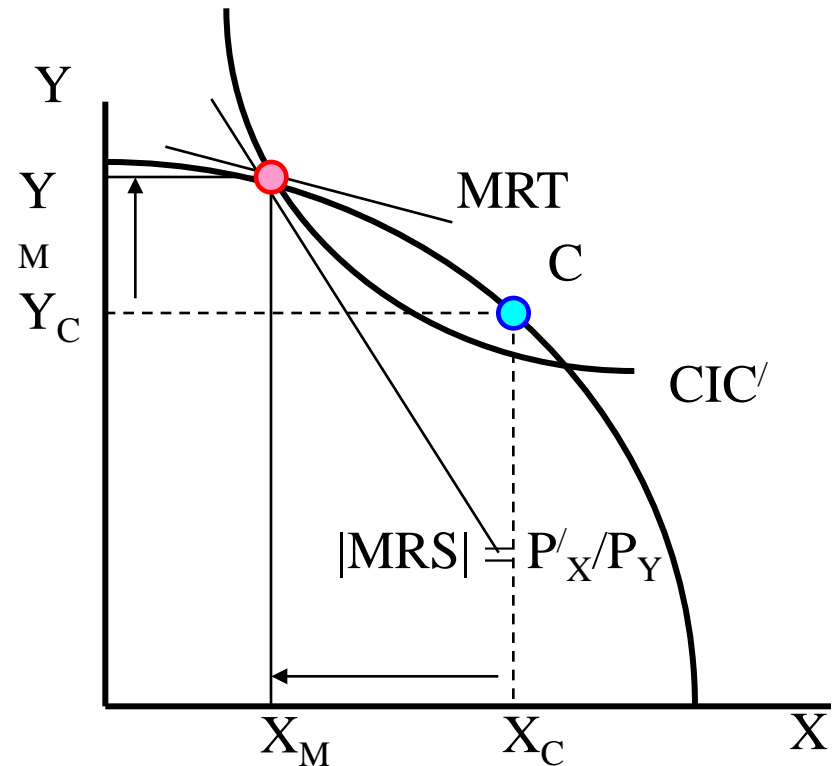
If X and Y are competitive

$$|MRT| = P_X/P_Y = |MRS|$$



If X is monopolized Y is competitive

$$|MRT| < P'_X/P_Y = |MRS|$$



# Why Markets Fail

## 2. Incomplete Information

Consumers must have accurate information about market prices or production quality for markets to operate efficiently

Lack of information can change supply and demand

- Too much goods with low quality
- Consumers can't find enough goods with sufficient quality

Some markets may never develop

# Why Markets Fail

## 3. Externalities

Consumption or production has indirect effect on other consumption or production not reflected in market prices

Market prices do not always reflect the activities of either producers or consumers

## 4. Public Goods

Nonexclusive, nonrival good that, once available, is difficult to prevent others from consuming

Example: Company thinking about researching a new technology if can't get patent

# Asymmetric Information



- **Asymmetric information:** a buyer and a seller knows different information about a transaction
- The one who knows more is the informed party and the one who knows less is the uninformed party. -> opportunistic behavior
- Asymmetric information leads to
  - **Adverse selection:** Unobserved characteristics
  - **Moral hazard:** Unobserved actions

# Adverse selection and the Market for Lemons

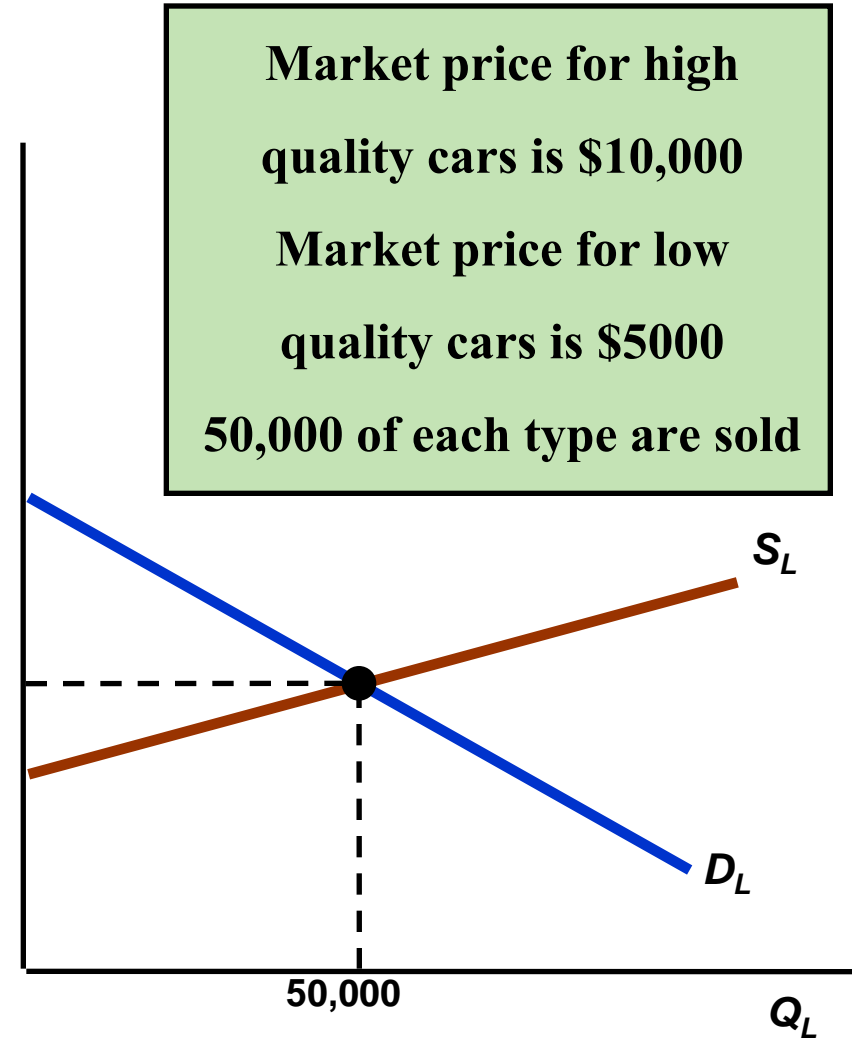
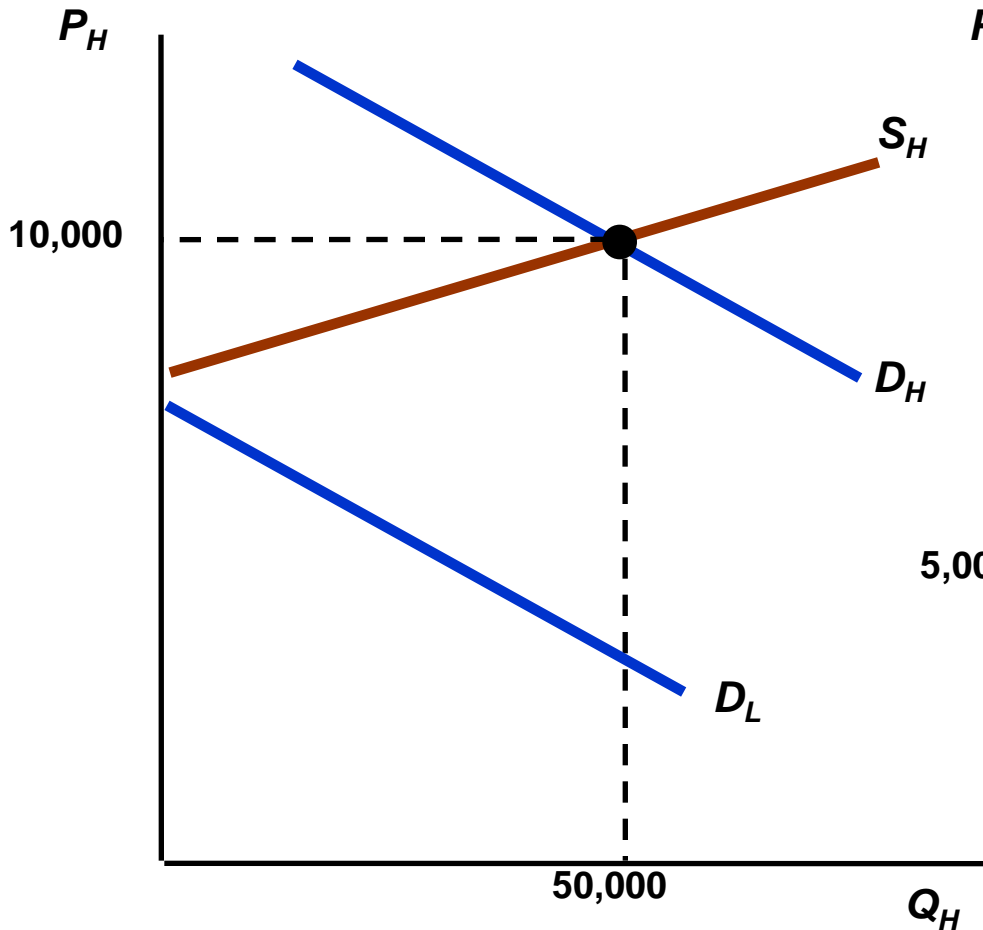
- Adverse selection: Low quality goods drive high quality goods out of the market because **unobserved characteristics**
- Examples
  - The lack of complete information when purchasing a used car increases the risk of the purchase and lowers the value of the car.
  - Markets for insurance, financial credit and employment are also characterized by asymmetric information about product quality

# Used Cars and lemon problem

- Assume: Two kinds of cars – low quality (lemons) and high quality (plums)
- If buyers and sellers can distinguish between the cars  
->There will be two markets – one for high quality and one for low quality
- High quality market
  - $S_H$  is supply and  $D_H$  is demand for high quality
- Low quality market
  - $S_L$  is supply and  $D_L$  is demand for low quality



# The Lemons Problem



Market price for high quality cars is \$10,000  
Market price for low quality cars is \$5000  
50,000 of each type are sold

# The Market for Used Cars

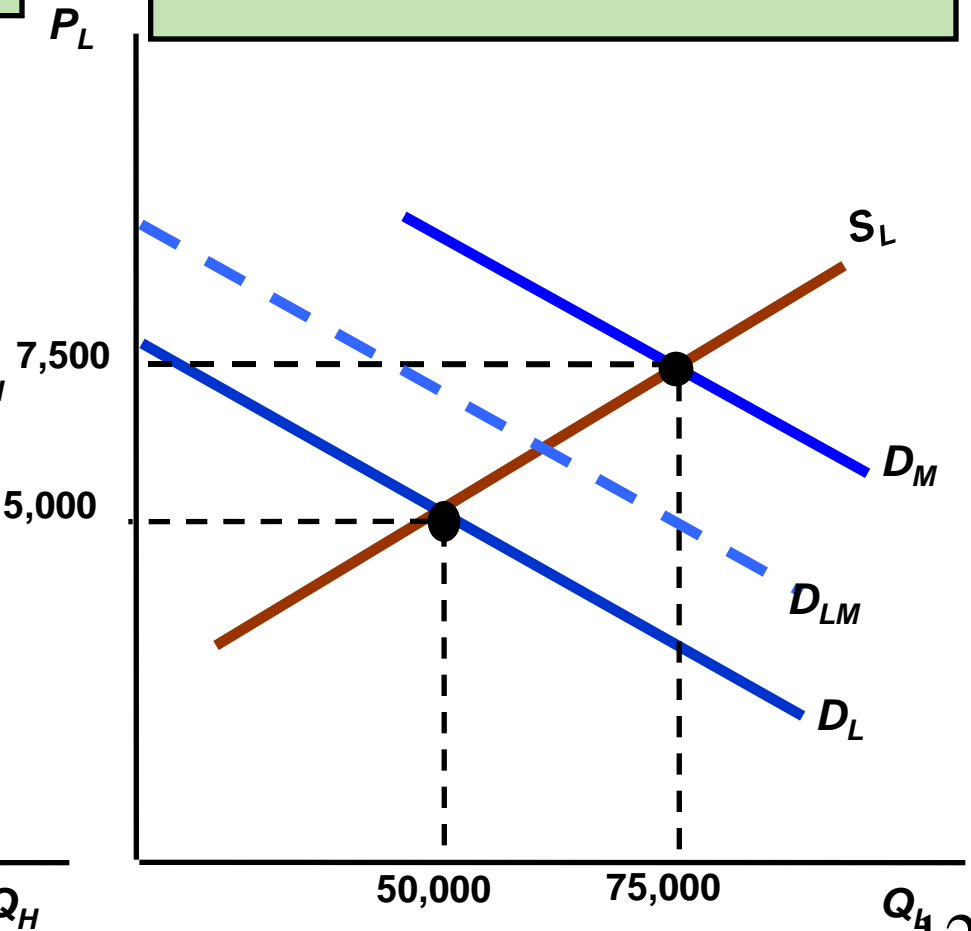
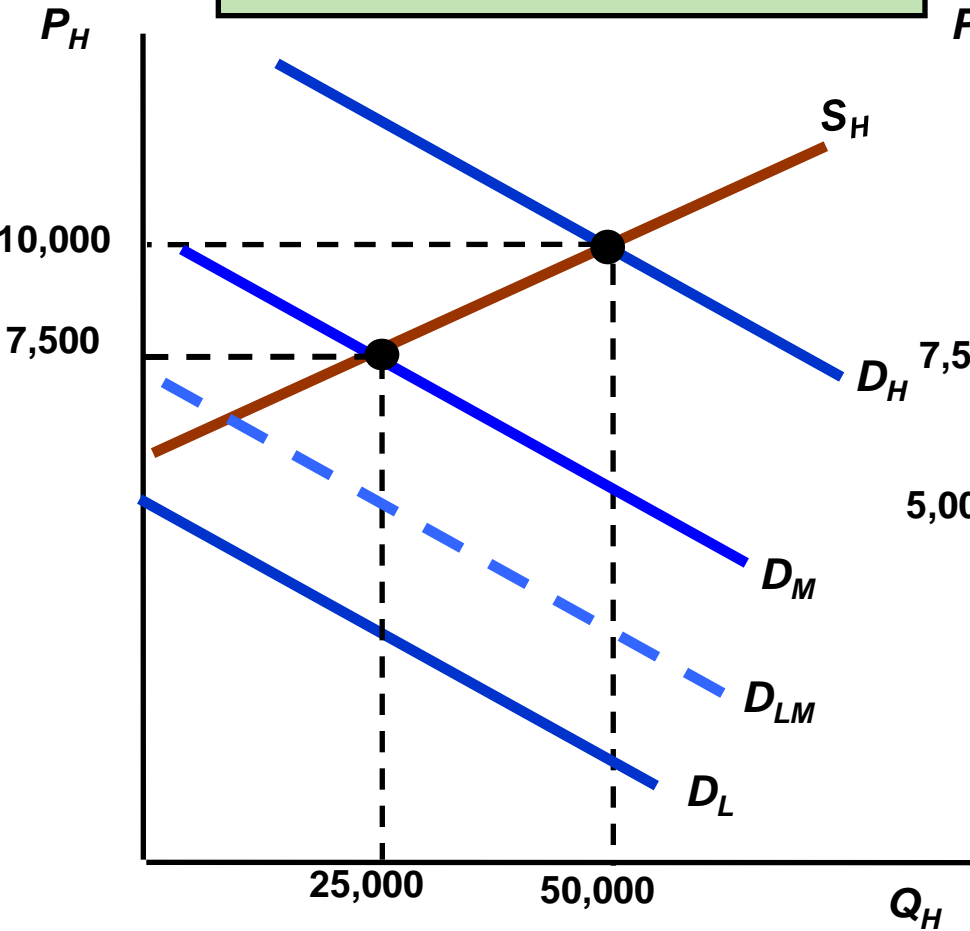
- $S_H$  is higher than  $S_L$  because owners of high quality cars need more money to sell them
- $D_H$  is higher than  $D_L$  because people are willing to pay more for higher quality
- Sellers know more about the quality of the used car than the buyer
- Initially buyers may think the odds are 50/50 that the car is high quality
  - Buyers will view all cars as medium quality with demand  $D_M$
- However, fewer high quality cars (25,000) and more low quality cars (75,000) will now be sold
- Perceived demand will now shift

# The Lemons Problem



Medium quality cars sell for \$7500 selling 25,000 high quality and 75,000 low quality

The increase in  $Q_L$  reduces expectations and demand to  $D_{LM}$ . The adjustment process continues until demand =  $D_L$ .



# The Market for Used Cars

- With unobserved characteristics:
  - Low quality goods drive high quality goods out of the market- the lemons problem.
  - The market has failed to produce mutually beneficial trade.
  - Too many low and too few high quality cars are on the market.
  - Adverse selection occurs; most cars on the market will be low quality cars.



# Market for Insurance

- Older individuals have difficulty purchasing health insurance at almost any price
- They know more about their health than the insurance company
- Because unhealthy people are more likely to want insurance, proportion of unhealthy people in the of insured people rises
- Price of insurance rises so healthy people with low risk drop out – proportion of unhealthy people rises increasing price more



# Market for Insurance

- If auto insurance companies are targeting a certain population – males under 25
- They know some of the males have low probability of getting in an accident and some have a high probability

If can't distinguish among insured, it will base premium on the average experience

- Some with low risk will choose not to insure and with raises the accident probability and rates



# Market for Credit

- The Market for Credit
  - Asymmetric information creates the potential that only high risk borrowers will seek loans.
  - Can end up with lemon problem again
  - However, banks and credit agencies use credit histories to gauge risk of borrowers



# Solutions to adverse selection problems

- Control: force insurance -> pool risks
- Reputation: credit history, “open since ..”
- Standardization and Certification
  - Chains that keep production the same everywhere –  
McDonalds
- Screening: testing the product
- Third-party Comparisons
- Market signaling:
  - must be credible: warranties
  - high quality producers must have low signaling cost
  - not works if all sending the same signal

# Market Signaling

- The process of sellers using signals to convey information to buyers about the product's quality.
- For example, how do workers let employers know they are productive so they will be hired?
- Weak signal could be dressing well
  - Is weak because even unproductive employees can dress well
- Strong Signal
  - To be effective, a signal must be easier for high quality sellers to give than low quality sellers.
  - Example: Highly productive workers signal with educational attainment level.

# Moral Hazard

- Moral hazard occurs when the informed parties exploit the uninformed parties due to **unobserved action**. Examples:
  - If my home is insured, I might be less likely to lock my doors or install a security system
  - Financial institutions was less prudent because they know that central bank would help them
  - Teachers can't promise all students who attend classes to get at least B
  - Principal-Agent problems

# Moral Hazard

- Determining the Premium for Fire Insurance
  - Warehouse worth \$100,000
  - Probability of a fire:
    - .005 with a \$50 fire prevention program
    - .01 without the program
  - If the insurance company cannot monitor to see if the program was run, how do they determine premiums?

# Moral Hazard

- With the program the premium is:
  - $.005 \times \$100,000 = \$500$
- Once insured owners purchase the insurance, the owners no longer have an incentive to run the program, therefore the probability of loss is .01
- \$500 premium will lead to a loss because the expected loss is now \$1,000 ( $.01 \times \$100,000$ )

## Exercise

- Thai Tour operators often compete for Chinese tourists so much such that they offer “zero dollar tour package”.
- Use the theory about asymmetric information to explain this situation.



# The Principal – Agent Problem

- Principal-agent problem arises when welfare of the principal depends on the unobserved performance of the agent
  - Owners cannot completely monitor their employees
  - Share holders cannot completely monitor the effort of the manager
  - Voters cannot easily remove politicians who do not keep their promises



# Reducing Moral Hazard

- Price discrimination by historical records
  - Bad drivers pay higher premium
- Partial liability
  - deductible: auto-insurers take partial liability in case of their own carelessness
- Profit sharing and piece rate contract
- Efficiency wage contract

# Efficiency Wage Theory

- In a competitive labor market, all who wish to work will find jobs for a wage equal to their value of marginal product.
  - However, most countries' economies experience unemployment.
- The efficiency wage theory can explain the presence of unemployment and wage discrimination.
  - > One way to solve Principal-agent problem.

# Efficiency Wage Theory

- The shirking model can be better used to explain unemployment and wage discrimination.
  - Assumes perfectly competitive markets
  - However, workers can work or shirk.
  - Since performance information is limited, workers may not get fired.

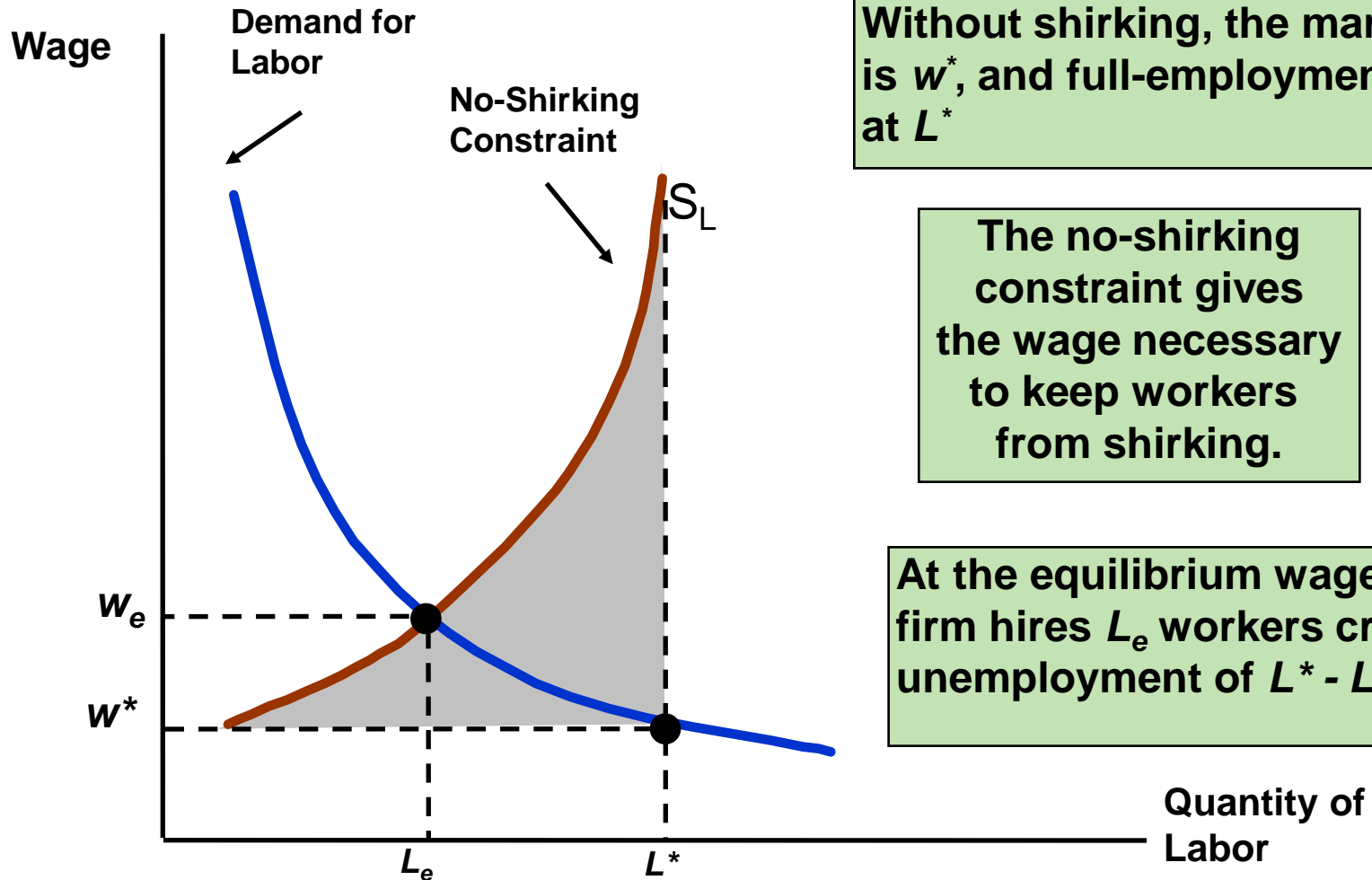
# Efficiency Wage Theory

- If workers paid market clearing wage  $w^*$ , they have incentive to shirk
- If get caught and fired, they can immediately get a job elsewhere for same wage
- Firms have to pay a higher wage to make loss higher from shirking
- Wage at which no shirking occurs is the **efficiency wage**

# Efficiency Wage Theory

- Firms will offer more than market clearing wage,  $w^*$ , say  $w_e$  (efficiency wage)
- In this case workers fired for shirking face unemployment because demand for labor is less than market clearing quantity

# Unemployment in a Shirking Model



Without shirking, the market wage is  $w^*$ , and full-employment exists at  $L^*$

The no-shirking constraint gives the wage necessary to keep workers from shirking.

At the equilibrium wage,  $W_e$  the firm hires  $L_e$  workers creating unemployment of  $L^* - L_e$ .

# Efficiency Wages at Ford Motor Company

- Labor turnover at Ford
  - 1913: 380%
  - 1914: 1000%
    - Average pay = \$2 - \$3
    - Ford increased pay to \$5
- Results
  - Productivity increased 51%
  - Absenteeism had been halved
  - Profitability rose from \$30 million in 1914 to \$60 million in 1916.

# Externalities



- **Externalities** arise between producers, between consumers or between producers and consumers
- Externalities are the effects of production and consumption activities not directly reflected in the market
  - They can be negative or positive

# Externalities

- Side effects which producers or consumers impose on the third parties
- Negative externalities: Action by one party imposes costs on the third parties
  - Plant dumps waste in a river affecting those downstream
  - Car users release air pollution into the atmosphere
  - Both have no incentive to account for the **external costs** that they impose on others



# Externalities

- Positive externalities: Action by one party benefits the third parties
  - Large universities generate large customer base for shops located nearby
  - A vaccinated tourist does not contract contagious disease and help preventing it to spread out
  - Both did not take the **external benefits** into account when deciding to plant or vaccinate



# Negative Externalities and Inefficiency

- Scenario – paper plant dumping waste
  - **Marginal External Cost (MEC)** is the increase in cost imposed on fishermen downstream for each level of production.
  - **Marginal Social Cost (MSC)** is MC (Marginal private cost) plus MEC.
  - We can show the competitive market firm decision and the market demand and supply curves

# Negative Externalities and Inefficiency

- Assume the firm has a fixed proportions production function and cannot alter its input combinations
  - The only way to reduce waste is to reduce output
- Price of paper and quantity of paper initially produced is at the intersection of supply and demand

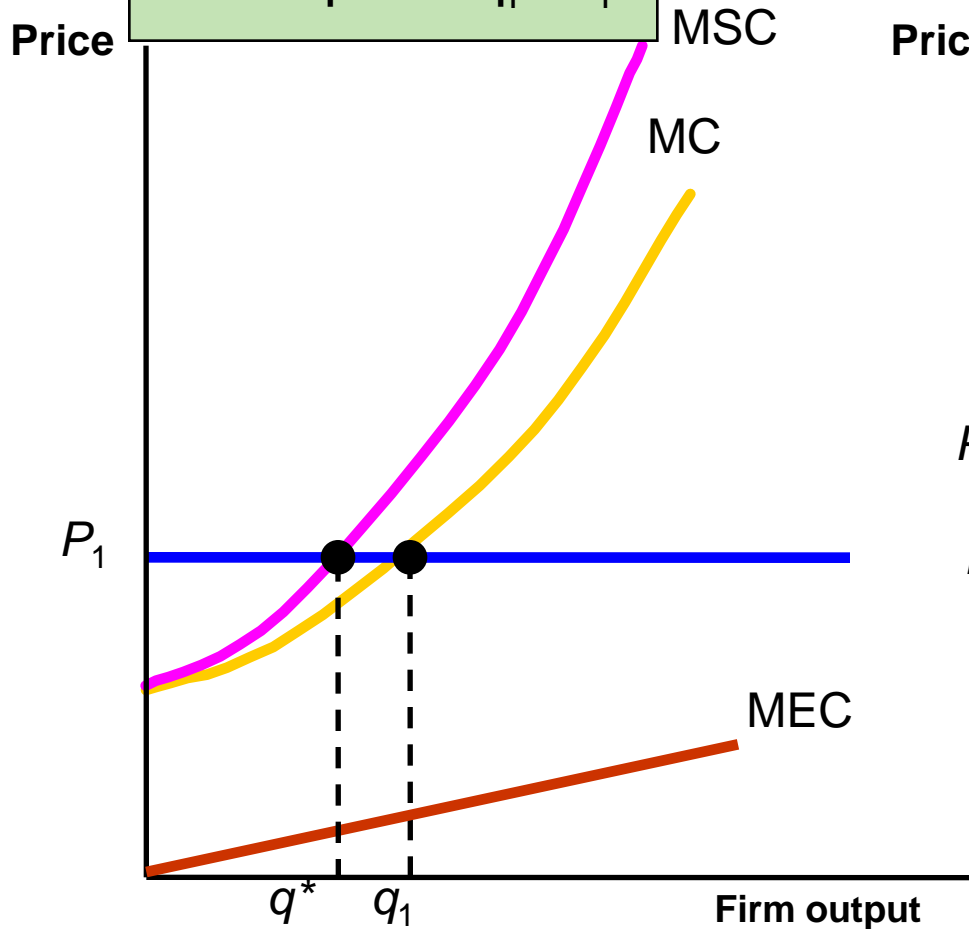
# Negative Externalities and Inefficiency

- The MC curve for the firm is the marginal costs of production
- Firm maximizes profit by producing where MC equals Price in a competitive firm
- As firm output increase, external cost on fishermen increases measured by the marginal external cost curve
- From a social point of view, **negative externality cause over production**

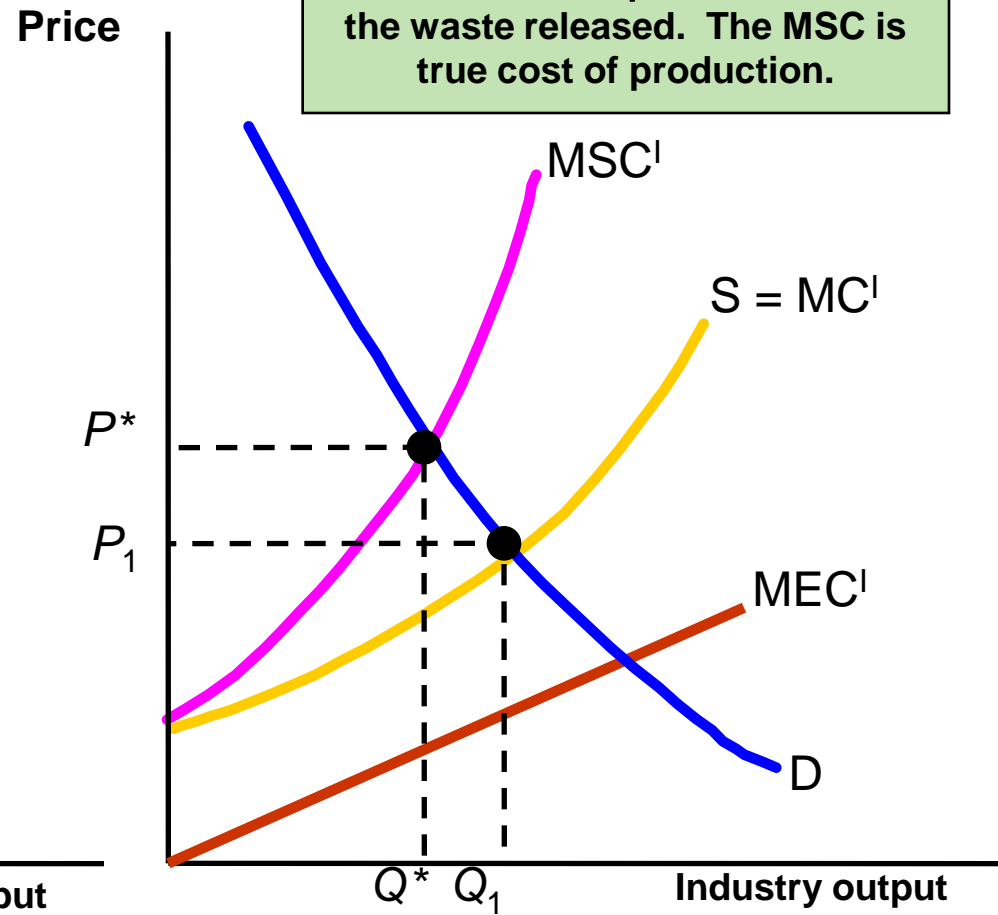
# External Costs

The profit maximizing firm produces at  $q_1$  while the efficient output level is  $q^*$ .

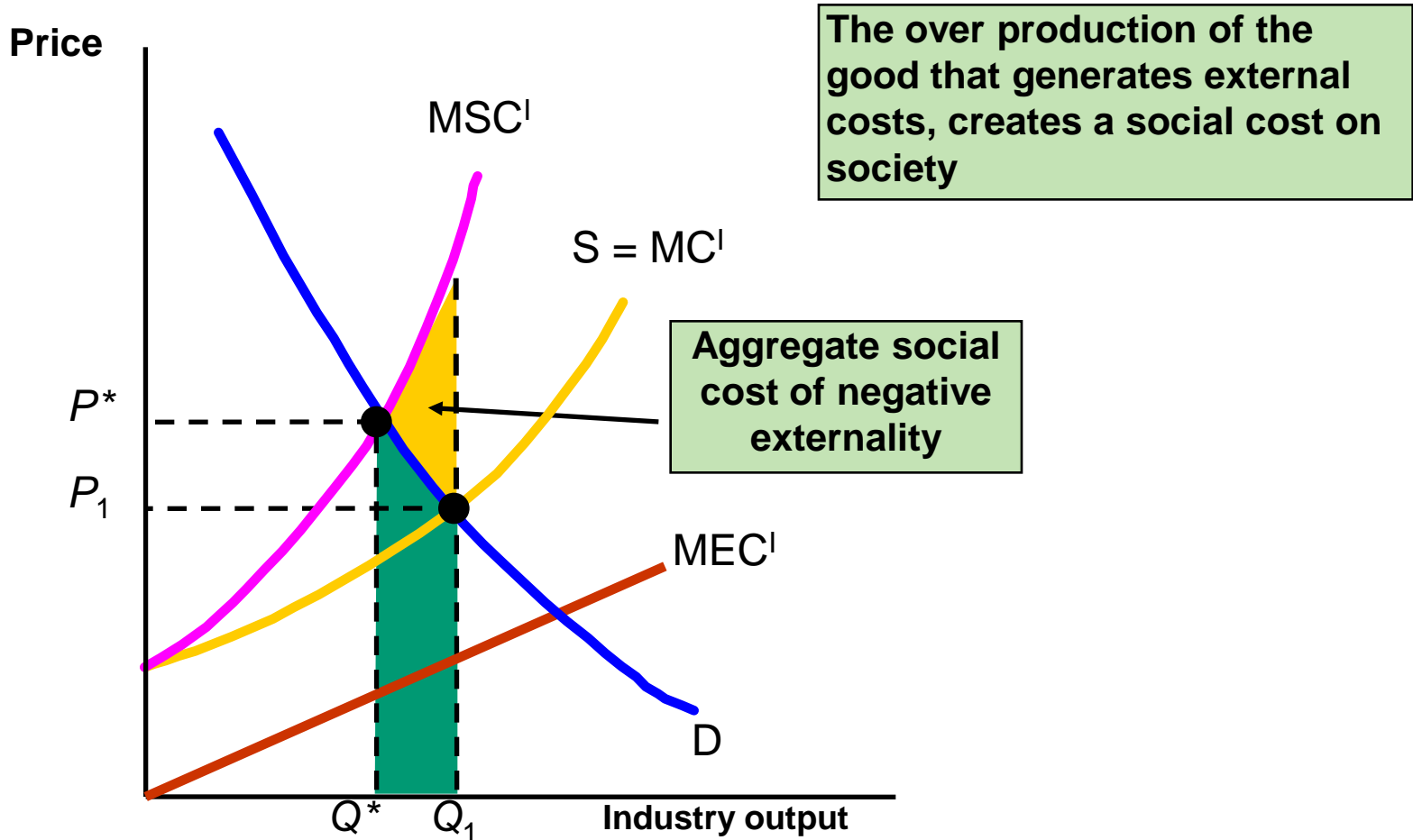
Firm will produce  $q_1$  at  $P_1$ .



There is MEC of production from the waste released. The MSC is true cost of production.



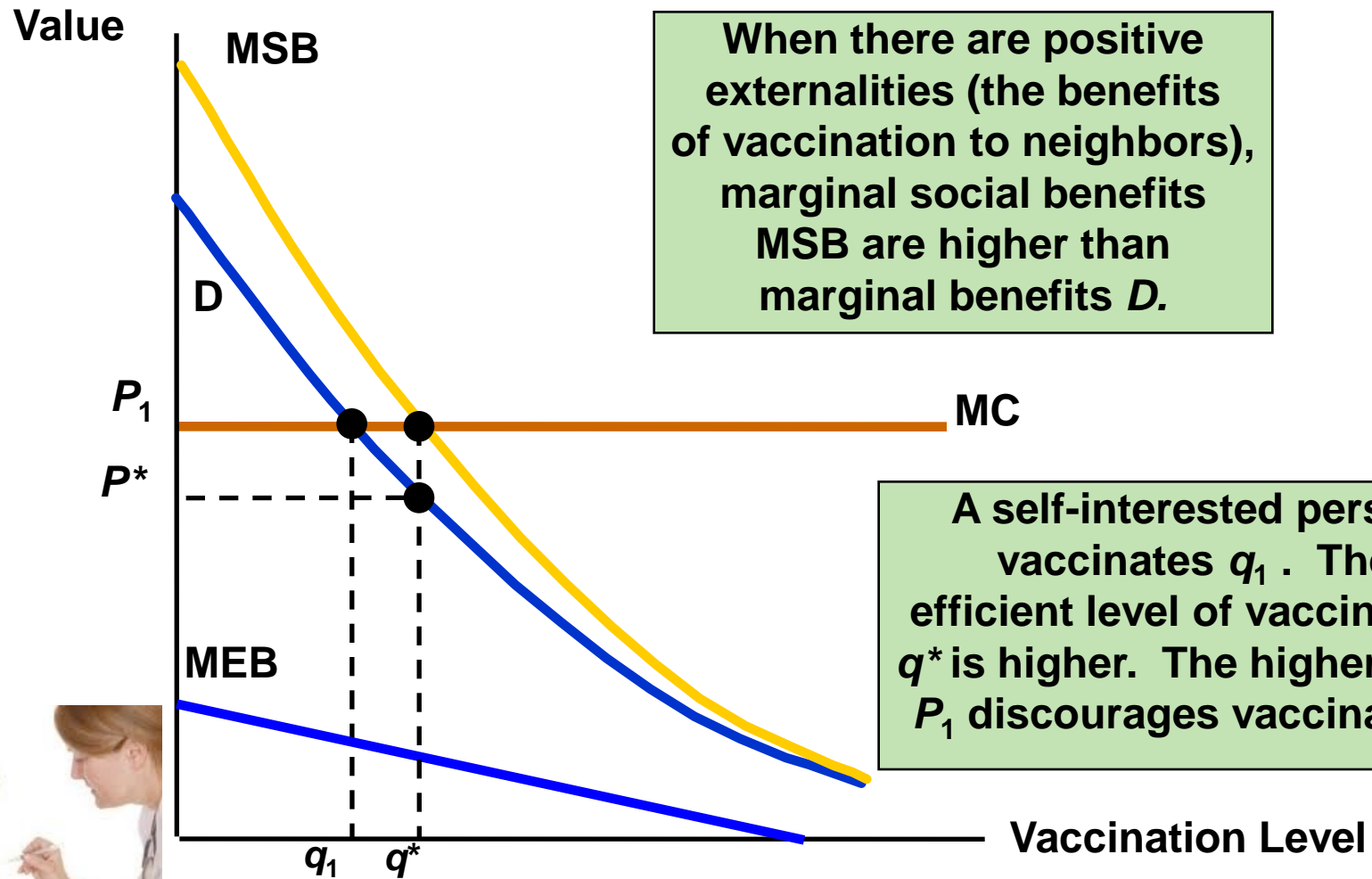
# External Costs



# Positive Externalities and Inefficiency

- Positive externalities result in too little production, as can be shown in an example of vaccination.
- Vaccination generates external benefits to the neighbors
  - Show by the **Marginal External Benefit** curve (MEB)
  - **Marginal Social Benefit** (MSB) curve adds  $MEB + D$

# External Benefits



# Question



- Why do department stores often set some areas for rent to small shops and have their own food court?

# When do externalities create problems?

Requires two conditions

- Activities of one party reduces or increases welfare of the third parties
- The third parties do not receive compensation for their welfare reduction or increase
- The party that increases others welfare does not receive compensation

# When do externalities create problems?



- Problems
  - Polluted wastes from plants
  - Massage parlors near schools
  - Liquor or cigarettes advertisement
  - Counterfeits of programs, songs, and movies
- No problems
  - Bee keepers and orchards
  - Department stores and food courts



# Ways of Correcting Market Failure due to externalities



- Assumption: The market failure is pollution
  - Output decision and emissions decision are independent
  - Firm has chosen its profit-maximizing output level
  - MEC is marginal external cost of emissions
    - Equivalent to MEC from before
    - Upward sloping because of substantially increasing harm as pollution increases

# Ways of Correcting Market Failure

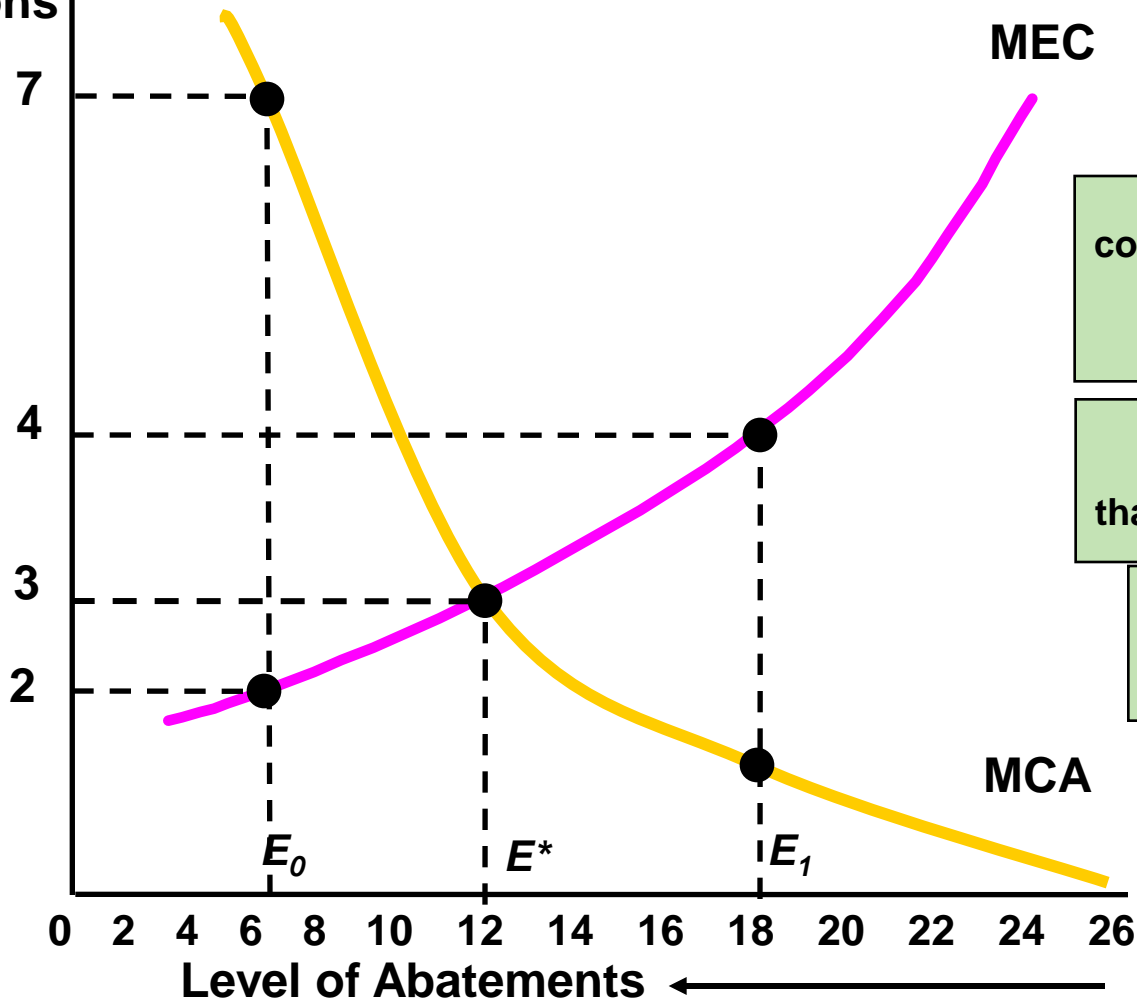


- MCA is marginal cost of abating emissions
  - Additional cost to firm of controlling pollution
  - Downward sloping because when emissions are high, little cost to controlling them
    - Large reductions require costly changes in production process

# The Efficient Level of Emissions



Dollars/ unit  
of Emissions



At  $E_0$  the marginal cost of abating emissions is greater than the marginal social cost.

At  $E_1$  the marginal social cost is greater than the marginal benefit.

The efficient level of emissions is where  $MCA = MEC$ .

# Ways of Correcting Market Failure

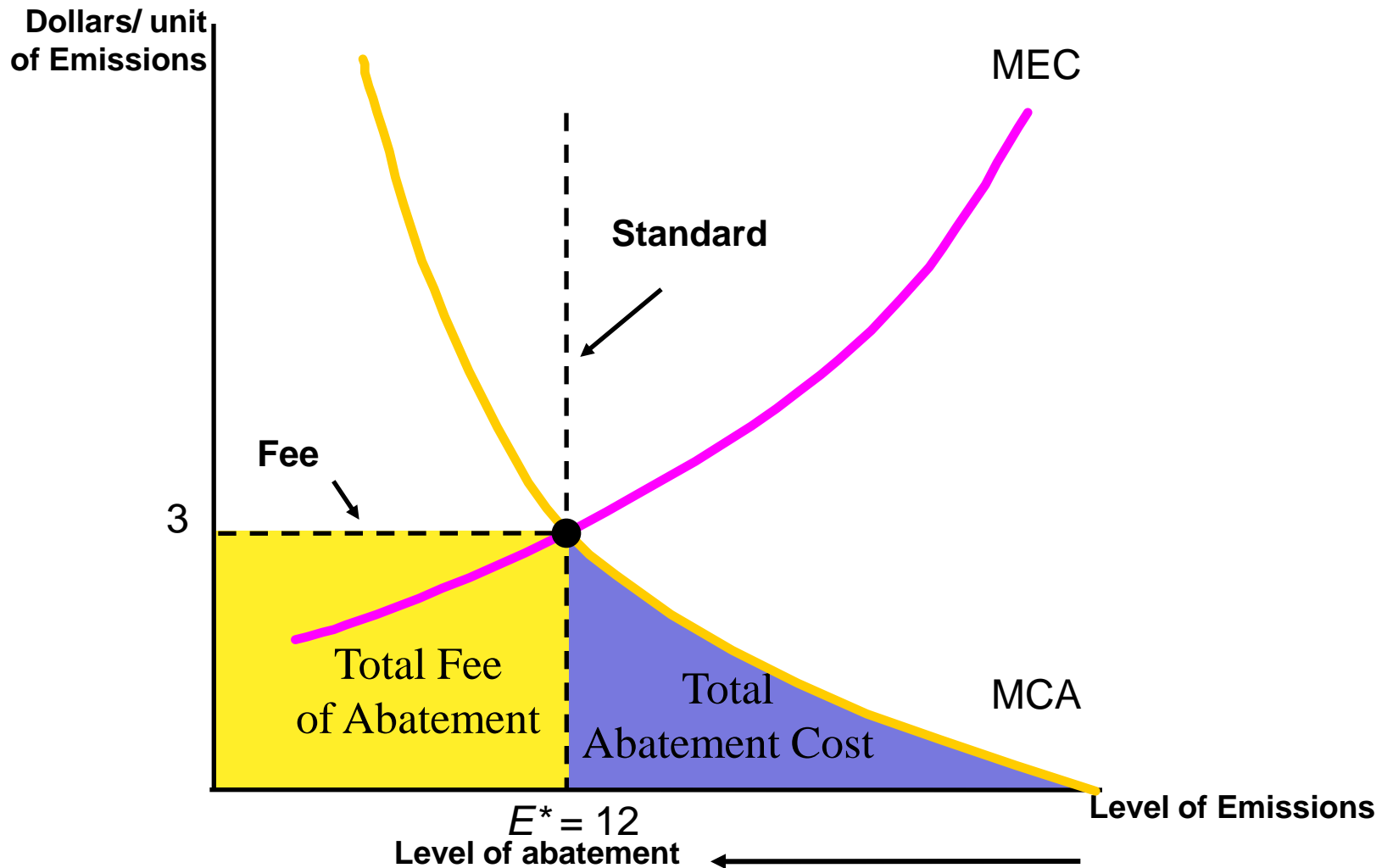
- If the firm does not consider abatement, their profit maximizing level is 26 units of emissions
  - Level where MCA is zero
- The socially efficient level of emissions is 12 where the MEC equals the MCA
- Firms can be encouraged to reduce emissions to the efficient level in three ways
  - Emissions standards
  - Emissions fees
  - Transferable emissions permits



# Ways of Correcting Market Failure

- Options for Reducing Emissions to  $E^*$ 
  - Emission Standard
    - Set a legal limit on emissions at  $E^*$  (12)
    - Enforced by monetary and criminal penalties
    - Increases the cost of production and the threshold price to enter the industry
  - Emissions Fee
    - Charge levied on each unit of emission

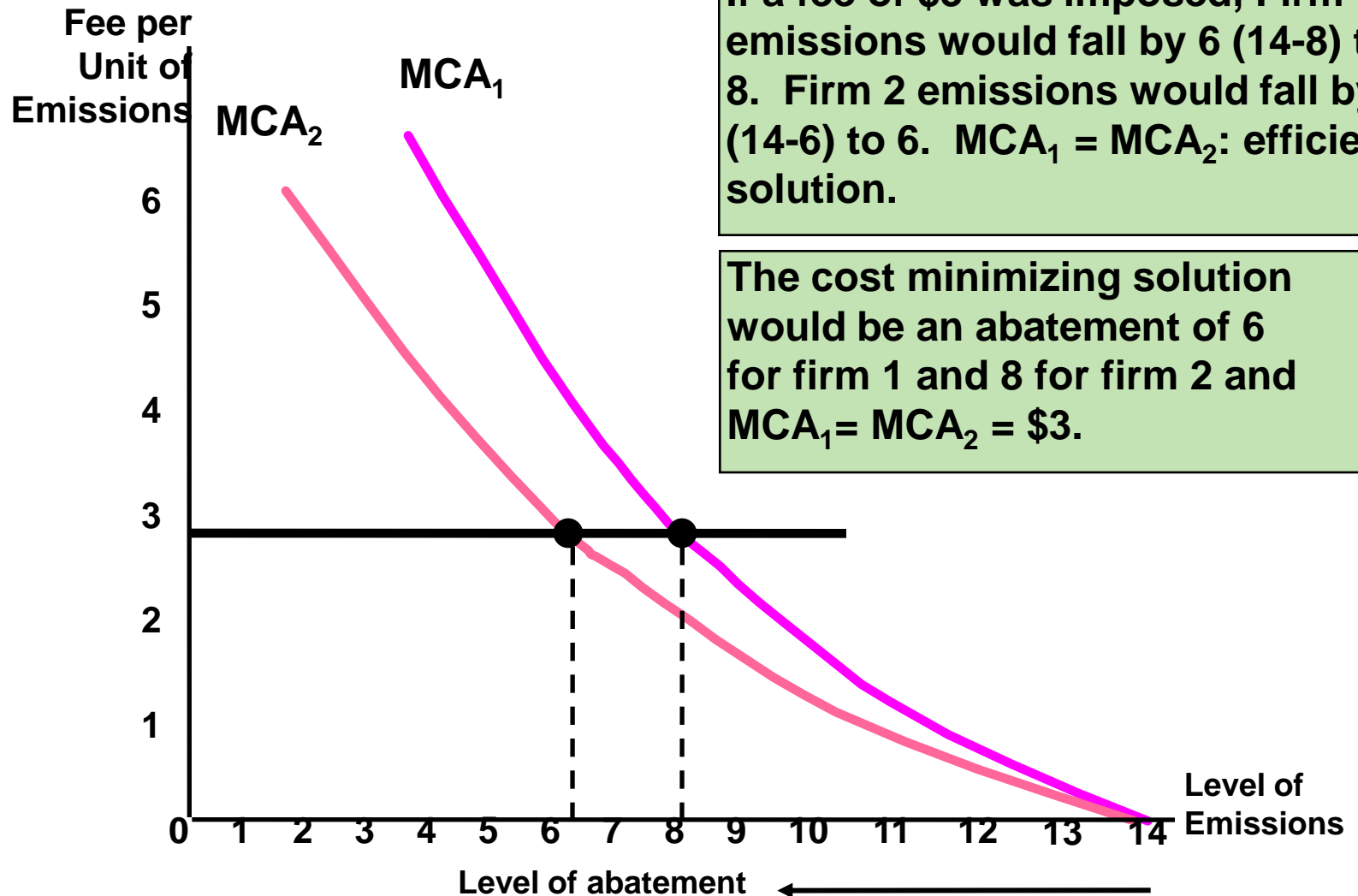
# Standards and Fees



# The Case for Fees

- Assume two firms
  - Total emissions is 28 units
  - Same marginal social cost curve
  - Different marginal abatement cost curves
    - $MCA_1$  and  $MCA_2$
- Emissions fees are preferable to standards in this case
  - We want to reduce total emissions by 14 units
  - The cheapest way to do that is for firm 1 to reduce by 6 and firm 2 by 8 units

# The Case for Fees



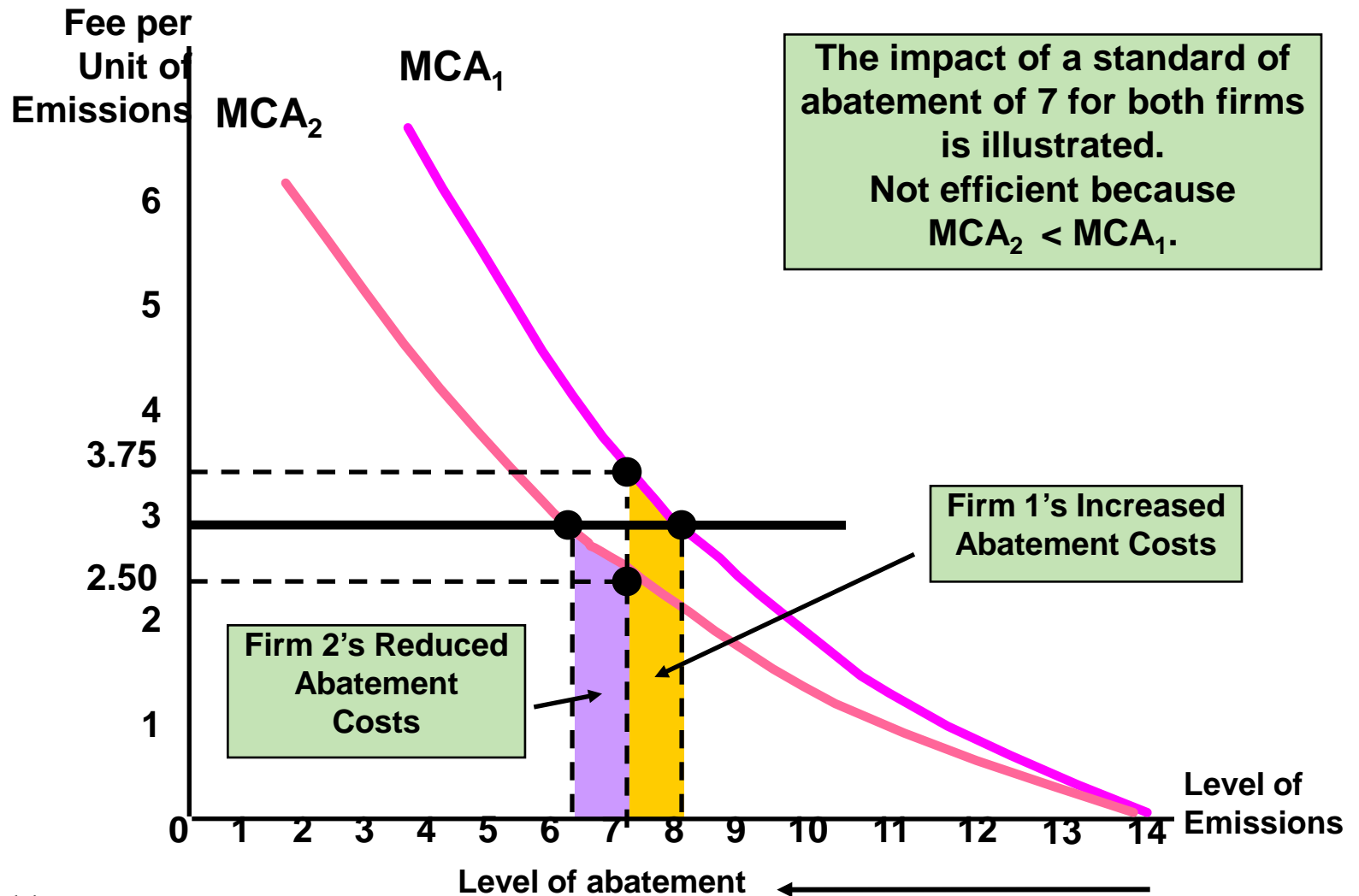
If a fee of \$3 was imposed, Firm 1 emissions would fall by 6 (14-8) to 8. Firm 2 emissions would fall by 8 (14-6) to 6.  $MCA_1 = MCA_2$ : efficient solution.

The cost minimizing solution would be an abatement of 6 for firm 1 and 8 for firm 2 and  $MCA_1 = MCA_2 = \$3$ .

## The Case for Fees

- What if the regulatory agency forces each firm to cut emissions by 7 units
  - MAC for firm 1 increases to \$3.75
  - MAC for firm 2 decreases to \$2.50
- This is not cost minimizing because one firm can reduce emissions at a lower cost than the other firm
- *Marginal cost of abatement must be equal between firms for reductions to occur at minimum cost*

# The Case for Fees



# Ways of Correcting Market Failure



- Advantages of Fees
  - When equal standards must be used, fees achieve the same emission abatement at lower cost.
  - Fees create an incentive to install equipment that would reduce emissions further.
  - Fees generate income to used to subsidize cleaner technology

# The Case for Standards

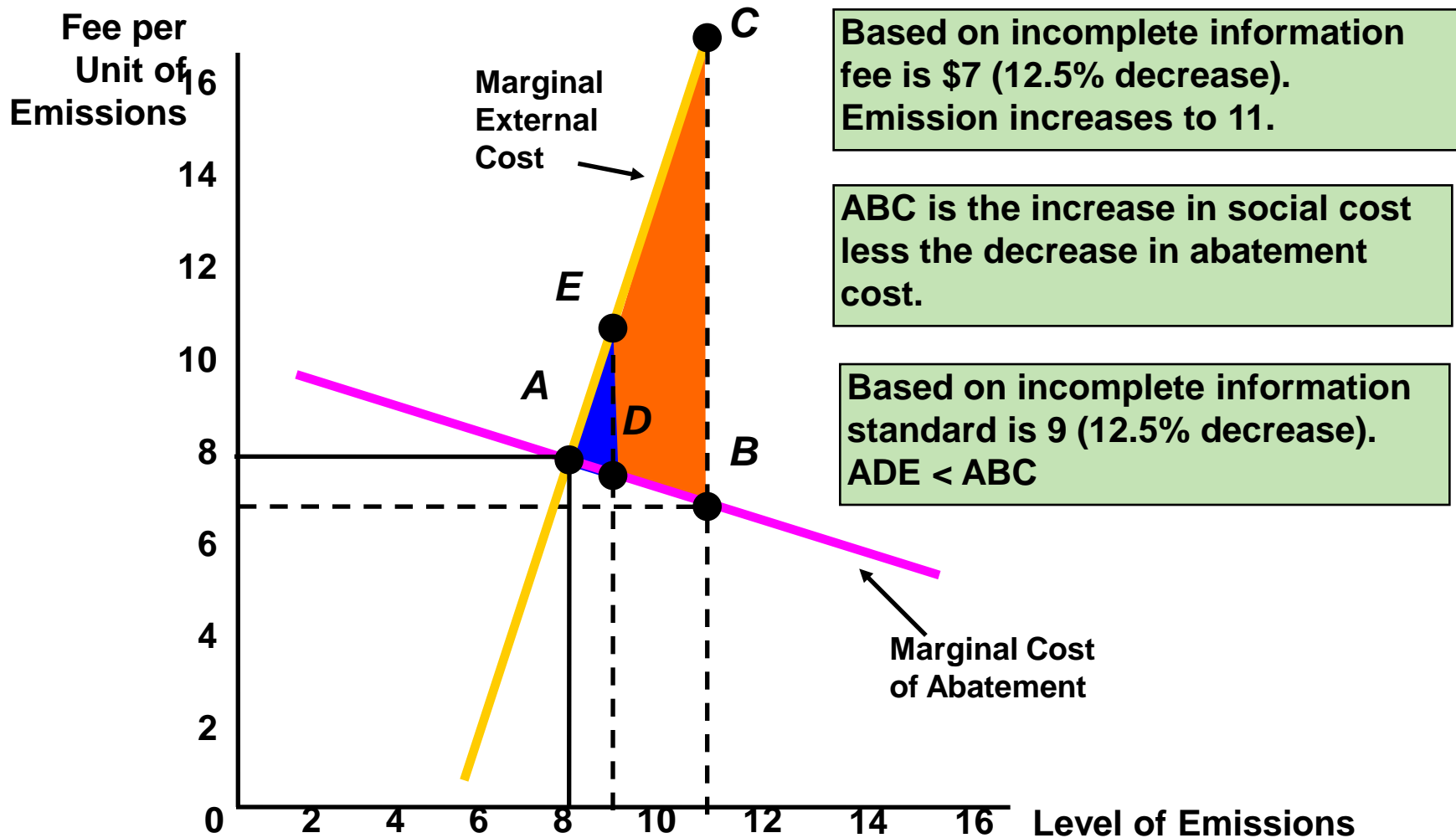


- Assume we have
  - Steep marginal external cost curve
  - Flat marginal cost of abatement
  - An emissions fee of \$8 would be efficient but because of limited information, fee is set at \$7
  - Firms emissions increase and with steep MEC, this will lead to significant additional social costs

# The Case for Standards

- What if standard is used instead and has the same percentage mistake
  - Standard set at 9 instead of 8
  - Increase in social cost and decrease in abatement costs
  - Net increase in social costs is smaller than with fees

# The Case for Standards



## Summary: Fees vs. Standards

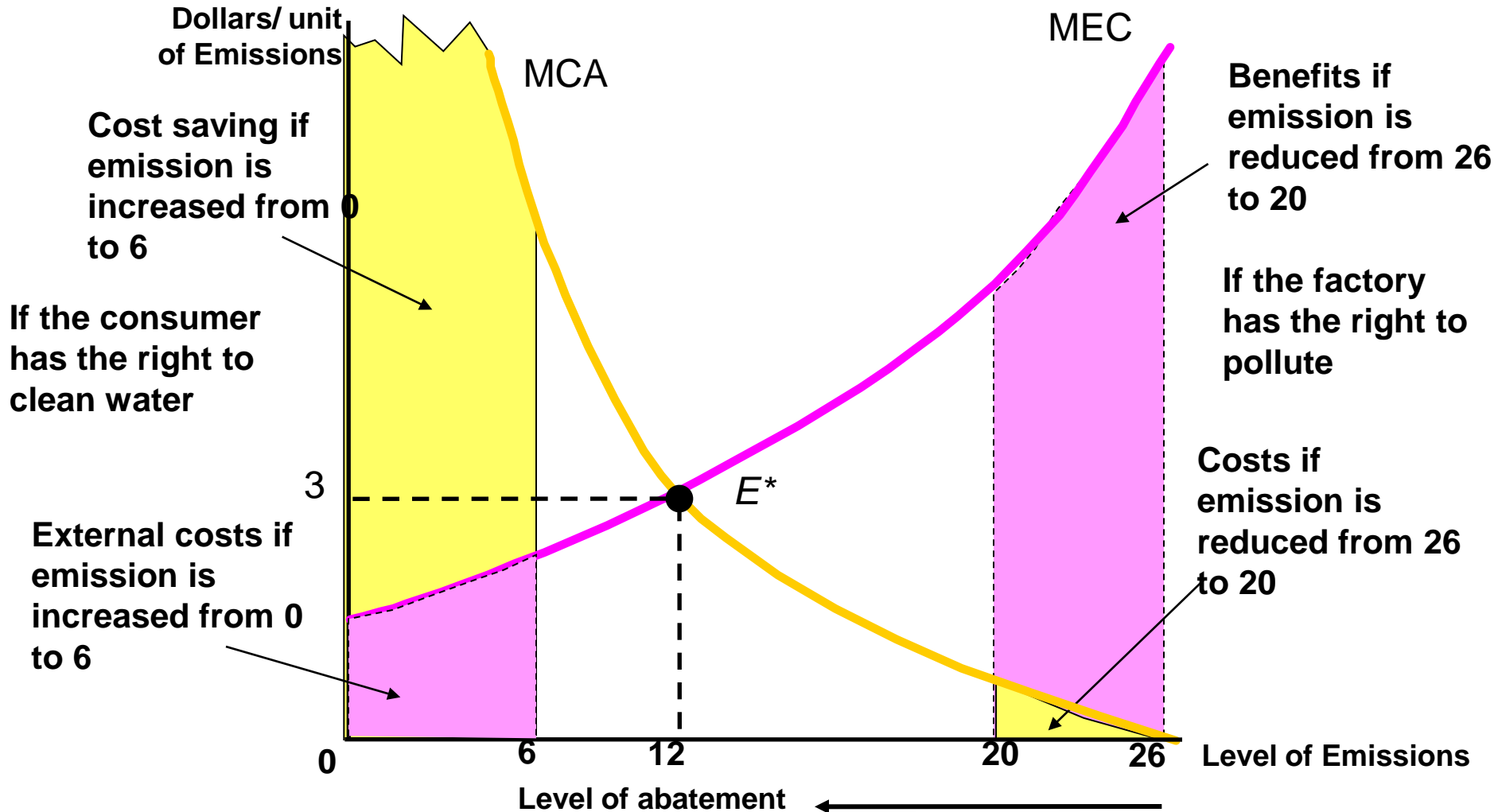
- Standards are preferred when MEC is steep and MCA is flat.
- Standards (incomplete information) yield more certainty on emission levels and less certainty on the cost of abatement.

# Property rights and Coase Theorem



- Property Rights
  - Legal rules describing what people or firms may do with their property
- Bargaining and Economic Efficiency
  - Economic efficiency can be achieved without government intervention when the externality affects relatively few parties and when property rights are well specified.

# Property rights and Coase Theorem



# Property rights and Coase Theorem

- The party that has no property rights can compensate the other party and moves toward the efficient outcome
- Conclusion: Coase Theorem
  - When parties can bargain without cost and to their mutual advantage, the resulting outcome will be efficient, regardless of how the property rights are specified.
- But transaction cost can be prohibitively high when there are many parties.

# Ways of Correcting Market Failure

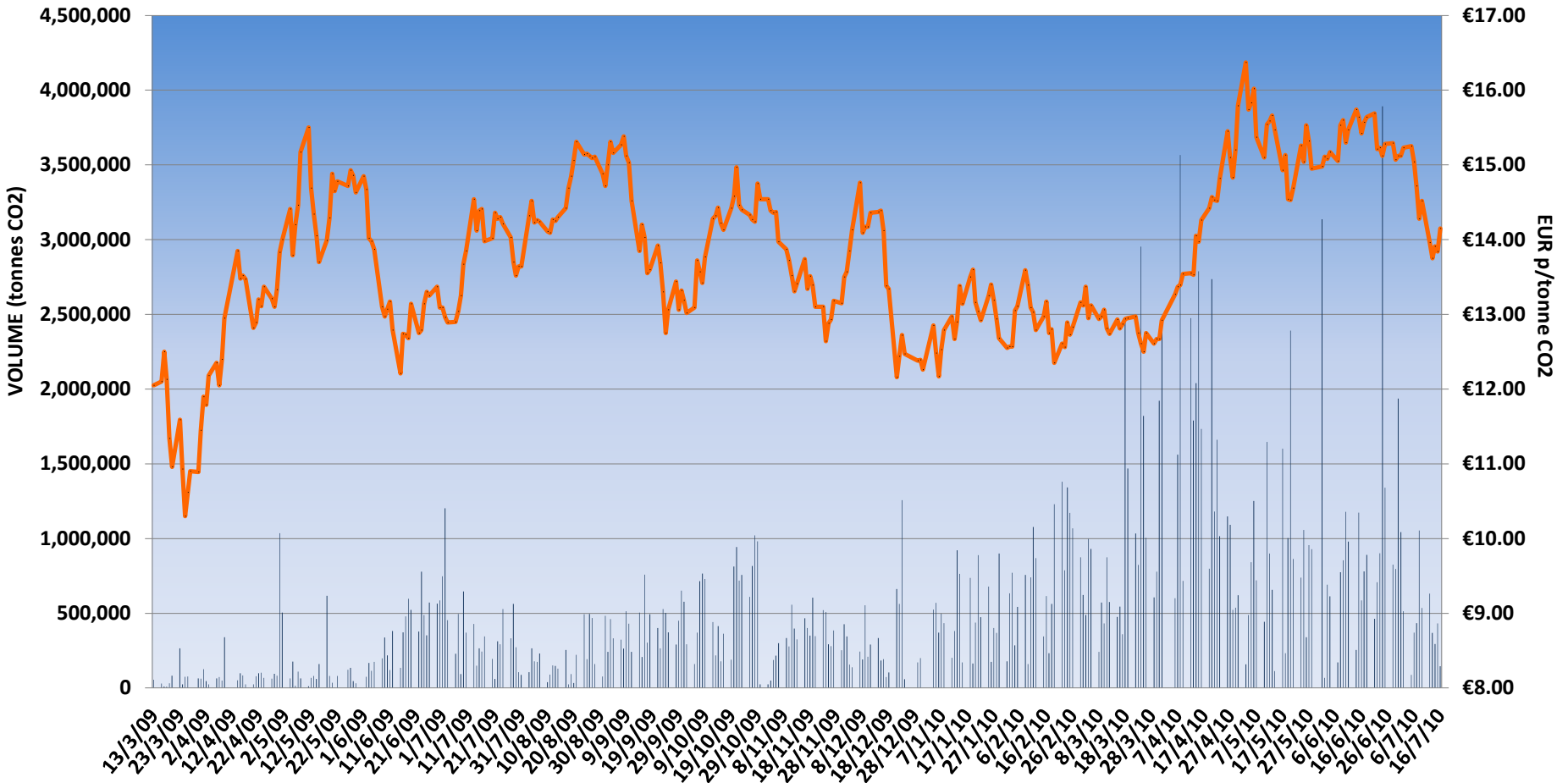
- Transferable Emissions Permits
  - Permits help develop a competitive market for externalities.
    - Agency determines the level of emissions and number of permits
    - Permits are marketable
    - High cost firm will purchase permits from low cost firms
    - Need competitive market

# European Climate Exchange



## ECX EUA Daily Futures Contract: Price & Volume

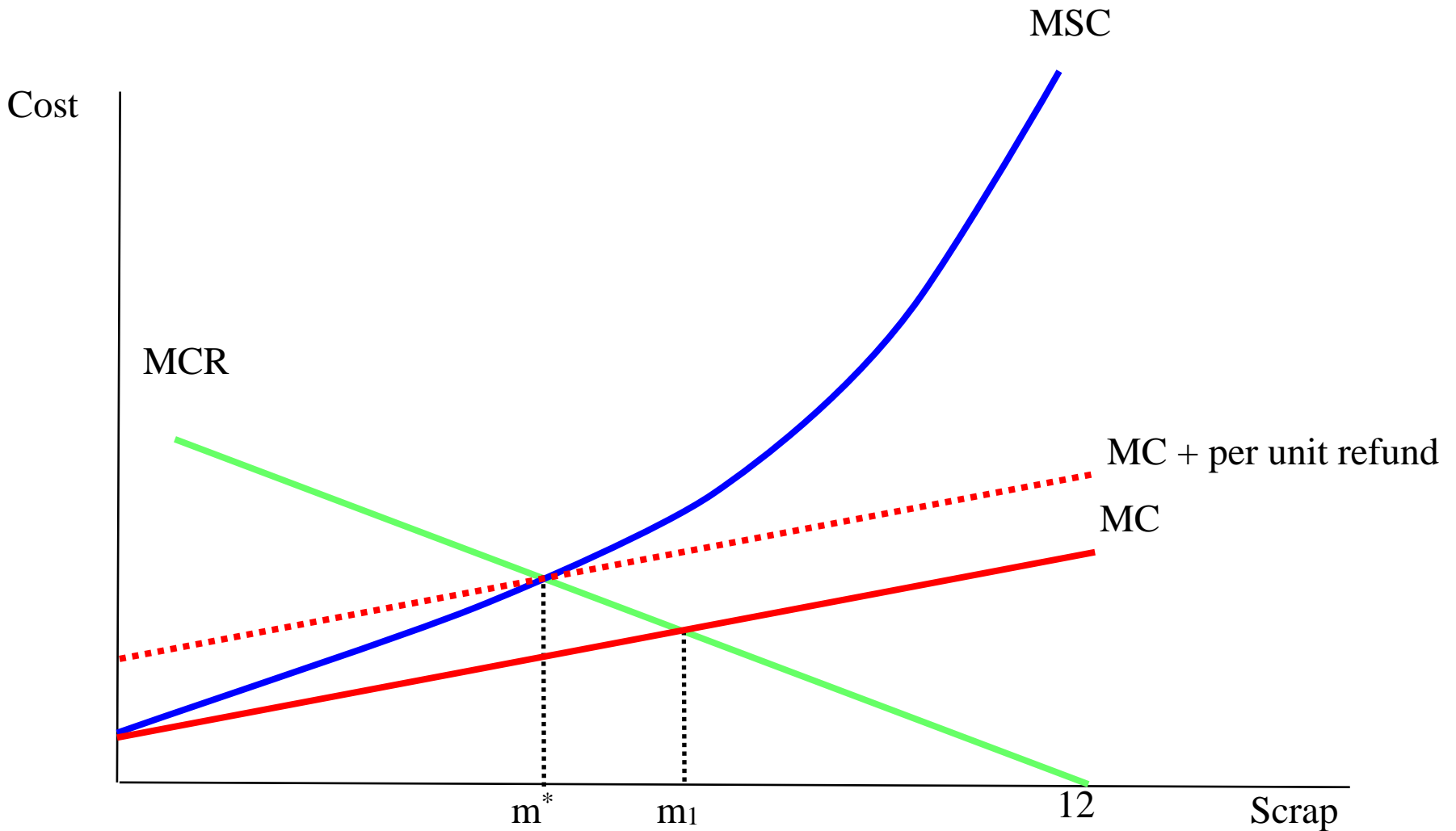
■ Total Volume    ■ Sett (€)



# Ways of Correcting Market Failure

- Recycling
  - Households can dispose of glass and other garbage at very low cost.
  - The low cost of disposal creates a divergence between the private and the social cost of disposal.
- Marginal private cost likely constant for fixed amount of garbage

# The Efficient Amount of Recycling



# Recycling

- Social cost of disposal includes the harm to environment from littering and injuries caused by litter
- Without market intervention, the level of scrap will be at  $m$  and  $m_1 > m^*$
- With refundable deposit, MC increases and  $MC = MSC = MCR$

# Alternative measures



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Reuse, Recycle, Reduce, Reject

# Public Goods: Characteristics

- Nonrival
  - For any given level of production the marginal cost of providing it to an additional consumer is zero.
- Nonexclusive
  - People cannot be excluded from consuming the good, so that it is difficult or impossible to charge for their use
  - Example – use of lighthouse by a ship, national defense, radio wave, fireworks

# Public Goods



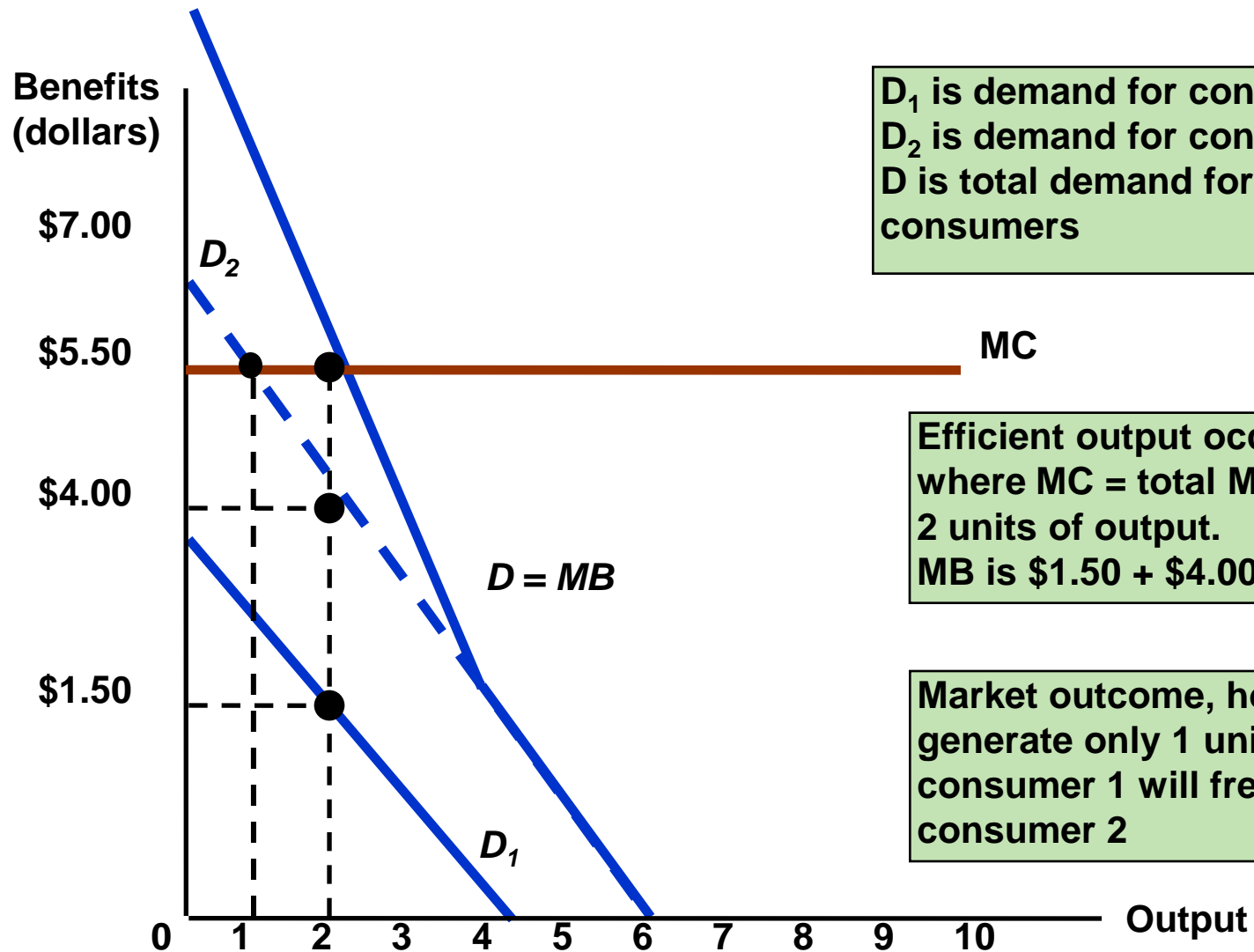
	Exclusive	Nonexclusive
Rival	Private goods: car, cloth 	Common property: forest, fish stock 
Nonrival	Semi-Public goods: cable TV, sport club 	Public goods: national defense, radio wave 

# Efficiency and Public Goods



- Efficient level of private good is where marginal benefit equals marginal cost
- For a public good, the value of each person must be considered
  - Can add demand of all those who value good
- Must equate the vertical sum of these marginal benefits to the marginal cost of production

# Efficient Public Good Provision



$D_1$  is demand for consumer 1  
 $D_2$  is demand for consumer 2  
 $D$  is total demand for all consumers

Efficient output occurs where  $MC = \text{total } MB$   
2 units of output.  
 $MB$  is  $\$1.50 + \$4.00$  or  $\$5.50$ .

Market outcome, however, generate only 1 unit since consumer 1 will free ride on consumer 2

# Public Goods and Market Failure

- Nonexclusive ->Free Riders
  - There is no way to provide some goods and services without benefiting everyone.
  - Households do not have the incentive to pay what the item is worth to them.
  - Free riders understate the value of a good or service so that they can enjoy its benefit without paying for it.
- Provision of public goods suffer from Prisoners' Dilemma.

# Private Preferences for Public Goods

- Government production of a public good is advantageous because the government can assess taxes or fees to pay for it.
- Determining how much of a public good to provide when free riders exist is difficult.

# Private Preferences for Public Goods

Voting may generate non-transitive social preferences.

	Rank 1	Rank 2	Rank 3
Voter 1	A	B	C
Voter 2	B	C	A
Voter 3	C	A	B

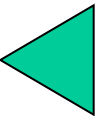
2 out of 3 prefer A to B, 2 out of 3 prefer B to C, 2 out of 3 prefer C to A --> non-transitive social preferences.

- In the previous case, voters have Single-Peaked preferences
- the median voter wins regardless of the sequence of voting
- But when voters have Multi-peaked preferences, the sequence of voting matters.

# Private Preferences for Public Goods



- From the previous preferences, the chosen allocation depends on the order in which the vote is taken.
- A v.s. B then compare the winner to C
  - 1st round: A wins then 2nd round: C wins
- C v.s. A then compare the winner to B
  - 1st round: C wins then 2nd round: B wins



# Arrow's Impossibility Theory

- A socially welfare function should satisfy
  - Complete and transitive
  - If every one prefers A to B, A should be socially preferred to B
  - Society's ranking of A and B should depend only on individuals' ranking of these two allocations, not on how they rank other alternatives
  - Dictatorship is not allowed
- Arrow proved that it is impossible to find a social welfare function that satisfies all this criteria.

# Private Preferences for Public Goods



- Example: democracy may not be fair
- There are 5 people
- Choice A: 4 people get 100 Baht from the last person.
- Choice B: do nothing.
- Majority rule would chose A over B.

# Common Property Resources



- Characteristics
  - Everyone has free access
  - Likely to be over utilized
  - Examples
    - Air and water
    - Fish, forest and animal populations
    - Minerals



# Common Property Resources

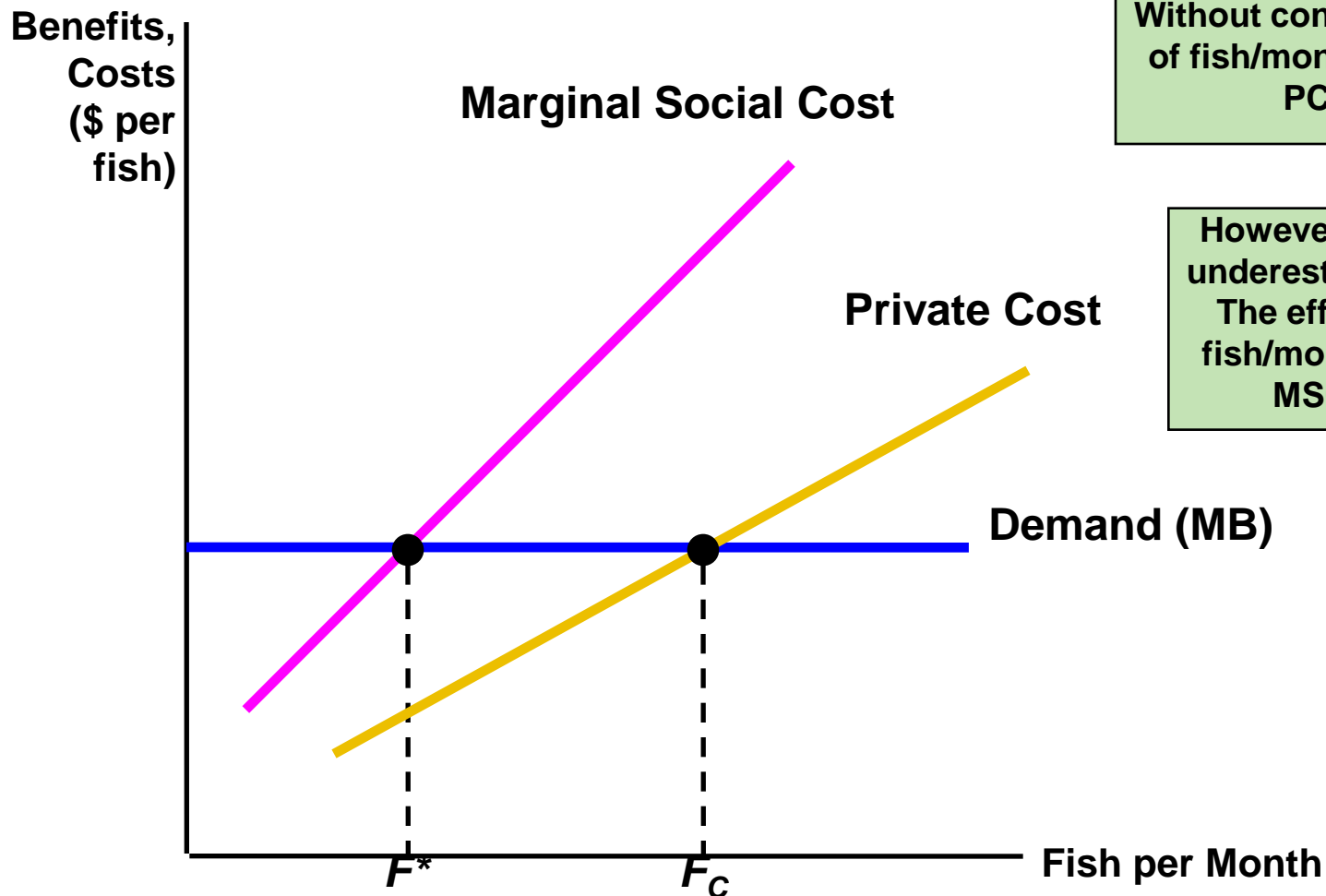


- Consider a lake where people fish
- Each fisherperson takes fish up to the point where the marginal benefit to them equals the marginal cost
- There is no reason that any one fisherperson take into account how their taking fish affects others experience

# Common Property Resources

- Private cost underestimates the true cost to society
  - More fishing reduces the stock of fish
  - Less is available to others and too low of a stock will completely deplete the fish
  - Too many fish are caught

# Common Property Resources



Without control the number of fish/month is  $F_C$  where  $PC = MB$ .

However, private costs underestimate true cost. The efficient level of fish/month is  $F^*$  where  $MSC = MB (D)$

# Common Property Resources



- Solution
  - Private ownership
  - Owner will set fee for use of resource equal to the marginal cost of depleting the stock
  - Fishermen will no longer find it profitable to catch more than the efficient amount of fish
  - It is often the case that private ownership is not possible, the government steps in