Problem set 1

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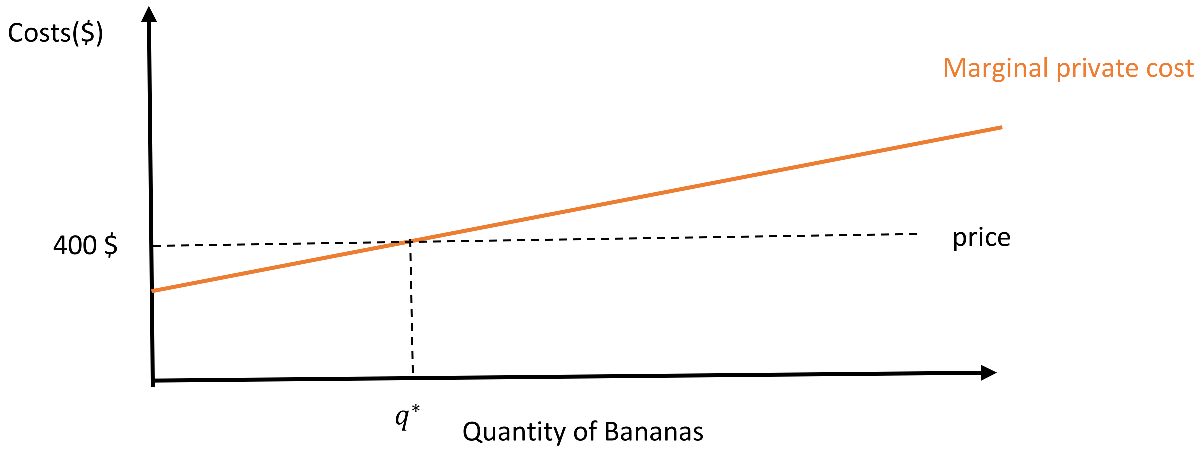
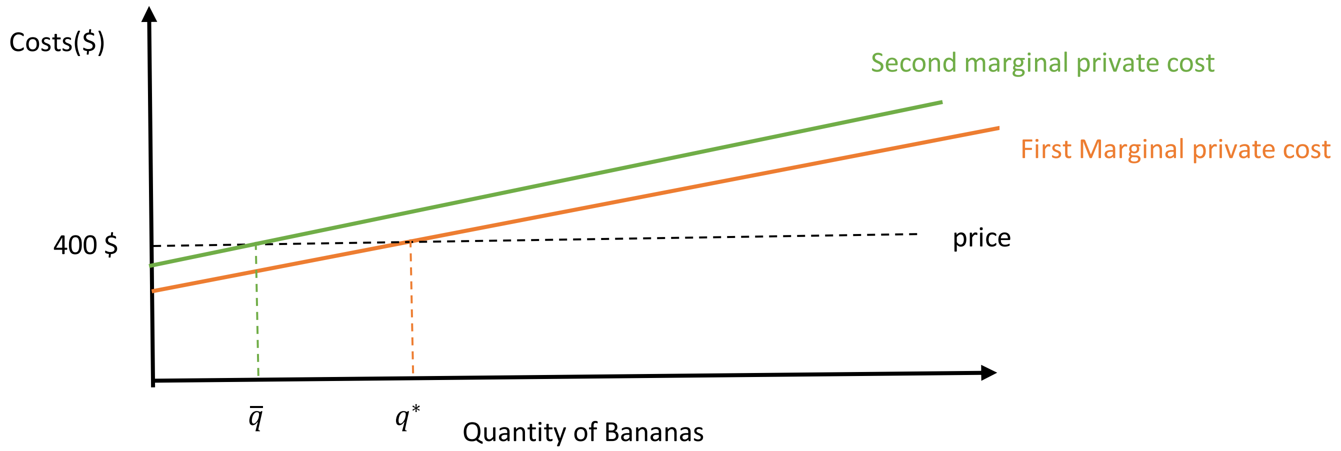
1-

a) At first we start with the case where there is no tax policies:



Now the government tax the harmful pesticide, the marginal cost of the firm will increase, because they also have to pay additional tax to use the materials.



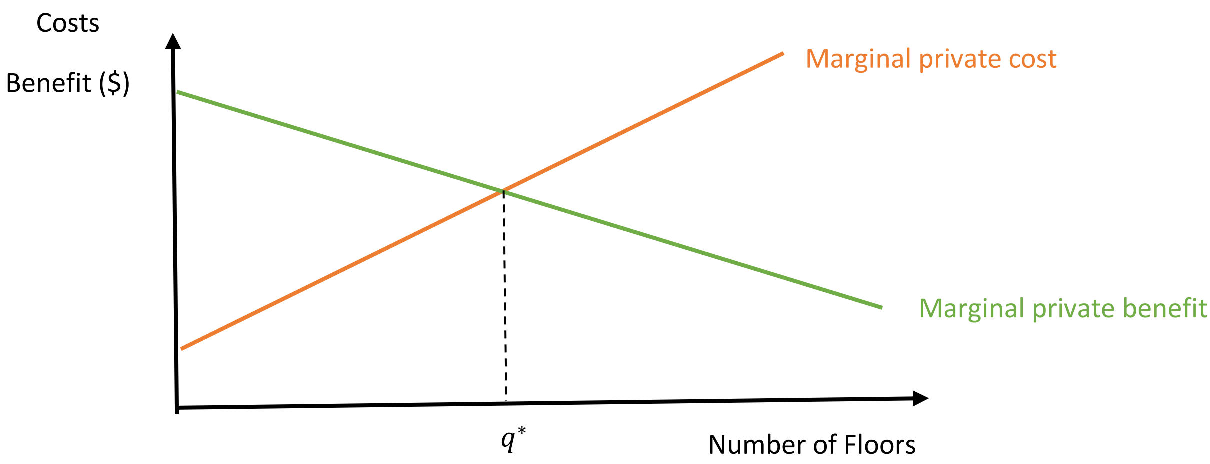
The new produced amount is $\bar{q}$, which is obviously less than the first amount q^*, because now that the marginal private cost function shifted upward, the banana plantation firm will produce less at the new pareto efficient point.

b) In the first case, regulation, the government will cap the total production amount at the pareto efficient quantity. This policy will reduce the cost of pollution for the fishermen

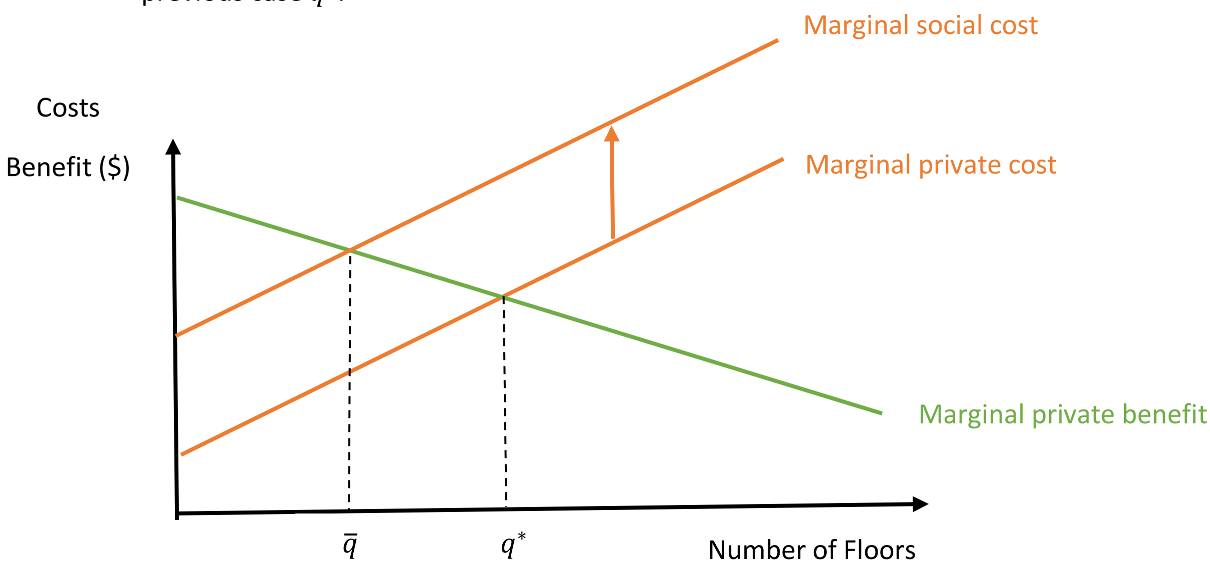
but it will lower the plantations profit and there is no revenue for the government in this case.
In the second case, the government puts tax on each ton of bananas produced. The costs of pollution for the fishermen are reduced by the same amount and it is not different from the previous case. Nevertheless, the farmers revenue will decrease even more because not only they have to reduce the banana production amount, but also they have to pay taxes to the government, so the government will make positive payoff here.
In the third case the farmers pay total compensation to the fishermen, so for the farmers the situation is like the previous case, where the total tax amount was exactly equal to the cost they imposed on the fishermen (equal to the total compensation), but the fishermen will earn more in here because they are the ones who receive the payment from the farmers not the government.

2-

a) marginal private benefits and marginal private cost functions without any externalities. The optimum number of floors for a profit maximizing developer in q^*, where the marginal private cost is equal to the marginal private revenue.



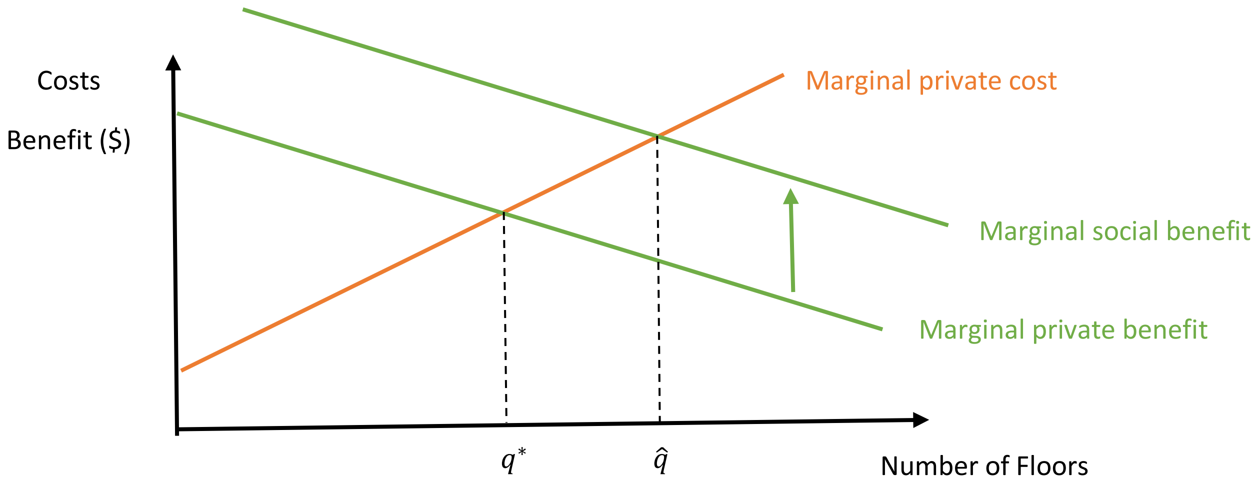
b) Now we have negative externalities, which we can model using the marginal social cost. In this case the optimum number of floors is $\bar{q}$ which is obviously lower than the previous case q^*.



The city planner makes the developer to operate in the pareto efficient point by:

1) Regulation: cap the number of the floors to $\bar{q}$.
2) Tax: Optimal taxation on each floor for the building developer
3) Compensation: Make the developer to pay the compensation to the people who lost something as the result of the construction.

c) We model positive externalities as the upper shift in the marginal private revenue so the new pareto efficient point will be $\hat{q}$, which is obviously higher than q^* , $\bar{q}$.



Taller buildings will also bring some positive externalities such as the higher number of offices, apartments or even restaurants which will definitely increase the payoff of the people who live nearby.

3-

a) **Excludable** because only people with the valid ticket can come in. **Rival** because the room has limited capacity.
b) **Not excludable** because anyone can use it. **Nonrival** because there is no limit or capacity over the number of the users.
c) **Rival** because the capacity of the park is limited. **Non-excludable** because it is free for everyone to use it.
d) **Non-rival** because many people can use it at the same time. **Excludable** because it is only allocated to the people who are in a specific place.
e) **Non-rival** because many people can use it at the same time without any problem. **Excludable** because it is only for the people who pay for it.
f) **Rival** because the capacity of the gym is limited and the coach who train you does not train someone else at the same time. **Excludable** because it is only for the people who pay for the lessons

4-

a) Leaving a bike unlocked when it is insured**. This is a moral hazard problem** because the insurer has hidden actions (leaving the bike with no lock on), which haven't been considered in the contract and it is not observable by the insurance company.
b) Over-fishing at a lake**. It is not a moral hazard problem** but it is an example of having a negative external effect on the market which is also a market failure.
c) Buying goods online. **This is not a moral hazard problem** because you pay for the good at first but you are not aware of the quality of the good you will receive, so this is an adverse selection problem.
d) Investment in a friend's new venture without knowing his efforts. **This is a moral hazard problem** because you are not aware of your friend's actions and it is not possible to include them in the contract because they are not observable (asymmetric information).
e) A car mechanic suggesting expensive repairs**. This is not a moral hazard problem** because it is not about the actions. This is about the characteristics of the car so it is an adverse selection problem.
f) A student play loud music in a dorm. **This is not a moral hazard problem** but it is an example of having a negative external effect on the market.

5-

a) Sellers of good cars will sell with the price higher than 1500$, and the sellers of lemon (useless cars) will sell with price higher than 200$. On the other hand, the buyers will pay 2500$ for good cars and only 300$ for lemons. Since buyers do not know anything about the quality of the cars the propose the average price for each car which is:
$$0.5 * 2500 \ + 0.5 * 300 = 1400$$
Since this is less than 1500, the sellers do not sell their cars and leave the market. In the equilibrium, the sellers of good cars leave and only the lemons will be traded in the market (market failure).

b) Now the buyers have some information about the cars. They know that there are 120 good cars (60%) and 80 lemons (40%). In this case, the expected amount they will pay is:
$$0.6 * 2500 \ + 0.4 * 300 = 1620$$
which is higher than the lower-bound of the sellers (1500$). Consequently, in the equilibrium, the good cars will be sold at a price between 1620 and 1500 dollars. Note that the buyers do not know about the lower bound of the sellers. In other words, the symmetric information is only about the quality of the car, so the final price will be something between the lower bound (1500 $) and the amount the buyers will pay (expected value which is 1620$).
Obviously, the lemons will also be sold with price between 1620$ and 300$.

6-

Farm B has the negative externality of 1000$ on farm A. A can build the fence with the cost of 800$ and B can prevent the externality with the cost of 500$.

In the first part (English common law), firm B will bear the cost of externality. In other words, he faces the marginal social cost function. He will pay 500$ if he prevents the destruction, and 1000$ if he does not. As the result, farm B will prevent the negative externality and will build the fence. Note that it is possible for B to negotiate with A over the price but since the cost of building a fence is higher for A, he will not accept any offer.

In the second case (free grazing), the negative externality that A faces is 1000, which is higher than what he should pay, 800$. The profit maximizing decision for both of the firms would that B build the fence with the cost of 500$ and A will pay B any amount between 500 and 800$.

What happens if the negative externality is 400$, which is less than the costs of prevention by both farms. Obviously, none of the farms have any incentives to prevent the negative externality since it will be cheaper for them to just bear the marginal social costs.