Part I

Objective of the chapter 1

- To present the implementation of an economic instrument in the context of the environmental regulation.
- To understand the role of incentives through the concept of externalities.
- To underline that the objective of an incentive is to allow the existence or the continuity of *public goods* : accessible goods to all without the consumption by one reducing those of others.

Chapter 1. The economic approach of incentives

Environmental Incentive

In the simplest sense, *to incentivize* is to encourage an individual to act in a given direction or to push him/her to do something.
If the question arises in the context of environmental protection, it is because we do not sufficiently consider the impact of our actions (purchases of goods, consumption of energy and natural resources, transportation, etc.) on the environmental quality and the degradation of the environment.

Source : Ouvrard et Stenger 2018

Environmental Incentive

What ? Change our behaviors !

Environmental Challenges

- Climate change.
- Accelerated loss of biodiversity.
- Environmental and security degradation.
- Access to water.
- Environmental refugees.
- Technological accidents.
- Chemical hazards.

Environmental Incentive

Environmental Incentive

An incentive is the implementation of a policy aimed at modifying the behavior of the economic agents.
The incentive must provoke in the agents the direction desired by the regulator.
In the environmental field, the incentive is to contribute to the resolution of an externality.

Public Goods

Public goods (collectives)

Goods whose consumption is *indivisible and not exclusive*.
They designate a complex category of environmental resources.

Public goods

Non-exclusion

Non-exclusivity refers to the fact that once a resource is made available, even people who do not pay for it cannot be deprived of the benefits it offers.

Non-rivality or Indivisible

Consumption is *indivisible or non-rivalrous* when the fact that one person consumes a good does not limit the quantity of that good available to other consumers.

Types of goods

	Exclusion	Non-exclusion
Rivality or Divisible	Individual or Private goods Rivate goods Ex: apple	Property in common ownership Common property Common-pool resources Common goods Ex: fishing area
Non-rivality or Indivisible	Share property or Club goods Ex: cinema	Collective goods Public service Public goods Ex: National defense

Discussion : Public goods

Several common environmental resources fall into the category of public goods, including : a beautiful landscape, clean air, clean water and biodiversity.

Discussion

Can we trust the private sector to produce an efficient quantity of public goods, such as biodiversity ?

Link for brainstorming

Free rider

The inefficiency comes from the fact that each agent can interfere with the contribution of others.

Free riders

An economic agent who takes the benefits associated with a good or a service without contributing to the provision of that good or service. It is called a free rider.

Given the indivisible and non-exclusive nature associated with the consumption of a public good, each consumer could gain the benefits whose cost has been paid by others. Because, it is difficult to finance an efficient quantity of the public goods.

Common goods

Common goods or common-pool resources

In Economics, goods that have a *non-exclusion of use* but a *rivalry* in their consumption are defined *common goods*.
Often consumed by a community of users, these goods would be destined to be overexploited (Hardin, 1968).

(Combes, Combes-Motel et Schwartz 2016)

Externality : market failure (1/3)

Externality

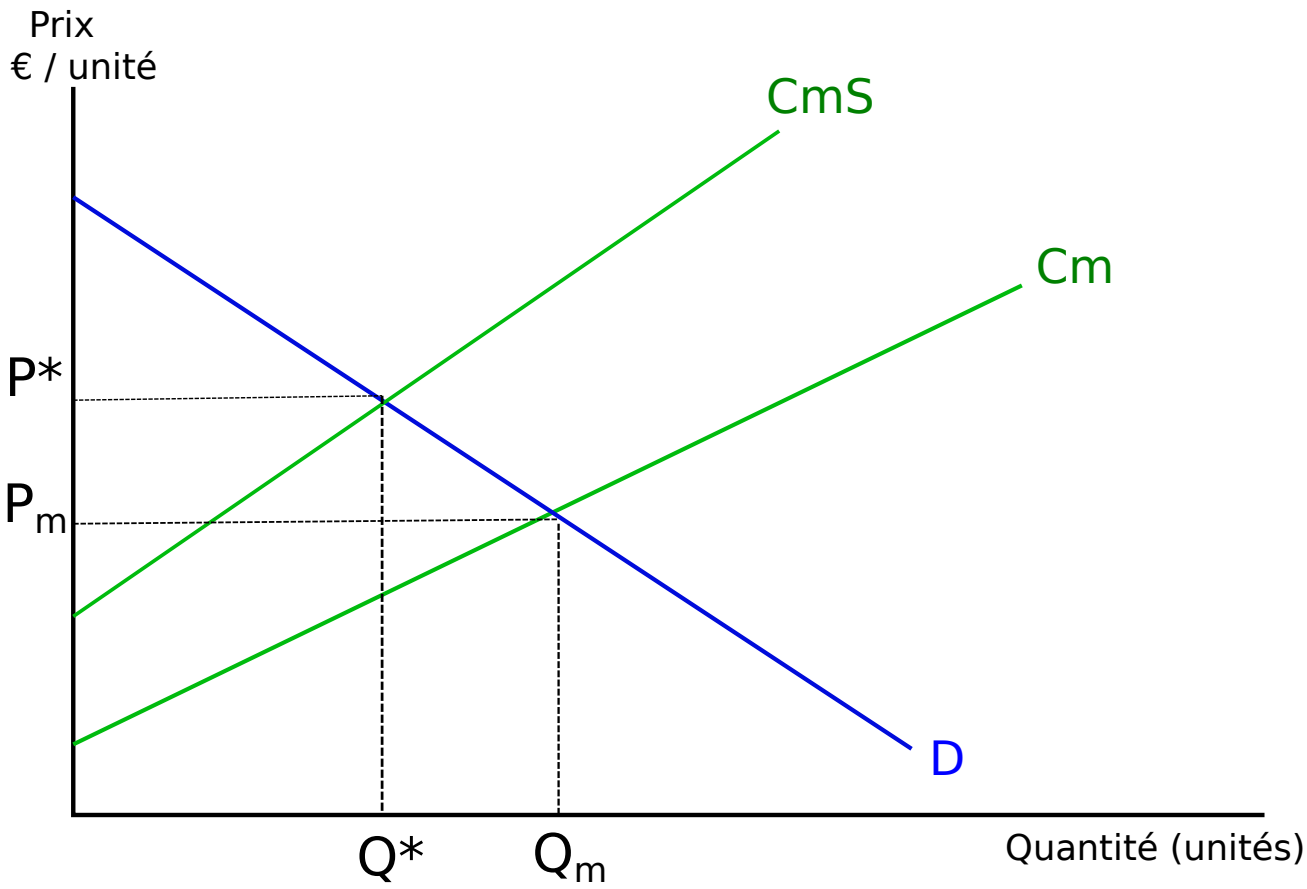
An *externality* arises as soon as the well-being of an agent no longer depends only on his own actions, but also on the activities of one or more other agents.

Externality : market failure (2/3)

Examples :

- the production of a good is too big ;
- pollution is excessive ;
- the price of pollution-causing products is too low ;
- as long as the costs remain external, the market does not encourage the company to think of ways to reduce the pollution generated by each unit produced ;
- recycling and reuse of polluting substances are not encouraged because their release into the environment is less costly, thus we maintain inefficiency.

Externality : market failure (3/3)



D : demand curve, Cm : private marginal cost of production, CmS : social marginal cost. (Tietenberg et al. 2013)

Different types of externalities (1/2)

- External effects, or externalities, can be either *positive or negative*. They refer to the circumstances in which an agent is favored or disadvantaged by external effects.
- An externality is monetary (market externality) when the external effect results in a change in price.
  Example : the installation of a new company in the region causes an increase in the price of land rental.
  $\Rightarrow$ The signal « price » could readjust the market.

Different types of externalities (2/2)

- Pollution cannot be defined as a market externality because in this case the effect is not reflected in the price.
- The price does not adjust to the increase of waste.
- Another form of externality is the technological externality, when a resource cannot be supplied.
- The concept of externality is vast and covers several causes of market failures.

Types of incitives

Various forms :

- Traditional instruments : taxes, subsidies, etc.
- Non-monetary incentives : nudges, role of motivation, education.
- Legal measures : *command and control*.
- Dissemination of information on polluters.
- Voluntary approaches.

Nudge

Nudge ⇒ Chapter 6 Strategies for implementing environmental policies

A simple, inexpensive or low-cost action whose goal is to steer agents' behavior in a given direction to improve their well-being.

Source : Thaler & Sunstein, 2008.

Motivations and Incentives

$\Rightarrow$ Incentives $\Rightarrow$ Policy in place $\Rightarrow$ Directing individual desicions.
But, the motivation for adhering to the incentive can be :

- extrinsic : the reason is linked to a monetary award.
- intrinsic : related to a self-interest.

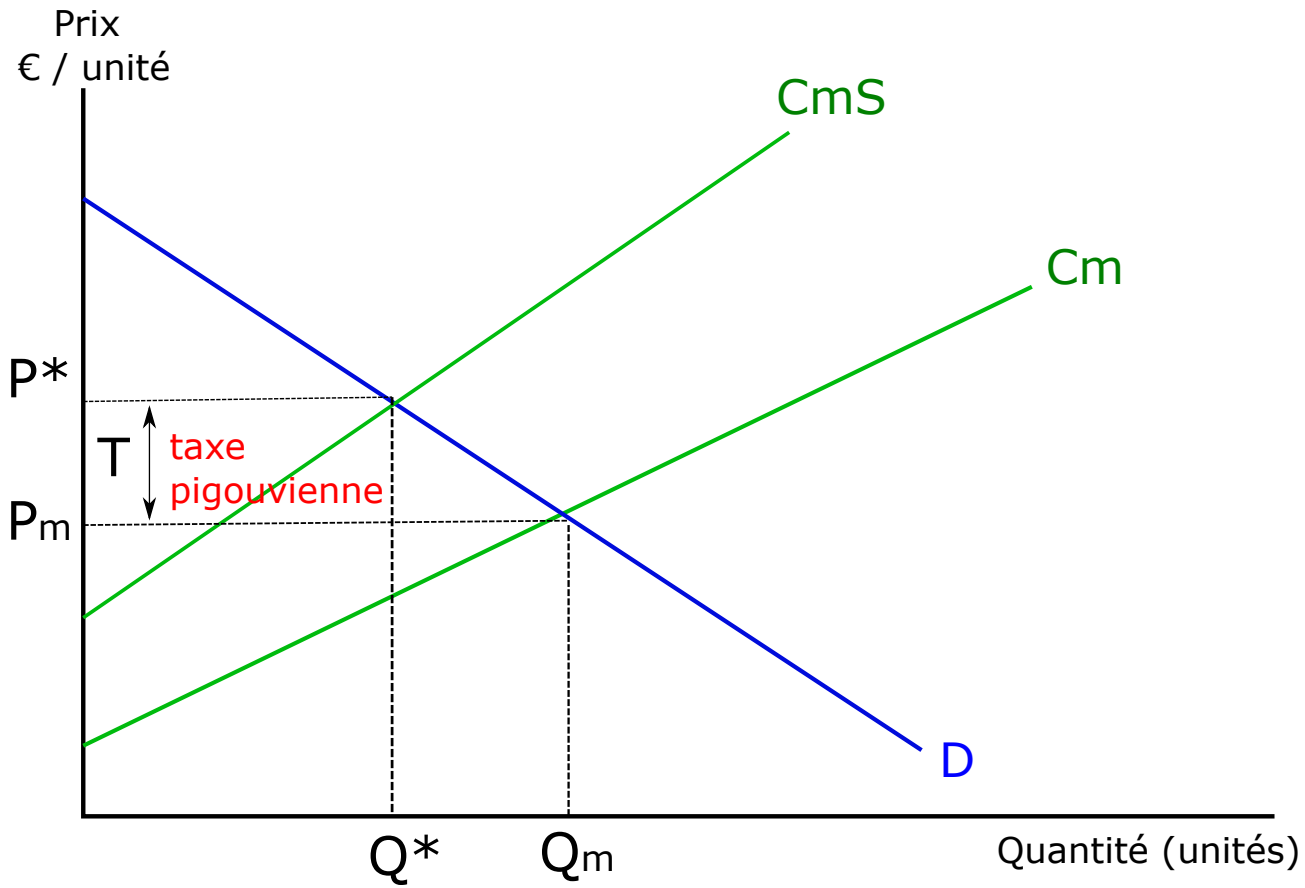
The main distinction between the two concepts : adherence and effectiveness.
Source : Frey & Jegen, 2002.

A Brief History of Environmental Incentives (1/7)

The history of the use of economic incentives to guide individual behavior can be understood through the history of the concept of externality.

- 1920 : The first internalization method is proposed by Arthur C. Pigou in his work *The Economics of Welfare*. ⇒ concept of Pigouvian tax.
- 1960 : Ronald Coase creates an approach based on the exchange of property rights, ⇒ The Social Cost Problem. From an empirical point of view, externalities are still considered to be fairly marginal phenomena, associated with neighbourhood problems.
- Both approaches are based on economic incentives, which are supposed to reorient individual behaviour in the direction of convergence towards Paretian optimality. In theory, only prices allow optimality to be achieved.

Focus : Pigouvian tax



T : Pigouvian tax, D : demand curve, Cm : private marginal cost of production, CmS : social marginal cost.

Focus : Coase's theorem

Coase's theorem

This theorem states that in a system where transaction costs are zero and property rights are well defined, it is possible to obtain an optimal allocation of resources without government intervention.
Applied to the environment, it implies that externalities can be eliminated by the simple fact negotiation between polluters and the polluted, who will agree on the necessary offsetings/compensations.

A Brief History of Environmental Incentives (2/7)

The growth of the concept of environmental externalities :

- 1952 : Report of the Paley Commission, it marks the birth of the research institute *Resources For the Future (RFF)*.
- The RFF works initially on the depletion of natural resources and quickly becomes interested in the problems of pollution and contributes to the development of the Environmental Economics.
- RFF introduces cost-benefit analysis and economic instruments in the management of environmental problems.

A Brief History of Environmental Incentives (3/7)

The growth of the concept of environmental externalities :

- 1962 : R. Carlson published *Silent Spring* which alerts on the dangers of DDT and pesticides in agriculture.
- 1966 : K. Boulding publie : *The economics of the coming spaceship earth*, highlighting the limits of growth, constrained both by the depletion of natural resources and by the increase in waste and pollution.
- $\Rightarrow$ Externalities are not marginal and negligible deviations from the optimun.

A Brief History of Environmental Incentives (4/7)

Division between theory and practice :

- Environmental problems are managed by regulatory measures : *Clean Air Acts* (1962), *Clean Water Acts* (1972).
- Willingness to rationalize environmental policies considered costly : Allen Kneese (1964) ; Kneese and Bower (1968), underline the cost savings generated by the use of taxes compared to a system of standards and norms, in the practical case of water quality.
- $\Rightarrow$ Second-rank solutions : mixtures of standards and incentives. These policies give up any claim to (unrealistic) Paretian optimality, and fall back on a less ambitious efficiency criterion : the minimization of the collective cost of depollution.

A Brief History of Environmental Incentives (5/7)

Research of second rank solutions ⇒ two rival solutions :

1. The Pigouvian tradition : Kneese and Bower (1968), Baumol and Oates (1971) will propose a type of non-Pigouvian (non-optimal) unitary tax to achieve a predetermined standard.
2. The emerging Coasian tradition : Crocker (1966) and Dales (1968) will develop the idea of a market for tradable permits/ licenses.

⇒ The optimal level of externality (pollution) is exogenous (politically fixed), at the lowest collective cost.
⇒ Clear separation between the goals (emission reduction) and the means (economic incentives) of environmental policies.

A Brief History of Environmental Incentives (6/7)

Least-cost theorem :

- 1970 : New incentive policies to achieve predetermined emission thresholds at least collective cost.
- A split between regulatory (command and control) and incentive (market based) instruments.
- Baumol and Oates (1971) consider the preference for the use of the price mechanism and propose a mixture of standards and taxes.
- Montgomery (1972) emphasizes the permits market. He seeks a compromise between competitive markets and the need to include a large number of agents.

A Brief History of Environmental Incentives (7/7)

Price instrument vs. quantity instrument.
In a situation of uncertainty about firms' marginal costs (variation in production costs), both instruments are no longer equivalent :

- The market sets the emission limits, but the equilibrium price is then uncertain.
- The tax fixes the price, but the quantity of emissions obtained in return remains uncertain.
- $\Rightarrow$ Weitzman (1974) created this debate between price instrument vs. quantity instrument.