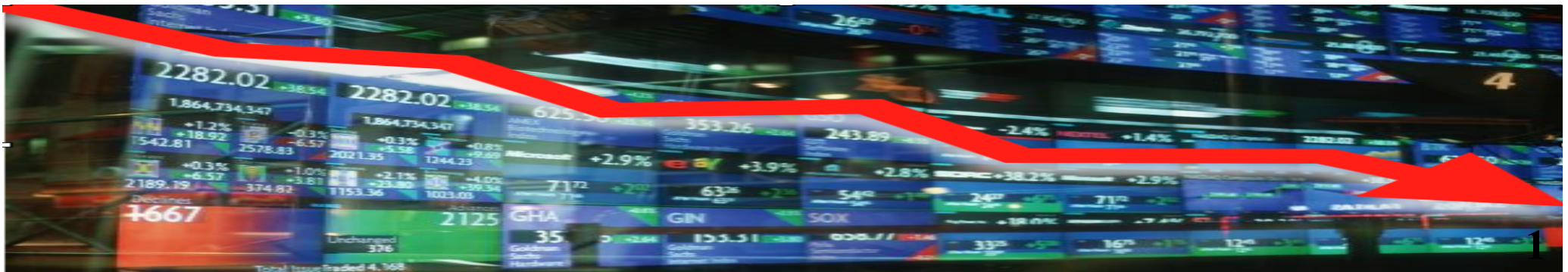


Market Failure

EE 376

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Outline



- Conditions for efficient markets
- Important reasons for market failure for the environment
 - Externalities
 - Insufficiency of public goods or services
 - Tragedy of the commons

Institutional conditions for free market mechanism



- Under specific institutional conditions, free market mechanism can allocate resources most efficiently
- Institutional conditions for free market mechanism
 - Private property
 - Freedom in consumption and production
 - Effective enforcement of contracts and protection of private property rights

Conditions for efficient markets



- No buyer(s) or seller(s) can influence the market:
 $P = MC$
- The market price reflects the social cost and social benefit
 - Lack of externalities, both + or -
- Only private goods are being exchanged; not public goods or common properties
- Informed buyers and sellers

Why Markets Fail



1. Imperfect competition: e.g., A maximized profit monopolist can restrict outputs so that the price is higher than the competitive level and produces at Q that leads to $P > MR = MC$
2. 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

Why Markets Fail



3. Public goods:

- Nonexclusive, nonrival good that, once available, is difficult to prevent others from consuming
- Example: Companies may not want to invest in R&D if their intellectual property rights are not protected

Why Markets Fail



4. Asymmetric 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

Important reasons for market failure for the environment



1. Externalities
2. Insufficiency of public goods or services
3. Tragedy of the commons

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
- Side effects which producers or consumers impose on the third parties
 - They can be negative or positive

Externalities

- Negative externalities: Action by one party that imposes costs on the third parties
 - Burning fossil fuels that release GHGs which are the main cause of global warming and climate change
 - Usage of CFC which leaks into the atmosphere and destroys the ozone layer which protect us from UV rays
 - Both have no incentive to account for the **external costs** that they impose on others



Externalities

- Positive externalities: Actions by one party that 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 their activities



When do externalities lead to problems?

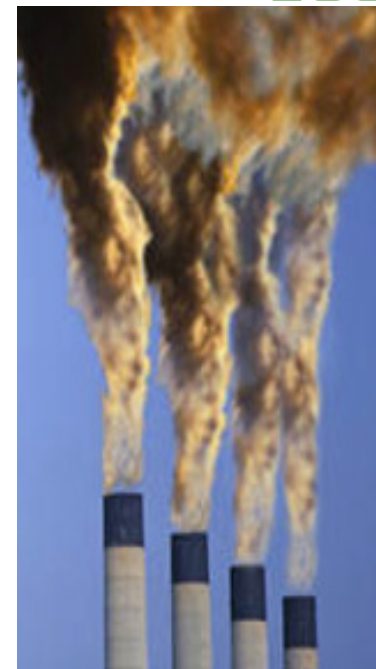


Need two conditions:

- The activities decrease or increase welfare of the third party
- The third party whose welfare is decreased does not receive any or sufficient compensation or
- The party who generates welfare for the third party does not receive any or sufficient compensation

When do externalities lead to problems?

- Cases that need intervention
 - Pollution from economic activities
 - Massage parlors near schools
 - Drink and drive behavior
 - Imitation of intellectual property rights
- Cases that do not need intervention
 - Beekeepers and orchards
 - Department stores that have renting spaces for restaurants



Externalities and market failure



- Suppose an industry releases GHGs to the atmosphere
 - Private Costs: all production costs that firms consider for their profit making, represented by the MC curve
 - External Costs: Costs from losses and damages from climate change associated with the released GHGs, represented by the MEC curve
 - Social Costs: The summation of both costs, represented by the MSC curve
 - $MSC = MC + MEC$

Externalities and market failure

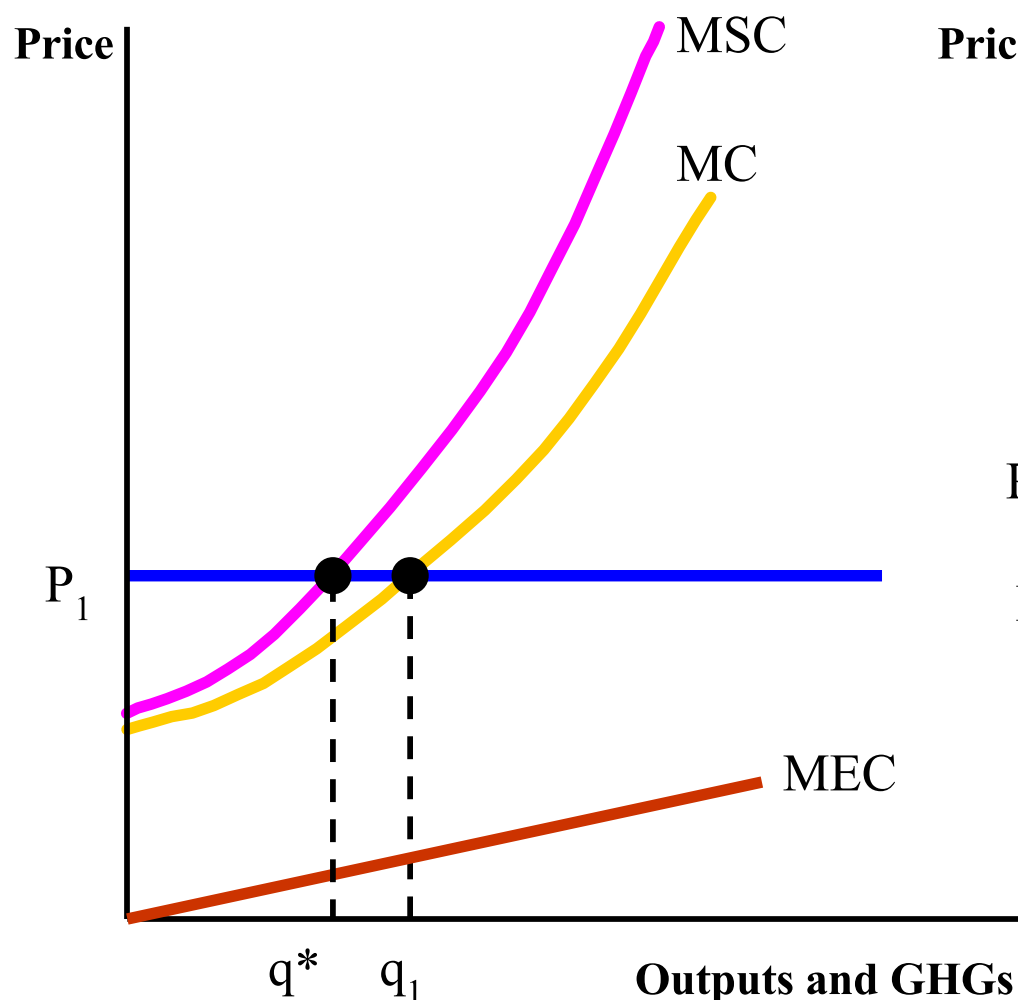


- Assumptions
 - Each unit of output generate 1 unit of GHGs
 - GHGs mitigation is only possible by output reduction
 - Market structure is perfect competition
- Market equilibrium price and quantity occur at the point where $P = MR = MC$
- The market equilibrium generates over production and more than optimum amount of GHGs the market price ignore the external costs

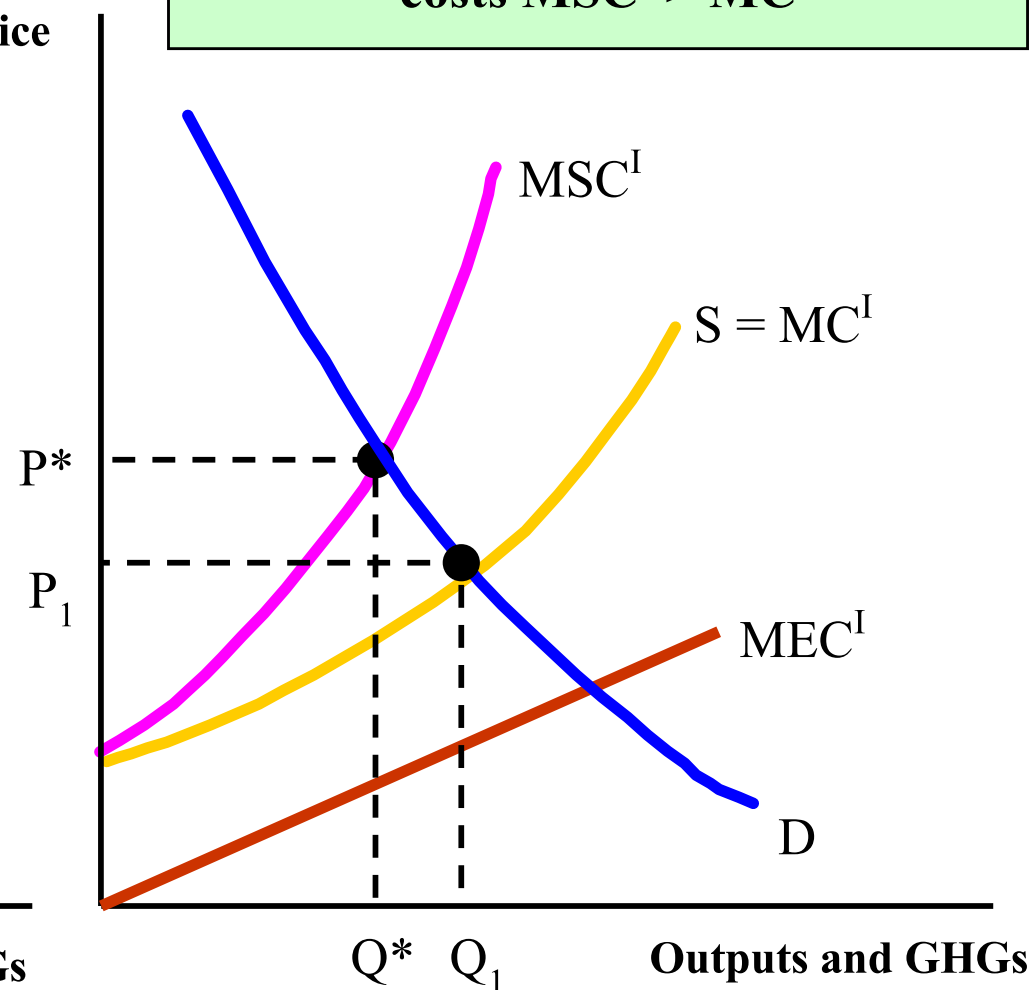
Externalities and market failure

Efficient output and GHGs are at q^*

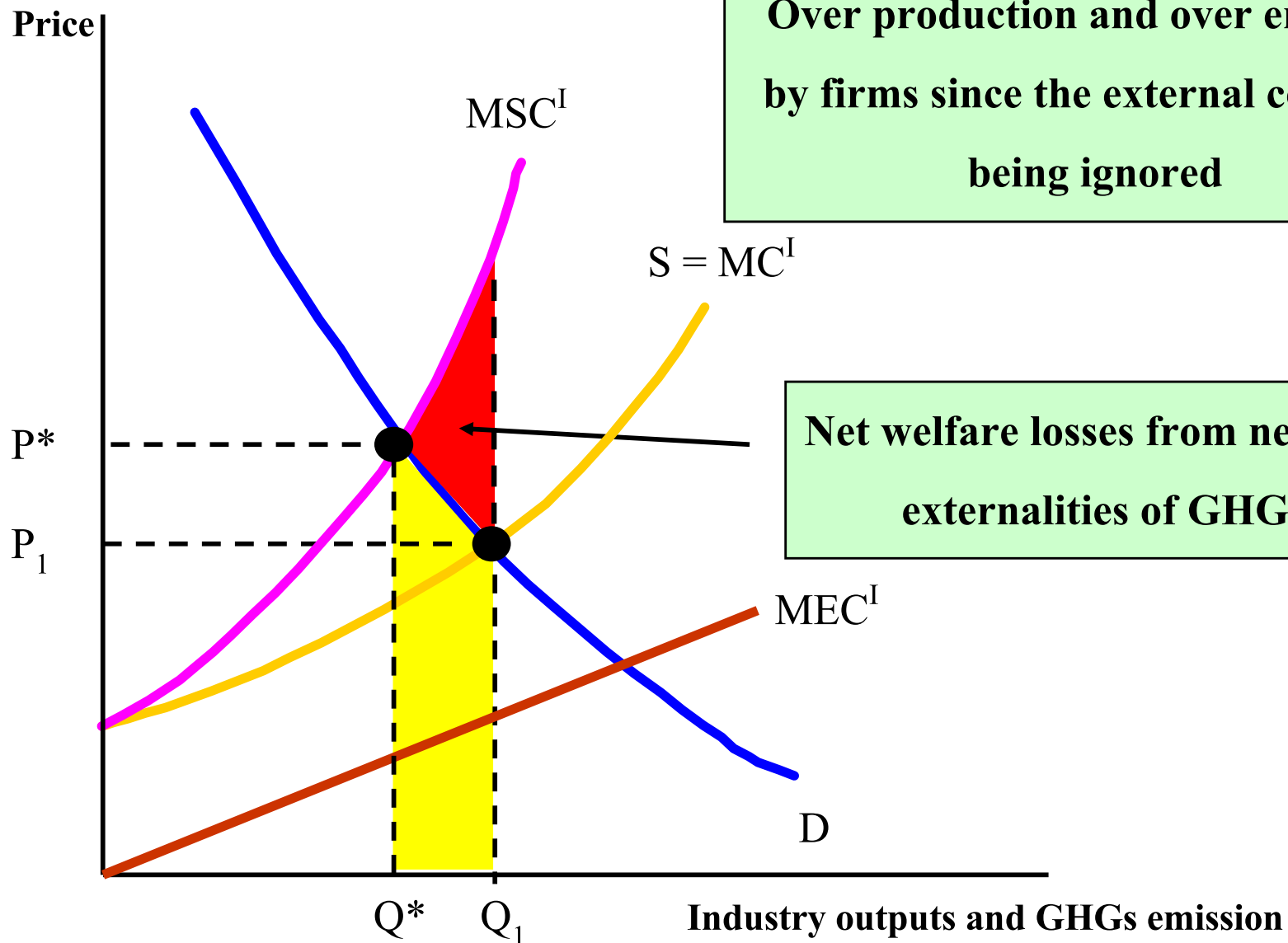
A firm produces at q_1 and sell to P_1



MEC from firms cause the social costs $MSC > MC$



Externalities and market failure



Externalities and market failure: remarks



Remarks 1:

- GHGs emitters neglect their external costs
- Their perceived production costs are lower than the social costs
- Production (and consumption) levels are higher than the optimal levels that maximize social welfare
- Over production and over emission of GHGs

Externalities and market failure: remarks

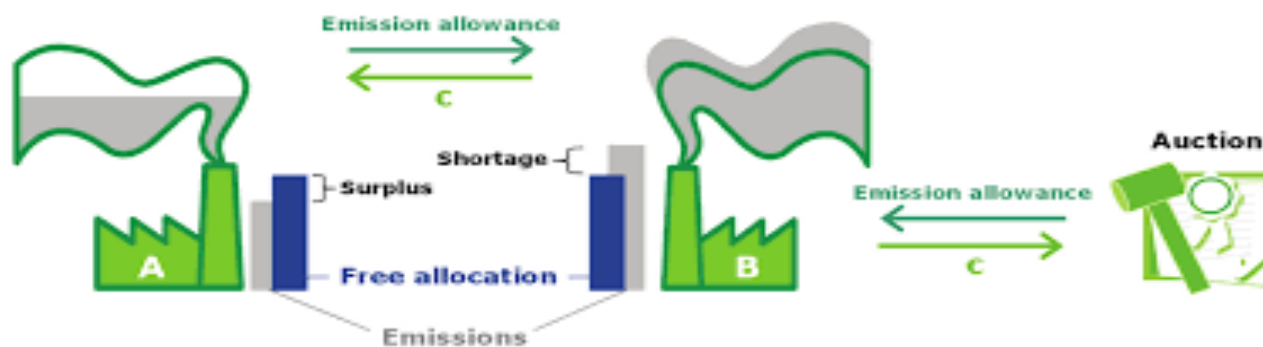


Remarks 2:

- The social optimal output levels are neither the one that are GHGs or completely free from external costs
 - since that would means none will be produced
- Nor they means firms take no responsibility on their externalities
 - Since that would means disaster to the environment
- The optimal outputs and GHGs emission level occur at the point where $MB = D = MSC$

Externalities and market failure: Solutions

- Emission standards: costly to enforce and inefficient
- Internalize externalities by **Carbon pricing** which push the external cost burden back to the emitters
 - Carbon taxes which increase the cost of GHGs emission
 - Cap-and-Trade which creates market for exchanges of limited carbon permits that in turn increases the costs of GHGs emission



Insufficiency of public goods or services



- Most goods and services are **Private goods** which are **Rival in consumption** and **Exclusive**
- **Public goods** are products or services that are both **Non-rival** and **Non-exclusive**
- Non-rival in consumption means the amount for consumption is always constant regardless of consumption level
- Non-exclusive means regardless of payments it is impossible or not practical to exclude consumption

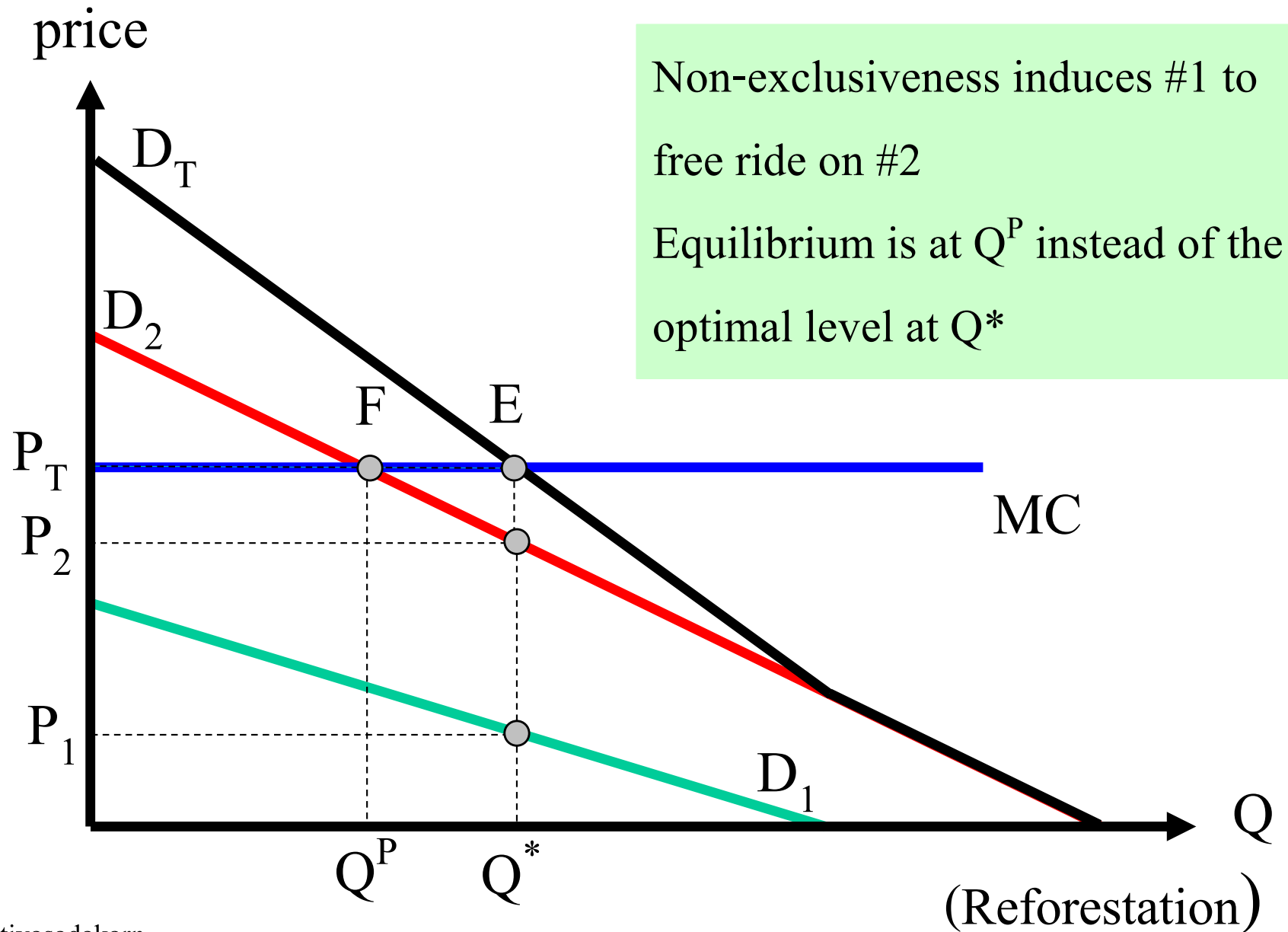
Private vs. public goods

	Exclusive	Non-exclusive
Rival	Private goods: Food, Mobile phone 	Common properties:  Natural resources, Climate with appropriate amount of GHGs
Non-rival	Semi-public goods: Sport clubs, Cable TVs, Netflix 	 Public goods: National defense, radio wave, innovation, GHGs mitigation or reforestation

Insufficiency of public goods or services

- The non-exclusive property of public goods always leads to the **free rider problems**
- Examples:
- Counterfeit software free ride on the software creators
 - Less incentives for software developing
- Reforestation in country A helps absorbing GHGs which benefits every countries on achieving 2⁰C target even though non of them may provide any financial supports for her efforts
 - Insufficient GHGs mitigation efforts

Insufficiency of public goods or services



Insufficiency of public goods or services



- D_1 is the demand for reforestation of Thailand, D_2 is of others
- From the non-rival property, all countries equally enjoy the benefits of lower GHGs absorbed regardless of where the forest is
- At Q^* Thailand is willing to pay at P_1 while others are willing to pay at P_2 , total willingness to pay is P_T
- The maximum willingness to pay at world level is given by D_T which is the vertical summation of D_1 and D_2
- Question: Why do we sum horizontally for private goods but vertically for public goods?

Insufficiency of public goods or services



- D_T which represents the social benefits intersect the MC of reforestation at point E
- Hence, the optimal reforestation should be at Q^* where $D^T = MC$ at which Thailand should pay P_1 and the rest should pay P_2 which add up exactly equal to P^T at point E
- But each country may try to avoid the payment and free ride on each other; Q^* will not occur

Insufficiency of public goods or services

- Assuming that Thailand refuse to pay by arguing that she is still a developing country and cannot afford to do this and need the land and timbers
- Suppose other countries decide to pay for this
- The level of reforestation will occur at the intersection between D_2 and MC at point F instead
- The voluntary reforestation level will end up at $Q^P < Q^*$
--> insufficient provision of public goods
- Solution: Peer pressure, Kyoto Protocol and Paris Agreement

Tragedy of the commons



- Both ocean and atmosphere are resources which have no **property rights** or they are **not well defined**
- They are open-access resource
- Each country often claim the rights over the ocean area extended from the coastal line by 200 nautical miles (370.4 km; 230.2 mi)
- But, no country can fully patrol and **exclude** the claimed areas thoroughly

ความล้มเหลวของตลาดจากโศกนาฏกรรมของ ทรัพยากรร่วม (Tragedy of the commons)



- These are **Open access resources** or **Common properties**
- They are non-excludable but exhaustible
- Lead to over exploitation and degradation of natural resources; e.g., deforestation, extinction, too high concentration of GHGs in the atmosphere, Illegal, Unreported and Unregulated (IUU) fishing
- Garret Hardin calls this phenomenon as **Tragedy of the commons** [Hardin, Garrett. (1968). “The Tragedy of the Commons,” *Science*, 162(3859):1243-1248.]



Tragedy of the commons

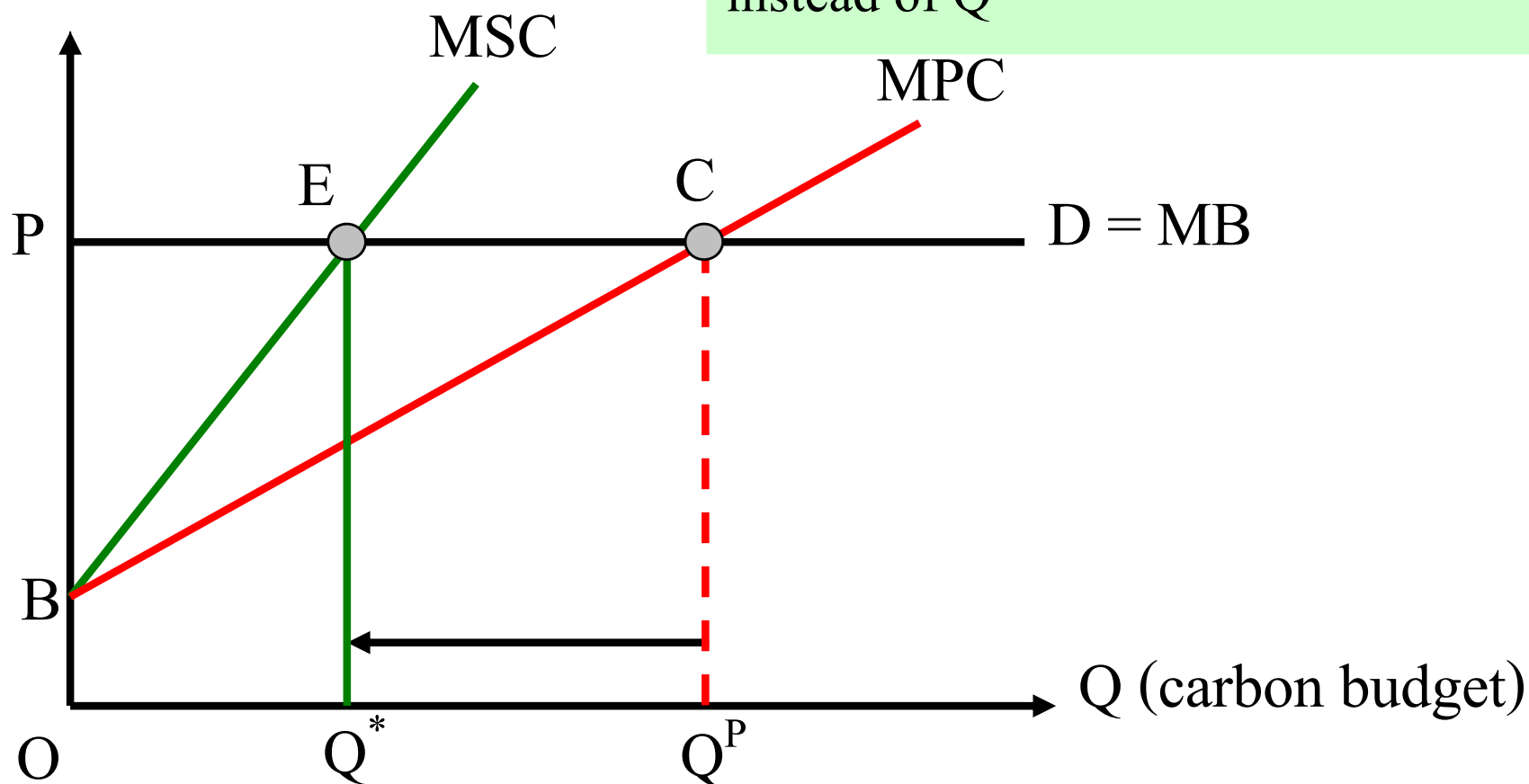
- Open-access resources are always over exploited in an unsustainable manner as in the proverb “**To pull to get the longest end** (มือใครยาว สาวได้สาวเอา)”
- Private Costs < Social Costs
- Current users increase the user cost of late comers
- All users benefit (free ride) at the expense of other conservation efforts
- **Carbon budget:** the amount of CO₂ emissions we can emit while still having a likely chance of limiting global temperature rise to 2°C above pre-industrial levels

Tragedy of the commons

Private Costs < Social Costs

Over utilize carbon budget up to Q^P
instead of Q^*

Price, costs



How to solve Tragedy of the commons

- Convert the resource to private property; e.g., forest concession, Emission Trading System (cap-and-trade)
 - Define the right to use carbon budget and convert to emission permit (allowance)
- Many countries still has no commitment to reduce emission
 - Paris Agreement requires all members to submit its Nationally Determined Contribution (NDC)

