

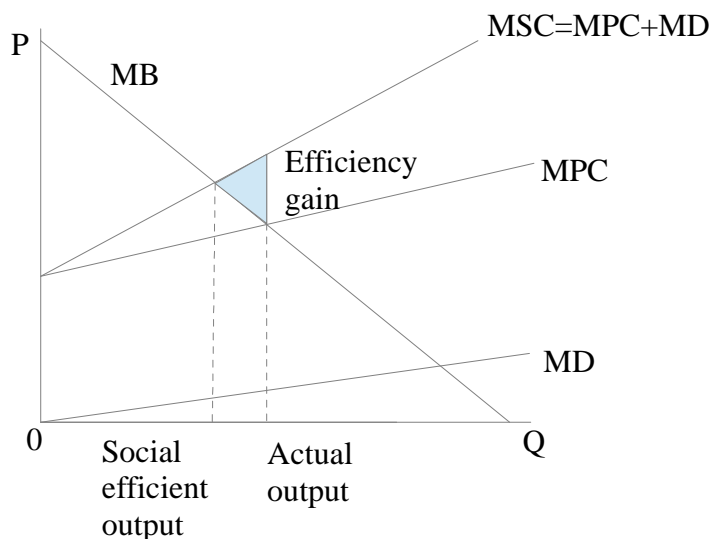
Chapter 5. Externalities

When the activity of one entity (person or firm) directly affects the welfare of another in a way that is not reflected in the market price, the effect is called an **externality**. Because one entity directly affects the welfare of another entity that is external to the market. Unlike effects that are transmitted through market prices, externalities affect economic efficiency negatively.

Characteristics of externalities:

- They can be produced by consumers as well as by firms
- Externalities are reciprocal in nature
- Externalities can be positive (example = vaccination)
- Public goods can be viewed as a special kind of externality. When an individual creates a positive externality with full effects felt by every person in the economy, the externality is a pure public good. Although public goods and positive externalities are similar, we have to distinguish between them in practice.

As long as someone owns a resource, its price reflects the value for alternative uses, and the resource is therefore used efficiently. An externality is the consequence of the absence of **property rights**.



If a person (person 1) wants to maximize profits, he produces each unit of output for which his marginal benefit (MB) exceeds his marginal costs (MPC). Thus he produces then the output level where MB intersects MPC, the actual output.

If we want to maximize profits from society's point of view, society produces as long as marginal benefit for the society (MB) exceeds society's marginal costs (MSC). The MSC consists of the MPC of person 1 and the marginal damage done to person 2 (MD).

The output that is produced is where MSC and MB intersect and is called the socially efficient output.

By looking at producer and consumer surpluses we can prove that the society gains by reducing production from actual output to socially efficient output.

We can implicate two observations from this analysis:

- When externalities exist, private markets do not produce the socially efficient output level.
- The model shows that efficiency would be improved by a move from actual output to socially efficient output and it also provides a way to measure the benefits of doing so.
- In general zero pollution is not desirable.

It is difficult to identify and to value the effect of an externality like pollution:

1. *What activities produce pollutants?*

The types and quantities of pollution associated with various production processes are hard to identify.

2. *Which pollutants do harm?*

It is difficult to determine which pollutants cause harm and by how much.

3. *What is the value of the damage done?*

It is a hard to calculate the dollar value of the damage. Pollution is generally not bought and sold in explicit markets. The use of a willingness-to-pay measure can be questioned. People may be ignorant about the effects of an externality and underestimate the value of reducing it.

The inefficient allocation caused by an externality can be avoided. An efficient output can be achieved by both private and public responses.

Private responses:

- **Bargaining**

When property rights are assigned, individuals may respond to the externality by bargaining with each other. In this way the gain is divided over the involved parties.

The *Coase Theorem* states that no matter who is assigned the property rights, an efficient solution will be achieved if both:

1. The bargaining costs are low;
2. The owner can identify the polluter.

This theory implies that once property rights are established, no government intervention is required to deal with externalities.

- **Mergers**

Another way to deal with an externality is to internalize it by combining the involved parties. In effect, by failing to act together, companies are often throwing away money. The market, then, provides a strong incentive for the firms to merge.

- **Social conventions**

Individuals cannot merge to internalize externalities like firms can. Certain social conventions can be viewed as attempts to force people to take into account the externalities they generate. Often moral regulations cause people to emphasize with others (example = turn of mobile phones in class). These regulations correct for the absence of missing markets.

Public responses:

- **Pigouvian tax**

A natural solution is to levy a tax on the polluter that makes up for the fact that some of his inputs are priced too low. A Pigouvian tax is a tax levied on each unit of a polluter's output in an amount just equal to the marginal damage it inflicts at the efficient level of output. Such a tax gives the producer a private incentive to produce the efficient output. Practical problems in implementing a

Pigouvian tax:

What is the marginal damage (= tax rate)?

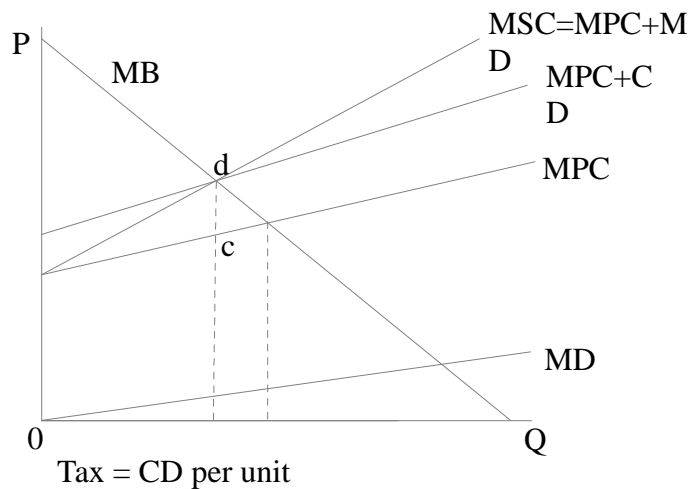
- Who pollutes and how much?

However, an imperfect Pigouvian tax is often better than none at all.

- **Pigouvian subsidy**

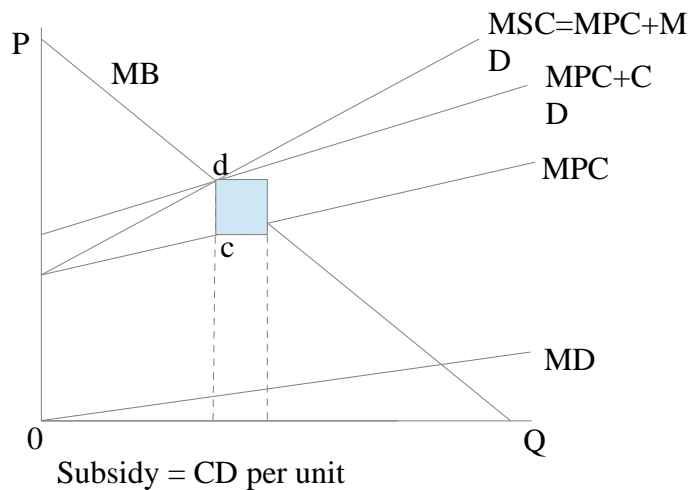
A subsidy for pollution not produced can induce producers to pollute at the efficient level. This is called a Pigouvian subsidy.

A subsidy also leads to the efficient production level, but it has different distributional consequences compared to a Pigouvian tax (SEE FIGURE).



Practical problems of a Pigouvian subsidy:

- Polluters and the amount of pollution are hard to identify.
- Subsidy may attract more factories, because a subsidy increases the profits. Eventually, total pollution, then, will increase.
- Subsidizing polluters is often ethically undesirable.



Creating a market

The government can sell permits with socially efficient output and permissions to pollute go to the firms with the highest bids (example = CO₂ emission rights). The price paid for permission to pollute measures the value to producers of being able to pollute. The main advantage of this permit approach is that it reduces uncertainty about the ultimate level of pollution.

- **Regulation**

Under regulation, each polluter must reduce pollution by a certain amount or else face legal sanctions. Regulation is likely to be inefficient when there are multiple firms that differ from each other, because the social value of pollution reduction varies across firms, locations and the populace. Regulation that mandates all firms to cut back by equal amounts (either in absolute or proportional terms) leads to some firms producing too much and others too little.

Public responses to externalities:

- **Emissions fee**
An emissions fee works the same as a pigouvian tax. The only difference is that with an emissions fee a tax is levied on each unit of pollutions rather than on each unit of the polluter's output. The total cost of emissions reduction is minimized when the marginal costs are equal across all polluters. The outcome is called *cost effective* if it is achieved at the lowest cost possible.
- **Cap-and-Trade**
An alternative policy to an emissions fee is that the government can require person 1 and person 2 to submit one government-issued permit for each unit of pollution they emit. A system of tradable pollution permits is called *cap-and-trade*.

Emissions fees and cap-and-trade systems are called **incentive-based regulations** because they provide polluters with market incentives to reduce pollution.

The traditional approach to environmental regulation has relied on command-and-control regulations instead of incentive-based regulations. Command-and-control regulations are more flexible than incentive-based ones and take a variety of forms. Two types:

- **Technology standard.** Requires polluters to install a certain technology to clean up their emissions. The law does not allow this so technology standards are unlikely to be cost effective.
- **Performance standard.** It sets an emissions goal for each polluter. Polluter frequently has the flexibility to meet this standard in any way it chooses. Therefore it is more cost effective than a technology standard.

Positive externalities

The analysis of positive externalities is similar to that of negative externalities. Efficiency requires the marginal cost to equal the social marginal benefit. When an entity produces positive externalities, the market underprovides the good. This can be corrected by an appropriate Pigouvian subsidy.

However, requests for such subsidies must be viewed cautiously:

- Subsidy has to be financed by taxes. This means a redistribution of income *and* a distortion of the market which is taxed.
- The fact that an activity is beneficial does not always mean that a subsidy is required for efficiency – only if the market is imperfect.