

Professional Career Program

Environmental Economic Theory

No. 2

Economic Efficiency and Markets

Instructor: Eiji HOSODA

Textbook: Barry .C. Field & Martha K. Fields (2009)
Environmental Economics - an introduction, McGraw-Hill, International Edition

PCP Environmental Economic Theory (Hosoda)

Homework 3

9 October 2018

1. Theme: Explain why efficient allocation of resources is *not* attained in markets when there is external diseconomy. Use at least two illustrative examples to make the point clear.
2. Language: English.
3. Volume: A4 Two pages. Single space. 12 points.
4. Submission period: 9 a.m. 15 October 2018 ~ 9 a.m 16 October 2018.
5. Submission: Submit your paper in a pdf file. A file name must be “HW3.xxx.pdf” (xxx=your name). Send your file to hosoda@econ.keio.ac.jp.
6. Remark: Sources other than internet documents are recommendable. If you use internet information, check plural sources and compare them. List references you have used.

Economic efficiency

- Economic efficiency is an important index to examine whether an economy is functioning well or not.
- It gives us a criterion for judging whether an economy is performing well as it might be expected.
- Notice that even if a single firm or group of firms may be judged efficient in their own limited way, a social performance may not be.
- To evaluate the *social* performance of firms, we must use the idea of economic efficiency in a wider sense.

The central idea of economic efficiency

- The central idea of economic efficiency is that there should be a *balance* between the value of what is produced (i.e. benefits) and the value of what is used up to produce it (i.e. costs).
- There should be a balance between marginal willingness to pay and marginal costs of production.
- We have to be careful here on the concept of “costs”. Notice that there is a gap between private costs and social costs.

Remarks

- Here too, the definition of costs matters.
- Surely, costs are defined as something which we sacrifice when we try to get something.
- Yet, it is sometimes hard to find all the things which we sacrifice and count them, particularly in money terms.

Equity

- It is important to discuss the relationship between economic efficiency and equity.
- Equity is the concept which is very hard to handle in economics, since it is deeply connected to value judgment. This does not mean that it is an unimportant issue in economics.
- Particularly in some environmental problems, inequity (equity) does matter.

The basic question in this lecture

- Can a market system, left to itself, produce results that are socially efficient?
- There are many circumstances in which a system of private markets cannot normally bring about results that are efficient in a wider sense.
- If the economy is not operating as we want it to, what kind of public policy should be used to correct the situation? (We consider this problem in the next lecture.)
- Especially in keeping or enhancing environmental quality, a market does not work well.

Economic efficiency applied to the determination of output levels.

- Economic efficiency is applied to the determination of output levels.
- Economic efficiency can also be applied to the “output” of *environmental quality*.
- There are two questions:
- The first one: What quantity ought to be produced? (Economic efficiency: a normative question)
- The second one: What quantity is produced in fact? (Market performance: a positive question)
- There may be a difference between the two quantities.

Normative analysis vs positive analysis

- We have to strictly differentiate a normative analysis from a positive analysis.
- A normative analysis is concerned with a question such as “what a thing ought to be” or “what a thing should be”, while a positive analysis is concerned with a question such as “what a thing will be” or “what a relationship exists between A and B”.
- While the former analysis includes value judgement, the latter does not.

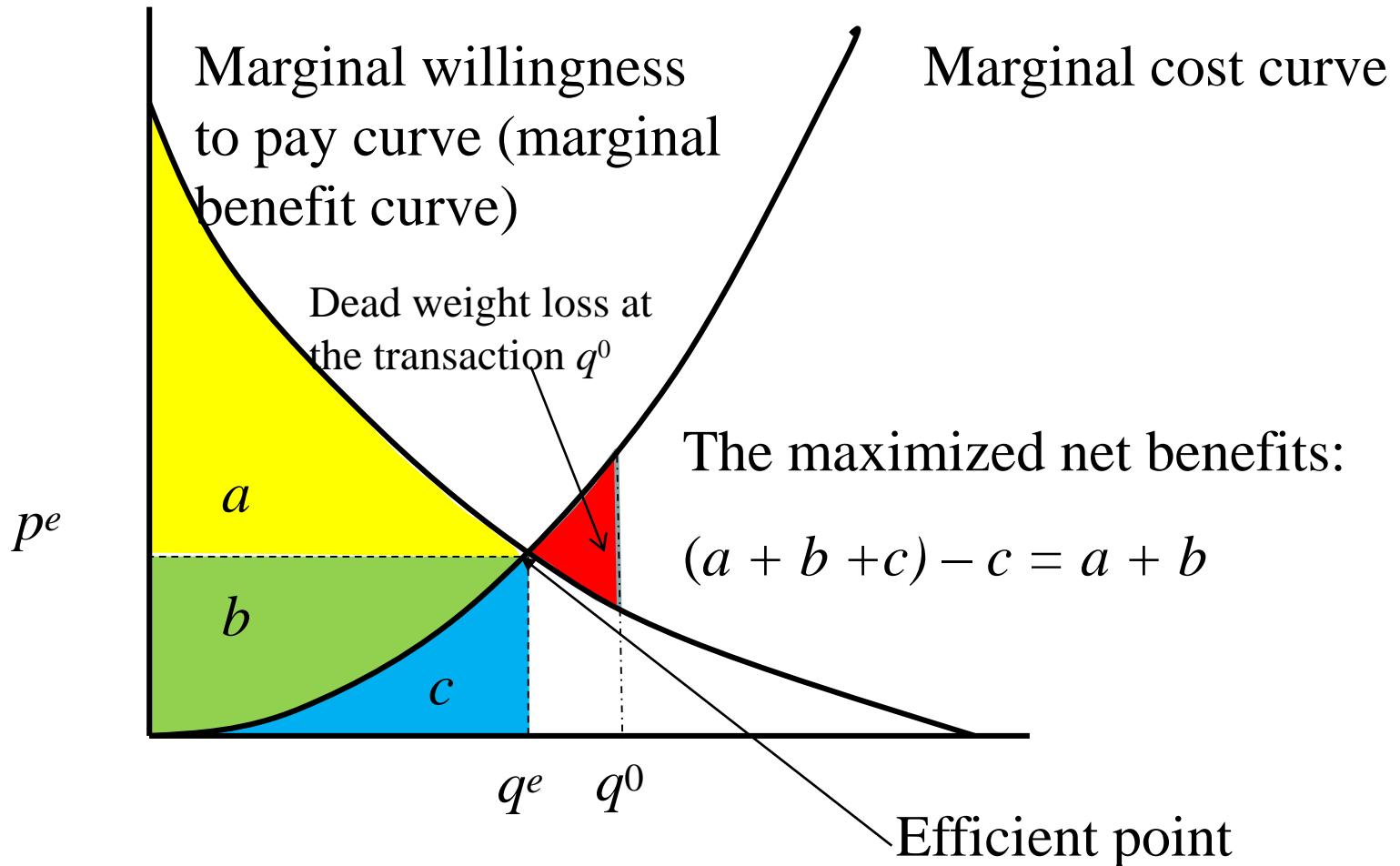
Economic efficiency (1)

- Economic efficiency is related to balance between marginal benefits (willingness to pay) and marginal costs.
- Efficiency is a notion that requires a reference point.
- Efficient from the standpoint of whom?
- We want to have a concept of efficiency that is applicable to the *economy as a whole* in this lecture.

Economic efficiency (2)

- Usually, economic efficiency refers to the relationship between *all* the benefits and *all* the costs.
- When the marginal benefits equals the marginal costs, the economy concerned is efficient.
- In this situation, the net benefits are maximized.

Explanation by means of a figure



Dead weight loss

- *Dead weight loss* means a loss of welfare which occurs in transaction of goods or services.
- If a proper amount of goods or services were transacted, there should be no room for increasing welfare.
- If an improper amount of goods or services were transacted, we could increase welfare and the loss should disappear.
- Thus, dead weight loss means inefficiency in transaction of goods or services.

Pareto Efficiency

- So far, efficiency is judged in terms of the total surplus; if there is no room for the total surplus to be increased by transaction, the situation is efficient.
- There is another criteria on which efficiency is judged; Pareto efficiency. If any person's utility cannot be increased without decreasing other person's utility, the situation is called *Pareto efficient*.

Remarks

- The concept “Pareto efficiency” is more general than maximization of total surplus.
- Generally speaking, there are infinitely many points which satisfy Pareto efficiency.

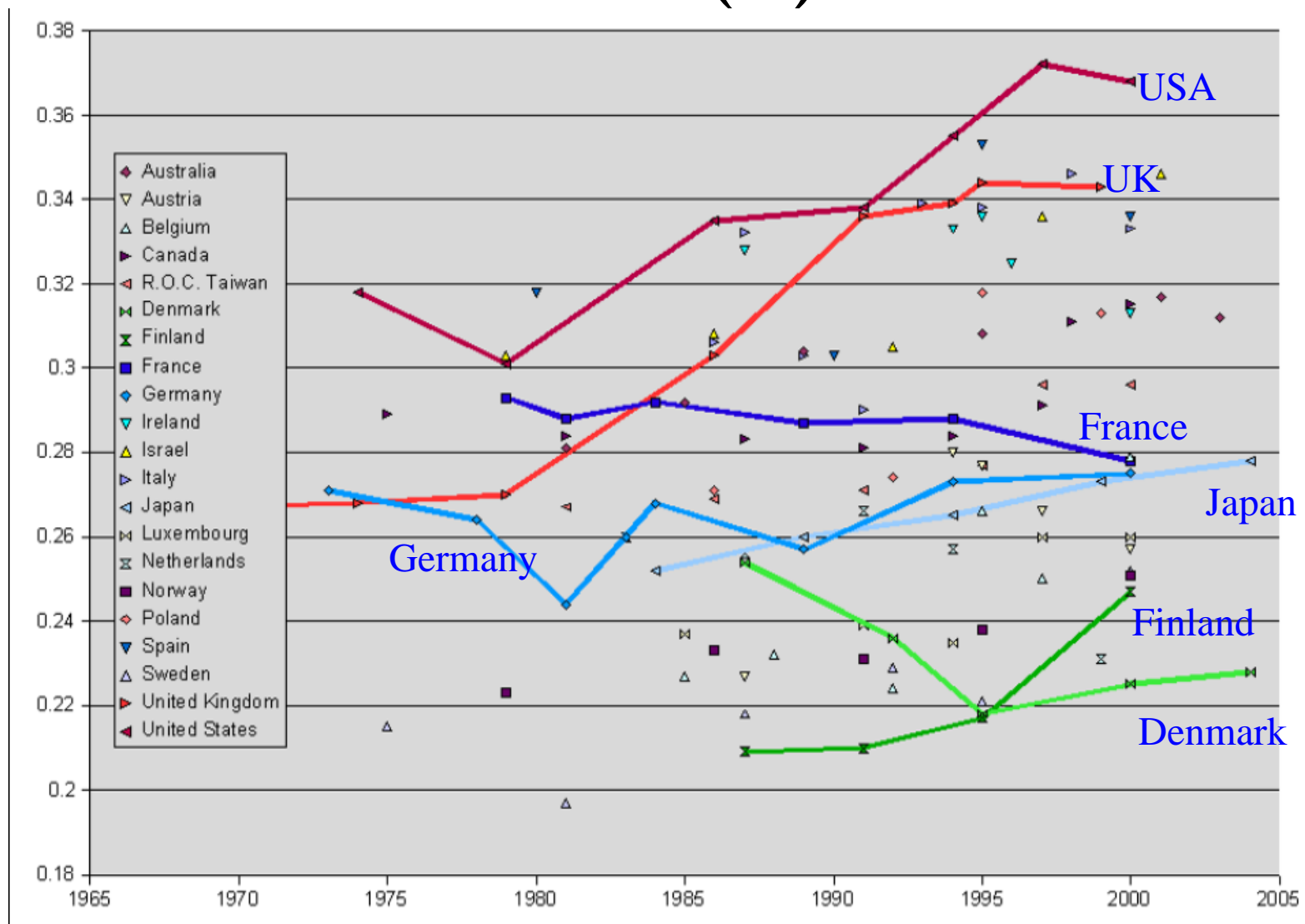
Efficiency and equity

- Efficiency does not distinguish among people.
- Efficient economic situation is not always equitable.
- Equity is sometimes regarded as an important issue rather than efficiency in a daily life.
- Equity is closely related to distribution of income or wealth among people.

Topic: Unfair income distribution?

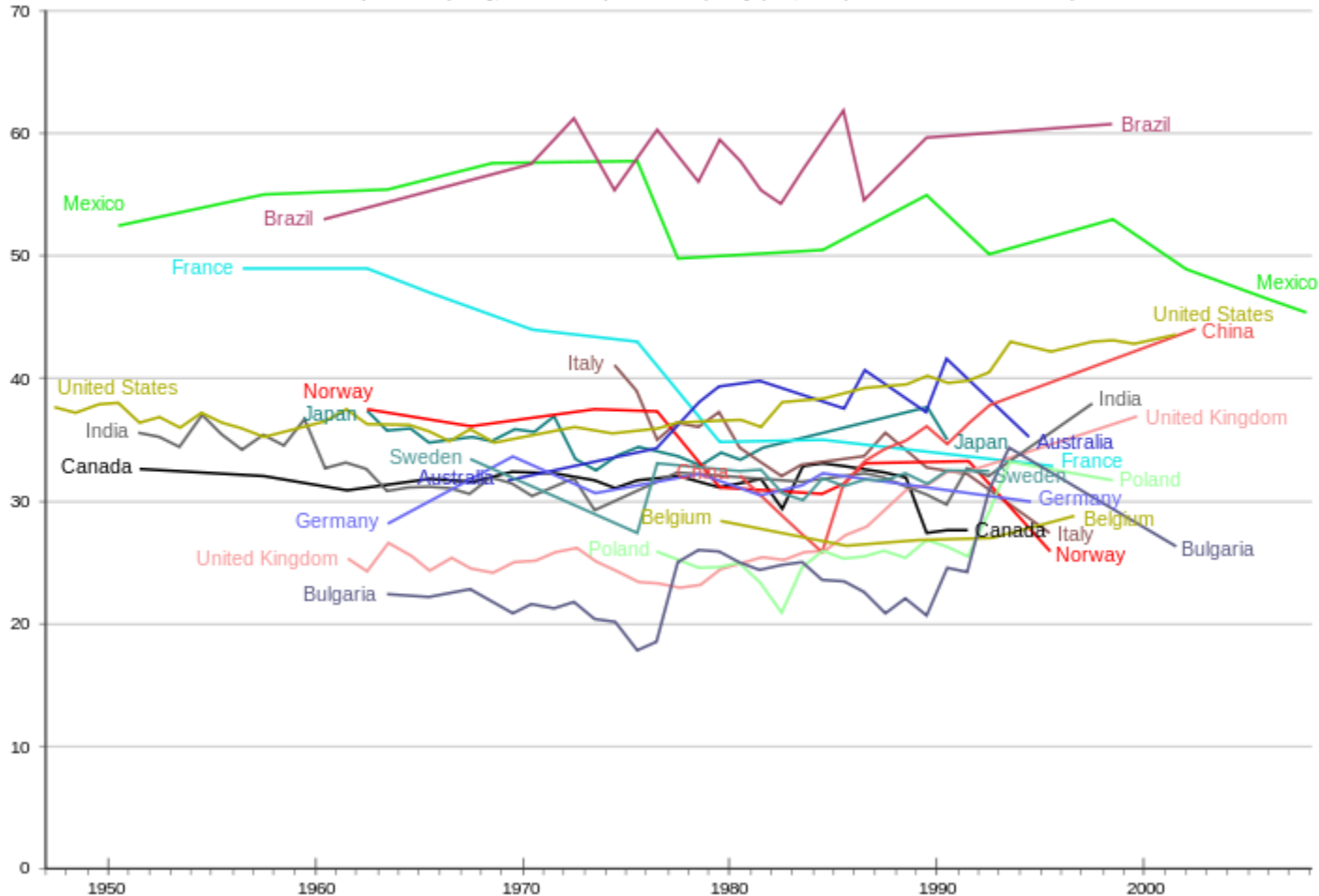
- It is said that a gap between rich and poor is widening in advanced countries, such as Britain, USA., Japan and so on.
- Is this true, first of all?
- In those countries, markets are considered to work well, allocating resources efficiently.
- Is something to be done, to narrow the gap?
- Should re-distribution of income be made?
- Then, how should it be made? What policy should be adopted to improve the circumstance?

Topic: What does Gini coefficient tells? (1)



Topic: What does Gini coefficient tells? (2)

Gini Index - Income Disparity since World War II
where 0 is perfect equality, and 100 is perfect inequality (i.e., one person has all the income)



Remarks on efficiency

- Efficiency is a concept which can be used without referring to a market price.
- Hence, we can talk about efficiency of a socialist economy where there is basically no price mechanism.
- It is an interesting theme to design a efficient mechanism for transaction of goods and services whether price mechanism may be utilized or not.

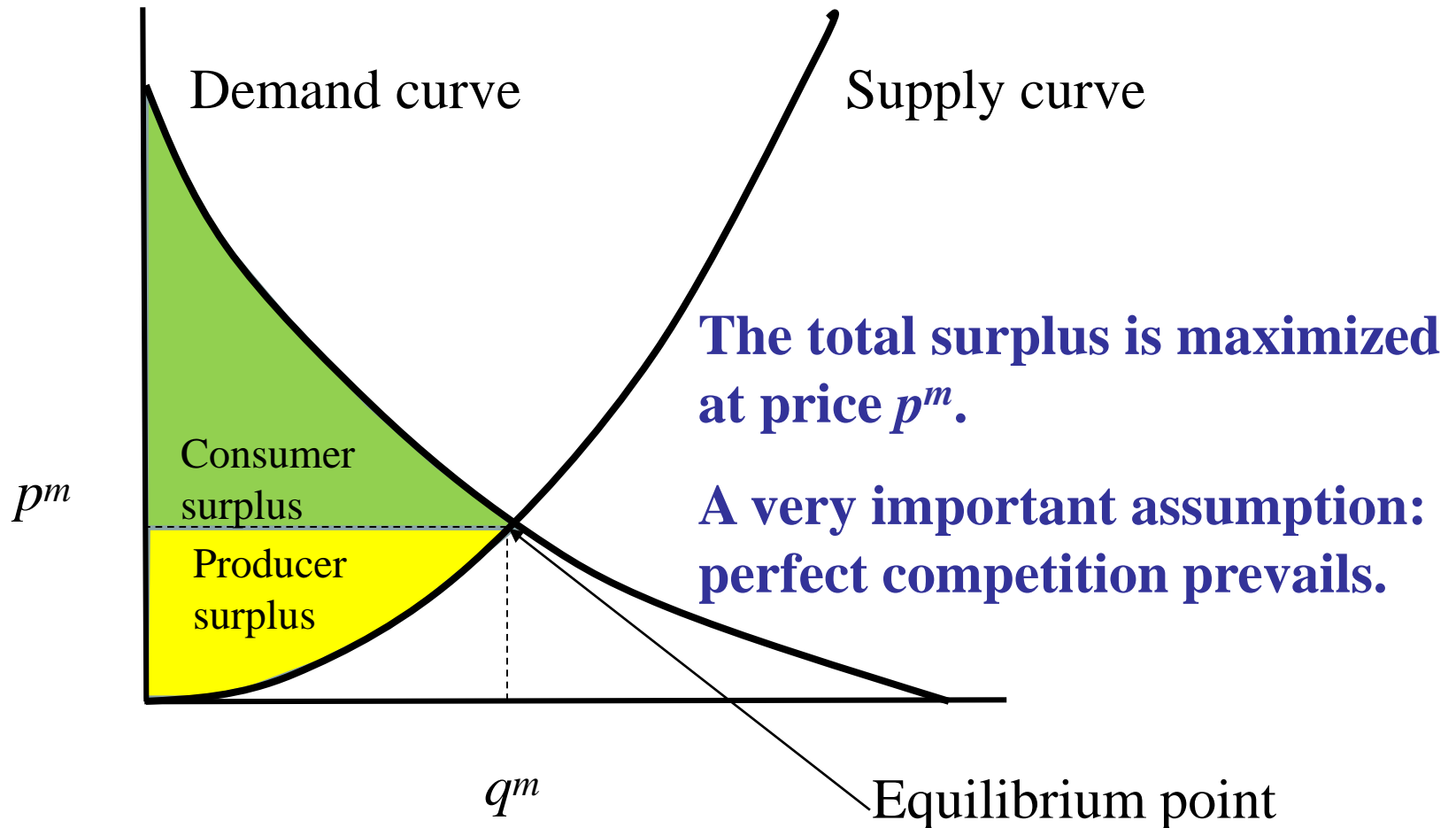
Are markets working well? (1)

- Markets fulfill efficient allocation of resources insofar as some conditions are satisfied.
- For all its faults, a market system will normally produce better economic results overall than any other system.
- Clearly, although our system is “market based”, we do not have to accept whatever results it yields.
- Basically, the results are acceptable only if they are reasonably efficient and equitable.

Are markets working well? (2)

- Markets sometimes fail, particularly when environmental factors affect benefits (willingness to pay) and/or costs (external economy and diseconomy).
- Yet, it should be remembered that incentive structures are built-in in markets.
- We can utilize economic incentives to improve environmental quality in a market system.
- Actually, we are doing that for enhancing environmental quality.

Explanation by means of a figure



An important remark

- If the government is so wise that it knows all about supply and demand curves, imposing the amount of transaction represented by q^m both on producers and consumers, then the total surplus can be maximized without price mechanism.
- A huge amount of information is, however, required to execute the transaction, and such a thing is almost impossible for the government.

Markets and social efficiency

- An important question: Do markets produce socially efficient performance?
- Yes, provided that some important conditions are satisfied.
- If the marginal willingness to pay (marginal benefit) curve equals the demand curve and the marginal (social) cost curve equals the supply curve, efficiency of markets is guaranteed.
- But, markets sometimes fail (market failure), unless some conditions are satisfied.

Externalities:

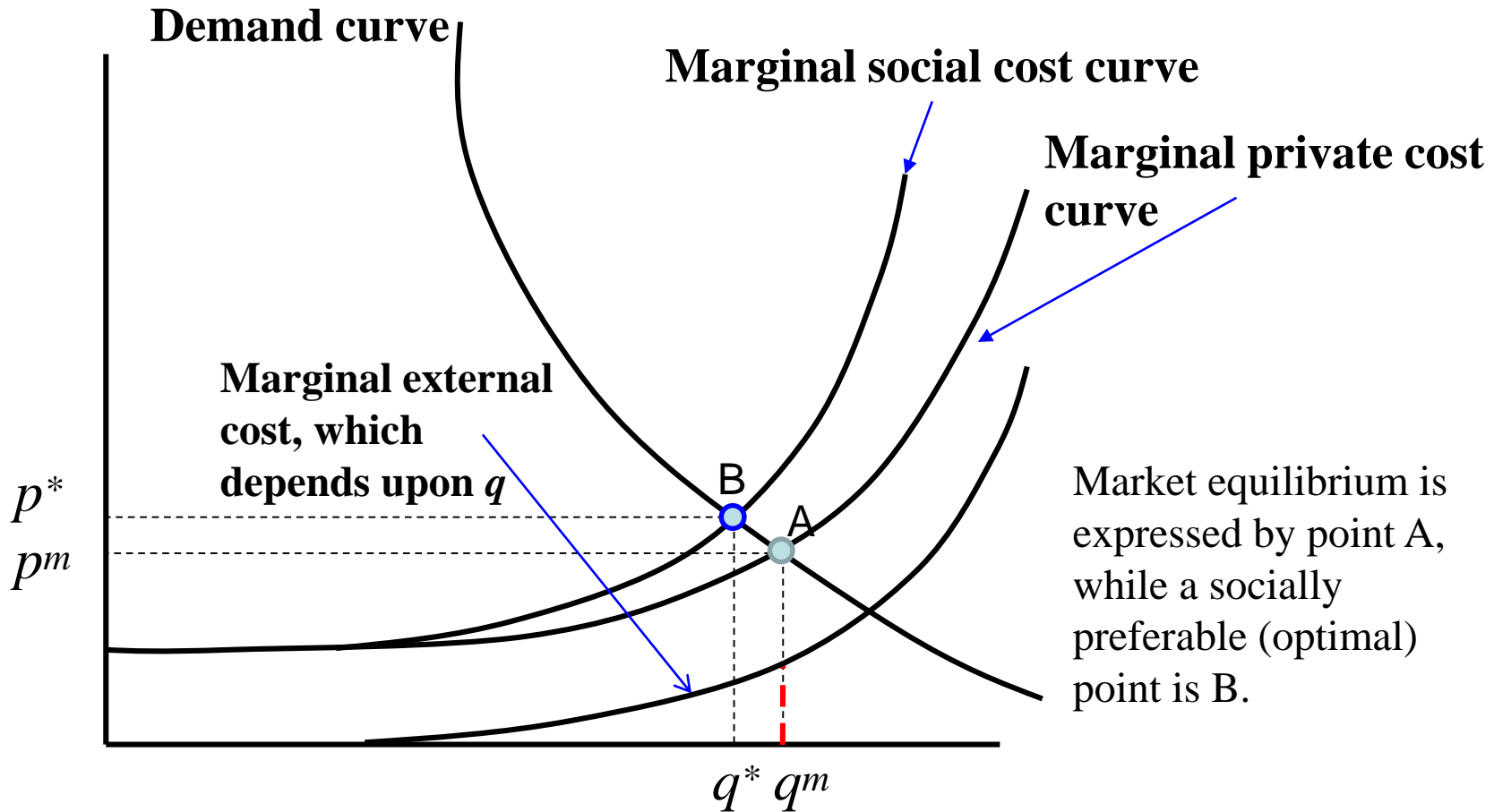
External economy and diseconomy

- When there is external diseconomy, the private costs differ from the social costs.
- Then, the social cost curve differs from the private cost curve.
- What are externalities?
- If cost burden is on someone's shoulder without market transaction, external diseconomy exists.
- If some benefits are enjoyed by someone without market transaction, external economy exists.

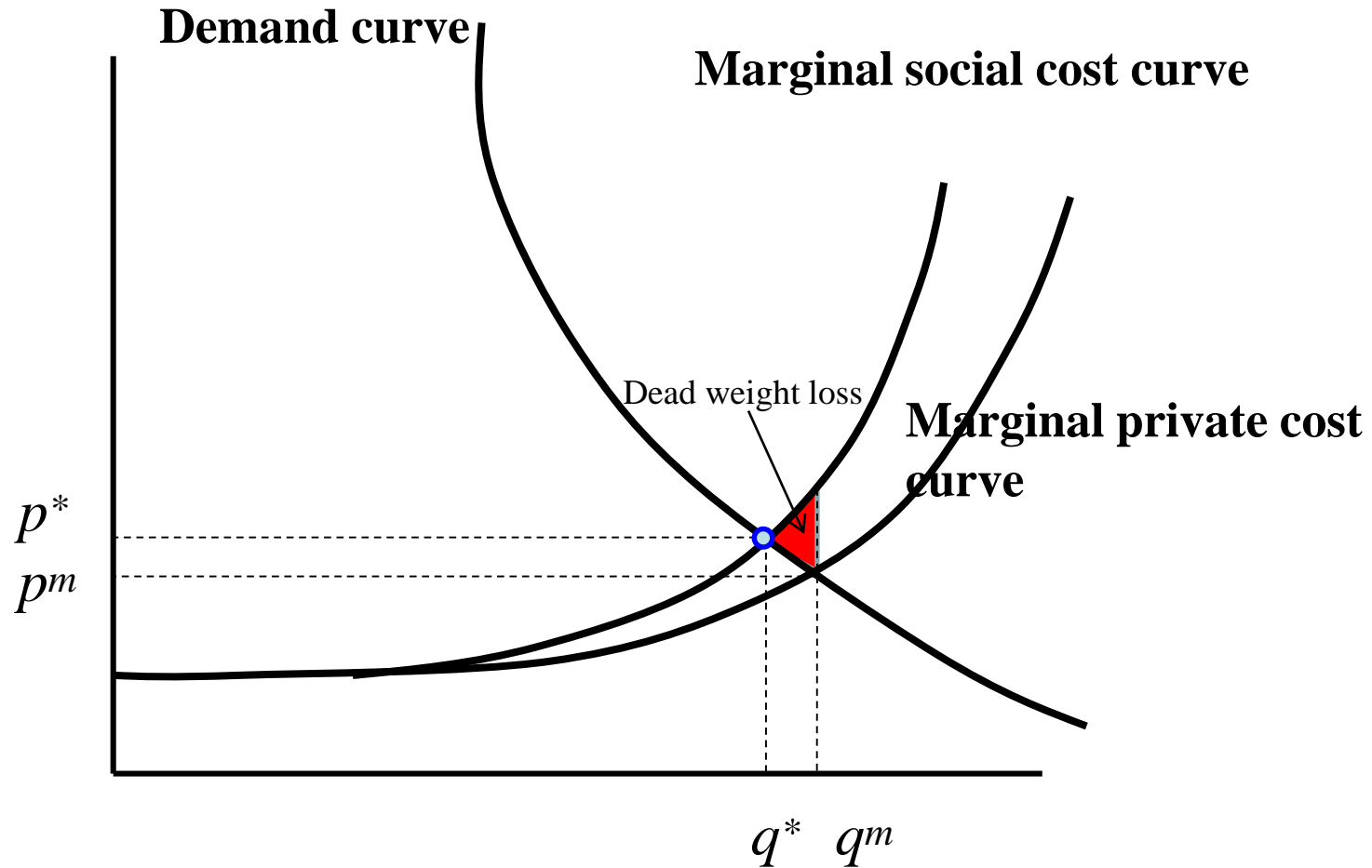
External diseconomy and environment

- If environmental degradation is experienced, there is external diseconomy. Thus, external costs (costs which come from external diseconomy) are on someone's shoulder.
- $\text{Social costs} = \text{Private costs} + \text{External costs}$
- Hence, the social costs differ from the private costs if there is environmental degradation which is external costs to someone.

Explanation by means of a figure



Dead weight loss due to external costs



Environmental externalities and physical linkage

- Most environmental externalities are expressed through physical linkage among people.
- Yet, some environmental externalities do not have physical linkage among people.
- One of those examples is degradation of landscape.
- What is important in this context is the notion of willingness to pay.

Externalities and open-access resources

- “Open-access” implies that anyone can make an access freely to certain resources.
- Open-access sometimes means external diseconomy.
- This diseconomy has a reciprocal nature.
- One of the good examples is traffic congestion.
- When you try to drive on a road, you consider only *your* costs, not others’ additional costs which may be caused by *your* action.

An important remark

- Open-access sometimes means external economy, instead of external diseconomy.
- So-called network externality is a good example.
- When many people enter into a network, other people will benefit from the entry of those people.
- In this case, open-access has merits.

Topic: Sturgeons in the Caspian Sea

- Sturgeons in the Caspian Sea have been overfished, and are in crisis of extinction.
- The caviar which is obtained from the Caspian Sea tastes so nice and expensive, and this accelerates free entry to the fishing, based upon “first come, first served” idea.
- Open access prevails, and there has been poaching.
- Sturgeons in the Caspian Sea have come to be endangered species.

External benefits

- External benefits (external economy) are the benefits which can be enjoyed by other people than those who make the action.
- When you keep your garden beautiful, the beauty (benefits) can often be enjoyed by someone else, either. The benefits are not restricted to you.
- Then, the willingness to pay revealed in a market (the private benefits) underestimates the social willingness to pay (the social benefits).

An example of external benefits: A Tyrolean house



Public goods and environment

- There is a close relationship between environment and public goods.
- Mt. Fuji may be considered to be public goods.
- Then, how are public goods defined?

Definition of public goods

- Public goods are characterized as follows:
- (1) Non-exclusiveness: No one can be prevented from utilizing goods.
- (2) Non-rivalness: Given constant amount of goods, anyone's utility is never reduced even if some other persons come to utilize the goods.
- Equal amount of consumption as for public goods holds: $x^s = x^d_1 = x^d_2 = \dots = x^d_n$

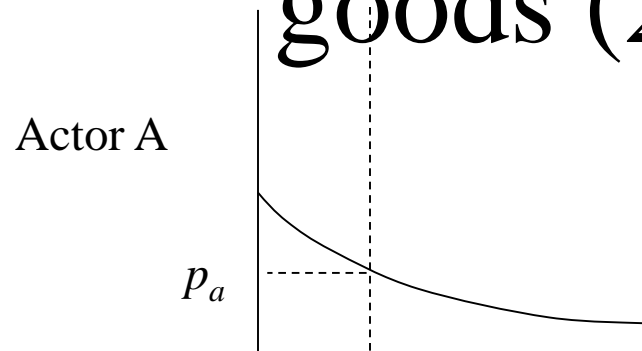
Market failure: Public goods

- Private markets tend to supply less amount of public goods than the efficient level.
- Marginal costs of additional unit of supply is zero. Consider why.
- Thus, markets cannot set the efficient level of price.
- Furthermore, there is a free-rider problem.

Optimal level of supply of public goods (1)

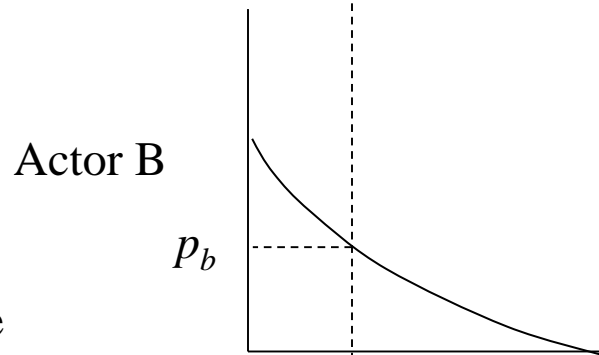
- How is the optimal supply of public goods obtained?
- The point is that public goods are consumed by the same amounts by consumers.
- Thus, the total WTP is obtained by *summation of all the persons' WTP* at each amount of public goods.

Optimal level of supply of public goods (2)



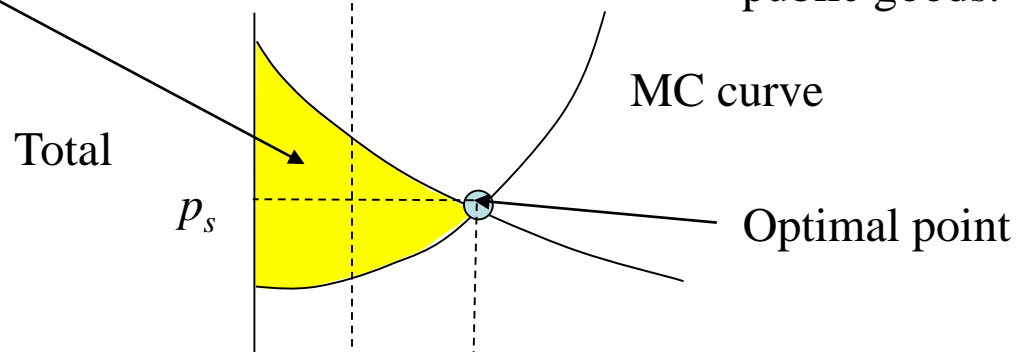
Optimal condition:

$MC = \sum$ willingness to pay,
which does not hold in a market.



None is prepared to pay p_s for this public goods. Moreover, they do not reveal their willingness to pay.

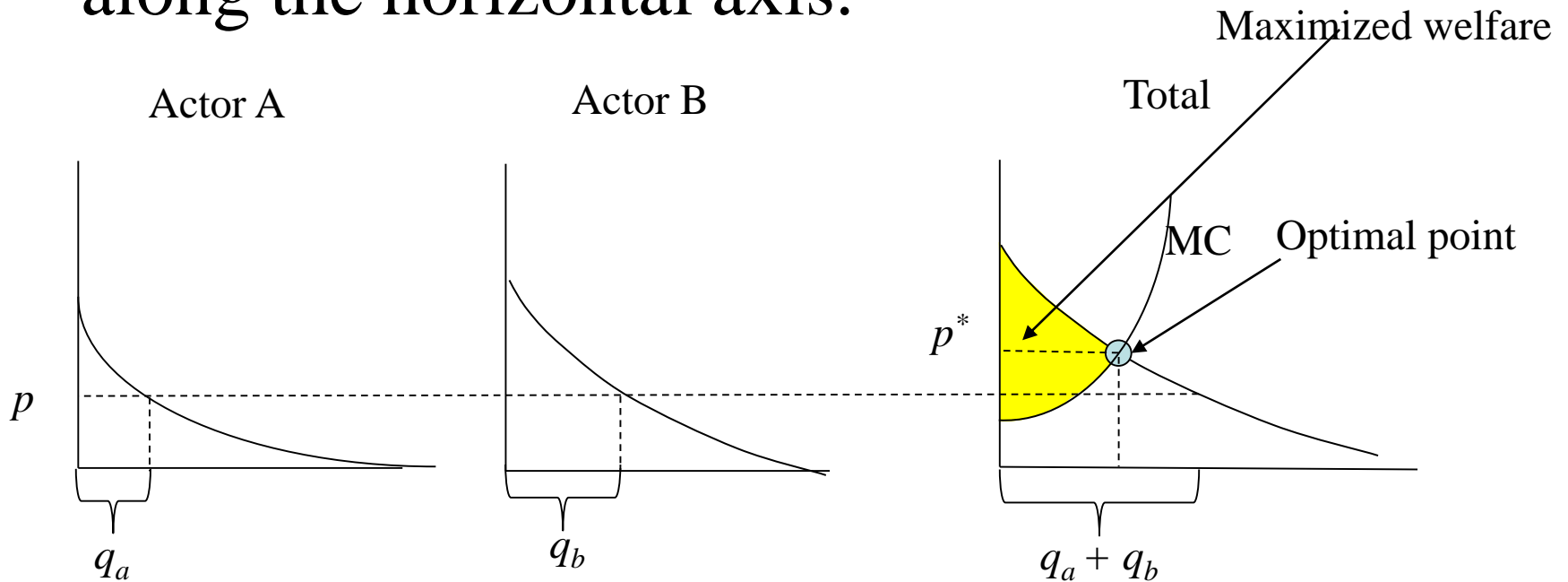
maximized welfare



Hence, a market fails as for public goods.

Remark

- In the case of private goods, the total WTP is obtained by summation of individuals' WTP along the horizontal axis.



Environment and Public Goods

- Natural environment may be regarded as public goods.
- In most of the cases, anyone can make an access to natural environment freely.
- Within a certain limit, there is no congestion when people make an access to natural environment.
- None tries to owe cost burden to maintain natural environment, expecting someone does.
- Thus, environmental goods or resources are not maintained at the optimal level in markets

Question

- What sort of institutional device is invented for enhancing environmental quality?