Externalities & Public Goods I

Advanced Microeconomics - Pratical Lecture 4

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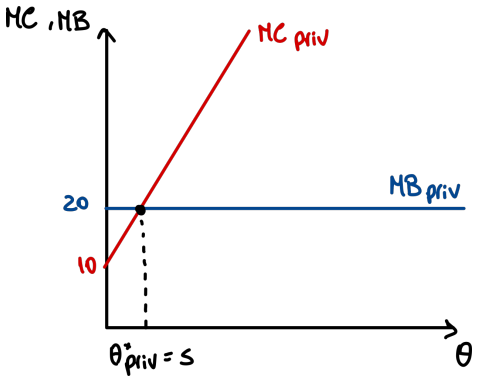
$\theta \rightarrow$ Number of hives
$MC_{priv} = 10 + 2\theta$ | Total Benefit$_{priv} = 20\theta \rightarrow MB_{priv} = 20$

a) How many hives will A have?



$\theta \rightarrow$ Number of hives
$MC_{priv} = 10 + 2\theta$ | Total $\text{Benefit}_{priv} = 20\theta \rightarrow MB_{priv} = 20$

b) Coincidentally there is an orchard next to A's new business, and each hive A keeps will pollinate one acre of apple threes. The orchard owner must pay €10 per acre to artificially pollinate those acres not pollinated by A's bees. What kind of externality do A's bees generate? Specify consumption or production, positive or negative?

Externality Classification

Externalities can be classified as:

According to their **effect**:

(1) Positive
(2) Negative

According to their **cause**:

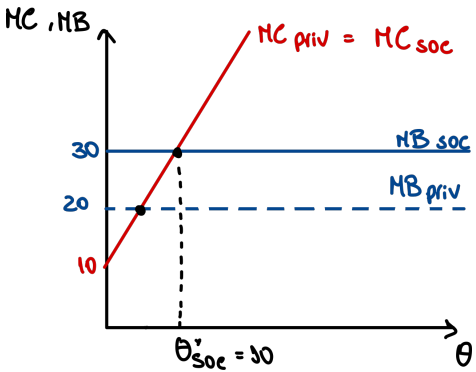
(1) Consumption
(2) Production

$\theta \rightarrow$ Number of hives
$MC_{priv} = 10 + 2\theta$ | Total Benefit$_{priv} = 20\theta \rightarrow MB_{priv} = 20$

c) What is the marginal social benefit of each hive?

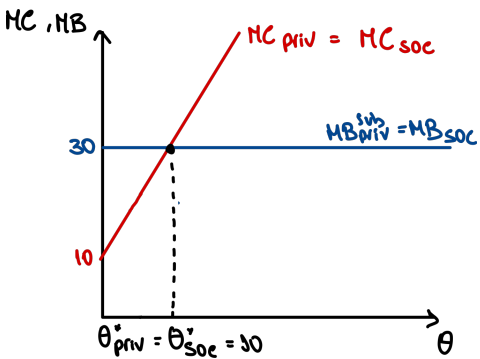
$\theta \rightarrow$ Number of hives
$MC_{priv} = 10 + 2\theta$ | Total Benefit$_{priv} = 20\theta \rightarrow MB_{priv} = 20$

d) Compute the socially efficient number of beehives.



$\theta \rightarrow$ Number of hives
$MC_{priv} = 10 + 2\theta$ | Total Benefit$_{priv} = 20\theta \rightarrow MB_{priv} = 20$

e) What kind of measure can the Government implement in order that the efficient number of hives to be reached? Quantify.



Pigouvian Subsidy/Tax

In the presence of an externality, one measure to correct the market failure and reach the social optimum is by introducing a tax (subsidy) that equals the marginal cost (benefit) caused by the externality at the social optimum.

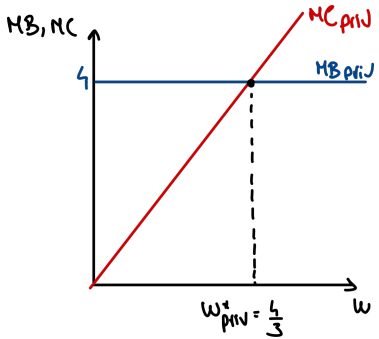
$w \rightarrow$ Weight of the car
$B_{priv} \rightarrow$ Total Benefits (private) | $C_{priv} \rightarrow$ Total Costs (private) | $D \rightarrow$ Total damage (externality)

a) What car weight will be chosen by drivers?

There are two ways to solve this exercise.

(1) Car drivers choose the w such that $MB_{priv} = MC_{priv}$.

(2) Car drivers choose w that maximizes their private net benefits.



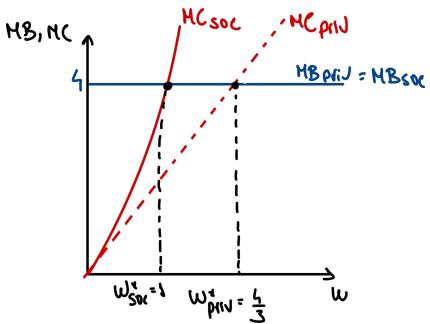
$w \rightarrow$ Weight of the car
$B_{priv} \rightarrow$ Total Benefits (private) | $C_{priv} \rightarrow$ Total Costs (private) | $D \rightarrow$ Total damage (externality)

b) What is the socially optimal car weight? Is it different to the one you found in (a)? Why?

There are two ways to solve this exercise.

(1) Social optimum reached when $MB_{soc} = MC_{soc}$.

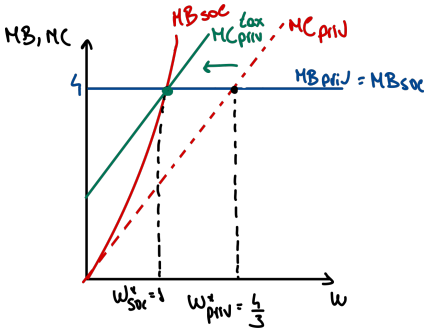
(2) Maximize the social net benefit.



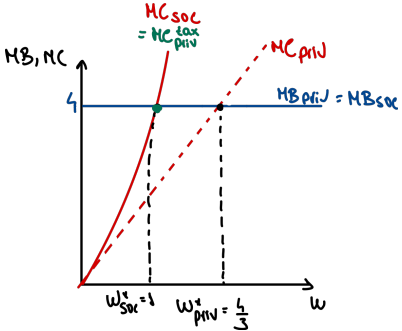
$w \rightarrow$ Weight of the car
$B_{priv} \rightarrow$ Total Benefits (private) | $C_{priv} \rightarrow$ Total Costs (private) | $D \rightarrow$ Total damage (externality)

c) Can you design a toll system that makes drivers to choose the right size of their cars? If so, how would this work?

Proposal 1: Implement a tax per unit of w



Proposal 2: Set a total tax equal to the damage



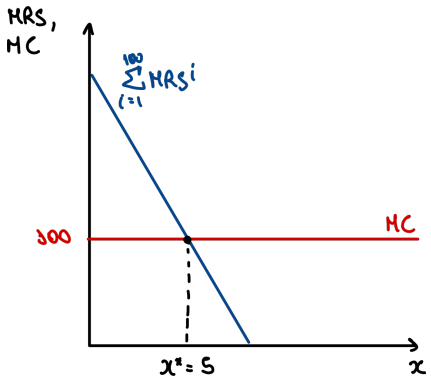
100 homeowners, each with $MRS^i = 6 - x \mid x \rightarrow$ Number of tankfuls sprayed
$MC = 100$

a) What is the Pareto efficient amount of spray?

Samuelson Condition

At the Pareto efficient level of provision of a public good:

$$\sum_{i=1}^{n} MRS^i = MC$$

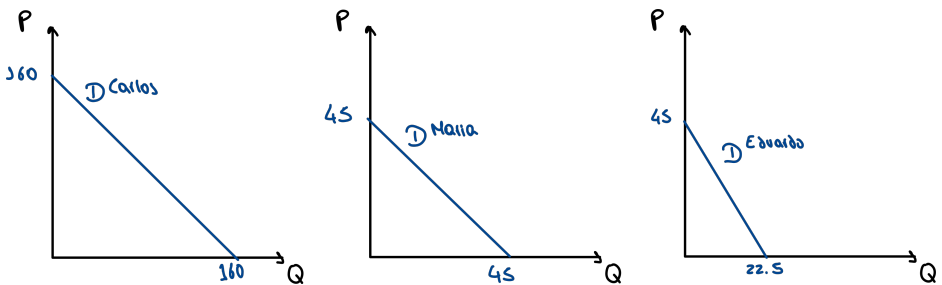


100 homeowners, each with $MRS^i = 6 - x \mid x \rightarrow$ Number of tankfuls sprayed
$MC = 100$

b) How much will actually be sprayed if each homeowner chooses on the basis of just his own benefit from the spray?

Carlos: $P = 160 - Q$ | **Maria**: $P = 45 - Q$ | **Eduardo**: $P = 45 - 2Q$
Total Cost: $C(Q) = 135Q$

a) What is the optimal area to be allocated to the park? Represent your solution graphically.

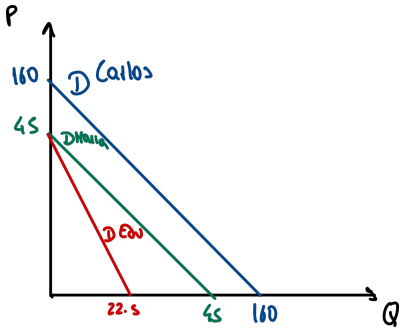


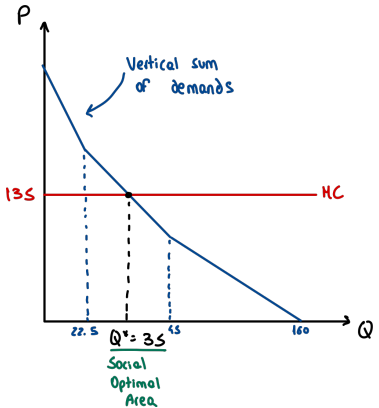
Exercise 4

Problem Set 4

Carlos: $P = 160 - Q$ | **Maria**: $P = 45 - Q$ | **Eduardo**: $P = 45 - 2Q$
Total Cost: $C(Q) = 135Q$

a) What is the optimal area to be allocated to the park? Represent your solution graphically.





Carlos: $P = 160 - Q$ | **Maria**: $P = 45 - Q$ | **Eduardo**: $P = 45 - 2Q$
Total Cost: $C(Q) = 135Q$

b) If the costs were to be financed by a Lindhal prices, how much would each pay?

Lindahl Pricing

Method of financing public goods where individuals pay a tax equal to their marginal benefit/maximum willingness to pay at the socially optimal quantity.

Carlos: $P = 160 - Q$ | **Maria**: $P = 45 - Q$ | **Eduardo**: $P = 45 - 2Q$
Total Cost: $C(Q) = 135Q$

c) Suppose now that the three neighbors had agreed that the park should be financed by equal contributions by each of the beneficiaries: each should pay 1/3 of the total cost. Furthermore, the decision to build the park or not is to be taken by a majority vote. How will each individual vote? Explain. Will the park be built? Explain carefully.