# 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,

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

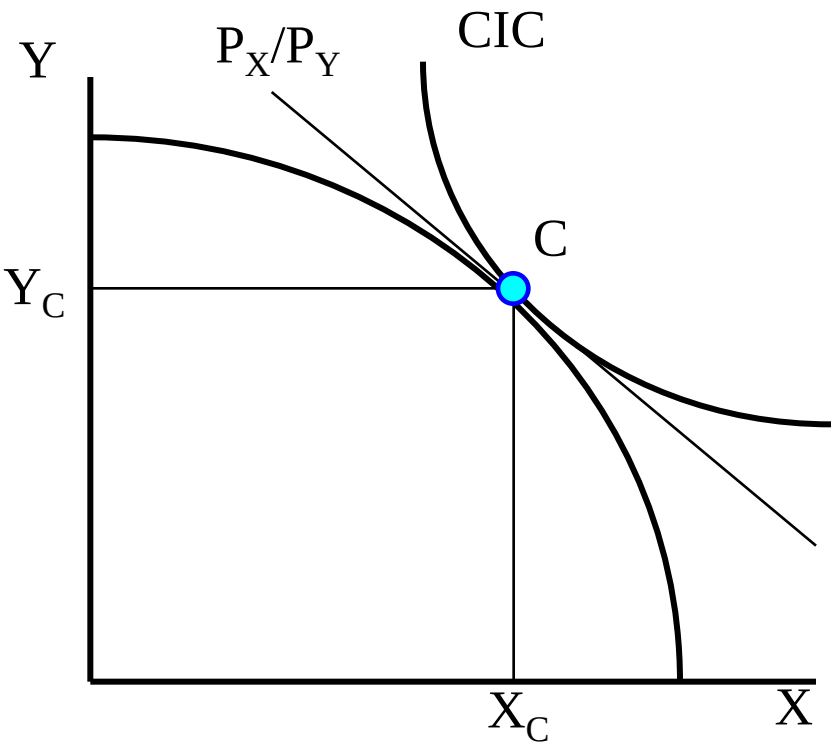
# Imperfect competition and market failure

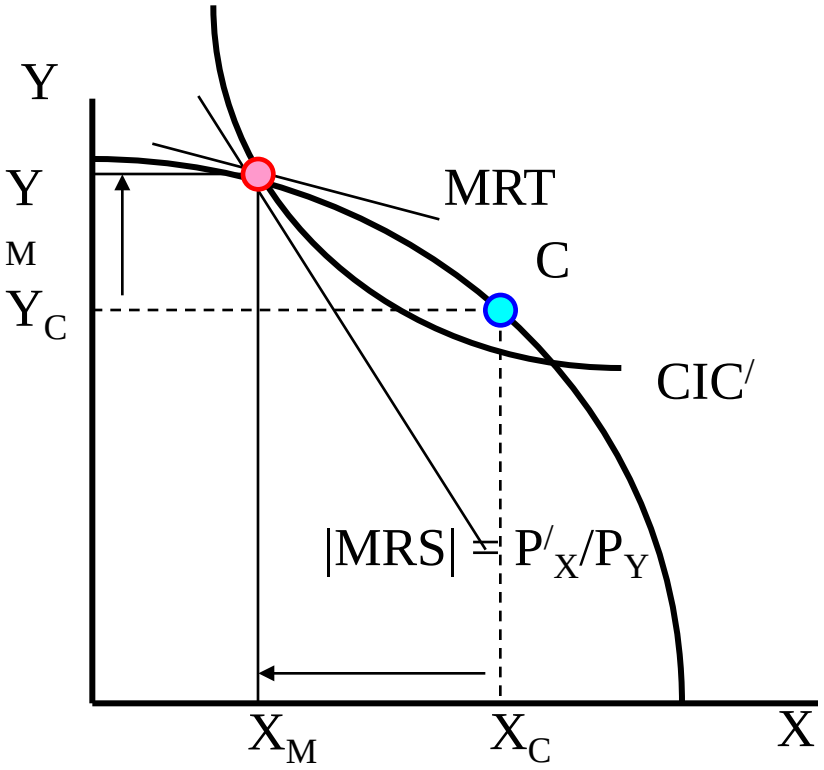
If X and Y are competitive

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

If X is monopoliszed 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 efficiency

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 others' 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

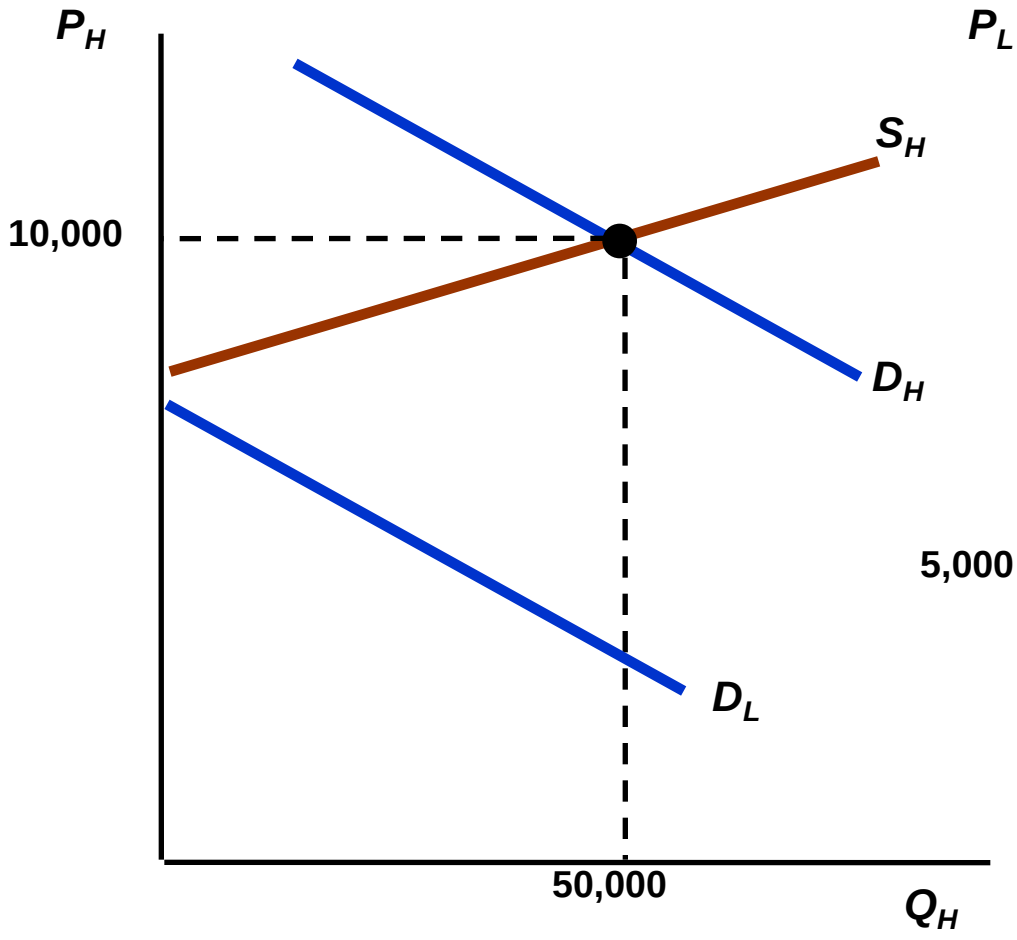
# Adverse selection and the Market for Lemons

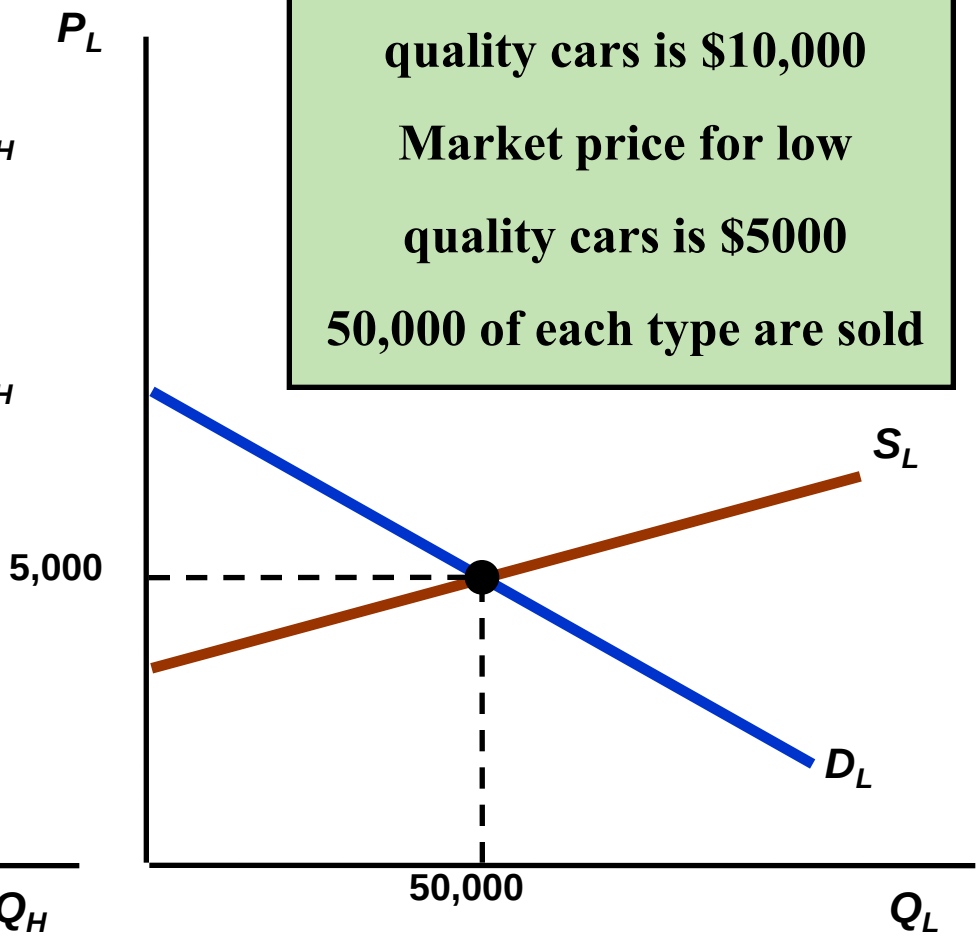
- Adverse selection: Low quality goods drive high quality goods out of the market because unobserved characteristics
- Examples
  - The lack of complete information when purchasing a used car increases the risk of the purchase and lowers the value of the car.
  - Markets for insurance, financial credit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

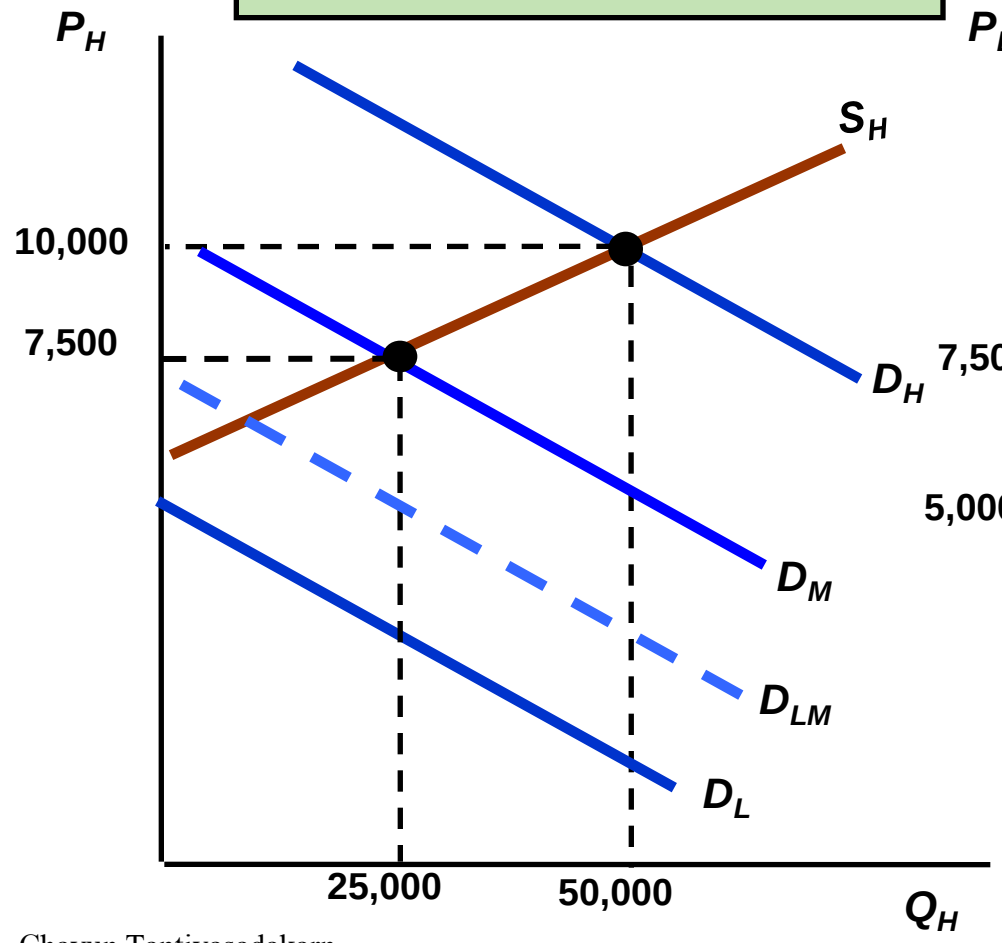
**50,000 of each type are sold**

# The Market for Used Cars

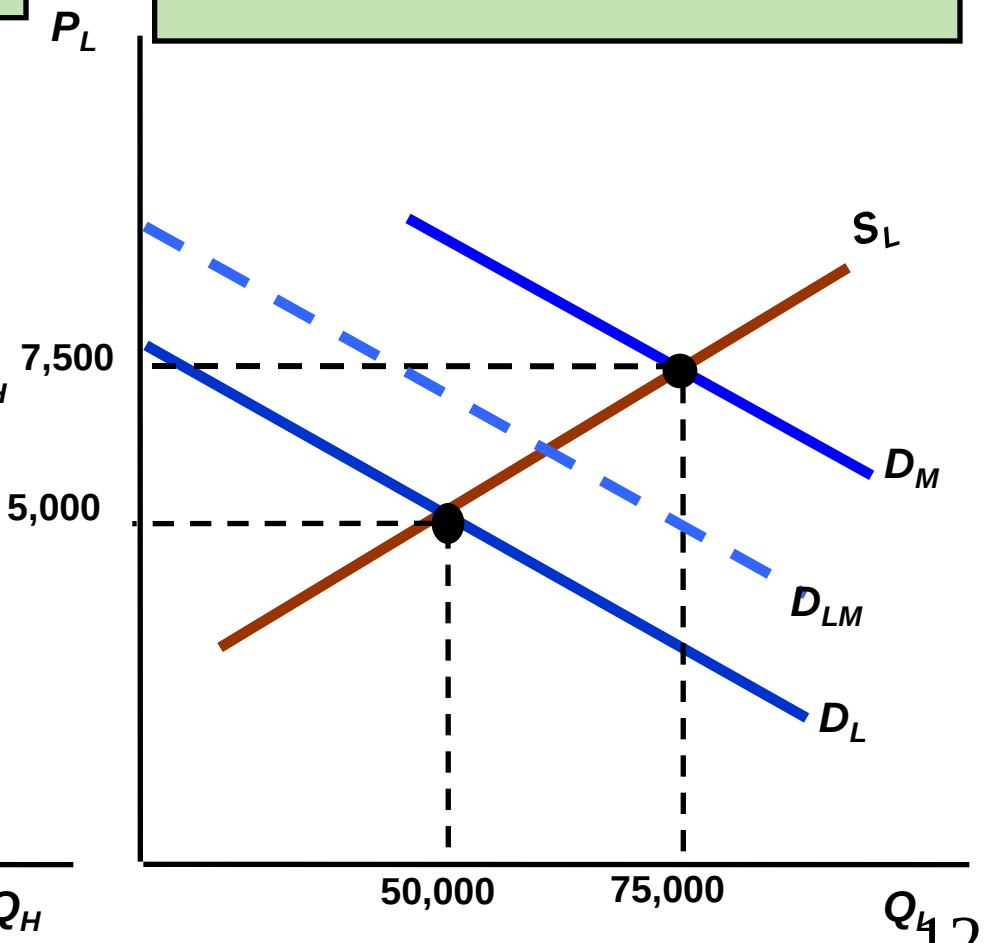
- $S_H$ is higher than $S_L$ because owners of high quality cars need more money to sell them
- $D_H$ is higher than $D_L$ because people are willing to pay more for higher quality
- Sellers know more about the quality of the used car than the buyer
- Initially buyers may think the odds are 50/50 that 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 pool 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 x $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 x $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.

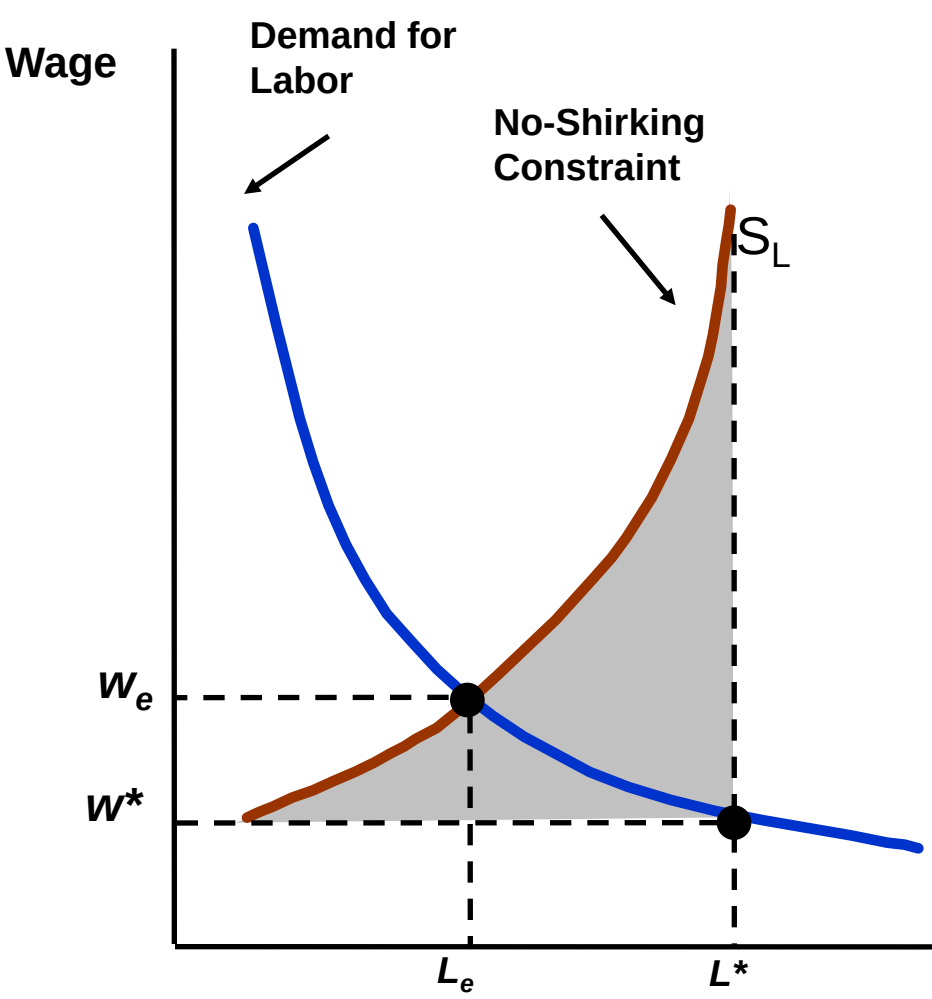
# Efficiency Wage Theory

- 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

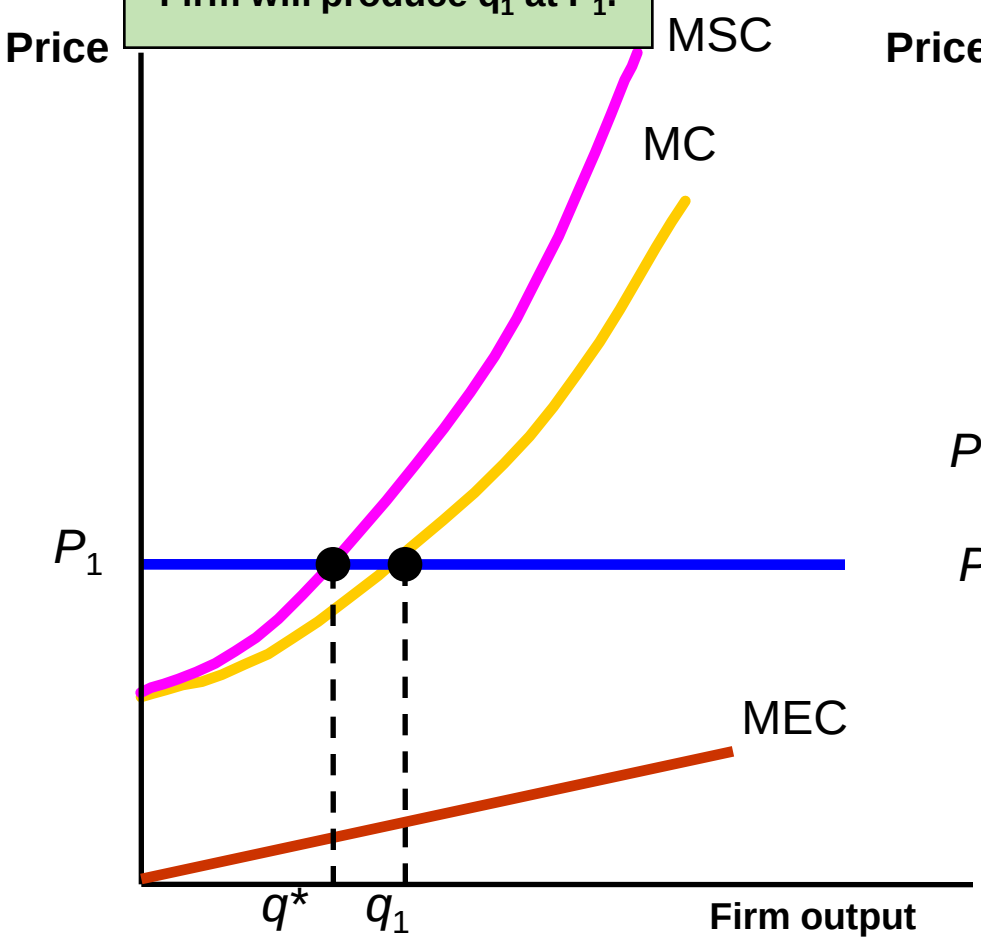
# Negative Externalities and Inefficiency

- 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

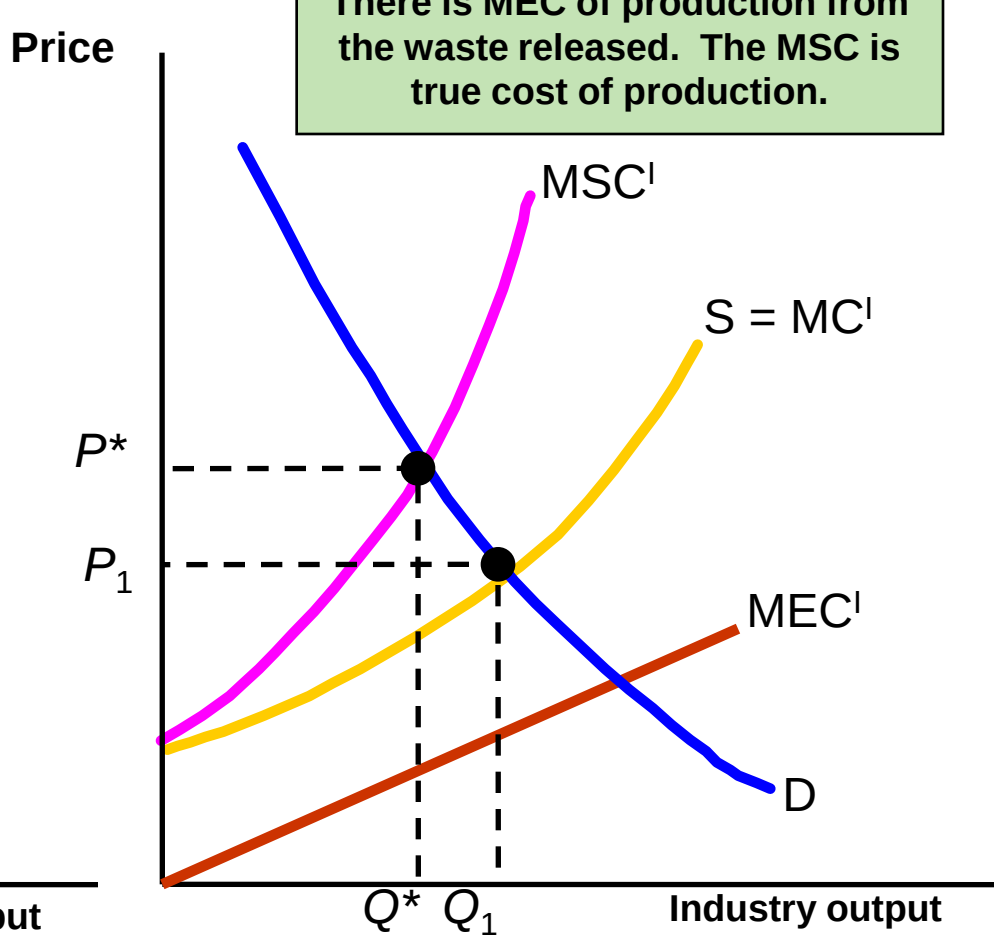
# External Costs

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

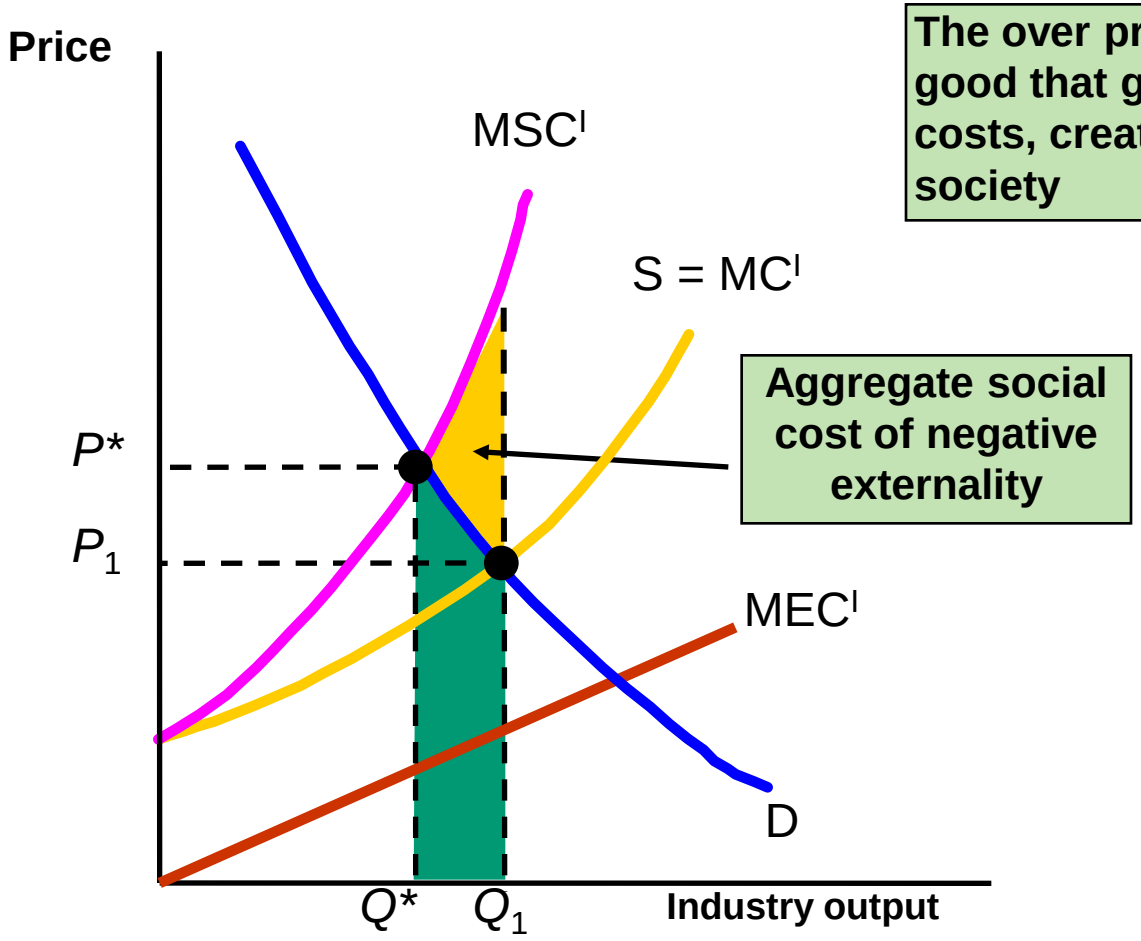
**Firm will produce $q_1$ at $P_1$.**




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



# External Costs



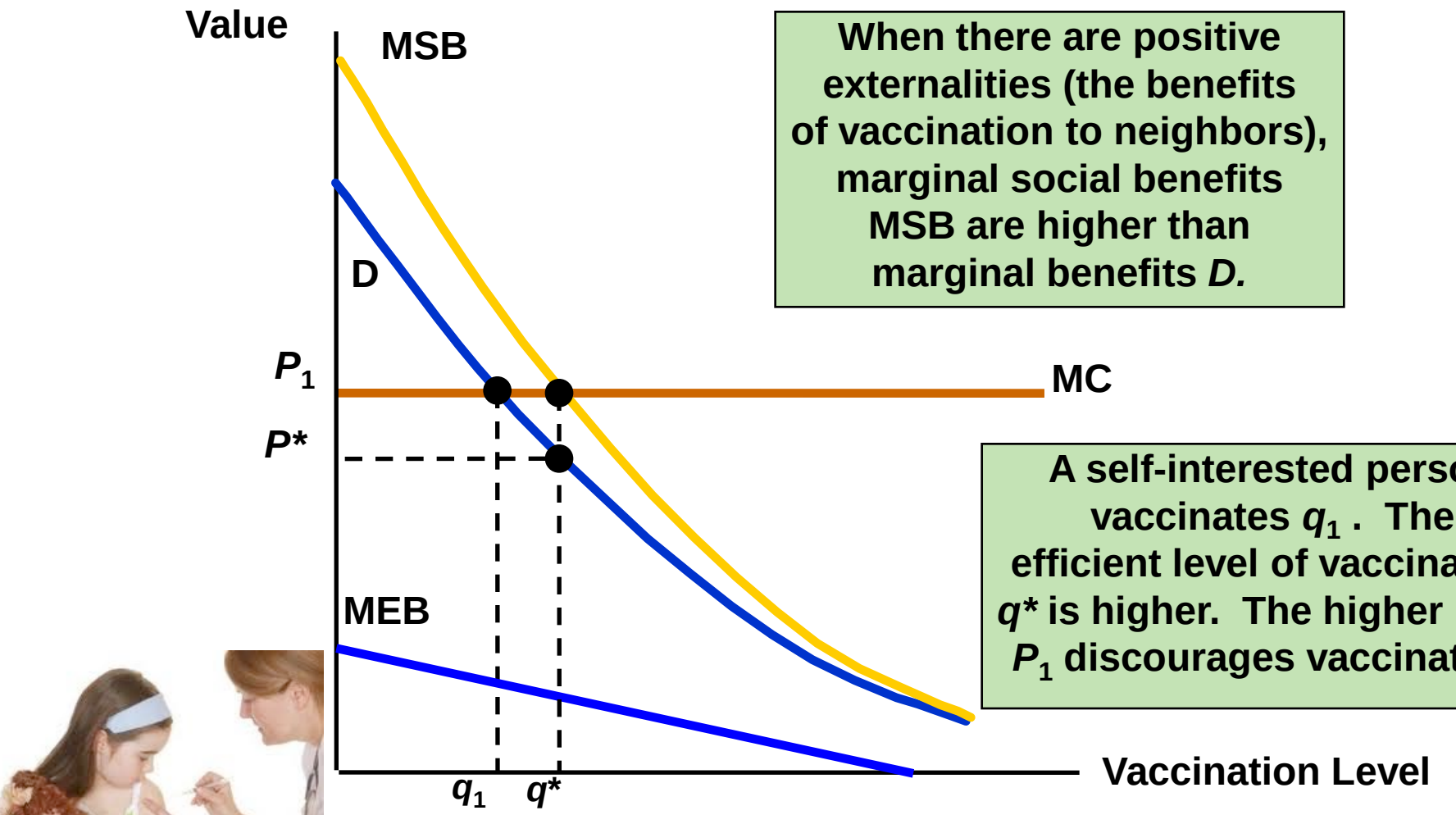

**The over production of the good that generates external costs, creates a social cost on society**

**Aggregate social cost of negative externality**

# 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




When there are positive externalities (the benefits of vaccination to neighbors), marginal social benefits MSB are higher than marginal benefits *D*.

A self-interested person vaccinates $q_1$ . The efficient level of vaccination $q^*$ is higher. The higher price $P_1$ discourages vaccination.

# 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 on party reduces or increases welfare of the third parties
- The third parties do not received compensation for their welfare reduction or

  The party that increase 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

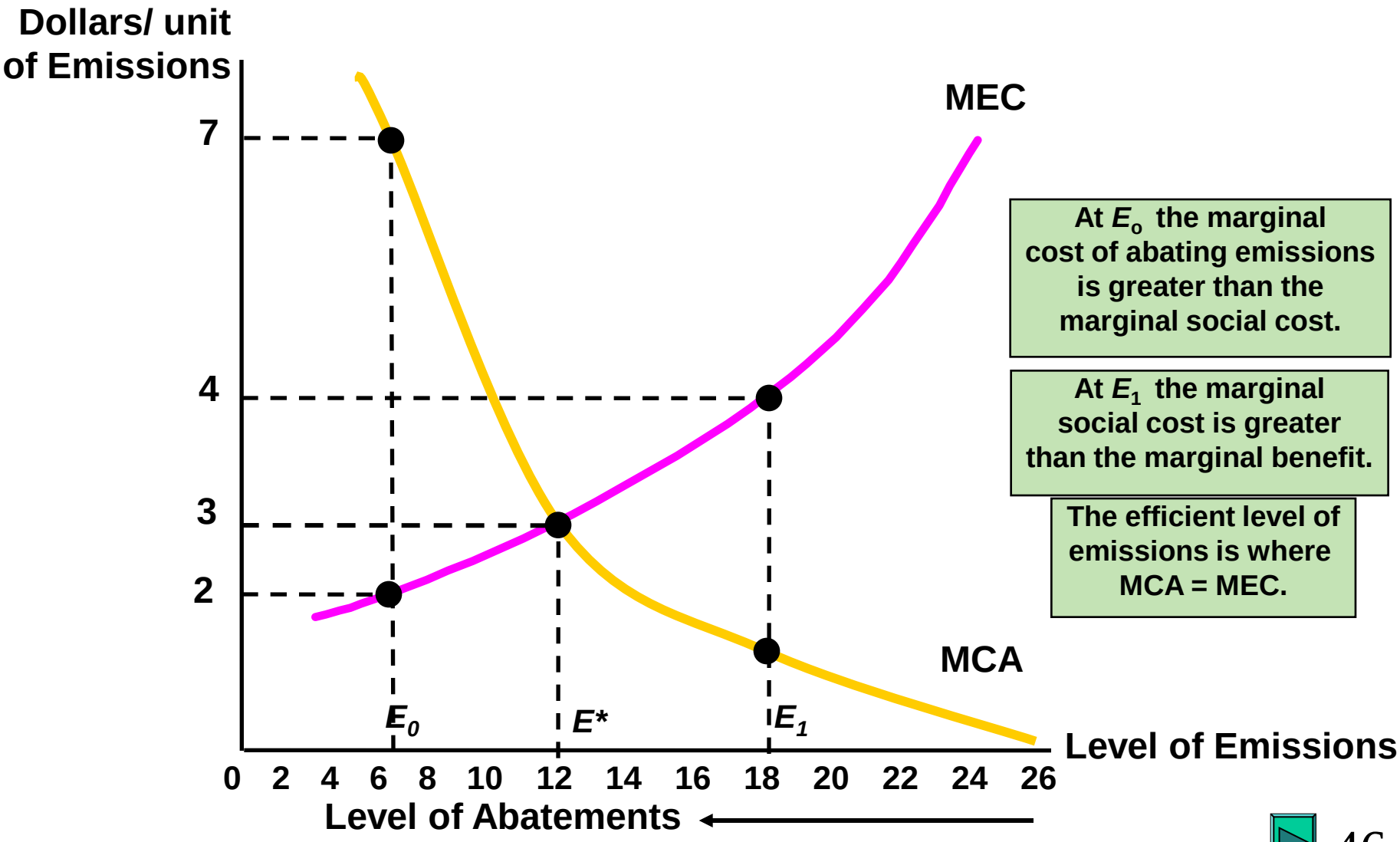
# Ways of Correcting Market Failure due to externalities

- 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



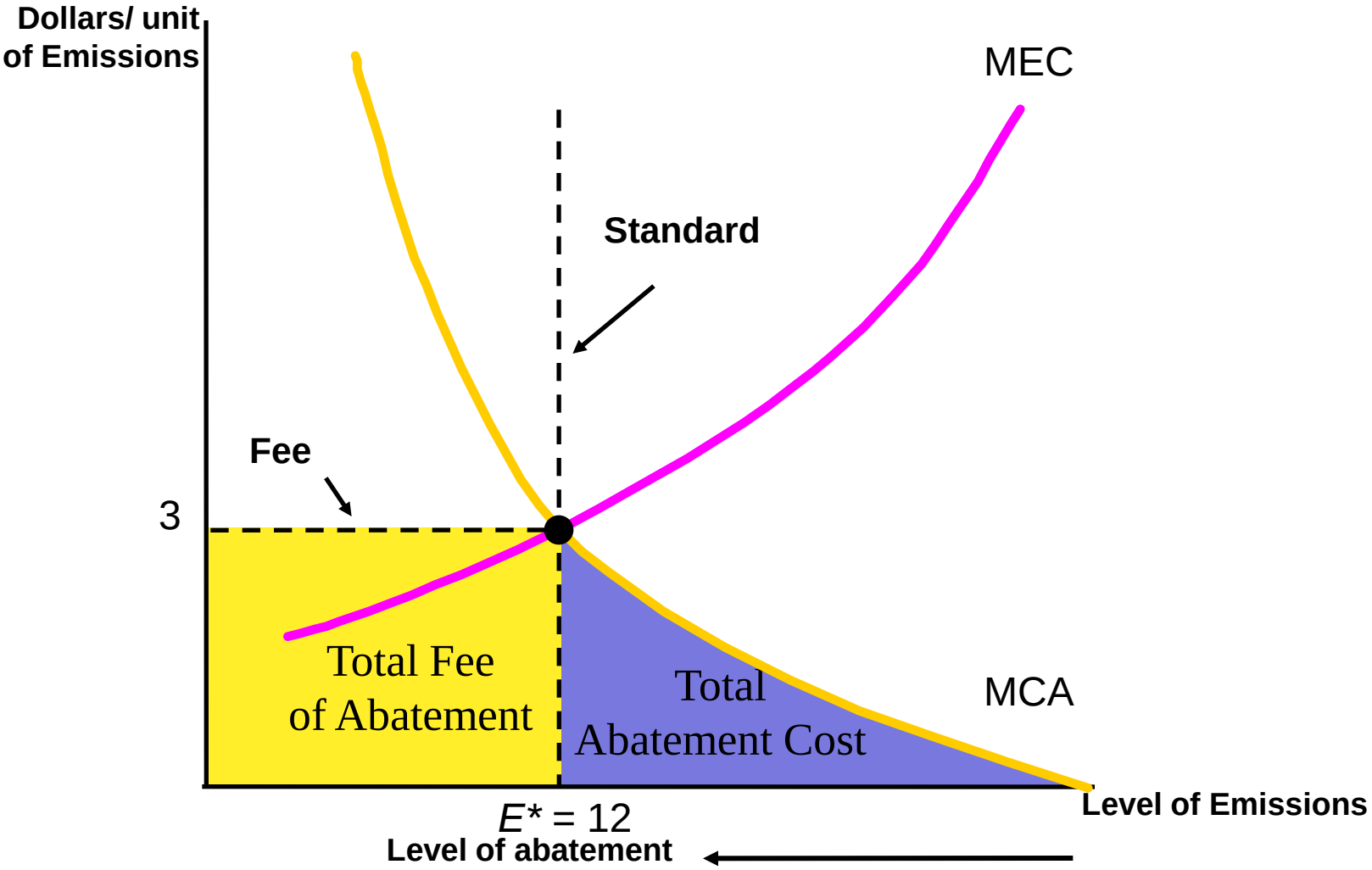
# Ways of Correcting Market Failure

- 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

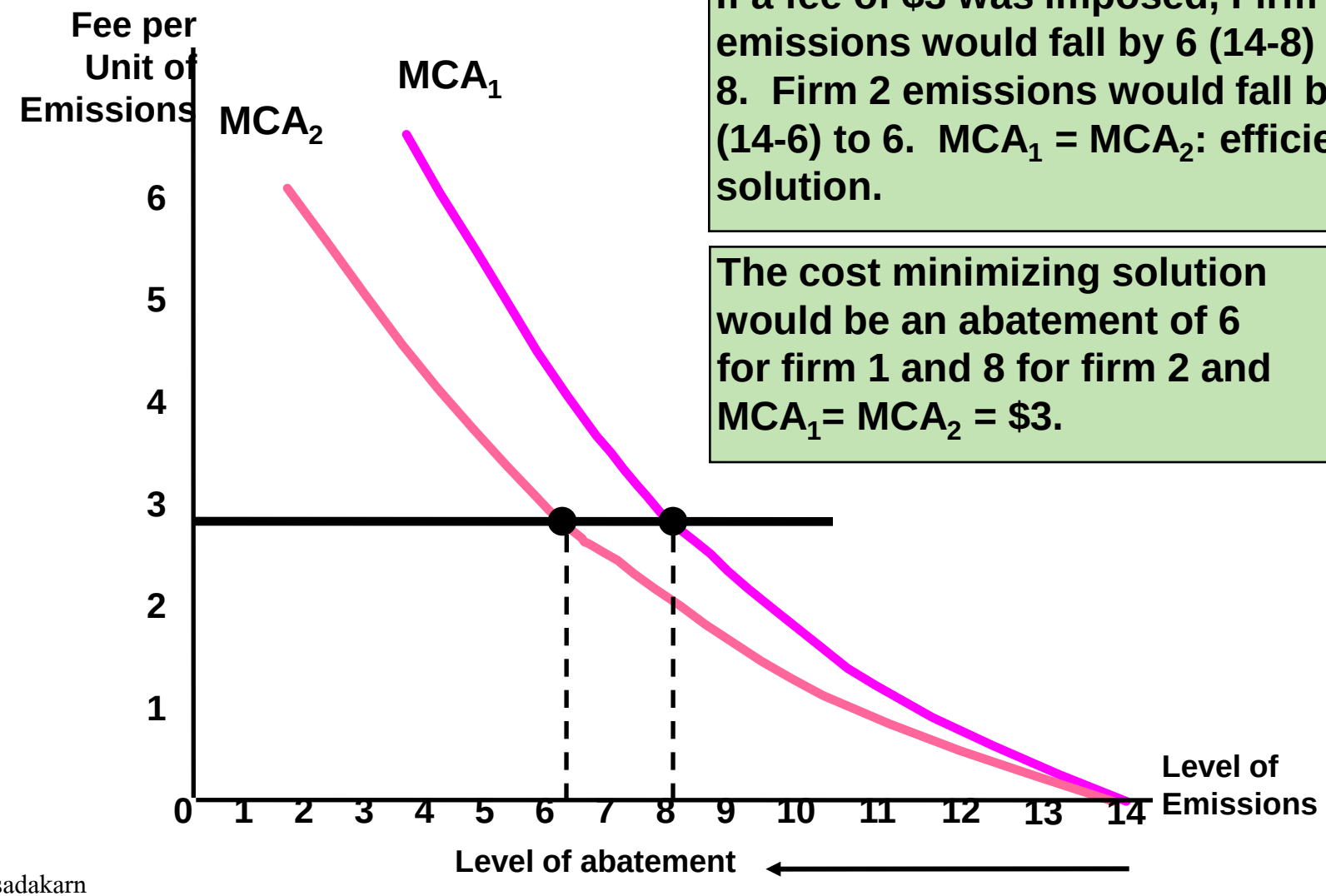
# Standards and Fees



# 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



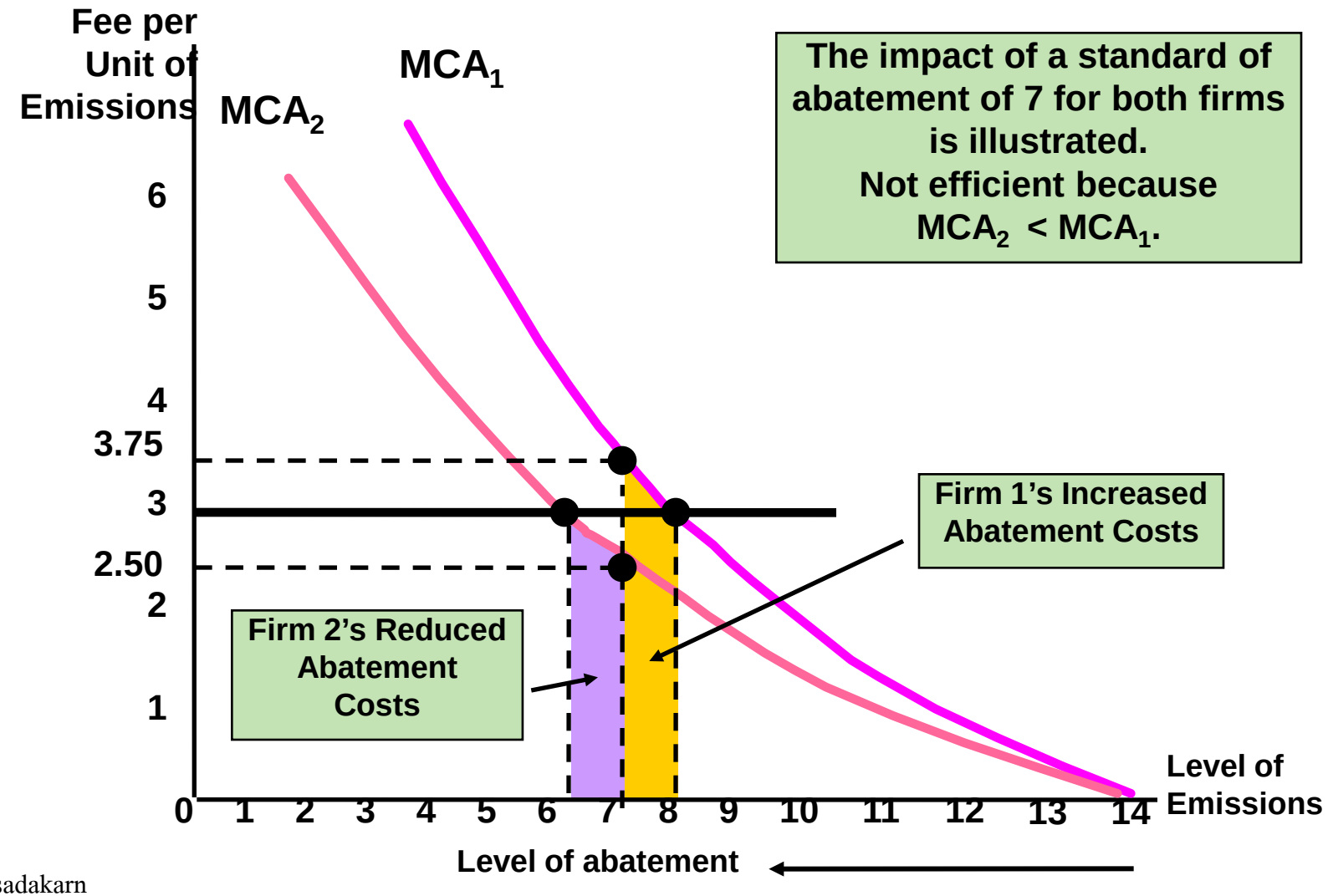

If a fee of $3 was imposed, Firm 1 emissions would fall by 6 (14-8) to 8. Firm 2 emissions would fall by 8 (14-6) to 6. $MCA_1 = MCA_2$: efficient solution.

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

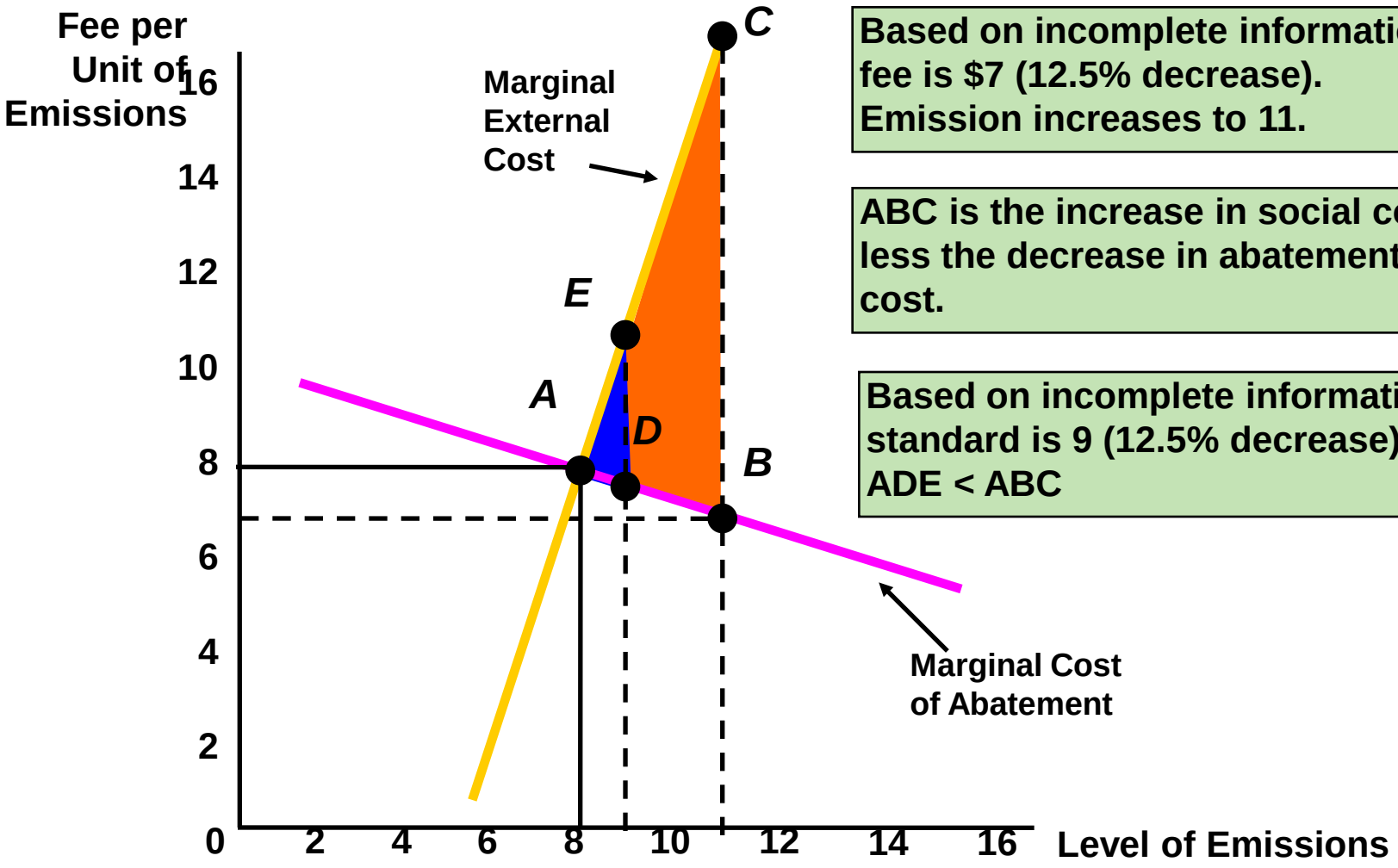
# The Case for Standards

- 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




Based on incomplete information fee is $7 (12.5% decrease). Emission increases to 11.

ABC is the increase in social cost less the decrease in abatement cost.

Based on incomplete information standard is 9 (12.5% decrease). ADE < ABC

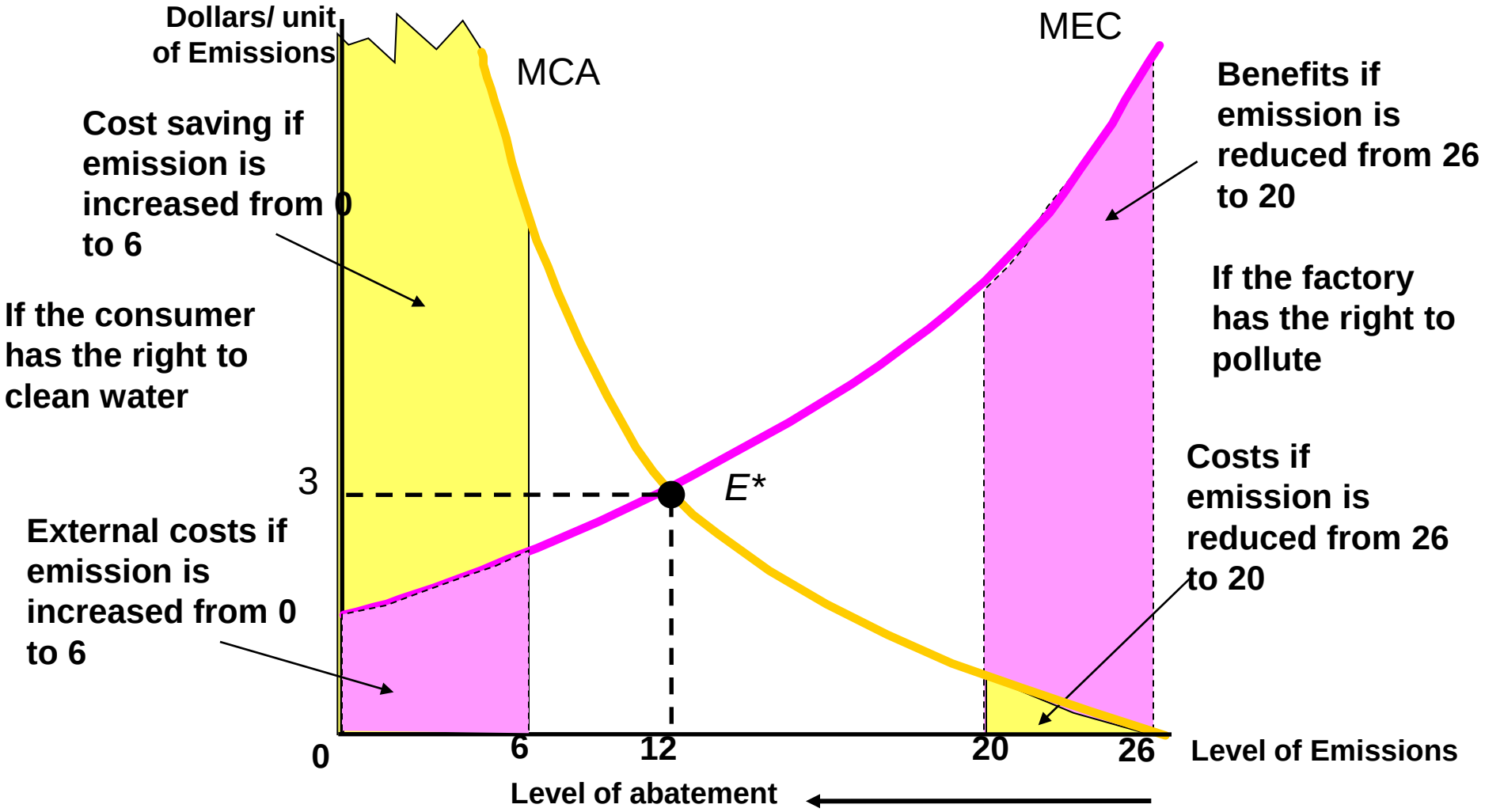
# Summary: Fees vs. Standards

- 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



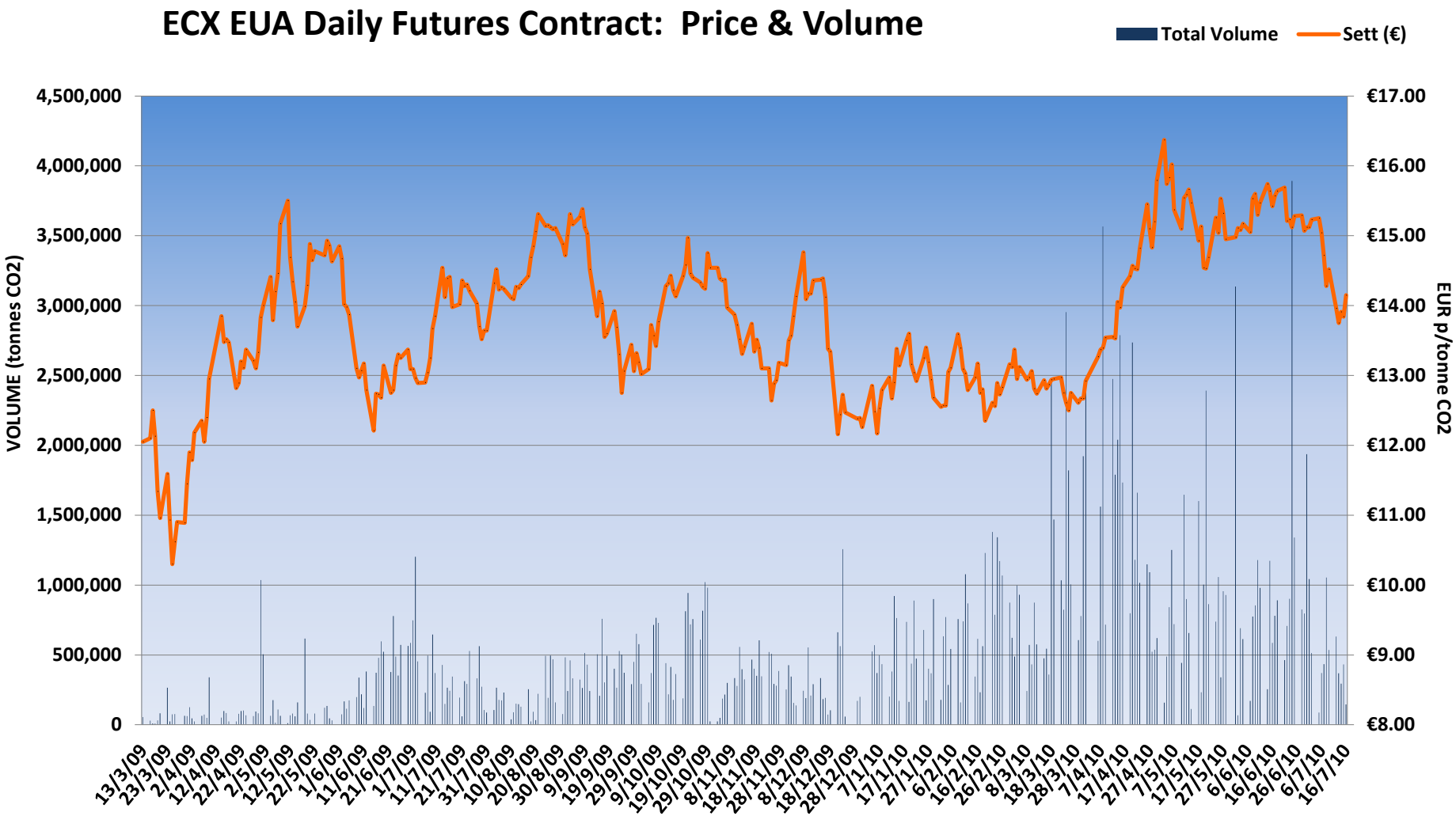
# Property rights and Coase Theorem

- 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

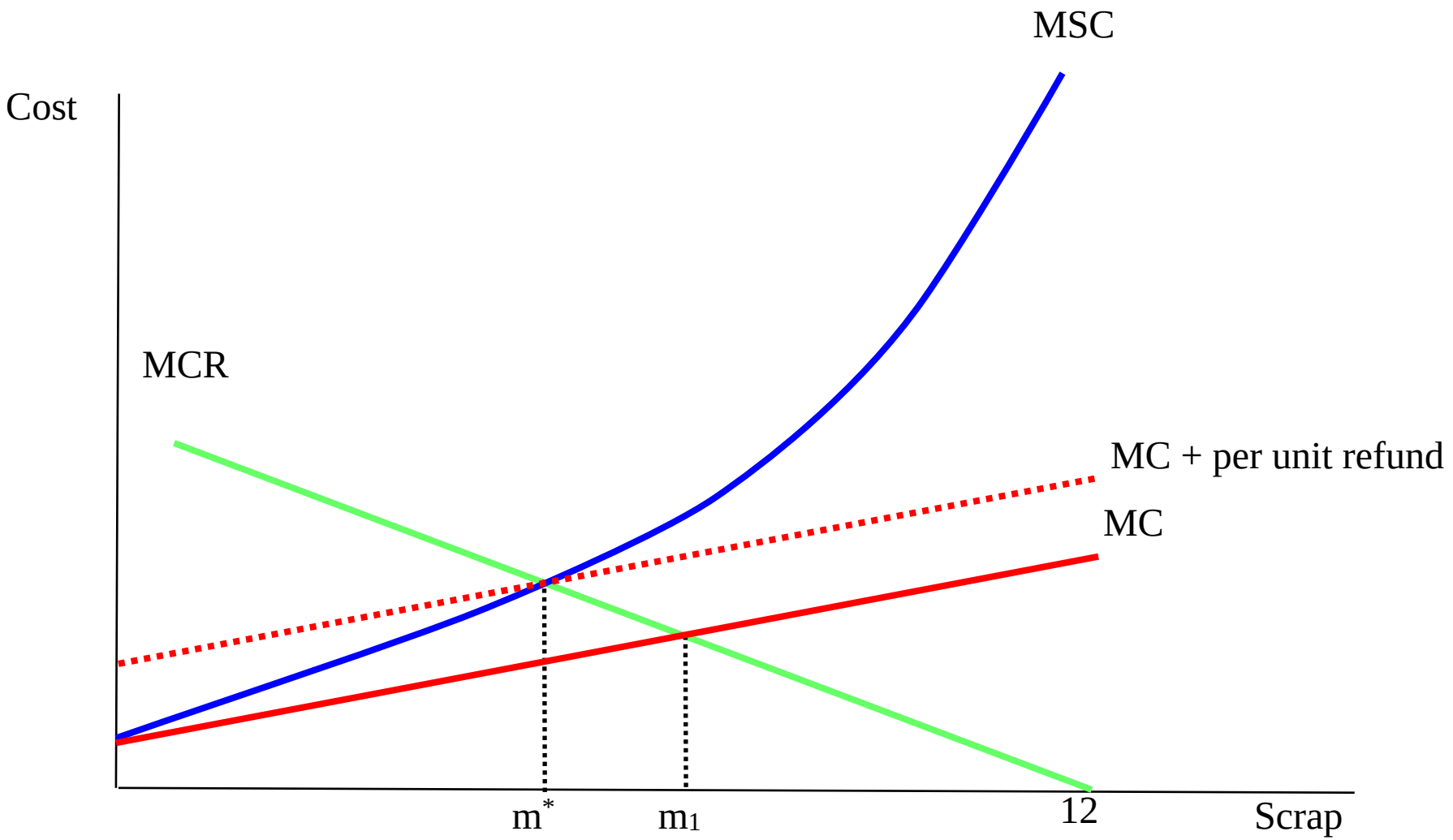
# European Climate Exchange



# 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

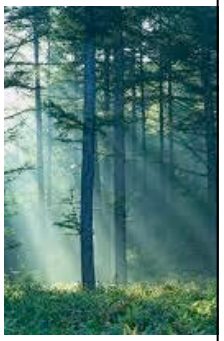

โครงการผ้าป่าขยะ / ขยะแลกไข่

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

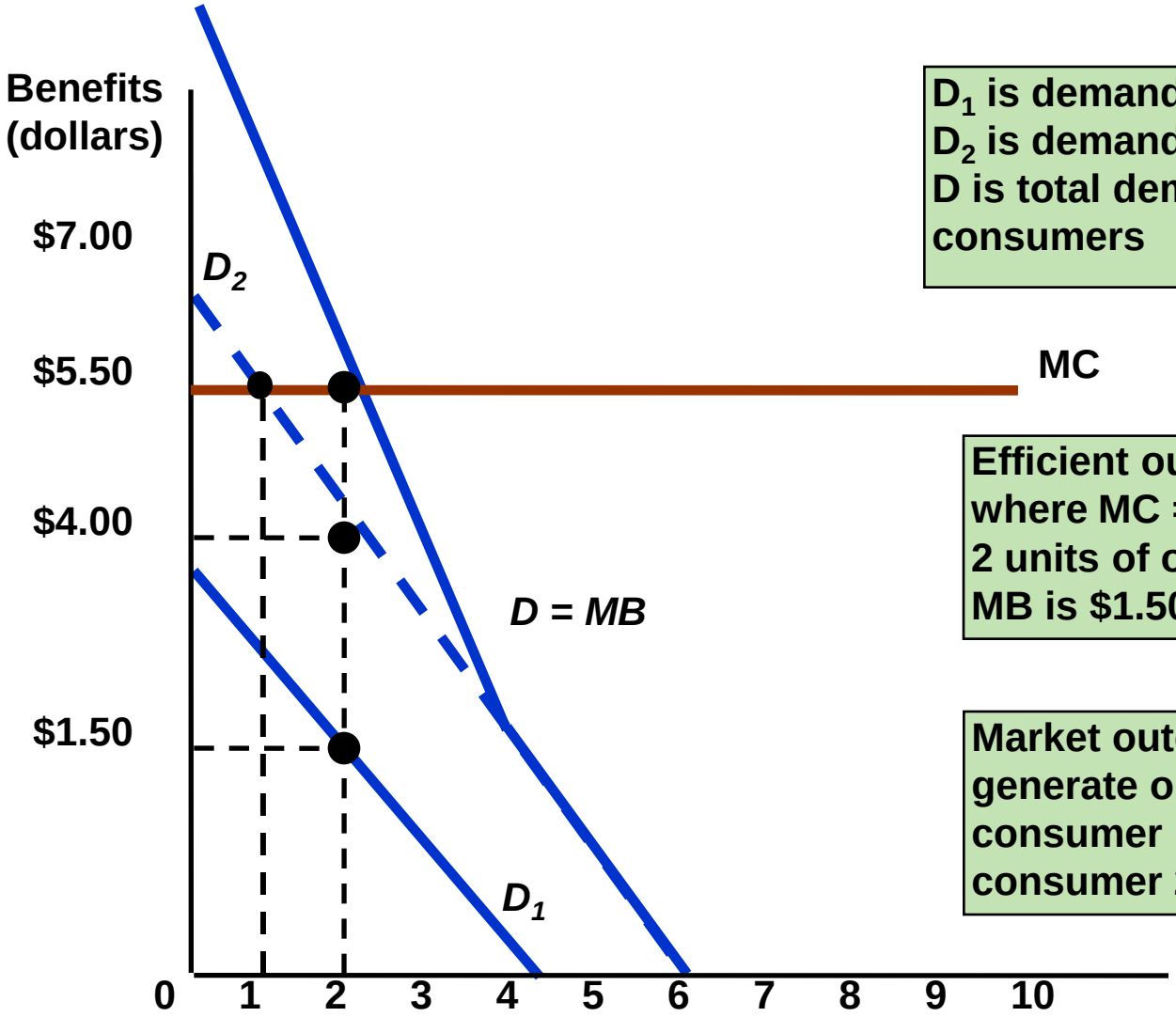
# Public Goods

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

# Efficiency and Pubic 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 = 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

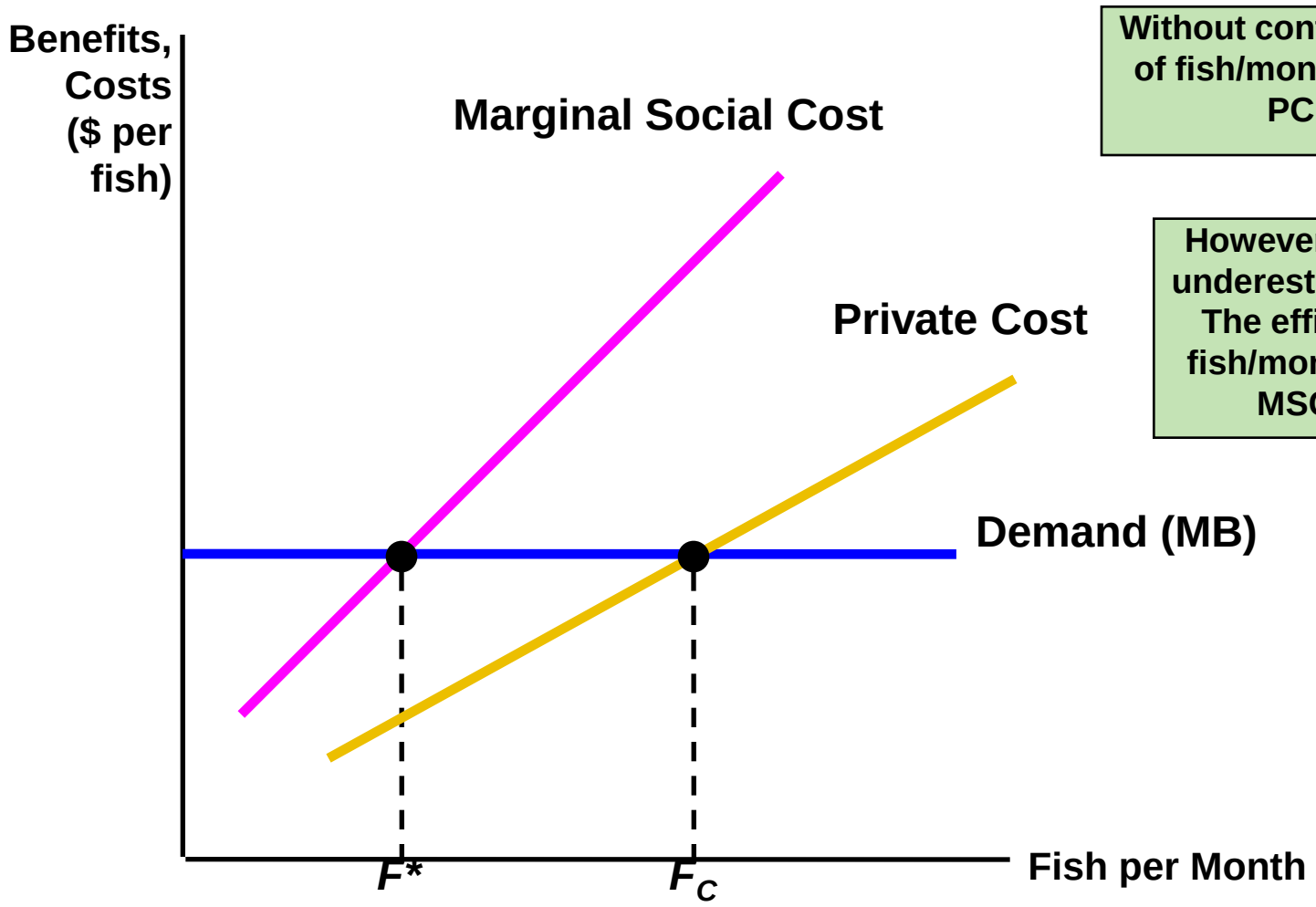
# Common Property Resources

- 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